

# Formal Investigation Report – Passenger Fatality

## Waterloo Station – Bakerloo Line platform 3

26<sup>th</sup> May 2020

HSE Info Exchange Reference Number: 001082007

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Version Number	Date
2.0	16/12/2020

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## 1.0 Executive Summary

On Tuesday 26<sup>th</sup> May 2020, during a short period of delay in consequence of a signal failure, a male passenger (hereafter referred to as the Person Central to the Incident – PCI) alighted a train at Waterloo Bakerloo line northbound platform three at 10:09:56. The PCI stepped on to the platform, and immediately stumbled, falling back into the gap between the train and the platform edge. The PCI remained in the track environment, apparently unable to get back on to the platform. The train departed at 10:11:17, the train operator having not observed the PCI in the gap during the period stationary in the platform, unfortunately striking the PCI as the train left the platform. The incident had not been identified as having occurred at that time.

The next train to arrive into the platform at 10:12:28 did not see the PCI in the track area, and his presence was only detected at the point where the train was stopped having come in to contact with him and operating the train tripcock system. Immediate investigations identified a person under train incident, and appropriate emergency response protocols were enacted.

The Formal Incident Report (FIR) reviewed the station and train assets and found no defects that would have caused or contributed to the incident, and that all systems were working as per design. CCTV recorded the PCI at an earlier point in his journey at Elephant and Castle station, and it was noted that he was very unsteady on his feet. The FIR also assessed the actions of the train operators. It was identified that there was a very small window of opportunity (<5 seconds) for the initial train operator to observe the PCI falling, and that they would have been undertaking other activities (both routine and in relation to the signal failure delay) during this period and in dispatching the train. The PCI, situated low in the Platform Train Interface (PTI) gap, at the extreme of camera view and wearing dark clothing, would have blended in to the dark area between the train and the platform and been very difficult to identify. The FIR concluded that the train operator would have been unlikely to have seen the passenger under these circumstances.

The investigation also considered the actions of the second Train Operator. It was noted that they too were under degraded operating conditions due to the ongoing signal failure, and that the focus would have been on cab based equipment, the platform area and the distance from the stopping position of the train. Combined with the passenger being static, in dark clothing against a dark background and in an area not in focus for the Train Operator, the FIR concluded that it was unlikely that the PCI would have been seen in the track area by the second Train Operator.

The FIR ultimately concluded that this was a tragic accident precipitated by a series of unique and specific events and circumstances. During the investigation, the FIR identified eight recommendations where it was felt that improvements could be made in general safety terms.

## 2.0 Preface

The purpose of the Formal Investigation is to determine the causes of the incident and to identify any measures necessary to prevent a reoccurrence. The investigation is not to establish blame or liability.

## 3.0 Terms of Reference

The investigation should:

- Establish the sequence of events that led to the incident.
- Identify why the incident occurred in terms of immediate cause, causal factors and root causes.
- Identify any actions already underway to address the root causes.
- Develop reasonably practicable recommendations to address the root causes.
- Consider previous or similar incidents and the response followed.

The investigation should pay particular attention to:

- The operational response to the Incident – including initial staff response, communication between Train Operator and service control and discharge of traction current.
- Understand how the CCTV/visibility was used operationally both regarding the driver, platform staff and control room
- The condition of the station and train assets and any affect these may have had on the incident.
- Platform management in respect to the Platform Train Interface (PTI) risk
- Highlight gaps in safety arrangements leading, contributing or relating to the incident.
- Consider the impact of COVID-19 on the network operations in relation to customer numbers and staff deployment.

## 4.0 Summary of Incident

Time	10:10
Date	26 <sup>th</sup> May 2020.
Organisations involved and their business units /departments	Bakerloo Line Operations, London Underground
Location	Waterloo station – Bakerloo line northbound platform 3.
What Happened	A person fell backwards in to the gap between train 210 and the platform edge. Train 210 then departed the station with the person still on the track and struck them. The subsequent train in to the platform (214) did not observe the person and struck them.
Consequences	Passenger fatality.
Incident Report Number	001082007, 001081873
Enforcement Authority Involvement	British Transport Police (BTP), Office of Rail and Road (ORR) and Rail Accident Investigation Branch (RAIB) investigations.

