MAYOR OF LONDON

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

Agenda

Meeting: Safety, Sustainability and Human Resources Panel

Date: Wednesday 14 September 2022

Time: 10:00am

Place: Conference Rooms 1 and 2, Ground Floor, Palestra, 197 Blackfriars Road, London, SE1 8NJ

Members

Dr Lynn Sloman MBE (Chair)
Dr Nina Skorupska CBE (Vice-Chair)
Kay Carberry CBE
Bronwen Handyside
Dr Mee Ling Ng OBE
Mark Phillips
Marie Pye

Copies of the papers and any attachments are available on tfl.gov.uk How We Are Governed.

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Further Information

If you have questions, would like further information about the meeting or require special facilities please contact:
James Varley, Secretariat Officer, 020 7983 4613; email: JamesVarley@TfL.gov.ukEmail: JamesVarley@TfL.gov.uk.

For media enquiries please contact the TfL Press Office; telephone: 0343 222 4141; email: PressOffice@tfl.gov.uk

Howard Carter, General Counsel
Tuesday 6 September 2022

Agenda
Safety, Sustainability and Human Resources Panel
Wednesday 14 September 2022

1 Apologies for Absence and Chair's Announcements

2 Declarations of Interests

General Counsel

Members are reminded that any interests in a matter under discussion must be declared at the start of the meeting, or at the commencement of the item of business.

Members must not take part in any discussion or decision on such a matter and, depending on the nature of the interest, may be asked to leave the room during the discussion.

3 Minutes of the Meeting of the Panel held on 29 June 2022 (Pages 1 - 10)

General Counsel

The Panel is asked to approve the minutes of the meeting of the Panel held on 29 June 2022 and authorise the Chair to sign them.

4 Matters Arising and Actions List (Pages 11 - 16)

General Counsel

The Panel is asked to note the updated actions list.

5 Safety, Health and Environment Report (Pages 17 - 90)

Chief Safety, Health and Environment Officer

The Panel is asked to note the report.

6 Safety, Health and Environment Assurance Report (Pages 91 - 98)

Director of Risk and Assurance

The Panel is asked to note the report.

7 TfL Sustainability Report and Corporate Environment Plan Progress Report (Pages 99 - 126)

Chief Safety, Health and Environment Officer

The Panel is asked to note the report.

8 Bus Safety Update (Pages 127 - 248)

Chief Operating Officer

The Panel is asked to note the paper.

9 Human Resources Quarterly Report (Pages 249 - 260)

Chief People Officer

The Panel is asked to note the report.

10 Members' Suggestions for Future Discussion Items (Pages 261 - 266)

General Counsel

The Panel is asked to note the forward plan and is invited to raise any suggestions for future discussion items for the forward plan and for informal briefings.

11 Any Other business the Chair Considers Urgent

The Chair will state the reason for urgency of any item taken.

12 Date of Next Meeting

Wednesday 16 November 2022 at 10.00am.

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Transport for London

Minutes of the Safety, Sustainability and Human Resources Panel

Conference Rooms 1 and 2, Ground Floor, Palestra, 197 Blackfriars Road, London, SE1 8NJ 10.00am, Wednesday 29 June 2022

Members
Dr Lynn Sloman MBE (Chair)
Dr Nina Skorupska CBE (Vice Chair)
Kay Carberry CBE
Bronwen Handyside
Dr Mee Ling Ng OBE
Mark Phillips (via Teams)
Marie Pye

Executive Committee

Howard Carter	General Counsel (via Teams)
Lilli Matson	Chief Safety, Health and Environment Officer
Tricia Wright	Chief People Officer

Staff

Katherine Adams	Business Partner, Procurement (via Teams for Minute 23/06/22)
Kerri Cheek	Senior Bus Safety Development Manager
Louise Cheeseman	Director of Bus Operations
Nick Dent	Director of Customer Operations
Laura Grant	Head of Procurement (via Teams for Minute 23/06/22)
Jonathon Hawkes	HR Strategic Planning Manager (for Minute 25/06/22)
Donna McGuigan	Diversity and Inclusion Lead (for Minute 27/06/22)
Siobhra Murphy	Engagement Manager – Vision Zero (via Teams for Minute 20/06/22)
Stuart Reid	Head of Insights and Direction
Mike Shirbon	Head of Integrated Assurance
Karen Wallbridge	Skills and Employment Lead (via Teams for Minute 26/06/2226)
Hannah White	Senior Safety and Strategy Manager (for Minute 29/06/22)
James Varley	Secretariat Officer

Also in attendance

Jon Emmett	Principal Policy and Programme Officer, Greater London Authority (via Teams)

16/06/22 Apologies for Absence and Chair's Announcements

The Chair welcomed everyone to the meeting. The meeting was also being webcast live to TfL's YouTube channel to ensure the public and press could observe the proceedings and decision making.

The Chair reminded those present that safety was paramount to TfL and encouraged Members to raise any safety issues during discussions on a relevant item or with the appropriate member of the Executive Commmittee after the meeting. Members confirmed there were no other safety matters they wished to raise, other than those to be discussed on the agenda.

Mark Philips was attending via Teams and was able to take part in the discussions but was not counted toward the quorum. Andy Lord, Gareth Powell and Alex Williams were unable to attend and Kerri Cheek, Louise Cheeseman and Nick Dent were attending in their place. Howard Carter was attending via Teams.

17/06/22 Declarations of Interests

Howard Carter introduced the item.

Members' declarations of interests, as published on tfl.gov.uk, were up to date and there were no additional interests to declare that related specifically to items on the agenda.

18/06/22 Minutes of the Meeting of the Panel held on 24 February 2022

The minutes of the meeting of the Panel held on 24 February 2022 were approved as a correct record and signed by the Chair.

19/06/22 Matters Arising and Actions List

Howard Carter introduced the paper, which set out progress against actions agreed at previous meetings of the Panel.

The information provided to Dr Nina Skorupska CBE relating to the removal of the requirements to wear a face covering on the transport network would be shared with Panel Members. **[Action: Secretariat]**

The Panel noted the actions list.

20/06/22 Safety, Health and Environment Report

Lilli Matson, Louise Cheeseman and Nick Dent introduced the report, which provided an overview of safety, health and environmental performance for London Underground, TfL Rail, Surface Transport (including London Overground) and Crossrail for Quarter 4 of 2021/22 (12 December 2021 to 31 March 2022) and notable incidents outside the reporting period.

This week saw the launch of Vision Zero Week and Siobhra Murphy introduced a video created for stakeholders and a wider audience as part of the work taking place. Members reflected on the content, and found it a moving and powerful reminder of the relentless need to address road safety. Significant mobilisation activity was taking place during the week which included a Parliamentary briefing, the Youth Panel, issuing a

communications toolkit, and social media engagement. Stakeholders such as the London boroughs, Metropolitan Police and London Ambulance Service were also involved.
The Office of Rail and Road (ORR) had decided to bring legal proceedings against TfL in respect of the tram overturning at Sandilands in Croydon on 9 November 2016. TfL had worked closely with the ORR and the Rail Accident Investigation Branch (RAIB) to make the network safer. TfL had entered a guilty plea at the Magistrates' Court earlier this month. The next hearing at the Crown Court was scheduled for next week. The Panel would be kept updated.

The incident at Sandilands remained at the heart of safety performance. The recommendations of the RAIB report had been fully implemented and resulted in an increase in performance. TfL would continue to reflect on it and consider what more could be done.

There had been three fatalities involving London's buses since the last meeting which were currently under investigation.

A contractor carrying out a routine maintenance track patrol on the Metropolitan line had been struck by a train. Although the contractor was not hurt, it was a serious incident and the RAIB were investigating. At the same time, track access procedures were being reviewed.

Although the coronavirus pandemic was no longer at the front and centre of activities, it was still a significant factor and was considered in decision making as controls were lifted. Staff would continue to be supported, particularly those with symptoms of long Covid.

It was acknowledged that it was not likely that the target for reductions in the number of people killed or seriously injured on roads would be reached. Progress had been made, with a reduction of 44 per cent against the 2005-09 baseline but the 65 per cent target would be difficult to achieve. The rate of improvement was different across the modes. TfL was doing all it could, but it was a collective effort with other stakeholders. The right measures were in place, though these were at risk in a managed decline scenario.

All new buses since 2019 had been compliant with the Bus Safety Standard. Work to retrofit the standard was taking place on a further 1,200 buses that had come into service prior to 2019 with 959 completed so far. Funding uncertainty had caused a pause in the programme for a further 1,800 buses. A breakdown of whether injuries were caused on or by a bus would be included in the Safety, Health and Environment Report going forward.
[Action: Lilli Matson / Louise Cheeseman]

There was a clear link between fare evasion and workplace violence, with it linked to 40 per cent of incidents. The current cost of living situation was being monitored to understand if and how it might take effect. The approach to fare evasion had been light touch during the pandemic although as restrictions were relaxed, activity was increasing.

The Bus Action Plan had been published in March 2022 and it set out the steps being taken to improve the safety of buses including driver fatigue, health and wellbeing initiatives, building on the success of the Destination Zero programme and implementing a strategic, data-led approach to reducing passenger injuries.

Members commented on the ability to understand and manage driver consistency, particularly in braking and to a lesser extent acceleration. The Advanced Braking system was part of the Bus Safety Standard to be introduced in 2024. Research had taken place, and this would drive forward the system performance levels, although it was noted that systems that had a faster and more powerful reaction could impact on risk to passengers travelling inside the bus. Driver training standards were monitored across operators and individual garages/depots where appropriate and had been found to be consistent. Safety performance rates tended to be related to the distance travelled.

The removal of pandemic related public health restrictions had seen an increase in ridership although a demographic breakdown of customers was not available. It was known that weekend and leisure journeys showed the most significant return to previous levels. It remained to be seen if customers from more vulnerable groups were returning at the same rate as others. TfL was continuing to encourage and normalise the use of face coverings to ensure customers felt safe.

The Health and Safety Executive (HSE) had visited the TfL site at Acton and highlighted the need for a better health risk management system. Systems and processes were in place, however enhanced management was needed. Improvements were implemented and the HSE had confirmed that it was satisfied with the action taken.

Members welcomed the Mayoral and TfL's commitment to purchasing renewable energy. It was noted that it was also important not to lose sight of the need to reduce energy usage wherever possible.

The Panel noted the report.

21/06/22 Safety, Health and Environment Assurance Report

Mike Shirbon introduced the paper, which provided an overview of the effectiveness of the risk controls for Enterprise Risk 1 – Major safety, health or environmental incident or crisis.

At the year-end, 94 per cent of the Audit Plan had been completed. The range of audits had been expanded to include matters such as security. The ability to provide assurance was a result of the ability to analyse data. A new digital assurance system had been procured which would allow front line assurance to be more effectively delivered.

The Panel noted there were a number of overdue actions. A series of protocols existed for assessing whether overdue actions should be extended or whether subsequent changes meant they were no longer appropriate following communication with the action owners. The Panel would receive an update on the approach to the most overdue actions at the next meeting. **[Action: Mike Shirbon]**

The Panel noted the paper.

22/06/22 2021 Road Safety Performance

Lilli Matson and Stuart Reid introduced the paper, which set out road safety data from London in 2021 as well as analysis of the trends and patterns of interest for the Panel.

For the year 2021, 75 people had been killed, 3,501 people seriously injured and 23,071 people slightly injured on London's roads. This had been an improvement on the previous year which was acknowledged to be anomalous due to the public health situation. 2021 had seen reductions in the number of pedestrians and motorcyclists killed or seriously injured but with an increase in the number of cyclists killed or seriously injured. The geographical distribution of incidents had also changed with an increase in the share of people killed or seriously injured while walking in Outer London boroughs, in particular Croydon and Ealing. Members noted that further improvements would be difficult to achieve if funding was not made available.

The increase in deaths and injuries to cyclists was a concern, however the programme remained appropriate and had the flexibility to address the change in geography that was seen in 2021. Incidents on the TfL Road Network were returning to pre-pandemic levels and it was important to recognise that Vision Zero applied across London and not just the central zone.

The use of e-scooters was increasing and Government was considering further legalising their use. In terms of risk, any assessment would need to consider the origins of any modal shift.

The impact of roadworks on safety was taken into consideration. Roadworks activity was managed and advice and guidelines were issued to operators. The Network Management Centre provided surveillance and monitoring activities to assist with coordination.

The Panel noted the paper.

23/06/22 Responsible Procurement

Laura Grant and Katherine Adams introduced the paper, which presented the draft Modern Slavery Statement and provided an update on activities related to responsible procurement.

From March 2024, suppliers would be requested to complete a Modern Slavery Assessment Tool with the expectation that a score of 70 per cent or above was achieved. This was for those suppliers who were not subject to a legal requirement to have their own Modern Slavery Statement in place. TfL would work with suppliers to achieve the score, with the aim of promoting responsible procurement and raising the standards of suppliers rather than it being a barrier to entry for suppliers. The target figure was subject to review to ensure it was appropriate. Confirmation would be provided on whether the responsible procurement programme applied to organisations with a commercial relationship with TfL who were not supplying a good or a service, such as lessees of commercial property. **[Action: Katherine Adams / Laura Grant]**

TfL was working with Electronics Watch on its Low Emission Vehicle programme to promote transparency in the supply chain and improve conditions of workers in the mining and mineral extraction industry.

An update on Responsible Procurement would be provided to the Panel meeting scheduled for 16 November 2022. This would include further detail on environmental and sustainability issues. **[Action: Katherine Adams / Laura Grant]**

The Panel noted the paper.

24/0622 Human Resources Quarterly Report

Tricia Wright introduced the paper, which provided an update on key Human Resources led activities and performance for the period February – June 2022.

The TfL Scorecard set out the measures that would be reported against in future reports. The diversity declaration rate had seen a downward trend and the target of 56 per cent required a reversing of the trend. It was an important indicator as it reflected efforts to make TfL a more inclusive place to work. A communications programme was being put in place and this would be shared with the Panel. **[Action: Tricia Wright]**

In response to a request from Bronwen Handyside, the status in terms of union membership and collective bargaining of staff withing the graduate and apprentice programmes would be confirmed. **[Action: Tricia Wright]**

The gender, ethnicity and disability pay gap reports had been published. The results were mixed, and a more detailed paper was due to be presented at the next meeting to set out work that was taking place to address gaps.

A number of initiatives to help staff had been launched including: provision of guidance for staff and managers to better support colleagues who were trans or non-binary; the TfL Anti-racism charter; the first Domestic Abuse Policy which would strengthen TfL's ability to provide a safe and inclusive work environment for those affected by domestic abuse; and a partnership with two credit unions to provide access to financial services for colleagues at potentially more competitive rates for savings and loans.

On 1 April 2022 the transition to hybrid working was completed, with colleagues coming into the office a minimum of two days per week, and the priority remained to keep people safe. There were benefits to attending a place of work such as the social and collaborative nature of the environment. In addition, using the public transport network to travel to and from work helped staff have empathy with and an understanding of customers.

The Panel noted the paper.

25/06/22 Attraction and Retention of Our Employees

Jonathan Hawkes introduced the paper, which set out the approach to the attraction and retention of employees, the current challenges, the range of initiatives and programmes currently in place and critical skills in the organisation. This item was considered in conjunction with the paper on Enterprise Risk 2 – Attraction, Retention and Wellbeing of Our Employees as there was a significant amount of overlap.

TfL was a people led organisation and the pursuit of its vision and purpose could only be achieved through its people.

Attraction and retention of staff and skills was a long-term challenge. The employment market was increasingly competitive and employees were making different choices about their career direction. The traditional employee offer was becoming less competitive, particularly in the areas of information technology and engineering, making it harder to attract people.

Skills retention was also important. A turnover of staff was normal and skills and knowledge needed to be retained through succession planning.

It was noted that roles in information technology and engineering were the most immediate to face the challenges posed by the strong employment market.

An emerging rewards strategy was being developed which would look beyond salaries but also career paths and address elements of the current package which may be less attractive to some people. The overall offer, beyond just salary, included career development, upskilling and reskilling, and the benefit of having worked at TfL for a period, which could draw people towards TfL. It was difficult to analyse and understand why people may not apply to TfL or not accept a job.

Attraction and retention pressures in pay band one roles had not been as acute as other pay bands, however all the initiatives would also be applied to those roles.

Analysis of leavers had shown that there was some disproportionality. Women, LGBT+ and staff with disabilities groups were leaving at a faster rate than being employed. This correlated with the Viewpoint staff survey scores. Data would be shared with the Panel.
[Action: Tricia Wright]

The Panel noted the paper.

26/06/22 Everyone's Future Counts

Karen Wallbridge introduced the paper, which provided an update on the employability programmes, which sought to create opportunities and mitigate against barriers to employment for Londoners. The scheme generally applied to people who were not TfL staff and the purpose was to make them 'work ready'.

TfL had a key role in London's recovery, not only in providing a clean, safe transport network but also in ensuring everyone could thrive and flourish and not leave anyone behind.

It was known that there were social, economic and health inequalities in London. For example, women were more likely to be unemployed or have their working hours reduced than men, young black people were more likely to be unemployed than their white counterparts, and young people who were eligible for free school meals were more likely to have lower grades at GCSE levels.

The programme benefited participants by providing them with employability skills or educational attainment and giving them a level playing field in the employment market. TfL also benefitted, as it became a better organisation by learning from people who faced barriers and also had a better understanding of diverse groups who made up its customers. Staff who supported the programme also received personal and career development opportunities as a result.

The Panel noted the paper.

27/06/22 Acting on Viewpoint

Donna McGuigan introduced the paper, which provided an update on our activities in response to the findings of the 2021 Viewpoint staff survey, including the work taking place to address the lower engagement and inclusion scores experienced by disabled and LGBT+ colleagues.

Engagement had taken place with the Staff Network Group for Disability and the OUTBound Staff Network Group and action was being taken to respond to the feedback provided.

The Staff Network Group for Disability had raised its members' concerns regarding possible backlash resulting from being perceived as receiving preferential behaviour. Panel Members highlighted the need to tackle this and move to a focus on workplace adjustments rather than reasonable adjustments which would provide a broader range of actions.

Going forward, disaggregated data would become available to allow an understanding of engagement across TfL's business areas. This would be shared with the Panel in due course. **[Action: Tricia Wright]**

The Panel noted the paper.

28/06/22 Enterprise Risk Update – Attraction, Retention and Wellbeing of Our Employees (ER2)

This item was considered in conjunction with the paper on Attraction and Retention of Our Employees, as detailed in Minute 25/06/22 above.

The Panel noted the paper.

29/06/22 Enterprise Risk Update – Failure to prevent Safety, Health or Environment incident / meet commitments (ER1)

Lilli Matson and Hanna White introduced the paper, which set out the acitivites to manage risk relating to the failure to prevent a major safety, health and environment (SHE) incident and/or meet/comply with either applicable SHE regulations, SHE commitments or tagets in the Mayor's Transport Strategy (MTS) and/or TfL's own Vision and Values SHE ambitions and roadmap deliverables.

A clearer, more specific interpretation of Enterrpise Risk 1 (ER1) had taken place following feedback from the Panel when the item was presented in 2021. This made the risk more relevant at business unit level through the risk cascade. It also allowed the risk to be better aligned with TfL's Vision and Values and the MTS.

The risk was complex and ongoing. Progress had been made in mitigations and processes. The assessment of 'Requires Improvement' reflected uncertainty over funding, possible further actions by the Office of Rail and Road, climate related incidents and other factors.

A priority list of SHE Risk Topics had been created which were identified as the most likely to result in the risk being realised. It was noted that this did not cover all the risks but those that presented the greatest risk to mitigating the revised definition of ER1.

The prioritisation enabled a more joined up approach and visibility across the business units in TfL.

Climate change risk and its location with the Enterprise Risk system was a subject of significant discussion and ongoing work.

Members commented that funding, and in particular, the managed decline scenario was a common thread in this risk and safety management in general. A paper on risk and prioritisation of safety matters in relation to budgets was on the Forward Plan and would be presented when a clearer picture of funding was available .

Members noted that the risk was currently higher than target and requested the next update to include detail on plans to reduce the risk. **[Action: Lilli Matson]**

30/06/22 Members' Suggestions for Future Discussion Items

Howard Carter introduced the item.

The Chair requested that the Corporate Environment Plan updates scheduled for the 14 September 2022 meeting should include reports from various directorates such as Capital Investment and Operations to inform the Panel on how the Plan was cascaded through TfL.

The Action on Inclusion Report was added to the Forward Plan.

The Panel noted the forward plan.

31/06/22 Any Other Business the Chair Considers Urgent

There was no urgent business.

32/06/22 Date of Next Meeting

The next scheduled meeting of the Panel would be held on Wednesday 14 September 2022 at 10.00am.

33/06/22 Exclusion of the Press and Public

The Panel agreed to exclude the press and public from the meeting, in accordance with paragraph 3 of Schedule 12A to the Local Government Act 1972 (as amended), when it considered the exempt information in relation to the items on: Enterprise Risk Update – Attraction, Retention and Wellbeing of Our Employees (ER2); and Enterprise Risk Update – Failure to prevent Safety, Health or Environment incident / meet commitments (ER1).

The meeting closed at 12.30pm.

Chair: _____

Date: _____

Safety, Sustainability and Human Resources Panel

Date: **14 September 2022**

Item: **Actions List**

This paper will be considered in public

1 Summary

1.1 This paper informs the Panel of progress against actions agreed at previous meetings.

2 Recommendation

2.1 **The Panel is asked to note the Actions List.**

List of appendices:

Appendix 1: Actions List

List of Background Papers:

Minutes of previous meetings of the Panel

Contact Officer: Howard Carter, General Counsel
Email: HowardCarter@tfl.gov.uk

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Appendix 1

Safety, Sustainability and Human Resources Panel Actions List (reported to the meeting on 14 September 2022)

Actions from the meeting held on 29 June 2022

Minute No.	Description	Action By	Target Date	Status/note
19/06/22	**Matters Arising and Action List: Face Coverings** Information relating to the removal of the requirements to wear a face covering on the transport network would be shared with Panel Members.	Secretariat	July 2022	Completed. Information sent on 28 July 2022.
20/06/22	**Safety, Health and Environment (SHE) Report: Injuries on buses** A breakdown of whether injuries were caused on or by a bus would be included in the SHE Report going forward.	Lilli Matson	14 September 2022	Completed. Data included in the SHE Report elsewhere on the agenda.
21/06/22	**Safety, Health and Environment Assurance Report: Overdue actions** The Panel would receive an update on the approach to the most overdue actions at the next meeting.	Mike Shirbon	14 September 2022	Completed. Information contained within the latest report.
23/06/22	**Responsible Procurement: Commercial Relationships** Confirmation would be provided on whether the responsible procurement programme applied to organisations with a commercial relationship with TfL such as lessees of property.	Katherine Adams/ Laura Grant	16 November 2022	Information to be provided in next update to the Panel

Minute No.	Description	Action By	Target Date	Status/note
23/06/22 (2)	**Responsible Procurement: Environment and sustainability** The next update to the Panel would include further detail on environmental and sustainability issues.	Katherine Adams/ Laura Grant	16 November 2022	Information to be provided in next update to the Panel
24/06/22	**Human Resources Quarterly Report: Diversity declarations** A communications programme relating to diversity declarations was being put in place and this would be shared with the Panel.	Tricia Wright	Autumn 2022	Information will be provided when available.
24/06/22 (2)	**Human Resources Quarterly Report: Graduate and Apprentice cohorts** Confirmation would be provided on whether TfL have looked at collective bargaining agreements for the Graduate and Apprentice cohorts.	Tricia Wright	14 September 2022	Completed. Graduates and Apprentices are training and preparatory roles often spanning several disciplines across the TfL Group, rather than substantive employment roles. As such, they are not included as part of collective bargaining.
25/06/22	**Attraction and Retention of Our Employees: Diversity data** The Panel would be provided with diversity data relating to leavers.	Tricia Wright	August 2022	Completed. Information sent on 1 August 2022.
27/06/22	**Acting on Viewpoint: Disaggregated data** Disaggregated data would become available to allow an understanding of engagement across TfL's business areas. This would be shared with the Panel in due course.	Tricia Wright	August 2022	Completed. Information sent on 1 August 2022.

Minute No.	Description	Action By	Target Date	Status/note
29/06/22	**Enterprise Risk 1 Update** Members noted that the risk was currently higher than target and requested the next update to include detail on plans to reduce the risk.	Lilli Matson	16 November 2022	On forward plan.

Actions from previous meetings

Minute No.	Description	Action By	Target Date	Status/note
05/02/22 (1)	**Quarterly SHE Report: Face Masks** Provide the data used to inform the removal of the face covering requirement from the Conditions of Carriage to Dr Nina Skorupska CBE.	Lilli Matson	July 2022	Completed. Information sent on 28 July 2022 (as per 19/06/22 above).
05/02/22 (3)	**Quarterly SHE Report: Safety risk prioritisation** Provide an update on how safety risk is prioritised across the network in the context of decision making and business planning.	Lilli Matson	September 2022	To be addressed in business planning discussions with Members.
05/02/22 (5)	**Quarterly SHE Report: Sustainable Development Framework** Provide an update on the Sustainable Development Framework to the Panel or the Land and Property Committee.	Lilli Matson / Graeme Craig	To be scheduled	An update will be provided to the Land and Property Committee. All Members will be notified.

Minute No.	Description	Action By	Target Date	Status/note
08/02/22 (1)	**Bus Safety Programme: Funding uncertainty** A summary of projects within the programme that were paused due to funding uncertainty would be presented to a future meeting.	Louise Cheeseman	14 September 2022	Information included in Bus Safety Programme Update on this agenda.
08/02/22 (2)	**Bus Safety Programme: Pedal confusion** Circulate the report of Pedal Confusion when available.	Louise Cheeseman	14 September 2022	Report is included in the Bus Safety Programme Update on the agenda for this meeting.

Safety, Sustainability and Human Resources Panel

Date: **14 September 2022**

Item: **Safety, Health and Environment Report**

This paper will be considered in public

1 Summary

1.1 This paper summarises key information and trends reported in the first Quarterly (Q1) Safety, Health and Environment (SHE) report for the 2022/23 financial year.

1.2 Q1 covers the dates 1 April – 25 June 2022. Most data presented covers this date range, except for some road safety and work-related violence data. It is clearly highlighted when data falls outside this period.

2 Recommendation

2.1 The Panel is asked to note the report.

3 Key information presented in the Q1 report

Scorecard

Measure	Unit	Q1 Target	Q1 Actual
People killed or seriously injured in road traffic collisions per million journey stages	Killed or seriously injured per million journey stages	0.33	0.27
People killed or seriously injured in road traffic collisions in or by a London bus (per million surface journey stages)	Killed or seriously injured per million journey stages	0.020	0.019
Customer all injuries per million passenger journeys	All injuries per million journeys	2.58	2.73
Workforce all injuries	Number of workforce injuries	325	335

3.1 The report shows that our safety scorecard measures of rate of people killed or seriously injured on the roads and rate of people killed or seriously injured on or by a London bus have been met for Q1 2022/23.

3.2 We did not achieve our public transport customer safety scorecard measure this quarter. In period 3 (29 May to 25 June 2022) 40 per cent of the total Q1 customer serious injuries occurred, driven principally by a spike in slip, trip, fall customer injuries. However, the recorded rate of 2.73 still represents an improving trend compared to the result of 2.85 in Q1 2021/22.

3.3 It is disappointing that we did not meet our target for workforce all injuries this quarter, however again the recorded results represent an improving trend compared to the 351 in Q1 2021/22. Our target for workforce injuries is 325, in contrast to 438 in Q1 last year which demonstrates our significant progress on this issue.

4 Safety

4.1 When comparing trends between Q1 2022/23 and Q4 2021/22, it is worth noting that Q4 consists of four periods, rather than three (almost four weeks longer than Quarters 1 to 3).

Public Transport

4.2 During Q1, total customer numbers on the public transport were 0.72bn, a decrease of 0.08bn when compared with Q4. Our customer numbers – whilst recovering – still have some way to go to resume to pre-pandemic levels (1.08bn in Q4 2019/20).

4.3 Across our public transport network, tragically, one customer died on London Underground from a fatal head injury that they sustained when they fell down some stairs. Sadly, 43 customers were seriously injured in Q1, which is 11 less than Q4. Since the pandemic began, the number of customers killed or seriously injured has increased as customers returned to our network, however injury rates have declined.

4.4 The number of customers injured per million passenger journeys was 2.73, which is above our target of 2.58 per million journeys but is lower than the customer injury rate in Q1 2021/22. We have seen a reduction in the rate of injuries attributed to customers not holding on to handrails. This has decreased by 33 per cent on buses and 25 per cent on London Underground when compared with Q1 2021/22. Reducing the risk of customer slips, trips and falls remains a key priority. The rate of customer injuries mentioning a slip, trip, or fall has reduced by 19 per cent on London Underground and eight per cent on buses.

Streets

4.5 In Q1 2022/23 we have continued to see a return to pre-pandemic levels of road journeys. This is the second successive quarter which has seen travel patterns and casualties on the roads return to pre-pandemic levels. There were more walking, cycling and motorised journeys when compared with Q1 2020/21 and Q1 2021/22.

4.6 In Q1 2022/23 15 people were killed, which is broadly similar to Q1 2020/21 and 2021/22. While this number represents a tragic level of death on our roads, it is 46 per cent lower than the 28 people who were killed on London’s roads in Q1 2019/20.

4.7 The number of people walking who were killed in Q1 2022/23 (five) is less than a third of the Q1 2019/20 pre-pandemic figure (18). This contrasts with Q4 2021/22, which appeared to suggest a return to pre-pandemic casualty patterns. This could mean that travel patterns remain unsettled in the wake of the pandemic, and we will monitor emerging trends as 2022/23 progresses.

4.8 The number of people seriously injured on London's roads has slightly decreased in Q1 by five per cent when compared with Q1 2021/22 (883 in Q1 2022/23 and 929 in Q1 2021/22) but is marginally higher than Q1 2019/20 before the pandemic when 839 people were seriously injured. The number of people seriously injured on or by a bus or coach (33) also increased when compared with Q1 2021/22 (24) and Q1 2019/20 (20). Work is underway to analyse this data and mitigate the trend, but initial analysis suggests more customers are suffering falls on buses, and more people walking were involved in collisions with buses.

Workforce

4.9 In our Capital Delivery teams, this quarter was one of good performance. It is positive that there were zero incidents reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). As a result, the accident frequency rates decreased across all of our Capital teams. The Project and Programme Delivery team have now maintained zero RIDDOR-reportable incidents on their projects for a year.

4.10 Lost time injuries (LTIs) are injuries which cause an employee to be absent for one or more shifts. There were three LTIs reported in our Capital teams during Q1, a decrease of four when compared with Q4 2021/22. All three reported LTIs were minor injuries: two were slips and trips, and one was classified as a misuse of hand tools. The most significant root cause related to issues with task planning. As a result, changes have been made at site levels with operatives being re-briefed and learnings shared across Capital teams.

4.11 Two of the LTIs occurred at the Bank Station Capacity Upgrade project, where the Bank branch of the Northern line was closed from January to May 2022. It is a testament to the teamwork of everyone who worked on this intricate project that no major incidents or injuries occurred during the closure.

4.12 Fare evasion remained the biggest trigger for work-related violence and aggression (WVA) during Q4, resulting in 39 per cent of all WVA incidents. Following the ban on the carrying of electric scooters on TfL's public transport network due to fire risk in December 2021, we have been monitoring the number of WVA incidents involving a customer attempting to bring an e-scooter onto the network. This quarter this has decreased by 44 per cent from 50 incidents in Q4, to 28 in Q1. It is too early to say whether this is as a result of increased customer compliance with the ban, but at the very least our workforce are not being subjected to violence and aggression when reminding customers of the ban.

5 Health

5.1 COVID-19 remained the top cause of short-term absence in the quarter (although this reduced from 59 per cent of short-term absences in Q4 to 30 per cent this quarter) and was the fourth most common cause of long-term absence. Absences

related to mental health and musculoskeletal issues were the most significant causes of long-term absences and remain the focus of our preventative measures, alongside measures to mitigate the risk of Covid-19 to our people and customers.

5.2 Our Occupational Health team is constantly working hard to prevent ill health but also to support those who become unwell, to return to work. Some events hosted this quarter included sessions on Breathing and Meditation, as well as Diabetes Week 13-19 June 2022.

6 Environment

6.1 Our electricity consumption was three per cent higher this quarter when compared with Q1 2021/22. This has largely been driven by increased reported energy consumption on London Overground, resulting from changes by Network Rail to estimates for traction energy consumption. This is under review.

6.2 Carbon dioxide emissions from operations, excluding buses, track closely to electricity consumption. Emissions decreased by approximately five per cent this quarter compared to the same period in 2021/22, partly due to a reduction in emissions intensity of grid electricity.

6.3 In May 2022, we launched a public consultation on plans to further extend the Ultra Low Emission Zone (ULEZ), to cover almost the whole of the capital from 29 August 2023. On 18 and 19 July 2022 the UK experienced record-breaking temperatures and we strongly advised people not to travel. Tube and bus customer numbers vastly reduced compared to the previous week. We are working to understand and build learning from these incidents into our forthcoming pan-TfL Adaptation Plan.

6.4 In Q1 we launched the tender for our first Power Purchase Agreement, which aims to purchase more than 10 per cent of our required electricity from renewable energy sources and new build assets. Our carbon literacy training programme continues to gather pace after having been accredited by the Carbon Literacy Project in June 2022. We are now working to increase the number of trainers and make courses more widely available.

List of appendices to this report

Appendix 1: Q1 Safety, Health and Environment Report

List of Background papers

None

Contact Officer: Lilli Matson, Chief Safety, Health and Environment Officer
Email: LilliMatson@tfl.gov.uk

Appendix 1

Safety, Health and Environment Quarterly report

Quarter 1 2022/23

Contents

Introduction and Executive Summary

This report summarises our performance in Quarter 1 of 2022/23 and identifies strategic trends covering 1 April to 25 June 2022, unless specified.

The report sets out ways in which we have continued to keep our customers and workforce safe as, after the lifting of all restrictions we have transitioned to living with coronavirus. In January 2022, the Government removed the mandate to wear a face covering in public spaces, meaning that they were no longer enforceable on our services. This quarter we changed our customer and staff messaging to encourage people to take appropriate action to keep themselves safe, including using hand sanitiser and wearing a face covering if this helps them to travel and work with confidence. In parallel, we have continued to make progress towards our longer-term safety, health and environmental objectives.

During Quarter 1, we saw customer numbers decrease slightly, ending the quarter at 0.72 billion customer journeys, representing an 0.08 billion decrease from the end of Quarter 4 2021/22. However, it is worth remembering that Quarter 4 is a four-period quarter – rather than three – covering 12 December 2021 to 31 March 2022, so these numbers should be treated with caution. We still have some way to go before reaching the pre-pandemic customer journey figures of 1.08 billion (Quarter 4 2019/20). This means many of our key safety, staff and environmental performance indicators remain at different levels than they might have been previously.

We have progressed with the implementation of measures to improve our short- and long-term safety, health and environmental performance. We have continued to perform well on most of our safety metrics. In Quarter 1, we met our targets for injuries to people in road traffic collisions and injuries to people on or in collision with a bus. The data behind these scores is explained in the roads safety section of this report. Conversely, we did not meet our targets for customer injuries and workforce injuries and the reasons behind this are discussed in the public transport safety section of this report.

COVID-19 remained the top cause of short-term staff absence but significantly decreased as a proportion of staff absence from 59 per cent in Quarter 4 to 30 per cent in Quarter 1. Mental health and musculoskeletal-related health remained the top two causes of long-term absence, which is in line with the national average. Following the Government's decision to phase out free lateral flow tests, we have continued to make free lateral flow tests available to our staff.

On 4 April 2022, we responded to the Department for Environment, Food & Rural Affairs consultation on Biodiversity Net Gain regulations and implementation. On 26 May 2022, our Head of Corporate Environment attended the London Assembly Environment Committee to discuss London's wild spaces. On 24 June 2022, we

responded to the London Rewilding Taskforce's Call for Evidence, to feed into a Local Nature Recovery Strategy for London.

In Quarter 1, the Government confirmed continued short-term rollovers in funding support whilst discussions continue about a longer-term arrangement [n.b on 30 August 2022 a funding arrangement to 31 March 2024 was agreed with the Government]. Government funding is critical to guarantee the operation and maintenance of essential and safe transport services in London, allowing us to continue our full and vital contribution to the Mayor's economic recovery programme for London as well as national priorities on decarbonisation, air quality and making transport better for users.

About this report

This report explores and highlights the performance, trends and measures we are implementing to improve safety, health and environment performance.

Throughout this report, our 'customers' refers to direct users of our services, and our 'workforce' includes our directly employed staff as well as people working in our supply chain. For both groups, we use data collected directly from our operational businesses. Some assault data comes from both our own internal reporting systems and the police.

When referring to people killed or seriously injured, the following causes of injury are excluded: an injury which results from an incident arising from a pre-existing medical condition; intentional self-harm resulting in a physical injury or death; criminal activities perpetrated by customers or members of the public on other customers or members of the public.

Unless otherwise stated, 'streets' refers to all of London's roads, including those managed by London's boroughs which make up the majority (95 per cent) of London's roads. Where we report safety data for streets, we use data collected by the Metropolitan Police Service (MPS) and the City of London Police (CoLP), in line with Government requirements. All road safety data is provisional and subject to review and assurance, with the final data published annually in line with Department for Transport (DfT) requirements.

Reporting period

Most data covers the quarter from 1 April to 25 June 2022, except for some work-related violence and aggression data which is reported six months in arrears. Some data is provisional and is subject to change.

Mayor's Transport Strategy and Scorecard

Our role is to enable London to move safely and sustainably, in line with the goals of the Mayor's Transport Strategy (MTS). This includes increasing the attractiveness of public transport and making cycling and walking safer, easier and more convenient. We work with many partners, including London borough councils, businesses, the police, local communities and consumer organisations to achieve the MTS objectives.

Scorecard

Figure 1: Quarter 1 2022/23 Scorecard

Measure	Unit	Q1 Target	Q1 Actual
People killed or seriously injured in road traffic collisions per million journey stages	Killed or seriously injured per million journey stages	0.33	0.27
People killed or seriously injured in road traffic collisions in or by a London bus (per million surface journey stages)	Killed or seriously injured per million journey stages	0.020	0.019
Customer all injuries per million passenger journeys	All injuries per million journeys	2.58	2.73
Workforce all injuries	Number of workforce injuries	325	335

The table sets out the relevant scorecard metrics and accompanying targets and actual performance. Below are brief explanations of the performance of each measure. More detailed explanations, with accompanying graphs are set out in the relevant sections of this report.

Road safety measure

As part of our continuing trajectory towards Vision Zero; eliminating death and serious injury on the roads by 2041, our aim in Quarter 1 2022/23 was to reduce the number to fewer than 0.33 people killed or seriously injured on the roads per million journeys. For Quarter 1, there were 0.27 people killed or seriously injured on the roads per million journeys.

Bus safety measure

Our ambition is for no one to be killed in, or by, a London bus by 2030. In Quarter 1, our aim was to have no greater than 0.020 deaths or serious injuries per million journey stages. During Quarter 1 there were 0.019 deaths or serious injuries per million surface journey stages.

Public transport safety measure

Working towards our Vision Zero ambition to eliminate deaths and injuries to customers travelling on our public transport network by 2041, our aim in Quarter 1 2022/23 was to have fewer than 2.58 injuries to our customers per million journeys. This target represents a five per cent performance improvement compared to last financial year.

During Quarter 1 there was a rate of 2.73 injuries per million journeys, unfortunately missing this target. Periods 1 and 2 (1 April to 28 May 2022) were within target, however we saw a spike in our customer injury rate during Period 3 (29 May to 25 June 2022). Across the quarter, our customer injury rate is lower than in Quarter 1 of the previous financial year, 2021/22. This is discussed in more detail in the public transport safety performance section later on in this report.

Workforce safety measure

Working towards our Vision Zero ambition to eliminate deaths and injuries to our workforce, in Quarter 1 our aim was to have fewer than 325 workforce injuries. During Quarter 1 there were 335 injuries sustained by our workforce. This total reflects a return to pre-pandemic levels of some workforce injury causes, such as assaults.

This is a reminder we must strive for continuous improvement towards Zero Harm when it comes to the safety of our workforce.

Safety

This section summarises our safety performance across London's roads, public transport, capital delivery activities and work-related violence. It provides an overview of key trends for the year and the areas we are targeting for improvement.

Violence Against Women and Girls

We continue to make good progress with our programme of activities to end violence against women and girls, while also looking at what more we can do. On 15 June 2022, the Mayor published his strategy for tackling violence against women and girls. We are proud to have been involved in its development and will work with the Mayor's Office for Policing and Crime and other partners to deliver on it. Additionally, on 4 July 2022, the British Transport Police (BTP) released the first edition of their new mobile reporting app, 'Railway Guardian', making it easier for customers to report crime and access support. It also provides customers with information on what to do if they see sexual harassment on trains or at stations. We have collaborated with them on the design and continue to work closely on integrating this platform into other apps and tools.

The delivery of our 'zero tolerance to sexual harassment' training to frontline customer-facing transport staff continues. Our 500 enforcement officers have been trained, and training programmes have launched for staff that work in our bus and Tube stations. This training is supported by a comprehensive internal communications plan to raise awareness and provide guidance to staff. Sexual harassment will also be covered in the new diversity and inclusion training being rolled out to all of our bus drivers starting later this year.

We continue to run our communications campaign across our networks that reinforces our zero tolerance of sexual harassment. The primary aim of the campaign is to send a strong message to offenders that sexual harassment behaviours are wrong, harmful and not tolerated on our network. We want to encourage those who experience any form of sexual harassment on our rail network to report it and to reassure that those reports will be believed and handled sensitively, and to that end, we have seen an increase of 74 per cent in the reporting of sexual harassment behaviours. There were 1,363 reports of sexual harassment made between October 2021, when the campaign launched, and the end of April 2022. This is up from 575 reported offences in the same period the year before.

Government launches the Road Safety Investigation Branch

In June 2022 the Government announced that it will recruit a specialised team of inspectors to join the country's first ever Road Safety Investigation Branch (RSIB). They will be charged with the responsibility of looking at how and why collisions

happen and to provide insight into how new technologies such as self-driving and electric vehicles can be rolled out on our roads.

The branch will investigate themes in the causes of collisions, as well as specific incidents of concern, to learn valuable road safety lessons. It will make independent safety recommendations to organisations, such as government and police forces, to better shape the future of road safety policy and provide better, greener and safer journeys.

The specialised unit will also provide vital insight into safety trends related to new and evolving technologies, which could include self-driving vehicles, e-scooters and electric vehicles, to ensure the country maintains some of the highest road safety standards in the world and exciting new technology is deployed safely.

The Government has not yet announced a timeline for the launch of the RSIB, but we will provide notable updates in future quarterly reports.

Road safety performance

In Quarter 1, we continued to see a trend towards pre-pandemic levels of road use, with journeys reaching the highest levels since the pandemic. This is the second successive quarter which has seen journeys on the roads return to pre-pandemic levels, with more walking, cycling, and motorised journeys compared to the same quarter in 2020/21 and 2021/22. Customer journeys on buses are at the highest levels since the pandemic began but remain approximately 22 per cent lower than pre-pandemic levels.

Fewer people were killed or seriously injured in this quarter (899) compared to last quarter (1050), with a corresponding drop in the risk rate of death or serious injury. The exception is that slightly more people were killed or seriously injured while cycling this quarter (272 people compared to 222 last quarter).

Quarterly performance

Figure 2: Number of people killed on London's roads

Transport Mode	Q1 2019/20	Q1 2020/21	Q1 2021/22	Q1 2022/23
Pedestrian	18	3	8	5
Pedal cycle	0	2	1	3

Powered two wheeler	8	9	4	4
Car	1	2	0	3
Bus or coach	1	0	0	0
Taxi	0	0	0	0
Private hire	0	0	0	0
Goods vehicle	0	0	0	0
Other vehicle	0	0	1	0
Total	**28**	**16**	**14**	**15**

**Quarter 1 2022/23 figures are provisional and subject to change.*

Due to the large changes in the number of people using the road network over the last few years of the pandemic, it is useful to compare Quarter 1 2022/23 to Quarter 1 in 2019/20. A total of 15 people were killed on London's roads in Quarter 1 2022/23, which is broadly similar to the same quarter in 2020/21 and 2021/22. However, the number of people killed in this quarter is significantly less than pre-pandemic (Quarter 1 2019/20).

Notably, the number of people walking who were killed in Quarter 1 2022/23 was less than a third of the 2019/20 pre-pandemic figure, and approximately half for powered two wheelers. This is in contrast with Quarter 4 2021/22, which appeared to suggest a return to pre-pandemic casualty trends. Taken together, this suggests that travel patterns may remain unsettled in the wake of the pandemic, and we will closely scrutinise this data as emerging trends become clearer.

Figure 3: Number of people seriously injured on London's roads

Transport Mode	Q1 2019/20	Q1 2020/21	Q1 2021/22	Q1 2022/23
Pedestrian	267	90	207	231
Pedal cycle	192	169	299	269
Powered two wheeler	227	139	248	210

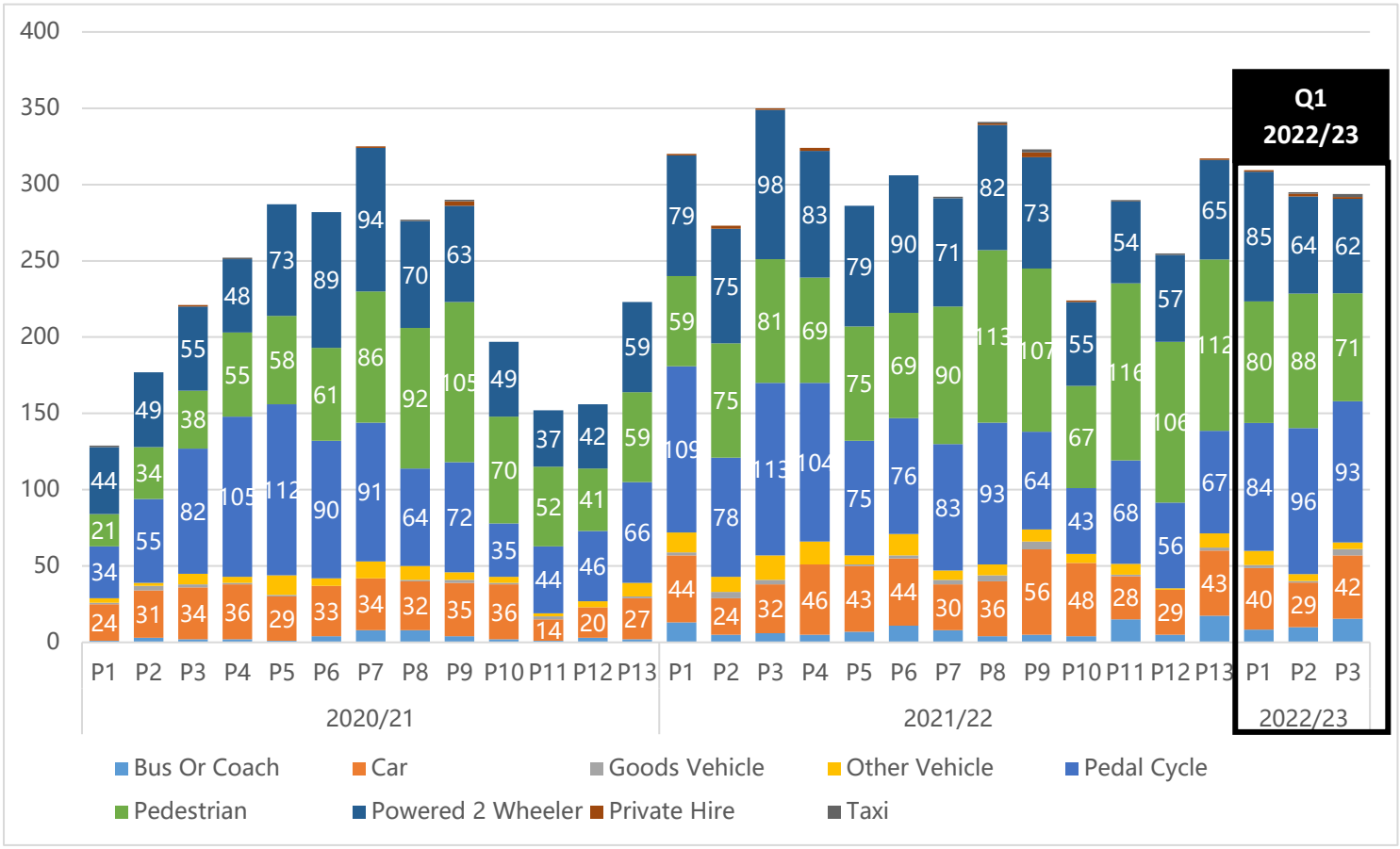
Car	109	87	100	108
Bus or coach	20	6	24	33
Taxi	7	1	0	3
Private hire	3	1	4	4
Goods vehicle	12	6	9	7
Other vehicle	2	12	38	18
Total	**839**	**511**	**929**	**883**

**Quarter 1 2022/23 figures are provisional and subject to change.*

The number of people seriously injured has slightly decreased by five per cent compared to the same period last year (883 serious injuries compared to 929 in Quarter 1 2021/22) but is a little higher than the equivalent period in 2019/20 (pre-pandemic). Against this trend, serious pedal cycle injuries remained higher in Quarter 1 2022/23 than the pre-pandemic figure although they fell slightly compared to the same quarter last year (299 and 269 serious injuries respectively). This may be due to changes in where and when people are cycling since the pandemic, and we are working to better understand how shifting travel patterns are shaping this trend.

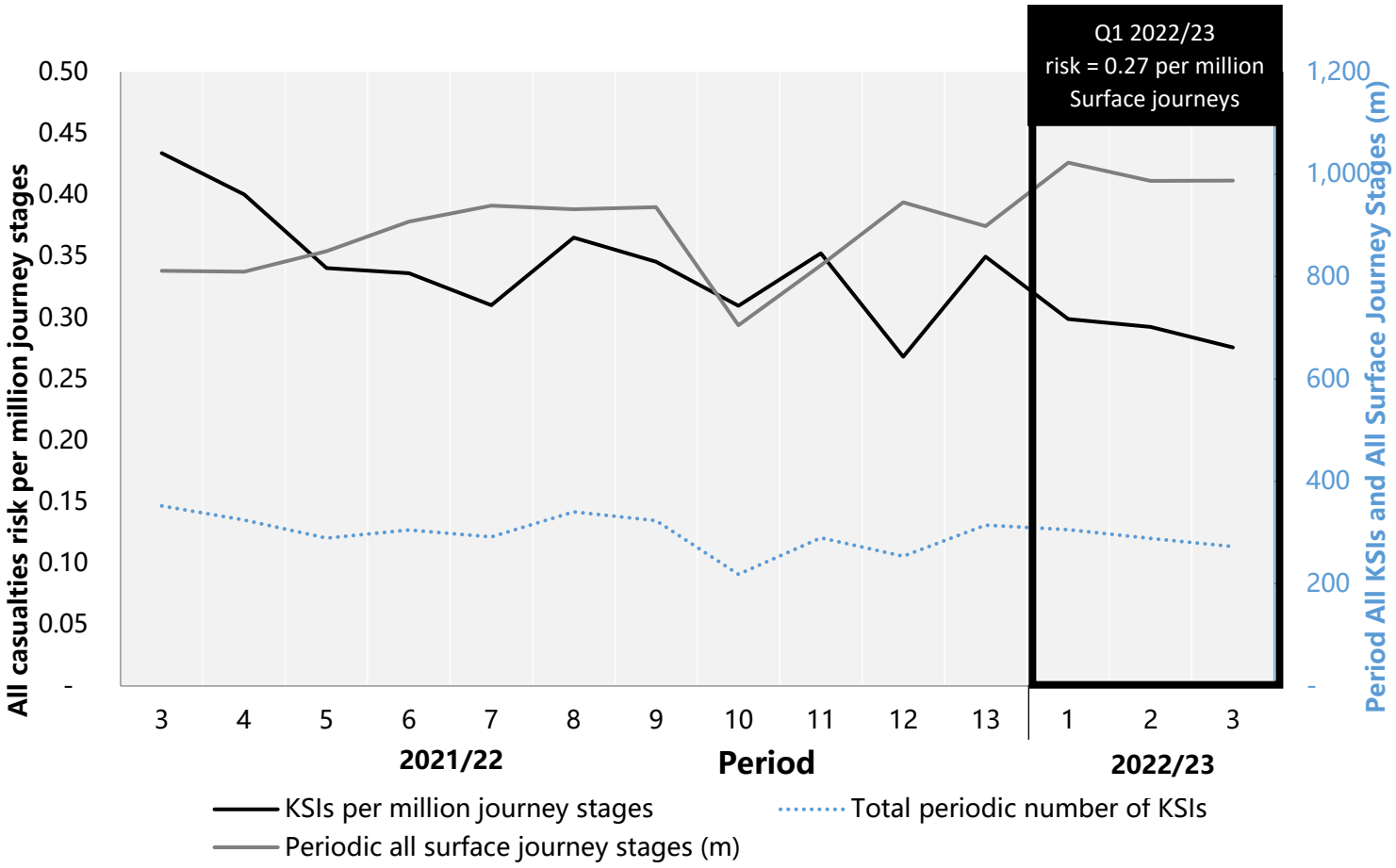
The number of people seriously injured on or by a bus or coach also increased in Quarter 1 2022/23 compared to the same quarter last year and pre-pandemic. The road traffic collision data collected by the police (STATS19) indicates that more bus occupants were injured, and a greater number of people outside the bus were injured in collisions with buses, than during the same quarter last year and the equivalent quarter pre-pandemic. Work is underway to understand and mitigate this trend, but initial analysis suggests more customers are suffering falls on the bus, and more people walking were involved in collisions with buses.

People killed or seriously injured on London's roads (by mode travelled)



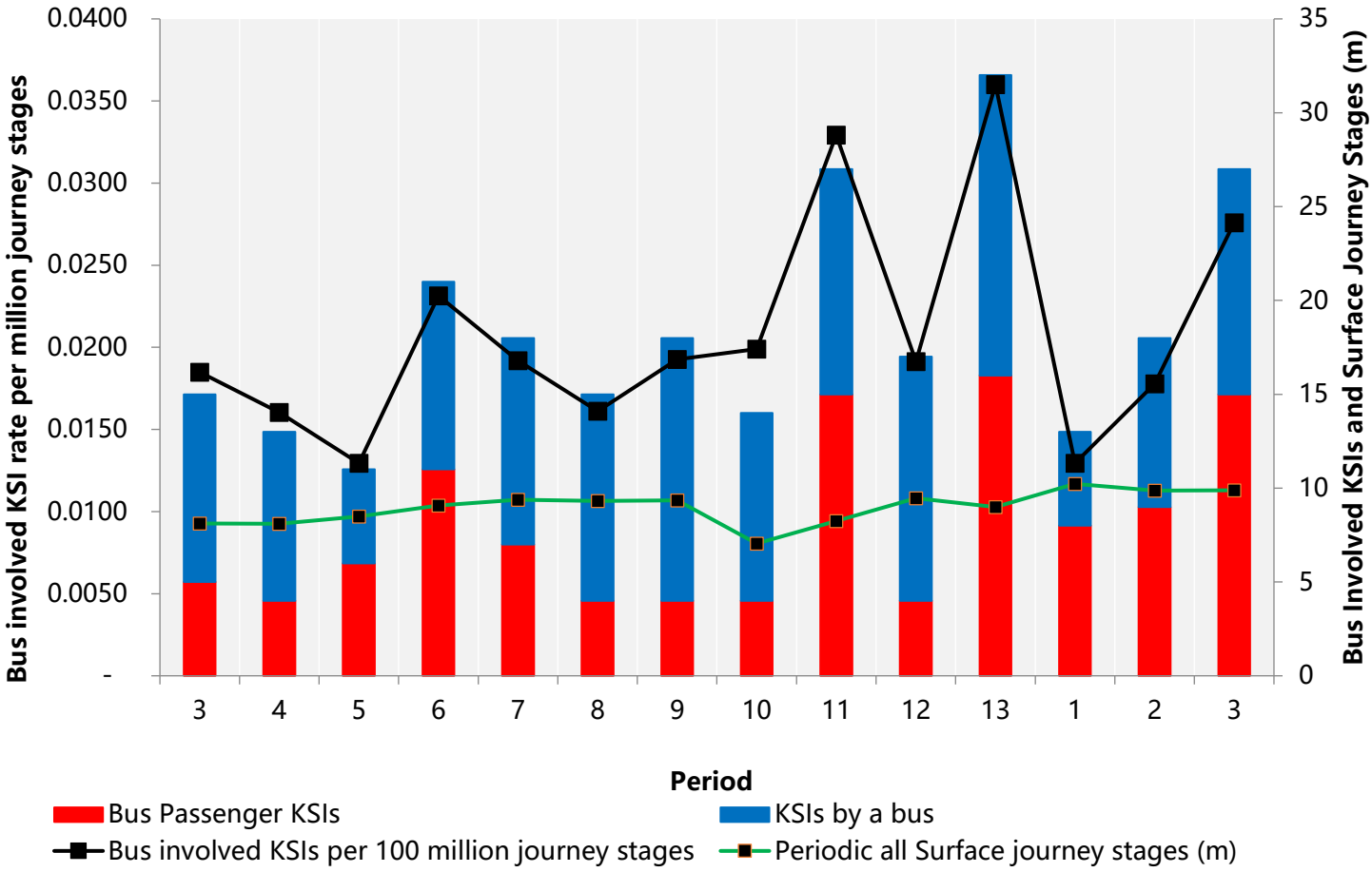
In Quarter 1 2022/23, 899 people were killed or seriously injured on London's roads. People walking, cycling and motorcycling continued to account for 81 per cent of those killed or seriously injured. Since the pandemic, and a return of motorised traffic, the longer-term trend appears to be roughly 300 people killed or seriously injured each period, which is similar to the 2017-19 average, albeit with changes in the composition of who is being injured as mentioned previously. This highlights the challenges London faces in making continual progress towards its Vision Zero goal.

Scorecard measure: People killed or seriously injured in road traffic collisions (per million journeys)



Working towards our Vision Zero ambition to eliminate death and serious injury on the roads by 2041, our scorecard aim for the quarter was for fewer than 0.33 deaths or serious injuries per million journeys. During Quarter 1, there was 0.27 people killed or seriously injured on the roads per million journeys.

Scorecard measure: Rates of fatal or serious injury experienced by people in collision with buses



Our ambition is that no one is killed or seriously injured on, or by, a London bus by 2030. The risk of a bus being involved in a collision that kills or seriously injures either a bus passenger or someone else on the roads remains extremely low.

In Quarter 1, our aim was to have no greater than 0.020 deaths or serious injuries per million journey stages. Our aim for bus safety is more stretching than the general road safety aim, to reflect our ability to directly influence bus services. In Quarter 1 there were 0.019 deaths or serious injuries per million surface journey stages. Whilst we have met our target this quarter, we are noticing an increase this calendar year in the number of deaths or serious injuries on or by a bus as pandemic recovery continues. We are monitoring this trend and conducting further analysis into whether any specific trends or causes are driving this recent increase.

Road safety updates

Vision Zero action plan progress report

The Vision Zero action plan progress report, published in November 2021, reiterates our focus on actions that contribute to creating a Safe System:

- Safe speeds: lowering speeds to reduce the severity of collisions.
- Safe streets: redesigning streets to reduce conflict between road users – which is integral to our Healthy Streets approach.
- Safe vehicles: allowing only the safest vehicles to use our roads.
- Safe behaviours: engaging and educating people about travelling safely and enforcing road rules.
- Post-collision learning and justice: learning from collisions and better supporting the people who have been involved.

Vision Zero Summit

On 5 July 2022, we hosted the Vision Zero Summit. We brought together TfL colleagues as well as representatives from London Councils, academia, the Greater London Authority (GLA), emergency services, victims of road trauma, road safety charities and organisations.

A moving highlight of the day was hearing from Yair Shahar, a road crash victim whose life had been irrevocably changed on the day that he was knocked off his bicycle by a car driver. He spoke about the far-reaching impact this had on his family's lives, and how he has channelled his experience into campaigning for safer streets. His call to action touched attendees in a way that no one else could, and his story has featured on our staff intranet so that people who weren't present at the event can learn about his experience.

TfL's Chief Safety, Health and Environment Officer, Lilli Matson, opened proceedings and Commissioner, Andy Byford and the Deputy Mayor for Transport, Seb Dance both spoke at the event. Walking and Cycling Commissioner, Will Norman chaired the panel discussion at the end of the session and Chief Operating Officer, Andy Lord, provided closing remarks.

Safe Speeds

Lowering Speed Limits Programme

Lowering the speed of vehicles in London is key to reducing both the likelihood of a collision occurring and the severity of the outcome. This programme is vital to the Mayor's Vision Zero ambition to eradicate fatal and serious injury collisions from London's roads by 2041.

The second phase of the programme is underway, and - as detailed in the Vision Zero action plan progress report - seeks to reduce speeds by 10mph on a further 140km of our roads.

Raised pedestrian crossings will soon be introduced in eight locations to further reduce danger to people walking and increase compliance with the new speed limit, as well as introducing accessibility benefits for mobility impaired customers.

Detailed design work is complete on proposals for a 30mph speed limit in Gants Hill town centre and is in progress for the introduction of a 40mph speed limit on the A4 Bath Road, and 20mph in Putney town centre. Concept design work is complete to introduce a new 20mph speed limit on a further 31km of our roads which - subject to funding - we plan to deliver by the end of 2022. This will see a consistent 20mph speed limit across most roads in Camden, Islington, Hackney, Tower Hamlets and Haringey.

Concept design work has also started to lower the posted speed limit on a further 73km of our roads, which includes the third wave of delivery under Phase Two of the programme.

Safe Streets

Safer Junctions

In April 2017, the Safer Junctions programme highlighted 73 of the most dangerous junctions on our road network. These junctions are defined as those with the highest vulnerable road user collision rates. Work to 43 of these junctions has now been completed.

Design work continues on the remaining 30 junctions, including detailed design of York Road roundabout and Holloway Road/Drayton Park, which are respectively delivering motorcycle and pedestrian safety measures. Detailed design work has started on a new 20mph speed limit through the junction of A205 Upper Richmond Road with Putney Hill/Putney High Street, the first phase of a three-stage approach to improve road danger at this location.

In November 2021, a new pedestrian crossing was introduced over Battersea Bridge, where a person walking was tragically killed at the beginning of 2021. The second phase of this project is planned for public engagement at a future date to be confirmed.

Subject to funding, we propose to engage on 10 further Safer Junctions by 2024.

Safe Vehicles

Direct Vision Standard

TfL's world-first Direct Vision Standard (DVS), which reduces lethal blind spots on lorries is already helping to save lives and prevent life-changing injuries. The scheme requires owners of heavy goods vehicles (HGVs) weighing more than 12 tonnes to apply for a free permit that assigns vehicles a star rating based on how much the driver can see directly through their cab windows to be able to drive safely in London.

Since its introduction, more than 177,067 HGVs have had safe systems fitted, improving the direct vision of the driver from the cab. 277,478 permits have been issued and 90,220 penalty charge notices were issued up to the end of Quarter 1 2022/23.

Collision severity involving HGVs has been falling, indicating that interventions undertaken by both TfL and the freight industry in recent years are already making a positive impact. The overall number of serious injuries involving HGVs has fallen from a total of 48 in 2017 to 17 in 2021. The first year of enforcement of the DVS and the HGV safety permit scheme has also seen a reduction in fatal collisions where vision is cited as a contributing factor. In 2021, there were a total of 11 fatal collisions involving HGVs and people walking or cycling. Of these, six fatal collisions occurred where vision was cited as a contributing factor. This compared to eight in 2020 and nine in 2019 where vision was cited as a contributing factor. Four of the six fatal collisions in 2021 involved zero-star rated vehicles, further demonstrating the enhanced value of direct vision over other safe system equipment. TfL has published the DVS One Year On report which can be accessed here.

Electric Scooters

The e-scooter rental trial[1] has expanded significantly since its launch on 7 June 2021. By 3 July 2022, over 1,280,000 hire trips had been taken, averaging a distance of 2.6km per trip. Operators have reported that there have been no fatalities and 20 serious injuries based on the STATS19 injury classification definition in the same time period. Thousands of users have also benefitted from the operators' discount schemes, which make the rental vehicles more affordable for people on low incomes and with disabilities.

TfL and London Councils have extended the capital's trial of rental e-scooters from 6 June until 20 November 2022, which will allow the trial to build on its successes and

[1] https://tfl.gov.uk/modes/driving/electric-scooter-rental-trial

continue to explore how e-scooters could play a role in a sustainable transport network.

London's trial has expanded significantly since its launch, with 10 boroughs, more than 500 designated parking locations and 4,100 e-scooter vehicles now involved. Updated DfT guidance allows existing trials in the UK to be extended until November 2022, enabling local authorities to continue to test the vehicles in a safe and legal way.

Bus Safety Standard

We continue to roll out the Bus Safety Standard (BSS) to new vehicles joining the fleet. The number of new buses meeting the BSS specification continues to climb with approximately 800 buses now in the fleet. The safety measures include Intelligent Speed Assistance (ISA) technology which limits buses speed to the posted speed limit.

Including buses retrofitted with ISA, approximately 25 per cent of London’s bus fleet now has ISA. Other measures in the BSS include an Acoustic Vehicle Alerting System (AVAS) for quiet-running buses, circa 650 new buses now fitted with AVAS, and circa 700 buses fitted with Camera Monitoring Systems which aims to reduce blind spots.

We are now focusing on supporting delivery of the safety measures required in 2024 and looking at what new safety requirements we will add into the BSS beyond 2024.

Pedal Confusion

Pedal confusion has been defined as the manoeuvre where a driver confuses the acceleration pedal with the brake pedal, resulting in either sudden unintended acceleration or harsh braking.

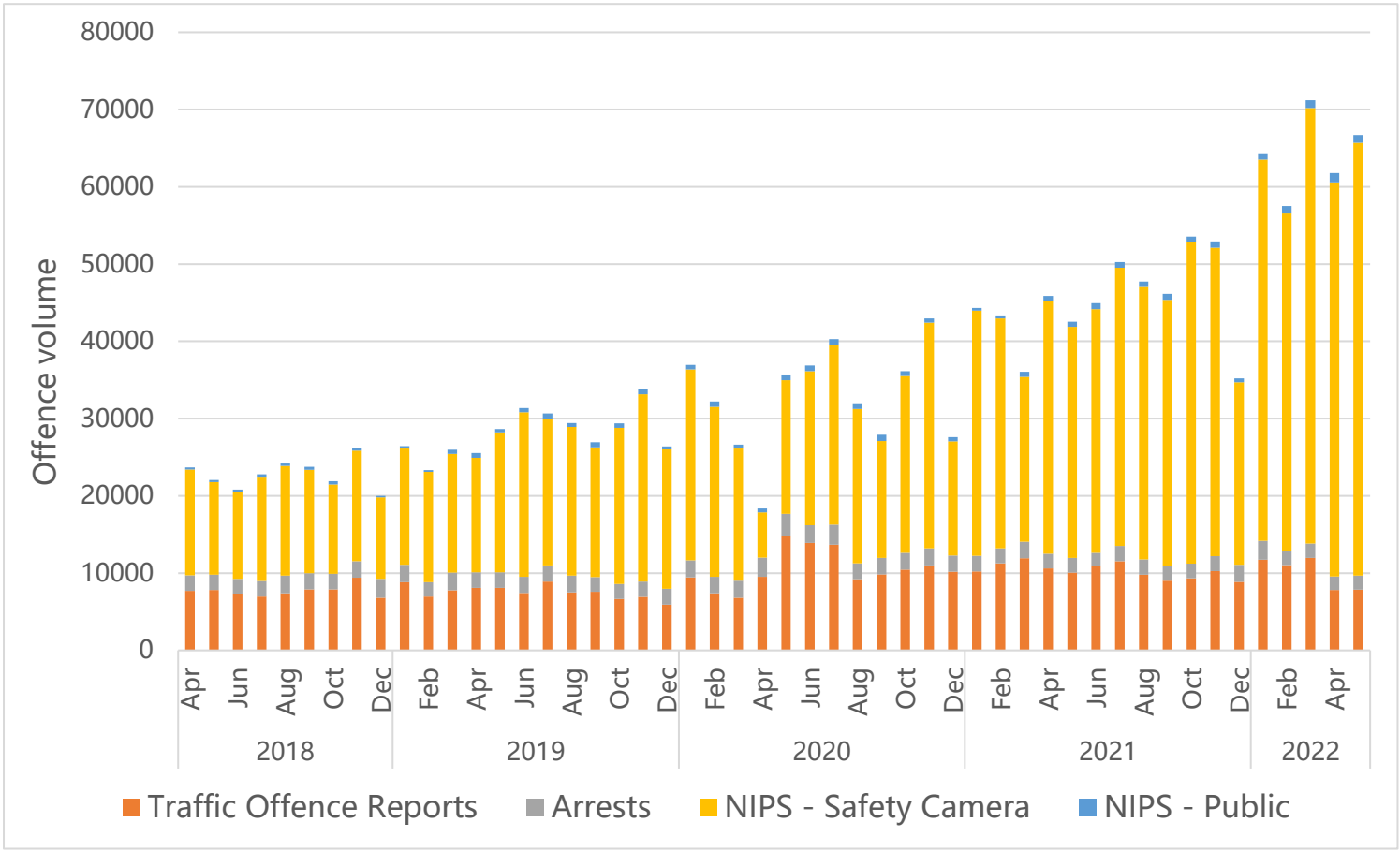
We commissioned the engineering company AECOM to produce a report on pedal confusion and are currently considering the recommendations.

Safe Behaviours

Enforcement

The Metropolitan Police Service (MPS) undertakes significant and wide-ranging activity to reduce road danger and prevent harm to all road users. This includes prevention and intelligence gathering activities, problem-solving to tackle the root causes of problems, community engagement and education initiatives and actively monitoring and targeting high risk vehicles and drivers.

Enforcement of road traffic offences volume 2018-2022



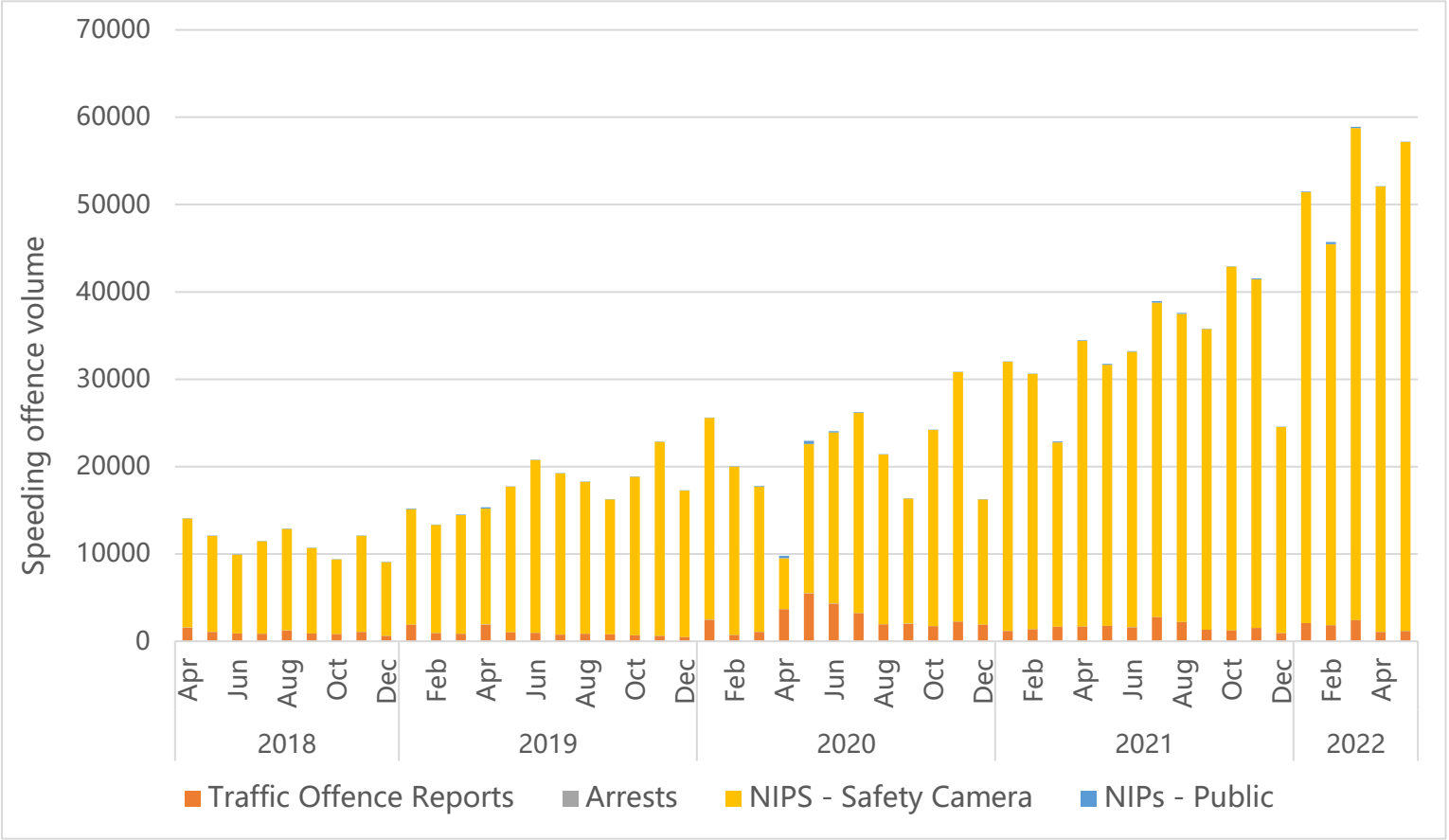
**NIP = Notice of Intended Prosecution*

The MPS dealt with 128,498 road traffic offences through enforcement action in Quarter 1 2022/23 (April – May 2022). This was 45 per cent higher than April – May 2021 (an additional 40,092 offences).

Enforcement action includes Traffic Offence Reports which are issued by police at the roadside, arrests or Notices of Intended Prosecution for offences enforced through safety cameras or evidence provided members of the public (for example, through headcam or dashcam footage).

The MPS prioritises its enforcement on the offences that cause the greatest risk and harm on London's roads. This includes speeding, mobile phone offences, driving under the influence of drugs and alcohol, red light offences, careless or dangerous driving, driving without a licence or in an uninsured vehicle or driving while disqualified. During Quarter 1 2022/23 (April – May 2022), 93 per cent of all road traffic enforcement action taken by the MPS was for priority offences, five per cent higher than 88 per cent during April – May 2021. Speed enforcement accounted for 85 per cent of all traffic enforcement, reflecting the risk and harm this causes.

Speeding offences volume 2018-2022



**NIP = Notice of Intended Prosecution*

In line with our commitments in the Vision Zero action plan progress report, we have been working with the MPS to increase the level of police enforcement to tackle speeding and the harm it causes. This has included a programme of activity to increase the effectiveness of the safety camera operation, working towards having the capacity to enforce up to one million speeding offences by 2024/25.

In Quarter 1 (April – May 2022), the MPS enforced 109,307 speeding offences. This was 65 per cent higher than April – May 2021 (an additional 43,087 offences). This is due to the planned uplift in safety camera enforcement, as part of the shared collaborative programme between the MPS and TfL, to improve the MPS's capability to enforce greater volumes of offences captured by safety cameras. This is not an indication that speeding is worsening but moreover that the MPS's capacity to issue more penalties has improved.

The above traffic enforcement results are provisional and are subject to change as more offences are processed.

In Quarter 4 2021/22, we introduced the new mobile safety camera capability (five lasercam devices) that are operated by Roads Policing Police Community Support

Officers. This capability complements police roadside enforcement activity and the fixed safety camera network, and it will enable us to deal with more offences. The MPS has enforced 13,984 speeding offences through mobile safety cameras since they were introduced at the end of January 2022.

New Enforcement Powers to be used to Improve Cycle Safety

In June 2022, we announced we will begin issuing fines to vehicles that drive within, or cross, the white lines of cycle lanes that are marked by a solid white line and cycle tracks on TfL's Road Network (TLRN). Reducing non-compliance will help improve safety and the confidence of people cycling as part of TfL's Cycling Action Plan and help us work towards our Vision Zero goal of eliminating death and serious injury on the road network by 2041.

The Government has introduced new powers allowing us and London borough councils to fine motorists who infringe on cycle lanes and cycle tracks in the same way that they currently do for bus lanes and yellow box junctions. These powers were introduced in May 2022, at the same time as wider national changes giving local authorities in England outside of London the powers to enforce moving traffic contraventions such as illegal U-turns and stopping in a yellow box junction. Initially, we will use existing CCTV cameras to enforce contraventions in cycle lanes and cycle tracks at key locations across London's road network.

Road danger remains a barrier to people walking and cycling, with more than half of Londoners choosing not to cycle because of safety concerns. The new enforcement powers will help protect designated space for people cycling and make the capital's roads more attractive for Londoners to cycle on, helping to build on the huge increases in cycling seen in the capital since the start of the pandemic.

Powered two-wheeler (P2W) Training Courses

Demand and attendance on our motorcycle safety training courses remains strong. Year-to-date (January to July 2022), 228 riders have completed one-to-one Motorcycle Skills and 148 riders have completed Beyond CBT, the training course aimed specifically at those who ride for work. Since the inception of TfL's P2W courses, 4,300 individuals have been trained across the two courses.

The MPS has delivered 111 CourierSafe workshops to 93 riders year-to-date (January to July 2022). CourierSafe is a one-day workshop specifically designed for gig economy riders to boost biking ability and improve safety on the road while working.

Information on all of TfL's motorcycle training courses can be found here.

Marketing Behaviour Change Campaign - Speed

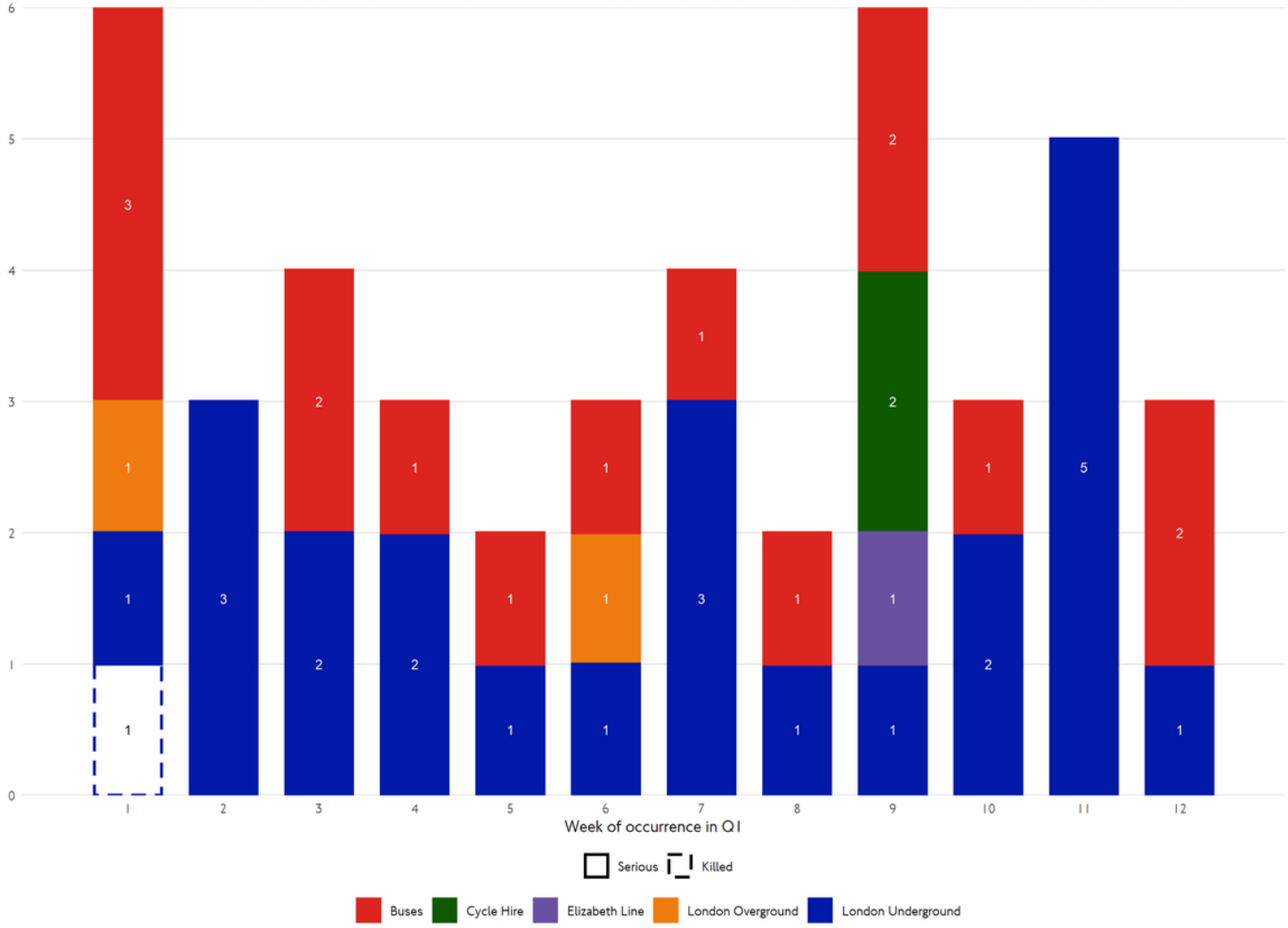
The Mayor of London's Vision Zero objective is to eliminate all deaths and serious injuries from road collisions from London's roads by 2041. We must inspire a change to the way people feel about road danger in London, influence specific behaviours such as speeding. Towards this aim, in spring 2023 we will launch a revised behaviour change campaign tackling speed, targeting drivers. We are currently working with our creative and media agencies to develop a new strategy and will update stakeholders for input soon.

Public transport safety performance

This section does not include injuries sustained by our construction and projects workforce, which are covered in the Capital safety performance section.

Quarterly performance

Customers killed or seriously injured per week in Quarter 1 (by mode)



One customer was tragically killed on our public transport network during Quarter 1. Sadly, 43 customers were also seriously injured.

We have seen customers being seriously injured on a greater variety of modes this quarter compared to Quarter 1 2021/22. This includes two customers seriously injured whilst using Cycle Hire, two customers seriously injured when travelling on London Overground (LO), and one customer seriously injured when travelling on the Elizabeth line. This is in addition to a customer death and serious injuries on LU (55 per cent) and serious injuries on buses (34 per cent).

On LU, there were eight falls on escalators and eight falls on stairs, resulting in serious customer injuries and one fatality in which the customer fell down a set of stairs at Walthamstow Central London Underground station, resulting in a fatal head injury.

Five of the eight falls on escalators and five of the eight falls on stairs involved intoxication as a possible contributory factor. Other factors include carrying luggage, wet weather and the customer losing balance whilst using a walking aid. Other notable serious injuries sustained on LU included an accidental fall onto the track, and a customer's head being crushed as they urinated between two train carriages of a Piccadilly line train which was in motion at the time.

On buses, customers sustained serious injuries in a number of scenarios. The most common factor continued to be other road users' behaviour, requiring the bus driver to take avoiding action which led to serious injuries being sustained by bus passengers. Although this remains a common injury scenario, as discussed in more detail below, it is encouraging to note the downward trend in this type of incident. Two bus customers were also seriously injured whilst using the stairs: one whilst descending and another as the bus moved off. Other circumstances this quarter included a fall from a seat; a fall on the same level as the bus approached the bus stop; and a road traffic collision between a customer and a car after the customer had alighted the bus and attempted to cross the road.

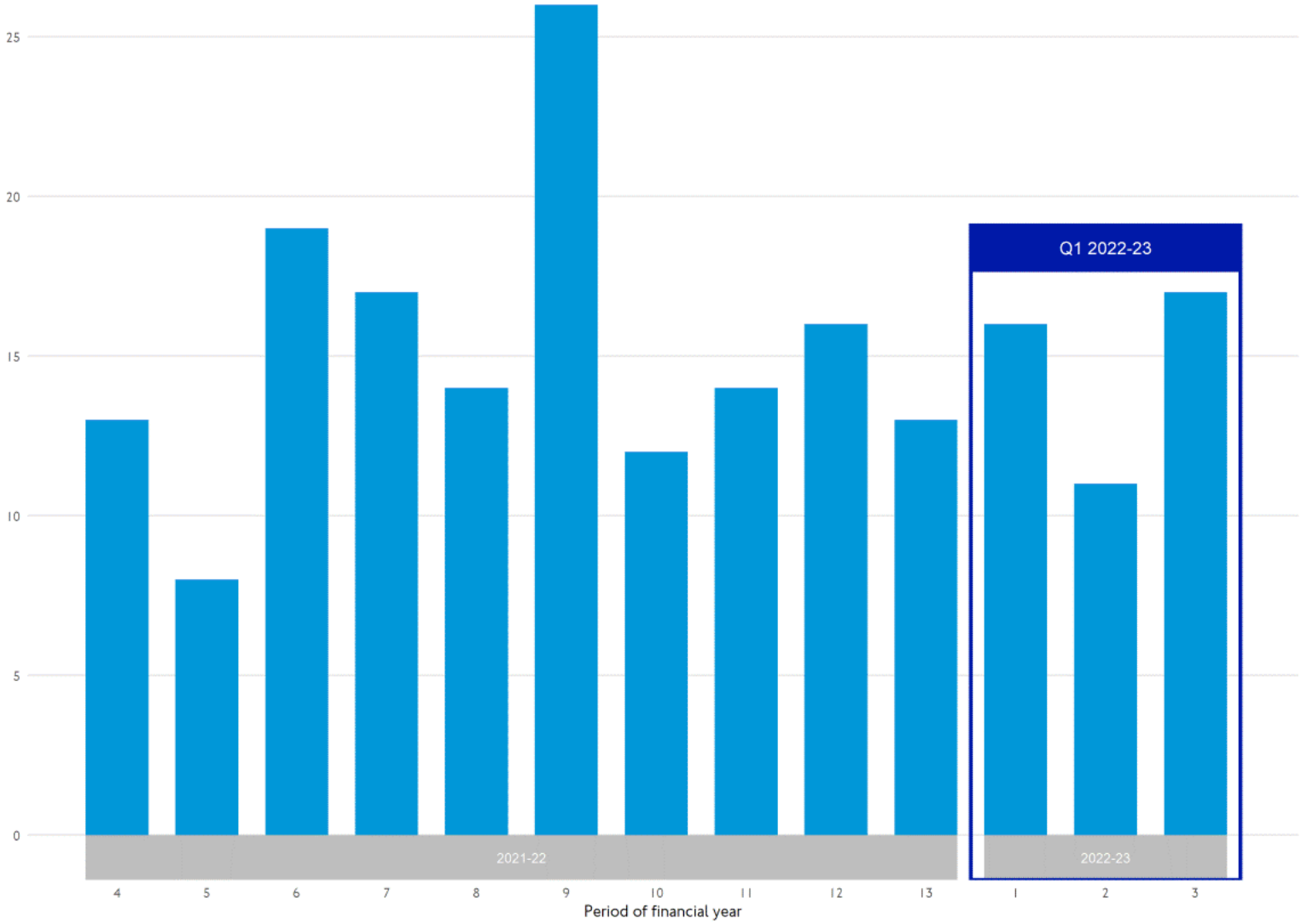
On LO, there were two incidents: one in which a visually impaired customer fell from the train onto the platform, and another where a customer fell on the platform.

On Cycle Hire, one customer was seriously injured in a collision with a car, and in a separate incident a Cycle Hire bike collapsed when the front wheel detached, causing the customer to sustain a serious injury. Serco's usual process was followed whereby the bike was collected and underwent a full service and engineer's check, before being tested again and then released back into hire.

As the central section of the Elizabeth line has recently opened, we are still in the process of establishing a streamlined approach of how data on customer injuries will be collected, due to the stations being operated by various partners such as LU, MTR and Network Rail. Accordingly, information about serious injuries sustained on the Elizabeth line is limited. However, we do know one serious injury occurred at Paddington as a result of a slip, trip or fall, and that the customer was taken to hospital as a result of their injuries.

We continue to strive to improve the safety of our public transport network. We are embarking on a new strategic approach to working in a risk-based way: building a broader understanding of our safety performance; diagnosing and prioritising our top safety concerns; and enabling transport modes and teams to take local action on these concerns. In taking this approach, we have initially prioritised common customer safety concerns including slips, trips and falls; passenger/transport interfaces; and road risk. First and foremost, we will focus on improving what is within our control. However, we acknowledge that customer incidents will always be influenced by human behaviour. Our Customer Experience teams across TfL continue to work hard to identify effective strategies to positively impact customer behaviour on our network.

Customers killed or seriously injured per period this year (total)

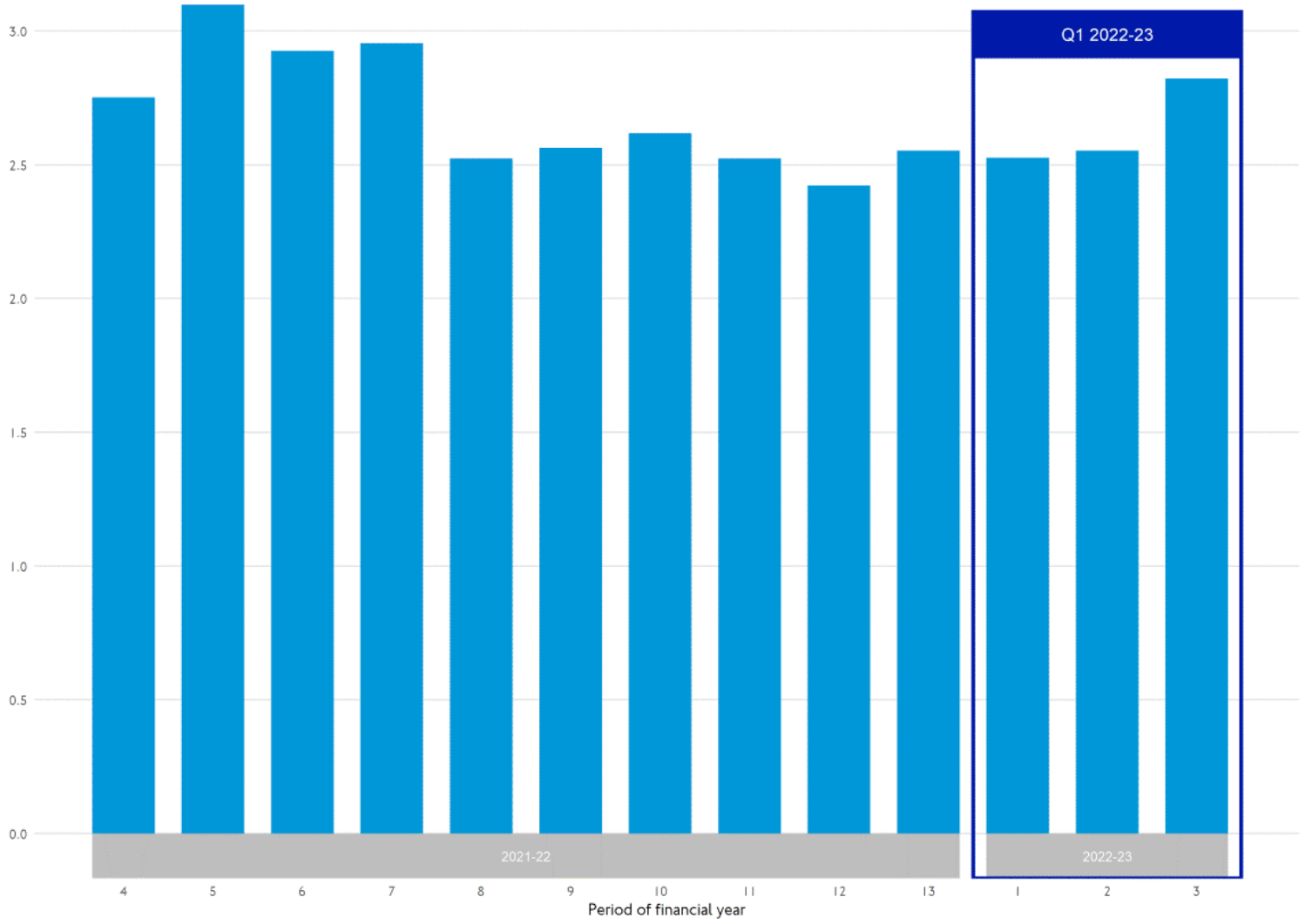


Overall, more customers were killed or seriously injured this quarter than in Quarter 1 of 2021/22.

To put this into context, compared to Quarter 1 of 2021/22, the number of passengers travelling on our public transport network this quarter has increased by 47 per cent. In the same quarter last financial year, many pandemic measures either remained in place or eased during the quarter. This included the opening of non-essential retail and outdoor venues (12 April 2021) the rule of six and opening of indoor venues (17 May 2021); and the lifting of restrictions on funerals and weddings (19 July 2021). The final closed sectors of the economy, including nightclubs, remained shut for the entirety of Quarter 1 2021/22. These measures influenced the number of people we saw travelling on our network, their reasons for travel, and the contribution of different travel behaviours, for example travelling with luggage or whilst in an intoxicated state.

Comparing the same quarters, although passenger numbers have increased by nearly half, the number of customers killed or seriously injured has increased by 13 per cent. This does mean more customers have unfortunately encountered significant harm this financial year, but it is encouraging that the number of customers killed or seriously injured has not increased to the same proportional extent as customer numbers.

Scorecard measure: Customer all injuries rate (per million passenger journeys)



The number of customer injuries per million passenger journeys this quarter is 2.73. Unfortunately, the Quarter 1 customer injury rate is above our target across 2022/23 of 2.58 injuries per million passenger journeys. This target customer injury rate represents a five per cent reduction in our customer injury rate performance last financial year. This rate of improvement, if sustained year-on-year, is equivalent to the elimination of all customer injuries by 2041. While we are not yet meeting our

scorecard target, our customer injury rate this quarter is lower than our customer injury rate in Quarter 1 2021/22, suggesting we are progressing in the right direction.

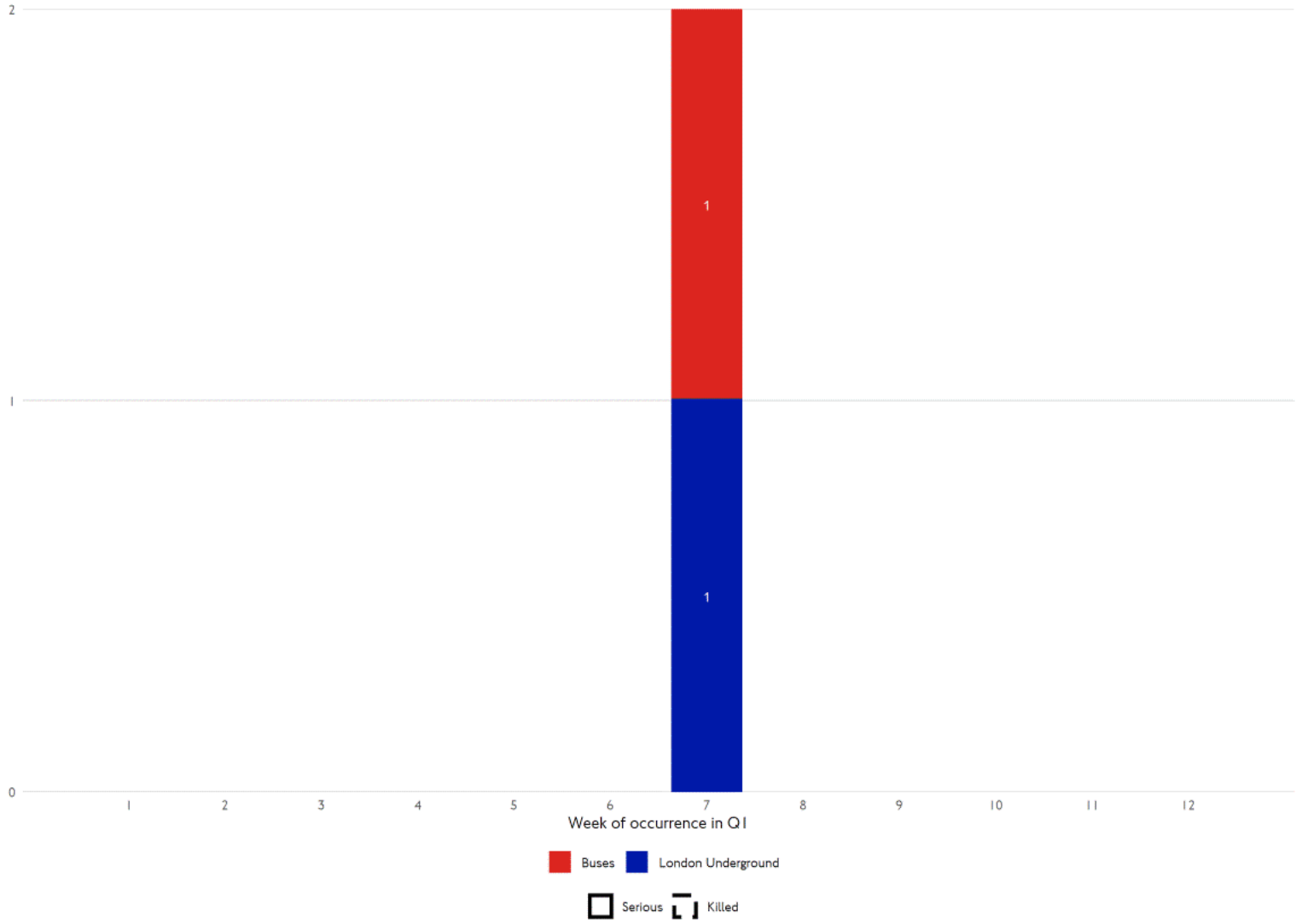
One positive change is a reduction in the rate of injuries mentioning that customers were not holding on to handrails and poles in our stations and on our vehicles. This has decreased by 33 per cent on buses and 25 per cent on LU compared to Quarter 1 2021/22. We observed over the pandemic that customers were not holding on to handrails and poles, due to a fear of catching coronavirus. It is encouraging to see that as the pandemic eases, the number of injuries sustained per million passenger journeys where a customer was not holding on is decreasing.

The risk of customers slipping, tripping, or falling whilst travelling on our network has been a key part of our risk profile for as long as we have been transporting customers. This injury type remains a priority. Encouragingly, this quarter there has been a reduction in the number of customer injuries per million passenger journeys resulting from slips, trips, or falls compared to Quarter 1 2021/22. The rate of customer injuries mentioning a slip, trip, or fall has reduced by 19 per cent on LU and eight per cent on buses.

Often slips, trips and falls occur on specific station or vehicle infrastructure such as stairs and escalators. We are currently seeing different trends in relation to risk on stairs and escalators. On stairs, there is an encouraging trend in reduced risk. Stair-related customer injury risk this quarter is 27 per cent lower on LU and 39 per cent lower on buses when compared to Quarter 1 2021/22. However, on the LU network, we have seen a 12 per cent increase in the rate of customer injuries involving escalators when comparing the same quarters. This may be linked to customers increasingly being laden with luggage as international travel increases. The rate of customer injuries mentioning the customer being encumbered or carrying luggage increased by 53 per cent between this quarter and Quarter 1 2021/22. By contrast, the risk of injuries mentioning intoxication, another common contributor to falls on escalators, has decreased by 17 per cent. This is particularly encouraging given that the hospitality industry has been continuously open this quarter, compared to when restrictions remained in place for some sectors of the hospitality industry, such as nightclubs, in the same quarter last year.

On buses, we are seeing encouraging downward trends in the rate of customer injuries mentioning a collision or sudden braking. The rate of bus customer injuries mentioning a collision has reduced by over 30 per cent compared to Quarter 1 2021/22. Meanwhile, the rate of bus customers injuries mentioning sudden braking events has reduced by 27 per cent.

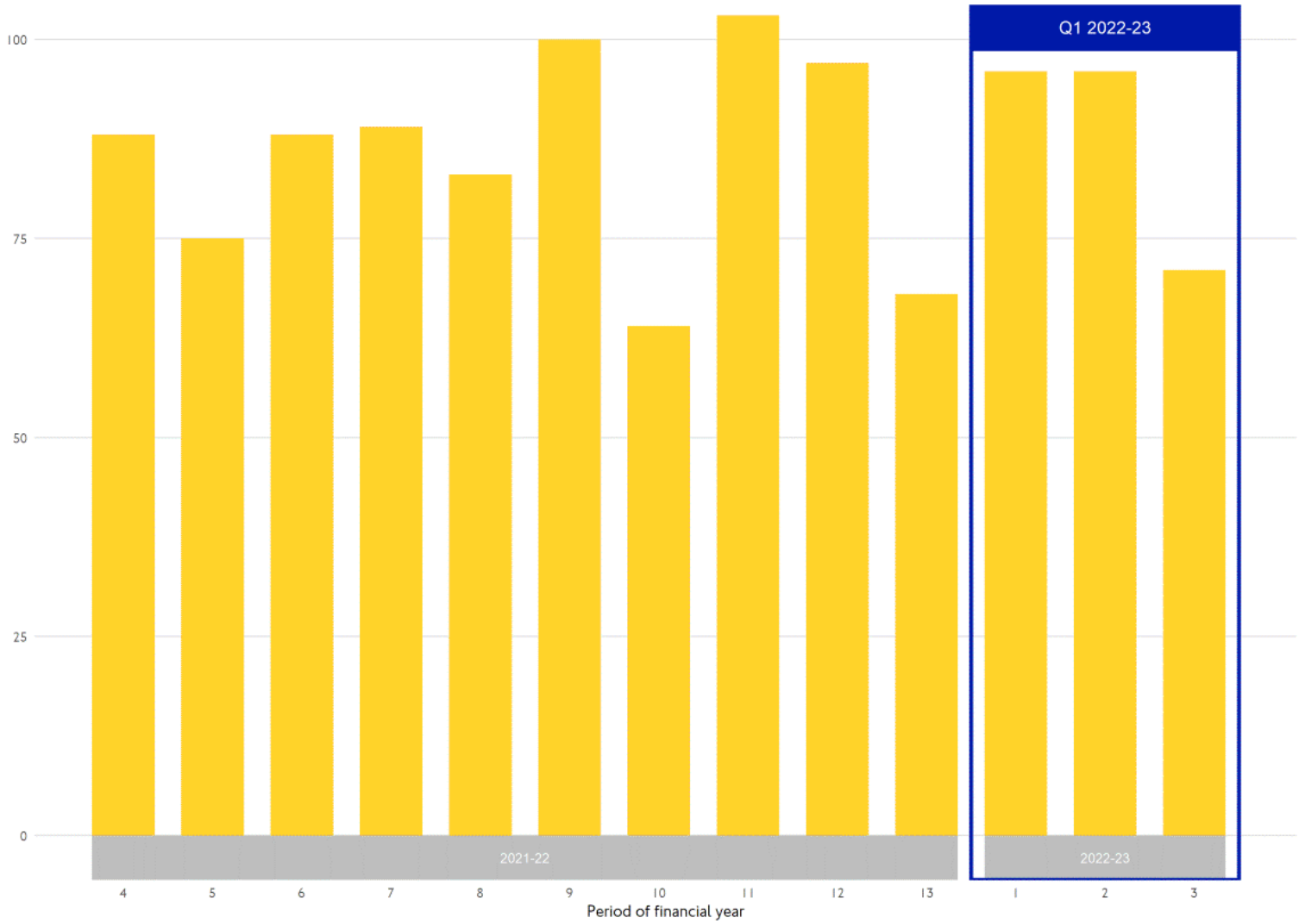
Workforce killed or seriously injured per week in Quarter 1 (by mode)



This section does not include injuries to our construction and projects workforce, which are covered in the Capital safety section below.

No one was killed whilst working on our public transport network in Quarter 1. Unfortunately, two members of our workforce were seriously injured, one on buses and one on LU. This compares to five serious injuries sustained by people working on our public transport network during Quarter 1 2021/22.

Scorecard measure: Workforce injuries



In Quarter 1, 263 members of our public transport workforce were injured (not including colleagues involved in construction and projects). Everyone who works for us should go home safe and healthy every day. Our Vision Zero ambition is to significantly reduce all injuries sustained by our workforce by 2030 and eliminate death and serious injury by 2041.

When we include our Capital-related workforce injuries, we have not met our target scorecard performance this quarter. Our target across this financial year is to reduce workforce injuries by five per cent compared to the previous financial year, 2021/22.

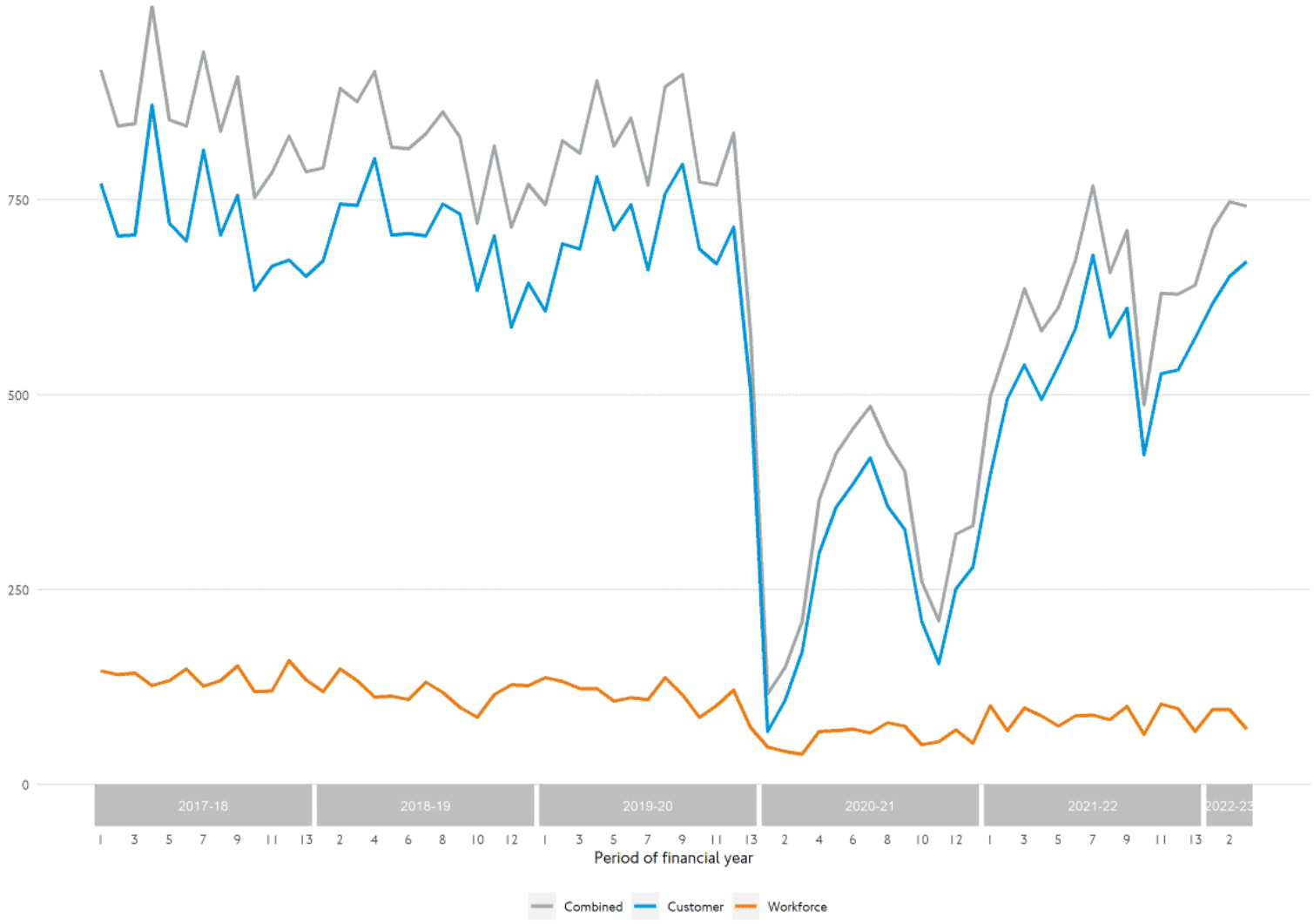
By mode, there have been a greater number of workforce injuries on LO, Dial-a-Ride and the Elizabeth line (formerly TfL Rail) than in Quarter 1 2021/22. Notably fewer people working on or for London buses have been injured this quarter in comparison to Quarter 1 2021/22.

Overall, workforce injuries remain below pre-pandemic levels. However, certain injury causes or types have returned to pre-pandemic levels. For example, assaults appear

to have recovered to pre-pandemic levels for LU, however the introduction of body-worn cameras may be encouraging an increase in reporting rates. Sudden braking, whilst contributing to far fewer workforce injuries per quarter than other causes, also shows signs of a return to pre-pandemic levels. Conversely, workforce injuries relating to slips, trips, or falls; trapped hands; or as a result of distraction remain below pre-pandemic levels.

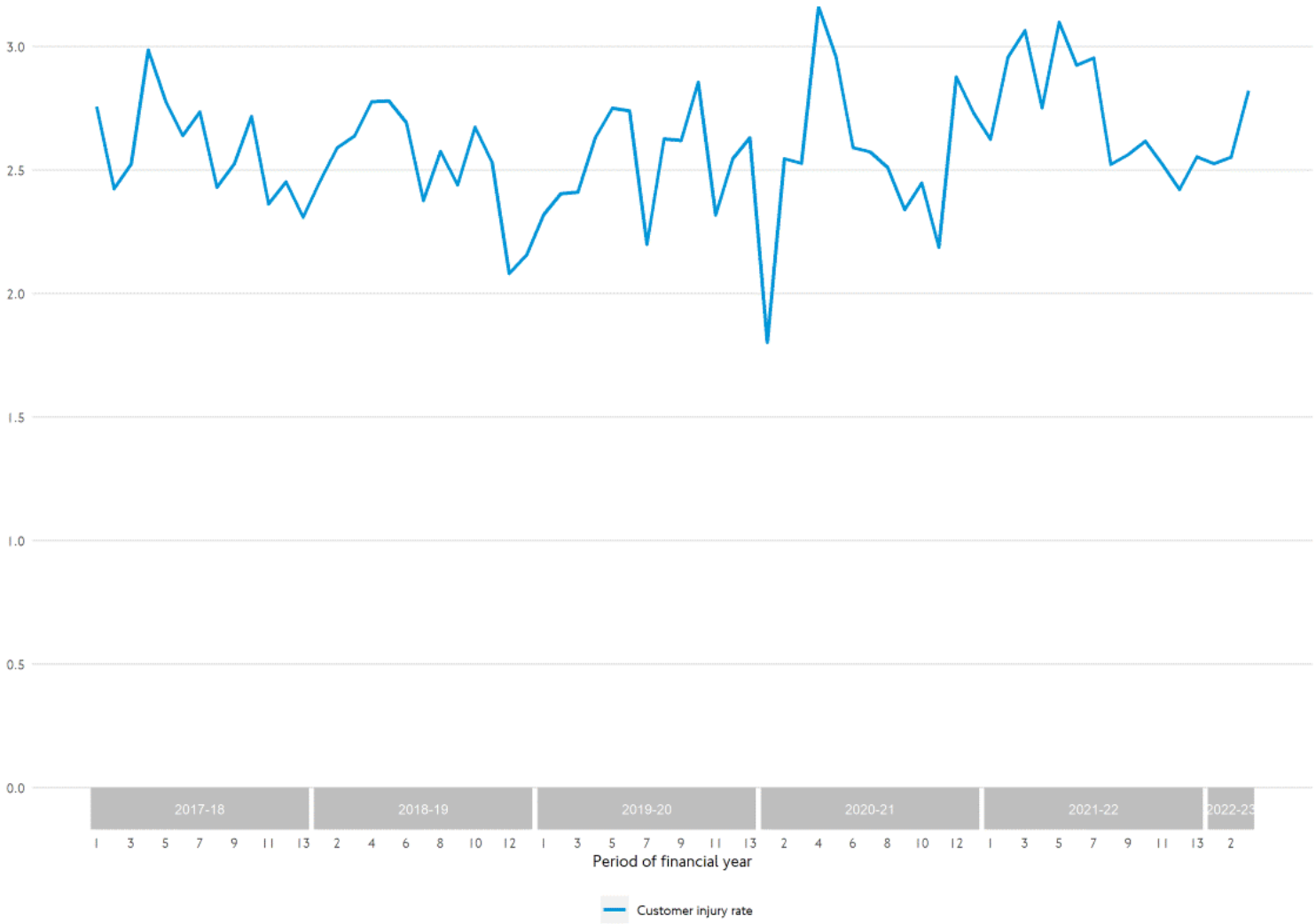
Long term trend

Customer and workforce injury numbers per period since 2017-18 (total)



As the pandemic eases and our passenger numbers grow, we are witnessing increases in both customer and workforce injuries. In the final period of this quarter (29 May to 25 June 2022), the number of customer injuries had increased to a level equivalent to some of the lower periodic customer injury totals pre-pandemic. This is despite passenger numbers not having fully recovered.

Customer injury rates per period since 2017/18 (total)



Despite this recent increase in periodic customer injury totals, over the past nine months we have seen an encouraging trend in lower customer injury rates. These rates have more closely resembled pre-pandemic levels than the heightened customer injury rates experienced during much of the pandemic. However, as noted in the final period of Quarter 1, there has been a spike in this trend. We will continue to monitor this to better understand if it is a sustained trend or part of an expected fluctuation in our customer injury rate.

Public transport safety updates

Elizabeth line opening

On Tuesday 24 May 2022, the Elizabeth line opened with services between Paddington and Abbey Wood. The new railway is the most significant addition to the capital's transport network for a generation.

The Elizabeth line has been designed to keep our customers safe and to make our network more accessible. Platform edge doors have been installed at eight new stations to reduce the risk of a customer falling onto the track. Step-free access is available from street to train across all Elizabeth line stations between Paddington and Woolwich to assist customers who are older, disabled, travelling with children, or encumbered (for example with luggage/other large items) to travel safely by avoiding escalators and stairs.

At all other stations on the Elizabeth line, staff will deploy a manual boarding ramp between the platform and train.

Existing stations have been refurbished, with improvements to safety and security including brighter and more spacious ticket halls and waiting areas, and platform enhancements such as CCTV and help points.

Barking Riverside London Overground station opens

On 18 July 2022, Barking Riverside station opened to customers ahead of schedule, and helping to transform journeys to this rapidly developing area of east London. Around 3,000 homes have been built or are under construction, and this new railway will unlock more than 7,000 further homes as well as leisure facilities, schools and riverside walks. Barking Riverside station forms part of the extended Gospel Oak to Barking route, complementing the existing bus network and providing a new direct transport option. Journey times to Barking have been dramatically cut by more than two thirds to around seven minutes, while the city is now accessible in just 22 minutes.

Sustainable travel is a key part of the plans for the Barking Riverside development. Public transport, walking and cycling feature heavily in plans supported by local bus services, easily connected with the new railway station, and a network of footpaths and cycleways. Cycle parking for 180 cycles is provided at a dedicated new facility as part of the new station making it easier for people to start or end their journeys by cycle. Accessibility is another core focus of this extension, as the station is fully step-free. This brings the total number of step-free stations across the London Overground network to 60, helping to make London a more accessible city for all and supporting independent travel.

Re-opening of the Bank branch of the Northern line

On 16 May 2022, the Bank branch of the Northern line reopened between Kennington and Moorgate after a 17-week closure, with all planned work for this stage of the programme successfully delivered on time. This has enabled us to bring the first stage of the station upgrade into customer use. It includes a new southbound running tunnel and platform, along with a new spacious central concourse. The focus now turns to introducing new interchanges between the Northern, Central and Docklands Light Railway platforms, along with the new station entrance at Cannon Street. When

completed, this will increase station capacity by 40 per cent and significantly improve interchange and evacuation times.

Suicide Prevention Programme

Year-on-year data comparison tells us that since 2018, our Suicide Prevention Programme has helped reduce the number of suicides by 36 per cent across the LU network.

We have trained 91 per cent of LU station staff in suicide prevention so far and we are now training all new starters as part of their induction. The training is open to all TfL staff, and we have recently opened the course to some of our stakeholders, including the British Transport Police and the London Fire Brigade (LFB). In Quarter 1, we made 147 life-saving interventions, bringing the total over the last few years up to 2,365.

We have recently expanded the Safeguarding Award and LifeSaver Award schemes to all staff within TfL Customer Operations. The Safeguarding award recognises those who go above and beyond to ensure effective safeguarding across our transport network and display excellent practice and behaviours in helping safeguard vulnerable customers travelling on our services. The LifeSaver award is given to staff who make a suicide intervention based on best practice criteria. There are slightly different criteria for LU staff from other operational colleagues, as in LU there is an existing mode of logging suicide interventions, using an electronic incident reporting form.

In Quarter 1 we trained a further 14 Safeguarding Officers. The total number of accredited Level 3 LU Safeguarding Officers is now 53.

We are working towards accreditation in the DfT's Safeguarding on Rail Scheme and hope to gain full accreditation by September 2022.

Rail and Sponsored Services Safety in the Spotlight sessions

As part of Rail and Sponsored Services' (R&SS) Vision and Values Programme, we hosted a series of events for 'Safety in the Spotlight'. The purpose of the spotlight period was to raise awareness of the importance of safety, health and environment (SHE) within R&SS.

It was a fantastic way to bring wider SHE messages to R&SS colleagues, with insight sessions held on topics such as SHE Improvement Plans, our Public Transport Scorecard, our SHE Insights Framework, and a workshop to discuss our safety concerns.

We also shared key work happening within buses to mitigate slips, trips and falls, a session on the role of the SHE Business Partner within R&SS; and a session with the Head of SHE Business Partnering (Surface) on our SHE priorities as well as looking at the SHE Culture Programme.

The sessions were well received and have helped increase the understanding and support of SHE initiatives within R&SS. It was also a great example of collaboration between two teams in SHE: the R&SS SHE team and the SHE Insights and Direction team.

Capital safety performance

Capital works cover a broad range of activities across the Major Projects, Project and Programme Delivery and LU Capital Delivery. Some are essential asset renewals and maintenance to keep our frontline service operating efficiently. Other activities represent new and significant investments to improve existing infrastructure. Within the Capital area, teams comprise employees from both TfL and supplier organisations. Likewise, work sites may be managed by TfL or by suppliers acting as our Principal Contractor. We do not distinguish between TfL or supplier hours worked or incidents within this section of the report.

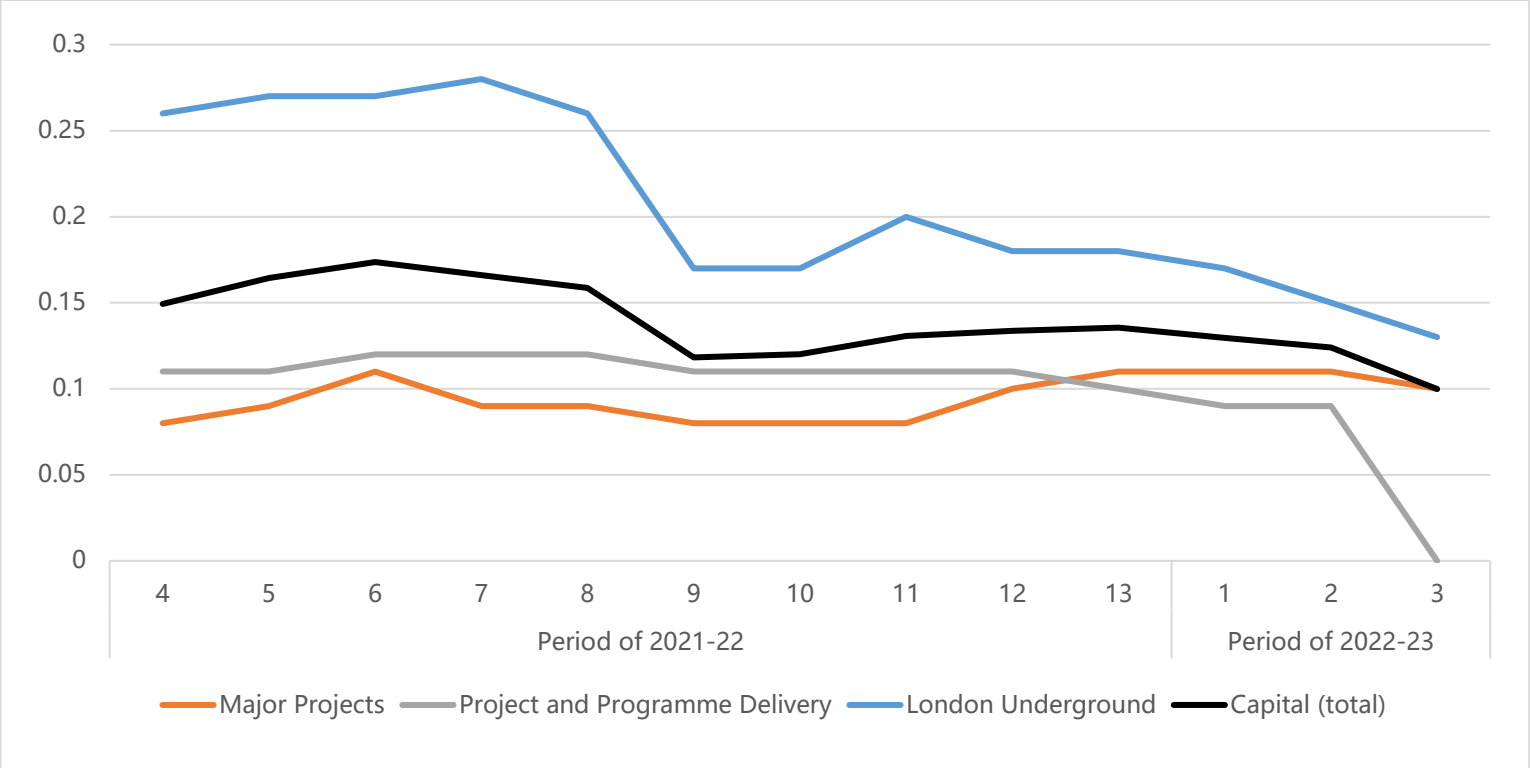
During Quarter 1, the Capital area workforce completed 2.1 million hours worked, a decrease of 0.6 million on the previous quarter, which comprised of one additional period. Compared with Quarter 1 of 2021/22, there has been a 30 per cent reduction in the number of hours worked, predominantly as a result of some of our major projects, such as the Northern Line Extension, Bank Station Capacity Upgrade and Barking Riverside Extension, reaching or nearing their conclusion.

Quarterly performance

To enable accurate analysis of data, some of our key measurables are quoted as a frequency rate per 100,000 hours worked. Frequency rates are calculated using a moving annual average based on performance over the previous 13 periods.

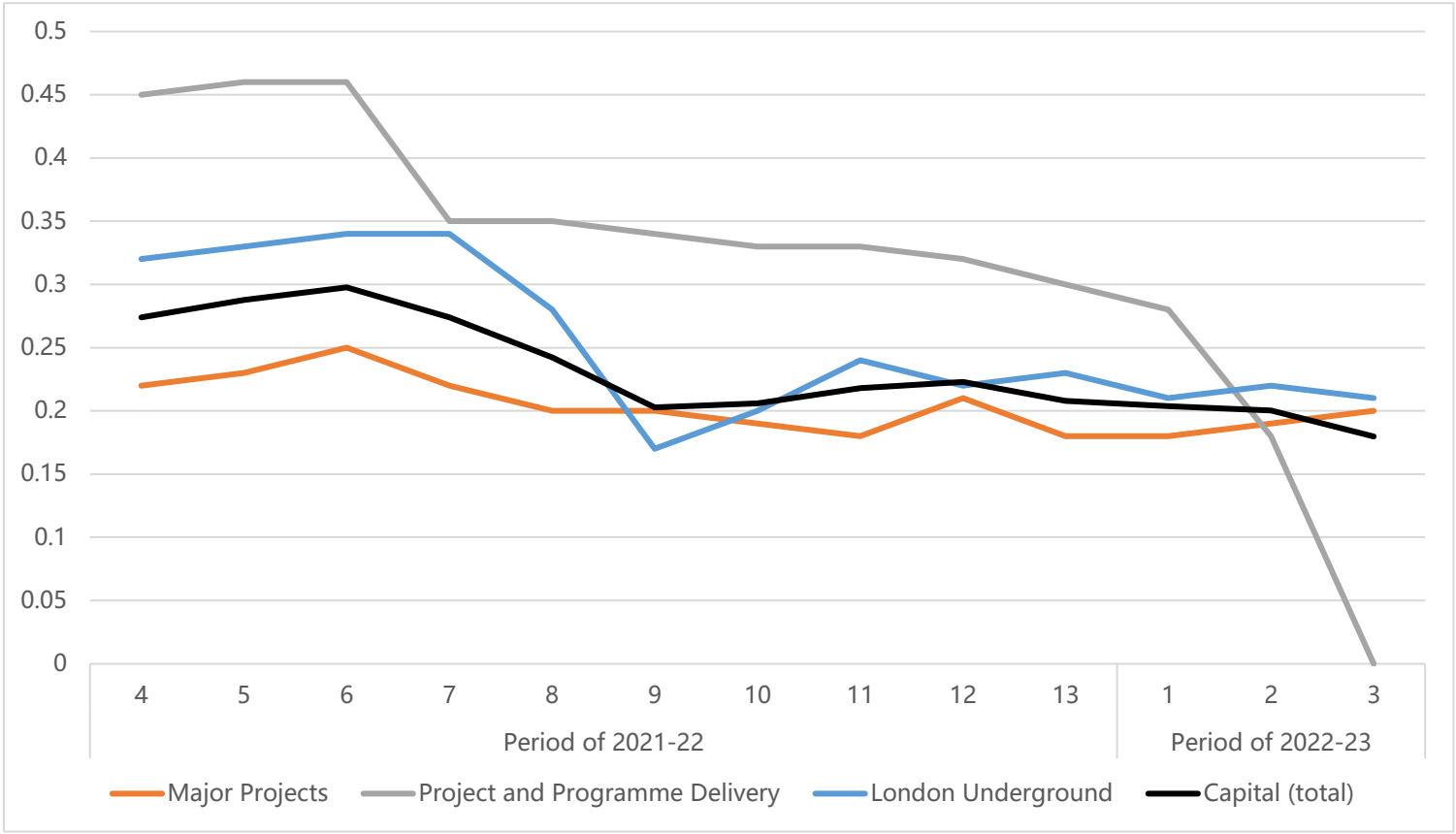
In addition to reporting on performance across the three Capital teams individually, we now also report on our overall Capital performance. The composition of the Capital area and the data we report on within this section will continue to evolve in line with changes to TfL's organisational structure.

RIDDOR accident frequency rate (per 100,000 hours worked)



In Quarter 1, there were no incidents reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) in our Capital teams, a significant improvement on the previous quarter. As a result, the accident frequency rates decreased across all of our Capital teams, with the overall Capital rate ending the quarter in line with our 2022/23 annual target of 0.10. The Project and Programme Delivery team have now maintained zero RIDDOR incidents reported on their projects for a year.

Lost time injury frequency rate (per 100,000 hours worked)



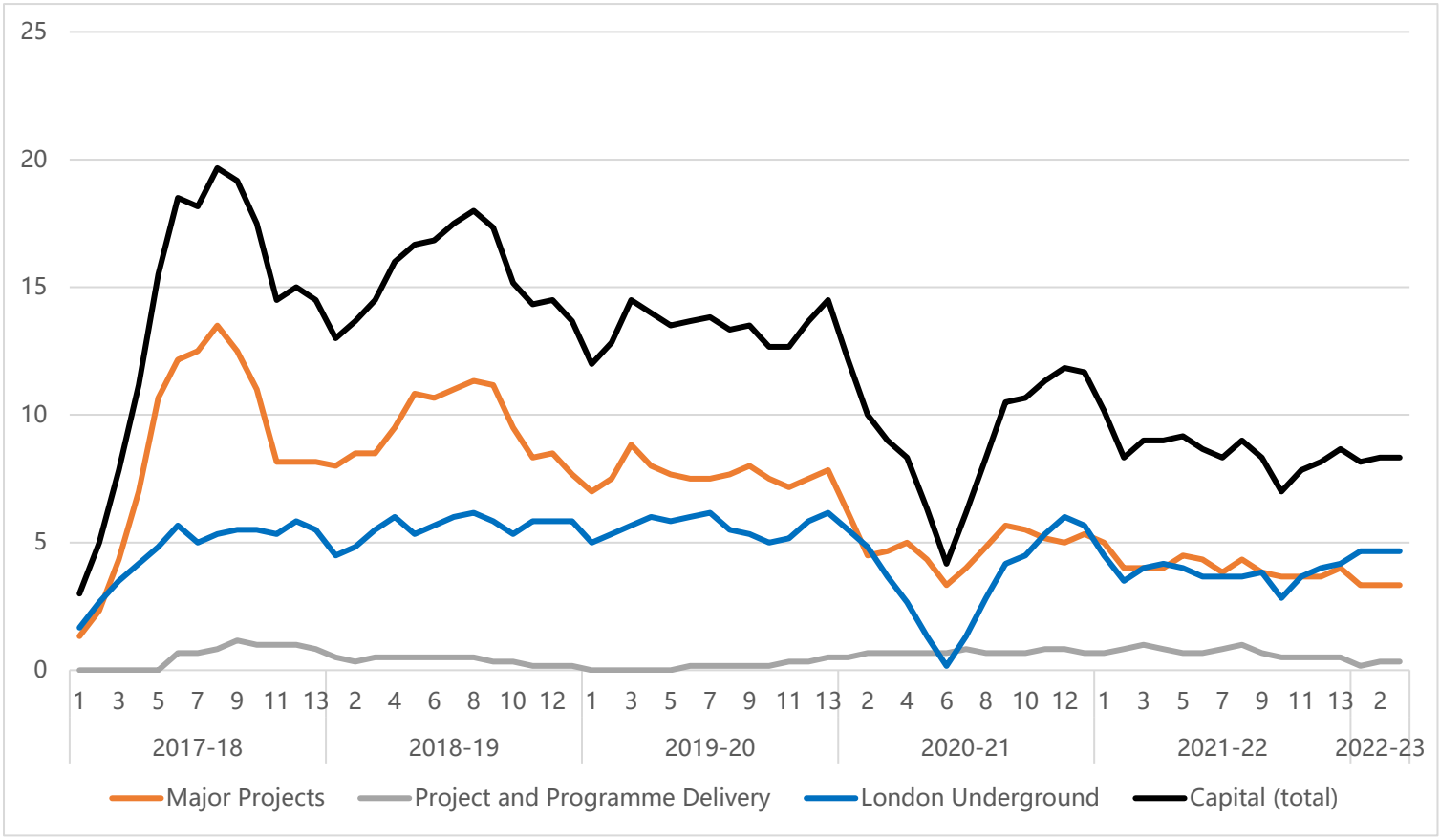
Lost time injuries (LTIs) are injuries which cause an employee to be absent for one or more shifts. There were three LTIs reported in our Capital teams during Quarter 1, a decrease of four compared with Quarter 4 2021/22. Consequently, the lost time injury frequency rate for the Capital area, and all teams within it, ended the quarter below the target of 0.25. The Project and Programme Delivery rate dropped to zero having now experienced a year without an LTI report. This, along with a quarterly fall in the rate of RIDDORs and LTIs across the Capital teams, demonstrates positive progress, although this is down from a relative peak of injuries witnessed in the first half of 2021/22.

All three LTIs reported during Quarter 1 were minor injuries, with two classified as slips and trips and the other classified as a misuse of hand tools. Human behaviour factors were identified as a theme in two of the incidents, but a more significant root cause identified across all three LTIs related to issues with task planning. As a result, changes have been made at site level, operatives have been re-briefed and learnings shared across the Capital teams.

Two of the LTIs occurred at the Bank Station Capacity Upgrade project, where an intense period of construction work took place with the Bank branch closure of the Northern line in order to open the new platform and concourse. The closure started in January 2022 and concluded in May 2022. Despite the minor injuries reported this quarter, no major injuries or incidents occurred during the closure, which is a real testament to the teamwork of everyone who worked on the project.