## 5.0 Location of the Incident

The incident occurred on the northbound Bakerloo line platform at Waterloo station [Figure 1].

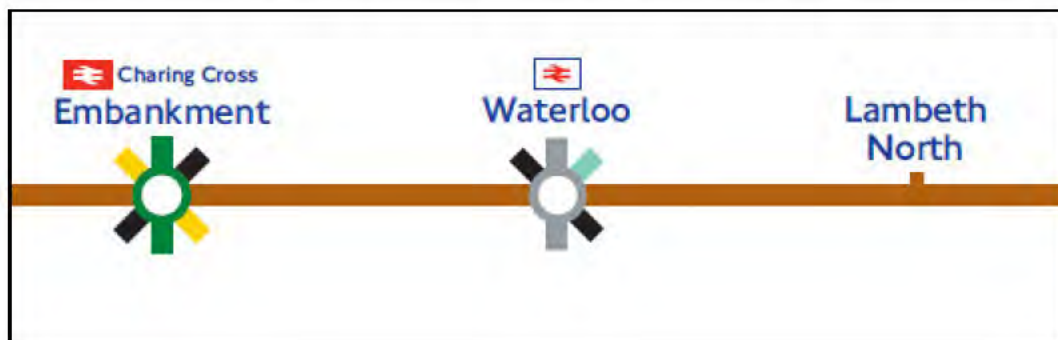


Figure 1 – Waterloo station location.



The view from each end of the platform and the curvature is shown in figures 2 and 3.



Figure 2 - North end (front) looking south (to rear).



Figure 3 – South end (rear) looking north (to front).

The incident itself took place between the two sets of double doors in car four. This is approximately 59m from the headwall of the platform.

There were no staff members present on the platform at the time of the incident. Whilst staffing levels on the station were reduced in line with COVID related restrictions and customer numbers, it is worthy of note that in normal operating circumstances no staff would be scheduled to be on the platform at that time.

## 6.0 Weather and Environmental Conditions

The incident location is an underground tunnel section platform area of the railway, and as such has no adverse weather.

The platform is lit by 5-foot twin 58-watt lighting tubes, which are ceiling mounted along the line of the PTI for the full length of the platform. This can be observed in figures 2 and 3. There were no lighting defects at the time of the incident.

The platform surface had been checked prior to start of passenger traffic and no defects were recorded. It was further checked post incident and there were no slip or trip hazards identified.

## 7.0 Pre-Incident Details

On the morning of the incident, an ongoing signal failure in advance of Waterloo station was causing delays to the service. Train 210 berthed in platform 3 at Waterloo at 10:07 and was, as a result of the delays further up the line, held in the platform for over four minutes. The platform starting signal (A332) would under normal circumstances clear upon the approach of a train, but on this occasion remained at danger. The train operator, having been advised of delays, made appropriate announcements to advise the customers. When the signal was cleared, the train operator made a further announcement, performed his pre-departure checks (see section 11.4.3) and departed the station with caution, as he was aware of another train in front.

The following train (train 214) was also delayed. This train was held at the signal prior to entering the platform (A326), in the single bore tunnel 158.1 metres to the rear of the start of the platform. The train operator of this train was able to see the rear of train 210 which was berthed in the platform, and on seeing it depart waited for a green signal and proceeded into the platform.

The position of trains just prior to the incident is shown in Figure 4.