Long-term injury trend

Total Capital workforce injuries (six-period average since 2017/18)



There were 20 injuries reported in the Capital area during Quarter 1, which is a decrease of 13 on the previous quarter. The number of injuries continues to fall year-on-year and remains well below pre-pandemic levels. This remains the case when hours worked are considered, which have seen a lesser decline over the same period, suggesting a continued reduction in the risk of injury. Slips, trips and falls, and manual handling remain the most common immediate causes. Due to changes in the structure of our Capital teams, the numbers featured in this section of the report may be prone to some fluctuation during the coming quarters.

SHE Performance in Capital Projects

Quarter 1 can be characterised as one of good performance. There have been no major injuries, or serious environmental impacts. However, when analysing the details, we can identify a variety of incidents which had the potential for something worse, or to provide us with a warning that failure to improve will lead to a more undesirable outcome.

A brief selection of such incidents (in no order of significance):

Old Street Roundabout

A member of our workforce avoided injury when drilling into a live 415V cable with a handheld drill. The Principal Contractor has investigated, and the findings will be a useful reminder to many of the hazards of not following all procedures to the letter.

As a proactive Client, we will be dedicating one of our quarterly Chief Capital Officer safety, health and environment Keeping in Touch events (KIT) to discussing the identification and management of buried services with our supply chains.

Docklands Light Railway Rolling Stock Replacement Project

A three-metre-deep excavation was dug on site without adequate support. There was a real risk of collapse, and a danger to anyone who may have entered the excavation. This was backfilled for support, and an investigation carried out. TfL is working with the Principal Contractor to ensure that temporary works are properly designed and executed.

Temporary works have been identified as a causal factor in a number of our recent near misses and incidents. Consequently, those visiting our sites have been asked to check compliance with temporary works arrangements and our first KIT event this year will focus on Temporary Works lessons learned and good practice to follow.

Threat of Assault

A member of the public flagged down one of our engineers in his van. The man pulled out a knife and tried to open a door, whilst another person tried to open the rear doors. Fortunately, our engineer kept the doors of the vehicle locked and managed to drive away safely without being harmed. The engineer was provided with appropriate support, and we issued company-wide internal communications highlighting the Urban Safety training available on TfL's internal learning platform, ezone.

Four Lines Modernisation

This quarter saw Signalling Migration Area 5 (SMA5) go live on the 27 March 2022. SMA5 is the section of signalling between Sloane Square, Paddington, Fulham Broadway and Barons Court. This will improve journey time by around five per cent on average on the Circle and District lines between Monument, Fulham Broadway, Barons Court and Paddington in September 2022. The completion of SMA5 represented a major achievement for the programme as it involved upgrading the highly complex junction at Earl's Court and completed the implementation of Communication Based Train Control (CBTC) across the entire Circle line.

It is normal practice for the introduction of new software to include Operational Restrictions (OR) to address issues where the software is not performing exactly as required. The introduction of SMA05 included a high number of ORs which was brought to the attention of the Office of Rail and Road (ORR), who are giving consideration to the issue of a formal Improvement Notice. A number of meetings have been held with the ORR to demonstrate the safety improvements that the CBTC introduction has over the legacy signalling. We are also undertaking an independent review of the SMA05 introduction to identify lessons that can be learned, and a post revenue software uplift is planned to reduce the number of ORs.

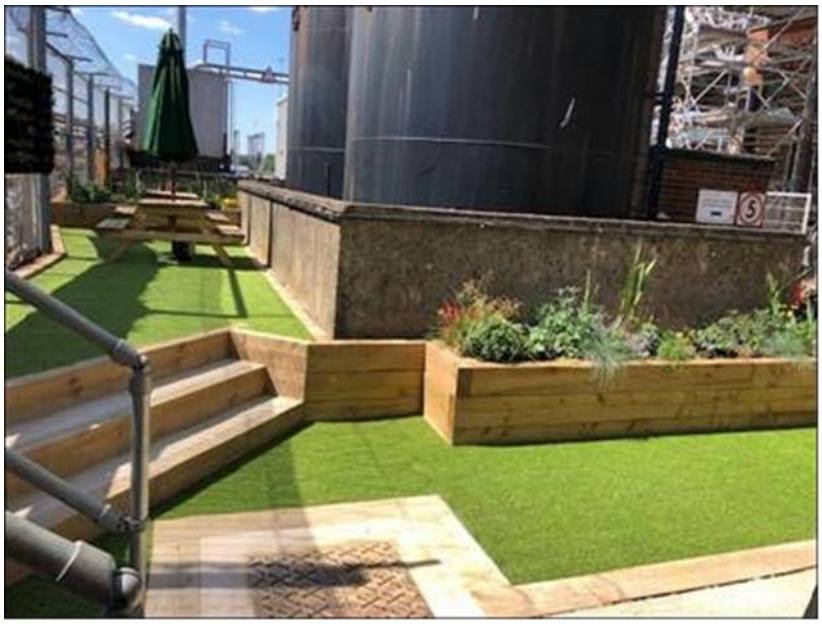
Focus on improvement

In many areas during Quarter 1, there was also a significant amount of proactive work done to further improve how we deliver on our projects.

The Piccadilly Line Upgrade continues to lead on carbon baselining and will shortly be extending its innovation to a new Signal Equipment Room being designed and built at the Tunnelling and Underground Construction Academy.

The London Overground Barking Riverside Extension opened to customers on 18 July 2022, which was ahead of schedule.

The Neasden Depot team have continued to go beyond their official scope, by doing what they have done before at other depots – building a wellbeing garden area near their site office – which will be available to all of the workforce in the longer-term.



Neasden Depot Wellbeing Garden

Within Capital, we held our first quarterly safety, health and environment (SHE) and Construction governance meeting in Quarter 1. Bringing together Directors and Leadership from Capital, Construction and SHE, these strategic sessions consider and

propose activity to improve our SHE performance, the wellbeing of our staff and our environmental impacts in the medium- to long-term. In the Quarter 1 session we focused on our SHE performance last year and lessons for the year ahead, our strategies for workplace violence and aggression and health risk management, carbon management, our SHE improvement plan for 2022/23 and supplier engagement.

SHE in Capital

SHE Capital Delivery & Maintenance Strategy

Quarter 1 saw the one-year anniversary of the publication of the SHE Capital Delivery & Maintenance (SHE CD&M) Strategy. The main highlights from year one included the development of a standardised framework for SHE improvement across the Capital teams (see below), the improvement of our SHE performance reporting, and commencement of a review of the SHE requirements within our procurement and supplier management processes.

In year two, we will continue to focus on establishing greater consistency in the way we conduct improvement activities, ensuring that learning and expertise can be shared across the Capital teams. This will be guided by the six core themes of the strategy, whose programmes have been updated to reflect progress during the first year, new insight and changes to our strategic priorities. In turn, these will continue to be informed by engagement and benchmarking with other large industry clients.

SHE Improvement Framework for Capital

Throughout Quarter 1, the former “Capital Delivery” areas of the business have been undergoing change to become part of TfL Capital, under the Chief Capital Officer. For the SHE team in support of Capital, the change is quite minimal, as the SHE team had already supported the constituent parts of the Major Projects Directorate (MPD), Surface Projects, and Capital within LU.

The projects have not changed, the people are largely the same, but the new structure will provide a better opportunity to share learning and experience. Built on the SHE CD&M Strategy, the new SHE Improvement Framework for the Capital area aims to bring the expertise together in a different way. The new area is bigger and more diverse, so a single Improvement Framework has been introduced, which then enables local project/programme team plans where the framework can be fine-tuned to local needs and priorities.

The framework has four areas of priority:

1. **People**
   We recognise that achieving and sustaining long-term improvement requires a shift in the way that our people think, feel and act in relation to SHE. This part

of the strategy is purposefully designed to enable and complement the delivery of TfL's SHE Culture Programme.

2. **Assurance**
   Those with responsibility for delivery of Capital and its projects have to have certainty on how we are able to manage our risks. This must be done within the recognised legal framework of the "principles of prevention", be risk-based and suitable. Bureaucracy is not required, but a streamlined approach where people recognise what needs to be done is paramount.

3. **Environment**
   We need to be treating the management of environmental risks in as critical a way as we manage health and safety risks. There is further progress required before managing our environmental impacts becomes truly "business as usual". Carbon baselining and reduction is a key part of this, but not to the exclusion of all else.

4. **Learning & Innovation**
   Perhaps the greatest potential offered by the Capital area is the opportunity it presents for shared learning, collaboration and innovation. Not only do we have a more diverse and experienced team internally within TfL, but we have brought together a more diverse and experienced group of suppliers too.

The framework will provide a structure for strategic improvements, and initiatives carried out at a local level.

Major Projects Carbon Baseline

In June 2022, we completed the Major Projects Carbon Baseline Report. This is the first time the whole life carbon baseline for all 10 current Major Projects have been modelled in detail, including the scope and carbon hot spots for each.

As it stands, the carbon baseline contains approximately 2.3 million tonnes of CO_2 equivalent and Major Projects will be aiming to reduce its whole life carbon impacts in the coming years, by management of carbon through the design process and in collaboration with our supply chain. We are now working to expand the carbon baseline across our capital investment portfolio.

Work-related violence and aggression

Work-related violence and aggression (WVA) towards our people and those of our operators and contractors is unacceptable. Concerted action is underway to tackle it.

Triggers of WVA incidents

Fare evasion continues to be the most common trigger for WVA. During Quarter 1 2022/23, 390 WVA incidents were triggered by fare evasion on the London Underground (LU) network, and 338 across the Other Rail modes (buses, roads, London Overground (LO), Docklands Light Railway (DLR), Elizabeth line (formerly known as TfL Rail), and London Trams). This amounts to 39 per cent of all WVA incidents. The proportion of incidents trigged by fare evasion increased by six per cent on the LU network compared with the previous quarter. The proportion remained at a similar level on Other Rail modes.

The percentage of incidents on the LU network that involved a repeat offender rose by two per cent to 20 per cent, equal to one in five offenders. There is a strong link between repeat offending, fare evasion and WVA on LU.

The percentage share of WVA incidents on Other Rail modes allegedly involving a young person (with the appearance of under 20 years) rose by three per cent to eight per cent of all incidents. There remains a strong link between fare evading, youth offending and WVA on the LU network. On Other Rail modes, only 36 per cent of youth WVA is triggered by fare evasion.

The number of WVA incidents motivated by hate has remained static, with 93 reported across Other Rail modes and 73 reported across the LU network. This represents 7 per cent of all incidents.

The number of WVA incidents that involved a customer attempting to bring an e-scooter on to the LU network during Quarter 1 2022/23 fell from 50 incidents in Quarter 4 2021/22 to 28 incidents. This suggests that customers attempting to bring an e-scooter on to the LU network has become less problematic for staff.

Volume of incidents in Quarter 1

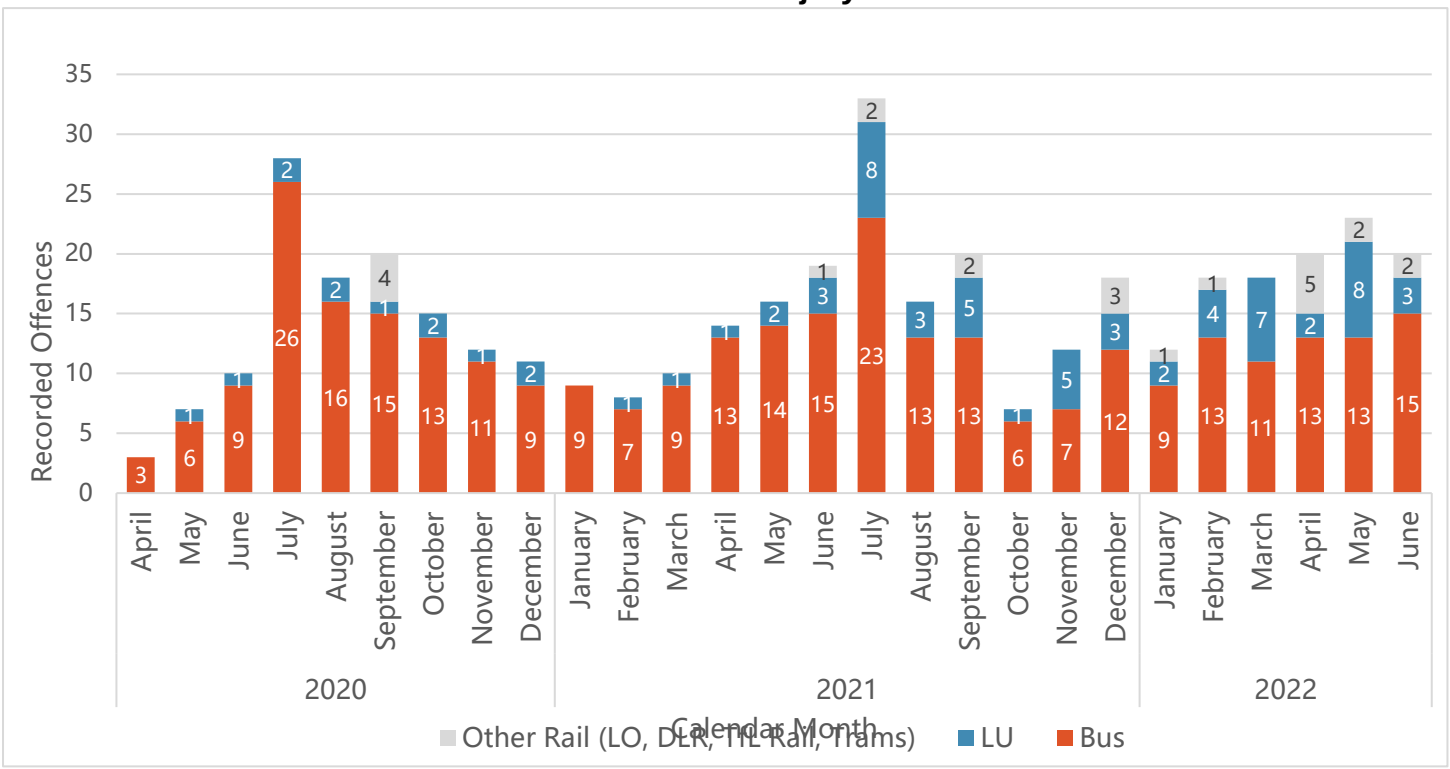
Due to the different time frames for the last two quarters, Quarter 1 2022/23 (12 weeks) and Quarter 4 2021/22 (16 weeks), we are not making data volume comparisons between these two quarters. The information below compares Quarter 1 2022/23 to Quarter 1 2021/22 but this has its own limitations due to the impact of lockdown restrictions and lower passenger numbers on incident levels last year.

During Quarter 1 2022/23, there were 2,305 incidents of WVA reported across all modes. This is an additional 362 incidents compared to the number recorded during Quarter 1 in 2021/22.

In Quarter 1 2022/23, there were 997 incidents of WVA reported by staff working on LU. This is 119 more than in Quarter 1 2021/22.

In Quarter 1 2022/23, there were 1,308 incidents of WVA reported across Other Rail modes. This is 123 more than were recorded during Quarter 1 2021/22.

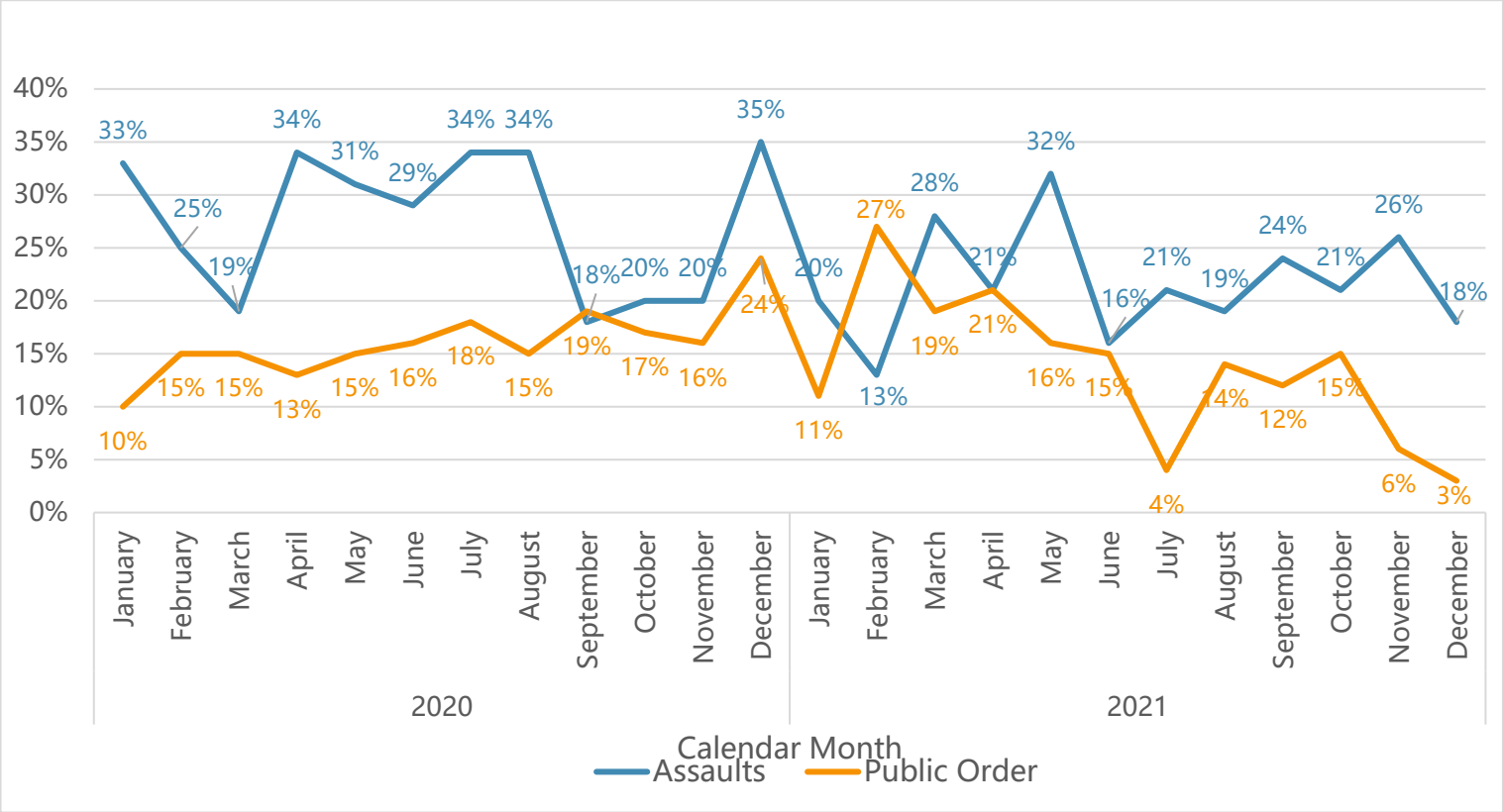
Police recorded work-related violence with injury offence from 2020 to 2022



We know from feedback from our workforce and trade unions that WVA is underreported, particularly verbal abuse. Changes in the reporting of incidents, compounded by the impact of the pandemic on overall crime levels, make it difficult to draw clear conclusions about trends in offending. Our assumption is violent offences that result in injury (actual bodily harm or grievous bodily harm) are more likely to be reported given that staff members may require support, treatment or time off. Police data for violence with injury offences is a more reliable data source for monitoring trends. Work is ongoing to improve staff confidence to report and make it easier for them to do so.

The level of bus-related violence with injury offences in Quarter 1 2022/23 (41 offences) was at a similar level to Quarter 1 2021/22 (42 offences). Police data for LU and Other Rail modes (LO, DLR, Elizabeth line – formerly TfL Rail - and London Trams) shows there were 22 violence with injury offences in Quarter 1 2022/23, compared with seven for Quarter 1 2021/22. The lower offence numbers on the rail network in 2021 reflect the lower levels of passenger journeys at this time.

Solved rate for WVA offences investigated by the police from January 2020 to December 2021



We are working closely with the police to improve the solved rate of offences. This includes prioritising the investigation of WVA incidents, providing access to body-worn video cameras, and continuing to support police investigations by providing Oyster card and CCTV information and victim and witness statements.

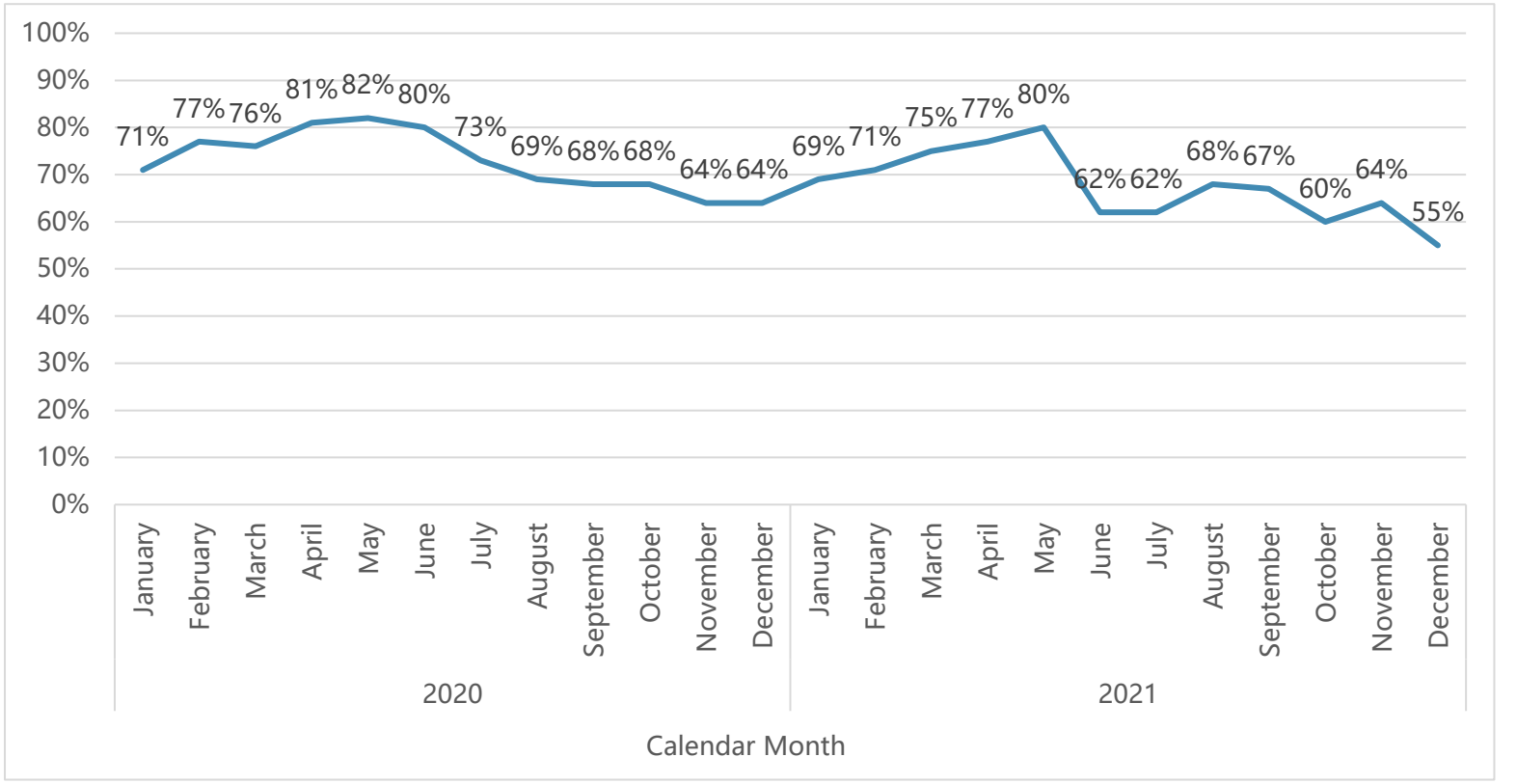
The solved rate is the percentage of offences investigated by the police that have resulted in action against the suspect, for example being charged with the offence, summonsed to attend court, or a restorative justice outcome. Figures are reported six months in arrears to allow time for the police investigation and for cases to progress through the criminal justice process. This section compares figures for the 12-month periods January to December 2021 (current) with January to December 2020 (previous).

During the current period the combined solved rate was 18 per cent for violence and public order recorded offences against our workforce – slightly lower than the previous 12-month period (21 per cent).

The solved rate varies by mode during the current period, with a solved rate of 19 per cent for bus-related offences, 19 per cent for LU, and 10 per cent for all other rail modes combined. Across all modes, the solved rates increase in line with the severity of the incident. The solved rate is higher for violent offences (with or without injury)

compared to public order (for example verbal abuse or threatening behaviour), as the police will allocate more resources to identifying and apprehending offenders for the former, with, for example, media appeals for information for violent incidents. The solved rate in the current 12-month period for violence (with/without injury) offences was 22 per cent, compared with 14 per cent for public order offences.

Percentage of Staff Willing to Support from January 2020 to December 2021 (all violence and public order offences)



A key factor in being able to bring offenders to justice is staff support for and consent to partake in the criminal justice process. As part of our strategy, we are working closely with the police to address staff concerns and improve the support we collectively provide throughout the process.

During the current period, the percentage of staff willing to support a police investigation was 68 per cent for violence and public order recorded offences against staff, down from 74 per cent compared to the previous 12-month period. Due to changing customer numbers, bus drivers make up a greater proportion of staff victims and they are less likely to support police investigations, particularly public order offences. We are working with the police and bus operating companies to address this.

Progress against the 2021/22 annual action plan

This report now includes updates against actions within the WVA annual action plan. Wherever staff are on our network, we are committed to their safety and preventing violence and aggression, tackling its causes, and providing support to those who experience it.

To deliver our WVA Strategy, we have committed to doubling the size of our WVA team. This will provide dedicated resource and a clearer focus on victim support, investigation services to support the Police, and preventative work. We have consulted with our people and our trade unions on our proposals for the new team and have confirmed the structure and closed consultation. We will now begin recruitment and the transition, with the aim to have the new WVA team in place by December 2022.

We continue to work with British Transport Police (BTP) colleagues on Operation Steed and other targeted operations to improve staff safety. Operation Steed is an ongoing operation which aims to increase both staff and public confidence, improve feelings of safety, and bring offenders to justice. Deployments have continued at West Ham, Plaistow, Upton Park and East Ham, with arrests made for a variety of offences and a number of safeguarding interventions made to protect young people. Camden Town has been targeted recently as part of Operation Steed. Police officers have focused on high visibility patrols but have also used plain clothes officers to target offenders.

Running staff engagement sessions is an important element of our work and provides us with an opportunity to pass on key messages about TfL's zero-tolerance approach to WVA, the importance of using spit kits, body-worn video and reporting. These engagement sessions take place across TfL and with our bus operating companies. Recent visits to bus garages include Enfield Bus Garage, Uno Buses – Barnet, Edmonton Bus Station, Canada Water, Dartford Bus Garage and Thornton Heath Bus Garage.

We have produced guidance videos on fare evasion on buses and what to do after a spitting incident - which includes detailed instructions on how to collect a DNA sample using a spit kit, and how to report the incident. The WVA spitting video is due to launch soon and will be disseminated to bus drivers and used in our engagement sessions with them.

Care immediately following a WVA incident is critical to our employees' recovery, participation in criminal proceedings and engagement with TfL as an employer. We have updated our Stations Incidents Duty of Care training aimed at operational staff and managers in LU. This will ensure that frontline LU managers are aware of how to

provide proper duty of care following a WVA incident, including correct reporting procedures and how to ensure staff get the support they need.

We are working with the BTP and our Rail & Sponsored Services (R&SS) team to increase the number of investigators in the BTP staff assaults team. This team is currently dedicated to investigating work-related violence against staff working on LU but is being expanded to cover all TfL rail modes to improve the consistency in police investigation and victim support.

The Transport Support and Enforcement (TSE) Officer role was created from a commitment in our WVA strategy, and our officers play a key part in tackling violence and aggression against our people through tackling the triggers of WVA. The team currently comprises 105 highly skilled officers with plans to recruit an additional 70 officers this year. These officers provide a visible and reassuring presence across our network, supporting all our frontline staff, dealing with antisocial behaviour on the network, and enforcing TfL byelaws to address some of the main causes of WVA.

TSEs have undertaken over 2,000 station/network visits in Quarter 1. The majority of engagements saw compliance achieved by offering advice and guidance to non-compliant individuals. However, 317 individuals were directed to leave the network, 276 were refused entry and 30 individuals physically removed from our service for antisocial behaviour. Officers reported 24 individuals for prosecution and five arrests were made as a direct consequence of the team's work.

Examples of Successful Prosecutions in Quarter 1

Liverpool Street LU Station

In October 2021, a group pushed through the ticket barrier with a hire bike. They were challenged by staff but ignored them. One man abandoned the bike on the platform but as the train doors were closing spat at a member of staff. A swab was taken on scene using a spit retrieval kit and a DNA match was made. In May 2022, the suspect was sentenced to 60 hours of unpaid work and ordered to pay compensation to the victim of £100 and a victim surcharge of £95.

Moorgate LU Station

In August 2021, a woman climbed down onto the tracks at Moorgate and onto the opposite platform. As she made another attempt to access the tracks, staff blocked her path, but she pushed them away, pulling staff members towards the tracks, holding their arms whilst being verbally abusive and then spat into the face of one of the arresting police officers. She was charged with assault, racially aggravated Public Order and trespass. On 6 May 2022, she was sentenced to two weeks imprisonment

suspended for 12 months, 180 hours of unpaid work and ordered to pay a total of £508 in fines and victim compensation.

East Acton LU Station

In April 2022, a member of the public accessed a closed station and when confronted was verbally abusive. He lashed out at a member of staff, smacking his arm and flicking a cigarette at the staff member's face. In May 2022, the suspect pleaded guilty to assault and trespass and was ordered to participate in a Rehabilitation Programme and 50 hours of unpaid work.

Route 86

In May 2022, a bus driver of route 86 was racially abused. The customer was intoxicated and made racially abusive comments to the bus driver throughout his journey. The bus driver used his code red button to alert TfL staff who called the police. On 9 May 2022, at East London Magistrates Court the suspect was found guilty of racially aggravated public order and imprisoned for four months.

Route 29

In March 2022, a bus driver of route 29 was abused by a customer that boarded the bus and went on to punch the assault screen several times. The police arrested the man at the scene. On 31 May 2022, the suspect appeared at North London Magistrates Court and was ordered to pay a victim surcharge of £34, a fine of £80 and was given a one-day detention at the courthouse for being disorderly.

Route 191

In February 2022, a bus driver of route 191 was spat at by the driver of another vehicle. The bus driver used his spit kit to collect a sample, which enabled police to identify the man and arrest him. On 19 May 2022, the suspect appeared at North London Magistrates Court where he was ordered to pay fines and costs totalling £885.

Significant incidents

This section outlines significant incidents that have occurred during Quarter 1 and since the last report. It also provides an update to significant incidents of note.

Significant London Underground incidents

There were no Rail Accident Investigation Branch (RAIB) reports pertaining to London Underground (LU) published in Quarter 1.

Incorrect Profiling of S8 Stock Wheels – 8 April 2022

During routine maintenance, we identified an issue with the profile of wheels on the LU Metropolitan line trains. The issue had the potential to cause track points to become fatigued which could, under certain circumstances, potentially lead to a more serious safety incident.

The affected trains (approximately 50 per cent of the fleet) were taken out of service for the issue to be rectified and a special timetable was implemented on the Metropolitan line. All trains have now been checked and the profile of the wheels restored to the correct standard. This incident is subject to an internal formal investigation.

Contractor hit by a train – 15 April 2022

A contractor who was assisting with the protection of other staff carrying out routine track patrol duties near Chalfont & Latimer station on the Metropolitan line, was struck by a Metropolitan line train. They were taken to hospital by ambulance and released later that day.

The incident is subject to formal investigations by both the RAIB and the Office of Rail and Road (ORR). We have also commissioned our own internal formal investigation. When these investigations have concluded, we will share the findings both internally and in this report.

Power failure and trackside fire at Barking – 29 and 30 May 2022

A significant failure of power at Barking sidings resulted in a trackside fire which severely damaged other critical power, signalling and communications services occupying the same cable route management systems and significantly disrupted the District line service. We have commissioned a formal investigation to determine the root cause(s) and other causal factors leading to the incident and to identify any measures necessary to minimise the risk of recurrence.

Customer fatalities on our network

On 7 April 2022, a customer fell down the stairs at station entrance into Walthamstow station ticket hall. She sustained a serious head injury, and we were subsequently informed that the customer had sadly died as a result of her injuries. On 8 April 2022, a customer lost their balance, fell against the side of a moving train and then fell into the gap between the train and the platform. It appears that the customer lost their balance as a result of a medical episode, and tragically, they died as a result of their injuries. On 15 June 2022, a customer fell from the platform at Chalk Farm station and onto the track. It appears that the man fell as a result of a medical episode and died as a result of his injuries.

The ORR has been informed about all incidents and further information provided as required.

Significant incidents on the Surface transport network

London Overground Collision with Buffer Stop – 12 October 2021

On 12 October 2021, a London Overground train, operated by Arriva Rail London, hit the buffer stops at Enfield Town at slow speed, causing damage to the infrastructure and the first carriage of the train to partially derail.

The driver of the train had a positive drugs test post incident and was suspended by Arriva Rail London. He has been charged with endangering the safety of passengers on the train. He appeared at Highbury Corner magistrates court early in July 2022. The pre-trial hearing took place at Inner London Crown Court in August 2022, where the driver pled not guilty. The case will proceed to trial. Further details will be provided in this report as the case develops.

The RAIB released their draft report to TfL on 3 August 2022 for comment. We are still awaiting final publication.

Sandilands Tram Derailment - 9 November 2016

Our thoughts remain with those who lost their lives, their family and friends, and all the other people affected by this incident, and we continue to offer support to those people directly affected as well as the wider community.

We have worked closely with the RAIB and the ORR since November 2016 to introduce a new safety regime and implement all the recommendations from the organisations across the tram network. This has made the network safer for everyone, and we continue to work tirelessly to ensure that such a tragedy could never occur again. We agreed to all of the RAIB's safety recommendations and accepted liability to ensure civil claims could proceed as soon as possible. We have also worked to address the issues raised by the Coroner in her Prevention of Future Deaths report following the Inquests.

We have delivered robust and lasting safety improvements since 2016 and we continue to review our operations and work with the wider tram industry to ensure that we have the safest possible network.

Following the conclusion of the Inquests, the ORR issued criminal proceedings against TfL, Tram Operations Limited (TOL) and the driver of the tram for breaches under the Health and Safety at Work etc, Act 1974 (the 1974 Act). TfL and TOL have both been charged with an offence under section 3 of the 1974 Act which requires employers to ensure that their employees and third parties are not exposed to risks to their health

and safety. The driver is charged with an offence under section 7 of the 1974 Act which requires employees while at work to take reasonable care for their own health and safety, as well as the health and safety of others who may be affected by their acts or omissions at work.

After careful consideration, at the first procedural hearing that took place at Croydon Magistrates' Court on 10 June 2022, TfL indicated a guilty plea to the charge. TOL also pleaded guilty at the same hearing. The driver indicated a not guilty plea. All three cases were transferred to Croydon Crown Court. On 8 July 2022, a procedural hearing took place in Croydon Crown Court concerning the driver. TfL and TOL attended and the Court confirmed that they would not be needed until after the conclusion of the driver's trial. The Court granted the driver's application to transfer the case to a different court in London in the interests of justice. The trial is estimated to last around 4-5 weeks andis listed to start on 15 May 2023 at the Central Criminal Court (also known as the Old Bailey).

Potters Bar Garage Bus Fires – 22 May 2022

On 22 May, a bus fire occurred at Potters Bar Bus Garage, which started with an electric bus, in which a further five buses caught fire. As a precaution, the manufacturer of the electric buses, Switch Mobility, asked all operators to temporarily withdraw its double-deck electric buses from service while investigations were carried out into the root cause of the incident.

Investigations have been concluded by an independent bus fire specialist and short- and medium-term recommendations to prevent a recurrence are currently being addressed and tracked. All Switch Mobility buses have re-entered service, with immediate interventions to ensure operatives identify the correct system to put coolant into.

London Overground – Three Trap and Drag Events, June 23 – June 29 2022

In June 2022, on three separate occasions London Overground (LO) reported trap and drag events. The details are:

- **23 June at Seven Sisters station:** Three customers ran up off the station escalators area onto the LO northbound platform as the train doors had just closed. One of them put their hand in as the doors were almost closed. The driver stopped the train, and the customer withdrew their hand seemingly without any difficulty.

- **27 June at Wembley Central station:** On the southbound platform, a customer put their walking stick in the closing doors of a train. The customer let go of the stick and the train moved a short distance before the driver observed the stick

in the CCTV, and stopped the train, which then allowed the customer to get off the train.

- **29 June at Crouch Hill station:** It appears an umbrella got caught in the train door as it closed.

All three incidents have been notified to the RAIB and are now part of a panel review undertaken by Arriva Rail London with LO representation.

TfL Formal Investigation Report (FIR) 02-2022: Tower Millennium Pier, Detached Bollard hit vessel – 12 June 2021

The final FIR has now been published on this incident in which a mooring line for a vessel was secured onto a bollard on the pier. No one was injured during the incident.

A corroded bollard broke away during mooring procedures. The investigation found issues around maintenance, inspections, lines of responsibility, operating procedures and transfer of assets to the asset management system. The FIR has made ten recommendations which are being implemented.

TfL FIR 03-2022: Wandle Park - Tram Door Near Miss – 13 September 2021

The final FIR has now been published on this incident in which a tram stopped in advance of Wandle Park tram stop, awaiting a proceed signal. Whilst the tram was stationary, an Emergency Door Release was operated by a member of the public travelling on the tram. The passenger disembarked the tram at a non-platform location.

The FIR made eight recommendations. The recommendations have been allocated to the appropriate personnel and actions are currently being addressed to close out these recommendations.

Engagement with regulators

This section looks at how we have engaged with our regulators on safety issues over the past quarter.

Engagement with the Environment Agency

We report our progress on removal of polychlorinated biphenyls (PCBs) to the Environment Agency. PCBs are substances that are toxic to humans and animals. They were banned from sale in the UK in the 1980s, but LU has equipment which contains components such as old electrical capacitors that predates this ban and therefore sometimes contain PCBs. There is also legislation in England and Wales as well as an international agreement which aims to ban PCBs entirely. Progress on our

programmes for identification, replacement and removal of components that may contain PCBs continued in Quarter 1.

Engagement with London Fire Brigade

We meet the London Fire Brigade (LFB) every quarter to share the progress of our Fire Safety Programme and to discuss any significant fire incidents in the previous months. As well as a joined-up response to incidents on our network, the LFB carry out a number of detailed inspection visits to review our approach to fire safety. These collaborative discussions have allowed us to share the detail of our fire risk assessment programme and training with the LFB, as well as sharing detail on how we manage and maintain our fire assets with LFB inspectors. It has also allowed us to identify areas where we can work together more closely to ensure we manage the risk of fire on our network.

Engagement with the Office of Rail and Road

We continue to work closely with the ORR to ensure we manage health and safety effectively across our network. We have regular discussions around our ongoing response to the coronavirus pandemic, as well as constructive, open and honest discussions about any incidents on our network and our plans for improving how we manage health and safety. We continue to work together closely to identify opportunities for improvement.

Health

COVID-19

Since the start of the coronavirus pandemic, our focus has been to protect the safety and health of our customers and workforce. This remains our focus as we emerge out of the pandemic and transition to living with COVID-19.

Deaths in service

Our sincere condolences remain with the families and loved ones of the 105 members of our workforce who have sadly passed away from COVID-19 since the start of the pandemic. Everyone at TfL pays tribute to the vital role they played in our fight against the pandemic.

Our Employee Assistance Programme continues to be available to all employees and their dependants, and provides support, guidance, and information on a range of topics, including bereavement. The safety of all our staff and customers continues to

be our top priority, and we are absolutely committed to doing everything in our power to keep everyone safe on our network.

We are continuing to make free lateral flow tests available, even after the Government phased out the free tests from 1 April 2022. We have clearly communicated this to our workforce through articles on the staff intranet and posters displayed in workplaces.

Face coverings on public transport

The Government announced that it would no longer be compulsory for people to wear a mask on public transport and in shops from 27 January 2022. From 24 February 2022, we removed the requirement set out in our Conditions of Carriage for customers to wear face coverings.

From 13 June 2022 we changed our customer and staff messaging to encourage people to take appropriate action to keep themselves safe, including using hand sanitiser and wearing a face covering if this helps them to travel with confidence.

We continue to encourage our workforce to wear face coverings when in enclosed spaces. We are continuing to provide free Type IIR masks for those working in our operational areas.

Reusable masks for our staff

In Quarter 4 2021/22, we made TfL-branded reusable face masks, complete with our iconic rondel logo, available to all of our staff. These could be acquired by team managers or team administrators who were able to order up to two face coverings per team member. This quarter, the first batch of 20,000 masks was distributed to those who had ordered them. We are currently awaiting delivery of our second batch.

COVID-19 testing schemes

We have set up locations at our head office buildings where staff can collect one lateral flow test kit box each per week, or order for their team via an online form available on the intranet. We have given out over 12,000 test kit boxes since we started this transition on 1 April 2022 and continue to use staff intranet articles and posters in the workplace to publicise the availability of the free lateral flow test kits.

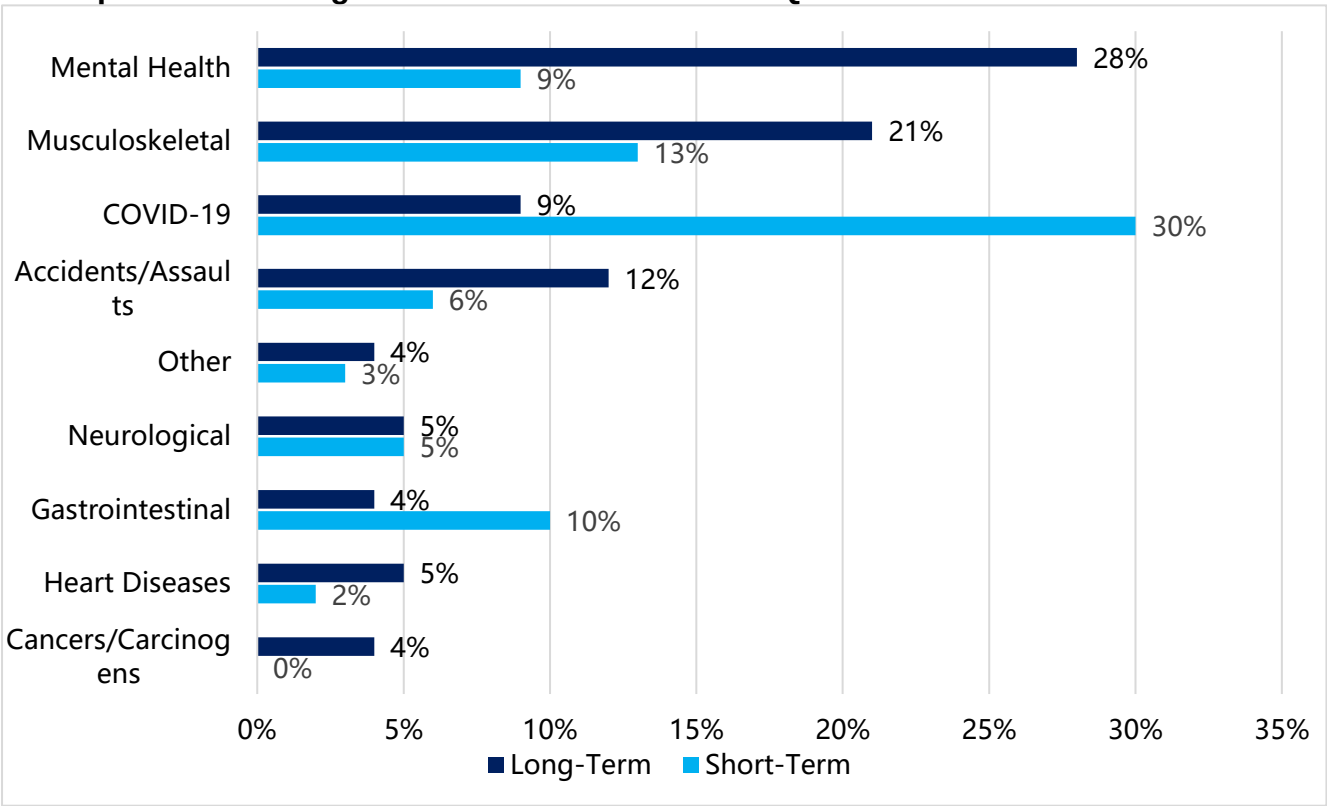
Monthly air and surface sampling for coronavirus by Imperial College London on the bus and Tube network which started in September 2020 has now ceased, as the managing of the pandemic moves into its next phase. We continue to investigate potential areas for future COVID-19-related research and investigation on the network.

Sickness absence data

When looking at our sickness absence data, short-term absence is any absence of less than 28 days and long-term absence is of 28 days or more duration.

By looking at the underlying causes of absence in detail, we gain meaningful insight into where we can best target preventative measures. Around 60 per cent of absences at any time are caused by long-term sickness.

Top causes of long- and short-term absence in Quarter 1 2022/23



In Quarter 1 of 2022/23, COVID-19 remained the top cause of short-term absence but has significantly decreased from 59 per cent in the previous quarter, returning to 30 per cent as last seen in Quarter 3 2021/22. All other absence types are holding fairly stable and the main spike in absence levels occurred at the start of the quarter in period 10 (12 December 2021 – 8 January 2022), which is when we normally see an increase in short-term absences.

In Quarter 1 of 2022/23, mental health remained the top cause of long-term absence, accounting for 28 per cent of all long-term absences. Musculoskeletal-related absence was again the second highest cause at 21 per cent. These two categories have reduced by two per cent and one per cent since the end of Quarter 4. They remain the top two causes typically accounting for the majority of long-term sickness absence in the UK. Our Occupational Health team has several initiatives aimed at prevention of ill health but also to support those who become unwell, to return to work earlier. Some

of the events we hosted this quarter included several sessions on Breathing and Meditation as well as Diabetes Week 13-19 June 2022.

Health updates

Health Surveillance

Since being issued with a contravention notice and two improvement notices by the Health and Safety Executive (HSE) in March 2022, TfL have made significant progress in highlighting areas of possible risk to health and implementing health surveillance programmes for these areas. Over 340 members of staff have been trained to deliver skin checks to their teams, so that any cases of possible skin disease can be identified and referred to Occupational Health (OH) for further assessment. A total of182 skin referrals have been received by OH and action taken where appropriate.

Blood samples have been taken from staff who have been identified as at risk of exposure to lead and will continue to be monitored as required.

Respiratory surveillance has also commenced for staff identified as at risk of exposure to respiratory sensitisers.

A quick and easy decision support tool has been implemented to assist managers in deciding whether health surveillance is required for their teams for both skin and respiratory; this will be expanded to include all other types of health surveillance in the near future.

All health surveillance forms are now available online which makes it quick and easy for managers to complete the required information and send to TfL's Occupational Health team via one simple route.

As a result of the improvements we have made in this area, the HSE notices have been closed out. Work continues to ensure that we meet our legal requirements in implementing health surveillance across the whole of TfL for all other types of hazards and risks.

Well@TfL

Well@TfL Mobile Health Unit

The Well@TfL health bus arrived late May 2022 and will be delivering onsite mobile health checks, health surveillance and periodic medicals. The mobile health bus will provide a convenient and cost-effective way for employees to receive onsite support on their health and wellbeing, as well as to attend medicals. Since launching the Well@TfL project in August 2021, over 1,000 employees have received a mobile health check. The Commissioner visited the Well@TfL Health Bus at the end of June

2022, discussing the benefits with the team of early identification of health risks and receiving onsite wellbeing support.

Phase Two of Well@TfL Acton pilot project

The Acton pilot project aimed to help our colleagues to learn more about their health and how they can improve it. The project started with wellbeing checks, including measurements like cholesterol, blood glucose and blood pressure. Participants were then invited for a three-month follow-up call and six-month follow-up appointment. The six-month follow-up health checks outlined a significant benefit to employee wellbeing. The comparison between first and last health check physical results indicated:

- A reduction in mean waist circumference,
- A reduction in the mean diastolic and systolic blood pressure recordings,
- A reduction in mean relative risk (the risk of a cardiovascular event) and an increase in individuals who had the recommended relative risk of 1.0 or below,
- 100 per cent of employees that attended three-month follow-up calls said they had made changes to improve their health and wellbeing.

RESET Health

TfL joined forces with RESET Health in December 2021 to support our employees in taking control of their health. Specifically, the programme aims to reverse the conditions of those living with diabetes or prediabetes, as well as those who are obese or overweight.

The table below presents the outcomes of members at the key 12-week milestone:

Indicators	Week 12 Average (Reduction)	Percentage
Weight (Kg)	5.6 kg	-5.5 per cent
BMI (kg/m2)	1.7kg/m2	-5.1 per cent
Waist Circumference (cm)	6.5cm	-6.0 per cent
Systolic Blood Pressure	1mmHg	-0.3 per cent
HbA1c	3.7 mmol/mol	- 8.1 per cent

Headline Outcomes: (data from 29 employees who onboarded the programme more than 12 weeks ago)

- Of the 29 members who have reached the 12-week mark, over 60 per cent lost more than five per cent of their body weight and of these, six members lost more than 10 per cent of their body weight.
- There has been a 19 per cent reduction in the proportion of members who are living with obesity compared with when they first joined the programme.
- Four members who were living with prediabetes when joining the programme reversed their condition after 12 weeks.

Environment

Air Quality

TfL launches a public consultation on further ULEZ expansion

In May 2022, TfL launched a consultation on plans to further expand the Ultra Low Emission Zone (ULEZ), to cover almost the whole of the capital from 29 August 2023.

The Mayor considered a range of options when deciding the next steps to take in dealing with the 'triple emergency' facing the capital. In the short-term, expanding the ULEZ London-wide will have the biggest effect on air pollution emissions relative to the cost to Londoners as a whole, as well as helping to tackle the climate emergency and traffic congestion.

The current £12.50 daily charge level for cars, vans and motorbikes that do not meet the standards would be retained. This would be supported by a revision of the Mayor's Transport Strategy (MTS), which is also part of this consultation. The consultation also asked Londoners to help shape the future of road user charging in the capital. This could include scrapping existing charges, such as the Congestion Charge, and replacing them with a single road user charging scheme that uses more sophisticated technology to make it as simple and fair as possible for Londoners.

Climate Emergency

Launch of Power Purchase Agreement tender

We marked London Climate Action Week (25 June to 3 July 2022) by launching the tender for our first Power Purchase Agreement (PPA), which aims to purchase more than 10 per cent of our required electricity from renewable energy sources and new build assets.

As one of the largest consumers of electricity in the UK, we will be playing a major part in meeting the Mayor of London's ambition for the capital to become a net zero-carbon city by 2030. The Mayor, through the London Environment Strategy, has also set us the goal of achieving a zero-carbon railway by 2030.

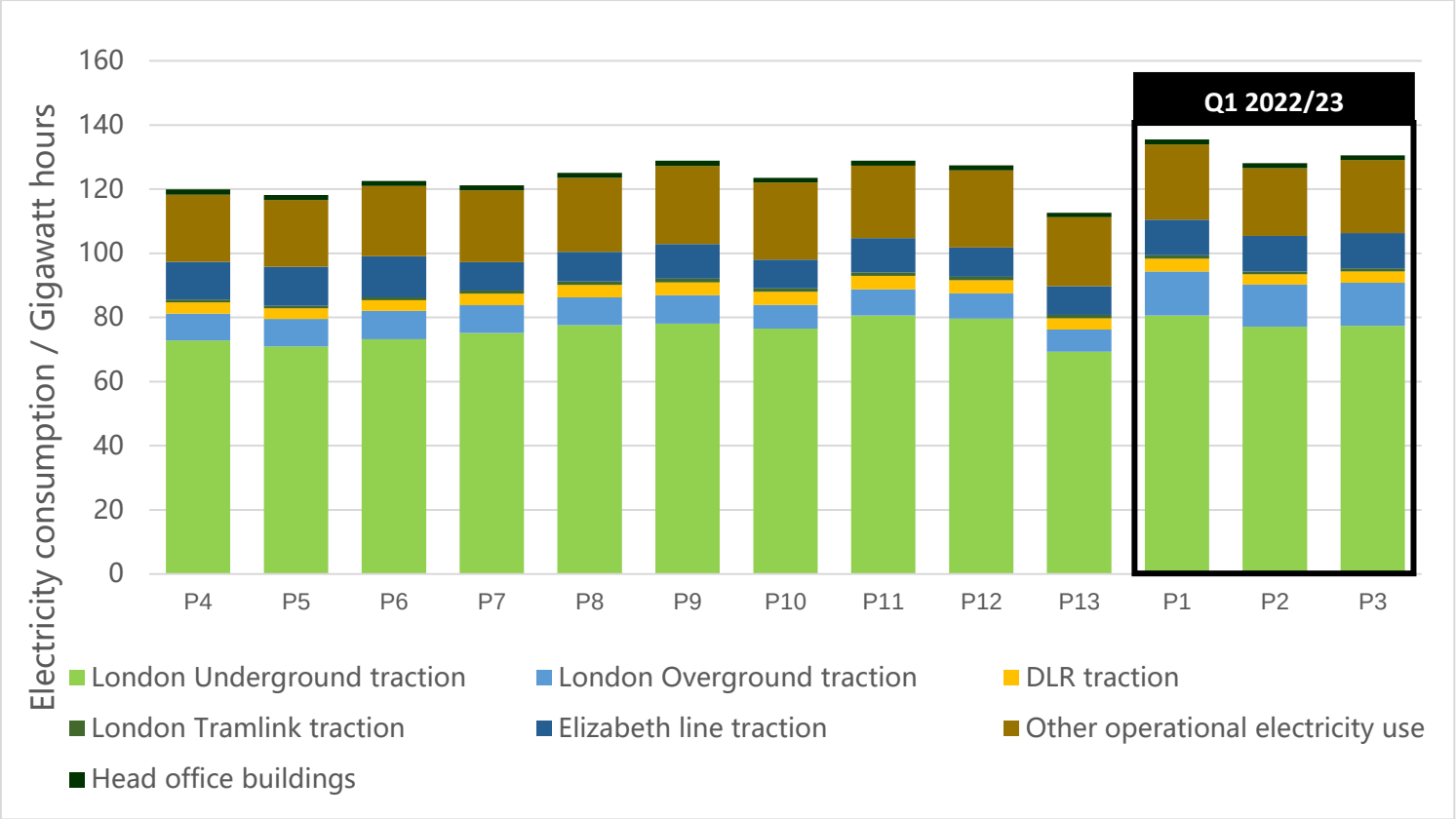
Renewable PPAs are long-term contracts with renewable generators for purchase of their electricity. These contracts can reduce our exposure to changes in the wholesale energy market, providing cost certainty and long-term cost savings, while also helping meet climate change targets through developing new renewable energy generation projects.

The launch of the tender on 27 June 2022 forms part of our long-term strategy to ensure that all the electricity we use is generated by 100 per cent renewable sources. By using a phased approach, we can also benefit through being able to learn and adapt as the renewable market evolves.

This tender will guarantee that the energy supplied is from renewable energy sources, comprising wind or solar power, rather than a mix of power generators that emit carbon into the atmosphere. By confirming the demand for renewable energy, the power purchase agreement will also lead to the creation of new build assets across the UK, such as solar or wind generation, by enabling the selected supplier to confidently invest in the delivery of new renewable energy projects.

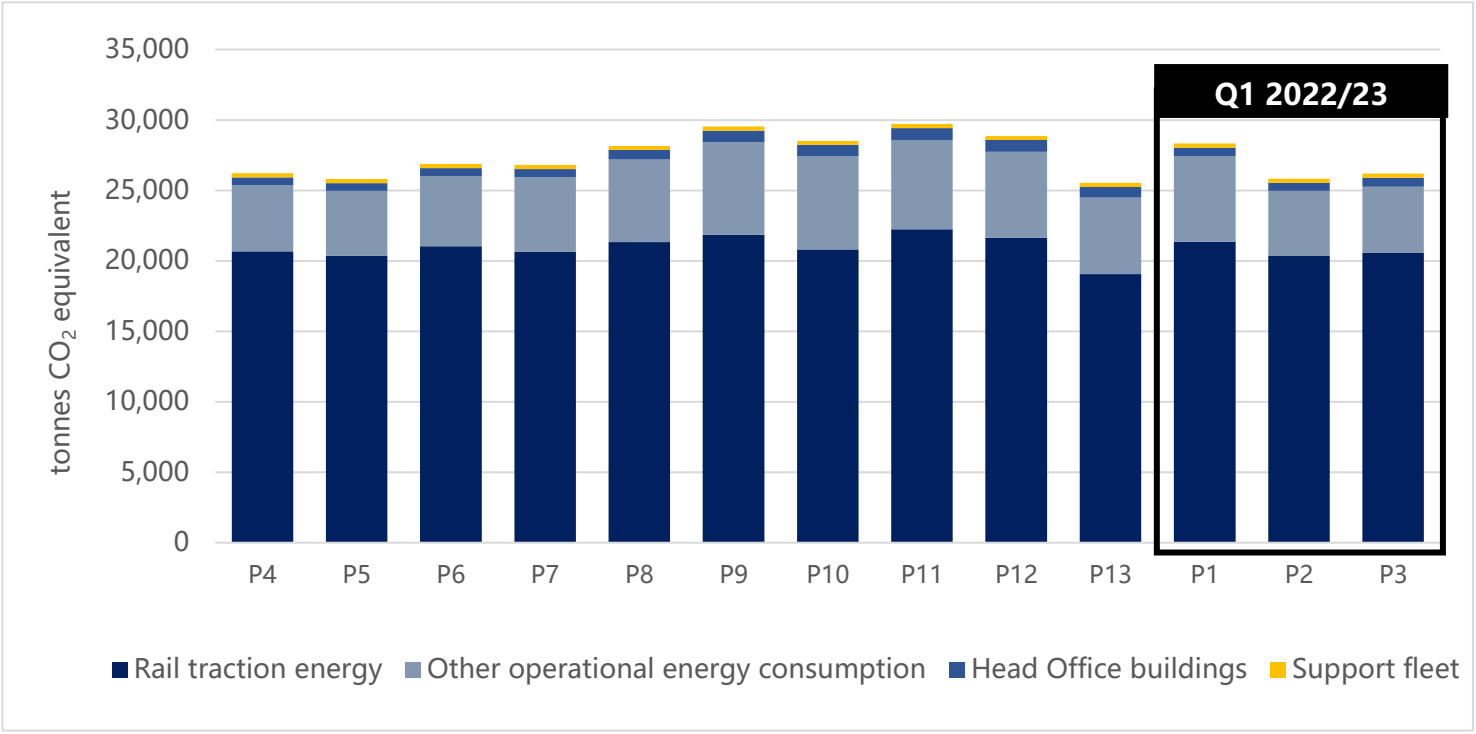
Energy consumption and carbon emissions from our operations

Electricity consumption – provisional – Quarter 1 2022/23 (Gigawatt hours)



Electricity consumption was three per cent higher in Quarter 1 than in the equivalent period in 2021/22. This has largely been driven by increased reporting of energy consumption on London Overground, resulting from changes by Network Rail to estimates for traction energy consumption. This is under review. While May 2022 saw the introduction of Elizabeth line services through the central section of the line, trial operations in the months running up to the opening meant that there has been no significant new increase in electricity consumption on the line.

CO_2 emissions (excluding buses) Quarter 1 2022/23 (tonnes CO_2 equivalent)



Greenhouse gas emissions from operations, excluding buses, track closely to electricity consumption. Emissions decreased by approximately five per cent in Quarter 1 compared to the equivalent period of last year, in part due to a reduction in emissions intensity of grid electricity.

Sustainability training, engagement and embedding

Sustainability Staff Network

Our Sustainability Staff Network Group continues to go from strength to strength, with over 400 active members and growing. It celebrated its second anniversary on the 16 June 2022. The consensus of the group is that we need to continue to share, learn and support each other, and encourage colleagues to be brave in creating space for conversations about the sometimes-difficult sustainability challenges we face.

In April 2022, Arcadis ran a free three-part bite-sized Zero-Carbon Academy, which was open to anyone at TfL. The sessions were run by Arcadis's UK Climate Change & Sustainability Director, Ben Harris. Session one presented an overview of where we are today internationally and nationally in tackling climate change, session two looked at operational carbon and session three looked at infrastructure carbon. The training talked about general principles as well as providing examples and describing TfL's strategy and actions in these areas. The sessions were recorded and are now available on the TfL staff intranet as a freely available internal resource. They acted

as a precursor to the more formal and detailed Carbon Literacy Training Programme described below.

Other events run by the TfL Sustainability Network have included presentations and discussions led by TfL experts on London's 2030 Electric Vehicle Infrastructure Strategy, ULEZ, how to be a 'Sustainability Champion', Circular Economy and Responsible Procurement. We also hosted external speakers, including from Regen, who are not-for-profit energy experts and have been working with National Grid ESO to examine the question of decarbonising UK's electricity grid by 2035.

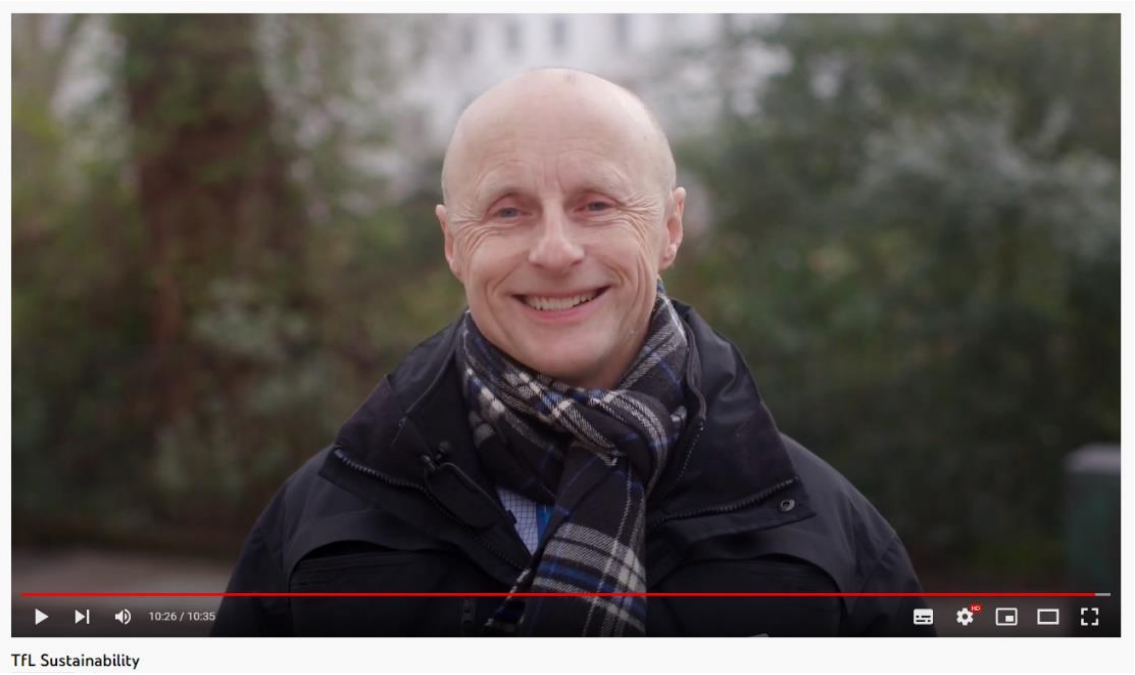
For London Climate Action week (25 June to 3 July 2022), the Sustainability Network held daily events including presentations and discussions on:

- decarbonising the TfL Pension Fund, led by the TfL Pension Chief Investment Officer,
- cutting carbon from our buildings,
- our strategy to use Power Purchasing Agreement to reach 100 per cent renewable rail operations by 2030.

We were also joined by 'The JUMP', who shared their 'Joyous, People-Led Movement', which is about coming together to make practical changes, support and inspire each other, celebrate success and drive a change in society's mindsets and cultures with a '6 Shifts approach'.

Sustainability video

At the start of London Climate Action week, we launched a 10-minute video on TfL's approach to sustainability. The video was shared internally and across TfL social media (LinkedIn and YouTube). The video describes our sustainability approach set out in TfL's first ever Sustainability Report published last September. It brings to life what we do across all three pillars (social, environment and economy) of sustainability. The video is available on the sustainability page of the TfL website.



TfL Sustainability

We are planning more video content to engage customers, stakeholders and potential job applicants on our sustainability agenda. As part of this we will be working with the TfL Youth Panel to generate engaging ideas and involve them in the development of video content. We are keen to promote TfL as a purpose-driven organisation that puts sustainability at the core of everything it does.

Green skills talent pipeline

We know that the green skills sector is rapidly growing and in the future all jobs will have an element of 'green' as we move toward sustainability. TfL needs to ensure it is getting the message out there that we are leading the way on many areas in relation to sustainability, and as well as being a great place to work with lots of opportunities for development, it also has huge scope and ability to deliver for the environment. To help with developing a talent pipeline of potential job applicants, we are in the process of building a micro-site to promote the potential for people joining TfL to work on many aspects of sustainability and to encourage potential future applicants to register their interest so we can proactively contact them as suitable roles are advertised.

We are in the process of retendering for suppliers across all our apprenticeships and we have included a requirement that they all include sustainability as part of the skills, knowledge and experience they provide. In addition, we included some sustainability and corporate social responsibility specific apprenticeships within the tender scope, such as ST0934 Corporate Responsibility and Sustainability Practitioner (Level 4) which will have the broadest appeal across TfL.

Taskforce on Climate-related Financial Disclosures and Climate Budgeting

We have strengthened this year's TfL Annual report with the inclusion of sustainability, to align with our new purpose to 'move London forward, safely, inclusively and sustainably' and our vision to be the 'strong green heartbeat for London', building on our TfL Sustainability Report published last September. We have already voluntarily begun reporting in line with the Taskforce on Climate-related Financial Disclosures (TCFD) this year, ahead of being legally required to from next year. The TfL Annual report also includes our first disclosures of physical and transition risks under TFCD requirements. In line with TCFD, TfL is in the process of creating a new Enterprise Risk on 'Climate Change, including Adaptation'.