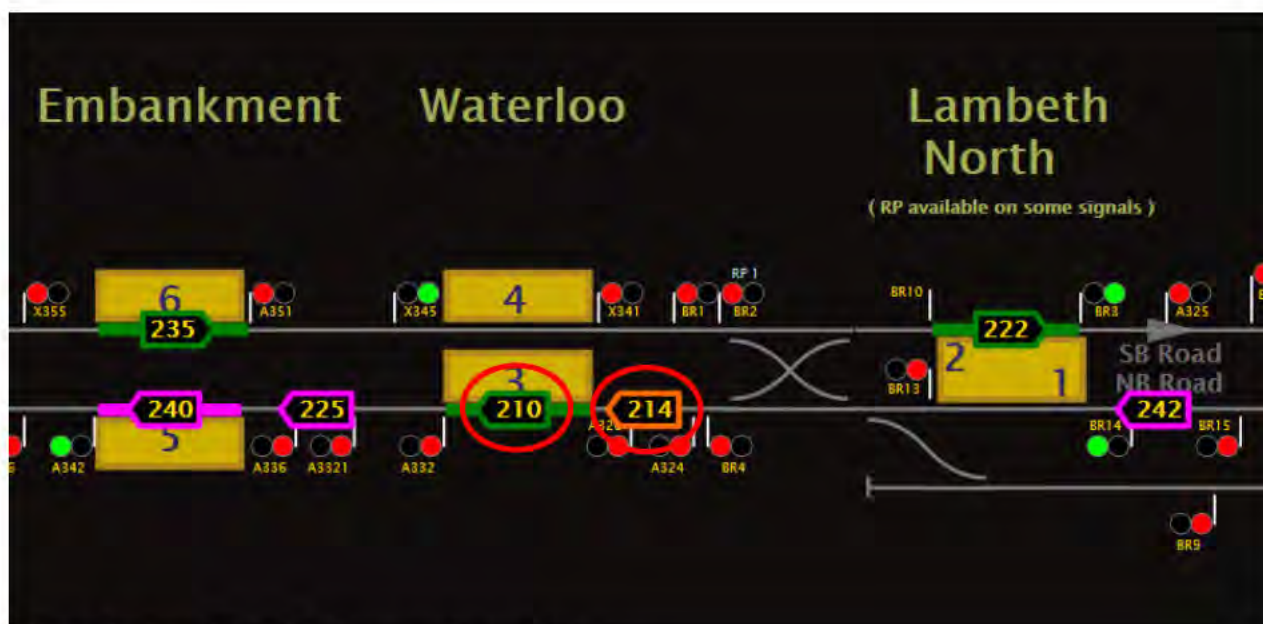


Figure 4 – Location of trains prior to incident.

## 8.0 Incident Timeline

**Note:** All timings are approximate, and are compiled from station CCTV, incident reports and other statements and accounts.

- 09:59:19      PCI seen colliding into platform wall whilst walking along at Elephant & Castle platform 4 after alighting T225.
- 09:59:48      PCI seen walking along platform 4 unsteady on his feet. Interacts with station cleaners.
- 10:01:00      PCI seen after crossing onto Bakerloo Line platform 3 and boarding NB T210.
- 10:07:00      T210 enters Waterloo NB platform 3, berths and doors open.
- 10:09:56      PCI alights T210 (4th car, second set of double doors).
- 10:09:59      PCI loses balance, falls backwards towards T210 and falls into the gap between the train and the platform.
- 10:10:05      PCI begins unsuccessful attempts to get out of the gap between T210 and the platform. PCI is primarily below platform level.
- 10:11:08      Doors of T210 begin to close. PCI still in situ between train and platform.
- 10:11:14      Doors of T210 closed and train departs. PCI still in situ.
- 10:11:30      Last car of T210 leaves, PCI still on the track, dragged approximately 13m from start point.

- 10:12:28 T214 enters Waterloo NB platform 3.
- 10:12:44 T214 comes to a stop, one car length past the PCI position. It appears this is in consequence of the train being 'tripped'.

- 10:15 Report from customer of smoke under train.
- 10:16:50 Customer Services Supervisor arrives on platform. Person under train confirmed.

## 9.0 Incident Management and Recovery

Once the nature of the incident had been established, all appropriate actions in line with the 'Person Under Train Impulse Card' were undertaken. Impulse Cards are aide-memoires issued to operational staff to be used in incidents, detailing the immediate key and secondary actions to be undertaken.