The Mayor has set an ambitious target of making London net zero carbon by 2030. A key enabler of this ambition is the integration of a 'London Climate Budget' within the Greater London Authority (GLA) Group's annual consolidated budget process and documents. To inform this work the GLA is working with C40 Cities, which the Mayor has chaired since December 2021, in order to learn from cities like Oslo that have had a climate budget in place for several years. London is a C40 climate budget 'Pilot City', with the GLA Budget Guidance issued in July 2022 including a requirement for Climate Budgeting for the first time.

A climate budget is a governance system that mainstreams climate considerations into decision making via the budget allocation process and highlights a city's short-term actions (typically annually) to deliver the long-term climate targets (in line with the city's climate action plan or Net Zero Pathway).

As part of the financial budget process, climate measures are proposed, adopted, implemented, monitored and reported in line with the budget cycle. The climate budget should clearly state targets, actions and to the extent possible the estimated emissions reduction effects over time, costs and financing, as well as any relevant co-benefits.

London's first climate budget for the financial year 2023/24 will focus on scope one and two carbon emissions for the GLA Group, and therefore TfL. Ultimately, the ambition of the London Climate Budget is to cover all actions reducing Greenhouse Gas emissions in London (both within its boundaries and from the goods and services it consumes). London's Climate Budget will also be expanded in future years to include actions to mitigate the impact of climate change, to ensure functional bodies manage climate risks and implement measures to adapt.

London Climate Action Week 25 June to 3 July 2022

As well as internal events hosted by the TfL's Sustainability Network, releasing our Sustainability Video and the Mayor announcing the opening of TfL's Purchase Power Agreement tender, we also took part in several external activities during London Climate Action week. These included the Climate Innovation Forum, Climate

Investment Coalition, Surface Water Flooding Conference and the Business Climate Forum.

TfL Youth Panel Investigation

During the summer we supported the TfL Youth Panel to undertake an investigation into issues of diversity, inclusion and equality and how it interacts with environmental sustainability. The intention is to complete evidence gathering, hearings and research over the summer and present initial findings to the TfL Executive Committee in the autumn. Following this, a report will be finalised and published.

The objectives of the investigation are:

1. Development opportunity for the TfL Youth Panel and TfL staff.
2. Collation and synthesis of the latest evidence and research in relation to the investigation topic, which can then be used for communication, engagement and upskilling across TfL.
3. Identification of specific issues in relation to TfL activities, purpose and objectives.
4. Identification of specific policy recommendations for TfL.
5. Promotion of TfL as a forward thinking and attractive purpose-driven organisation.

Carbon Literacy Training Programme

We gained accreditation for our one-day carbon literacy training course from the Carbon Literacy Project in June 2022 and have trainers from across the business delivering one to two courses per week as part of a pilot phase.

Planning is underway for the next stage of the rollout, where we will increase the number of trainers and make courses more widely available. As well as embedding carbon reduction as a core part of TfL culture, this course will help to achieve cost savings due to an increased awareness of energy and resource consumption.

Buildings Decarbonisation

If we are to achieve our Corporate Environment Plan ambition to reach net zero carbon across our operations and Head Office estate by 2030, we need to decarbonise our built environment. TfL has a large and complex property estate with over 6,000 assets registered as buildings in our Asset Management systems. This includes a range of archetypes such as our head offices, stations, depots and garages, which are all integral to keeping London moving. Over the past nine months we have conducted a baseline assessment of the carbon emissions associated with our buildings and undertaken initial analysis for how we can simultaneously reduce carbon and operational cost. Our understanding will continue to be refined, but we estimate that

approximately 11-12 per cent of TfL's operational carbon emissions (approximately 105 kilotonnes of CO_2) are attributable to the activities that we undertake in our buildings.

Alongside this work we have developed a Buildings Decarbonisation plan, which includes recommendations and key action areas requiring further development. One of these actions is to conduct site specific feasibility to improve our understanding of how to decarbonise high priority sites, particularly at complex locations such as depots. In this regard, we have successfully secured grant funding through the Low Carbon Skills Fund (LCSF) to conduct feasibility work and generate Heat Decarbonisation Plans at eight of our operational buildings, with a further two LCSF applications awaiting a decision for our Commercial Development estate. This feasibility work will complete by March 2023 and will start to build a pipeline of projects that we will continue to develop.

Asset Climate Risk Assessment and Adaptation Reporting Power submission

In April 2022 we published our final submission under the third round of the Adaptation Reporting Power. The report sets out TfL's governance process, strategy for adapting to climate change, main climate risks now and in the future and proposed adaptation measures.

The climate risk assessment conducted for this report demonstrates that all of our assets, operations and services, staff and customers carry some degree of weather and future climate-related risk. The assessment identified 333 climate risks using the Met Office's latest climate projections and best professional judgement from a wide range of colleagues across the business.

We are now using the report and risk assessment to identify and prioritise actions for our forthcoming Adaptation Plan. This includes actions on governance, processes and decision-making, data and evidence, TfL's adaptive capacity, and collaboration and interdependencies. This is due to be published later in 2022.

We are also using the climate risk assessment to inform the development of our research programme, as well as in internal and external collaborative work, including with the Rail and Safety Standards Board's Climate Change Adaptation Working Group, Transport Adaptation Steering Group, and Infrastructure Operators Adaptation Forum.

Pan-London surface water flooding

The Transition Group, responsible for helping to transform the way that London plans for and responds to surface water flooding, held a stakeholder workshop in June 2022, ahead of the one-year anniversary of the July 2021 flood events. The workshop introduced the work done by the Task & Finish Group and the purpose of the Transition

Group. As well as the intention to establish a new, pan-London Strategic Forum for coordinated management of surface water flood risk, and the development of a pan-London surface water flood risk management strategy. It also began the process of creating a vision and scope for the strategy. Representatives from 27 boroughs attended, together with representatives from Thames Water, TfL, the Environment Agency, the GLA and other key stakeholders.

In July 2022, the London Councils Transport & Environment Committee discussed and approved a Transition Group paper on the governance of the Strategic Forum, including membership and roles and responsibilities. TfL will be represented by our Chief Safety, Health & Environment Officer. A detailed Terms of Reference will be produced as part of a funding bid to the Thames Regional Flood and Coastal Committee to support an independent Chair, secretariat and strategy officer.

July Heatwave

In July, the UK experienced a heatwave that was severe enough to warrant the Met Office issuing a Red Extreme Heat Warning for the first time. The 18 and 19 July 2022 were record-breaking days for both minimum and maximum temperatures. TfL staff, contractors and customers responded to the challenges of the event with great professionalism and resilience and TfL is incredibly proud and grateful for all they did to keep everyone safe.

Our operational response worked effectively, and there was extensive adverse weather planning and intensive and agile management of our response and coordination with other agencies prior, during and following the extreme weather. We experienced both planned and unplanned impacts on our operations and construction activities.

Planned measures (some of which were at short notice) included standing up a major incident command structure, implementing adverse weather plans (which include preparing for potential flash flooding that might follow the heatwave due to potential for thunderstorms). We also implemented speed restrictions, service suspensions (Cable Car due to cabin temperature, multiple line suspensions), traffic diversions, early closure of construction sites and reduced staff availability.

Our staff and customer communications were advising people:

- Not to travel unless necessary,
- That there would be widespread speed restrictions,
- To stay well hydrated by drinking plenty of water,
- To stay cool by adjusting their clothing to prevent overheating, where safe and practical to do so,

- To look out for those who may struggle to keep themselves cool and hydrated including young children and babies, older people, those with underlying conditions and those who live alone are particularly at risk,
- To try to stay in the shade and keep out of the sun between 11.00 and 15.00 when UV rays are strongest
- To always wear sun cream,
- To always travel with a bottle of water.

Tube travel reduced by 24 per cent on 18 July in comparison to the previous week, and by 34 per cent on 19 July. Bus travel reduced by 13 per cent on 18 July in comparison to the previous week, and by 19 per cent on 19 July.

There were also knock-on impacts on TfL services and operations due to issues for national rail services in the Southeast as a result of the heatwave. These included widespread impacts on London commuter services and National Rail services in London, including into Wednesday 20 July, resulting in reduced ridership and staff availability.

Unplanned incidents included asset failures (trains, ferries, signals, points, pumps, air conditioning, Electric Vehicle chargers and track circuit failures, fallen trees, track buckling, sagging overhead cables etc), police assisted customer evacuations of stuck trains, multiple fires (small and large, one of which – a trackside fire between Upney to Becontree 500 metres past footbridge - was declared as a CAT1 incident). There were also several cases of staff and customers becoming unwell due to heat.

We are working to understand and learn from these incidents so we can continue to improve and build insights and action into our forthcoming pan-TfL Adaptation Plan.

Green Infrastructure

Development of full Natural Capital Account

Natural capital accounting is the process of considering the value of the environment in business decision making and reporting.

This is the first time that we have assessed our whole estate and carried out a monetary valuation of our natural capital. The main objective was to develop a better understanding of how a natural capital approach can support TfL's strategies and operations. The Natural Capital Protocol was followed throughout, a four-stage assessment that provides a robust, credible and replicable assessment that is also in line with British Standards.

Our natural capital assets support significant value to Londoners and global society. They provide numerous, important benefits ranging from air quality, carbon sequestration, biodiversity, visual screening, shading and cooling to mental health and education that have been included in the assessment.

Due to the complex nature of our organisation, we have identified several data gaps that we intend to fill to improve future natural capital accounts and are working to embed the natural capital approach into business activities, including project delivery, asset strategy, and maintenance.

TfL is one of the first Transport and Infrastructure organisations to look at natural capital in this depth. This provides us with a great opportunity to show leadership and to share learning with other organisations in the sector.

The natural capital account will help inform the development of a pan-TfL Green Infrastructure and Biodiversity Plan.

Wildflower verges

Following the successful trial of six wildflower verge sites from 2019, we are currently identifying additional sites that will be suitable from a safety and visual amenity perspective. We are currently managing 108,000 square metres of roadside verge – 6.5 per cent of the road network – for biodiversity.

Verges have considerable potential for boosting biodiversity and can be cost-effective due to their management requirements, including reduced cutting frequency (allows wildflowers to grow and set seed) and collecting the clippings (reduces nutrient levels, allowing wildflowers to compete & reduces growth levels).

TfL's six pilot sites have been selected based on: vegetation suitability, proximity to residential areas and maintainability & safety considerations. We are continuing to assess the potential for further sites.

Safety, Sustainability and Human Resource Panel

Date: **14 September 2022**

Item: **Safety, Health and Environment Assurance Report**

This paper will be considered in public

1 Summary

1.1 The purpose of this report is to give the Panel an overview of the effectiveness of the risk controls for Enterprise Risk 1 (ER1) – Major safety, health or environmental incident or crisis based on second line of defence audit work by the Quality, Safety and Security Assurance (QSSA) team. Information is also provided on Enterprise Risk 12 (ER12) – Asset condition unable to support TfL outcomes and Enterprise Risk 4 (ER4) – Major Security Incident as they correlate to ER1.

1.2 The appendices provide a list of audits undertaken in Quarter 1 of 2022/23 (1 April to 25 June 2022) (Q1). Audit reports issued are given a conclusion of 'well controlled, adequately controlled, requires improvement or poorly controlled'. Individual findings within audit reports are rated as high, medium or low priority.

1.3 Performance data is provided on progress against the audit plan, audit ratings, rating trends by Enterprise Risk and business unit and progress against actions, with comparisons provided across the last two years.

2 Recommendation

2.1 **The Panel is asked to note the report.**

3 Annual Quality, Safety and Security Assurance Audit Plan

3.1 The annual QSSA audit plan contains a series of second line of defence audits that address ER1, ER4 and ER12.

3.2 The 2022/23 annual audit plan was finalised in Quarter 4 of 2021/22 in consultation with the Safety, Health and Environment (SHE), Operations, Maintenance, Engineering Directorates and Security teams to identify where assurance is required or where there are performance or compliance concerns. Each audit has an identified sponsor within TfL to whom assurance is provided, typically a management system or risk owner or an assurance function. In Quarter 2 of 2022/23 (26 June to 17 September 2022) (Q2) the 2022/23 audit plan for Quarter 3 and Quarter 4 of 2022/23 will be checked with audit sponsors to ensure it reflects current risks and assurance needs.

4 Work of Note this Quarter

4.1 ER1 was reviewed by the TfL Executive Committee on 1 June 2022 and has been updated to reflect a post-coronavirus pandemic environment and includes new preventative actions. Feedback from the Executive Committee has been incorporated into ER1. The overall risk assessment ratings for ER1 remain the same.

4.2 Internal Audit have three ER1 audits in progress in Q1 concerning climate adaptation data management and two audits on the reporting and procurement of a digital monitoring and assurance system. There were no ER1 Internal Audit reports issued in Q1.

4.3 A total of 10 second line QSSA audits were delivered in Q1, this is 17 per cent of the six-month programme for Q1-2 and is therefore behind the target of 50 per cent for Q1. However, early data from the first few weeks of Q2 shows progress increased to 43 per cent and therefore recovery is underway. No audits were rated as 'Poorly Controlled' or 'Requires Improvement' in Q1. The breakdown of the Q1 audits by risk is below (see Appendix 1 for the full detail of audits completed in Q1):

(a) ER1 – seven audits: six Integrated Systems Audits of London Underground (LU) (not rated) and one 'Adequately controlled';
(b) ER4 – one audit 'Adequately controlled'; and
(c) ER12 – two audits 'Adequately controlled'.

4.4 In Q1, six integrated systems audits of LU Operations and Maintenance teams were delivered, providing assurance of key management system requirements addressing local SHE, security, assets, competence and financial controls.

5 Cancelled and Deferred Work

5.1 There were no audits cancelled or deferred in Q1.

6 Performance and Trends

6.1 Comparing the last four quarters (Quarter 2 of 2021/22 to Q1) with the four prior quarters, the data shows a greater number of audits were completed in 2022/23 than 2021/22 (84 compared with 66). This difference is predominantly due to the Integrated Systems audits being put on hold due to social distancing rules in place at the time, whereas other audits were able to be completed using online meeting tools. The profile of audits undertaken within each Chief Officer team is generally consistent across the eight quarters, as is the ratio of audit conclusions.

6.2 When comparing the audit conclusions against the associated Enterprise Risks over the two years, the distribution of conclusions by risk is broadly consistent, indicating there has been no significant change in risk identified by our audits. However, it should be noted that the audit plan is different each year so there are limitations to direct comparisons.

6.3 The graphs in Appendix 2 show there was an increase in the number of audits completed against ER1 in the last four quarters compared with the previous year. Conversely, there was a reduction in the number of audits completed against ER12 in the last four quarters compared with the previous year. There are differences in the number of audits undertaken against individual risks when comparing years. However, when viewed over a two to three year period such annual fluctuations evens out.

6.4 There had been a steady increasing trend of actions been closed on time which is now starting to plateau: steadying from 68 to 40 per cent and in response we have increased and escalated our reporting on overdue actions to senior management. There has been a small increase in the number of actions granted extensions (in compliance with our procedure) from 13 to 15 per cent.

6.5 There are currently 56 overdue actions which has decreased from a peak of 68 during Q1. It is noted that the actions from three audits in three different areas of TfL make up 50 per cent of the total number of significantly overdue actions. Actionees receive routine reminders from the Audit team and overdue actions are escalated to the applicable management teams to try and resolve. Chief Officers also receive reports that include overdue actions within their teams which the Director of Risk and Assurance discusses with them in quarterly meetings.

6.6 The greatest number of overdue actions is in the Chief Operating Officer's (COO) team which is where the majority of our audits are conducted. The overdue actions table is slightly polarised with 22 significantly overdue actions (over 200 days) and the remainder of the actions following a more normal pattern of closure within 60 days of the deadline. COO has recently started an initiative to ensure these overdue actions receive additional focus and as many are closed out as soon as possible.

7 Improving SHE Assurance Tools and Processes

7.1 SHE has entered the planning phase of the iAuditor implementation project. This solution enables local management teams to confirm compliance with the SHE management system easily and systematically, highlighting areas for improvement. This self-assurance capability (first line assurance) will give senior officers in TfL greater visibility of how well the SHE management system is being implemented in their areas of accountability. It will also provide a valuable leading indicator (an indicator of potential SHE risk before it manifests as harm) that can inform decision making.

7.2 The SHE Insights and Direction team is currently in discussion with the QSSA and Internal Audit teams to develop a holistic approach to prioritising SHE audits. The intention is to develop an approach that draws not only from SHE assurance data but also from SHE risk management and identification processes, such as ER1, SHE Priorities and current strategic thinking in SHE. This aligns with the desire to move toward a more systematic, risk-based, evidence-driven approach to planning SHE related audits.

List of appendices:

Appendix 1: QSS Assurance, Audits Completed in Q1 against ER1, ER4 and ER12

Appendix 2: QSS Assurance, Audit Data

List of Background Papers:

None

Contact: Mike Shirbon, Head of Quality, Safety and Security Assurance
Email: Mike.shirbon@tube.tfl.gov.uk

Appendix 1 – Quality, Safety and Security Assurance Audits Completed in Quarter 1 of 2022/23 against ER1, ER4 and ER12

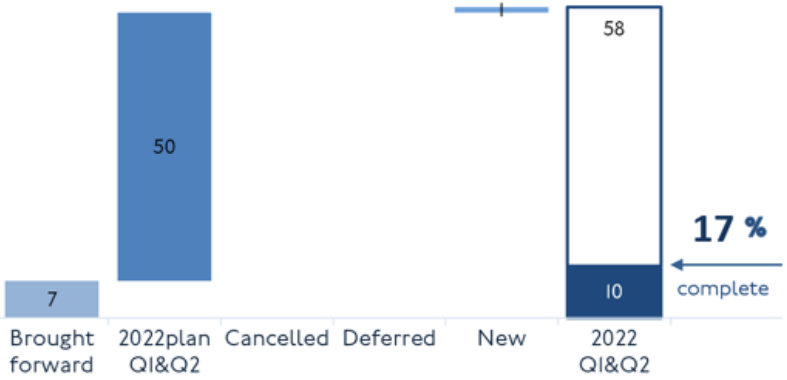
Enterprise Risk	Directorate	Ref.	Audit Title	Objective	Conclusion	Summary of Findings
ER01 - Major safety, health or environmental incident or crisis	LU Customer Operations	21 723	Bakerloo Service Control Integrated Systems Audit	To provide assurance that key requirements contained in the management system are being met	Not Rated	68% Conformance, 23 Green, 1 Amber, 10 Red (compliant, minor non-compliance, major non-compliance)
	LU Asset Performance and Capital Delivery	21 729	Upminster Rolling Stock Depot Integrated Systems Audit	To provide assurance that key requirements contained in the management system are being met	Not Rated	68% Conformance, 41 Green, 3 Amber, 16 Red (compliant, minor non-compliance, major non-compliance)
	LU Customer Operations	22 701	Acton Town Area Integrated Systems Audit	To provide assurance that key requirements contained in the management system are being met	Not Rated	68% Conformance, 39 Green, 1 Amber, 17 Red (compliant, minor non-compliance, major non-compliance)
	LU Customer Operations	22 702	Baker Street Area Integrated Systems Audit	To provide assurance that key requirements contained in the management system are being met	Not Rated	71% Conformance, 39 Green, 3 Amber, 13 Red (compliant, minor non-compliance, major non-compliance)
	LU Customer Operations	22 703	Victoria Service Control Integrated Systems Audit	To provide assurance that key requirements contained in the management system are being met	Not Rated	79% Conformance
	LU Customer Operations	22 704	Kentish Town Area Integrated Systems Audit	To provide assurance that key requirements contained in the management system are being met	Not Rated	76% Conformance, 42 Green, 2 Amber, 11 Red (compliant, minor non-compliance, major non-compliance)

Enterprise Risk	Directorate	Ref.	Audit Title	Objective	Conclusion	Summary of Findings
	Rail and Sponsored Services	21 772	DLR Rolling Stock Door System Maintenance	To seek assurance that DLR Rolling Stock door system maintenance is managed by Keolis Amey Docklands in accordance with the requirements in MR-100 Maintenance Management Standard and MR-700 Maintenance Standard for Rolling Stock.	Adequately Controlled	There are minor weaknesses that are unlikely to impact on the management of risks or meeting objectives. Three medium priority finding were raised to enhance documentation control and follow up on known issues.
ER04 Major Security Incident	Strategy & Chief Technology Officer	21 797	Management of Network and Information System Regulations Compliance	To seek assurance that TfL is meeting its obligations under the Network Information Systems (NIS) Regulations regarding the management of a framework of assessments	Adequately Controlled	The Cyber Security team have established a clear governance and control structure and newly created policies. Work is required and underway to strengthen risk management and incident response management.
ER12 Asset condition unable to support TfL outcomes	LU Asset Performance and Capital Delivery	22 719	Signals Authority to Work Certificates (AWC) Process	To provide assurance that the requirements of Pr0536 is being implemented which ensures that signals works are carried out safely and to quality requirements	Adequately Controlled	Requirements for Authority to Work Certificates were implemented by the Asset Control Centre and records well maintained.
	LU Asset Performance and Capital Delivery	22 732	Hammersmith Service Control Centre Maintenance and Control of Software Configuration	To provide assurance that control centre equipment is maintained in accordance with G0199E	Adequately Controlled	Apart from two issues, the signalling at Hammersmith Service Control Centre was found to be effectively maintained, cleaned, and managed in compliance with an established standard and guidance.

Appendix 2 : Quality Safety Security Audit Summary

Q1 2022/23

Audit Progress against half year plan Q1-2 2022/23



Open Audit Actions - Overall TfL Performance (6-Period trend)

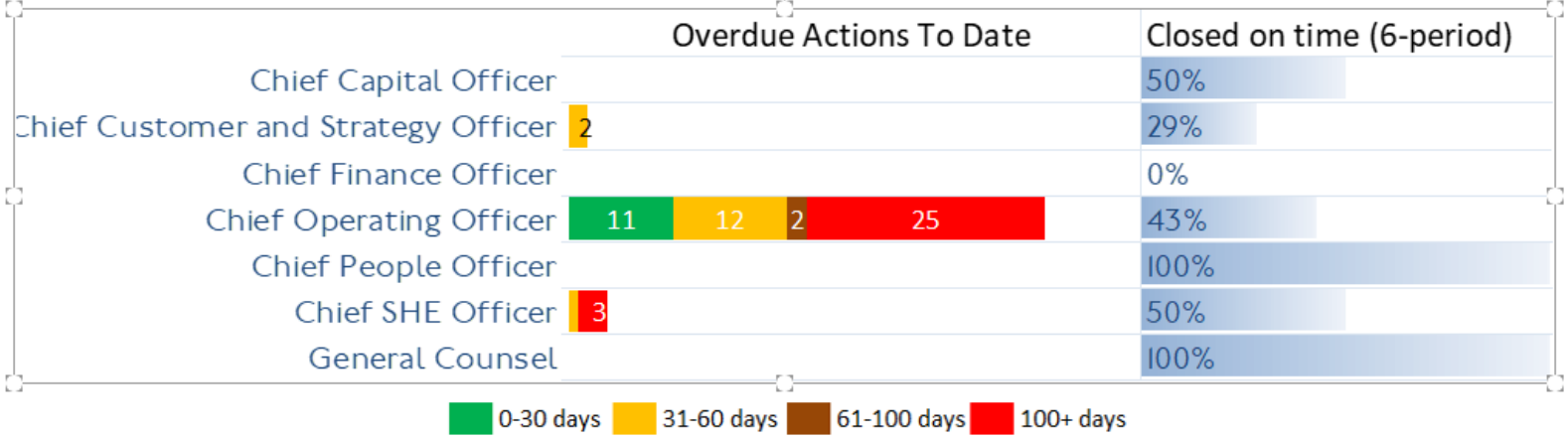
Measure	No.	%	6-period rolling trend
No. Actions Closed on time	41	40%	
No. Actions Extended	16	15%	

56 Overdue

Out Of

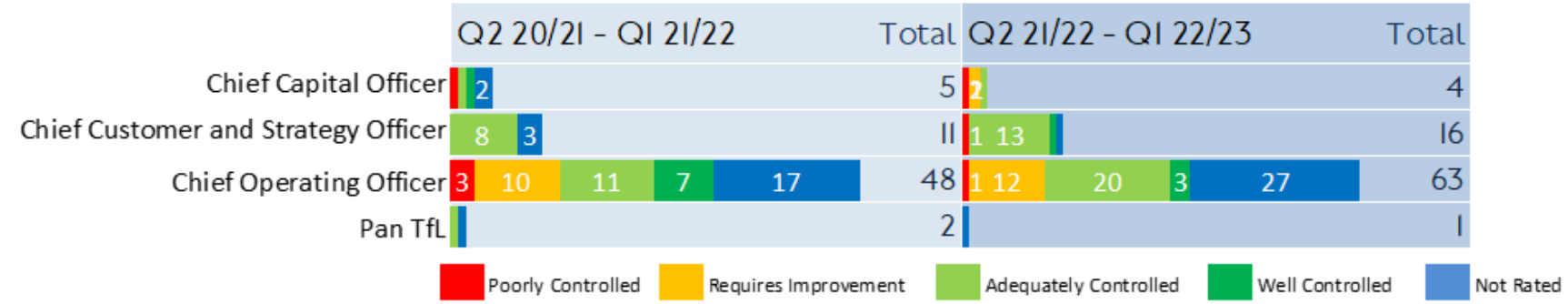
105 Open

Action Management - Overdue Action by Directorate by Overdue Days

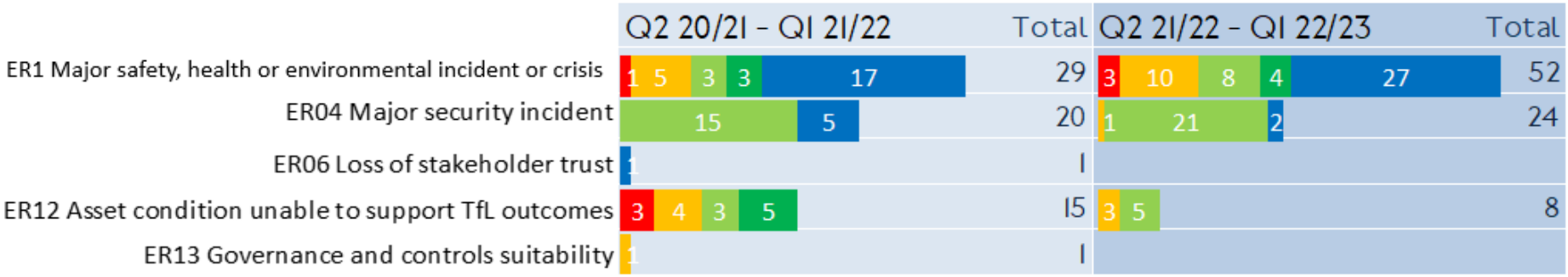


Appendix 2 : Quality Safety Security Audit Summary Q1 2022/23

Audit Conclusion Trends by Chief Officer Team (over 4 quarters)



Audit Conclusion Trends by Enterprise Risk (over 4 quarters)



Safety, Sustainability and Human Resources Panel

Date: **14 September 2022**

Item: **TfL Sustainability Report and Corporate Environment Plan Progress Report**

This paper will be considered in public

1 Summary

1.1 Last September, we published our first ever Sustainability Report and Corporate Environment Plan (CEP), in order to outline our approach to sustainability and environment to our customers, staff and suppliers.

1.2 The Sustainability Report is structured around the three pillars of sustainability (society, environment, and economy) and the CEP provides more detail on our plans and ambitions for the environment pillar.

1.3 This paper provides an update on key metrics one year after publication and our ongoing progress against key sustainability themes and our CEP. Section 6 of the report highlights work to implement the CEP by TfL Operations Office and Section 7 highlights work to implement the CEP in our Capital Office. A summary of our efforts to embed and improve our approach sustainability within TfL is provided in Section 9.

Key points

1.4 Society

(a) **Safe**: We have published our Vision Zero Action Progress Report introducing new and updated measures to help ensure we continue to work towards our target of eliminating deaths and serious injuries from London's roads. We have progressed actions set out in our work-related violence and aggression strategy, including recruitment of Transport Support Enforcement Officers. We continue to make good progress with our programme of activities to end violence against women and girls, while also looking at what more we can do;

(b) **Inclusive**: In November 2021, we published our equalities objectives setting out our commitments on equality. It has 13 objectives which are underpinned by the way we treats our customers, supports our people and works with partners. Over half of all stations (>50 per cent) on our network are now step-free; and

(c) **Healthy**: We continue to roll out our Well@TfL programme to support our colleagues in improving their health. We have successfully rolled out Health Surveillance for exposure to skin and respiratory hazards within the workplace.

1.5 Environment

(a) **Decarbonisation**: We have continued to introduce zero emission buses as we aim to reach a fully zero emission fleet. We launched our first tender for renewable energy Power Purchase Agreements. We have identified opportunities to improve energy efficiency and reduce carbon emissions from our building estate and we are working to develop an ongoing pipeline of funded projects to progress this. We continue to improve our understanding of infrastructure and wider supply chain carbon emissions and build the tools and capability needed for reduction;

(b) **Adapting to climate change**: Extreme rainfall and heat events in 2021 and this year have highlighted the degree of risk climate change poses to London's transport network. Our asset climate risk assessment provides the most detailed picture to date on the potential impacts of the changing climate, but we have much to do to embed adaptation across our business processes. This will be set out in our forthcoming Adaptation Plan;

(c) **Green infrastructure and Biodiversity**: We have continued to increase street tree numbers and have successfully delivered Sustainable Drainage Systems (SuDS) on the network. We have developed an initial pan-TfL Natural Capital Account for the organisation, detailing the value to TfL and Londoners of TfL's green estate. We are working to develop tools to embed and maintain the Natural Capital Account within our processes and decision making, which will be described in our forthcoming Green Infrastructure and Biodiversity Plan that will be published next year; and

(d) **Air Quality**: Expansion of the Ultra Low Emission Zone (ULEZ) in October 2021 to cover the area within the North and South Circular roads has had a transformative effect on air quality. Levels of nitrogen dioxide in the zone are 20 per cent lower than they would have been without the expansion and this is in addition to the step change in better air quality delivered by the original central London ULEZ. In May 2022, TfL launched a consultation on proposals to further expand the Ultra Low Emission Zone (ULEZ), to cover almost the whole of the capital.

1.6 Economy

(a) **Financial Stability**: Our 2022/23 Budget sets the trajectory to achieve financial sustainability from April 2023. This year will be the last year we require extraordinary Government revenue support due to the pandemic as we return to financial sustainability.

(b) **Responsible Procurement**: We have approved the GLA Group Responsible Procurement Implementation Plan, committing TfL to further ambitions, targets and reporting metrics to demonstrate delivery of the Mayor's Responsible Procurement Policy; and

(c) **Security Risk Management**: We are continuing to progress our Security Improvement Programmes across the organisation and are delivering

the Security Governance and Culture programme. We have a pan TfL security scorecard to measure our progress to achieving 'competent' security maturity. defined as a consistent approach to security.

1.7 Significant progress has been made across TfL's sustainability objectives in the last year, despite our current financial constraints. However, more action is still required across the organisation to meet our environmental and sustainability challenges, particularly around embedding decarbonisation and climate change adaptation requirements in TfL's activities.

2 Recommendation

2.1 **The Panel is asked to note the 2022 progress update to the Sustainability Report and Corporate Environment Plan described in this paper.**

3 Background

3.1 The TfL Sustainability report published in 2021 reported the social, environmental and economic outcomes TfL delivers as an organisation. It provides an account of work to date, including key metrics to measure performance.

3.2 The Corporate Environment Plan (CEP) published in 2021 sets out TfL's future approach to improving its organisational performance. It is a forward-looking plan with a focus on the environment strand of sustainability, providing more detail on our ambition, targets and plans.

Sustainability Report

3.3 The 2021 report acted as a baseline to help us understand our progress against our strategy, commitments and priorities. We used the Global Reporting Initiative (GRI) Sustainability Reporting standards to guide the development of the report. The voluntary GRI standards help translate the UN Sustainable Development Goals down to an organisational level. We intend to strengthen future iterations of our Sustainability Report and ultimately work towards a GRI compliant report.

3.4 The 2021 Sustainability report and this 2022 update is structured around the three pillars of sustainability:

(a) **Society** - Caring about our colleagues, customers and communities through safe, healthy and accessible transport services;

(b) **Environment** – Operating in a sustainable way, to protect and regenerate the natural world; and

(c) **Economy** – Being financially sustainable to provide a resilient and good quality of life for all.

3.5 We have increased reporting on our sustainability performance through the TfL Annual Report. Our 2021/22 report includes our first reporting of climate-related risks and opportunities to the organisation under the Taskforce for Climate-Related Financial Disclosures (TCFD) framework.

3.6 The Mayor's Budget Guidance 2023-24[1], issued in July, included a requirement for 'Climate Budgeting" for the first time. London's first climate budget will focus on the Greater London Authority Group operational emissions (scope 1 and 2); however, this focus may broaden beyond the Group in the future. Ultimately, the ambition of the London Climate Budget is to cover all actions reducing Greenhouse Gas (GHG) emissions in London (both within its boundaries and from the goods and services it consumes) and the measures supporting London's adaptation to climate change.

3.7 We will report annually to the panel on our progress and performance against our Sustainability Report metrics and will publish new versions of the report itself on a regular, but not necessarily annual, basis.

3.8 The landscape of sustainability reporting standards and frameworks is complex and fast evolving. It is particularly noteworthy that the International Financial Reporting Standards (IFRS) Foundation has established the International Sustainability Standards Board (ISSB)[2] and are working to establish a comprehensive global baseline of sustainability disclosures. The new baseline is building upon existing sustainability disclosure standards, including those of the Task Force on Climate-related Financial Disclosures (TCFD), the Climate Disclosure Standards Board (CDSB), SASB Standards, Integrated Reporting, the World Economic Forum and the Global Reporting Initiative (GRI). We will keep the ISSB's work under review to inform our approach to future sustainability reporting and disclosures.

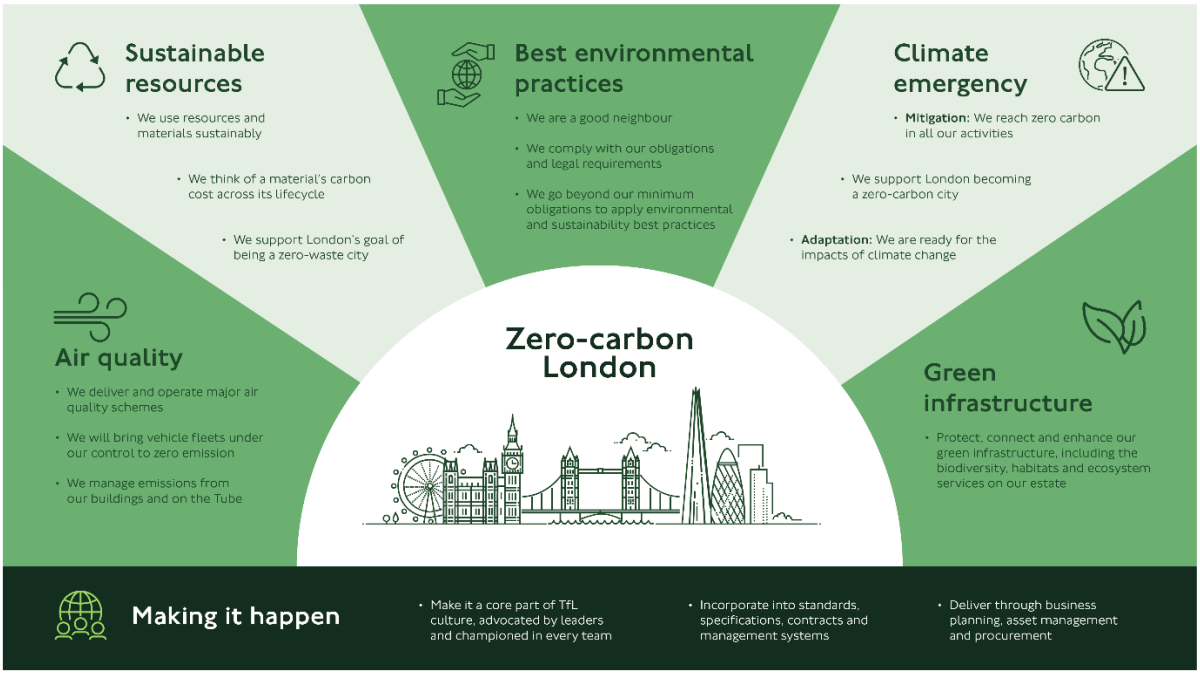
[1] https://www.london.gov.uk/sites/default/files/mayors_budget_guidance_2023-24.pdf

[2] IFRS Foundation merged with the Climate Disclosure Standards Board (CDSB) and the Value Reporting Foundation (VRF). The VRF was a global non-profit organisation, itself formed from the merger of the Sustainability Accounting Standards Board (SASB) Foundation and the International Integrated Reporting Council (IIRC).

Corporate Environment Plan (CEP)

3.9 Our CEP sets out our environmental ambition and how we will achieve this through our operations, maintenance and construction activities. It forms the detailed environmental pillar of our sustainable development approach.

3.10 CEP framework and ambitions are structured around five environmental themes: Climate Emergency, Air Quality, Green Infrastructure, Sustainable Resources and Best Environmental Practices.



3.11 Our CEP is underpinned by actions required to “Make it happen”. This includes the need to:

(a) make it a core part of TfL culture, advocated by leaders and championed in every team;

(b) incorporate into standards, specifications, contracts and management systems; and

(c) deliver through business planning, asset management and procurement.

3.12 A summary of our work to achieve the above is covered in section 9 of this paper on ‘Embedding sustainability at TfL’. The following sections of this paper provide an update on progress on ongoing work against each of the Sustainability Report and CEP themes.

4 Society

4.1 Themes under this pillar include:

- **Safe:** Safety is our top priority. Our Vision Zero ambition aims to eliminate deaths and serious injuries on our transport networks, construction and operational sites.
- **Inclusive:** We strive to have an accessible and inclusive workplace and transport network.
- **Healthy:** Enabling more cycling and walking will support a healthier, more inclusive London. We want a healthy and happy workforce.
- **Thriving:** We encourage the connectivity among people, trade and culture, celebrating London's unique identity.

Safe

4.2 **Vision Zero Action Plan:** In 2021, we published our Vision Zero action plan progress report. Vision Zero is our fundamental belief that no death or serious injury on London's transport network is acceptable or inevitable, firmly positioned at the heart of the Mayor's Transport Strategy.

4.3 The safety of London's streets has long been a focus for us, the boroughs and the police. In 2018, we published our first Vision Zero action plan, which set out how we will eliminate deaths and serious injuries from London's streets by 2041. Three years on, we refreshed the action plan. In doing so, we highlighted the significant achievements made to date, shared new insight and understanding, and outlined new priorities and challenges for Vision Zero over the new Mayoral term.

4.4 **Bus Safety:** TfL has committed to producing a Bus Safety Programme Strategy that will set out the approach to achieving Vision Zero for buses, the alignment with Vision Zero as a whole and the role played by the specific projects in TfL's investment programme. The development of this strategy is at an advanced stage and bus driver engagement sessions and stakeholder workshops have already been undertaken.

4.5 **Work-related Violence and Aggression:** The safety of our workforce is a priority, and we are committed to preventing violence and aggression on our network by tackling the causes and providing support to those who experience it. Our work-related violence and aggression strategy was approved by the Safety, Sustainability and HR Panel in June 2021. In it, we outline our actions around this work.

4.6 Our Transport Support Enforcement Officers, who work closely with the British Transport Police, are trained and equipped to deal with the triggers of work-related violence and aggression through engagement, enforcement and problem-solving. We recruited a total of 90 officers by the end of 2021/22 and we aim to increase this to 135 by the end of 2022/23.

4.7 Fare evasion remains the biggest trigger for this type of violence. We are recruiting 60 new Revenue Control Officers as part of our strategy to help tackle fare evasion on the London Underground network. There are 27 fully trained officers working across our network and we started training the additional officers in July 2022.

4.8 We have just approved plans to double the size of our work-related violence and aggression (WVA) team with new, dedicated staff working on WVA Prevention Activity to tackle the causes of WVA and one pan-TfL Support and Investigations Team who will support colleagues who experience WVA and provide assistance to the police forces investigating those crimes.

4.9 Ensuring our staff have up to date safety equipment is an essential part of our strategy. All our frontline customer services staff have access to body worn video cameras and we are now rolling these out to other groups of staff, and we plan to roll out additional body-worn cameras, following a successful initial roll out. Emergency communication devices are also being provided for staff where there is an operational need.

4.10 **Violence against women and girls:** We continue to make good progress with our programme of activities to end violence against women and girls, while also looking at what more we can do. On 15 June 2022, the Mayor published his strategy for tackling violence against women and girls. We are proud to have been involved in its development and will work with the Mayor's Office for Policing and Crime and other partners to deliver on it. Additionally, on 4 July 2022, the British Transport Police (BTP) released the first edition of their new mobile reporting app, 'Railway Guardian', making it easier for customers to report crime and access support. It also provides customers with information on what to do if they see sexual harassment on trains or at stations. We have collaborated with them on the design and continue to work closely on integrating this platform into other apps and tools.

4.11 The delivery of our 'zero tolerance to sexual harassment' training to frontline customer-facing transport staff continues. Our 500 enforcement officers have been trained, and training programmes have launched for staff that work in our bus and Tube stations. This training is supported by a comprehensive internal communications plan to raise awareness and provide guidance to staff. Sexual harassment will also be covered in the new diversity and inclusion training being rolled out to all our bus drivers starting later this year.

4.12 We continue to run our communications campaign across our networks that reinforces our zero tolerance of sexual harassment. The primary aim of the campaign is to send a strong message to offenders that sexual harassment behaviours are wrong, harmful and not tolerated on our network. We want to encourage those who experience any form of sexual harassment on our rail network to report it and to reassure that those reports will be believed and handled sensitively, and to that end, we have seen an increase of 74 per cent in the reporting of sexual harassment behaviours. There were 1,363 reports of sexual harassment made between October 2021, when the campaign launched, and the end of April 2022. This is up from 575 reported offences in the same period the year before.

Inclusive

4.13 **Equalities Objectives:** In November 2021, we published our equalities objectives setting out our commitments on equality. It has 13 objectives which are underpinned by the way TfL treats its customers, supports its people and works with partners. The customer focused objectives relate to affordability (fares and road charging), customer information, safety, customer service, inclusive infrastructure, stakeholder and community engagement, improving the health of all Londoners and embedding inclusion and equality into decision making. TfL's objectives for supporting its workforce relate to workforce representation, fairer internal opportunities, skills development and creating an inclusive culture. Its final objective is to work with partners, suppliers and the wider industry to have inclusion as a core value.

4.14 **Trans and Non-Binary Guidance:** We recently published our Trans and Non-Binary guidance 'Creating Inclusive workplaces for trans and non-binary colleagues' and a set of Conversation Cards. These resources help to support colleagues who identify as Trans or Non-Binary, along with their line managers and other colleagues, consider some of the challenges that may require support on their unique journey. The new guidance is supported by changes to our process and systems that will unlock barriers previously faced by colleagues. With this new resource, we aim to help colleagues navigate a clear path through some of the cultural, legal and technical steps to ensure that at least our working environments are truly inclusive. Every individual's journey and approach to their gender identity and expression will be unique, but by familiarising ourselves with this guidance we can each play our part in creating a shared understanding of what it means to be trans and non-binary inclusive at TfL.

4.15 **Pay Gap Reports**: Earlier this year we published our Gender, Ethnicity and Disability pay gap reports for 2021. It was the first year that we have published our Disability pay gap and this is as per a Mayoral commitment. We know that people with disabilities face many barriers towards, and within, employment. To successfully target barriers from within our organisation, we know that we need to be guided by what our data is telling us. Later this year we will publish our new four year pay gap action plan which sets out the steps we will take to help reduce our pay gaps for women, Black, Asian and minority ethnic and disabled colleagues as referenced in our three pay gap reports.

4.16 **Employee Network Groups**: Last Autumn, following a recruitment campaign, we announced the names of our new Chairs and Vice Chairs for our Staff Network Groups. Our Staff Network Groups (SNG) are part of the wider Employee Network Groups that also include Special Interest Groups. SNGs play a key role in creating a diverse and inclusive workplace where differences are celebrated and our colleagues can share, learn and be inspired. We're very excited to welcome the new Chairs and Vice Chairs onboard. They'll help us create an environment where a deep sense of pride and belonging is embedded into everything we do.

4.17 **Anti-Racism:** On 9 June 2022, we held a hybrid event on the topic of Anti-Racism. Colleagues from across the organisation came together for this event, that aimed to shine a spotlight on our Anti-Racism Leadership Charter

(ARLC) and hear more about its mission to erase workplace racism. It was a chance to drive the conversation forward, discuss the successes and challenges, and most importantly listen to the hurdles and issues people face at the hands of racism, and hear from a range of voices on what more needs to be done. External speakers Afua Hirsch and Nova Reid, both respected authors and activists in this space, joined us to discuss what more we can all do to challenge behaviours and create safe spaces to discuss and tackle this important issue. We also heard from internal colleagues, who bravely shared their own moving and personal experiences of racism, as well as giving colleagues the opportunity to raise questions to members of our senior leadership team. As an organisation, we're committed to ensuring racism is a thing of the past for our colleagues here at TfL.

4.18 **An Accessible Network for all:** Over half of all stations (>50 per cent) on our network are now step-free. We currently have 92 London Underground stations, 62 London Overground stations and all stations across the Elizabeth line route fully step-free. DLR, Tram and Bus remain fully step-free.

4.19 The delivery of the Elizabeth line provides new step-free routes and interchange with other lines, level boarding and wider more spacious trains with plenty of provision for luggage, pushchairs and wheelchairs.

4.20 **Inclusive supply chain:** Through the Supply Chain Sustainability School, TfL is co-funding the Fairness Inclusion and Respect programme with other transport clients (HS2, National Highways and Network Rail) to drive Equality, Diversity and Inclusion best practice in the supply chain as well as within the transport client organisations. This includes requesting diversity data from suppliers and collaborating to tackle issues at an industry level. The programme offers free training, workshops and webinars to upskill our suppliers.

Healthy

4.21 **Phase two of Well@TfL Acton pilot project:** The Acton pilot project aimed to help our colleagues to learn more about their health and how they can improve it. The project started with wellbeing checks, including measurements like cholesterol, blood glucose and blood pressure. Participants were then invited for a three-month follow-up call and six-month follow-up appointment. For those that attended the six-month follow-up health checks there was a significant improvement including:

(a) an average reduction overall in waist circumference;

(b) an average reduction in the mean diastolic and systolic blood pressure recording; and

(c) an average reduction in relative risk (the risk of a cardiovascular event) and an increase in the number of individuals who had the recommended relative risk of 1.0 or below.

4.22 **Well@TfL Mobile Health Unit:** The Well@TfL health bus has been busy since May and is delivering onsite mobile health checks, health surveillance and periodic medicals. The mobile health bus will provide a convenient and

cost-effective way for employees to receive onsite support on their health and wellbeing, as well as to attend medicals. Since launching the Well@TfL project in August 2021, more than 900 employees have received a mobile health check.

4.23 **Health Surveillance:** Health Surveillance for exposure to skin and respiratory hazards within the workplace has been successfully rolled out across TfL with more than 300 people being trained so far to become local skin assessors. Health surveillance programmes help to identify any ill health that may be caused as a result of exposure to these workplace hazards and will continue to be implemented for other risks such as vibration and noise in the coming months.

4.24 **Staff absences:** At TfL mental health problems and musculoskeletal problems are the leading cause of long-term sickness absence. This is the same for organisations across the UK. We continue to provide support and treatment options for these conditions and are exploring evidence-based interventions to reduce risk of these conditions. We are now reporting into the Rail Safety and Standards Board (RSSB) pilot health dashboard. Their first report indicates that absence at TfL due to mental health and most musculoskeletal conditions is lower than other reporting organisations (train operating companies).

4.25 **Covid 19**: As of 31 March 2022, 105 members of our workforce have sadly lost their lives to COVID-19. Each loss is a personal tragedy to their friends, family and colleagues, and our thoughts are with everyone affected. We lost people from across all areas of the organisation and everyone within the organisation pays tribute to the vital role they played in our fight against the pandemic.

4.26 In October 2021, we announced plans to create a memorial in Braham Street Park in Aldgate to commemorate the London transport workers who died from COVID-19 and provide somewhere for their families and friends to visit and remember those they have lost. We are using this opportunity to bring significant improvements to the park while we create the memorial to the transport workers we have lost.

4.27 The initial designs were shared with the bereaved families for feedback and we have continued to involve them throughout the design process. Planning permission for the memorial was granted in April 2022 and the memorial is set to open later this year.

Thriving

4.28 **Everyone's Future Counts:** In March 2022 we published Everyone's Future Counts which for the first time brought together all of our employability and young people outreach work which aims to support those who face barriers in education and getting into or returning to work. Even before the pandemic, many groups of people in London faced much higher levels of underemployment and unemployment. Addressing this inequality and other challenges people in our city face is fundamental to who we are as an organisation and the contribution we make to helping London, and the UK, move ahead.

4.29 **Education to Work:** has supported 9567 students with 91 per cent of them from under-represented backgrounds. Eighty per cent experienced increased confidence in their employability.

4.30 **Ways into Work and Routes back to Work:** has supported 523 participants, with 58 per cent in paid employment within six months of leaving. Eighty-eight per cent experienced increased confidence in their employability.

4.31 **Commencing Work:** has seen progress in our representativeness across our intake. Our total intake for 2021-22 was 61 Graduates, 103 Apprentices and 5 Interns. Of that:

(a) those declaring a disability, we saw an increase of two thirds****;

(b) 38 per cent were individuals from Black, Asian or Minority Ethnicity, compared to 34 per cent last year and surpassing our target of 36 per cent to reflect London's population; and

(c) 33 per cent were women; while this was a decrease from 40 per cent last year, there was a positive trend of women making up 47 per cent of apprentices hired at higher levels 4-6.

4.32 Our focus remains to design person-centred interventions to remedy the barriers people face in education and into employment. As a result, two new 12-week programmes for Ways into Work and Routes Back to Work are currently in design and are scheduled to launch at the end of the year. We continue to focus our education to work outreach on those from lower social economic backgrounds and supporting young people impacted by the pandemic.

Performance metrics: Society

4.33 Table 1 shows an update on our 'Society' metrics compared to our first published report in 2021. We continue to evolve and improve on our Sustainability reporting and some of these measures have therefore been updated to align with our most current reporting approaches.

Table 1

Theme	Measure	2019/20	2020/21	2021/22
Safe	People killed or seriously injured on our roads (number of injuries)	3,624	2,968*	3,899*
	Customer and workforce injuries on public transport (number of people)	11,167	4,497	8,430

Inclusive	Percentage of TfL employees (based on declarations)			
	Women	23.7% as of 31st Mar 2019	24% as of 31st Mar 2020	24.2% as of 31st Mar 2021
	Black Asian Minority Ethnic	30.5% as of 31st Mar 2019	32.5% as of 31st Mar 2020	32.8% as of 31st Mar 2021
	Disability	Not available	Not available	2.8% as of 31st Mar 2021
	Relative additional journey time using the step-free network (minutes)	8.3	7.3	6.8
Healthy	Number of colleagues who feel there is adequate support in place to help them manage their health, safety and wellbeing	60%	65%	62%
	Number of employees completing the MIND Mental Health Awareness training	406	1,134	2,385
Thriving	Number of people progressing from pre-employment programmes to employment within 12 months	29%	44%	Not currently available
	Percentage of TfL graduate starts (based on declarations)			
	Women	22%	25%**	32%***
	Black Asian Minority Ethnic	53%	30%**	45%***
	Disability	Redacted****	Redacted****	Redacted****
	Percentage of TfL apprentice starts (based on declarations)			
	Women	37%	40%**	33%***
	Black Asian Minority Ethnic	36%	34%**	38%***
	Disability	Redacted****	Redacted****	Redacted****

** Numbers for 2020/21 and 2021/22 are provisional and subject to change*

***starts delayed to Jan/April 2021*

****started Sept 2021 and Jan/Feb 2022*

****Actual percentages have been redacted in instances of smaller numbers, to protect the identification of individuals in compliance with the General Data Protection Regulation (GDPR)

5 Environment

5.1 Themes under this pillar are summarised in our Sustainability Report, but more comprehensively set out in our CEP as follows:

- **Climate Emergency:** We will reduce carbon emissions from our activities and ensure we are ready for the impacts of climate change.
- **Air quality:** We will transform our vehicle fleets to zero emission and support broader efforts to clean London's air.
- **Sustainable resources:** We will design for the circular life cycle of resources and materials, supporting London's goal of being a zero-waste city.
- **Green infrastructure:** We will increasingly protect, connect and enhance our green infrastructure, including the biodiversity, habitats and ecosystems services on our estate.
- **Best environmental practices:** We are a good neighbour. We comply with our obligations and legal requirements. We go beyond our minimum obligations to apply environmental and sustainability best practices.[3]

Climate Emergency: Decarbonisation

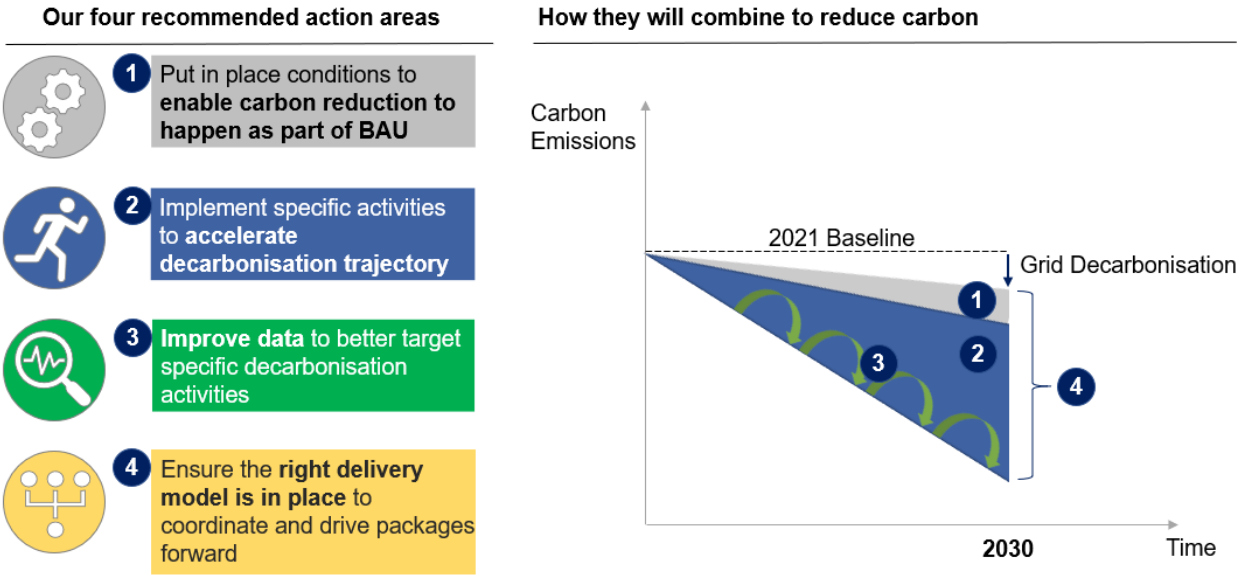
5.2 **Tender Launched for First Power Purchase Agreement:** In June we went out to procure our first Power Purchase Agreement, 'PPA Comet'. This tender aims to purchase more than 10 per cent of our required electricity from 'new build' renewable energy sources. The launch of the tender forms part of TfL's long-term strategy to ensure that all the electricity it uses is generated by 100 per cent renewable sources.

5.3 **Buildings Decarbonisation:** Over the past nine months we have conducted a baseline assessment of the carbon emissions associated with our buildings, using existing data, supplemented with 40 site visits. We have undertaken initial analysis for how we can simultaneously reduce carbon and operational cost. We estimate that approximately 11-12 per cent of TfL's operational carbon emissions (approximately 105 kilotonnes of CO_2) are attributable to the activities that we undertake across our estate of approximately6,000 buildings.

5.4 The energy used by our buildings is estimated to currently cost TfL c£65m per year. However, this is set to increase with rising energy costs. London Underground, Tenanted Estate, Bus Operations and Head Office account for 93 per cent of all emissions. We have developed a Buildings Decarbonisation plan, which includes recommendations and key action areas requiring further development.

[3] 'Best environmental practices' is not a theme of the Sustainability Report, but is included in the CEP, which is a more comprehensive description of our environment sustainability pillar.

Our buildings decarbonisation plan is structured around four action areas:



5.5 One important action is to conduct detailed site-specific feasibility to improve our understanding of how to decarbonise high priority sites, particularly at complex locations such as depots. In this regard, we have successfully secured grant funding through the Low Carbon Skills Fund (LCSF) to conduct feasibility work and generate Heat Decarbonisation Plans at eight of our operational buildings. This feasibility work will complete by March 2023 and will start to build a pipeline of projects that we will continue to develop and deliver.

5.6 **Carbon Literacy training:** We have developed a one-day carbon literacy course for employees, which is fully accredited by the Carbon Literacy Project. As part of this course, employees make two pledges to reduce carbon. The course is currently being piloted prior to full roll out later in the year. We aim to train 500 employees by April 2023, initially prioritising TfL's Capital Office.

5.7 **Understanding our scope 3 emissions:** Building on an initial GLA-wide scope 3 footprint undertaken in 2021, we are currently undertaking a more detailed emissions assessment of our upstream scope 3 emissions. Assessments of whole lifecycle emissions from our Major Projects (section 7.1) and Technology and Data activities have been undertaken. Our full upstream scope 3 footprint will be used to inform overall emissions reduction targets in this area.

Climate Emergency: Adapting to climate change

5.8 **Adaptation Reporting Power:** In April 2022 we published our final submission under the third round of the Adaptation Reporting Power. The report sets out TfL's governance process, strategy for adapting to climate change, main climate risks now and in the future and proposed adaptation measures.

5.9 The climate risk assessment conducted for this report demonstrates that all of our assets, operations and services, staff and passengers carry some degree of weather- and future climate-related risk. The assessment identified 333 climate risks using the Met Office's latest climate projections and best professional judgement from a wide range of colleagues across the entire business.

5.10 We are also using the climate risk assessment to inform the development of our research programme, as well as internal and external collaborative work, including with the Surface Water Transition Group (who are working to set up a new pan-London Surface Water Strategic Forum), Transport Adaptation Steering Group and Infrastructure Operators Adaptation Forum.

5.11 **TfL Adaptation Plan:** TfL's first corporate Adaptation Plan will use the climate risk assessment to set out actions needed to embed adaptation requirements and increase maturity across the business, expanding on the Corporate Environment Plan. The plan includes both business-wide actions to improve governance, improve our evidence base and upskill our people, as well as embedding adaptation requirements within key business processes. The agreed plan will be submitted to the Panel by the end of 2022/23.

Air Quality

5.12 **Expansion of the Ultra Low Emission Zone (ULEZ):** We expanded the ULEZ in October 2021 to cover the area within the North and South Circular roads. The 'six-month on' report on the expanded ULEZ, published 19 July 2022, shows 94 per cent compliance rate inside the zone. Levels of nitrogen dioxide in the zone are 20 per cent lower than they would have been without the expansion. All monitoring sites along the North and South Circular Roads have seen reductions in NO_2.

5.13 In May 2022, TfL launched a consultation on proposals to further expand the Ultra Low Emission Zone (ULEZ), to cover almost the whole of the capital from 29 August 2023.

5.14 The Mayor considered a range of options when deciding the next steps to take in dealing with the 'triple emergency' facing the capital (air pollution, climate change and congestion). In the short-term, if ULEZ is expanded London-wide it will have the biggest effect on air pollution emissions relative to the cost to Londoners as a whole, as well as helping to tackle the climate emergency and traffic congestion.

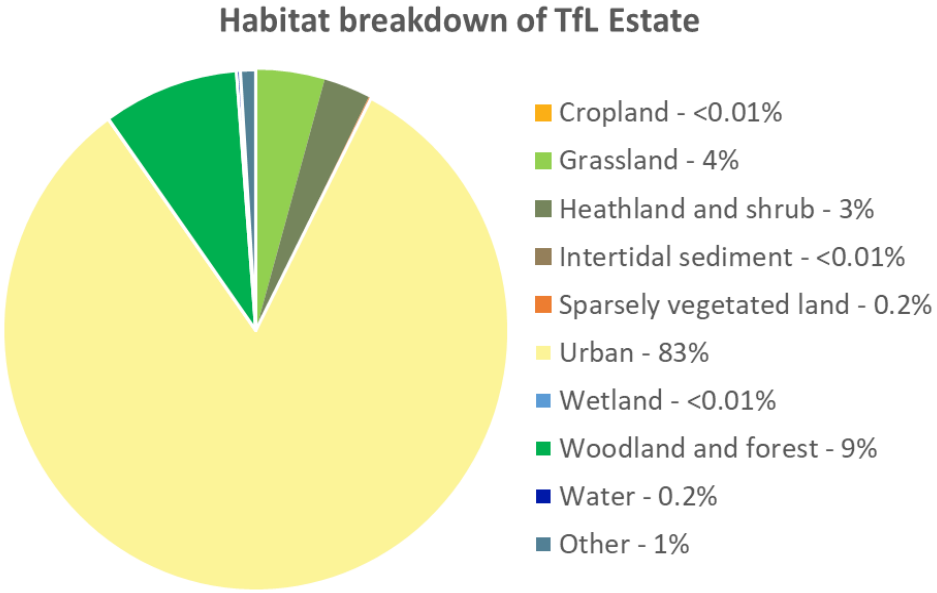
5.15 **Non-Road Mobile Machinery:** We continue to work with the GLA to develop an online portal to monitor compliance with NRMM standards across the GLA group and pilot this on TfL's highways maintenance contracts.

Green Infrastructure

5.16 **Developing TfL's Natural Capital Account**: Natural capital accounting is the process of considering the value of the environment in business decision making and reporting. For the first time, we have assessed our whole estate and carried out a monetary valuation of our natural capital following the Natural Capital Protocol throughout.

5.17 Our natural capital assets support significant value to Londoners and global society. They provide numerous, important benefits ranging from air quality, carbon sequestration, biodiversity, visual screening, shading and cooling to mental health and education that have been included in the assessment.

5.18 Due to the complex nature of our organisation, we have identified several data gaps that we intend to fill to improve future natural capital accounts, and are working to embed the natural capital approach into business activities, including project delivery, asset strategy and maintenance.



5.19 TfL is one of the first transport infrastructure organisations to look at natural capital in this depth, therefore we have great opportunity to show leadership and to share learning with other organisations in the sector.

Sustainable Resources

5.20 **Increased and more efficient use of sustainable resources:** Overall recycling levels remain similar to previous years; however, TfL has increased the number of dedicated recycling services to stations and depots which allows for improved recycling and better staff visibility of recycling.

5.21 We will continue to monitor the improvements in station recycling performance and look to introduce more recycling facilities where possible.

5.22 For example, following a successful trial at Stratford station, we're starting food waste collections at a further two stations working closely with station tenants.

5.23 We also continue to collaborate with the ReLondon partnership engaging with Tier 1 suppliers and contractors and small and medium-sized enterprises (SMEs).

5.24 Working in partnership with the Transport Infrastructure Efficiency Strategy (TIES) project, we have identified a series of future Circular Economy

benchmarks and metrics that could be used across the industry and have rolled out improved reporting systems for collating information from projects.

Best environmental practices

5.25 **Managing our impact:** As part of the Safety Health and Environment Management System (SHEMS) Improvement Workstream, work is currently underway to review and update our existing Environmental Evaluation process which is used to assess project's environmental risks and opportunities.

5.26 TfL is also supporting Defra's efforts to update their noise modelling, which will result in interactive and accurate noise maps that can be used to better target interventions.

Performance Metrics: Environment

5.27 Table 2 shows an update on our 'Environment' metrics compared to our first published report in 2021.

Table 2

Theme	Measure	2019/20	2020/21	2021/22
Climate Emergency	Operational carbon emissions (thousand tonnes per annum)	1,040	862	832
Air Quality	Percentage of bus fleet that are zero emission	3.5%	5.4%	9.2%
	Percentage of support vehicles that are zero emission	2.6%	2.5%	2.3%
Sustainable Resources	Percentage of Commercial and Industrial waste recycled	42%	40%	47%
	Percentage of construction, demolition and excavation waste reused	98.2%	99.26%	89.11%*
Green Infrastructure	Number of trees on our road network	24,234	24,103	24,581

** Results for 2021/22 are provisional and subject to change*

Update to our Roadmap of environmental improvements

5.28 The roadmap below shows an update on our 'Environment' milestones compared to our first published Corporate Environment Plan in 2021.

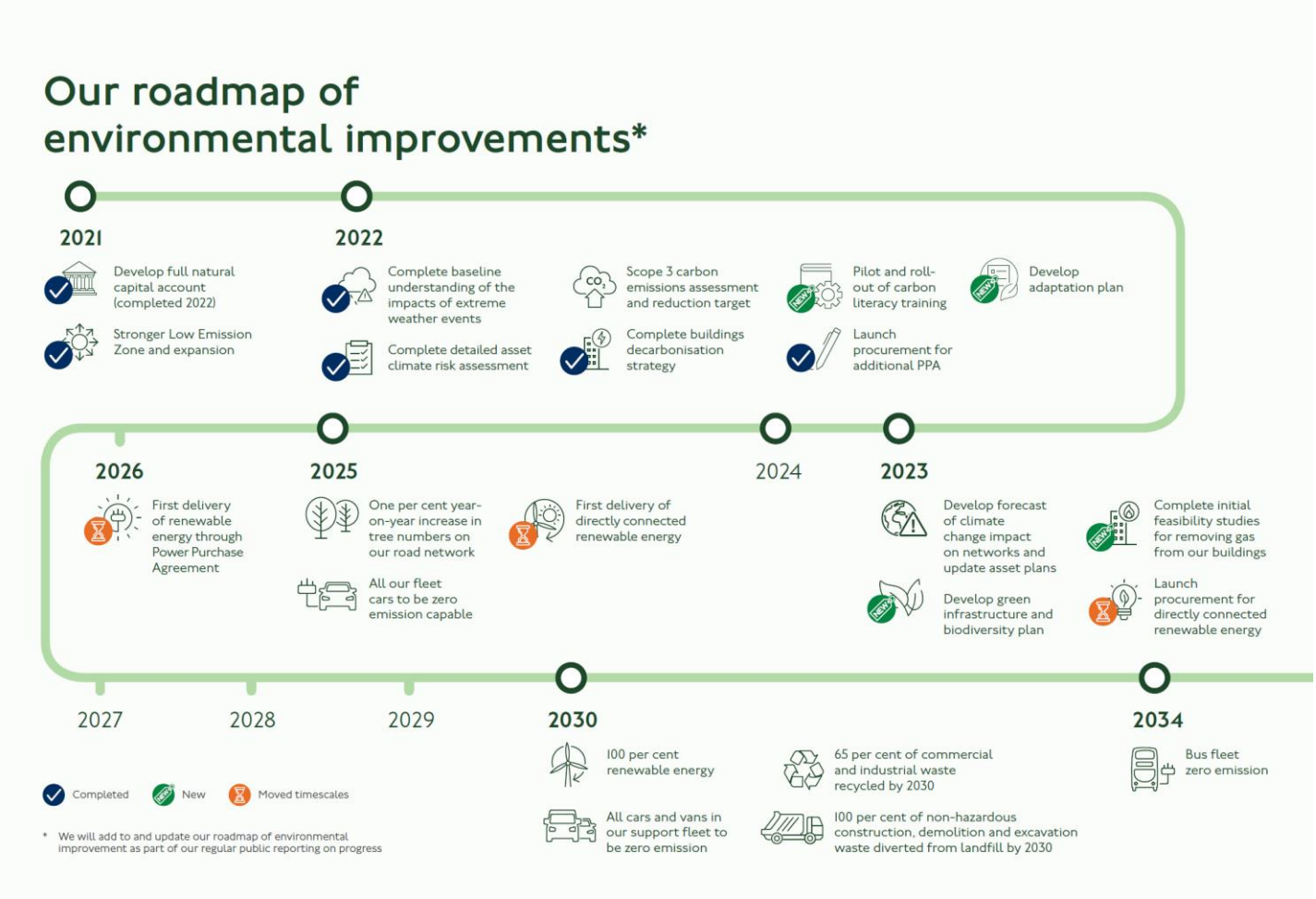
5.29 Some key updates on the roadmap include:

(a) We have delivered our 2021 milestones with the exception of the launch of procurement of directly connected renewable energy which has been delayed to 2023;

(b) We have added new 2022 milestones**,** including strengthening our approach to adapting to the changing climate through the development of a detailed Adaptation Plan**,** and piloting and rolling out carbon literacy training;

(c) We have added new 2023 milestones to address our Green Infrastructure and Climate Emergency priorities; and

(d) We will add to and update our roadmap of environmental improvement as part of our regular public reporting on progress



6 Implementation of the CEP: Operations

6.1 **Zero emission TfL buses:** We are aiming for 10 per cent of our 9,000 buses to be zero-emission by the end of 2022. As of 31 March 2022, there are more than 800 zero emission buses in our fleet, helping us reduce our reliance on diesel, cut harmful emissions and reduce CO_2 in the capital. The fleet also includes 20 double-deck zero-emission hydrogen fuel-cell buses, launched in June 2021, with technology that helps us reduce emissions and ensures our buses emit nothing except water vapour from their propulsion systems.

6.2 **Piloting wildflower verges on the road network:** Verges have considerable potential for boosting biodiversity and can be cost-effective due to their management requirements. We are piloting wildflower verges at six pilot sites, selected based on vegetation suitability, proximity to residential areas and maintainability and safety considerations. Public perception of 'untidy' verges can be a challenge – signage, mowing at the edges close to the road, and better communications have been used and found to help.

A wildflower verge on the A40 in Hillingdon

6.3 **Tree planting:** We remain on track to meet the target of a one per cent year-on-year increase in street tree numbers between 2016 and 2025. In 2021/22 an additional 849 trees were planted, increasing the total number on the network to 24,581.

6.4 **Sustainable Drainage Systems (SuDS):** In November 2021, a raingarden capturing 500m2 of surface water run-off was installed on the TLRN at Elspeth Road in Wandsworth, as part of our commitment to installing Sustainable Drainage Systems (SuDS) on London's road network.

6.5 We have agreed £640k of Thames Water funding for the delivery of sustainable drainage (SuDS) projects on TfL's road network, including outside Edgware Road station, at Tolworth roundabout, Nine Elms Lane and Old Street.

6.6 **Managing Noise from our activities**: Reducing noise on the Underground remains a priority for TfL. We continue to monitor noise levels on the Tube network closely.

6.7 Rail grinding is currently TfL's principal means of addressing Tube noise. We also continue to carry out other targeted interventions to reduce noise (including removing redundant rail joints, maintaining points and crossings and re-ballasting track, where appropriate to the location) and detailed investigations to understand and address the root cause of noise issues such as rail corrugation.

6.8 We are also investigating alternative engineering solutions to manage Tube noise. For example, TfL has been trialling the replacement of Pandrol Vanguard (PV) track fastenings (which impact in-carriage noise) with alternative Delkor track fastenings between Baker Street and St John's Wood on the Jubilee line. The next site for installing Delkor is Camden Town to Euston, where work commenced in July 2022.

6.9 **London Underground Air Quality:** The £4.2m tunnel and track cleaning programme continued in 2021/22, Additional training was provided to help improve targeting of the 10,000 metres of air-quality related track cleaning per month which is carried out using Bac-Vacs, shown to the right.

A colleague using a 'Bac-Vac' to clean a Tube tunnel

6.10 Financial restraints impacted air quality budgets that were in addition to the £4.2m track cleaning budget. However, funding was secured for research and monitoring, and new sources of funding are being explored for trials of new cleaning techniques.

6.11 We have commissioned two academic studies by independent researchers from Imperial College to look at whether Tube dust has an impact on health. The studies will examine:

(a) Sickness absence in workers exposed to tunnel dust to evaluate whether staff exposed to LU tunnel dust have higher levels of sickness absence due to respiratory and cardiovascular conditions; and

(b) Retrospective Cohort Epidemiological study on mortality/morbidity/cancer in LU workers (such as train operators and station staff) exposed to tunnel dust.

6.12 The short-term sickness absence study commenced in 2021. Data collection is in progress and records are being reviewed to determine whether there is any association between employment role, tube dust exposure and absence. The short-term study report is due to be published in 2023, while publication of the long-term report is expected in 2025.

7 Implementation of the CEP: Capital

7.1 **Major Projects Carbon Baseline:** In June 2022, we completed the Major Projects Carbon Baseline Report. This is the first time the whole life carbon baseline for all 10 current Major Projects have been modelled in detail, including the scope and carbon hot spots for each. We will be aiming to reduce whole life carbon impacts in the coming years, by management of carbon through the full Project lifecycle in collaboration with our supply chain. We are now working to expand the De-carbonisation Strategy and carbon baseline across our capital investment portfolio in conjunction with the stand-up of the new Capital Directorate.

7.2 **CEEQUAL**: Projects where the estimated total cost exceeds £5m or the contractor's costs exceed £25m must achieve CEEQUAL certification award level of at least 'Very Good', ideally 'Excellent', and BREEAM (Building Research Establishment Environmental Assessment Method) rating level of at least 'Very Good' and ideally 'Excellent'.

7.3 The Northern line Extension (NLE) project was awarded 'Excellent' Whole Team Award for Civil Engineering Environmental Quality Assessment & Award Scheme (CEEQUAL) in December 2021. This award was achieved by the hard work and commitment of the TfL and Ferrovial Laing O'Rourke teams, with the support from the many suppliers and sub-contractors involved.

8 Economy

8.1 Themes under this pillar include:

- **Economic impact:** We will deliver a transport system for London that supports economic development and create more sustainable buildings and homes.
- **Responsible procurement:** We deliver social value and support our supply chain to become greener, fairer and more inclusive.
- **Financial stability:** Reduction on operational expenditure funding support from central government.
- **Security risk management:** We manage existing and emerging security risks and adopt a zero-tolerance approach to any fraud, bribery or corruption committed against us.

Economic impact

8.2 The pandemic devastated our finances and meant we have had to rely on extraordinary Government funding to fill the gap as ridership significantly declined and our revenues diminished. In total, we have received around £5bn of Government funding over the last two years, on a declining trajectory each year, so that this year will be the last year we require extraordinary Government revenue support due to the pandemic as we return to financial sustainability.

8.3 Our Budget for 2022/23 set out the final step in that path. We had secured £300m from 1 April 2022 to 24 June 2022 with a remaining funding requirement of £900m for the remainder of the financial year to 31 March 2022. The 2022/23 Budget was based on a managed decline scenario which reduced levels of renewals whilst still ensuring safety standards on the network are maintained, and deep service reductions of 18 per cent on buses and 9 percent on tube and rail services.

8.4 On 30 August we reached an agreement with Government to receive base funding of around £1.2bn until 31 March 2024 and ongoing revenue support should passenger numbers not recover at the rate budgeted, which is crucial at this time of ongoing economic uncertainty. It helps us avoid large-scale cuts to services, and means that we will commit £3.6bn to capital investment over the period, with around £200m of new capital funding from Government beyond previously budgeted sources like business rates, which were devolved to the Mayor in 2017. The agreement also allows us to increase our asset

renewal programme to help ensure our network remains reliable, and means we can restore our Healthy Streets programme, making our roads safer, and more attractive for those walking and cycling.

8.5 However, the support offered by Government left an unfunded gap in our budget, which we have been working hard to identify how we will fill. This work has made good progress and we are confident that we will achieve an outcome that allows us to balance our budget and maintain our minimum cash balance. We will need to progress with our plans to further modernise our organisation and make ourselves even more efficient, and we will still face a series of tough choices in the future, but London will move away from the managed decline of the transport network.

8.6 Projects like the Elizabeth line, Barking Riverside extension on London Overground and Northern line extension are examples of transformative projects making a big difference. These projects support the regeneration of the entire area with plans for 10,000 new homes, communities and business spaces and adds to the list of innovative projects that places TfL firmly as a strong, green heartbeat for London.

Responsible Procurement

8.7 TfL has approved the GLA Group Responsible Procurement Implementation Plan (RPIP), which includes various ambitions and reporting metrics, as well as five key targets. The GLA Group will:

(a) apply a minimum weighting of 10 per cent of the total tender evaluation score allocated to responsible procurement and social value;

(b) create 500 supply-chain apprenticeship starts per annum, with progress towards apprentices reflecting London's diversity;

(c) work towards purchasing 20 per cent of goods and services from small and medium-sized enterprises (SMEs), directly or indirectly within the supply chain;

(d) double the number of GLA Group suppliers accredited to the Good Work Standard, from 26 to 52; and

(e) require every new contract over £5m in value to produce an organisational Carbon Reduction Plan; and we will include evaluation criteria in these tenders to encourage bidders to demonstrate their contribution towards London's ambition of being net-zero by 2030.

8.8 The RPIP also commits TfL to further ambitions, targets and reporting metrics to demonstrate delivery of the Mayor's Responsible Procurement Policy. These include, but are not limited to:

(a) training all Procurement and Commercial staff in Carbon Literacy by the end of the Mayoral term;

(b) reporting the number of London Living Wage beneficiaries in the supply chain;

(c) driving the creation of green skills and employment through procurement activity; and

(d) working with medium to high-risk suppliers of modern slavery to ensure they achieve a score of 70 per cent in the Government's Modern Slavery Assessment Tool

8.9 TfL is a signatory to the London Anchor Institutions' Charter addressing the five objectives of the London Recovery Board through procurement and recruitment activity. This includes opening contract and job opportunities to micro, small and diverse businesses. A trial to reserve specific contracts for Small & Medium Enterprises is currently underway as well as a review of indemnity insurance and other requirements that create barriers for small and diverse businesses.

8.10 The Supplier Skills team delivered its annual supply chain apprenticeship fair in February 2022, connecting suppliers with those looking to enter the transport industry. In person pre-employment programmes recommenced in June 2022, Women into Transport and Engineering is being delivered with Alstom, BAI Communications and ADComms. The team also reported 868 new supply chain apprenticeship starts in 2021/22 (53 per cent from a BAME background and 23 per cent were women).

Financial stability

Financial performance: year-to-date, 2022/23

8.11 Our 2022/23 Budget sets the trajectory to achieve financial sustainability from April 2023: Quarter 1 financial performance for 2022/23 is on track against Budget, with passenger income, other operating income and operating costs close to Budget. .

8.12 Our cash balances are expected to average £1.2bn over the remainder of the year, in line with the new funding agreement with government. Passenger journeys continue to recover: The most recent data shows total journeys were 81 per cent of pre-pandemic levels in Period 5 (period ending 20 August 2022), up from 68 per cent at the end of last year. Elizabeth line journeys are 14 million higher than budget following the earlier than expected opening in May 2022. We are still expecting passenger income to be broadly in line with Budget, with average demand of 80 per cent versus pre-pandemic level over the full year.

Security risk management

8.13 TfL is a key player in the safety and security of London with the maintenance and operation of a transport network, that employs thousands and transports millions of people. We take a holistic approach to the threats we face, and proactively strengthen our defences by optimising the inter-relationship between physical, personnel and cyber security measures to protect customers and colleagues from hostile and deliberate actions that cause harm. We actively measure our progress to continually improve our security maturity which monitors our critical pathway progress. We have regular

access to threat briefings which informs our planning and decision making to ensure our security defences are robust.

8.14 We are continuing to progress our Security Improvement Programmes across our organisation and are delivering the Security Governance and Culture programme, all of which will play a vital role in responding to Security threats across our business. We continue to refresh our understanding and risk management of corporate vulnerabilities, and take on board best practice learning where applicable. For example, we have fully embraced, reviewed and responded to the Lord Harris report. We have a security policy where we commit to all colleagues owning security within their roles, with a focus on requiring colleagues to update / refresh their security knowledge through training and comms plans for the year. We also continue to work towards achieving full compliance with regulatory programmes, and we are in constant engagement with our DfT regulators and rail operators to achieve this.

Performance Metrics: Economy

8.15 Table 3 shows an update on our 'Economy' metrics compared to our first published report in 2021.

Table 3

Theme	Measure	2019/20	2020/21	2021/22
Economic impact	Number of new homes started on site	1077	178	467
Responsible Procurement	Number of new supply chain apprenticeship starts each year: including BAME and Women	619 (62%,18%*)	524 (62%, 22%*)	868 (69%, 22%*)
	Number of job starts: including previously workless	1,027 (46%*)	677 (42%*)	1,314 (43%*)
Security Risk Management	Number of colleagues undertaking fraud awareness training	1,828	6,181	4,108

** Of those who disclosed*

9 Embedding Sustainability across TfL

9.1 Sustainable development is core to our purpose. Our strategies, plans and regular reporting on sustainability performance are centred around the principles of:

(a) social development;

(b) improvement of the environment; and

(c) economic development

9.2 We are working to improve the understanding of our colleagues with regards to sustainability and how to apply its principals and contribute toward progress

against our sustainability performance metrics through training, communication, discussion and system improvements.

9.3 **Vision and Values:** Our new Vision and Values was created from the ground up with input from thousands of colleagues from every part of TfL. The roadmaps contained in our Vision and Values plan map perfectly with the pillars of sustainability: Colleague and Customer (society pillar), Green (environment pillar) and finance (economy pillar).

9.4 This was not by design; this is what emerged from the collaborative and collective process we used to produce the Vision and Values. This suggests that our colleagues, when asked, what their vision for the organisation is, it is a vision of sustainability. Therefore, implementing and strengthening our Vision and Values is key to improving our performance on sustainability.

9.5 We are working to embed our Vision and Values, and therefore sustainability, throughout our governance and processes. This includes applying it to the development of our next business plan and the prioritisation of our investment.

9.6 To ensure we maintain a particular focus on sustainability, and we are able to drive this agenda with sufficient detail, we have established a Sustainability Sub-Group of the Executive Committee, which is chaired by our Chief Safety, Health and Environment Office and our Chief Capital Officer as the deputy chair. The group, which will meet regularly and include senior representation from across TfL, will be responsible for tracking and driving progress against our environmental ambitions and targets.

9.7 **Executive Sustainability Training and Sustainability Summit:** In November 2022, we will be running sustainability training for the TfL Executive Committee. The training will be hosted at a local social enterprise (to be confirmed) with a briefing and workshops sessions run by Will Day, Sustainability Advisor to PricewaterhouseCoopers UK. Will is also a fellow of the University of Cambridge Institute for Sustainability Leadership and previously sat on the UK's Sustainable Development Commission.

9.8 Following this, we will explore how to best roll out this training to all of TfL's senior leaders as well as making the key messages, information and tools available to everyone in TfL. This will complement our Carbon Literacy training programme discussed at paragraph 5.6.

9.9 To support this, we are also planning a TfL Sustainability Summit in 2023. It will be internally focused, similar to TfL's Anti-Racism Journey event held on 9 June 2022. It will help us to continue to build momentum and strengthen our engagement and understanding amongst TfL colleagues in relation to the issues of sustainability. Importantly, it will encourage our people to have brave conversations about some of the more challenging aspects of sustainability and bring their whole selves to work.

9.10 **TfL Youth Panel Exploration:** Over the summer we are supporting the TfL Youth Panel to undertake an 'exploration' into issues of diversity, inclusion and equality and how it interacts with environmental sustainability. The intention is to complete evidence gathering, hearings and research over the

summer and present initial findings to the TfL Executive Committee in the autumn. Following this, a report will be finalised and published.

9.11 The objectives of the exploration are:

(a) development opportunity for the TfL Youth Panel and TfL staff;

(b) collation and synthesis of the latest evidence and research in relation to the exploration topic, which can then be used for communication, engagement and upskilling across TfL;

(c) identification of specific issues in relation to TfL activities, purpose and objectives;

(d) identification of specific policy recommendations for TfL; and

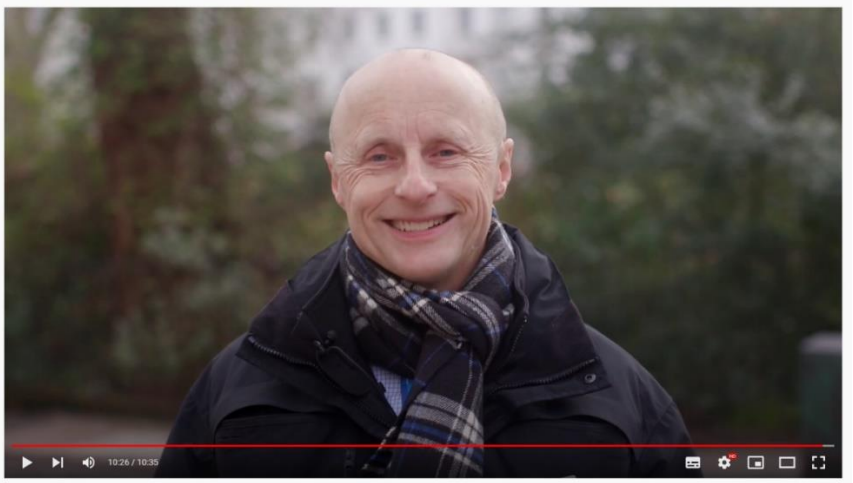
(e) promotion of TfL as a forward thinking and attractive purpose-driven organisation.

9.12 **Sustainability Staff Network:** Our Sustainability Staff Network Group continues to go from strength to strength, with over 400 active members and growing. It celebrated its second anniversary on the 16 June 2022. The consensus of the group is that we need to continue to share, learn and support each other, and encourage colleagues to be brave in creating space for conversations about the sometimes-difficult sustainability challenges we face.

9.13 Events run by the TfL Sustainability Network have included presentations and discussions led by TfL experts on London's 2030 Electric Vehicle Infrastructure Strategy, ULEZ, how to be a 'Sustainability Champion', Circular Economy and Responsible Procurement. We also hosted external speakers, including from Regen, who are not-for-profit energy experts and have been working with National Grid ESO to examine the question of decarbonising UK's electricity grid by 2035.

9.14 **Sustainability video:** At the start of London Climate Action week, we launched a 10-minute video on TfL's approach to sustainability. The video was shared internally and across TfL social media (LinkedIn and YouTube). The video describes our sustainability approach set out in TfL's first ever Sustainability Report published last September. It brings to life what we do across all three pillars (social, environment and economy) of sustainability. The video is available on the sustainability page of the TfL website[4].

[4] https://tfl.gov.uk/sustainability



9.15 We are planning more video content to engage customers, stakeholders and potential job applicants on our sustainability agenda. As part of this we will be working with the TfL Youth Panel to generate engaging ideas and involve them in the development of video content. We are keen to promote TfL as a purpose-driven organisation that puts sustainability at the core of everything it does.

9.16 **Green skills talent pipeline:** We know that the green skills sector is rapidly growing and in the future all jobs will have an element of 'green' as we move toward sustainability. TfL needs to ensure it is getting the message out there that we are leading the way on many areas in relation to sustainability, and as well as being a great place to work with lots of opportunities for development, it also has huge scope and ability to deliver for the environment. To help with developing a talent pipeline of potential job applicants, we are in the process of building a micro-site to promote the potential for people joining TfL to work on many aspects of sustainability and to encourage potential future applicants to register their interest so we can proactively contact them as suitable roles are advertised.

9.17 We are in the process of retendering for suppliers across all our apprenticeships and we have included a requirement that they all include sustainability as part of the skills, knowledge and experience they provide. In addition, we included some sustainability and corporate social responsibility specific apprenticeships within the tender scope, such as ST0934 Corporate Responsibility and Sustainability Practitioner (Level 4) which will have the broadest appeal across TfL. We are working to set up a new sustainability focused graduate and apprenticeship scheme with new intake starting in September 2023.

List of Appendices:

None

List of Background Papers:

TfL Sustainability Report & Corporate Environment Plan: https://tfl.gov.uk/sustainability

Safety, Health and Environment Annual Report: https://content.tfl.gov.uk/safety-health-and-environment-annual-report-2021-22.pdf

Expanded Ultra Low Emission Zone: Six Month Report: https://www.london.gov.uk/sites/default/files/expanded_ultra_low_emission_zone_six_month_report.pdf

Vision Zero Action Plan: https://tfl.gov.uk/corporate/safety-and-security/road-safety/vision-zero-for-london

Workplace Violence and Aggression Plan: https://content.tfl.gov.uk/sshrp-20210630-agenda-and-papers-public-website.pdf

Mayor's Violence Against Women and Girls Strategy: https://www.london.gov.uk/mopac-publications-0/mayors-violence-against-women-and-girls-strategy

TfL Adaptation Report Power Submission 2021: https://tfl.gov.uk/sustainability

TfL's Equality Objectives: https://content.tfl.gov.uk/our-equality-objectives-november-2021.pdf

Contact Officer: Lilli Matson, Chief Safety, Health and Environment Officer
Email: LilliMatson@tfl.gov.uk

Safety, Sustainability and Human Resources Panel

Date: **14 September 2022**

Item: **Bus Safety Programme Update**

This paper will be considered in public

1 Summary

1.1 This paper provides an update on the progress of the delivery of the Bus Safety Programme.

2 Recommendation

2.1 **The Panel is asked to note the paper.**

3 Background

3.1 The Mayor and TfL have adopted Vision Zero for London, with a target of zero deaths and serious injuries from road collisions by 2041.

3.2 Within Bus Operations, we have even more ambitious targets:

(a) 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 (against 2005-09 baseline); and

(b) No one killed in, or by, a bus by 2030.

3.3 The Bus Safety Programme was launched in February 2016, with the aim of reducing the number of people killed or seriously injured (KSI) on the bus network.

3.4 The Bus Safety Programme is aligned with the Vision Zero 'safe systems' approach which aims to ensure safe speeds, safe streets, safe behaviours and safe vehicles alongside post-collision learning and justice. Funding pressures have impacted on the progress of implementation of the Bus Safety Programme since our last update in February 2022. This paper sets out the financial impact on the programme and provides key updates on our progress.

4 Safety Performance

4.1 The number of people killed or seriously injured in or by a bus (bus involved KSIs) rose by 24 per cent to 174 people between 2020 and 2021. This increase was a result of the increasing number of people travelling again who continue to be concerned about Covid-19 while travelling on public transport, but still represents a 70 per cent reduction against the 2005-09 baseline. Figure 1 illustrates the continual downward trend in people being killed or seriously injured in or by a bus. We have now met our 2022 target of a 70 per cent reduction in KSIs two years early and for two years in a row. It is encouraging that we have maintained this

target achievement for a second year, despite the continued return to pre-pandemic collision rates, travel patterns, bus journeys and bus patronage. However, we continue to closely monitor this as our return to pre-pandemic levels is not yet complete. We also continue to monitor the emerging issues and risks that have developed during the pandemic and how these may continue to influence bus safety.

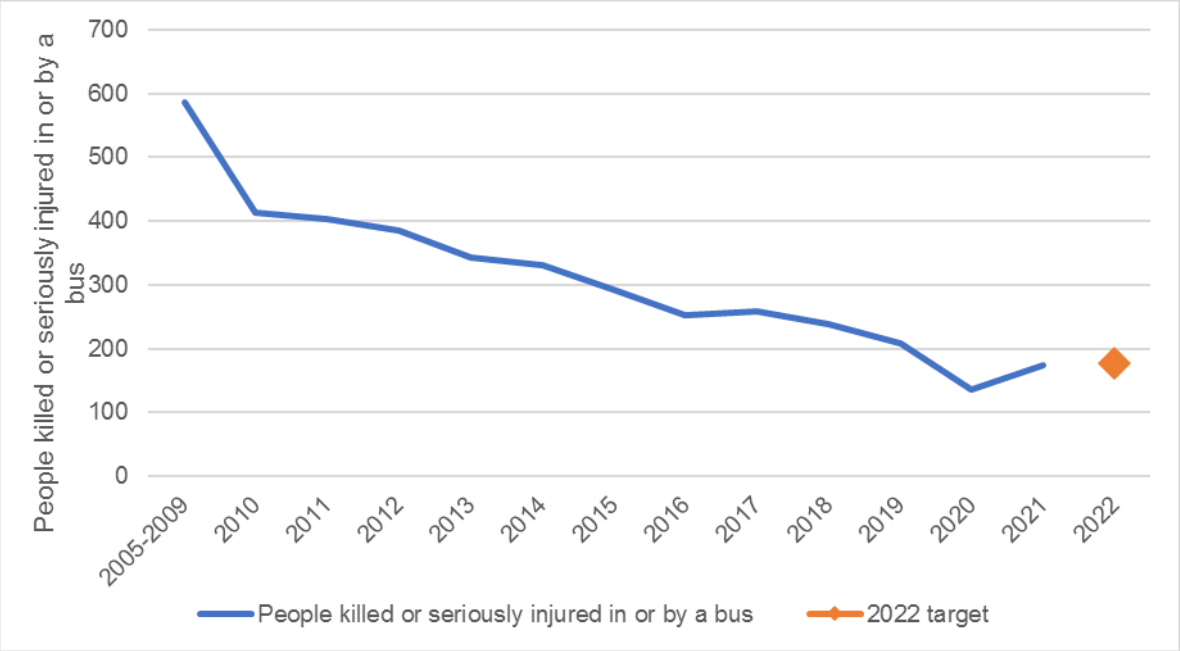


Figure 1: People killed or seriously injured in or by a bus: progress against baseline

4.2 Separating bus involved casualties into those injured on, and those injured by, the bus gives a slightly different perspective on who is being injured, that means we can target our safety interventions where they are most needed. It is important to note that whether a person was injured as a passenger, while walking or other road user, this does not mean that the bus driver was at fault, for example where someone may be injured 'by a bus', it could mean that a bus was involved in the collision simply as a stationary or third party. During 2021, one person died after falling down the stairs on a bus, and 66 people were seriously injured (passengers or bus drivers) on the bus, while four[1] people died and 103 people were seriously injured by the bus as a result of a collision involving the bus. Of those people who were killed or seriously injured 'by a bus', 49 were people walking, 30 were cycling and 16 were riding motorcycles.

4.3 Critical to our further progress in bus safety is the safety culture within TfL and London's bus operators. Ensuring that there is consistent safety performance is a key responsibility of our Safety, Health and Environment (SHE) team. Analysis can be complex when trying to normalise the data and taking into account safety risk exposure. However, when scrutinising passenger injuries, normalising the rate of injury occurring by annual mileage operated, gives an indication of safety performance across the London bus operators. Figure 2 shows that the

[1] This excludes a fatality in Victoria Bus Station in 2021 as deaths occurring on private land are excluded from STATS19

passenger injury rate follows a broadly similar downward trend of improvement until after the pandemic. The range of risk rate values between operators has reduced over time too which may suggest that the focus on safety, greater collaboration and transparency since the launch of the Bus Safety Programme has helped to improve the consistency of performance amongst operators. Monitoring safety performance will continue to be a priority for us.

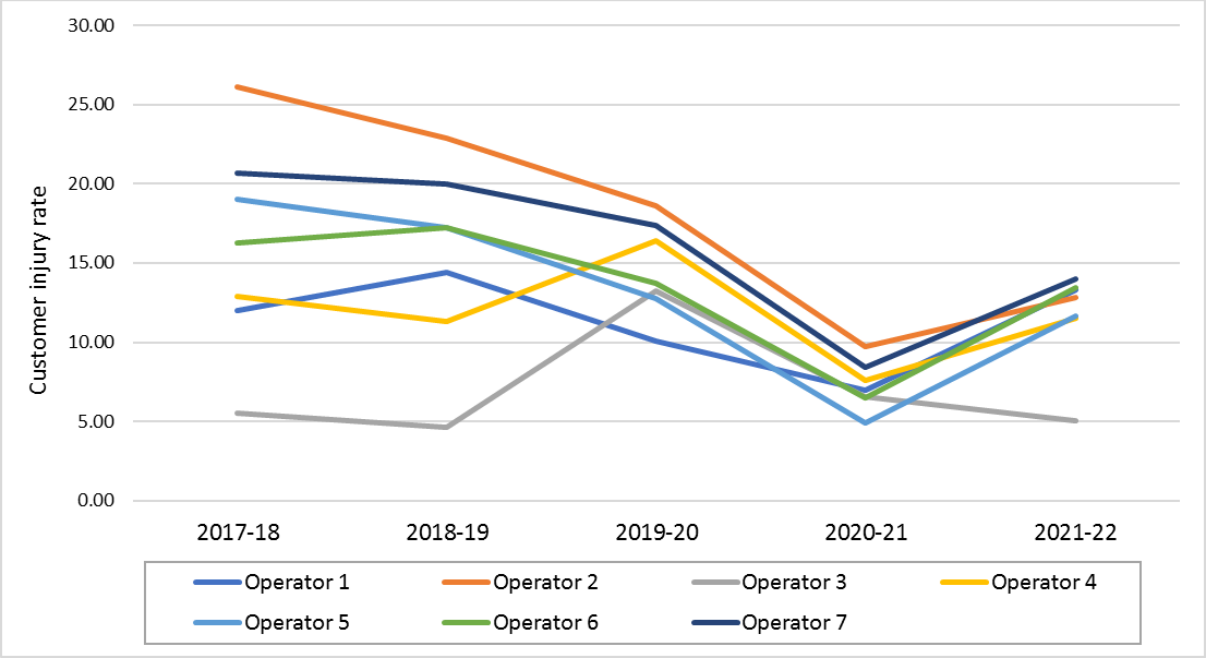


Figure 2: Customer Injury Risk Rate by annual Operated Mileage

Note: Three operators were excluded as their injury rate and/or mileage operated was low

4.4 In addition to statistical performance analysis, we also consider how well bus operators engage with our various safety initiatives. Examples include the fatigue management training rolled out to operators during 2021, where training was given to all bus operator managers and operational supervisors, engagement was high across all operators to deliver and receive this training; our most recent bus safety innovation challenge had bids submitted by nearly all the bus operators; engagement at our various safety working groups for pedal confusion, fatigue, and, health and wellbeing is well established and attendance is consistent across most operators.

5 Roll out of Bus Safety Standard into London's bus fleet

5.1 The Bus Safety Standard is being rolled out against the published Roadmap. At the end of July 2022, 827 new buses met the standard, which is approximately nine per cent of London's bus fleet. Based on the current 14-year lifecycle of buses within our fleet, it is estimated that it will take until 2033 for complete roll out of the 2019 Bus Safety Standard to be achieved. For safety features required from 2021, complete roll out is estimated by 2035, and for safety features required from 2024, complete roll out is estimated by 2038.

5.2 Intelligent Speed Assistance (ISA) technology has been a requirement for new buses since the launch of the Bus Safety Standard, but we have also worked to enable some existing Volvo buses in the fleet which have a similar version of ISA capability to be activated, and there is an active ISA retrofit programme. This means that the rate of ISA fitment in London's bus fleet is much higher than the rest of the Bus Safety Standard measures, as at the end of July 2022 it was around 25 per cent of the fleet.

5.3 Acoustic Vehicle Alerting Systems (AVAS) have also been a requirement on new buses since the launch of the Bus Safety Standard but are only required on quiet-running buses so there are slightly fewer buses (672 as at end July 2022) with this technology, representing around seven and a half per cent of our fleet.

5.4 Camera Monitoring Systems (CMS) were only required in the Bus Safety Standard from 2021, however several operators were keen to introduce these earlier, which has resulted in 718 buses as at the end July 2022 being fitted with CMS, representing around eight per cent of the London fleet.

5.5 The next milestone for the Bus Safety Standard is 2024, when a range of further safety measures will be required. We have also included two additional new safety measures for implementation in 2024 within our latest New Bus Vehicle Specification and will publish a revised Roadmap later this year to reflect these changes. These additional safety measures help to further align the Bus Safety Standard with the new European General Safety Regulations updated in early summer 2022, they are:

(a) **Tyre Pressure Monitoring System:** a system that provides a warning to the driver if an unsafe change in air pressure in one or more tyres is identified; and

(b) **Alcohol Interlock Installation Facilitation:** requires bus manufacturers to make available a document with clear instructions for installation of alcohol interlocks without interfering with the performance or maintenance of the bus. This is a pre-cursor to any potential inclusion of Alcohol Interlocks within a future phase of the Bus Safety Standard.

6 Impacts of Funding Uncertainty

6.1 The funding uncertainties we face have impacted the Bus Safety Programme. With each short-term funding deal expected to lead to a longer-term settlement, deferring activity for 3-6 months has been an appropriate decision. The impact of the new Government funding deal on bus safety projects is not yet known, the following information is provided in the meantime and we will provide an update at a later meeting on any further changes. The aggregated effect of the pandemic and lack of clarity over future funding is now significant, and the following projects and activities were paused in March/April 2022 as a result of lack of funding availability:

(a) **ISA Retrofit:** Funding for 1,800 buses to be retrofitted with ISA was paused. The total number of buses in scope for retrofit is 3,000, the 1,200 buses with funding had hardware fitment completed during August 2022. It was estimated that if all 3,000 buses were retrofitted with ISA as originally

planned, together with the new build buses, this would equate to around 50 per cent of the bus fleet.

(b) **AVAS Retrofit:** Funding to retrofit AVAS onto all quiet-running buses in the fleet was paused. The number of buses that could be retrofitted was flexible, from just fitting the buses that always run quietly (the electric and hydrogen buses) to a full roll out onto all diesel-hybrid buses that have shorter periods of silent running.

(c) **CMS Retrofit:** Funding to retrofit buses in the fleet with CMS was paused. In particular, fitting CMS to all New Bus for London buses was planned.

(d) **Fatigue Detection Technology project:** Funding to fit a further 450 buses with Fatigue Detection Technology was paused. This funding would have enabled us to achieve our target in the Bus Action Plan for 500 buses fitted with Fatigue Detection Technology. Furthermore, this funding would allow us to collect a more diverse and robust set of quantitative data to ensure the effective development of the bus driver fatigue programme, and to enable us to introduce a performance specification for this technology for new buses through the Bus Safety Standard.

(e) **Bus Safety Standard Phase 2:** Funding for further development of the Bus Safety Standard beyond 2024 was paused. The Bus Safety Standard is a live document intended to evolve to take account of new technological advances and to respond to changes in risk to achieving TfL's bus safety Vision Zero targets. New safety initiatives such as reducing distraction and simplifying the driver's cabin, measures to further improve customer safety, and integrating the safety of e-scooter riders into the specification, are all now on hold.

(f) **Advanced Emergency Braking (AEB) implementation support:** Funding to realise the recommendations of recent work into supporting the implementation of AEB into the fleet by 2024 has been paused. AEB for an urban environment is the most challenging safety measure being introduced because of the complexity of the fixed and moving vehicles and vulnerable road users alongside the multiple passengers that are seated and unbelted, or who might be standing when an AEB system brakes. However, if implemented correctly AEB has the potential for significant safety benefits and forms a critical part of our ability to meet our Vision Zero targets for buses. Owing to the complexity of the technology it requires a high level of investment from our suppliers to meet our requirements. TfL had a strategy in place to help reduce the barriers while ensuring AEB systems realise the forecasted benefits, however a strong pipeline of orders for new vehicles is necessary to support that investment by our supply chains (see 6.2 (a) below).

6.2 The effects of the funding uncertainties were not limited to the direct impact on current project funding. There are further effects on the delivery of the Bus Safety Standard:

(a) The roll out of the Bus Safety Standard is directly linked to the rate of fleet renewal. Fleet renewal has been lower than average due to the natural

fleet renewal cycle over the last few years; however, it has also been affected by the pandemic through both supply chain delays and TfL's funding issues with a pause in letting new contracts implemented for a few months in late 2021. While this has now resumed, the effect on fleet renewal will remain. The proposed reduction in fleet size of around four per cent set out in our Financial Sustainability Plan (half of which is subject to a live public consultation) has had a direct impact on new vehicle orders for this year and next too.

(b) If further funding does become available for ISA retrofit, there will be a 9–12-month delay before any further buses can be retrofitted as there is now a minimum 26-week lead in time for parts with suppliers and fitting takes time. Orders were being placed on a rolling basis, but these were stopped when no further funding was approved. The ISA retrofit project will end in September 2022 at which point the project resourcing and approvals will expire.

(c) There are around 200 electric buses within our bus fleet which are going to be prioritised for AVAS retrofit alongside the ISA retrofit programme, in order for them to be fitted with our enhanced Responsive AVAS system which optimises safety and reduces extraneous noise nuisance. However, this is impacted by the lack of funding for ISA and compounded by the lack of funding for AVAS retrofit. These buses are the only electric buses without any form of AVAS currently in the fleet. Furthermore, lack of funding has meant that the successful outcome of the Responsive AVAS project has not been rolled out to the existing buses with AVAS.

(d) Funding for future year retrofit programmes was also paused including those for vulnerable road user alerting systems (a requirement on new buses from 2024) and further fatigue detection technology.

7 Bus Driver Fatigue, Health and Wellbeing Innovation Challenge

7.1 Ten projects selected from around 50 bids are being rolled out across eight bus operators as part of the Bus Driver Fatigue, Health and Wellbeing Innovation Challenge. Most of these projects were awarded funding in late February 2022 with work commencing at the end of March 2022. The last project had funding approved in July 2022. To manage the delivery of these ten projects which are of differing scope, value and timescale, we have put in place appropriate project controls and are actively engaging with bus operators.

8 Pedal Confusion

8.1 The recent research we commissioned AECOM to undertake has now been completed and this study is published on TfL's website at: https://content.tfl.gov.uk/bus-safety-standard-pedal-confusion.pdf

8.2 The report (appended to this update) sets out several recommendations which are being incorporated into the work overseen by the joint TfL and bus operator Working Group for pedal confusion. The report states that its main recommendation is the need to gather evidence to validate the reports' recommendations and the impact they will each have to the reduction of pedal confusion incidents. Evidence is now being collected through the use of pedal/footwell cameras on new buses, however owing to funding restrictions it is not currently possible to retrofit these cameras which would rapidly improve our evidence base.

9 Emerging Issues

Bus Safety Programme Strategy

9.1 An independent programme assurance group recommended that an overarching strategy for achieving Bus Vision Zero is established. We have committed to producing a strategy document that will set out the approach to achieving Vision Zero for buses, the alignment with Vision Zero as a whole and the role played by the specific projects in TfL's investment programme.

9.2 The development of this strategy is at an advanced stage and will be shared with the Panel when it is available. Activity undertaken for the strategy to date includes:

(a) holding five stakeholder engagement workshops to discuss and explore issues related to bus safety. Attendees included representatives from different transport modes, bus operators and manufacturers, lobby and safety campaign groups, the Independent Disability Advisory Group (IDAG), the London Fire Brigade, and internal TfL staff from a range of teams;

(b) holding several informal engagement sessions with bus drivers from different London bus operators at bus garages across London;

(c) developing a tool to carry out sensitivity testing of the Bus Safety Standard safety measures to understand how the estimated benefits of the Standard may be affected by changes in our business case assumptions such as fleet renewal, and to understand the potential safety impacts of new safety measures that we may wish to include in future phases of the Bus Safety Standard; and

(d) developing a new Power BI tool to better analyse the bus involved risk rates based on mode (e.g., person walking, cycling or travelling by bus) and known characteristics such as gender, age or ethnicity, to ensure that risk is being reduced for all people who may be killed or seriously injured in or by a bus.

Bus Fires

9.3 On average there have been 17 bus fires per year over the last five years in London. This is significantly below the average rate for the rest of the UK. The roll out of more zero emission buses introduces different risks than those arising from diesel and diesel-hybrid buses..

9.4 We have therefore decided to incorporate a Bus Fires workstream into the Bus Safety Programme to ensure a systematic approach is taken to address the actual and potential risks of fire within our changing bus fleet as with the rest of the Bus Safety Programme. The new workstream has been developed to address key risks and prioritise activities within TfL and amongst our key stakeholders, such as working with bus manufacturers, operators and the London Fire Brigade to provide education on the different types of buses in our fleet.

10 Summary

10.1 We have a good grasp of the safety issues facing the bus network, we have built robust relationships with the bus industry and work very closely with bus operators who are also strongly committed to improving safety.

10.2 We are committed to continual improvement of the safety of London's buses and bus network; however, the funding uncertainties are impacting upon our ability to deliver planned and future safety improvements, it can be seen that this is being compounded the longer these uncertainties persist. The impact of this is an increasing risk that we will be unable to achieve its Vision Zero targets for the bus network in the current timeframe.

10.3 However, we are ready to restart all the paused activity as soon as funding is available and subject to supply chain limitations, we will seek to catch up on lost time. The impact of the new Government funding deal on bus safety projects is not yet known, we will provide an update at a later meeting once the details have been confirmed.

10.4 We will continue to focus on improving and advocating for bus safety as a key outcome of both the Bus Action Plan and the Vision Zero Action Plan.

List of appendices to this report:

Bus Safety Standard Pedal Confusion Report (AECOM, 2022)

List of Background Papers:

Bus Safety Programme, Safety Sustainability and Human Resources Panel, 24 February 2022

Measuring and Improving Employee Health, Safety, Sustainability and Human Resources Panel, 14 September 2021

Bus Safety Programme and Driver Health and Well Being, Safety, Sustainability and Human Resources Panel, 10 February 2021

Bus Safety Programme, Safety, Sustainability and Human Resources Panel, 12 February 2020

Bus Safety Programme, Safety, Sustainability and Human Resources Panel, 4 September 2019

Bus Safety Programme, Safety, Sustainability and Human Resources Panel, 27 September 2018

Bus Safety Programme, Safety, Sustainability and Human Resources Panel, 23 January 2017

Bus Safety Programme, Safety, Accessibility and Sustainability Panel, 30 June 2016

Bus Safety Programme, Safety, Accessibility and Sustainability Panel, 10 March 2016

Contact Officer: Louise Cheeseman, Director of Bus
Email: LouiseCheeseman@tfl.gov.uk

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AECOM

Bus Safety Standard:
Report - Pedal Confusion

Transport for London

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Prepared for:

Transport for London

AECOM Limited
1 New York Street
Manchester M1 4HD
United Kingdom

aecom.com

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Executive summary

Introduction

AECOM were commissioned to research the frequency that pedal confusion occurs and the number of incidents of pedal confusion that go unreported by drivers, if any, such as occasions when they recover before there is an incident. Additionally, AECOM held workshops and discussions with stakeholders from TfL, bus operators, Unions and drivers to evaluate opinion of six proposed solutions put forward following previous work in 2018 by TfL and the Transport Research Laboratory which were based on the recommendations from a 2011 report.

Research was completed using various methodologies

- Secondary data analysis: A literature review of published studies about pedal confusion and use of the Incident Reporting & Investigation System (IRIS) data with support from the Notification and Investigation of Major Incidents (NIMI) data.
- Primary research in three stages:
    1. An online survey for drivers and other bus operator employees to complete, with 593 drivers self-selecting to complete the survey;
    2. Group discussions with 45 drivers for additional detail about their views; and
    3. Ten workshops with a total of 86 key stakeholders and union representatives with various roles (engineering, operations, health and safety) and responsibilities (manufacturers, operators and TfL stakeholders).

Number of incidents and locations of pedal confusion

Secondary data findings using IRIS data

- 143 pedal confusion incidents reported between 2015 and 2019 an average number of 29 incidents per year. 19 of these were flagged as NIMI

Between 2015 and 2019:

- There was an average of 2.4 incidents per month;
- Tuesday saw the highest number of incidents (35) and Sunday the lowest (9); and
- The times when the highest number of incidents took place was between 15:00 and 16:00 and between 10:00 and 11:00.

Findings from the drivers online survey

- Approximately 1 in 5 drivers (22%) were unaware of pedal confusion (78% aware);
- 44% had awareness of incidents (56% unaware);
- 16% of drivers have experienced unintended acceleration at any time;
- 9% of drivers experienced unintended acceleration in the past year; and
- 1.3% of drivers experienced a collision due to unintended acceleration.

Of the 53 drivers* who experienced unintended acceleration in the past year, 85% of these experiences did not result in a collision.

***Note**: the low base of 53 drivers means statistically significant conclusions cannot be made and data should be treated with caution and considered indicative.

Locations of the 143 incidents identified in the IRIS data

- Most incidents occurred on a two-way major road, the second most on a two-way minor road. IRIS data reports often refer to the start-stop nature of the traffic;
- A third of all incidents took place as a bus is approaching either a stand, a stop or moving traffic; and
- Half the incidents did not involve a third-party vehicle

Possible causes of pedal confusion

All views provided in the survey were based on driver opinion, similarly, all views in the workshops were from the attendees own opinion and experience. A main recommendation of this report is to build the evidence to confirm whether these opinions are validated.

The main themes expressed by those who attended the workshop were:

Pedal configuration

- Pedal sizes and spacing between the pedals were referenced as possible causes. Pedal configuration on electric and hybrid vehicles and the New Routemaster bus were an example where pedal configuration may lead to pedal confusion.

Hybrid and electric buses driving style

- Drivers and workshop attendees stated a belief that the regeneration feature on hybrid and electric vehicles may confuse the driver as it provides the option for “one pedal driving” and drivers may become confused about which pedal their foot is covering, particularly as the vehicle slows down even though they are covering the accelerator pedal.

Possible driver related causes of pedal confusion

- Driver concentration;
- Passenger interaction; and
- Driver pressure to meet stand times or finish their shift (including home pressure)

Drivers’ opinions of the factors causing pedal confusion from the online survey

- The top two factors according to drivers who responded to the survey were fatigue and human error with just over half the drivers mentioning at least one of these;
- A fifth of drivers believed that driving in heavy, stop/start traffic was a contributory factor;
- Drivers who had experienced pedal confusion previously were more likely to say that pedal confusion is most likely to occur at any point in the shift compared to those who had not experienced pedal confusion (50% compared to 29%); and
- More drivers with under 5 years’ experience agree with the statement “**“I have been trained to recognise when unintended acceleration is occurring and how to respond to it”** than those who have over 5 years’ experience (55% compared to 43%). There is no significant difference in the views between those who have and have not experienced pedal confusion.

Potential solutions to pedal confusion

In the same manner as the possible causes of pedal confusion, all views expressed in the survey and workshops were opinion based and not evidence led. The six solutions[1] shown during the workshops, using previous work from TfL Human Factors and Transport Research Laboratory were:

Brake Toggling:

- Believed this would be effective during setting off manoeuvres, but as most pedal confusion incidents occur at slow speeds, this needs to be complemented by another solution(s); and
- Drivers believed that while there would be a benefit when setting off, it would add to journey time.

Improve direct / indirect vision

- The link between improving vision around the whole of the bus and pedal confusion was not obvious to workshop attendees and once explained, nearly all disagreed with the link. There was an expectation that drivers would move in their cab anyway, such as turning around to speak to passengers; and
- Drivers were as concerned with the practicialites of driving as much as the benefit as a solution, believing this would add on time.

Pedal acoustic feedback (audible cue) and Pedal light indicator (visual cue)

- The main observations for pedal acoustic feedback and pedal light indicators were very similar, it was believed that these two solutions had merit but relied on the driver to react and intepret the sound they heard or light they saw, with some feeling that in a stressful, panic situation this may not happen, or happen in time;
- There was a view that both lights and noises would be ignored based on current experience of introducing other warning lights; and
- The majority of workshop attendees believed the light was preferable to an audible cue (sound), however some attendees provided the counter argument that drivers should be encouraged to keep their eyes on the road rather than the dashboard.

Advanced Emergency Braking (AEB)

- Those attending workshops agreed this would be a long-term consideration, adding that technology would need substantial testing, particularly around sensitivity of the AEB and when it is applied, before it could be put on the buses and for drivers to be comfortable with the technology being used;
- Bus manufacturers believed there were risks, providing scenarios where drivers would need to accelerate at times, this was echoed by workshop attendees who were equally concerned about stopping distances and reaction times; and.
- Many caveated that AEB was a postive part of the solutoin but would be a contribution rather than a solution on its own.

Pedal Standardisation

- Most attendees believed this would be the most effective solution of the six solutions shown, seeing the benefit as reducing unfamiliarity as drivers change buses during a shift, ‘spare’ drivers who regularly change buses were used as an example; and

[1] Three solutions: Brake togging, direct/indirect vision and the pedal light indicator have been introduced into the 2021 Bus Safety Standard therefore some workshop attendees were already familiar.

- Engineers and Health and Safety workshops attendees both brought up the concern that if pedals are standardised the importance of right first time design, and building knowledge based on evidence that standardising pedals will have a positive impact on reducing pedal confusion is critical.

Other potential solutions

A number of other solutions were discussed, in the main there were two themes.

Interim solution similar to AEB

- Use current technology to measure the pressure applied to the accelerator by a driver at all times, should this ever be full pressure (similar to the action of stamping on the brake), override the response.
- Operations teams, Engineers and Health and Safety workshop attendees were amongst those who, independently from one another, believed this type of interim solution was worth investigating and could be implemented in the short term. Attendees in other workshops used the term “dead man’s switch” such as a cut-off switch a train has or electric milk floats.

Reducing driver pressure and fatigue

- TfL, Operator, Unions and Drivers expressed their view that drivers work under pressure or have other distractions from passengers and other road users. There was a belief that reducing pressure on drivers including time between shifts (fatigue) would reduce incidents in general, including pedal confusion.

Recommendations

There are a number of recommendations which can be grouped under the safe system pillars that TfL has adopted in their Vision Zero approach to road safety.

This report acknowledges that some of the solutions presented in the workshop have been introduced on new buses in the fleet, as per the BSS roadmap and recommends that all future incident investigations linked to possible pedal confusion to report which if any solutions were a feature on the bus and if they were not a feature for the incident investigator to provide an opinion about whether any of the solutions could have prevented the incident.

Safe behaviours

Monitor any evidence that driver movement has been a contributory factor to pedal confusion. If monitoring shows a link to pedal confusion, update driver training and education.

Review the iBus controllers’ communication procedures with drivers, and ensure drivers are receiving training for correct use of iBus foot switch.

Investigate if any solutions to driver fatigue, as provided in the fatigue report, will reduce pedal confusion incidents or has reduced incidents once implemented.

Review whether footwear has a link to pedal confusion incidents. If a link is found, consider additional testing and trials to resolve this.

Investigate if ‘spare’ drivers, who regularly change buses are more likely to be involved in pedal confusion incidents or near misses.

Safe vehicles

Explore differentials across bus make and model for pedal type, height, and spacing by conducting an audit of the current fleet.
Build a library of lessons learnt from current technology such as early warning systems.
Use learnings from AVAS to develop a sound for pedal acoustic feedback; aim to produce a multi-beneficial sound such as improving driving style.
Conduct further analysis to understand whether travelling at slow speed and/or in heavy traffic is a contributory factor and if so add further workstreams such as driver training.
Conduct further analysis to measure brake regeneration in hybrid and electric buses as a possible cause using current data and/or track tests with drivers.
Measure if the assumed difference in acceleration between electric, hybrid and diesel buses is shown in driver data and if so, whether this could have an impact for pedal confusion.
Consider building a team of experts to design, validate and test the AEB parameters and to cover training and implementation once approved.
Engage with bus manufacturers for a possible review of the International Standards Organisation (ISO) standard for pedal layout.
Build an expert working group with the remit to assess what pedal standardisation could look like with pros and cons. Use findings from the analysis of the 143 incidents suggested for further evidence.

Post collision response

Review and improve the IRIS database with more fields including one specifically for suspected pedal confusion.
Explore measuring traffic flow prior to an incident. Record the road layout, traffic flow procedures (e.g., traffic lights); number of lanes, any joining or additional lanes, bus lane available.
Introduce footwell cameras on buses supporting driver education, incident prevention and incident investigation.
Analyse pedal configuration for each of the 143 incidents for similarities and differences.
Measure if buses with brake toggling are involved in fewer incidents; include near-miss data.
Contact the International Bus Benchmarking Group (IBBG) for learnings from the international industry and if there is appetite for a forum for best practice and solutions.
Work with bus operators to build a national view of pedal confusion for the UK.
Contact other UK industries, starting with waste disposal, investigate if pedal confusion incidents occur in their industry.

1. Introduction

1.1 Background

Pedal confusion has been defined as the manoeuvre where a driver confuses the acceleration pedal with the brake pedal resulting in either sudden unintended acceleration or harsh braking.

At present the scale or nature of the problem among London bus drivers is unknown and there are concerns of under-reporting of incidents by bus drivers, particularly if the driver is able to recover in time resulting in no collision occurring.

A better understanding of the nature and extent of pedal confusion incidents occurring amongst London bus drivers is required to support the decision on the most appropriate solution(s) to mitigate the issue of pedal confusion. TfL accepts that, while mistakes must be minimised, there will always be the chance of human error and one of the priorities for TfL is to make the whole system as safe as possible so that when a road user does make a mistake this does not result in serious or fatal injury.

The information provided in this report is intended to act as part of the supporting evidence for TfL to deliver Vision Zero for London which has a goal, as set out in the Mayor's Transport Strategy, that by 2041, all deaths and serious injuries will be eliminated from London's transport network.

1.2 Objectives

The primary objective of the research was to better understand pedal confusion, specifically:

- The nature and extent of pedal confusion incidents occurring amongst London bus drivers;
- Learn of any key causes and patterns which may increase the possibility of pedal confusion, and specifically if they are related to the driver, vehicle and / or environmental circumstance;
- Whether pedal confusion is attributed to unintended acceleration only or if harsh braking should be considered as well;
- Whether there are any environmental characteristics which contribute to pedal confusion incidents;
- To assess driver and stakeholder views of six proposed solutions* and their ability to reduce the number of any pedal confusion incidents; and
- To learn of any other suggestions of solutions for future thinking.

*The six proposed solutions were established following initial research and recommendations completed by TfL Human Factors in 2011 and an additional report with recommended safety measures evaluated by the Transport Research Laboratory (TRL) in 2018 [2].

One of the challenges to overcome is any fear of reprisal drivers are likely to have or the human trait to avoid admitting they have done something "wrong". AECOM reassured drivers about treating their data in confidence through the UK GDPR and further by reassuring anonymity in the reporting through the Market Research Society Code of Conduct, of which AECOM are Company Partners.

[2] Identifying solutions to pedal confusion in buses 2011: https://content.tfl.gov.uk/solutions-to-pedal-confusion.pdf
Pedal Application Error Prevention and Recovery 2018: https://content.tfl.gov.uk/pedal-application-error.pdf

1.3 Methodology

There were various types of data already available about the topic of pedal confusion, and due to a diverse nature of the respondents the following three different methodologies were used.

1.3.1 Method 1: Secondary data review

An analysis of the Incident Reporting & Investigation System (IRIS) and the Notification and Investigation of Major Incidents (NIMI) databases was undertaken to determine the number of incidents and the patterns in the occurrences of pedal confusion incidents, if any.

The Incident Reporting & Investigation System (IRIS) (2015-2019)

This database covers a range of parameters for road safety data relating to information recorded by bus operators and contains a detailed account of the incident, including a record of the primary and secondary types of incident and a description of the incident. The incident description is a key determinant of whether an incident was due to pedal confusion.

The Notification and Investigation of Major Incidents (NIMI) database (2018-2021)

A record of major incidents resulting from pedal confusion was provided by TfL. This database is separate to the NIMI cases identified within the IRIS database. The database covers the period from 2018 to 2021 and includes 18 records (two of which are ongoing investigations). NIMI data has recently been supported in some cases by the provision of footwell cameras, although reviewing this data was not part of this research as incidents had already been investigated.

Literature review

AECOM sourced data sets and reports and conducted a literature review, a list of the titles reviewed is shown in Appendix A.

STATS19 data

STATS19 data is published annually by the Department for Transport and this holds a data set of factors contributing to accidents recorded by police officers. STAT19 data was analysed as part of our data review. We found that while there are multiple factors that could potentially relate to pedal confusion incidents as there are no contributory factors that specifically reference it directly. The nearest contributory factors recorded are:

- 401 – Junction overshoot;
- 402 – Junction restart (moving off at junction);
- 509 – Distraction in vehicle;
- 605 – Learner or inexperienced driver / rider; and
- 607 – Unfamiliar with model of vehicle

In discussion with TfL, it was agreed that STATS19 data would not be included in the report.

1.3.2 Method 2: Driver survey (Online questionnaire)

Drivers were invited to take part in an online survey which took approximately 10 minutes to complete. The drivers who participated in the survey work for various operators, namely:

- Abellio;
- Arriva;
- HCT;

- Metroline;
- Stagecoach; and
- Tower Transit;

All drivers were eligible to take part and the survey was operated online, therefore drivers could select whether they wanted to complete the survey and could participate at any time, 24 hours a day, 7 days a week.

There were 593 completed surveys and while this number of responses is suitable for analysis with a level of confidence at the 95% level of +/- 4%, the responses should not be considered representative of drivers as the survey was self-select and the profile of drivers may skew to those with more experience, as described in section 2.

To inform and encourage participation:

- Each operator communicated details of the survey and how to provide feedback using a prepared information sheet, an example of this is in Appendix B;
- Drivers were informed of the survey using the operators' internal communication system and a survey link provided. A QR code was also included as an easy to use, alternative method for drivers to access the survey; and
- Drivers were incentivised to participate with a prize draw for each operator with one winner (£100 voucher) and two runners-up (£50 voucher each).

It was explained to all potential respondents that:

1. Data was being collected under the UK GDPR; and
2. AECOM are accredited as a Market Research Society (MRS) Company Partner and collected data under the MRS Code of Conduct, with a summary of the key points about anonymity and confidentiality explained to drivers.

AECOM interviewers attended 32 of the busiest garages, split by operator, to further communicate the importance to AECOM, TfL and bus operators about confidentiality, anonymity and a chance to respond freely without fear of retribution.

While at the garages, AECOM interviewers carried a tablet and invited anybody who was available to complete the survey at that time to do so. The survey on the tablet was identical to the online survey and the driver was handed the tablet to ensure this continued to be a self-complete survey, i.e. the interviewer did not read out the questions and importantly the driver did not need to vocalise their response on a sensitive subject.

1.3.2.1 Questionnaire

A copy of the questionnaire can be found in Appendix C, questions included:

- Experience as a driver;
- Opinions on frequency of pedal confusion including:
    - Personal experience
    - Knowledge of other drivers' experience
- Potential causes of pedal confusion; and
- Potential solutions to pedal confusion.

1.3.3 Method 3: Workshops

1.3.3.1 Driver only workshops

At the end of the online survey, drivers were offered an opportunity to provide their details if they wanted to participate in workshops. Those who were undecided at the time, or only wanted to participate in the workshops and not the survey, were offered the chance to leave their details using a separate link specifically for the discussions.

Drivers were invited to attend workshops at various times of the day to support the flexibility needed due to their shifts. To ensure shift patterns were not disrupted, AECOM arranged for workshops to take place outside of the drivers' working hours.

Workshops were held at either 4pm, 5pm, 6pm or 7pm with between two and four drivers attending each one. Drivers working later shifts were offered a chance to hold discussions at either 11am, 12pm or 1pm, to suit their shift pattern.

Each workshop lasted between 60 and 90 minutes, depending on the number of attendees. Each attendee received a £50 voucher to reflect time spent outside of working hours.

1.3.3.2 Stakeholder workshops

Stakeholders with a specific subject interest were invited to participate in one of ten workshops, each one lasting between 90 minutes and two hours. Those attending were from various bus operators, TfL and bus manufacturers. The workshop types based on roles and responsibilities are shown in Table 1.1. A total of 45 drivers and 86 stakeholders participated in the workshops.

Table 1.1 Stakeholder workshops and roles of attendees

Workshop	Representing	Roles and responsibilities of attendees
1	Bus manufacturers	Bus manufacturers
2	TfL	Health and safety experts
3	TfL	Operations experts
4	Bus operators	Health and safety experts
5	Bus operators	Operations experts
6	Bus operators	Incident investigators
7	Bus operators	Driver trainers
8	Union representatives	Bus operator staff nominated representatives
9	Union officials	Union officials
10	TfL and bus operators (combined group)	Engineers

The discussion guide for both driver and stakeholder workshops can be found in Appendix D.

1.4 Project timings

The project ran from July to October 2021.

The start date for the online survey varied by bus operator, with three weeks allowed for employees of the final operator to participate. Operators who started participating earlier, sent

reminder communications to drivers as well as confirmation of the final date they could respond. The timings by methodology are shown in Table 1.2.

Table 1.2 Project timings by methodology

Methodology	Start date	End date
Secondary data analysis	12 July 2021	22 October 2021
Online survey	12 July 2021	13 September 2021
Workshops	7 September 2021	19 October 2021

1.5 Data analysis and reporting

This report highlights the key findings from each data source, namely:

1. Secondary data;
2. Online quantitative survey; and
3. Workshops.

Where appropriate any statistically significant difference in response to the online survey have been highlighted although in general there were very few statistically significant differences. The significant differences were either based on the years' experience of a driver or whether a driver had experienced pedal confusion themselves.

To enable the report to be easily read and understood, all reported figures have been rounded to the nearest number or percentage. The rounding effect may cause some charts to sum 99 or 101 percent. If respondents could give more than one answer to a question, then the chart will sum to over 100%.

NOTE OF CAUTION: The online survey was using self-selection by drivers, therefore while the number of responses is suitable for analysis it should not be considered representative of bus drivers.

1.6 Definition of pedal confusion

As a point of clarity, all respondents, whether via the online survey or in the workshops were provided with definitions of pedal confusion.

Online survey definition of pedal confusion

> Pedal confusion is defined as an occurrence of a driver accidentally selecting the brake pedal instead of the accelerator pedal or the other way around. This causes either sudden unintended acceleration or harsh braking. This may lead to incidents such as a collision outside the vehicle, passengers being jolted inside the vehicle or may have no impact at all such as a near miss as the driver successfully recovered the situation.

The definition for the online survey was more detailed than the workshop definition. The detail in the online survey was included to ensure drivers considered all aspects of incidents as those responding did not have an opportunity to clarify, and the definition included softer words such as "accidentally".

Workshop definition of pedal confusion

> Pedal confusion can be defined as the manoeuvre of a driver confusing the brake pedal and the accelerator pedal thus causing an incident of sudden unintended acceleration or harsh braking of their vehicle

Those who attended the workshops were asked for feedback about the definition and while there was agreement about the definition there was also a view that:

1. The word manoeuvre should be replaced by action; and
2. Pedal confusion was associated with unintended acceleration and not harsh braking and many attendees did not agree that harsh braking should be part of the definition.

Confirmed definition of pedal confusion

The agreed definition amongst workshop attendees is shown below, with the change of the word “manoeuvre” to “action” and the removal of the reference to harsh braking.

This report will report on incidents recorded as pedal confusion or, where defined as such, unintended acceleration only and not harsh braking.

> Pedal confusion can be defined as the action of a driver confusing the brake pedal and the accelerator pedal thus causing an incident of sudden unintended acceleration of their vehicle

1.7 Format of the report

Following this introduction, the report shows:

Section 2: The literature view of published reports specifically to buses.

Section 3: Profile of those who responded to the online survey.

Section 4: Occurrences of pedal confusion with findings from both the secondary data which includes data by year, by month, day of week, time of day and findings from the online survey.

Section 5: Suggested causes of pedal confusion.

Section 6: Opinions on suggested solutions to pedal confusion and other potential solutions, combining the findings from the secondary data, online survey and workshops.

NOTE: In the survey and during the workshops, some drivers and attendees expressed their belief that fatigue was a potential cause of pedal confusion and as a consequence a reduction in fatigue would reduce the number of emergency situations where pedal confusion may occur. TfL has previously commissioned Loughborough University to complete a study in to bus driver fatigue, therefore this report does not focus on the reasons for, and solutions to, bus driver fatigue.

2. Literature Review

There are very few published reports on pedal application errors specifically related to buses. Those which have been reported have been commissioned mainly by TfL. Other studies into pedal misapplication errors tend to focus on passenger vehicles in general, with research in Japan and the USA exploring age or gender correlations.

There are a number of terms used for 'pedal confusion' including 'pedal confusion', 'pedal application error', 'pedal misapplication' and in some cases, 'unintended acceleration'. For the purposes of this review, these terms may be considered interchangeable.

An approach was made to the International Bus Benchmarking Group (IBBG) of which TfL are members, who kindly provided the Clearinghouse Study from Dublin in 2007, this provided useful guidance, however as this report is not published it is not referenced any further.

The IBBG is a group of bus operators and authorities from around 15 member cities around the world who share best practice on operations. The group undertakes benchmarking on a range of metrics including safety, finance, efficiency and operational practices. All information shared is confidential.

See appendix A for references to each piece of literature reviewed.