### Timeline

- 10:18 Traction current discharged Elephant & Castle – Embankment northbound and Embankment – Elephant & Castle southbound.
- 10:23 BTP and Network Incident Response Manager on site.
- 10:24 Train operator of train 214 brought up from incident area after train secured.
- 10:28 Short Circuiting Devices (SCD) confirmed laid at both ends of the train (front device in place at 10:22)
- 10:29 London Ambulance Service and London Fire Brigade on site.
- 10:35 London Underground Emergency Response Unit on site.
- 10:38 Declared non-suspicious and non-deliberate by BTP Force Control Room London.
- 10:55 PCI extracted from track area.
- 10:58 SCDs removed.
- 11:03 Traction current recharged to move stalled train from the platform.
- 11:23 Traction current discharged.
- 11:31 PCI taken to designated room.

- 11:35 Traction current recharged. Trains running through area but not stopping while affected area of platform is cleaned.
- 11:49 Cleaning complete. Platforms reopened to customers.

## 10.0 Immediate Actions Taken

### 10.1 Train Operators.

The train operator of train 210 remained unaware of the incident. The train was held at Embankment; a relieving train operator met the train and drove it to Queens Park where the original train operator was met by a Duty Manager. [REDACTED]

[REDACTED]

### 10.2 Incident Trains.

Both incident trains were sent to Stonebridge Park depot and were quarantined at the request of the RAIB.

### 10.3 Pre-opening checks.

Prior to the reopening of the station, the Customer Services Manager on duty arranged for a walk test of the PTI and a check of the One Person Operation (OPO) equipment, as well as the platform surface. No defects were identified.

### 10.4 BTP, ORR and RAIB

BTP were advised via two routes from the London Underground Control Centre (LUCC), direct to the Network Incident Response Team (NIRT) at 10:20, and direct to the BTP Force Control Room London at 10:21. Both the NIRT and other patrol officers attended.

The ORR was advised by the Network Operations Tactical Manager (NOTM) shortly after the incident as per standard reporting protocols and did not deploy.

The RAIB was advised by the NOTM shortly after the incident. Two Inspectors deployed to site to review CCTV and requested that the incident trains be quarantined pending inspection. The Inspectors further attended Stonebridge Park depot later in the day and released the trains back for use.

## 11.0 Areas, Subjects and Assets Investigated

### 11.1 Rolling stock.

Both incident trains were checked and prepared for service, with no performance affecting defects recorded prior to the start of service on the incident day.

Both incident trains were taken out of service and ran empty to Stonebridge Park depot. There were no reports of defective equipment, and the trains were inspected and cleaned before being returned to service.

The FIR does not consider the operation of the rolling stock to be a factor in this incident.

### 11.2 Lighting.

The lighting on the platform was checked post incident with no defects identified. The over platform lighting consists of 5-foot twin 58-watt lighting tubes, which are ceiling mounted along the line of the PTI for the full length of the platform. These were tested as part of the investigation and found to emit the required lux levels.

The FIR does not consider lighting to be a factor in this incident.

### 11.3 Station Operations.

This section restricts itself to activities related to this incident.

#### 11.3.1 Pre-start checks



Before start of traffic, the station is subject to a series of pre start checks. Included in this are visual checks of OPO monitors, lighting and platform infrastructure. There were no faults identified or reported in relation to the lighting or platform surface in the incident area on the morning of the incident.

The OPO monitors were checked. The checks on the OPO equipment on the Bakerloo line consist of looking at the monitors, checking that they are working and that the image is clear, and the overlap marker line is clearly visible in each monitor visual provided. On the day of the incident the checks were carried out and recorded at 04:55hrs and there was no defect/fault found. There was also no defect reported by any of the train operators that had gone through before the time of the incident. It is not a function of this check to ascertain visibility along the length of the platform, as the overlap markers are positioned in relation to previous alignment checks. This check is performed via an access door in the headwall of the platform, not from the Train Operator's position as there is no train available prior to passenger service commencing.