2.1 Human Factors – 2011 (TfL)

This report explored possible measures to counter pedal application error. Solutions were assessed by experts to explore the feasibility and potential benefits of each.

a. Standardise pedal layouts – ensure all models of bus use the same standardised pedal layout, so that drivers have a consistent mental model;

b. Seat adjustment controls – improved driving seat controls would allow quicker seat adjustment, particularly for smaller drivers, which would help to ensure a correct driving position, which could reduce the number of pedal errors;

c. Engine cut off when driver door is open – drivers must restart the bus and reposition their foot on the brake pedal to switch from neutral to drive mode, each time the driver's door is opened; and

d) Pedal application error training – provide pedal application error training to help bus drivers to recognise and react to a pedal application error which should help them to recover more reliably.

2.2 Transport Research Laboratory – 2018 (TRL)

A study was commissioned to research a range of safety measures to be included in the Bus Safety Standard (BSS). The safety measures evaluated by TRL were based on the recommendations from the Human factors – 2011 research (section 2.1).

Environmental and safety tests were conducted for feasibility and the development of assessment protocols for an individual vehicle's adherence to the BSS. In terms of pedal application error, recommendations included:

a. Toggling – Drivers should press the brake twice to update the driver's recent memory of the brake pedal position, for example, whilst waiting at a bus stand. If the brain has more frequent updates, drivers are less likely to place their foot incorrectly. This was introduced into the 2021 BSS.

b. Bus Vision Standard – Driver's feet might become misaligned to the pedals if they move to see a blind spot. Additional measures to reduce blind spots will help to reduce unintended acceleration.

c. Standardised pedal placement – Although pedal design is regulated and many manufacturers build to ISO standards, there is still variation between models. TRL suggested that identical layouts could eliminate potential driver confusion.

d. Driver feedback system – In the event of an error, a feedback system may help a driver realise that they have made a mistake. This could be a visual indication (the Pedal Indicator Light was introduced into the 2019 BSS), or engine noise simulation for electric/hybrid vehicles.

e. Future Advanced Emergency Braking (AEB) – If the current AEB system was adapted to recognise the difference between normal acceleration and brake confusion, it could engage emergency braking if the accelerator was depressed fully.

This research takes these recommendations to learn how stakeholders, including drivers perceive each of these as a potential solution.

2.3 Footright – 2015 (TTN Technologies)

Footright is an intelligent safety device designed for buses and coaches. It is specifically designed to eliminate the effects of unintended acceleration incidents. It is designed to be retrofitted to commercial vehicles, demanding a series of inputs before allowing the throttle to be enabled. Other features include variable speed limitation, reverse gear selection warnings and reduced acceleration after the operation of entry/exit doors.

2.4 Pedal Application Errors – 2012 (NHTSA)

The US Department of Transportation's National Highway Traffic Safety Administration (NHTSA) examined the prevalence of pedal application errors and the driver, vehicle, roadway and environmental characteristics associated with them. This was via a literature review, media analysis, crash database analysis, case studies and a panel of subject matter experts. Whilst this study was not limited to buses, it appears to be one of the largest scale examinations into the phenomenon.

Main findings include:

a. There are approximately 15 pedal misapplication crashes* in the USA per month;

b. Two thirds of the drivers of vehicles involved in those crashes* are female;

c. Driver age distribution is concentrated in the youngest (16-20) and oldest (76+) age groups, representing 35-50% of drivers, depending on the data set used; and

d. Passenger cars are the most common vehicle type to experience crashes* due to pedal application errors, correlating with their exposure in the vehicle fleet.

Recommendations include educating medical professionals about conditions associated with pedal application errors so that these can be flagged at routine physical examinations, public education on measures to counteract an unintended acceleration incident and providing law enforcement with a means to record driver details in such incidents.

*NOTE: The NHTSA refers to crashes, not incidents, this terminology has been matched here.

2.5 Additional Studies

In addition to the above studies there are several areas of focus in the wider academic field. There appears to be a particular focus on age, which correlates with the NHTSA age

distribution curve. Several studies have been conducted into the effects of age on pedal application errors, with a focus on older drivers. References are shown in Appendix A.

a) Kinematic and Electrophysical Characteristics of Pedal Operation by Elderly drivers during Emergency Braking;

b) Understanding the Automotive Pedal Usage and Foot Movement Characteristics of Older Drivers; and

c) Pedal Misapplication: Interruption Effects and Age-Related Differences.

3. Profile of respondents to the online survey

3.1 Respondent Profile

In total, 593 respondents participated in the online survey which delivers data. This number of responses provides data with a level of confidence at the 95% level of +/- 4%. However, the responses should not be considered representative of drivers as the survey was self-select and the profile of drivers may skew to those with more experience as shown later in Figure 3.2.

Table 3.1 shows the number of interviews achieved through the online invitation with the link or QR code and those who completed the interview while the interviewer was in attendance using a tablet available for an immediate response.

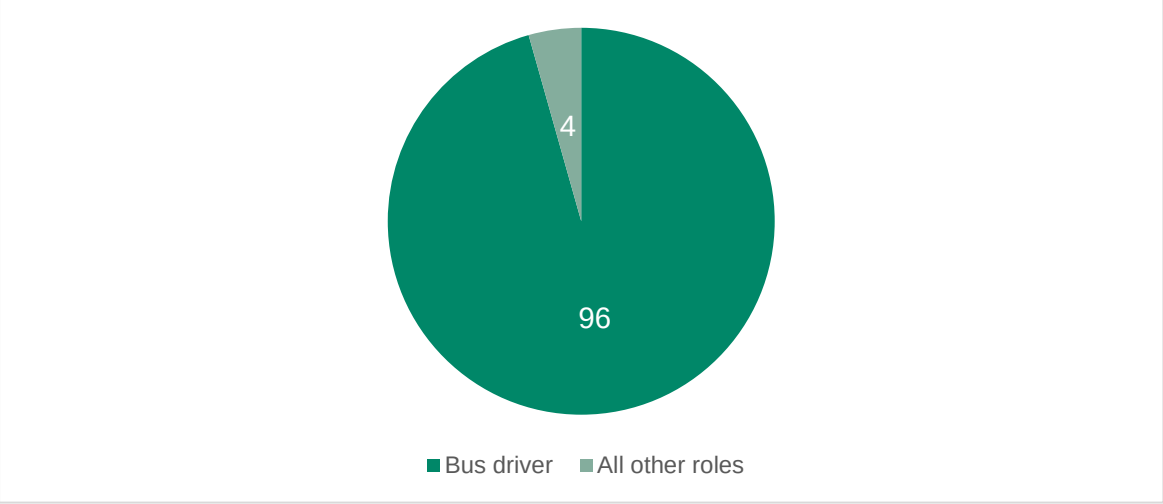
Table 3.1 Number of interviews by time

Time of interview	Number (n)	Percentage (%)
Completed during interviewer visit using a tablet with an online link	402	68
Completed at any other time using a personal device and accessing the online link	191	32
Total	593	100

Base: all respondents (n=593)

The majority of responses to the survey were from drivers as shown in Figure 3.1.

Figure 3.1 Profile of respondents: drivers and other roles (%)

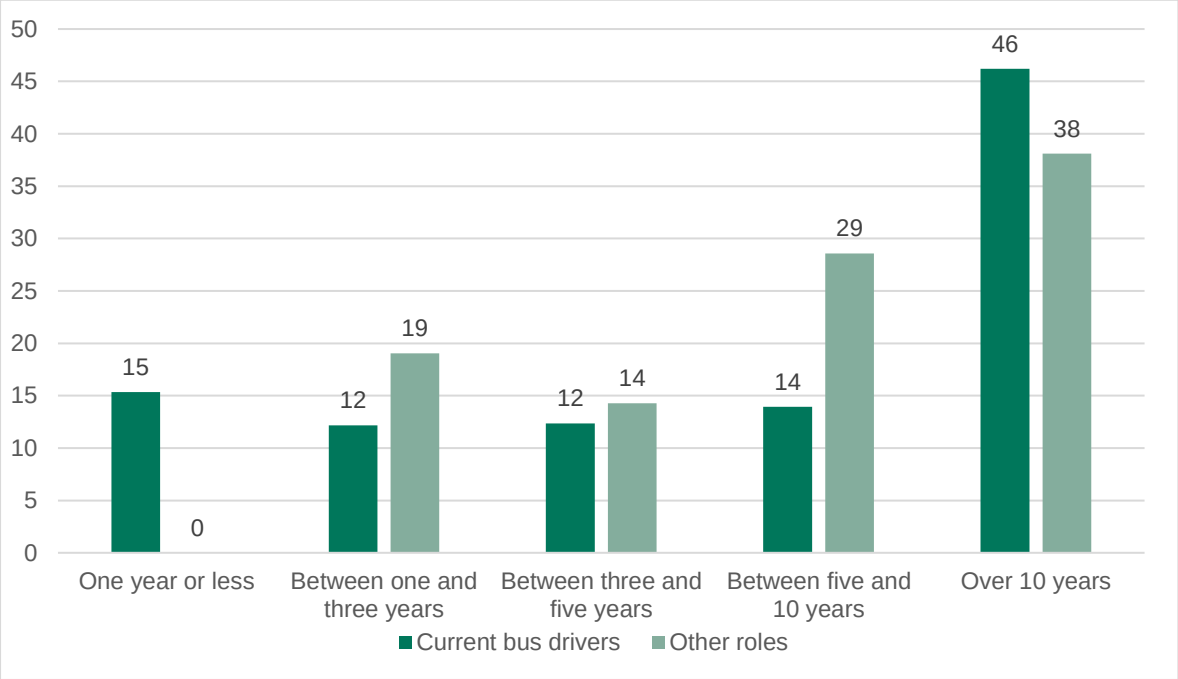


Base: all respondents (n=593)

Of the 593 responses to the survey, 567 (96%) were current drivers. Of the remaining 26 respondents (4%), 21 had previously worked as a bus driver before changing roles, with 5 respondents who worked in the bus garages but had not had a role as a bus driver. In total, 99% of all respondents work or had worked as a bus driver.

Figure 3.2 shows the amount of driving experience of those currently driving and those who had previously been a bus driver but were now in another role.

Figure 3.2 Driving experience (%)

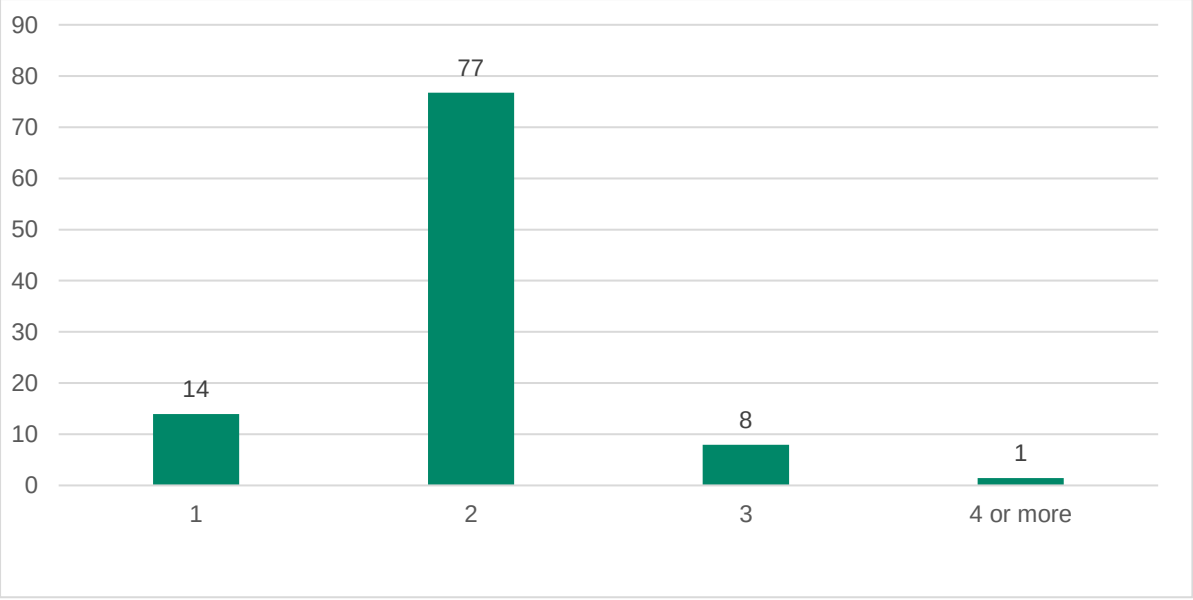


Base: all current bus drivers (n=567); other roles, previously bus drivers (n=21)

Of those who currently drive a bus, 39% have under five years' driving experience and 60% have over 5 years' experience with most of these (46%) having over 10 years' experience.

Figure 3.3 shows the proportion of drivers who stated that typically they drive more than one bus per shift, even if it is the same make and model, with 86% of all drivers stating this.

Figure 3.3 Typically, number of different buses driven per shift per driver (%)



Base: all current bus drivers (n=567)

4. Occurrences of pedal confusion

This section looks at the number of times that pedal confusion is reported to occur, firstly using the IRIS database and secondly the online survey.

4.1 IRIS data

The IRIS database also includes a description of the incident and this account was used to identify cases of pedal confusion incidents.

The IRIS data provided had a total of 363,329 incidents in the five-year period from 2015 to 2019 and includes 64,203 incidents where a bus driver was noted as the primary cause of the incident. In the absence of contributory factors, and without a categorical indication of whether incidents were related to pedal confusion, the analysis of this data focussed on interpreting the incident descriptions. Owing to the vast number of data points held, the methodology focussed on searching for key words in the incident description field to highlight incidents of pedal confusion. Key words searched included ‘pedal confusion’, ‘accelerator’, ‘accelerated’, ‘brake’ and ‘gas’.

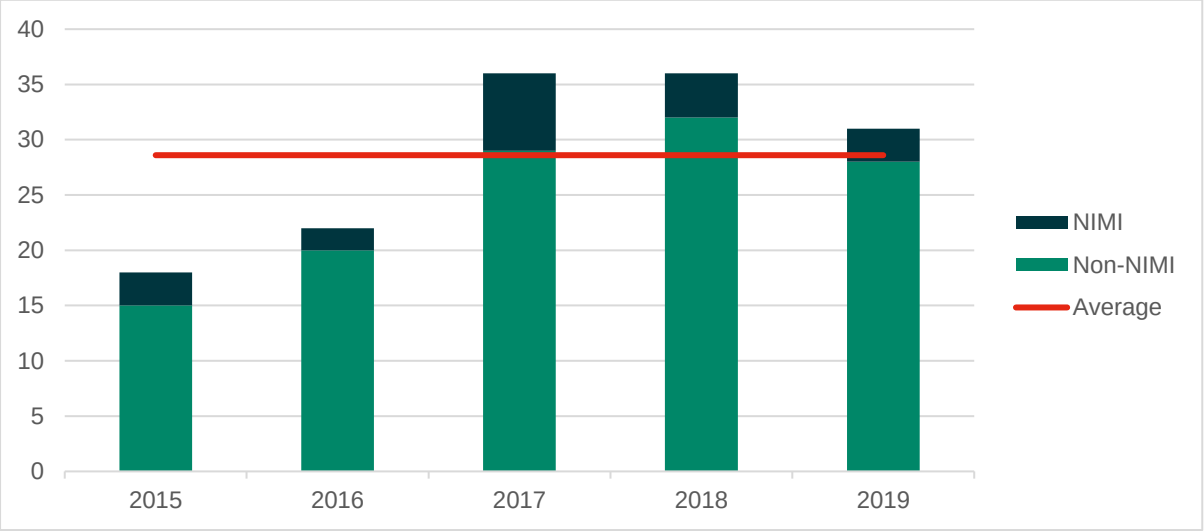
In total, 143 incidents were identified as pedal confusion incidents and of these 19 had been flagged as NIMI (major) incidents.

In addition to the 143 pedal confusion incidents, there were multiple incidents caused by drivers’ failure to apply the handbrake when the vehicle was stationary. These incidents were also highlighted by searching for key words in the incident description field including “handbrake”, “hand brake” and “rolled”. There were 93 of these incidents identified, with two of these incidents then leading to instances of pedal confusion. The incidents which did not lead to pedal confusion were considered outside the scope of the study and were not analysed further.

It is worth noting that the narrative provided in the descriptions varied case-by-case (in particular, the level of description and whether the description was written by the driver or other staff). There was therefore an element of subjectivity involved in the study of this information.

Figure 4.1 shows the number of incidents related to pedal confusion in the IRIS data set recorded over the five-year period from 2015 to 2019. The incidents that had been flagged as NIMI (major) incidents within the IRIS database have been highlighted in the figure below.

Figure 4.1 Number of pedal confusion related incidents by year (n)



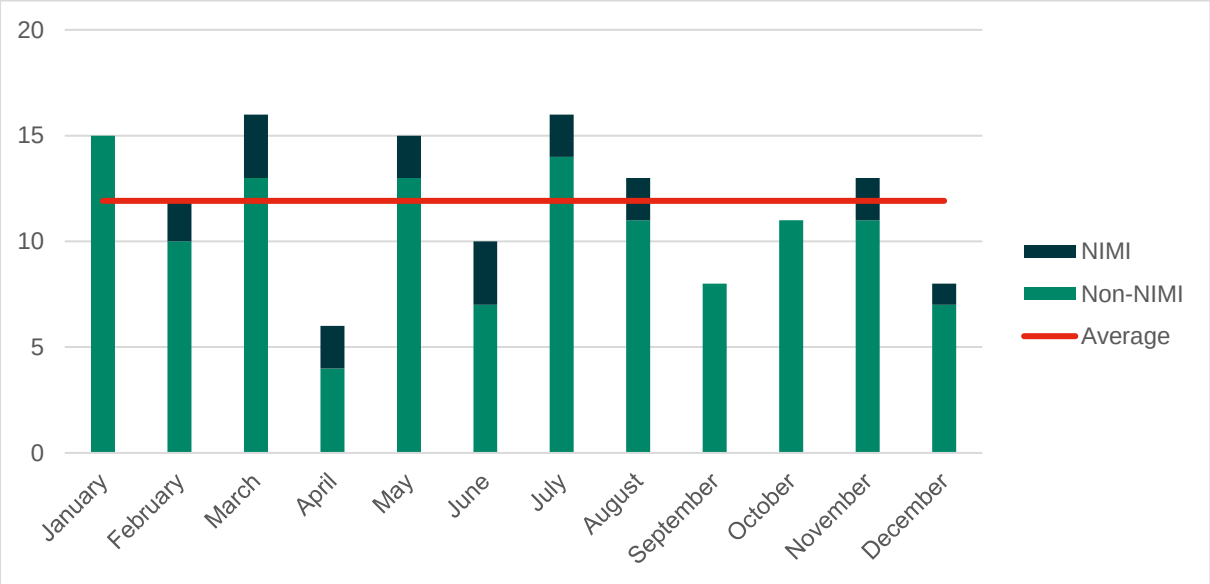
The number of recorded incidents grew considerably from 2016 to 2017 and fell slightly from 2018 to 2019. Given that the period of study was only five years in length, it was difficult to determine whether these changes were significant or whether they were just a natural variation in the number of incidents reported year-on-year. If there is a significant increase, the reasons for this cannot be determined, but may include:

1. Driver willingness to report due to a more open reporting culture;
2. Improved investigation techniques, such as footwell cameras;
3. Changes in bus types being driven, such as more hybrid and electric buses; or
4. More incidents of pedal confusion from any bus type.

Month of year

Figure 4.2 presents the incidents related to pedal confusion in the IRIS database by month for the period 2015 to 2019. The major (NIMI) incidents in the IRIS data set have been highlighted in Figure 4.2 and the average number has been added for comparison.

Figure 4.2 Number of pedal confusion related incidents by month (n)



As can be seen in Figure 4.2, the number of instances of pedal confusion varied considerably by month. For example, there were six reported incidents occurring in April but as many as 16 in March and July. The number of incidents that had NIMI flags in the IRIS database (representing the more serious incidents) also varied by month. There were no NIMI incidents recorded in January, September or October but the majority of the remaining months had at least two NIMI incidents recorded.

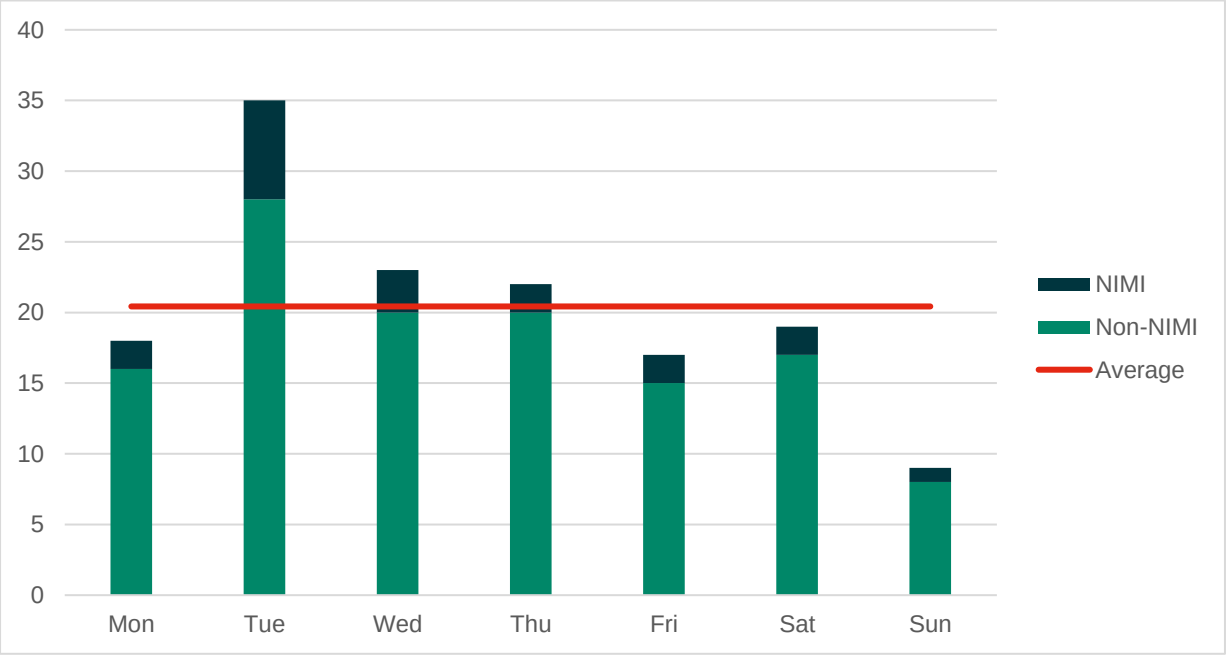
In the IRIS data set, March and July had the highest number of reported pedal confusion incidents (16) and these months were closely followed by January and May which both had 15 reported incidents. The highest number of NIMI incidents was recorded in March (3) however the months with the highest frequency of serious incidents as a proportion of the total incidents that occurred during the month was April (33%) and June (30%).

Whilst the data showed that pedal confusion incidents occurred with a higher frequency in some months than others, the trends were fairly weak and more detailed data would therefore be needed to identify whether there is a relationship between the number of collisions and the month of the year. The limited quantity of NIMI incidents available for study in the IRIS database also meant that it was not possible to determine whether there was a relationship between the month and the incident severity. Further data would also be required to explore this relationship further.

Day of week

Figure 4.3 presents the incidents related to pedal confusion by day of the week and includes the NIMI and non-NIMI data in the IRIS database for the period 2015 to 2019.

Figure 4.3 Number of pedal confusion related incidents by day of the week (n)



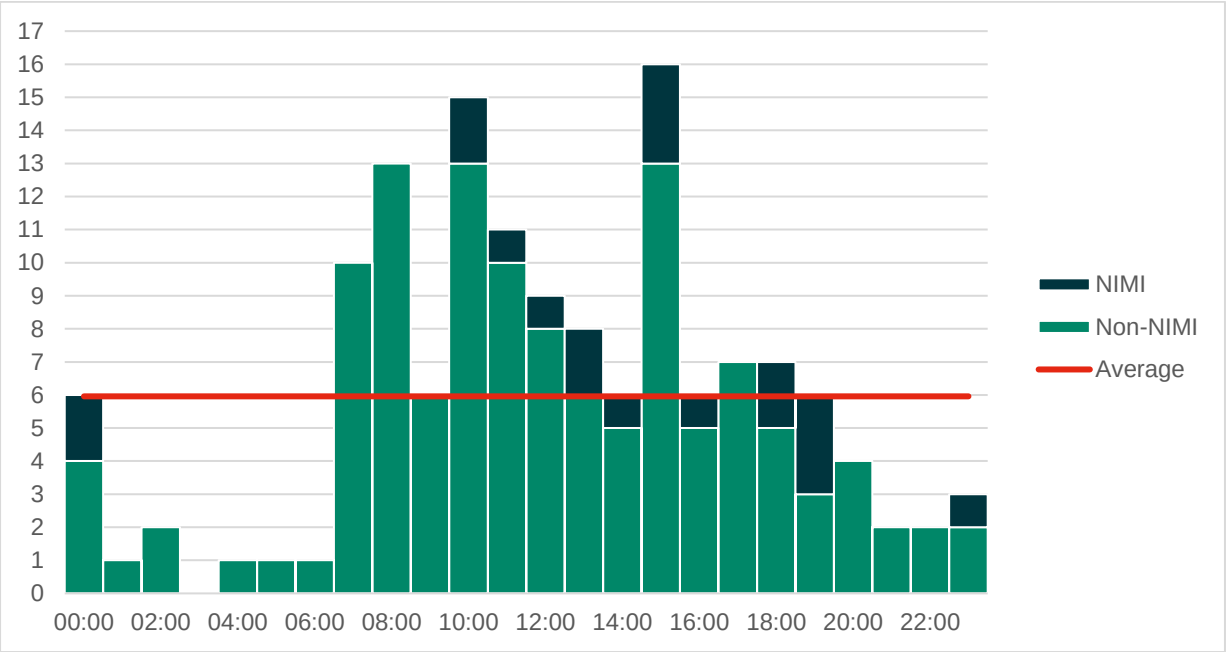
Tuesday clearly had the highest number of reported pedal confusion incidents both in terms of overall number and the number of NIMI incidents. The proportion of the overall pedal confusion related incidents that were classed as NIMI incidents was also highest on a Tuesday (20%). The remaining days of the week, excluding Sunday, all appeared to have a similar level of reported incidents in the IRIS data set (in the range from 17 to 23). There were very few incidents recorded on a Sunday, although this may be because there is a reduced service on a Sunday.

Over the period of study, pedal confusion incidents occurred considerably more frequently on a Tuesday than any other day. Of the relationships studied relating to time of day, day of the week and month of the year, this was the clearest indication that there might be an underlying pattern in the data. It is worth stressing however that data would need to be studied over a longer period to confirm whether this represents a trend or if this was purely coincidental.

Time of day

Figure 4.4 shows how the number of pedal confusion incidents varied by hour of the day and is again separated into NIMI and non-NIMI incidents.

Figure 4.4: Number of pedal confusion related incidents by hour of the day.



There were very few incidents recorded during the early hours of the morning when the traffic on the network was likely at its lowest. The number of incidents recorded increased significantly from 07:00 onwards, which could be linked to a potential increase in traffic volumes during morning rush hours. The hour with the highest number of incidents was 15:00 – 16:00 and this was closely followed by 10:00 – 11:00. Whilst there were a few hours which had higher numbers of incidents recorded, there does not appear to be a significant variation.

The number of incidents recorded was lower for the hours from 20:00 onwards however there was a slight increase in the number of incidents recorded for the hour 00:00 – 01:00. When compared to the hours in the middle of the day, which generally saw higher levels of incidents than the hours during the evening and early hours of the morning, the hour 00:00 – 01:00 does not have a significantly high level of incidents. However, when comparing the six incidents recorded in this hour to the number of incidents recorded in the other hours from 20:00 to 07:00, there is a marked increase in incident levels for this hour.

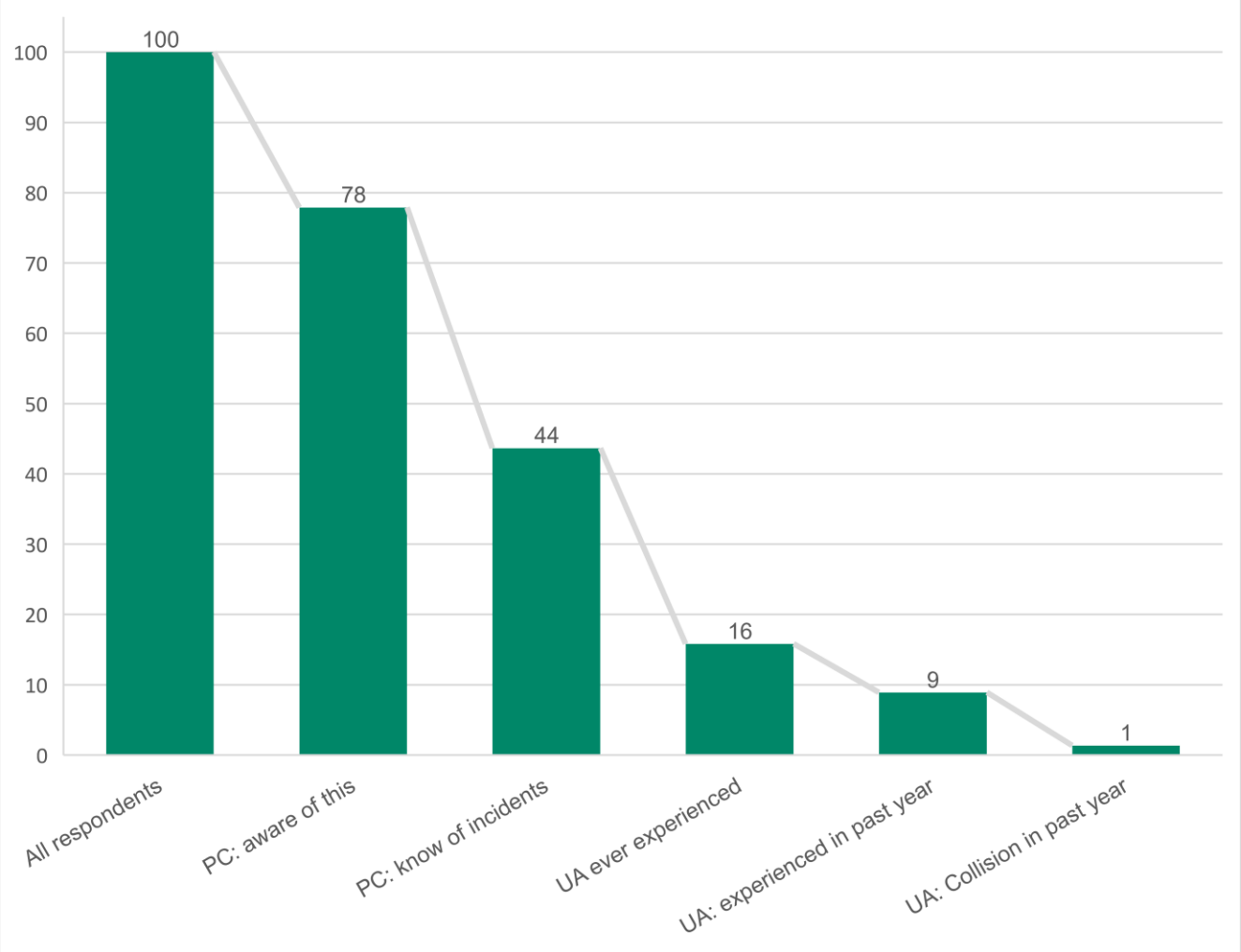
Like many of the findings in this study, more detailed data would be needed to clarify whether the peak in incidents in the hour 00:00 – 01:00 was significant or whether this was purely coincidental. Furthermore, more detailed data would be required to determine if there are hours of the day that have a higher rate of incident occurrence.

4.2 Drivers reporting of pedal confusion

When asked about their awareness and experience of pedal confusion, approximately 1 in 5 drivers were unaware of pedal confusion (22%), 44% had awareness of pedal confusion incidents and 56% were not aware of any pedal confusion incidents.

Figure 4.5 shows the awareness of pedal confusion (PC), which may include harsh braking due to the definition provided to drivers in the survey and those who have experienced unintended acceleration (UA).

Figure 4.5 Awareness of pedal confusion; experience of unintended acceleration (%)



Base: all respondents (n=593)

Occurrences of unintended acceleration

Drivers in the survey confirmed the following, specifically about unintended acceleration:

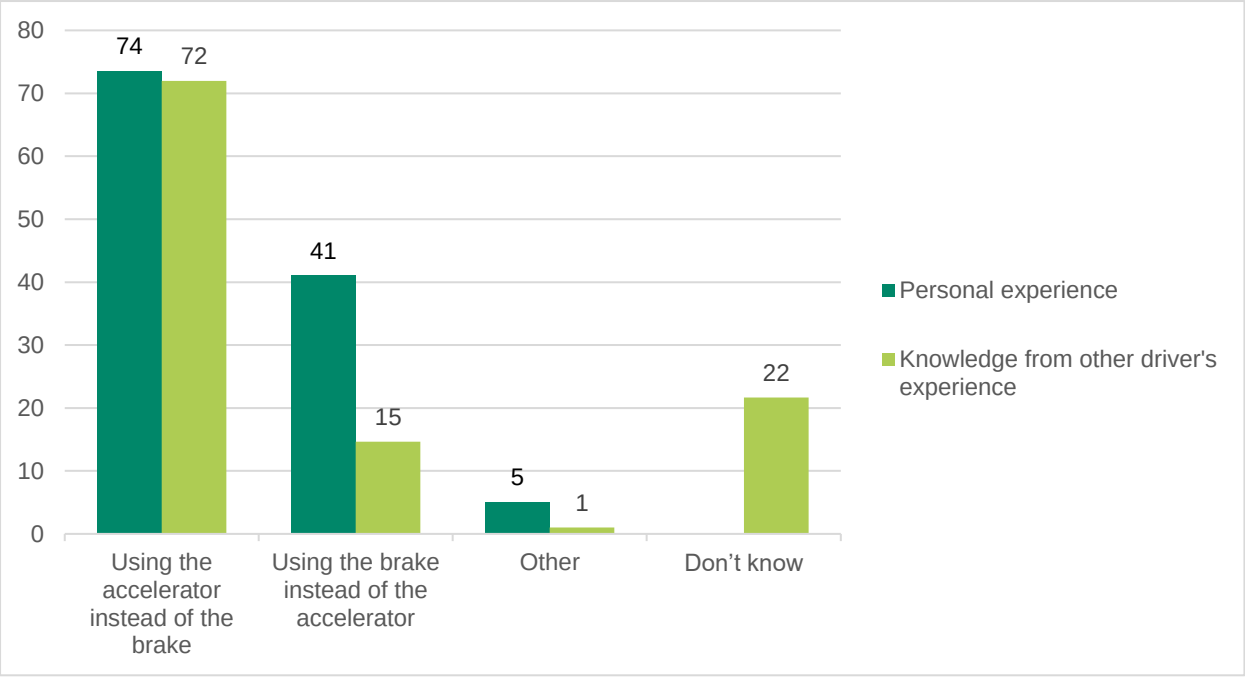
- 16% of drivers have experienced unintended acceleration;
- 9% of drivers experienced unintended acceleration in the past year; and
- 1.3% of drivers experienced a collision due to unintended acceleration

Of the 53 drivers who experienced unintended acceleration in the past year, 85% of these experiences DID NOT result in a collision, these are assumed to be near misses.

Additionally, drivers with less than 5 years' experience are less likely to know of any other drivers' experience of pedal confusion compared with those who have more than 5 years' experience (46% compared to 33%), while the proportion who do not have any knowledge of pedal confusion is similar irrespective of experience.

Figure 4.6 shows whether driver's knowledge and experience about actual incidents were unintended acceleration or harsh braking.

Figure 4.6 Experience of pedal confusion (%)



Base: Personal experience (n=127); Knowledge from other driver's experience (n=157)

This report continues to look at the higher proportion of driver's experience and workshop attendees knowledge, which is unintended acceleration, however, 41% of drivers stated they have used the brake instead of the accelerator, although the outcomes of these types of pedal confusion are unknown.

Of those who experienced pedal confusion, about three-quarters (74%) said they had used the accelerator instead of the brake, while 72% of those who were using their knowledge of other driver's experience understood it was unintended acceleration.

When asked about the anticipated frequency of a pedal confusion incident occurring, many drivers were unsure.

4.3 Summary of pedal confusion occurrences

Findings from IRIS data:

143 pedal confusion incidents reported between 2015 and 2019.

- An average of 29 incidents per year. 19 were flagged as NIMI;
- An average of 2.4 incidents per month;
- Tuesday saw the highest number of incidents (35) and Sunday the lowest (9); and

- The times when the highest number of incidents took place was between 15:00 and 16:00 and between 10:00 and 11:00.

Findings from the online survey

- Approximately 1 in 5 drivers (22%) were unaware of pedal confusion (78% aware);
- 44% had awareness of incidents (56% unaware);
- 16% of drivers reported having experienced unintended acceleration at any time;
- 9% of drivers reported having experienced unintended acceleration in the past year; and
- 1.3% of drivers reported having experienced a collision due to unintended acceleration.

Of the 53 drivers who experienced unintended acceleration in the past year, 85% of these experiences did not result in a collision. This low number means significant conclusions cannot be made and data should be treated with caution and considered indicative.

5. Causes of pedal confusion

5.1 Secondary data

The following section describes the possible causes, other than time of day (see section 4).

5.1.1 NIMI data

Records for each incident included the date of incident, route, operator, and vehicle information; and a brief description of the event and the key findings resulting from the investigation. In addition to the information provided in the database, further information about the 16 cases with completed investigations was obtained, including details of driver shift patterns leading up to the incident and drivers' experience in operating the model of bus involved in the incidents.

As the NIMI data didn't cover the same reporting period as the IRIS data therefore it was not possible to treat the NIMI data as a sub-set of the IRIS data. Additionally, whilst the NIMI records included useful information that was not contained in the IRIS databases (namely shift pattern information, vehicle type and drivers' experience of operating the vehicle involved in the collision), the small number of records available for study meant that it was not possible to draw statistically significant conclusions from the information.

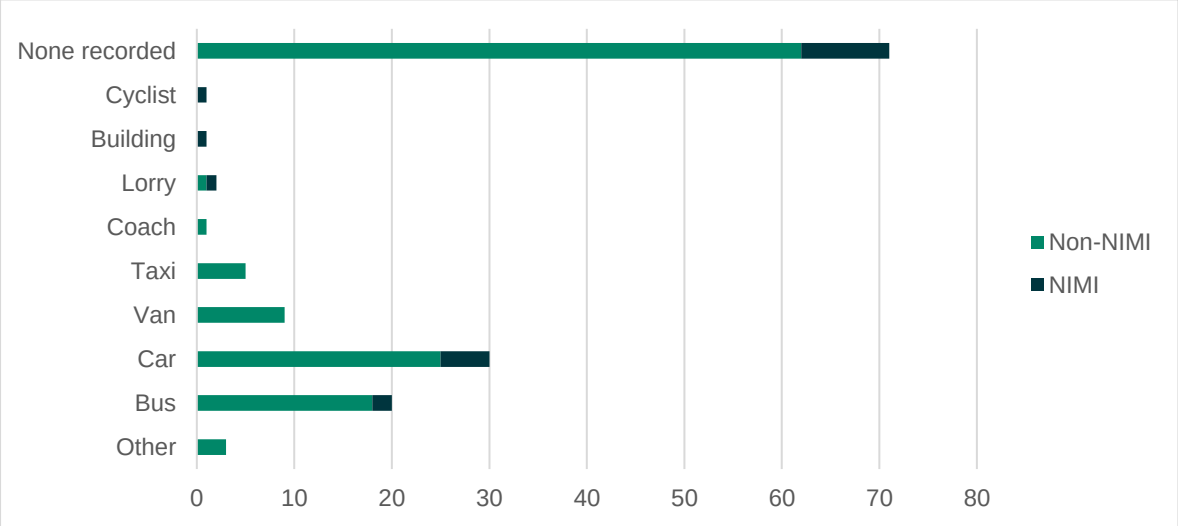
For this reason, the remainder of the analysis focuses on the data in the IRIS databases.

5.1.2 IRIS data

Third party involved

Figure 5.1 splits the pedal confusion incidents with respect to the third party involved in the collision.

Figure 1.1 Number of pedal confusion related incidents by third party involved (n)



Base: 143 pedal confusion incidents

Of the 143 incidents identified in the IRIS database, 71 had no third party recorded despite many of the incident descriptions suggesting that a third party was involved. Most of the

remaining incidents involved cars or buses which were often the nearest object at the point of pedal confusion occurring.

The incident descriptions suggest that many of these incidents occurred while the bus was in stop-start traffic.

Recommendations

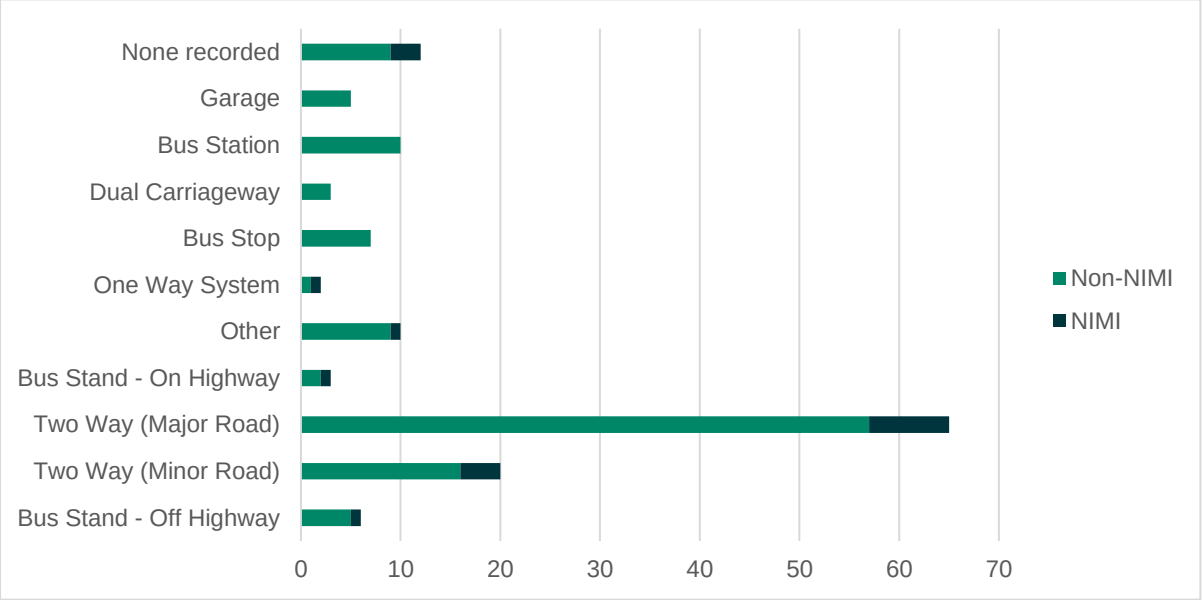
To aid future analysis it is recommended that a comprehensive review of the IRIS and NIMI database fields is carried out, with fields expanded as follows:

- Manoeuvre being performed at the point of the incident;
- Whether the incident is specifically related to pedal confusion;
- Clear details of the vehicle model;
- Drivers' experience in operating the vehicle involved in the incident; and
- Shift patterns or length of time on shift at the point of the incident occurring.

Location Type

Figure 5.2 shows the location of the incidents related to pedal confusion and includes the 143 identified instances in the IRIS database.

Figure 5.2 Number of pedal confusion related incidents by location (n)



Base: 143 pedal confusion incidents

Most of the records had location information included, though there were 12 incidents that were missing this information. Almost half of all incidents occurred on two-way major roads and the next most common location was two-way minor roads. Many of the incident descriptions that had these two locations recorded referred to stop-start periods in traffic or where buses were on approach to bus stops.

Though it appears that incidents are more likely to occur on major and minor roads with two-way traffic, it is important to consider the proportion of each journey spent in these locations. Traffic flow information would need to be considered in further research to allow a better understanding of whether pedal confusion incidents are more likely to occur in these locations

or whether incidents occur more frequently due to the relatively greater time spent in these locations.

Recommendations

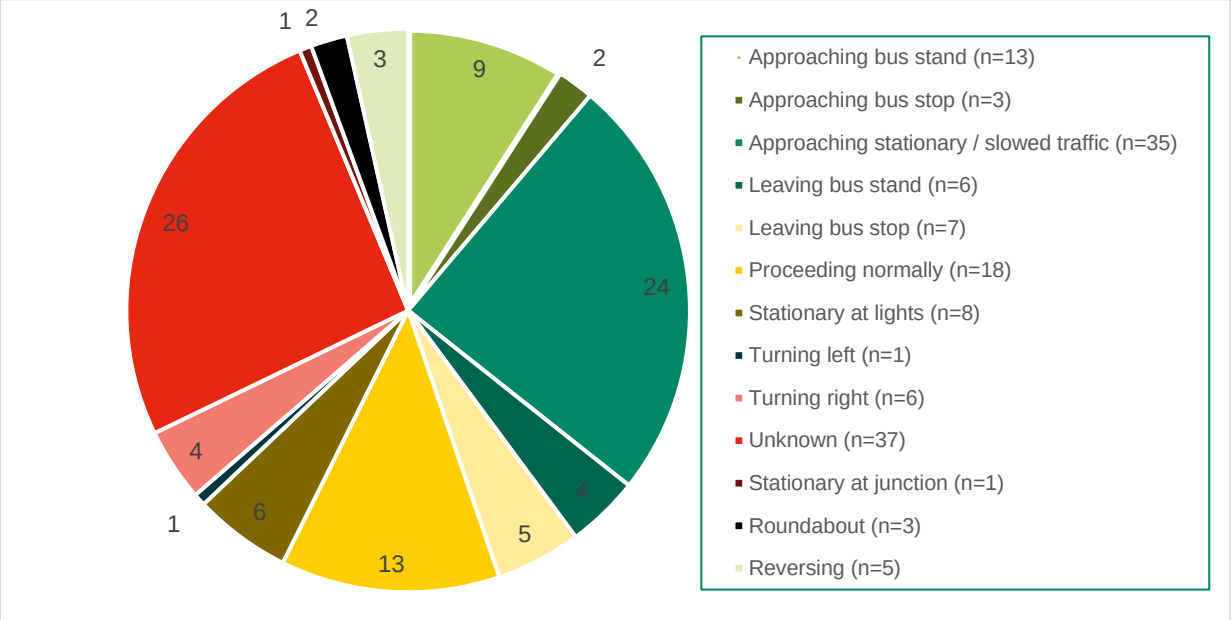
Make sure key fields, such as location, if not all fields, in the database have a forced response when data is inputted.

Measure traffic congestion levels or traffic flow at the incident location at the time of the incident and validate with previous days/weeks at the same time of day to validate if this was usual or unusual.

Manoeuvre Involved

Figure 5.3 categorises the 143 pedal confusion incidents identified in the IRIS database by the manoeuvre that was being performed at the point that the incident occurred.

Figure 5.3 Manoeuvre performed at point of pedal confusion (%)



Base: 143 pedal confusion incidents

The manoeuvre for each incident was determined using the incident descriptions which, for over a quarter of cases, was not clear enough to categorise the incident. Based on the analysis, the most common manoeuvre that led to pedal confusion incidents was 'approaching stationary / slowed traffic'. Almost a quarter of all incidents occurred under these circumstances. Further evidence would be needed to confirm whether there was an increased frequency of pedal changes in slowed or stationary traffic which may be a contributing factor. Other manoeuvres with a significant share of the total incidents included 'proceeding normally' (13%) and 'approaching bus stand' (9%).

Given that it was not possible to determine the manoeuvre for such a high proportion of the incidents, it was difficult to identify patterns in the data. A clearer, more consistent method for recording this data would be required to delve into this.

Recommendations

Add a data field or fields which clearly state the type of manoeuvre being completed to reduce the proportion of unknown manoeuvres. The list in this report could be used as a starting point, with a comments box for additional detail.

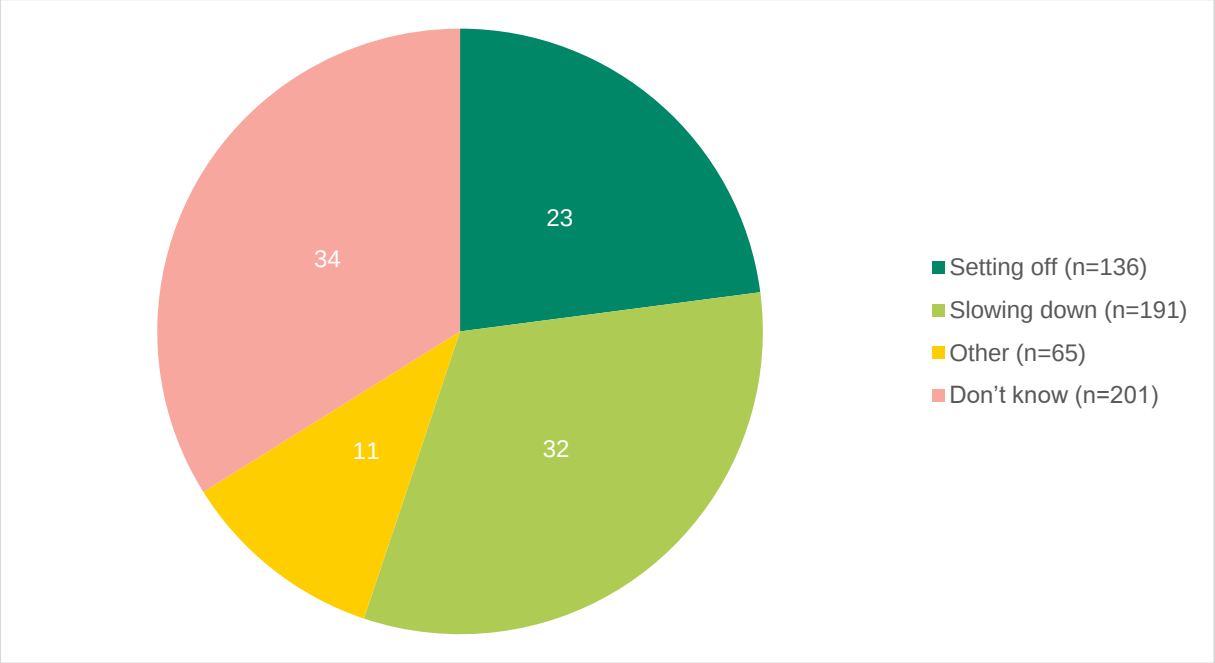
Consider using technology such as footwell cameras to measure and record whether the number of pedal changes were high, regular or low. The definition of high, regular, low and the number in the scale would be better determined by TfL and other experts.

5.2 Online survey

5.2.1 When might pedal confusion occur

Drivers were asked when they believed pedal confusion was most likely to occur and the point in a shift it is most likely to occur. Figure 5.5 shows the outcomes, where setting off and slowing down includes from a garage (depot), from a bus stop or at a junction. Figure 5.6 shows the outcomes by shift.

Figure 5.5 Driver opinion: When is pedal confusion most likely to occur (%)

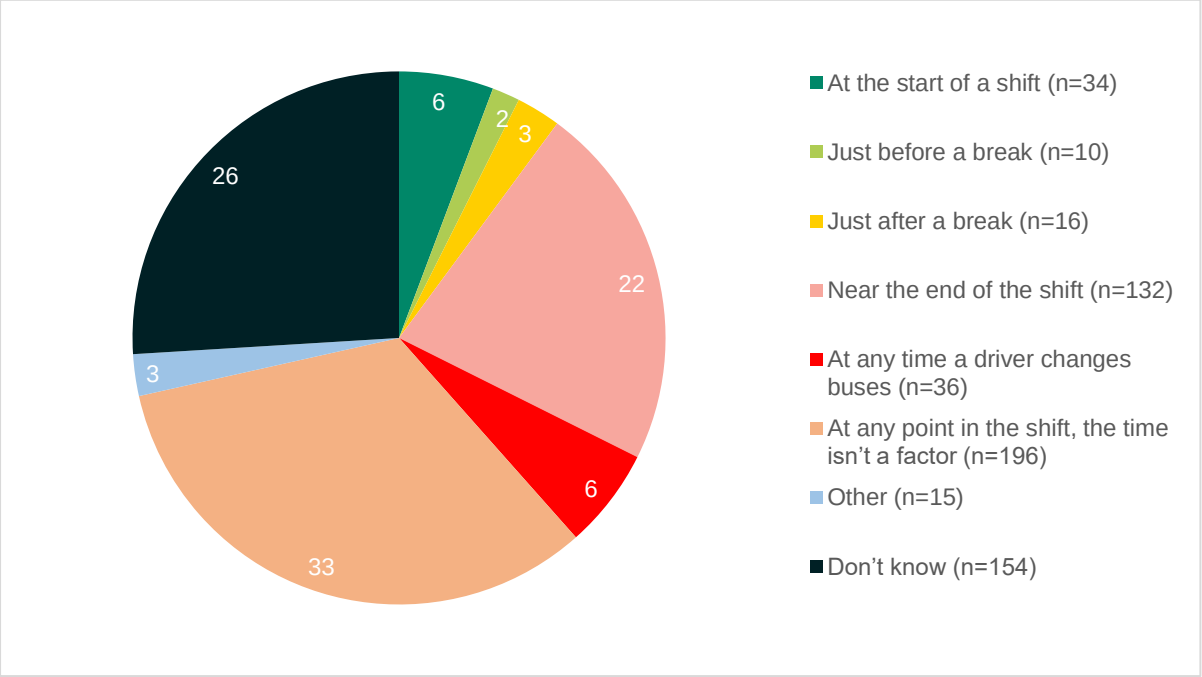


Base: all respondents (n=593)

Similar to the manoeuvre data, the breadth of response varied, including 34% who felt they didn't know enough to answer. The other responses were mainly:

- At any time (n=16);
- Slowing down and sitting in slow moving traffic (n=14); and
- Others such as along a straight road, when tired and that it does not happen.

Figure 5.6 Driver opinion: When in a shift is pedal confusion most likely to occur (%)



Base: all respondents (n=593)

In total, 33% of drivers felt that pedal confusion could occur at any time, and when those who stated they don't know are removed, this increases to just over half the drivers (52%). In addition, drivers who had experienced pedal confusion previously were more likely to say that pedal confusion is most likely to occur at any point in the shift compared to those who had not experienced pedal confusion (50% compared to 29%).

When drivers were asked for reasons, they felt these specific timings were most likely to be when pedal confusion might occur, the main reasons provided were consistent, irrespective of the time selected, and mainly:

- Long shifts, not enough rest time and time between shifts;
- Hurrying, rushing or panicking, or feeling under pressure; and
- That pedal confusion can happen at any time, therefore it's not possible to give a most likely time.

As referenced in section 1.7 of this report, a separate report TfL has previously commissioned Loughborough University to complete a study into bus driver fatigue[3].

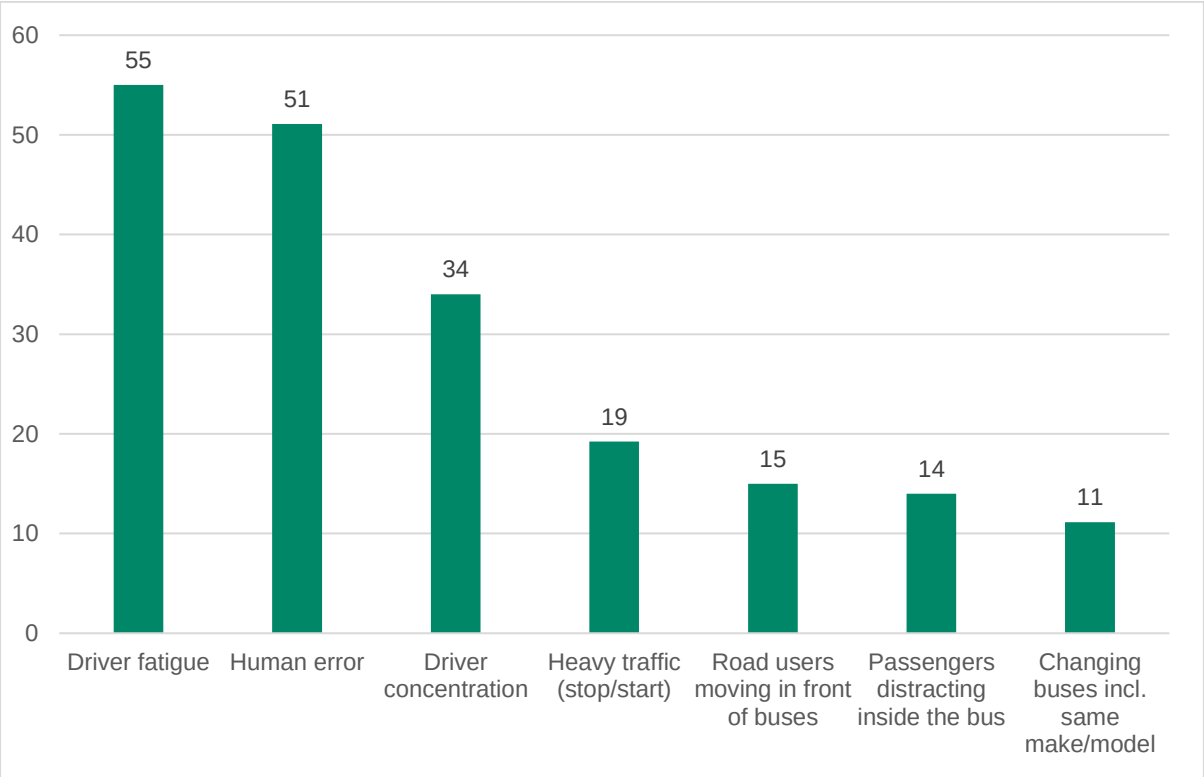
5.2.2 Main factors that cause pedal confusion to occur

Respondents were asked to give their opinion of the top three reasons they believed may cause pedal confusion and given an opportunity to offer any other reason not provided on the list of 14 potential reasons they had been asked to consider. The findings are based on their opinion and does not assume it is evidence based.

Figure 5.7 shows all the possible causes of pedal confusion that drivers gave an opinion on, those selected by at least 10% of respondents are included.

[3] https://content.tfl.gov.uk/bus-driver-fatigue-report.pdf

Figure 5.7 Driver opinion: Factors most likely to cause pedal confusion (%)



Base: all respondents (n=593)

The three main causes in drivers opinion are: driver fatigue, human error, lack of driver concentration. In total, 49% of drivers mentioned at least one type of driver distraction (driver concentration, passenger distraction or pedestrian distraction).

The other options, in order of selection by respondents were:

The other options, in order of selection by respondents were:

- Other road users (7%);
- At blind spots (6%);
- Distraction by pedestrians outside the bus (6%);
- At bus stops (5%);
- Drivers unable to hear the acceleration (4%);
- Pedal shape, placement or layout (4%);
- Rushing or panicking, feeling under pressure (4%);
- Stress (3%);
- Driving when dark (2%); and
- Driving a night bus (2%).

Drivers with over 5 years' experience were more likely to feel that fatigue was one of the three main causes compared to drivers with under 5 years' experience (60% compared to 48%), although both levels of experience ranked this highest as a possible cause.

Drivers who had experienced pedal confusion previously (n=127) listed human error (54%), driver fatigue (51%), driver losing concentration (31%) and driving in heavy traffic (27%) as the most likely causes of pedal confusion.

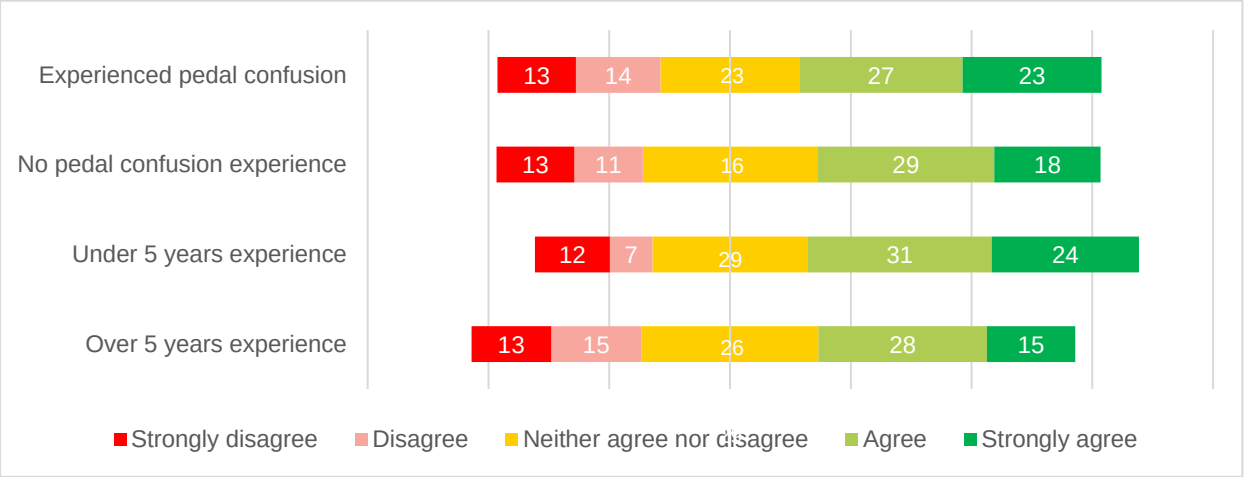
5.2.3 Driver training

Drivers were asked about how much they agreed with the following statement:

"I have been trained to recognise when unintended acceleration is occurring and how to respond to it"

Figure 5.8 shows the responses from drivers based on their driving experience and personal experience of pedal confusion.

Figure 5.8 Driver opinion: Training on unintended acceleration (%)



Base: all current bus drivers (n=567)

More drivers with under 5 years' experience agree with the statement than those who have over 5 years' experience (55% compared to 43%). However, there is no significant difference in the views between those who have and have not experienced pedal confusion.

5.3 Workshops

The causes and occasions when drivers thought that pedal confusion might occur were discussed in all workshops. Table 5.1 outlines the workshop and day-to-day roles of attendees in each workshop. A total 86 stakeholders participated in the workshops. In addition, of 45 drivers participated in separate workshops with 2 to 4 drivers attending each session.

Table 5.1 Stakeholder workshops and roles of attendees

Workshop	Representing	Roles and responsibilities of attendees
1	Bus manufacturers	Bus manufacturers
2	TfL	Health and safety experts
3	TfL	Operations experts
4	Bus operators	Health and safety experts
5	Bus operators	Operations experts
6	Bus operators	Incident investigators
7	Bus operators	Driver trainers
8	Union representatives	Bus operator staff nominated representatives
9	Union officials	Union officials
10	TfL and bus operators (combined group)	Engineers

The outcomes of these workshop discussions have been divided into possible causes related to the vehicle and driving conditions and possible causes that related to a driver.

Everything stated in the workshops was the attendees own opinion based on their experience and was not evidence based. Quotes from the workshop about each topic are shown in Appendix F.

5.3.1 Possible Causes: Vehicle and driving conditions

Many of the workshop respondents thought that similar aspects of the vehicle might contribute towards pedal confusion including:

Different pedal configurations or cab design

Attendees pointed out that pedals differ from bus to bus, both make and model, which means this is something drivers have to get used to, 86% of drivers state they drive more than one bus per shift (see Figure 3.3). Bus drivers thought that electric buses and the New Routemaster bus had pedals that were particularly close together.

The gap between the accelerator and brake pedals, the type of pedals and the height of pedals were all areas of discussion in many of the stakeholder workshops. These features are regulated by national and international regulations. The view was that generally drivers were able to use both pedals by swivelling their foot at the heel (which is a poor driving technique), rather than lifting their foot (which is the driving technique taught to new drivers).

There was a very small piece of analysis completed by one bus operator health and safety expert with a very small sample of six to seven incidents, which is insufficient to draw conclusions. In the small sample, the pedal layout wasn't found to be a consistent reason for the incident, however pedal layout could not be ruled out as a factor either

It is noted that Pedal Standardisation is on the roadmap for the Bus Safety Standard.

Traffic

While it was agreed by most respondents that pedal confusion could occur at any time, it was noted throughout the groups that pedal confusion tends to happen at slow speed and in heavy traffic building upon the evidence from the IRIS data. Further analysis may be required to understand what the contributory factors are that lead to pedal confusion in these instances.

Hybrid and electric buses

There was a view that the acceleration in electric buses, as well as being quieter, was quicker compared to diesel buses.

Some stakeholders thought that regenerative braking on hybrid and electric buses contributed to pedal confusion. The view held by some stakeholders is that during regeneration as the bus slows down the driver may falsely believe their foot is on the brake pedal and this may not be the case. In an emergency situation, those who thought this may be happening also thought that when the driver intends to press the brake the driver is likely to press the pedal as hard as possible but does not realise their foot is on the accelerator.

Footwear choice / lack of feeling of the pedals underfoot

Stakeholders thought that that footwear could make a difference to what the drivers can feel underfoot. Union representatives had a view that drivers do not always wear appropriate footwear. Some drivers in other workshops added similar points.

Driving different models of bus on the same shift / general unfamiliarity with the bus design

Some drivers are required to drive more than one bus per shift, as referenced in section 5.2 of this report. Some drivers we spoke to felt this could potentially contribute towards pedal confusion.

It is noted that Pedal Standardisation is on the roadmap for the Bus Safety Standard.

Recommendations

Explore pedal differentials such as height of pedals and spacing between pedals further. Analyse pedal layouts on all 143 previous incidents, where data is available.

Ensure pedal layout, pedal types, height and spacing are recorded on future incident investigations and included in the IRIS database.

Review current bus operator driver training for correct use of pedals.

Conduct further analysis to understand whether travel at slow speed and/or heavy traffic is a contributory factor and if so, further work such as driver training to be determined.

Conduct further analysis to measure brake regeneration in hybrid and electric buses as a possible cause using current data and/or track tests with drivers.

Review whether footwear has a link to pedal confusion incidents or near misses by reviewing current evidence. If a link is found, further work on footwear requirements should follow and footwear type and condition to be considered to be added to the IRIS database.

Confirm whether bus operators have a footwear regulation or guidance for drivers and where this is the case, review the regulation or guidance.

5.3.2 Causes: Driver related

Driver distraction and driver pressure were mentioned as possibly contributing to pedal confusion by stakeholders across all workshops. In some cases, it might be that these are causes of an emergency situation rather than a direct cause of unintended acceleration. Where a workshop participant thought there may be a direct link these are discussed below.

General driver distraction

Drivers may become distracted for many reasons such as:

Radio controllers contacting drivers

A small number of drivers mentioned that bus operator radio controllers contacting them whilst driving and the pressure they feel to answer the radio before they have managed to stop the bus might contribute towards pedal confusion occurring.