The methods used to perform the OPO pre-start checks were examined. It became evident that there are different methods of checking the OPO monitors, with some local practices being used. Anecdotal accounts suggest that similar arrangements exist in other locations.

### 11.3.2 Staffing

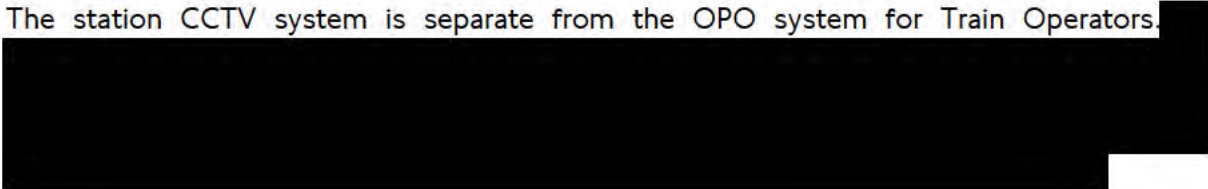
On a normal day during the pre-COVID period, there would have been 27 members of staff on duty to provide optimum customer service capability. On the day of the incident, the station was operating a COVID roster which meant the station was operating with 13 staff members. This is more than the minimum requirement. Staff members were deployed carrying out gate line duties on the three gate lines and in public areas giving information to customers.



During normal operating circumstances, there would be no staff deployed on any platforms at the time of the incident, and this was also the situation in regard to the COVID-19 working arrangements.

### 11.3.3 Station CCTV

The station CCTV system is separate from the OPO system for Train Operators.