The operator health and safety discussion built on this point further by identifying that the radio button to speak to controllers is on the floor and while drivers should not be in contact with controllers while driving this may not always be complied with.

Passengers / passenger behaviour

Respondents pointed out that drivers may be distracted by passengers' behaviour on the bus behind the driver or when passengers talk directly to them.

Other road users' actions / road conditions

Bus drivers in the workshops described feeling that they have to concentrate hard as they need to read the road ahead, be aware of pedestrians, cyclists and other drivers as well as reading the traffic and safely stopping the bus. Some actions of others around them may cause them to perform an emergency stop or cause panic braking.

Respondents also discussed other possible causes of pressure that could cause driver distraction which have the potential to contribute towards a pedal confusion incident. These included:

Home life pressures (need to pick the children up, family commitments)

A number of respondents provided their view that external timing pressures with family commitments will sometimes cause a driver to rush or to be thinking about that rather than the driving of the bus. Their belief is that rushing to a finish can potentially contribute to an incident of pedal confusion occurring.

Drivers rushing: To achieve their stand time or to finish a shift

Some respondents thought that traffic or incidents on the road may result in buses falling behind schedule and that in these incidences drivers may feel under pressure to make up the time to get back to the depot and not have a route running late.

No toilet facilities in rest areas

One driver felt that in some cases, no facilities at one end of a route may lead to a loss in concentration later during the shift.

Tiredness / fatigue

Some respondents thought that on some days drivers will just be tired or fatigued and therefore their attention to detail and to their driving may not be as accurate or as focused than other days when they are not feeling as tired.

As referenced in section 1.7 of this report, a separate report TfL has previously commissioned Loughborough University to complete a study in to bus driver fatigue[4].

Recommendations

Review current technology that uses sound to alert drivers to a potential incident to assess if a similar method and any learnings can be applied as an effective intervention for pedal confusion.

Identify whether there is a link between driver fatigue and pedal confusion*

Explore how driver stress can be managed for each possible circumstance*

- Communication with radio controllers; type of communication such as late running and driver response and impact on driver**.
- Personal pressure: Drivers want or need to meet timings
- Personal pressure: Home life problems impact on driver concentration

Explore how passenger distraction can be minimalised, for example through driver training, improving passenger information to answer common questions and improved customer education on not speaking to the bus driver whilst the vehicle is in motion.

*Outcomes may be linked to the Loughborough study about driver fatigue.

**Review bus operator policy about communication with drivers whilst driving including:

- Bus operator policy;
- Guidance in the Big Red Book and whether this can be improved; and
- Whether best practice from both the bus operator policy and the Big Red Book can be integrated.

[4] https://content.tfl.gov.uk/bus-driver-fatigue-report.pdf

6. Solutions

6.1 Introduction

Those who responded to the survey and attended the workshops were asked for their views about possible solutions to pedal confusion, using a defined list based on previous research in 2018 and further investigation by TfL since.

This section uses the opinions of those who participated in the survey and the workshops. In the workshops, attendees often clarified there was no data evidence for their views, only their opinion, and often stated more data was needed to validate their opinion.

Recommendation:

Opinions reported in this section should be reviewed by gathering and analysing data which either proves or disproves the view and provides a sense of scale to the value of the solution.

As described in section 3, 96% of those who responded to the online survey were current drivers. In the online survey, respondents were asked for their level of agreement about various solutions and whether they would reduce pedal confusion.

These responses have been ranked based on the difference between those agreeing and disagreeing, as shown in Table 6.1

Table 6.1 Possible solutions to reduce pedal confusion in rank order

Possible solution	Ranking	Net Percentage
Improved driver training about pedal confusion	1	75
Giving drivers time to prepare when changing buses	2	69
*Having the same types of pedals and pedal layout for all makes/models of bus	3	68
*Making sure drivers can see all around the exterior of the bus before setting off, i.e. no more blind spots	4	59
Using the same bus for the whole shift	5	44
*Having a visible cue, such as a light, to inform the driver when the accelerator and brake pedal are being pressed	6	42
Drivers being provided with approved footwear to be used when driving buses	7	42
* Forcing a driver to apply the brake pedal before engaging a gear to drive away[1]	8	41
*A detector to automatically brake, based on sensors which deem when a bus is likely to be unintentionally accelerating	9	41
*Having an audible cue to inform the driver when the bus is accelerating from a low speed or stationary position	10	29

Base: all respondents (n=593)

[1] Description provided to drivers in the survey as some drivers may be unfamiliar with the term brake toggling.

*These are the six possible solutions already included in the BSS roadmap for new build buses and were the ones discussed in more detail in the workshops.

The remainder of section 6 will look at the benefits and limits of each of the six solutions discussed in the workshops as well as other solutions suggested that were not listed.

Everything stated in the workshops was the attendee's own opinion and was not evidence based. Quotes from the workshop to demonstrate each topic is shown in Appendix G.

6.2 Suggested solutions

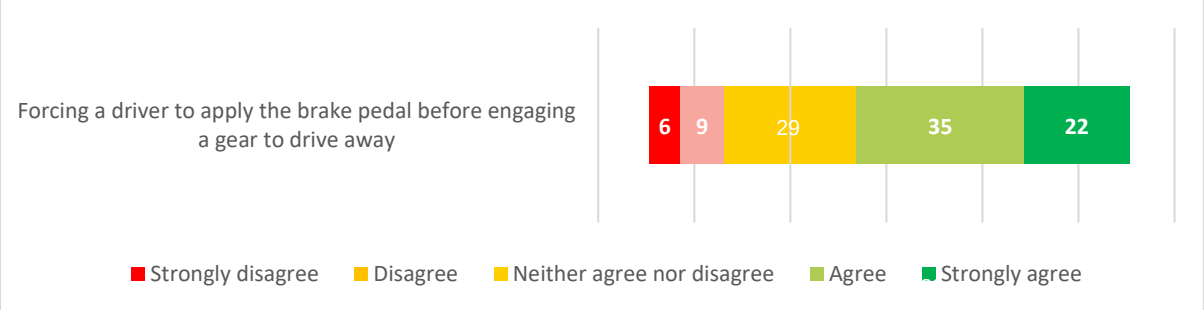
6.2.1 Brake toggling

Brake toggling was introduced during the discussions using the text below. All workshop attendees were advised this was introduced into the 2021 BSS and required on all new buses being delivered that meet the 2021 BSS specification.

> This solution would enable the driver to re-initialise their right foot/driving position and update recent memories of the brake position before leaving a bus stand/stop. This is achieved by the driver needing to double tap the brake before the bus will move forwards (accelerate).
>
> This solution would also avoid errors linked to drivers not following expected driving operations when stopped at a bus stop/stand.
>
> The addition of such a solution could be fitted on an operated bus as long as (light) training is provided to the drivers.

The drivers who answered the online survey saw this described in a more succinct way as shown in Figure 6.1.

Figure 6.1 Brake toggling: Opinions from the online survey (%)



Base: all respondents (n=593)

Over half (57%) of respondents (drivers) either strongly agreed or agreed that brake toggling would be a possible solution with an overall ranking of eight out of the ten suggested solutions.

Opinions of workshop attendees about benefits and limitations of brake toggling

Main Benefit: Expected to be more useful when the bus sets off

Main Limitation: Not expected to be as useful when the vehicle is in motion

Context: 59% of incidents occur when the vehicle is moving;

16% as the vehicle is setting off;

Context (cont.) 26% unknown.

Reference: Figure 5.3 of this report

Topic: Brake toggling as a benefit

Many of the workshop attendees recognised that a clear benefit of having brake toggling was the idea of making drivers find the two pedals sequentially and therefore promoting muscle memory.

A possible additional benefit is for times when buses are in stop-start, heavy traffic.

Topic: Brake toggling as a limitation

The main limitation is the requirement for brake toggling when the vehicle sets off, when more incidents occur when the vehicle is approaching a stop or stand.

Recommendations for brake toggling

Monitor any future pedal confusion incidents and any near misses, with a record of whether the vehicle involved had brake toggling.

In cases where a bus involved in an incident had brake toggling, record the time and/or distance the bus was last stationary to validate whether a driver had driven for a sufficient time or distance to mis-align their foot placement.

6.2.2 Pedal Acoustic Feedback (audible cue)

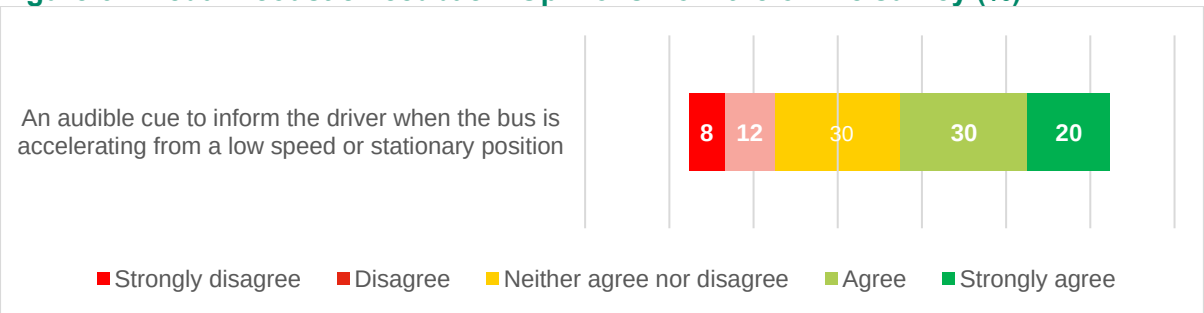
Pedal Acoustic Feedback was introduced during the discussions using the text below. All workshop attendees were advised that Pedal Acoustic Feedback had been a requirement of the 2021 BSS. To note, implementation has been paused until the completion of this research.

Add / Amplify an accelerator engine sound when the bus is in electric mode and at low speed (below 20mph).

The selected sounds to be tested will be fitted in the cab using a speaker/sounder at a predetermined noise level.

The drivers who answered the online survey saw this described in a more succinct way as shown in Figure 6.2.

Figure 6.2 Pedal Acoustic Feedback: Opinions from the online survey (%)



Base: all respondents (n=593)

50% of respondents (drivers) either strongly agreed or agreed that accelerator sound would be a possible solution with an overall ranking of ten out of the ten suggested solutions, with 20% of respondents either strongly disagreeing or disagreeing, the most for any of the ten possible solutions.

Opinions of workshop attendees about benefits and limitations of Pedal Acoustic Feedback

Main Benefits:	It may help drivers who don't realise their bus is still moving.
	It may alert the driver's attention through the action
Main Limitation:	Expectation / reliance remains with the driver to respond
Context:	It may alert the driver's attention but the action and response remains with the driver
Pre-conception:	Drivers who have driven with AVAS on electric buses hold a concern about any sound used being continuous and therefore irritating, and this pre-conception needs to be considered and overcome.

Topic: Accelerator sound as a limitation

The views widely expressed by workshop attendees was that the audible cue would create the need for a response or reaction from a driver, which means the reaction time of the driver between the audible cue being heard, the brake being applied and the stopping distance for the bus would all be factor.

Over time, with all other sounds in the cab this would become white noise to a driver.

There was still some reliance on the driver to realise there was unintended acceleration and to respond correctly. The opinion of workshop attendees was there are too many sounds already for a driver to distinguish.

Topic: Past experience

Health and safety teams commented they had tried something similar before and they did not see it as successful, and therefore their opinion is the sound does not get past the limitation of human nature and reaction time.

Recommendations for Pedal Acoustic Feedback (audible cue)

Use learnings from Acoustic Vehicle Alerting System (AVAS) project to support development of a suitable Pedal Acoustic Feedback sound including gaining buy-in from drivers.

Explore the possibility and "need" for a consistent sound on all bus makes and models as described by the TfL Operations team.

Consider using the accelerator sound as a multi-beneficial addition to improve driving style as suggested by bus manufacturers.

Monitor any future pedal confusion incidents and any near misses, with a record of whether the vehicle involved had an accelerator sound.

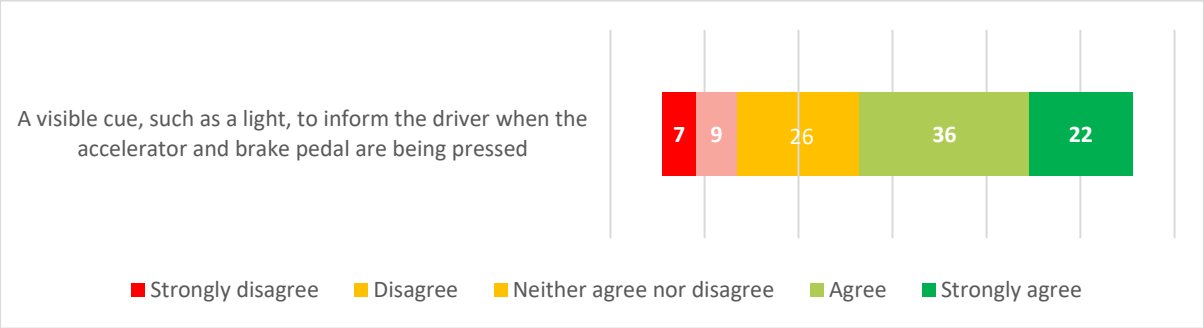
6.2.3 Accelerator/Brake light indicators (visual cue)

Accelerator / Brake light indicators was introduced during the discussions using the text below.

> Add two LEDs/lights (one light for the brake pedal activation, one light for the accelerator pedal activation) to a bus dashboard.
>
> The LEDs/lights should be dimmed between day/night conditions.
>
> NOTE: Pedal indicator lights were a requirement of BSS buses from 2019

The drivers who answered the online survey saw this described in a more succinct way as shown in Figure 6.3.

Figure 6.3 Accelerator/Brake light indicators: Opinions from the online survey (%)



Base: all respondents (n=593)

58% of respondents (drivers) either strongly agreed or agreed that accelerator/brake light indicators would be a suitable solution with an overall ranking of six out of the ten suggested solutions.

Opinions of workshop attendees about benefits and limitations of accelerator /brake light indicator

Main Benefits:	The light shows both accelerator and brake pedal use
	Probably quick and cheap to implement compared to others
Main Limitation:	Expectation / reliance remains with the driver to respond
Context:	There are a number of light displays on the dashboard for various notifications such as engine warnings; stop request; economical driving, a widely held view is this would become another light, drivers would not pay attention to and its value will become redundant

Topic: Accelerator / brake light indicator as a benefit

Drivers saw the benefits of a visual cue compared to an audio cue as it would act as confirmation of the current action for the driver.

A number of respondents liked the simplicity of lights showing up when they press on the brake or accelerator, thought this could be simple to implement and offer some benefit to help reduce pedal confusion as it could easily identify the pedals for the driver.

Topic: Accelerator / brake light indicator as a limitation

Workshop attendees held the opinion that drivers ignore LEDS, partly because drivers might not know what all the different lights do, and there are too many lights on the dashboard already.

In the same manner as the accelerator sound, the opinions of workshop attendees held is this is still reliant on a driver's reaction and understanding. Over and above an accelerator sound, they felt having such lights could have a negative impact, if drivers are checking the light and not the road ahead.

The potential for the driver to remove their eyes from the road, led one Union Official to state their belief that there would be more benefits to an audio cue rather than visual cue and a manufacturer agreed.

Recommendations for accelerator / brake light indicators (visual cue)

Undertake a review of the benefits and limitations of accelerator / brake light indicators on existing BSS vehicles in the fleet, including but not limited to the positioning of the lights in relation to the driver's line of sight and colours used.

Monitor any future pedal confusion incidents and any near misses, with a record of whether the vehicle involved had an accelerator and brake light indicator.

6.2.4 Improved Direct/Indirect vision for a driver inside the cab

Improved direct/indirect vision was introduced during the discussions using the text below. All workshop attendees were advised this was introduced into the 2021 BSS.

Use of additional visual aids to drivers to check all areas and reduce the need for body movement (including foot movement leading to misplacement) in the driver cab when making manoeuvres.

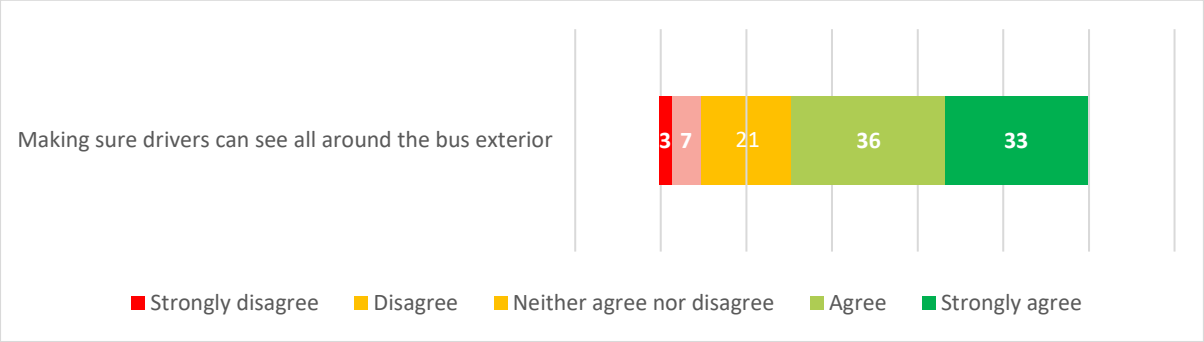
Visual driver aids such as:

- Blind spot mirrors (already fitted)
- Cameras providing external views back to driver replacing the usual wing mirrors with monitors which display view in drivers cabin

NOTE: some operators introduced Camera Monitoring Systems early; they are now a requirement of the BSS 2021 for all new buses.

The drivers who answered the online survey saw this described in a more succinct way using the wording "making sure drivers can see all around the bus exterior", as shown in Figure 6.4.

Figure 6.4 Improved direct/indirect vision: Opinions from the online survey (%)



Base: all respondents (n=593)

69% of respondents (drivers) either strongly agreed or agreed that improved direct/indirect vision would be a suitable solution with an overall ranking of 4 out of the ten suggested solutions.

Opinions of workshop attendees about benefits and limitations of improved direct/indirect vision

Workshop feedback: Most workshop attendees did not agree with a link between improved direct/indirect vision and pedal confusion

Context: Improved direct/indirect vision is designed to avoid driver movement in their cab, maintaining foot position

Topic: Improved direct/indirect vision as a benefit

Some drivers felt it might be a support for more concentration and possibly less distraction. One incident investigator had the opinion that on one occasion driver movement may have been linked to a pedal confusion incident.

Topic: Improved direct/indirect vision as a limitation

Many stakeholders required more clarity around why and how improving direct and indirect vision for a driver would be a suitable solution to reducing pedal confusion and once clarified they remained unconvinced about the link.

A union official held an opinion that if seat position was a key factor, then driver training on this topic would help.

Recommendations for improved direct/indirect vision

Monitor any future pedal confusion incidents and any near misses, with a record of whether the vehicle involved had improved direct/indirect vision and whether there is evidence of driver movement in the cab ahead of the incident or near miss.

Review the importance of correct seat positioning and if required, update as part of the driver training.

Develop driver communications and provide education around the link between driver foot mis-alignment and improved direct/indirect vision

6.2.5 Advanced Emergency Braking (AEB)

Advanced Emergency Braking (AEB) was introduced during the discussions using the text below.

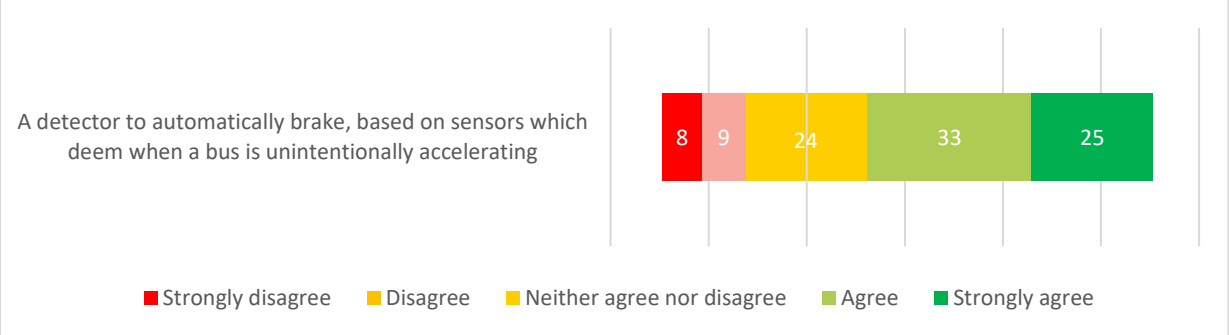
Technology capable of detecting unintended acceleration errors and intervene (e.g. automatic emergency braking interpreting the acceleration signal as a brake signal when a pedal error is detected)

AEB system activation for unintended acceleration scenarios is currently not available on the market but is under development.

NOTE: AEB solutions would be unable to be retrofitted to the current fleet of buses.

The drivers who answered the online survey saw this described in a more succinct way, using the wording “a detector to automatically brake, based on sensors….” as shown in section 6.5.

Figure 6.5 AEB: Opinions from the online survey (%)



Base: all respondents (n=593)

58% of respondents (drivers) either strongly agreed or agreed that AEB would be a suitable solution with an overall ranking of nine out of the ten suggested solutions. However, 58% agreed with the solution, the third highest of the BSS solutions presented in the workshops and the sixth highest overall.

Opinions of workshop attendees about benefits and limitations of advanced emergency braking (AEB)

Main Benefits:	Provides additional support to the driver to reduce or mitigate the chances of human error.
	Reduces the expectation for the driver to react and prevents the pedal application error
Main Limitations:	The parameters the AEB system will need to prevent false activations
	Trust in the technology, especially for drivers
	Time to implement
Context:	Some workshop attendees believed an interim solution would be possible by overriding the driver if too much pressure is put on an accelerator, such as the force used on a brake for an emergency stop.

Topic: Advanced emergency braking as a benefit

While the online survey had a mixed response as a solution to reducing pedal confusion, most of those in the workshops felt Advanced Emergency Braking (AEB) would be beneficial as a solution to reducing pedal confusion.

There were a number of stakeholders holding a view that AEB would reduce the impact of some incidents rather than delivering the solution to avoiding pedal confusion.

Topic: Advanced emergency braking as a limitation

Bus manufacturers had concerns with AEB and felt the solution was high risk and had doubts over the benefit as a solution to reducing pedal confusion. This type of concern was also expressed in the TfL Health and Safety workshop, the Engineers workshop and by union officials

Observation: There's a need to consider instances where a bus driver will need the bus to pick up speed at a junction or as the best course of action to avoid an incident, and the design would need to factor this into the logic.

Observation: The system needs to be able to differentiate between a possible incident and a busy area, with Oxford Street used as an example where this could prove challenging.

Additional discussions in workshops recognised and stated this would be a long term consideration, as technology would need substantial testing before it could be put on the buses and for drivers to be comfortable with the technology being used.

Some drivers felt they'd need reassurance the technology would work before believing it would be a suitable solution to reducing pedal confusion and many stakeholders agreed, caveating their response until they had clarity of the parameters for AEB and how it would work in practice.

Topic: driver reliance on technology

There was a view expressed about the solution encouraging an over-reliance on technology, and reduced driver concentration.

Topic: Interim solution suggested by Engineers, Health and Safety and Operations

There was a belief that a shorter term and more cost-effective solution to pedal confusion similar to AEB was possible by overriding the driver when they apply "too much" pressure to the accelerator, where too much is comparable to the force used when emergency braking, and they believed these solutions would have a similar benefit to AEB as a solution.

Recommendations for advanced emergency braking (AEB)

Build a team of experts to design, validate and test the AEB parameters.

In the interim, assess whether the accelerator pressure solution is viable including a review of when the accelerator is currently pressed e.g., to 100% by drivers.

Establish a clear communication and training guide for buses to build confidence in the final system.

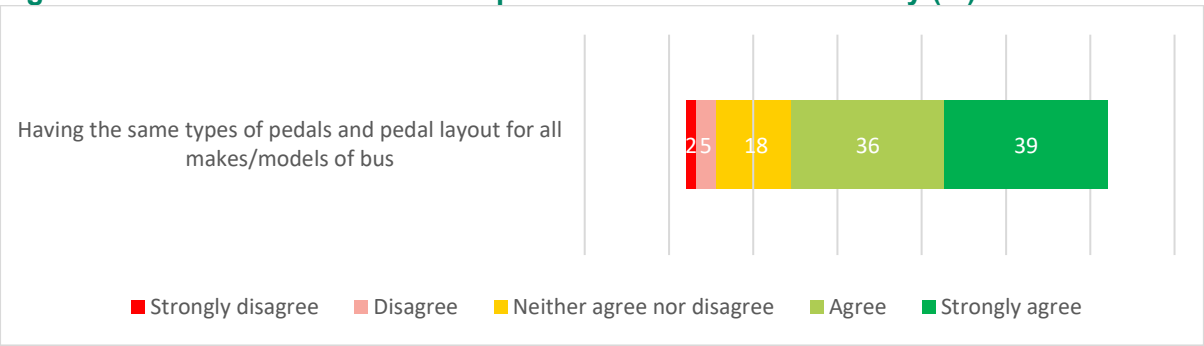
6.2.6 Pedal Standardisation

Pedal Standardisation was introduced during the discussions using the text below.

Propose a standard pedal configuration (pedal location, size, angle, pedal resistance, hanging or floor mounted) for all London buses.

The drivers who answered the online survey saw this described in a more direct way about the same type of pedals and pedal layout for all buses as shown in section 6.6.

Figure 6.6 Pedal Standardisation: Opinions from the online survey (%)



Base: all respondents (n=593)

75% of respondents (drivers) either strongly agreed or agreed that Pedal Standardisation would be a suitable solution with an overall ranking of 3 out of the ten suggested solutions and the highest ranked of the BSS solutions presented in the workshops.
Opinions of workshop attendees about benefits and limitations of Pedal Standardisation

Main Benefits:	Considered to be the most effective
	Driver familiarity as they change bus make and models
Main Limitations:	Design is critical to the success
	Time to implement
Context:	If Pedal Standardisation is included, this needs to be right first time, as stated by Engineers and Health and Safety teams.

Topic: Pedal Standardisation as a benefit

During the workshops, the majority liked this solution, and many described this as the best solution out of the six to help reduce pedal confusion.

Many of the workshop attendees saw the benefits to having a standard pedal arrangement across all London buses, reducing unfamiliarity with pedal setup as drivers move between different models or types of buses during a shift.

Drivers identified as ‘spares’ were one group who other drivers felt would benefit from Pedal Standardisation.

Drivers felt that there was little time to familiarise themselves with the pedals but if they were all standard this would be beneficial and possibly reduce pedal confusion.

Topic: Considerations for Pedal Standardisation

The type, shape and layout of the pedals was a topic that provided different opinions. Workshop attendees agreed there needs to be differences between the pedals in order for drivers to feel the difference in terms of shape, size and feel on the foot. A definitive space between pedals, height of pedals and type of pedals was not agreed upon, although engineers, health and safety and operations experts all concurred that further data and evidence was required before any opinion could be actioned

To summarise, there was general agreement that more work was required to determine what Pedal Standardisation looks like, however there was general agreement that drivers needed to move their feet rather than have the ability to swivel their foot when switching pedals.

It was suggested to look at pedal configurations on bus makes and models which have, and have never, had a pedal confusion incident for any learnings.

Topic: Pedal pressure

One engineer noted there needs to be a change in the amount of pressure that a driver needs to apply for each pedal and suggested it should require more force to press the accelerator and comparatively less force for the brake pedal.

Topic: Limitations of Pedal Standardisation as a solution

While some drivers and stakeholders agreed that this solution could help to reduce pedal confusion, there are still some limitations as respondents also pointed out that this would not solve everything. By standardising the pedal shape, location or size, this does not account for the variability between drivers such as leg length, feet size, shoe grip/resistance and chosen comfortable seating position. These all differ between drivers and therefore will always provide variability in how the drivers position themselves around the pedals.

Whilst overall this solution was preferred by most attendees, there were concerns with the implementation time of this solution with the expectation that this would be implemented as new buses are added to fleets.

Topic: International Organisation for Standards (ISO)

Manufacturers added that all buses are produced in line with the standards set out by the International Organisation for Standards (ISO) and therefore to move Pedal Standardisation forward the ISO standard may need to be reviewed.

Manufacturers agreed that differences in a driver's physique are not a specific consideration and referenced the ISO standards they work to.

Topic: Pedal Standardisation is a contributor to the solution, not a stand-alone solution

Operators also pointed out that a limitation to this is that you can standardise the pedal configuration but on its own, it is not enough. It is also about educating the drivers to drive correctly e.g. keeping their foot over a pedal and not resting it on the floor, regardless of what the vehicle is doing and that education and training needs to be as important as the pedal configuration standardisation.

Topic: Cab design

Manufacturers felt that it wasn't only Pedal Standardisation but also features need to be considered such as seat and steering column position for driver alignment to the steering wheel.

Drivers were keen to explain that to move forward with this solution they felt they should be involved in the design discussion as they have the day-to-day experience and knowledge of the practicalities and would be the end users. Union officials and representatives suggested the same.

Topic: Training

Driver trainers expressed the need for driver training once standardised pedal configuration has been agreed, tested and implemented.

Recommendations for Pedal Standardisation

Conduct an audit of the pedal configuration of each make and model of bus, including but not limited to pedal type, spacing between pedals, pedal height and difference in height between pedals and tread wear.

Carry out analysis of the pedal configuration of each of the 143 buses involved in pedal confusion incident. Identify if there are any similarities or any specific parts to the pedal configuration which never appear; and from this form a view whether it is possible to conclude a link.

Form a working group to consider what Pedal Standardisation would look like, assessing the pros and cons of each and formulating a plan to deliver from concept to implementation.

As part of the working group, identify where drivers and driver trainers can be included.

As part of the working group, identify if the design should go further than pedal, to include other parts of the cab.

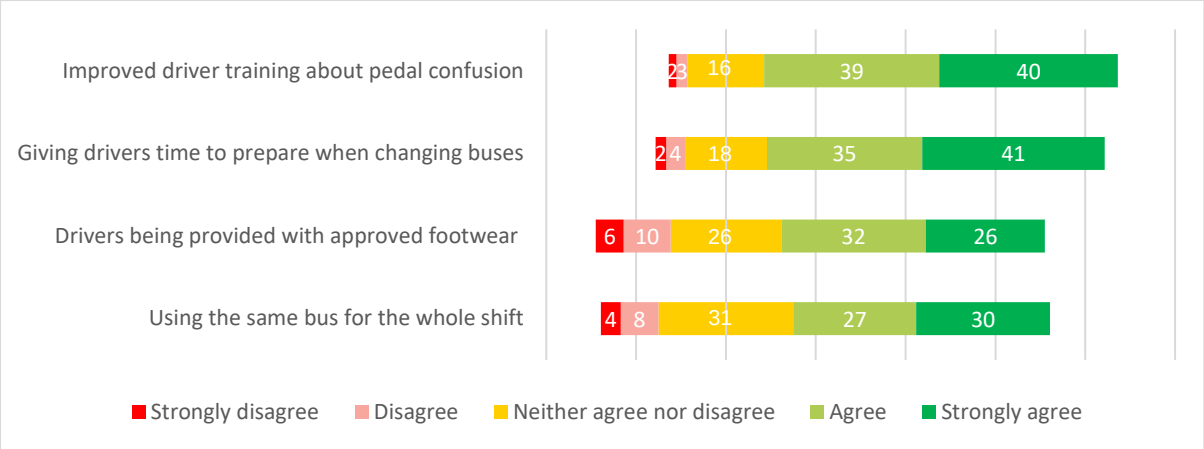
Engage with bus manufacturers to review the ISO standard.

Investigate whether the “spare” drivers have been involved in pedal confusion incidents, near misses (may include other incidents) and whether this is due to driving many makes and models with different pedal layouts

6.3 Other suggested solutions: Online survey

Prior to introducing the BSS solutions, drivers and stakeholders in the workshops were asked for their unprompted opinions on suggested solutions, while drivers who participated in the survey gave their opinions about four other solutions as shown in Figure 6.7.

Figure 6.7 Other solutions: Opinions from the online survey (%)



Base: all respondents (n=593)

Using the same bus for the whole shift

As shown in Figure 3.3 earlier in the report, 86% of those who currently drive a bus stated they typically drive more than one bus per shift, even if it's the same make and model.

Time to change a bus

In the survey, 71% of those who currently drive a bus (n=567) stated they have 5 minutes or less when changing buses.

Those who strongly agreed that giving drivers time to prepare when changing buses was a suitable solution were asked for their view of the length of time to change buses, with the outcomes shown in Table 6.2.

Table 6.2 Suggested mean, median and mode times to change buses by drivers

Average calculated	Time in minutes
Mean	8.8
Median	7
Mode*	5

Base: all respondents (n=241)

*While most drivers (n=80) stated 5 minutes, the second highest (n=62) stated 10 minutes.

Driver training

In the survey, 86% of those who currently drive a bus (n=567) stated they typically drive more than one bus per shift, even if it's the same make and model.

Footwear

Drivers who have experienced pedal confusion are more likely to strongly agree that using approved footwear is a possible solution to pedal confusion compared with those who have not experienced pedal confusion (29% and 19% respectively).

Recommendations

*Drivers trained for correct use of pedals and not swivelling the foot, using the current new driver training as a base for this.

*Review whether footwear has a link to pedal confusion incidents or near misses by reviewing current evidence. If a link is found, further work on footwear requirements should follow.

Validate drivers' opinions from the survey that 86% drive more than one bus per shift, monitor if there is any link between pedal confusion incidents and drivers changing buses and create an action plan if there is data evidence of a link.

*These recommendations are already included in the report and shown again for clarity.

6.4 Other suggested solutions: Workshops

Cut-off switch

Several workshop attendees referenced other modes of transport such as trains and trams who have an engine cut off switch often referred to as a "dead man's switch" which could mitigate the impact of pedal confusion incidents. It was recognised this may not be a solution to prevent pedal confusion but, they felt it would support in incidents where a driver is convinced, they are pressing the brake, but the bus isn't stopping.

Learning from other industries

A number of attendees to workshops asked whether pedal confusion occurs in similar types of vehicles, such as HGVs and coaches. It was acknowledged by attendees that the driving requirements and style were different, such as HGVs do not have passengers and coaches do not have the same number of start/stop procedures that a bus has.

The waste industry was referenced as having a similar start/stop in London streets and may warrant further investigation, with the only major difference being the absence of passengers.

Reducing driver pressure and fatigue

In the majority of the workshops, TfL, Operator, Unions and Drivers expressed their view that drivers working under pressure or having other distractions from passengers and other road users, are potential contributory factors in pedal confusion incidents There was a belief that reducing pressure on drivers including time between shifts (fatigue) would reduce pedal confusion.

As referenced in section 1.7 of this report, a separate report TfL has previously commissioned Loughborough University to complete a study in to bus driver fatigue[5].

[5] https://content.tfl.gov.uk/bus-driver-fatigue-report.pdf

Recommendations

Use a working group to verify if the opinions of engineers, health and safety and operations teams are correct and a cut-off switch when too much pressure is placed on the accelerator will have an impact, can be implemented and will be safe.

Investigate if there are any learnings from other industries, specifically:

- Contact the International Bus Benchmarking Group (IBBG) and members for learnings about pedal confusion incidents (if any) from the international industry and if there is appetite for holding a discussion group to build cross-industry best practice to avoid pedal confusion incidents (see chapter 2)
- Similar to the IBBG, contact bus operators, for example, incident investigators, for a national view, starting in busy UK cities to understand whether these types of incidents occur, how they categorise the incidents and take learnings from any successful solutions.
- Contact other UK industries who drive regularly in London, as a minimum, contact the waste industry.

As recommended in Chapter 5, identify whether there is a link between driver fatigue and pedal confusion with links to the Loughborough University report.

7. Recommendations

This chapter sets out our recommendations arising from this research study. We have not been able to evaluate the potential effectiveness of the recommendations, therefore these actions are not a prioritised list.

All recommendations are based on the opinions provided in the survey and workshops, as explained in earlier chapters, these opinions are not evidence led, therefore, the recommendations are formed from the analysis of these opinions and not evidence.

7.1 Summary of recommendations

Throughout the report, recommendations have been made and the following tables summarise these recommendations. Each recommendation has received a score from 1 to 3 for each of cost, time and value, where 1 is low and 3 is high.

Cost indicator:

Cost assumption compared with other recommendations

£	May be achieved with little or no additional employee time or outlay for technology
£ £	Requires some investment in technology and/or additional employee time
£ £ £	Requires highest investment in technology, and/or additional employee time or additional employees

Time indicator:

Time assumption compared with other recommendations

🕓	Short term: Less than one year
🕓🕓	Medium term: 1 to 3 years
🕓🕓🕓	Long term: 3+ years

Value indicator:

Possible contribution as a solution to pedal confusion (guidance only)

✪	Marginal impact, more indirect and less direct impact
✪✪	Medium impact: possibly offer some direct impact
✪✪✪	Largest impact: possibly offer most directly impact

The ratings in each table should only be used as a guide and AECOM do not accept any responsibility for how this guidance is used.

Each recommendation includes a suggested “owner” of the task, again, this is for guidance and it is anticipated that TfL and bus operators would need to work collaboratively on all tasks.

Main recommendation

The main recommendation of this report is the need to gather evidence to validate each recommendation in the table below and the impact it will have to the reduction of pedal confusion incidents.

Table 7.1 shows recommendations to improve the type of data collected and analysis of all data. Using the TfL Safe Systems model, these recommendations fall under the **Post Collision Response** pillar.

Table 7.1 Post Collision Response: Understanding causes through data collection and analysis

Recommendation	Owner	Cost	Time	Value
Comprehensive review of the IRIS database: Expand the number of data fields, including adding an incident category for suspected pedal confusion, vehicle make and model, engine type (electric/hybrid/diesel) and which BSS solutions were installed.	**TfL / Bus operators**	£	🕓	✪✪
IRIS database accuracy improvement: Force all fields for data entry to be comprehensive and provide guidance on how to complete entries to ensure all key data is captured.	**TfL**	£	🕓	✪
Traffic flow: Explore measuring traffic flow prior to the incident to establish any abnormalities on the day of the incident.	**TfL / Bus operators**	£	🕓	✪
Road layout and other external factors: Record of the road layout, traffic flow procedures (e.g. traffic lights); number of lanes, any joining or additional lanes, bus lane available. A full list to be defined by TfL and bus operator experts.	**TfL / Bus operators**	£	🕓	✪
Introduce footwell cameras on all buses: Use for driver training and improvement for prevention as well as incident investigation.	**Bus operators**	£	🕓🕓	✪✪
Pedal configuration: Carry out analysis of the pedal configuration such as but not limited to, pedal spacing, height differential, pedal type (organ or hanging) for each of the 143 incidents that have been reported from 2015 to 2019 and any incidents since 2019 and report prior to any Pedal Standardisation proposal is implemented.	**TfL / Bus operators**	£	🕓🕓	✪✪
Improve driver reporting culture: Build an open culture with drivers to report near-misses to their operators and operators to TfL.	**TfL / Bus operators**	£	🕓	✪

Tables 7.21 and 7.22 show recommendations to understand the main possible causes of pedal confusion. Using the TfL Safe Systems model, Table 7.21 shows recommendations that fall under the **Safe Behaviours** pillar and Table 7.22 shows those that fall under the **Safe Vehicles** pillar.

Table 7.21 Safe Behaviours: Understanding the main possible causes of pedal confusion

Recommendation	Owner	Cost	Time	Value
Driver communication: Review the iBus controllers communication procedures with drivers, compare these with the Big Red Book to build best practice.	**TfL / Bus operators**	£	🕓	✪
Driver training: Ensure drivers are receiving training for correct use of pedals (not swivelling foot) and consider if refresher or targeted training on pedal confusion can be provided.	**Bus operators**	£	🕓	✪
Possible cause review: Driver fatigue Consider whether driver fatigue and different pressure points drivers' experience has an impact on stress and possible loss of concentration.	**TfL / Bus operators**	£	🕓🕓	✪✪
Possible cause follow-up: Driver fatigue Investigate if any solutions to driver fatigue, as provided in the fatigue report, will reduce pedal confusion incidents or has reduced incidents once implemented	**TfL / Bus operators**	£ £	🕓🕓	✪✪
Possible cause review: 'Spare' drivers Investigate if 'spare' drivers, who regularly change buses are more likely to be involved in pedal confusion incidents or near misses.	**Bus operators**	£ £	🕓	✪
Possible cause review: Footwear Review whether footwear has a link to pedal confusion incidents or near misses by reviewing current evidence. If a link is found, further work on footwear requirements should follow, and any testing and trials would potentially add time and cost	**TfL / Bus operators**	£	🕓	✪

Table 7.22 Safe Vehicles: Understanding the main possible causes of pedal confusion

Recommendation	Owner	Cost	Time	Value
Pedal differential analysis: Explore differentials across bus make and model for pedal type, height, and spacing by conducting an audit of the current fleet.	**TfL / Bus operators**	£	🕒	✪
Possible cause review: Traffic and speed Conduct further analysis to understand whether travel at slow speed and/or heavy traffic is a contributory factor and if so, add further workstreams such as driver training	**TfL**	£ £	🕒	✪ ✪
Possible cause review: Brake regeneration Conduct further analysis to measure brake regeneration in hybrid and electric buses as a possible cause using current data and/or track tests with drivers.	**TfL**	£ £	🕒 🕒	✪ ✪
Possible cause review: Acceleration rates Measure if the assumed difference in acceleration between electric, hybrid and diesel buses is shown in driver data and if so, further investigate how this could be mitigated for when considering pedal confusion	**TfL / Bus operators**	£	🕒	✪ ✪

Tables 7.31, 7.32 and 7.33 shows recommendations to understand the potential of possible solutions to pedal confusion. Using the TfL Safe Systems model, Table 7.31 shows recommendations that fall under the **Post Collision Response** pillar, Table 7.32 shows those that fall under the **Safe Behaviours** pillar and Table 7.33 shows those that full under the **Safe Vehicles** pillar.

Table 7.31 Post Collision Response: Understanding the main possible solutions to pedal confusion

Recommendation	Owner	Cost	Time	Value
BSS introduction of brake toggling: Measure if buses with brake toggling are involved in less incidents; include near-miss data.	**TfL**	£	🕒 🕒 🕒	✪ ✪

Table 7.32 Safe Behaviours: Understanding the main possible solutions to pedal confusion

Recommendation	Owner	Cost	Time	Value
Improved direct/indirect vision: Monitor any evidence that driver movement has been a contributory factor to pedal confusion. If confirmed, share evidence with relevant TfL and Operators teams.	**TfL / Bus Operators**	£	🕒 🕒	✪
Improved direct/indirect vision: If monitoring shows a link to pedal confusion, update driver training and education	**Bus Operators**	£	🕒 🕒	✪ ✪

Table 7.33 Safe Vehicles: Understanding the main possible solutions to pedal confusion

Recommendation	Owner	Cost	Time	Value
Technology review: Build a library of lessons learnt from current technology such as early warning systems.	**TfL**	£ £	🕓 🕓	✪ ✪
Pedal Acoustic Feedback: Use learnings from AVAS to develop a sound, engage with bus drivers for buy-in; Produce a multi-beneficial sound such as improving driving style.	**TfL / Bus Operators**	£ £	🕓 🕓	✪ ✪
Advance Emergency Braking (AEB): Consider building a team of experts to design, validate and test the AEB parameters and to cover training and implementation once approved.	**TfL / Bus Operators**	£ £ £	🕓 🕓 🕓	✪ ✪ ✪
Accelerator pressure interim solution: Consider building an expert development team to assess whether an accelerator pressure solution is viable including a review of when the accelerator is currently pressed hard by drivers e.g. to 100% and possible safety implications of applying an interim solution.	**TfL / Bus Operators**	£	🕓 🕓	✪ ✪
Pedal Standardisation: Engage with bus manufacturers for a possible review of the ISO standard for pedal layout, for example pedal types, height, width and spacing.	**TfL**	£	🕓 🕓	✪ ✪
Pedal Standardisation: Build an expert working group to assess what standardisation could look like with pros and cons. Use findings from the analysis of the 143 incidents suggested for further evidence.	**TfL / Bus Operators**	£	🕓 🕓	✪ ✪
Pedal Standardisation: Consider whether Pedal Standardisation should expand to cab standardisation.	**TfL**	£ £	🕓 🕓	✪
Introducing a throttle kill switch: A similar to the system used by the railway. Investigate whether adding a throttle kill switch to shut off power to the engine will achieve either or both of, preventing a more serious incident during pedal confusion or improving safety when recovering a vehicle following an incident.	**TfL**	£	🕓	✪ ✪

Table 7.4 shows recommendations to gain any learnings from peer groups. Using the TfL Safe Systems model, these recommendations fall under the **Post Collision Response** pillar.

Table 7.4 Post Collision Response: Learnings from peer groups and other industries

Recommendation	Owner	Cost	Time	Value
International peer groups: Contact the IBBG for learnings from the international industry and if there is appetite for a forum for best practice and solutions	**TfL**	£	🕒🕒	✪✪
National peer groups: Work with bus operators to build a national view of pedal confusion for the UK and if similar incidents happen elsewhere and how these are recorded	**TfL / Bus Operators**	£	🕒	✪✪
Other industries: Contact other UK industries, starting with waste disposal, investigate if pedal confusion incidents occur in their industry. Either way, analyse similarities and differences between the industries, assess if conclusions can be reached.	**TfL**	£	🕒🕒	✪✪

Additional Recommendation: For solutions already introduced as part of the Bus Safety Standard (BSS)

This report acknowledges that some of the solutions presented in the workshop have been introduced on new buses in the fleet, as per the BSS roadmap. A final recommendation is for all future incident investigations linked to possible pedal confusion to report:

1. Which of the solutions, if any, were a feature of the bus;
2. If the solution has been introduced, record any mitigating circumstances to explain why the solution was unable to prevent the incident from occurring; and
3. If the solution had not been introduced but was a requirement of BSS, ascertain why the solution is not in situ and whether, in the opinion of the incident investigator, if the solution would have been introduced as required could it have prevented the incident or reduced its impact.

Appendix A Literature review titles

1. **Human Engineering Limited.** *Identifying Solutions to Pedal Confusion in Buses.* London : Transport for London, 2011. HEL/TfL/102561/RT01.

2. **Transport Research Laboratory Limited.** *The Transport for London Bus Safety Standard: Pedal Application Error Prevention & Recovery.* London : Transport for London, 2018. PPR984.

3. **TTN Technologies Ltd.** About Footright. *Footright Safe Pedal Management.* [Online] 2015. [Cited: 13 10 2021.] https://ttntechnologies.wordpress.com/

4. **United States Department of Transportation.** Pedal Application Errors. *National Highway Traffic Safety Administration.* [Online] 03 2012. [Cited: 04 10 2021.] https://www.nhtsa.gov/staticfiles/nti/pdf/811597.pdf

5. **Department for Transport.** Road Safety Data. *Find Open Data.* [Online] 24 September 2021. https://data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data.

6. **Hasegawa, Kunihiro, Kimura, Motohiro and Takeda, Yuji.** Pedal Misapplication: Interruption Effects and Age-Related Differences. *Human Factors: The Journal of the Human Factors and Ergonomics Society.* [Online] 02 07 2020. [Cited: 01 10 2021.] https://journals.sagepub.com/doi/10.1177/0018720820936122.

7. **Department for Transport.** Road Safety Data. *Find Open Data.* [Online] 24 September 2021. https://data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data

In addition, the International Bus Benchmarking Group provided a members report in confidence:

Clearinghouse Study: Fatal Injuries. **Dublin Bus.** London, 2007.

Appendix B Example communications poster

The poster shown below is an example sent to Abellio drivers, each operator received their own branded communication, supported by TfL and the relevant bus Operator communications teams.

July 2021

Sharing your views - Pedal confusion

busdriversurvey.com

Bus Drivers

Through London's Vision Zero, TfL aim to have a 70% reduction in the number of people seriously injured or killed by buses by 2022. To help, AECOM have been asked to learn about pedal confusion from drivers and their colleagues.

A survey has been produced to collect your views to share anonymously with TfL. This will be open until Monday 9 August and takes about 10 minutes to complete.

- Take this survey on mobile, tablet or PC
- Type in the link busdriversurvey.com
- Scan the QR code

What's in it for you?
An opportunity to share your views to avoid more incidents.
Win **£100** in Amazon vouchers; plus **two £50** runner-up prizes

£50 amazon.com Gift Card

Confidentiality Assured:

Only anonymous results are provided to TfL and Abellio. AECOM is an independent consultant who will receive your answers directly and produce a summary report of the overall findings. AECOM are bound by UK Data Protection Law (was GDPR) and are members of the Market Research Society.

Have more to say on this? busdrivergroup.com

Would you like to share your experience to help us find solutions? We would like to hear more from you and be one of five drivers taking part in a 90-minute group discussion. Sessions will take place between Monday 2 August - Friday 20 August.

A **£50** amazon voucher will be offered to cover your time (email address required).

Location: Face-to-face in your garage or online discussion groups, at home.

If you are interested in taking part, please enter your contact details, using the link: busdrivergroup.com or call 0800 652 8646. AECOM will be in contact with you.

2 July 2021

abellio AECOM Transport for London BUSES

Appendix C Online Questionnaire

Introduction
On behalf of Transport for London (TfL), AECOM; an independent research consultancy, is carrying out research about the occurrence of pedal confusion when buses are being driven.

The survey will take around 10 minutes**.**

We're aware of the sensitivity of this subject and we are keen that when you answer this survey you feel able to do so while being assured and confident that your responses are kept confidential.

Pedal confusion can lead to serious incidents and even fatalities which is why it is so important to get your honest views in this survey, to help TfL, bus operators and bus drivers in their bid to prevent it occurring in the future.

Your anonymity and using the answers you provide
We have taken steps to maintain the anonymity of your answers by:

1. Not sharing individual responses with TfL; and
2. Only providing a combined set of answers to TfL in a report format.

Your rights and our reassurance to you
The survey is being carried out under the Market Research Society's Code of Conduct. A copy of this is available here: mrs.org.uk/standards/code-of-conduct. The principles of this code of conduct include:

- Be transparent as to the subject and purpose of data collection.
- Respect the confidentiality of information collected in their professional activities.
- Respect the rights and well-being of all individuals.

You can access the AECOM's privacy policy using this website: aecom.com/privacy-policy/. To exercise all relevant rights or if you wish to make a query or file a complaint, in the first instance please contact AECOM's Data Protection Officer at privacyquestions@aecom.com. You can also contact the Information Commissioner's Office on 0303 123 1113 or via email ico.org.uk/global/contact-us/email/ or at the Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire. SK9 5AF.

ASK ALL
SINGLE CODE

1. Which bus operator do you work for?

Abellio
Arriva
HCT Group
Go-Ahead
Metroline
RATP Dev
Stagecoach London
Sullivan Buses
Tower Transit
Uno

ASK ALL
SINGLE CODE

2. Which of the following best describes your job role?

i. Bus driver
ii. Bus driver trainer
iii. Bus depot manager
iv. Health and Safety manager
v. Engineer
vi. Engineering Manager
vii. Work in an office role at the bus depot not directly with buses
viii. Other (please specify)

ASK ALL BUS DRIVERS (Q2=1)
SINGLE CODE

3. How long have you worked in total as a bus driver?

One year or less
Between one and three years
Between three and five years
Between five and 10 years
Over 10 years

ASK Q2=CODE 2,3,4,5,6,7,8
SINGLE CODE

4. Before your current role had you ever worked as a bus driver?

Yes
No

ASK Q4=CODE 1 (YES), previously worked as a bus driver
SINGLE CODE

5. How long did you work as a bus driver?

One year or less
Between one and three years
Between three and five years
Between five and 10 years
Over 10 years

ASK ALL
SINGLE CODE
ASK IF ALREADY KNOW TIME AS BUS DRIVER (AT Q3 OR Q5)

6. How long have you worked in the bus industry?

One year or less
Between one and three years
Between three and five years
Between five and 10 years
Over 10 years

ASK ALL DRIVERS (Q2=1)
SINGLE CODE

7. Typically, how many different buses do you drive in one shift, even if it's the same make/model of bus?

1
2
3
Over 4 (please specify)

ASK DRIVERS WHO DRIVE MORE THAN ONE BUS PER SHIFT (Q7=2,3 OR OVER 4)
SINGLE CODE

8. Typically, how many different makes/models of bus do you drive in one shift?

1
2
3
Over 4 (please specify)

ASK ALL DRIVERS AND THOSE WHO USED TO DRIVE (Q2=1 or Q4=1)
MULTICODE

8a Which of these makes of bus do you drive or have you driven in the past? Please select all that apply

ADL
BYD
Caetano
MCV
Mercedes Citaro
Optare
Scania
Wrightbus
Other (please specify)

ASK IF Q7=MORE THAN ONE BUS IN ONE SHIFT (Q7=2,3 OR OVER 4)
SINGLE CODE

9. When changing buses, typically how much time do you take from your bus arriving until you drive it away?

5 minutes or less
More than 5, up to 10 minutes
More than 10, up to 15 minutes
Over 15 minutes

ASK ALL
INTRO TEXT:
We would like to ask some questions about the potential for pedal confusion to occur when a bus is being driven. We'd like to reiterate that your responses are anonymous and the answers to this questionnaire will only be reported as a combined set of responses.

The definition of pedal confusion we are using is:
Pedal confusion is defined as an occurrence of a driver accidentally selecting the brake pedal instead of the accelerator pedal or the other way around. This causes either sudden unintended acceleration or harsh braking. This may lead to incidents such as a collision outside the vehicle, passengers being jolted inside the vehicle or may have no impact at all such as a near miss as the driver successfully recovered the situation.

ASK ALL
SINGLE CODE
10. How frequently do you believe pedal confusion occurs amongst London bus drivers even if there isn't a collision?
Select one only

i. At least once a week
ii. Less than weekly but at least once a month
iii. Less than once a month but at least once every 3 months
iv. Less than once every 3 months but at least once every 6 months
v. Less than once every 6 months but at least once a year
vi. Less than once a year but it does happen
vii. I'm not aware of this ever happening
viii. Prefer not to say
ix. Don't know

SHOW TO ALL
Bus operator incident data shows there have been **at least** 43 incidents where pedal confusion contributed to an incident between 2002 and 2018. Two of these had a fatality.

ASK ALL DRIVERS OR FORMER DRIVERS (Q2=1) or (Q4=1)
SINGLE CODE
11. Have you ever received training about pedal confusion, either when you joined the company or since?

Yes
No
Don't know / Can't remember

ASK ALL
SINGLE CODE
12. At what point in a journey do you think pedal confusion is most likely to occur?
Setting off from a depot
Setting off from a bus stop
At a junction, setting off
At a junction, slowing down
Slowing down for a bus stop
Driving back into a depot
Other (please specify)
Don't know

ASK ALL
SINGLE CODE
13. At what point in a shift do you think pedal confusion is most likely to occur?
At the start of a shift
Just before a break
Just after a break
Near the end of the shift
At any time a driver changes buses
At any point in the shift, the time isn't a factor
Other (please specify)
Don't know

ASK ALL EXCEPT DON'T KNOW AT Q12 AND Q13
OPEN END: 9999 CHARACTERS
14. When asked about when pedal confusion is most likely to occur, why did you say (PIPE FROM Q12) during a journey and;
Why did you say (PIPE FROM Q13) for the part of the shift?

ASK ALL
TOP 3
ROTATE LIST
15. Which of the list below do you believe are the main factors that lead to pedal confusion?
Please select the top three factors.
Switching from one bus to another, even if it's the same make/model
Passengers distracting the driver inside the bus
Pedestrians distracting the driver outside the bus
Other road users distracting the driver
A driver's mind wandering and losing concentration
At blind spots where a driver may concentrate on making sure they don't hit anything or anyone
At traffic lights / road junctions where other road users move in front of buses
At bus stops when other road vehicles do not let buses out
Driving in heavy traffic (stop/start)
Driving when dark
Driving a night bus
Driver fatigue
Human error
Drivers not being able to hear when the bus is accelerating

ASK ALL
OPEN END
16. Do you think there are any other reasons which are not listed which may lead to pedal confusion?

ASK ALL
MULTI CODE
17. What experience do you have of pedal confusion? Please select all that apply
I've experienced pedal confusion myself
I'm aware of pedal confusion happening to other drivers
I know what it is but do not know of any experiences
I do not have any knowledge of pedal confusion **EXCLUSIVE**

ASK IF Q17=CODE 1
MULTI CODE
18. What is your personal experience of pedal confusion?
Using the accelerator instead of the brake
Using the brake instead of the accelerator
I've used both the accelerator instead of the brake and brake instead of the accelerator
Other (please specify)

ASK IF Q17=CODE 1
SINGLE CODE
19. What type of vehicle were you driving?
Petrol
Diesel
Hybrid
Electric
Don't know / Can't remember

ASK IF Q17=CODE 1
MULTI CODE
20. Can you recall the make and / or model of the vehicle you were driving?
Yes
No

ASK IF Q20=CODE 1
OPEN BOXES X 2
21. Please provide the make and model
MAKE: MODEL:

ASK IF Q17=CODE 1
OPEN BOX NUMBER MAX 2 DIGITS
22. How many times have you experienced pedal confusion in the past year?

ASK IF Q17=CODE 1
OPEN BOX NUMBER MAX 2 DIGITS
23. How many times has the pedal confusion led to a collision in the past year?

ASK IF Q17=CODE 2
MULTI CODE
24. What is your knowledge of the occasions when another driver described pedal confusion?
Please select all that apply

The driver used the accelerator instead of the brake
The driver used the brake instead of the accelerator
Other (please specify)
Don't know the details **EXCLUSIVE**

ASK IF Q17=CODE 2 (NUM BOX, MAX 3 NUMBERS)
25. How many different drivers have mentioned they've experienced pedal confusion in the past year?

ASK IF Q17=CODE 2
MULTI CODE

26. What was the outcome of the incident(s)?
Please select all that apply

There has been a collision which involved another person (including cyclists/car drivers)
There has been a collision which involved an object (e.g. a tree or lamp post) but not a person
Passengers were jolted, but no outside collision
There was a near miss as driver successfully recovered the situation, no collision and passengers unaffected
Other (please specify)

ASK IF Q17=CODE 2
OPEN BOX NUMBER MAX 2 DIGITS

27. How many times have you heard of drivers experiencing pedal confusion in the past year?
OPEN BOX times

ASK IF Q17=CODE 2
OPEN BOX NUMBER MAX 2 DIGITS

28. How many times have these pedal confusion incidents led to a collision in the past year?
OPEN BOX times

ASK ALL BUS DRIVERS
SINGLE CODE

29. To what extent do you agree with the statement:
I have been trained to recognise when unintended acceleration is occurring and how to respond to it

Strongly agree
Agree
Neither agree nor disagree
Disagree
Strongly disagree

ASK ALL BUS DRIVERS
SINGLE CODE

30. How frequently do you choose to "coast" while in control of the bus?
Very frequently (multiple times on a route)
Frequently (at least once on a route)
Occasionally
Rarely
Never

ASK IF COAST FREQUENTLY (Q30=1 OR 2 OR 3)
MULTI CODE

31. Which of these places are you most likely to "coast"?
Please select all that apply
Sitting in slow moving traffic
Once I'm up to speed and I see traffic stopped ahead
Arriving at a bus stop
Arriving at the depot
Other (please specify)

ASK ALL
SINGLE CODE PER ROW
ROTATE OR RANDOMISE LIST

32. To what extent do you agree or disagree that the following possible solutions would reduce pedal confusion amongst bus drivers?

	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	Don' t Know
Forcing a driver to apply the brake pedal before engaging a gear to drive away (e.g. when leaving the depot or bus stop)	1	2	3	4	5	6
Having the same types of pedals and pedal layout for all makes/models of bus	1	2	3	4	5	6
Making sure drivers can see all around the exterior of the bus before setting off, i.e. no more blind spots	1	2	3	4	5	6
Having an audible cue to inform the driver when the bus is accelerating from a low speed or stationary position	1	2	3	4	5	6
Having a visible cue, such as a light, to inform the driver when the accelerator and brake pedal are being pressed	1	2	3	4	5	6
A detector to automatically brake, based on sensors which deem when a bus is likely to be unintentionally accelerating	1	2	3	4	5	6
Drivers being provided with approved footwear to be used when driving buses	1	2	3	4	5	6
Giving drivers time to prepare when changing buses	1	2	3	4	5	6
Using the same bus for the whole shift	1	2	3	4	5	6
Improved driver training about pedal confusion	1	2	3	4	5	6

ASK IF GIVING DRIVER TIME TO PREPARE IS STRONGLY AGREE OR AGREE
OPEN MAX 2 NUMBERS

33. You agreed that giving drivers time would be a possible solution to reduce pedal confusion. How long, in minutes, do you think should be given to a driver to prepare before driving away safely?

OPEN BOX Minutes

ASK ALL
DO NOT FORCE
QPRIZE
Thank you for taking the time to complete this survey.

To enter you in to the prize draw we need you to provide contact details to reach you should you win a prize, you can include either a phone number or email address or both.

If you do not want to provide these details please select next to move on to the next page however we will not be able to include you in the prize draw.

Your contact details are only used for the prize draw and they are separated from your answers straight away. Neither TfL or your bus operator will receive these details.

Q34 – Q36
Name
Phone number **NUMERIC AND VALIDATE**
Email address **VALIDATE**

ASK ALL BUS DRIVERS (Q2=1)
SINGLE CODE
QGROUP
We are keen to hear more about your views on pedal confusion and specifically about solutions which are being proposed.
AECOM are running some group discussions with bus drivers which would last 90 minutes each. These will occur outside your working hours and for that reason we would include an Amazon voucher of £50 to all those who attend in return for their time.
These discussions will be with up to 4 other drivers (expect 5 in a group) and other than these drivers nobody else from TfL or your bus operator will be present.
The groups discussions will be recorded on the day, again, these are for AECOM's analysis reasons only and the recordings will not be shared with TfL or your operator and everything you say will be kept anonymous.
Q37 If you wish to attend a group discussion please confirm below. We will contact you at a later date to make specific arrangements:

- Yes: I would like to be involved in the group discussions and you can use the contact details that I have provided for the prize draw to contact me
- Yes: I would like to be involved in the group discussions but I did not leave my contact details or I would like to give you different details
- No: I do not wish to attend a group discussion
- Don't Know: I need to decide later.

ASK IF QGROUP=YES BUT NEEDS TO GIVE CONTACT DETAILS (CODE 2)
TEXT
QCONTACT
Please provide a phone number or email address or both to enable us to contact you. If you do not want to provide these details please select next to move on to the next page however we will not be able to include you in the group discussions.

The contact details you give are for AECOM to make arrangements with you for attending the groups and for this reason only, these details are stored separately from your answers.

Q38 – Q40 Neither TfL or your bus operator will receive these details.
Name
Phone number **NUMERIC AND VALIDATE**
Email address **VALIDATE**

ASK ALL WHO SAID YES TO A GROUP (QGROUP=1 OR 2)
SINGLE CODE
QLOCATION
There are two options for holding the groups,

ONLINE (INTERNET): If most drivers prefer to complete these from home using the internet, we will arrange for these to be completed online. To use the internet you need to have a tablet, laptop or PC with a webcam (i.e. in the same way you use for Zoom calls, Facetiming etc).

OFFLINE (FACE-TO-FACE) We can arrange for a face-to-face discussion to take place in a depot close to you (it may not be your main depot) with somebody from AECOM in attendance.

Q41 Please give your preferred method for the group discussions
If you have no preference and have a webcam at home please select the bottom option
Online (using the internet and I confirm I have a webcam at home
Face-to-face in a meeting room
I don't mind and I confirm I have a webcam at home.

ASK IF QGROUP=DON'T KNOW (CODE 4)
TEXT
QDON'T KNOW
If, at a later date, you decide you would like to attend a group, please type Busdrivergroup.com in your internet browser and there will be a short survey asking for your contact details and we will then be in touch. You can find this web address on the communication from your operator.
Please select next to continue
ASK ALL
TEXT
Thank you again.
Please click on the submit button below to upload your answers and close your survey.

Appendix D Workshop Discussion Guide

The same discussion guide was used for all, with the exception of the introductions where workshop attendees included the name of the operator they were representing (or TfL) and driver discussion attendees included their years of experience and make(s) of bus they frequently drive.

Introduction session

Format of the session (adapt if online)

- H&S – Fire exits, toilets, refreshments, no mobile phones
- Introduce moderator / note taker and on behalf of TfL
- Recording the groups – Only for internal use etc. Comments and findings are anonymised
- No right or wrong answers.
- Collating view from a wide range of stakeholders.
- Objectives for today (reviewing solutions to reduce/remove pedal confusion)
- Don't have to reach a consensus

Introduction AECOM

- Self/ AECOM/independent consultancy
- Conducting research on behalf of Transport for London
- Purpose of research to talk about Pedal Confusion and the solutions to it
- Emphasise there are no right or wrong answers
- Emphasise confidentiality – recording interview for accuracy of reporting. Recording will not be passed on to anyone outside the research team or the client team. Findings are aggregated for reporting. Stress anonymity in reporting of findings

Introduction Respondents

- Introduce themselves
- First name
- Role / Operator
- How long have they been in the bus industry?

5 mins

If the incident at London Victoria is raised where a pedestrian lost their life. The incident is under investigation and the cause is unknown.
This should be mentioned before the discussion gets too deep and then continue with the discussion.

Context

TfL Vision Zero show on Powerpoint for all to read.

- 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 against 2005-09 baseline
- No one killed in, or by, a London bus by 2030

TfL's aim is to make the whole system as safe as possible so that when a road user, i.e. a cyclist, pedestrian or another driver does make a mistake, this mistake does not result in serious or fatal injury

Pedal confusion

- What is the definition of pedal confusion?
- Not why it happens but what is it?
- After driver discussion agree a definition and share:

Definition of Pedal Confusion

show on Powerpoint for all to read.

Pedal confusion can be defined as the manoeuvre of a driver confusing the brake pedal and the accelerator pedal thus causing an incident of sudden unintended acceleration or harsh braking of their vehicle.

- Is this the right definition of pedal confusion?
- Should we include both unintended acceleration and harsh braking?
- Anything to add…..aim for all to settle on a definition although overall consensus is not required

READ OUT BELOW IF THERE HAS BEEN DOUBT ABOUT WHETHER PEDAL CONFUSION EXISTS:

Bus operator incident data shows there have been **at least** 43 incidents where pedal confusion contributed to an incident between 2002 and 2018. Two of these had a fatality.

Footwell CCTV has shown pedal confusion to be a cause of incidents.

Reference: if asked: Transport Research Laboratory report on the TfL bus safety standard using bus operator incident data

Twitter video or similar

PLAY and put in full screen, short video so repeat 2 to 3 times:
https://twitter.com/howzmeluck/status/1240405171118772227?s=20

- Views on the video:
  - Is this an example of a driver experiencing pedal confusion?
  - How do we know (either way)?
  - What else, other than pedal confusion could have happened?

10 mins

Causes of pedal confusion

What are the potential causes of pedal confusion?

- PROBE: Bus specific
  - How do physical driving features on a bus vary? E.g. seating position, vision, pedals
  - Any makes/models considered better/worse?
  - What physical features of a bus could cause pedal confusion?
    - pedal layout (whether pedals are close together, how visible they are to the driver or how they differentiate between the two pedals; familiarity / unfamiliarity with personal car or other vehicles they drive;
    - bus size / visibility
  - Does engine type make a difference? i.e. diesel, hybrid, electric
  - Different makes/models of bus: any makes better than others in terms of visibility, pedal layout.
  - Changing from one make/model of vehicle to another and changing to another vehicle of the same make/model. How is this different?

  PROBE: is changing vehicles more to do with the physical features of a driver (height, shoe size) than changing make/model and the vehicle layout?
- Driver specific factors to PROBE:
  - What factors could be down to human error?
    - Driver error
    - What leads to driver error (e.g. fatigue, concentration disturbed by passengers)
    - Any manoeuvres which could cause unintended acceleration/harsh braking
- External factors to PROBE:
    - Driver footwear
    - Gears/pedals on a personal car vs on a bus; different types of buses
    - Emergency action avoiding a collision

IMPORTANT TO CHECK,. ESPECIALLY DRIVERS:

Impact of changing to hybrid or electric buses, i.e.

- Any noticeable change in pedal alignment
- Any noticeable change in acceleration / brake pedal i.e. harder or easier to press

If impact of changing buses is mentioned, confirm

MAKE of bus and

TYPE of bus, i.e. hybrid, electric, hydrogen, diesel

10 mins

Timing of incidents

When do you feel these incidents are most likely to happen? PROBE:

- Time of day
- Time of shift (i.e. beginning, middle, end)
- After multiple shifts
- Night bus / driving in the dark / driving in the day
- Peak periods vs off-peak
- Can relaxation after a “difficult” route lead to relaxation and oversight?

5 mins

Pedal configuration and footwear

What do you think of the current pedal configuration in relation to pedal confusion?

PROBE:

- Organ (flat) or hanging type pedals
- Type of tread on the pedals
- Distance between pedals
- Different levels of pedal resistance for different vehicles
- How does variation of pedal alignment for different makes of bus affect drivers? Including changing buses mid-shift

Does the type of footwear drives wear impact recognition of the pedals?

- Can drivers feel the pedals

5 mins

Solutions to pedal confusion

Spontaneous or first thoughts on best solutions

- Can think as far reaching as they feel necessary, assume no limit on budget and anything is possible!
- PROBE: Vehicle related / External (see examples)
    - How can buses be adapted;
    - Anything to allow for external distractions such as vehicles/cyclists/pedestrians completing unexpected manoeuvres
    - Are there any examples of make/model of bus which deliver already? What do they deliver and why?
    - Use of cameras / blind spot mirrors
- PROBE: Driver related (see examples):
    - One vehicle per shift;
    - Time to adjust when changing buses;
    - Driver checklist before setting off, such as confirm correct vision and controls (seat position check, mirror check); i.e. ensuring settled before leaving (depends if leaving a depot is highlighted as a higher risk for pedal confusion)
    - Shorter shifts; breaks;
    - Less consecutive days working;
    - Type footwear (what would this look like / how standardise?);
    - Specific training and what would this training be

10 mins

Suggested solutions.

READ OUT: I am now going show you six solutions that TfL are considering as potential solution. For each, I would like to hear your thoughts including pros and cons and the speed to which the solution could be implemented and deliver TfL Vision Zero.

- Use showcards to present each of the proposed solutions. Show in different order for different workshops, especially drivers.

Evaluate each solution

- Pros/cons for each
- Benefits and limitations of each
- How practical they believe the solution is
- How timely to implement
- How quickly can they see the solution being implemented and reference back to TfL Vision Zero
    - 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 against 2005-09 baseline
    - No one killed in, or by, a London bus by 2030

Solutions shown in this document are for ease of reference using the PowerPoint slides to run through each one. Additional information provided on benefits/limits for moderator use only.

5 mins per solution (30 in total)

Solution 1:

Brake Toggling:

This solution would enable the driver to re-initialise their right foot/driving position and update recent memories of the brake position before leaving a bus stand/stop. **This is achieved by the driver needing to double tap the brake before the bus will move forwards (accelerate)**

This solution would also avoid errors linked with a misuse of the system (especially when the driver is not following expected protocol and does not switch gear back to neutral when stopped at a bus stop/stand).

The addition of such a solution could be fitted on an operated bus as long as (light) training is provided to the drivers.

- **Evaluate each solution**
  - Pros/cons for each
  - Benefits and limitations of each
  - How practical they believe the solution is
  - How timely to implement
  - How quickly can they see the solution being implemented and reference back to TfL Vision Zero
    - 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 against 2005-09 baseline
    - No one killed in, or by, a London bus by 2030

Notes for moderator if need to probe:

Already a requirement on new vehicles

Table 16. Brake toggling benefits and limitations

Benefits	Limitations
• Improves right foot proprioception • Reduces foot misplacements • Quick retrofit on buses • This solution could be tested this year as a proof of concept • Short driver training time	• Retrofit limitations depending on bus models • Limited effectiveness (effectiveness expected at bus stop, bus stand only) –

Solution 2:

Accelerator noise:

Add/Amplify the accelerator engine sounds when the bus is in electric mode and at low speed (below 20mph) using the noise counter measures of the Bus Safety Standard project (AVAS).

The selected sounds to be tested will be fitted in the cab using a loudspeaker at a predetermined noise level.

- **Evaluate each solution**
  - Pros/cons for each
  - Benefits and limitations of each
  - How practical they believe the solution is
  - How timely to implement
  - How quickly can they see the solution being implemented and reference back to TfL Vision Zero
    - 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 against 2005-09 baseline
    - No one killed in, or by, a London bus by 2030

Notes for moderator if need to probe:

Table 19. Accelerator noise conspicuity benefits and limitations

Benefits	Limitations
• Helps the driver recover from a pedal error at any location/time • Reduces pedal error consequences and occurrence • No additional driver training • Easy to implement in a bus (loudspeakers)	• Additional time to design the solution on a bus (depends on manufacturers' possibility to prototype) • Additional/specific testing required

Solution 3:

Accelerator/Brake light indicators:

Add two LEDs/lights (one light for the brake pedal activation, one light for the accelerator pedal activation) to a bus dashboard.

The LEDs/lights should be dimmed between day/night conditions. The addition of such a solution could be fitted on an operated bus as long as adequate training is provided to the drivers.

NOTE: Pedal indicator lights were a requirement of BSS buses from 2019 implementation

Evaluate each solution

- Pros/cons for each
- Benefits and limitations of each
- How practical they believe the solution is
- How timely to implement
- How quickly can they see the solution being implemented and reference back to TfL Vision Zero
    - 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 against 2005-09 baseline
    - No one killed in, or by, a London bus by 2030

Notes for moderator if need to probe

Already a requirement on new vehicles

Table 20. Accelerator/brake lights benefits and limitations

Benefits	Limitations
• Helps the driver recover from a pedal error at any location/time • Reduces pedal error consequences and occurrence • Short additional driver training • Easy to implement in a bus (LEDs)	• Effectiveness when used alone (expected to be more effective when coupled with accelerator noise conspicuity) • Additional equipment to be fitted in a bus (could not necessarily be fitted in the main field of view on current buses)

Solution 4:

Improved Direct/indirect vision:

Use of additional visual aids to drivers to check all areas and reduce the need for body movement (including foot movement leading to misplacement) in the driver cab when making manoeuvres.

Visual driver aids such as:

- Blind spot mirrors (already fitted)
- Cameras providing external views back to driver replacing the usual wing mirrors with cameras which display view on screens in drivers cabin

NOTE: some operators introduced Camera Monitoring Systems early; they are now a requirement of the BSS 2021 for all new buses.

- **Evaluate each solution**
  - Pros/cons for each
  - Benefits and limitations of each
  - How practical they believe the solution is
  - How timely to implement
  - How quickly can they see the solution being implemented and reference back to TfL Vision Zero
    - 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 against 2005-09 baseline
    - No one killed in, or by, a London bus by 2030

Notes for moderator if need to probe:

Table 18. Improved direct/indirect vision benefits and limitations

Benefits	Limitations
• Improves drivers visibility and driving comfort • Reduces foot and body misplacements • Reduces pedal error in left-right turn locations (e.g. includes bus stop)	• Additional equipment to be fitted to a bus (additional cost) • Less applicable in a "straight road" pedal error scenario

NOTE FOR MODERATOR:
Pedal layout standardisation and AEB solutions are unable to be retrofitted to the current fleet of buses. Introduce later unless referenced by a member of the group
PROBE: These last two cannot be retrofitted on current buses. Does this mean they should be excluded from the solutions.

Solution 5:

Advanced Emergency Braking (AEB):

Technology capable of detecting unintended acceleration errors and intervene (e.g. automatic emergency braking interpreting the acceleration signal as a brake signal when a pedal error is detected)

AEB system activation for unintended acceleration scenarios is currently not available on the market but is under development.

NOTE: AEB solutions would be unable to be retrofitted to the current fleet of buses.

Evaluate each solution

- Pros/cons for each
- Benefits and limitations of each
- How practical they believe the solution is
- How timely to implement
- How quickly can they see the solution being implemented and reference back to TfL Vision Zero
    - 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 against 2005-09 baseline
    - No one killed in, or by, a London bus by 2030

Notes for moderator if need to probe:

Table 21. Automated Emergency Braking benefits and limitations

Benefits	Limitations
• Potential to mitigate most pedal error events depending on the level of performance of the algorithm developed • Corrects driver's cognitive errors by applying the brakes instead of the accelerator throttle	• Additional equipment to be fitted to a bus (additional cost) • Specific algorithm will need to be developed in a safe way to impede unexpected emergency braking

Solution 6:

Pedal position standardisation:

Propose a standard pedal configuration (pedal location, size, angle, pedal resistance, hanging or floor mounted) for all London buses.

NOTE: Pedal layout standardisation would be unable to be retrofitted to the current fleet of buses.

- **Evaluate each solution**
  - Pros/cons for each
  - Benefits and limitations of each
  - How practical they believe the solution is
  - How timely to implement
  - How quickly can they see the solution being implemented and reference back to TfL Vision Zero
    - 70 per cent reduction in the number of people killed or seriously injured in, or by, buses by 2022 against 2005-09 baseline
    - No one killed in, or by, a London bus by 2030

Notes for moderator if need to probe:

Table 17. Pedal standardisation benefits and limitations

Benefits	Limitations
• Improves bus standardisation • Reduces foot misplacements and adaptation time to a new bus model • No driver training time • Could be fitted on new buses	• Heavy retrofit for existing buses that could include driver's seat retrofit • Limited effectiveness (e.g. does not address cognitive errors) • International standard currently under review (updated version expected in 2018) • Requires advanced mock-ups

Conclusions about solutions

- What are the best solutions in terms of:
  - Time (short term/long term)
  - Safety
  - Practicality (ease of implementation)
- Is there a mix of solutions required, if yes, what is the mix?
- Assume cost and practicality are not a barrier and rank each solution for short term (2022) and long term (2030)
- Any additional solutions that should be included (based on their initial thoughts) which would add to their preferences / improve final outcome and goal

10 mins

Thank and Close

Appendix E Data Tables

		Count	%
Which bus operator do you work for?	Abellio	90	15
	Arriva	167	28
	HCT Group	42	7
	Go-Ahead	1	0
	Metroline	116	20
	RATP Dev	17	3
	Stagecoach London	131	22
	Sullivan Buses	0	0
	Tower Transit	28	5
	Uno	0	0
	Other	1	0
	Base	593	100

		Count	%
Which of the following best describes your job role?	Bus driver	567	96
	Bus driver trainer	7	1
	Bus depot manager	4	1
	Health and Safety manager	4	1
	Engineer	1	0
	Engineering Manager	0	0
	Work in an admin role at the bus depot not directly with buses	1	0
	Other	9	2
	Base	593	100

		Count	%
How long have you worked in Base as a bus driver?	One year or less	87	15
	Between one and three years	69	12
	Between three and five years	70	12
	Between five and 10 years	79	14
	Over 10 years	262	46
	Base	567	100

		Count	%
Before your current role had you ever worked as a bus driver?	Yes	21	81
	No	5	19
	Base	26	100

		Count	%
How long did you work as a bus driver?	One year or less	0	0
	Between one and three years	4	19
	Between three and five years	3	14
	Between five and 10 years	6	29
	Over 10 years	8	38
	Base	21	100

		Count	%
How long have you worked in the bus industry?	One year or less	85	14
	Between one and three years	66	11
	Between three and five years	69	12
	Between five and 10 years	80	13
	Over 10 years	293	49
	Base	593	100

		Count	%
Typically, how many different buses do you drive in one shift, even if it's the same make/model of bus?	1	79	14
	2	435	77
	3	45	8
	4 or more	8	1
	Base	567	100

		Count	%
Typically, how many different makes/models of bus do you drive in one shift?	1	146	30
	2	304	62
	3	33	7
	4 or more	5	1
	Base	488	100

		Count	%
Which of these makes of bus do you drive or have you driven	ADL	205	35
	BYD	76	13
	Caetano	39	7
	MCV	69	12
	Mercedes Citaro	61	10
	Optare	132	22
	Scania	201	34
	Wrightbus	236	40
	Other	218	37
	Base	588	100

		Count	%
When changing buses, typically how much time do you take from your bus arriving until you drive it away?	5 minutes or less	346	71
	More than 5, up to 10 minutes	115	24
	More than 10, up to 15 minutes	17	3
	Over 15 minutes	10	2
	Base	488	100

		Count	%
How frequently do you believe pedal confusion occurs amongst London bus drivers even if there isn't a collision?	At least once a week	142	24
	Less than weekly but at least once a month	50	8
	Less than once a month but at least once every 3 months	26	4
	Less than once every 3 months but at least once every 6 months	13	2
	Less than once every 6 months but at least once a year	24	4
	Less than once a year but it does happen	59	10
	I'm not aware of this ever happening	87	15
	Prefer not to say	5	1
	Don't know	187	32
	Base	593	100

		Count	%
Have you ever received training about pedal confusion, either when you joined the company or since?	Yes	188	32
	No	299	51
	Don't know / Can't remember	101	17
	Base	588	100

		Count	%
At what point in a journey do you think pedal confusion is most likely to occur?	Setting off from a depot	30	5
	Setting off from a bus stop	52	9
	At a junction, setting off	54	9
	At a junction, slowing down	126	21
	Slowing down for a bus stop	52	9
	Driving back into a depot	13	2
	Other	65	11
	Don't know	201	34
	Base	593	100

		Count	%
At what point in a shift do you think pedal confusion is most likely to occur?	At the start of a shift	34	6
	Just before a break	10	2
	Just after a break	16	3
	Near the end of the shift	132	22
	At any time a driver changes buses	36	6
	At any point in the shift, the time isn't a factor	196	33
	Other	15	3
	Don't know	154	26
	Base	593	100

		Count	%
Which of the list below do you believe are the main factors that lead to pedal confusion? Please select the top three factors Please note any other factors not listed that may lead to pedal confusion?	Switching from one bus to another, even if it's the same make/model	68	11
	Passengers distracting the driver inside the bus	81	14
	Pedestrians distracting the driver outside the bus	34	6
	Other road users distracting the driver	44	7
	A driver's mind wandering and losing concentration	200	34
	At blind spots where a driver may concentrate on making sure they don't hit anything or anyone	38	6
	At traffic lights / road junctions where other road users move in front of buses	89	15
	At bus stops when other road vehicles do not let buses out	30	5
	Driving in heavy traffic (stop/start)	115	19
	Driving when dark	12	2
	Driving a night bus	9	2
	Driver fatigue	329	55
	Human error	304	51
	Drivers not being able to hear when the bus is accelerating	26	4
	Lack of experience / new drivers	7	1
	Stress	17	3
	Over confidence	3	1
	Weather	2	0
	Seats incorrectly installed / uncomfortable	4	1
	Training is inadequate / non existent	6	1
	Pedal shape / placement / layout	26	4
	Low skilled drivers	3	1
	Bad cab layout / driver conditions	6	1
	Hurry / rushing / panic; including pressure from operator iBus controllers	21	4
	Footwear	6	1
	Not using handbrake	2	0
	Alcohol / drug taking	3	1
	Other	18	3
	Base	593	100

		Count	%
What experience do you have of pedal confusion?	I've experienced pedal confusion myself	127	21
	I'm aware of pedal confusion happening to other drivers	157	26
	I know what it is but do not know of any experiences	219	37
	I do not have any knowledge of pedal confusion	131	22
	Base	593	100

		Count	%
What is your personal experience of pedal confusion?	Using the accelerator instead of the brake	73	57
	Using the brake instead of the accelerator	31	24
	I've used both the accelerator instead of the brake and brake instead of the accelerator	21	17
	Other	6	5
	Base	127	100

		Count	%
What type of vehicle were you driving?	Petrol	7	6
	Diesel	58	46
	Hybrid	52	41
	Don't know / Can't remember	10	8
	Base	127	100

		Count	%
Can you recall the make and / or model of the vehicle you were driving?	Yes	44	35
	No	83	65
	Base	127	100

		Count	%
How many times have you experienced pedal confusion in the past year?	0	55	43
	1	46	36
	2	14	11
	3	5	4
	4	2	2
	5	5	4
	Base	127	100

		Count	%
How many times has the pedal confusion led to a collision in the past year?	0	118	93
	1	7	6
	2	1	1
	5	1	1
	Base	127	100

		Count	%
What is your knowledge of the occasions when another driver had pedal confusion?	The driver used the accelerator instead of the brake	113	72
	The driver used the brake instead of the accelerator	23	15
	Other	1	1
	Don't know the details	34	22
	Base	157	100

		Count	%
How many different drivers have mentioned they've experienced pedal confusion in the past year?	0	47	30
	1	27	17
	2	29	18
	3	24	15
	4	6	4
	5	12	8
	6	3	2
	7	2	1
	10	5	3
	12	2	1
	Base	157	100

		Count	%
What was the outcome of the incident(s)?	There has been a collision which involved another person (including cyclists/car drivers)	51	32
	There has been a collision which involved an object (e.g. a tree or lamppost) but not a person	58	37
	Passengers were jolted, but no outside collision	29	18
	There was a near miss as driver successfully recovered the situation, no collision and passengers unaffected	48	31
	Other	15	10
	Base	157	100

		Count	%
How many times have you heard of drivers experiencing pedal confusion in the past year?	0	45	29
	1	40	25
	2	22	14
	3	19	12
	4	11	7
	5	9	6
	6 or more	11	8
	Base	157	100

		Count	%
How many times has the pedal confusion led to a collision in the past year?	0	96	61
	1	30	19
	2	11	7
	3	11	7
	4 or more	9	6
	Base	157	100

		Count	%
I have been trained to recognise when unintended acceleration is occurring and how to respond to it	Strongly agree	105	19
	Agree	164	29
	Neither agree nor disagree	158	28
	Disagree	67	12
	Strongly disagree	73	13
	Base	567	100

		Count	%
How frequently do you choose to “coast”?	Very frequently (multiple times on a route)	46	8
	Frequently (at least once on a route)	33	6
	Occasionally	105	19
	Rarely	139	25
	Never	244	43
	Base	567	100

		Count	%
Which of these places are you most likely to “coast”?	Sitting in slow moving traffic	100	54
	Once I’m up to speed and I see traffic ahead	85	46
	Arriving at a bus stop	45	24
	Arriving at the depot	18	10
	Other	6	3
	Base	184	100

		Count	%
Forcing a driver to apply the brake pedal before engaging a gear to drive away (e.g. when leaving the depot or bus stop)	Strongly agree	131	22
	Agree	206	35
	Neither agree nor disagree	164	28
	Disagree	54	9
	Strongly disagree	38	6
	Base	593	100

		Count	%
Having the same types of pedals and pedal layout for all makes/models of bus	Strongly agree	230	39
	Agree	216	36
	Neither agree nor disagree	106	18
	Disagree	28	5
	Strongly disagree	13	2
	Base	593	100

		Count	%
Making sure drivers can see all around the exterior of the bus before setting off, i.e. no more blind spots	Strongly agree	197	33
	Agree	212	36
	Neither agree nor disagree	126	21
	Disagree	41	7
	Strongly disagree	17	3
	Base	593	100

		Count	%
Having an audible cue to inform the driver when the bus is accelerating from a low speed or stationary position	Strongly agree	116	20
	Agree	179	30
	Neither agree nor disagree	177	30
	Disagree	71	12
	Strongly disagree	50	8
	Base	593	100

		Count	%
Having a visible cue, such as a light, to inform the driver when the accelerator and brake pedal are being pressed	Strongly agree	131	22
	Agree	213	36
	Neither agree nor disagree	155	26
	Disagree	52	9
	Strongly disagree	42	7
	Base	593	100

		Count	%
A detector to automatically brake, based on sensors which deem when a bus is likely to be unintentionally accelerating	Strongly agree	147	25
	Agree	198	33
	Neither agree nor disagree	147	25
	Disagree	54	9
	Strongly disagree	47	8
	Base	593	100

		Count	%
Drivers being provided with approved footwear to be used when driving buses	Strongly agree	157	26
	Agree	191	32
	Neither agree nor disagree	146	25
	Disagree	62	10
	Strongly disagree	37	6
	Base	593	100

		Count	%
Giving drivers time to prepare when changing buses	Strongly agree	241	41
	Agree	205	35
	Neither agree nor disagree	108	18
	Disagree	25	4
	Strongly disagree	14	2
	Base	593	100

		Count	%
Using the same bus for the whole shift	Strongly agree	177	30
	Agree	162	27
	Neither agree nor disagree	178	30
	Disagree	50	8
	Strongly disagree	26	4
	Base	593	100

		Count	%
	Agree	231	39
	Neither agree nor disagree	101	17
	Disagree	15	3
	Strongly disagree	10	2
	Base	593	100

Appendix F Possible causes of pedal confusion: Quotes from workshops

Topic	Quote by	Quote
Different pedal configurations or cab design	Bus Driver	"On the electric buses, on the hybrids that I drive the pedals are much closer together and the cab is much smaller and also when you take off in one of those buses as well, when you take off in electric mode, it can be quite confusing, it can be quiet, because you think oh crumbs! But definitely an electric bus, the cab seating area is much smaller, because you've got the batteries behind you."
Different pedal configurations or cab design	Union Officials	"The actual layout of the pedals is a massive, massive concern and we do believe that it's probably second, only second to fatigue"
Different pedal configurations or cab design	TfL Operations	"Sometimes they're too close to each other, the pedals. Obviously, your orientation, you push down, and if the pedals are too close to each other, so obviously you don't know which one you're pressing."
Different pedal configurations or cab design	Operator Health and Safety	"The pedals are both floor mounted, push down, they're very close at the base and they spread out slightly. So, it encourages you…[to]...leave your heel where it is and it's across both pedals, which then gives you the potential issue of covering the pedals. The other issue is there's less than 5mm difference between the height of the pedals, the accelerator and the brake pedal, so if you are twisting your foot it's very easy to slide between the pedals, so we've also had instances where we're covering both pedals, whereas if you look at it on some of the other bus designs, they're square on, so you need to move your heel slightly, but there's also a lot bigger difference between [the pedals] 25 and 30 mm difference"
Different pedal configurations or cab design	Operator Health and Safety	"We photographed every pedal on every bus type, we've measured them, we've seen the issues, you know, with particular incidents we've had, does that reflect the pedal box? After a lot of work on doing that, we came to the conclusion well, no, there wasn't, not significantly or not sufficient that there's a real cause there, but that's me and six or seven pedal confusion incidents"
Traffic	Incident Investigators	"Or when slow moving traffic, they're on and off from one pedal to the other, therefore sometimes that can work that they actually think they're pressing the brake, when they're actually pressing the accelerator."

Topic	Quote by	Quote
Hybrid and electric buses	TfL Health and Safety	"I think sort of the quiet running buses, again in terms of those sort of where electric buses generally are able to get a little bit more torque and acceleration quicker, so we do sort of see those where they can go from stationary to moving and again the situation getting out of control probably a little bit quicker than maybe we sort of do with conventional diesel based engine"
Hybrid and electric buses	Engineers	"Just taking on what you're saying, regeneration on a hybrid and electric vehicle, you take your foot off, the bus is slowing down, you've got more chances of pedal confusion [at a slower speed] than where you're driving at a higher speed"
Hybrid and electric buses	Union Representatives	"There's one more other thing really with the electric buses is the regeneration of power. So, the batteries are not sufficient, so they have to regenerate and that's what causes that problem with the accelerator. It's always braking."
Footwear choice / lack of feeling of the pedals underfoot	Bus Driver	"When I first started on the buses I found that the shoes that you would wear were quite clumpy compared to what you'd say you'd use in your car and I did find a lot of the time that when you were pressing the accelerator [or] vice versa, your shoe would be sort of clipping the pedal next door."
Footwear choice / lack of feeling of the pedals underfoot	Union representatives	"A lot of them wear trainers and nobody controls them."
Footwear choice / lack of feeling of the pedals underfoot	*Bus Driver*	"Signing on in the morning, the difference in trainers, shoes that are falling apart, all kinds of different footwear, if you're not wearing the proper footwear, your shoe, which is the sole's coming apart or whatever can easily, you know, your foot can slip, maybe, so maybe the footwear should be examined by management"
Driving different models of bus on the same shift / general unfamiliarity with the bus design	Bus Driver	"It's the types of buses, because there are so many different types of buses, left indicators, right indicators, opening doors, closing doors is also different. It's not ergonomically designed for the seat adjustment, take our buses changeover and all [that] applies and the response time of each vehicle, even if it's made from the same model won't respond exactly the same, the steering will be different, the acceleration and the brake response will be different for each bus, individually you have to get used to it."

Topic	Quote by	Quote
General driver distraction	Operator Operations	"You know, when you do a root cause analysis, all the incidents that I've dealt with it tends to be something like fatigue, not concentrating, chatting to their buddies, potentially on the bus with them and many other factors that potentially lead to that I think we probably need to focus more on them and then obviously pedal confusion can't potentially get rid of it, because you never plan to do it, but it's then what do you do with that, but I'd definitely look at it as a wider aspect than simply that they're just confusing it."
Radio controllers contacting drivers	Bus Driver	"If they're feeling under pressure to reach a certain place by a certain time, because the drivers usually always want to make sure that they've got their stand time. If the running time is so short, no matter what they do they're going to miss that stand time, that will play on their heads as well or if they've left a few minutes late for whatever reason."
Radio controllers contacting drivers	Operator Health and Safety discussion	"Why do they radio buttons have to be on the floor…. I know drivers shouldn't answer their radios when they're driving, we tell them, but most of us all know that they probably do. Why can it not be on the steering wheel". "You're right and it probably is an element, because if you use it and you're in a rush to put your foot back to the brake or whatever else, so it's not ideal. You almost want it to be deactivated when it's in motion."
Passengers / passenger behaviour	Bus Driver	"Passengers talk with the driver when they are driving which is distracting."
Passengers / passenger behaviour	Incident Investigators	"So we've had a case recently where you clearly see the driver, if he leans out of the cab to talk to a passenger and as he recedes, just because his body isn't aligned with the pedals, I mean it happens almost instantaneously, that's just probably the way he hasn't checked where his feet are."
Topic	**Quote by**	**Quote**
Home life pressures need to pick the children up, family commitments	Bus Driver	"A lot of people think you just make a journey and it's not just like that, you have got to deal with time, you've got a time restriction to get from A to B and if you don't make it in time they sort of spin you around in the middle and send you back on yourself, so you get passengers that get a bit irate, you get the school rush, you've got quite a lot of things to deal with, so I think that you tend to get fatigued quite easily as a driver and I think that that's where you can make mistakes."

Drivers rushing: To achieve their stand time or to finish a shift	Operator Operations	“The bus started to move forward in slow moving traffic, it was behind schedule, so he wants to push, push, push, he can see the way off, starts to move away, the traffic stops, he puts his foot on what he believes is the brake, it’s not, it’s the accelerator”
No toilet facilities in rest areas	Bus Driver	“I was reading an article in the United States, where it stated that in their bus driver system, sometimes people get involved in an accident because when they’re too desperate to go to the toilet and your body system is really kind of like all over the place, you’re like holding on, you’re trying to right, you know, I’ve got ten minutes to get to the stand, so I can go to the toilet, that can give you, your body reaction, without even you realising it mentally…. physically your body cannot react, you don’t get the right signals of what pedal to press”
Tiredness / fatigue	Bus Driver	“Also driver fatigue, I think driver fatigue is the main thing in there and just basically driver error, unfortunately.”

Appendix G Possible solutions to pedal confusion: Quotes from workshops

Brake Toggling

Topic	Quote by	Quote
Brake Toggling	Operator Operations	"[Pedal confusion] tends to happen in slow moving traffic, when we're going quite slowly and something happens, that might not necessarily have come in"
Brake Toggling	Bus Driver	"Then that doesn't solve the solution, because pedal confusion comes when you're, say like you're on the road and the bus is actually moving."
Brake toggling as a benefit	Manufacturers	"So making the driver find the two pedals sequentially every now and again when he starts his shift or near a bus stop or something, it feels like that's probably a positive thing, but it's just a judgement, I don't have any data behind that."
Brake toggling as a limitation	Operators Health and Safety	"You also run into unintended consequences with this toggling, which we found, because we've got it on our new electric buses and they've recently changed, but what we've found was drivers weren't using the handbrake."

Accelerator Sound (audible cue)

Topic	Quote by	Quote
Accelerator sound as a benefit	TfL Health and Safety	"I think there have been occasions where pedal confusion has occurred because the driver psychologically perhaps isn't aware that the bus is moving, because there isn't a noise, if that makes sense, but I'll temper that with there is a lot going on in a bus driver's cab"
Accelerator sound as a benefit	Operator Health and Safety	"The noise just drags their attention back to the front windscreen. So that's an improvement, but that doesn't fix this [pedal confusion], so I'm not throwing out noise completely, but what I'm saying is it has a very limited benefit"
Accelerator sound as a benefit	Bus Driver	"With the electrical buses, we are missing the sound of the engine. So, I think it would be such an idea, when you press the accelerator to make a noise that make it shows that, we enjoy the sound of the engine, but now we need to enjoy something about the electrical engine, like a buzzer or I don't know, whatever they decide. At least you are in control by listening to it"
Accelerator sound as a limitation	Union Official	"By the time they're hearing the noise the incident's happening, this doesn't prevent it…….It all happens in a split second and this does nothing except tell the person you're making a mistake….even it was saying accelerating,

		accelerating, accelerating, accelerating, if we're talking about the focus issue here, I don't think it does enough"
Accelerator sound as a limitation	Union representatives	"You're getting beeping sounds from the controllers, where you get signals are coming and then you've got things that come on for the passengers as well, so you've got all these different things happening, when really you just need to concentrate on that road and what's ahead of you."
Accelerator sound as a limitation	TfL Health and Safety	"Sometimes we talk about distractions in cab now and we're actually putting more and more distractions into the cab for the driver just to sit there and shrug his shoulders and go, really, I haven't got a clue what alarm's going off now, because that one sounds like that, that one sounds like that"
Accelerator sound as a limitation	Driver Trainers	"It'll be okay for the first few times but then the drivers will switch off, it's just another annoyance that they'll just ignore."
Past experience	Operator Health and Safety	"We've had this on diesel buses….. they still don't take their foot off the pedal. It doesn't get through, the nature, human nature part of it."
Recommendations	TfL Operations	"I would like to see is a universal buzzer, so the bus you drive, by what manufacturer, if it's that noise you know it's that, if it's that noise you know it's that, whereas currently each manufacturer has its own buzzer or bells or whistles" TfL Operations
Recommendations	Manufacturers	"So if you progressively and smoothly press the accelerator in a controlled way, you either get perhaps no feedback sound or a very low level sound. If you stamp on it you get the same sound, but a lot louder or shriller or something. So, the driver gets used to the sound, but it's at very low level, so it's not an annoyance and it actually encourages the driver to use the accelerator pedal gently and smoothly, because that's nicest in terms of avoiding noises"

Accelerator / Brake light indicators (visual cue)

Topic	Quote by	Quote
Accelerator / brake light indicator as a benefit	Bus Driver	"Because it's telling you, the lights are telling you what you've got your foot on."
Accelerator / brake light indicator as a benefit	Operator Operations	"I also see the benefits of it, it probably can be quite simply done, it's in a lot of modern cars now for gear changes and it does help sometimes. That might potentially benefit to an extent, but I don't think it will be the solution."
Accelerator / brake light indicator as a benefit	Operator Operations	"Yes, whether it would make a difference, I guess, but it's probably one of the more cost effective and sort of straightforward ones that could be added."
Accelerator / brake light indicator as a limitation	Operator Operations	"I think it's that reaction and whatever it is that can help with that, but I still can't get away from this is unintended, it's over reaction, we're adding something else into it, are they genuinely going to react how we'd like them to which is press [the] brake."
Accelerator / brake light indicator as a limitation	Union representatives	"If you're talking about pedal confusion and you're [adding a light] , it's taking away the guy's concentration from the pedal and he's now looking at the light".
Accelerator / brake light indicator as a limitation	Union Official.	"You see my view is I'm not looking at the dashboard, I'm looking out the window. Where I'm going I'm looking at my surroundings. So, actually if we had a light on the dash, it'd probably be the last thing, you know, between the noise and that, I would hear a noise, but I wouldn't see that light"
Accelerator / brake light indicator as a limitation	Manufacturers	"My feeling is that the visual warnings are much lower value than an audible warning, because you have to be looking at a warning or you have a huge warning light that's going to be a massive distraction a lot of the time, in order to not require the driver to look at the instrument panel. The likelihood of the driver looking at the instrument panel to analyse what's gone wrong is, I would say, pretty low."

Improved Direct / Indirect vision for a driver inside the cab

Topic	Quote by	Quote
Improved direct/indirect vision as a benefit	Incident Investigators	"We've had a case [incident] recently where you clearly see the driver, he leans out of the cab to talk to a passenger and as he recedes, just because his body isn't aligned with the pedals, it happens almost instantaneously, that's just probably the way he hasn't checked where his feet are."

Improved direct/indirect vision as a benefit	Bus Driver	“Yes, you are less distracted, you are concentrating more, so somehow, part of what we said earlier is distraction actually leads to pedal confusion…. So I’m all for it.”
Improved direct/indirect vision as a limitation	Operator Health and Safety	“I don’t see how that’s going to improve pedal confusion. It can help with other things.”
Improved direct/indirect vision as a limitation	Operator Health and Safety	“I mean a lot of drivers when the weather’s hot, there’s a bit of a window, putting their arm out the window like they was driving a sports car, so again that’s a change in position. I don’t think it’s [pedal confusion] got anything to do with it”
Improved direct/indirect vision as a limitation	Operator Operations	“I think it’s basically trying to say that if you didn’t have these things, you’d be therefore moving your foot position, but I don’t necessarily agree with that.”
Improved direct/indirect vision as a limitation	Union Officials	“I think teaching people how to use their seats, teaching people how to position themselves for the pedal would be more beneficial than something we’ve already got.”

Advanced Emergency Braking (AEB)

Topic	*Quote by*	*Quote*
AEB as a benefit	Operator Operations	“To me it’s certainly the one that makes the most sense, because that is the problem and it tackles it directly, it’s interesting”
AEB as a benefit	TfL Health and Safety	“This is one that sort of seems to definitely be an intervention that could prevent these incidents from sort of ending in tears.”
AEB as a benefit	Bus Driver	“Yeah, I think it would be a good thing. Anything that would actually help us I think is a good thing. I used to have, on the car that I used to drive, it used to have the technology where it used to keep you in the lane, whereas if you used to start to drift slightly out of your lane it would automatically correct the steering wheel and sort of bring you back in, but yeah, obviously if you’re going to accidentally hit the accelerator and the bus can sense that there’s something in front and then it’s going to correct that, that can only be a good thing.“
AEB as a part benefit	Operator Health and Safety	“So it’s not going to change the fact we’ll have pedal confusion incidents, it’s just mitigating the effect. Because I think the velocity of the vehicles still means that there might be some immediate damage.”
AEB as a part benefit	Operator Health and Safety	“Yorkshire that had that case where they hit ten different vehicles on the road, it would certainly reduce that, because at some point after the first collision hopefully, but of course, that first collision could be a bus queue of people, it could be someone crossing the road.”
AEB technology	Bus Driver	“Yes, definitely, I think that would be something to explore. I don’t know how, if the technology would work on such a vehicle as a bus and I guess ..., but it’s definitely worth looking at, 100%.”
AEB technology	Operator Health and Safety	“It depends how the system works, because potentially certainly some of the [incidents] I can think of, you’re so close when it happens, is the system actually going to work for that?”
AEB in busy areas	Union Officials	“I think it’s a good idea. I think it’s okay if you’ve got something that works from a distance, that will reduce the speed down to say anything up to a metre, they would apply the brakes, but it’s how it would apply the brakes. What we can’t do is get into a situation where if it gets down to a metre that the bus will just stop, because we don’t know what speed that bus will be doing when it gets down to a metre.”

AEB in busy areas	TfL Health and Safety	"I think in busy areas, like Oxford Street, I think depending on how the technology work it might prove a challenge trying to drive a bus through a street with crowded pedestrians with the system not, malfunctioning or being oversensitive. So that's the only thing that kind of comes to mind in terms of being a limitation."
AEB technology	Manufacturers discussion	"It's a very high risk that the system will intervene at the wrong time, you know, the full scenario is you're overtaking a cyclist and a van comes round the bend on the other side of the road, faster than you're expecting, you have to either abort the manoeuvre or continue it. You take the judgement to continue it, so you stamp on the accelerator and then the bus comes to a halt in the middle of the road in front of the van." "How would this have bearing on the pedal confusion itself. I know that there's a different working on ABS and the amount of accidents that that might cause or create, but for the topic of pedal confusion how does it connect?" "It's very tricky, to pinpoint the unintended accelerations out of all the intended ones, because I mean regardless of the surroundings outside, sometimes the intended acceleration maybe is trying to avert another danger that the system for emergency braking doesn't see, like it doesn't take the complete picture, like the driver has to do."
AEB technology	Bus Driver	"From what I understand from this, it's meant to detect when you're accelerating or braking and basically cut it out when it thinks that you're doing it as a mistake. So, how does it know, because imagine I'm not doing it as a mistake?"
AEB technology	Bus Driver	"For me it looks like so advanced, so far away from the solution that we shouldn't even be part of it. Like this would be, I would see, you know, those self-driving cars. So the car itself predicts when it's going to accelerate or when it's going to brake. And it controls its prediction to the driver's reaction and that's what it does, but it's still science fiction to me, you know, where we are now."
AEB technology	Bus Driver	"Can you imagine that emergency brake with sixty people on board? Maybe on a small car it works, but on the bus, I think you have to be in control of it. I don't know how harsh the braking is and emergency stop on the bus is."
AEB technology	Bus Driver	"Yes, but how's it going to stop the bus, is it going to stop the bus suddenly, like how close do we have to be for it to detect that, oh my gosh, it's something, is it going to do a big shunt, is it going

		to be dangerous for passengers maybe standing up?"
AEB technology	Engineers	"If you think about the principal of what AEB does, you can't accelerate if something's in the way. It's just how good those sensors are. So, like some of you guys in here, we've all trialled all these bike and person monitoring devices and you have things going off, you go down Oxford Street and you might not get anywhere, so it's got to be right."
Other observations from the workshops	Bus Driver	"Any technology that can help is never going to be a bad thing, but I think the issue is so small that spending this sort of money on it doesn't make a lot of sense to me. I think there's bigger issues than pedal confusion."
Other observations from the workshops	Bus Driver	"I don't know if I'd be too happy with something braking for me. You know, there's been so much with these cars now with lane changes where they don't do it right and automatic braking systems that don't work. I think it would be a wrong way to go by virtue of the fact that people may back off of braking, because they know that, something's going to stop. I think laziness would start to creep in, personally."

Advanced Emergency Braking (AEB) discussions about interim solutions

Topic	*Quote by*	*Quote*
Interim solution suggested in the workshops	Operator Operations discussion	"I'm really surprised, to be honest, that it's only under development. I would have thought that there'd be something……, there's going to be stock data in terms of how much pressure you'd ergonomically, right, to apply to the brake pedal and the accelerator, they do have different weights." "so all you need is some software that tells you that pressure over a certain amount." "Yes, you have like a pressure sensor on the accelerator and it'll signal".
Interim solution suggested in the workshops	Engineers discussion	"You've got two differences, acceleration, which is minutes per second squared and then you've got minutes per second cubed and it's based with the time to go from zero to one minute per second squared, so it's like that, if you ramp up to one minute per second squared in ten seconds, that feels gradual, like it gets thrown, that's when it goes from 0-1 instantly. So, it might only cover half a metre, but it scares the driver, so it might actually, they might not actually travel very far, but like to them … "Could we not have something on the vehicle that cut out the signal but took away speed, took away acceleration? You press the throttle and it'll kick down, to try and get away quickly, you know, there'll be like a little kick down switch just behind the throttle, 95% feeling under foot. I wonder whether in kick down, whether you just instead, because like you were saying, when they panic, the driver panics. Foot goes down. Stamp and I just wonder whether you just if it goes 100% or 95%. Take away the throttle. They've still got time to react." "Something on your steering wheel where you have to click it to get acceleration, maybe that's where, if you want full acceleration you do that. So if you're pulling away into fast traffic. You click back to give yourself that boost. And then if someone hits the pedal. And obviously, it's not obviously, pedal confusion, but if they put their foot down and it doesn't react, you've got the ability for that boost, but if they put their foot down in the scenarios we've been talking about, because they think they're going to the brake and their foot doesn't come off of it, it should cut out."

Pedal Standardisation

Topic	Quote by	Quote
Benefits of Pedal Standardisation as a solution	Bus Driver	"This is the best one, this is the best one, yeah. Because each bus or each maker, they've got slightly difference. Like the 18s, they are different from the ADHs, you know, the pedals, the distance, how you sit as well, you know."
Benefits of Pedal Standardisation as a solution	Bus Driver	"Yeah, that would work. If every single bus you got on was all the same and the brake pedal is like a normal car brake pedal, where it's a lot squarer, where it's a lot squarer, where it accelerates. On our buses the accelerator pedal and the brake pedal are almost exactly the same."
Findings from the workshops	Operator Health and Safety	"It wouldn't solve everything, but I think it would have the biggest impact, as a single item"
Benefits of Pedal Standardisation as a solution	Bus Driver	"I think if you were to get to a position where every bus had the pedals in the same position with the same gap, it would help the drivers, because obviously we've all said that sometimes we're driving one bus and one half or one bus today and a different bus tomorrow. So, yeah, that's a positive, definitely."
Benefits of Pedal Standardisation as a solution	TfL Health and Safety	"For me, I think it would benefit a lot of people, because you familiarise yourself and you just take away another way out, for want of a better term, for the driver and it's standardised for all vehicles, yeah, definitely."
Considerations for Pedal Standardisation	Bus Driver	"It must be a little bit higher than the accelerator, a bit closer to the driver, …, I mean the position should be central when it normally is, but with a different size of pedal, different from the accelerator."
Considerations for Pedal Standardisation	Bus Driver	"To have them more separated, more apart from each other. That's one of the, I think that could be a good solution"
Considerations for Pedal Standardisation	Driver Trainer	"I see something for actual hanging pedals, as in if you have flat type pedals then the foot could slide up on the pedal, whereas if you put them down like a conventional car, then perhaps that might take away or having two pedals, as was said before, the old mushroom type, so if you have one pedal that does …, another pedal and therefore, you know, you're going to have a completely different feel."
Considerations for Pedal Standardisation	Union Officials	"If you physically have to move your feet to hit the brake or the accelerator, that means you have to register it with your brain and I think it's a big thing to do that and we've got away from that, which I think is quite a big concern."

Considerations for Pedal Standardisation	Union Officials	"[On electric buses] the pedals are identical side by side and I think that there's something that we can do there, even if it means just, look, I'm no engineering expert, but I'm pretty sure that without changing the linkage we could easily move the pedal over on the right hand side and move the left hand pedal towards the left and that would create the gap"
Considerations for Pedal Standardisation	Engineers	"It's naturally easy in a driver's cab to press the throttle at 100% than it is to press the brake at 100%. It needs to be the other way round, it needs to be harder to press the throttle and easier to press the brake."
Caveats to Pedal Standardisation	Operator Health and Safety	"I think from our point of view the best pedal box design is the accelerator is floor mounted, so it's push down. The brake pedal is a swing pedal, more likely to have in a car, so it's a very different action between them……and you physically need to move your foot across"
Caveats to Pedal Standardisation	Engineers	"You slip off the top of the pedal if you've got wet shoes as well…..but if it was mounted at an angle and you push into it and that felt more different from a high pitch compared to throttle."
Caveats to Pedal Standardisation	Engineers	"Just bear in mind that if you get Pedal Standardisation wrong, it causes problems for the lot."
Caveats to Pedal Standardisation	TfL Health and Safety	"The limitations would be if you do it to 9,000 plus vehicles and then we start to have pedal confusion on them, then we are screwed, yes, the NRMs, we've got a thousand of them, so again obviously there is a debate as to kind of, is it sort of volumes in the fleet that kind of make them more likely to. It's that being absolutely certain that kind of the design you've chosen is the right one, because otherwise, yeah, it presents quite a large issue."
Limitations of Pedal Standardisation as a solution	Bus Driver	"Yeah, I drove a bus with the pedals hanging and it felt like so strange. When I try to hold the brake, I can't hold the brake properly, because my foot is resting down too hard and the brake is going now, so I try to accelerate, the accelerator is going too hard, because it just feels different, when the pedals are in the … inaudible and that time, that's the first time I actually drive that bus."
Limitations of Pedal Standardisation as a solution	Operator Health and Safety.	"I think there's some element to the design of the pedal configuration which you would think could be designed out and improved on, but I think even if we had complete standardisation of pedals across the bus industry, that may make a difference and remove pedal confusion, but I think we'd still have pedal confusion…..it's just an element of it, rather than a real solution"

Limitations of Pedal Standardisation as a solution	Manufacturers	“The only thing about the standards, they tend to have a fairly big range in which you can comply with the standard. From memory there’s a sort of recommended area and there’s a required area and I think there’s quite a big tolerance on it, in terms of pedal positions and seat position and steering column position relative to accelerator heel point and that type of thing…… the tolerances of these recommendations aren’t usually to accommodate for different heights for drivers etc, because many times we have come across the problem that some of the drivers are inside the tolerances and some of the drivers are not, because these tolerances are for a population,”
Limitations of Pedal Standardisation as a solution	Manufacturers	“From our point of view we design all our cabs to meet the ISO ergonomic standard... I don’t know if anyone’s done any more work to see whether the standard is valid and the pedal positions relative to each other are good and accurate….it might be that maybe a bit more investigation needs to be done.”
Limitations of Pedal Standardisation as a solution	Operator Health and Safety	“But also, it’s drumming into the drivers that your foot should always be over one, the pedal, regardless of what your vehicle’s doing, don’t rest it on the floor.”
Limitations of Pedal Standardisation as a solution Limitations of Pedal Standardisation as a solution	Operator Health and Safety	“I think that’s just poor practice, because rather than placing your foot properly on the pedals, you’re using it in a lazy fashion, so I think that’s just poor placement.”
Other observations from the workshops	Driver Trainer	“I still, me personally I still think there needs to be, even for each vehicle to be the same there’s got to be that retraining, hasn’t there, people have got to be retrained for that.”
Other observations from the workshops	Operator Health and Safety	“There are some bus types that you don’t have pedal confusions, they’re the ones we should be looking at to see what is it about those pedals and the configuration that has contributed and we have had incidents with those buses, but again I don’t think Pedal Standardisation would stop all this.”
Other observations from the workshops	Manufacturers	“I think it needs more of a study as to how the driver is sat and interacts, rather than potentially the pedals themselves.”

Other observations from the workshops	Bus Driver	“They need to talk to us. We are the ones driving. We know what works and what doesn’t. Not people sat in an office.”
Other observations from the workshops	Union Officials	“We don’t get involved in cab designs anymore….and that’s the biggest problem, no-one consults the bus driver anymore. It’s about what the manufacturer wants, yeah and what they may think is okay in a lorry or whatever, maybe not ideal for any bus, whether it be a London bus or whatever.”
Other observations from the workshops	Union Representatives	“I think the best solution is to get those who are concerned, which is the drivers and the union in the process of design and that’s the only time this problem can be solved.”

Report 6.4 Quotes Other suggested solutions: Workshops

Topic	Quote By	Quote
Cut-off switch	Operator Operations.	“The idea of like a dead man’s switch is not new at all. I think most mechanical equipment they’ve got, safety devices and things like that and there are plenty of, so if you look at other things, technically it’s just a couple of pedals”
Cut-off switch	Union representatives.	“In milk floats…..you put your foot down hard on the accelerator there was a cut-off, like a little button underneath, like a dead man’s switch. So, the vehicle wouldn’t go nowhere. It would stop you from, you’d put your foot down, because you’d believe you were on the brake and you’d put it down harder. So, as soon as you put it down harder it would cut out”
Regeneration	Engineers	“You can change the pedal, you can tweak the regen, it’s not going to solve everything, but it might make it a little bit better, because [a manufacturer] at the time, there was a lot of pedal confusion and that’s because they had it, the lift off the accelerator was almost like a braking effect, it was very strong regeneration and [the manufacturer] said they reprogrammed it to be more like a diesel bus”
Learning from other industries	TfL Health and Safety	“You know, waste vehicles, picking up rubbish, they’re stopping, they’re starting, they are moving through London, they are a similar style of driving, but they don’t appear to be getting this”

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Safety, Sustainability and Human Resources Panel

Date: **14 September 2022**

Item: **Human Resources Quarterly Report**

This paper will be considered in public

1 Summary

1.1 The Quarterly Report is a standing item on the agenda for this Panel. It provides an update on key Human Resources (HR) led activities and performance for the period June - August 2022.

2 Recommendation

2.1 **The Panel is asked to note the report.**

List of appendices to this report:

Appendix 1 – HR Quarterly Report

List of Background Papers:

None

Contact Officer: Tricia Wright, Chief People Officer
Email: TriciaWright@tfl.gov.uk

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Appendix 1

HR Quarterly Report June to August 2022

14 September 2022

EVERY JOURNEY MATTERS

HR Quarterly Report June – August 2022

Introduction

This Human Resources (HR) Quarterly Report provides an update on the activity that has taken place to support our colleagues from June – August 2022, to make Transport for London (TfL) a great place to work, for everyone.

The first section provides an update on our People Scorecard measures and targets for the 2022/23 performance year.

The second section updates on activity delivered across the HR function aligning to three of our top People Priorities:

1. A More Inclusive and Diverse Organisation
2. An Engaged, Motivated and Healthy Workforce
3. The Right People, Skills and Capacity to Deliver the Business Plan

People Scorecard Measures and Performance 2022/23

Our Scorecard performance for our Engagement, Inclusion and Wellbeing measures will be calculated through our Viewpoint employee survey scheduled to take place from the 26 September 2022. As in previous years, we will reach out to Board and Panel members around December to share these results with you in detail and talk through any key changes from previous years.

Total Engagement

Last year's score – 61 per cent
This year's target – 62 per cent

We are committed to making TfL a great place to work for everyone, caring for our people, and supporting them to be the best they can be. This is the only way we can truly deliver for London. The best indicator of how well we are doing at this are our Viewpoint engagement scores, which tell us how our people feel about working for us and what needs to be better.

Our overarching measure of employee engagement at TfL is called Total Engagement. This is average of positive responses across 20 questions about different parts of the working experience. These include engagement with change & leadership, customers, wider team and the TfL brand.

Wellbeing at Work Index

Last year's score – 57 per cent
This year's target – 58 per cent

Wellbeing is linked to engagement, so we introduced and continue to track our Wellbeing at Work Index from our Viewpoint results. This allows us to check if any areas of the business are at risk of work-related stress.

The six factors that can affect employees' wellbeing at work are: Control, Support, Role, Demands, Relationships and Change. These areas, if not managed well, are linked with stress and could lead to poor health and wellbeing, lower productivity and increased sickness absence.

Inclusion Index

Last year's score – 51 per cent
This year's target – 52 per cent

It is of the utmost importance to us that our workforce remains engaged and happy and feels included.

Our inclusion index is calculated from six questions on our Viewpoint Survey, measuring our colleagues views on their involvement in decisions, openness of senior managers, challenging the way things are done, on bullying and harassment and if the survey will result in change.

A More Inclusive and Diverse Organisation

Diversity Declaration Rates

Last year's score – 54 per cent
This year's target – 56 per cent

Improving our data and improving our colleagues' trust in us with their data is key to building an inclusive workplace and ultimately improving diversity. We have seen a steady decline in declarations across all demographics over the last two years – so driving increased declaration rates represents a significant improvement from where we are now.

The top drivers of this measure are centred around issues of trust & inclusivity and colleagues feeling that it is safe to share their data with us and that it will have no adverse impact on their career. In previous years, declaration drive campaigns have encouraged people to declare and can have up to a 10 per cent impact, but we can't force people to declare, which is why creating the right environment is so important.

Diversity declaration rates

Period 4 actual	Period 4 target	YTD actual	YTD targ
54.0%	54.3%	54.0%	54.3

South Asian Heritage Month

South Asian Heritage Month which takes place between 18 July - 17 August every year seeks to celebrate, commemorate, and educate on all things South Asian with a particular lens on the historical, social and cultural ties to the UK. This includes looking at the role of trade and the British Empire, migration and wide-ranging contributions, influences, fusions and changes in modern society.

To celebrate this, we created a virtual exhibition space on our online Platform, where colleagues from across the organisation can share what South Asian Heritage Month means to them and the experiences they have had. This online exhibition enabled more of our colleagues to

join in and access the sketches, artwork and recipes shared by other colleagues.

In addition to this, throughout the month there were online and in person events, ranging from South Asian literature, to a museum visit, ending with a summer fair on the 16 August.

Celebrating the 50th Anniversary of Pride

This year at TfL we are celebrating the huge diversity of our LGBT+ identities, intersectionality with other protected characteristics. Throughout June there were multiple events happening across the organisation to highlight our LGBT+ colleagues and allies, leading to our presence at Pride events across London.

We were proudly represented at the Pride in London Parade on the 2 July 2022, at Croydon Pridefest on the 16 July 2022, and at UK Black Pride on the 14 August 2022, giving our colleagues to change to get involved in the 50th Anniversary celebrations.

Following the success of the LGBT Roundel campaign held in 2021, we launched a competition for colleagues to submit artwork associated with Pride that was displayed across the TfL estate during Pride month.

Defence Employer Recognition Scheme – Gold Award

We have been successful in the revalidation of our Gold Employer Recognition Scheme (ERS) award by the National Employer Recognition Board on behalf of the Ministry of Defence. This award will run for a further five years and is in recognition of our commitment to support colleagues involved in the Armed Forces.

This is down to work done with the Reservist and Ex Forces Special Interest Group, placements for ex Forces, our annual Industry Day, including CV writing, interview skills, skills matching and engaging with our supply chain to attend along with key note speakers. Attendance at The Mayors Remembrance Service and attending the cenotaph on Remembrance Day and engagements with outside agencies such as Career Transition

Partnership, The Poppy Factory, Veterans Adi and SSAFA.

Count me In

Our main drive to increase the number of our colleagues declaring their protected characteristics, Count me In, is to run throughout October.

The importance of sharing personal information will be cascaded from senior managers down to individual teams. There will be articles published on our Platform intranet pages, along with our On the Move publication. Complementing this will be a poster campaign across our estate.

We are also building an App which will allow operational colleagues to enter their details directly, without the need to go via their line manager or call the HR Services phoneline. All operational colleagues will be sent a link directly asking them to share their details, removing barriers to them sharing their details with us whilst also explaining the importance of doing so.

Our Pay Gap Action Plan

We are shortly due to publish our Pay Gap report Action Plan. This action plan sets out how we will increase the representation of women, Black, Asian and minority ethnic, and disabled colleagues across the organisation, particularly in more senior roles.

We will provide an update to the Panel at the November meeting and go into the interventions that will run up to 2025 as we look to reduce our pay gaps.

An Engaged, Motivated and Healthy Workforce

Further embedding our Hybrid Working

Whilst our transition to hybrid working concluded on the 31 March, we continue to ensure that we make this way of working as effective as possible for our colleagues and the organisation.

Starting on the 14 July, we introduced further Hybrid Working training sessions for our colleagues to enrol on. These sessions involved guidance on setting up meeting room technology so that other attendees can log on virtually, hybrid meeting etiquette and how to co-author documents live. These sessions are being held both virtually and in person across our estate.

Viewpoint 2022

On 26 September we will be launching our annual employee engagement survey,

Viewpoint. This will run for four weeks and will allow us to measure our employee engagement, inclusion and wellbeing.

This year we will again be carrying out a paperless survey to help increase the response rate in operational areas. A campaign to promote the survey began at the end of August to help build momentum ahead of the survey going live.

Ahead of the survey, we are hosting confidentiality sessions for our colleagues to sign up to. These aim to provide reassurance that information provided will remain anonymous.This is to provide confidence so that colleagues can provide accurate information for us to act upon. These sessions will be held virtually and take place at different times to allow for operational colleagues working shifts to take part.

As in previous years, we will reach out to Board and Panel members around December to share these results with you in detail and talk through any key changes from previous years.

Employee Engagement – You Said We did

Ahead of the 2022 survey, across the business we are currently highlighting to our employees action which has been taken from last year's survey results via our 'You said, we did' process. This seeks to demonstrate to our employees that their input into this survey does generate real change, with the aim of driving a higher response rate with the 2022 survey.

An example of this includes one of the main themes to come out of Viewpoint around communication and engagement. Open and honest communication were highlighted in London Underground customer operations, in response to this we established a new monthly Customer Service Manager call, line engagement sessions, listening sessions and regular calls with the Area Managers.

Our City Planning function have actively promoted diversity & inclusion through a series of departmental listening sessions which have focused on issues around race, inclusion and more recently on specific topics such as mental health, neurodiversity and domestic abuse. This has been accompanied by including "diversity moments" at the start of key meetings and forums, where we reflect on issues that might be significant for our colleagues (e.g. faith festivals, celebrations of key moments, reflections on how we have handled or supported a particular issue in the workplace) and promote the work of SNGs.

Across Network Management, two key themes were identified from last year's survey results and acted upon, communication and development. The team have developed a new SharePoint site providing information for colleagues on health, safety and wellbeing, personal and career development, inclusion, job opportunities and a calendar of events of interest for our people. They have also established regular development seminars to improve awareness and competence in subjects including unconscious bias, time management and interview guidance.

Embedding our new approach to Talent

Following on from our colleagues' end of year conversations with their line managers, we have conducted a review of our first year using our employee-led Readiness talent

model, new Performance Ratings and my Journey (the underpinning Performance & Development portal). This lessons learnt exercise will drive further improvements, helping us embed the employee led, inclusive and integrated approach to talent and performance.

The myJourney tool is where our end of year performance ratings are captured following discussions with line managers. Through the lessons learnt, we have reviewed the engagement of employees and managers in capturing new ratings on myJourney, alongside qualitative feedback on how well the new ratings have been understood and used by the business. myJourney also captures if colleagues are looking to strengthen in role, stretch or move, and we are already looking at how this data will be used to inform career agility & development initiatives.

The next steps are to further embed the MyJourney tool and the new talent approach throughout the year, helping our colleagues have better quality performance conversations, capture achievements and feedback, develop talent and enable career development.

Update on mydiscounts

mydiscounts was launched at the end of March 2022 and so far nearly c16,000 employees are using the new discounts platform, hosted by Reward Gateway, with more joining each day. Employees feedback was key to establishing the requirements for the procurement of the new mydiscounts, and this has really paid off in the success of the scheme. In little more than four months after launch, employees have spent over £4.7 million, with total saving of c£330k, (average of c.8% on each purchase). The next stage of the campaign is promoting the app, particularly in operational areas, ensuring that everyone can make the most of mydiscounts.

Cycle to Work Day

On the 5 August, we took part in the nationwide Cycle to Work Day initiative, providing colleagues who are able to do so the perfect opportunity to start exploring the benefits and possibilities of cycling in London.

Regular exercise can boost mental health, reduce stress, improve your mood, productivity and sleep quality. It also has the benefit of making a cleaner choice for London's air quality - so it's a good choice for our colleagues and a more sustainable choice for London.

Online cycle safety schemes were available to our colleagues to help mitigate any safety concerns. We also continue to offer our colleagues the Cycle to Work scheme, allowing colleagues to hire cycles and cycling equipment to further encourage this active mode of travel.

Participants complete three unpaid work placements within Transport for London's offices, stations and across the GLA. They will have the opportunity to gain accredited and practical qualifications such as 'Work Skills', so they'll feel more confident and prepared to find work post programme.

SiW is delivered in partnership with Shaw Trust who provide all aspects of training and guidance for both participants and their placement hosts.

Our Graduate & Apprentice schemes update

We have completed assessment centres for the next intake of graduates and apprentices with offers having been extended to 60 Apprentices across 16 schemes, 11 Year in industry interns across four schemes and 51 Graduates across nine schemes. A full breakdown will be provided in the next report following their induction next week.

We have also concluded the re-tender for 17 apprenticeships commencing in September. The retender aimed to increase the quality of apprentice training provision by placing a greater emphasises on diversity and inclusion, embedding of sustainability into apprentice training, awarding longer contracts to improve supplier relationship, innovation and continuous improvement.

Steps into Work

On 5 September we also welcomed our latest Steps into Work (SiW) cohort into the organisation. SiW is a 12-month programme offering neurodivergent participants the chance to gain skills and work experience.

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Safety, Sustainabiliy and Human Resources Panel

Date: **14 September 2022**

Item: **Members' Suggestions for Future Agenda Discussions**

This paper will be considered in public

1 Summary

1.1 This paper presents the current forward programme for the Panel and explains how this is put together. Members are invited to suggest additional future discussion items.

2 Recommendation

2.1 **The Panel is asked to note the forward programme and invited to raise any suggestions for future discussion items.**

3 Forward Plan Development

3.1 The Board and its Committees and Panels have forward plans. The content of the plans arise from a number of sources:

(a) Standing items for each meeting: Minutes; Matters Arising and Actions List; and any regular quarterly reports. For this Panel these are the Health, Safety and Environment Quarterly Report and the Human Resources Quarterly Report.

(b) Regular items which are for review and approval or noting such as the Health, Safety and Environment Annual Report.

(c) Items requested by Members: The Deputy Chair of TfL and the Chair of this Panel will regularly review the forward plan and may suggest items. Other items will arise out of actions from previous meetings (including meetings of the Board or other Committees and Panels) and any issues suggested under this agenda item.

4 Current Plan

4.1 The current plan is attached as Appendix 1. Like all plans, it is a snapshot in time and items may be added, removed or deferred to a later date.

List of appendices to this report:

Appendix 1: Safety, Sustainability and Human Resources Panel Plan.

List of Background Papers:

None

Contact Officer: Howard Carter, General Counsel
Email: HowardCarter@tfl.gov.uk

Safety, Sustainability and Human Resources Panel Forward Planner 2022/23 Appendix 1

Membership: Dr Lynn Sloman MBE (Chair), Dr Nina Skorupska CBE (Vice Chair), Kay Carberry CBE, Bronwen Handyside, Dr Mee Ling Ng OBE, Mark Phillips and Marie Pye.

Abbreviations: CCSO (Chief Customer and Strategy Officer), CFO (Chief Finance Officer), COO (Chief Operating Officer), CPO (Chief People Officer), CSHEO (Chief Safety, Health and Environment Officer), D (Director), DIT (Diversity, Inclusion & Talent), DCP (Director, City Planning), Director of Risk and Assurance (DRA), CDD (Commercial Development Director)

16 November 2022		
Safety, Health and Environment Quarterly Report (to include resilience, assurance and compliance issues)	CSHEO	Standing item
Safety, Health and Environment Assurance Report	DRA	Standing Item
Vision Zero Update	DCP	To note
Air Quality Update	DCP	To note
Human Resources Quarterly Report	CPO	Standing item
Pay Gap Action Plan	CPO	To note
Leadership at TfL	CPO	To note
Improvement Plan for Enterprise Risk 1 Failure to prevent Safety, Health or Environment incident / meet commitments	CSHEO	To note
Enterprise Risk Update - Inability to Support New Ways of Working (ER10)	CPO	To note

22 February 2023		
Safety, Health and Environment Quarterly Report (to include resilience, assurance and compliance issues)	CSHEO	Standing item
Safety, Health and Environment Assurance Report	DRA	Standing Item
CIRAS Presentation	CSHEO	To note
Bus Driver Facility Improvements	COO	To note (6 monthly standing item)
Pan-TfL Fatigue Management Programme	CSHEO	To note
Climate Change Adaptation Update	CSHEO	To note
Building Decarbonisation Update	CSHEO	To note
Responsible Procurement	CFO	To note
Human Resources Quarterly Report	CPO	Standing item
Our Colleague Strategy	CPO	To note

To be scheduled

- Action on Inclusion
- Rail Accident Investigation Branch Update
- Safety Risk Prioritisation
- Vision Zero Inequality Dashboard and Analysis
- Safety at Junctions Update
- Review of the Programme to Improve Safety for Women and Girls Travelling on the TfL Network
- Update on Tram Collision at Oaks Road, Croydon
- Report on Graduate and Apprentice Diversity

SSHRP Forward Planner 2022/23

Regular items

- SHE Quarterly Report – standing item
- HR Quarterly Report – standing item
- SHE Assurance Report – standing item
- Bus Driver Facility Improvements (every 6 months)
- People Plan Update
- Review of CIRAS Report and Themes – annual
- Vision Zero
- Enterprise Risk Updates

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