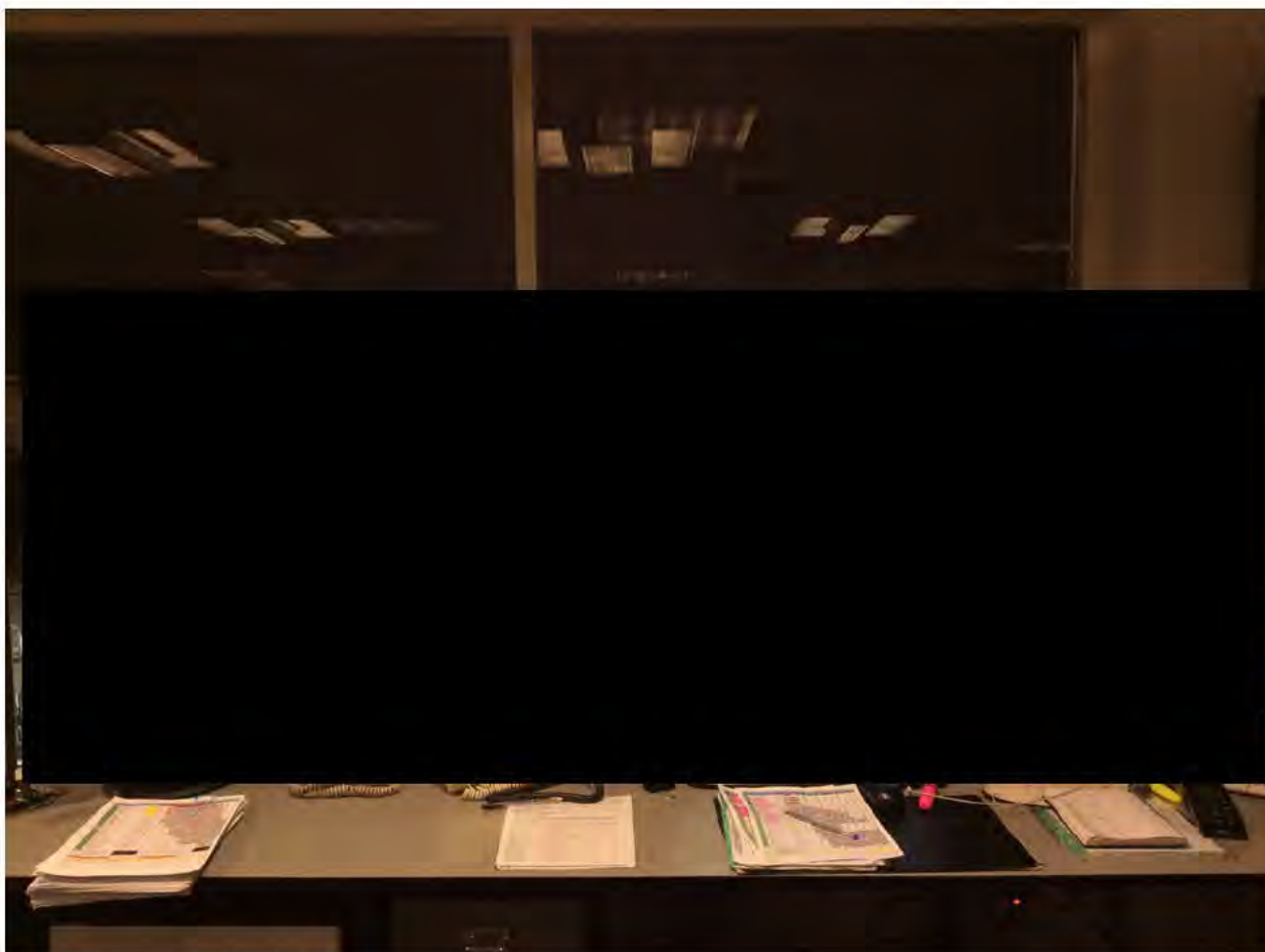


Figure 5 – Waterloo Station Control Room CCTV Monitors

The primary purpose of the station CCTV system is to be used to monitor reported incidents and other known issues, rather than to detect them. Camera views are monitored as part of a range of duties from the Station Control Room. In consequence, the CCTV system is regularly monitored, but not consistently monitored. Whilst incidents can be detected via the CCTV system, the number of cameras makes this difficult to reliably monitor.

#### 11.3.4 Station Incident Response

The response to the incident was prompt and effective, and in line with the 'person under train impulse card' guidance. No issues were identified in any debrief documentation, and the reduced staffing levels as a result of COVID restrictions did not affect the response.

#### 11.4 Train Operations

For the FIR panel to gain a greater understanding of the situational and spatial awareness of the overall area and of that experienced by the Train Operators, a simulation exercise was arranged. In this, a train was stabled in the platform as it would have been at the time of the incident, allowing for a range of investigative routes to be explored.

#### 11.4.1 Incident site.

The area where the PCI initially fell was inspected. [REDACTED]

When a bogie rail vehicle negotiates curved track, the centre of the vehicle will be displaced on the inside of the curve by an amount known as the 'centre throw'. This in turn means that on the outside of a curve the displacement occurs towards the inside of the curve, creating a larger gap. This is the case at the incident site in this case. The opposite of this occurs at the ends of the bogie rail vehicle and is known as 'end throw'. To mitigate this where passengers are crossing the PTI from platform to train or vice-versa, there are painted warnings on the platform, and the platform edge and track bed are painted to increase visibility, with some under platform lighting installed. There are also station and train announcements played.

The height of the platform edge to the track bed was measured as 58cm. From the images and observations obtained in the simulation exercise in comparison to station CCTV, it seems that the PCI remained sitting or kneeling whilst in the PTI gap.

#### 11.4.2 OPO Equipment and Train Operator View.

Platform based OPO systems are utilised on London Underground lines as one of a number of measures designed to mitigate the risk to passengers during train door closure and dispatch. OPO systems provide the train operator with a visual means of observing the PTI and make judgements of when to close the train doors and depart safely.

[REDACTED]

[REDACTED]

The CSE-SCS-ST0002 standard does not cover any Human Factors or detailed performance requirements for the monitors. The standard does require a minimum displayed image height of 45mm for a person 1.83m height when standing on the PTI corridor. It does not have any requirements for conspicuity or viewing angle required for the train operator. There was never any requirement for delivering un-obscured views of the PTI, and this is reflected by all OPO systems that were delivered during this time.

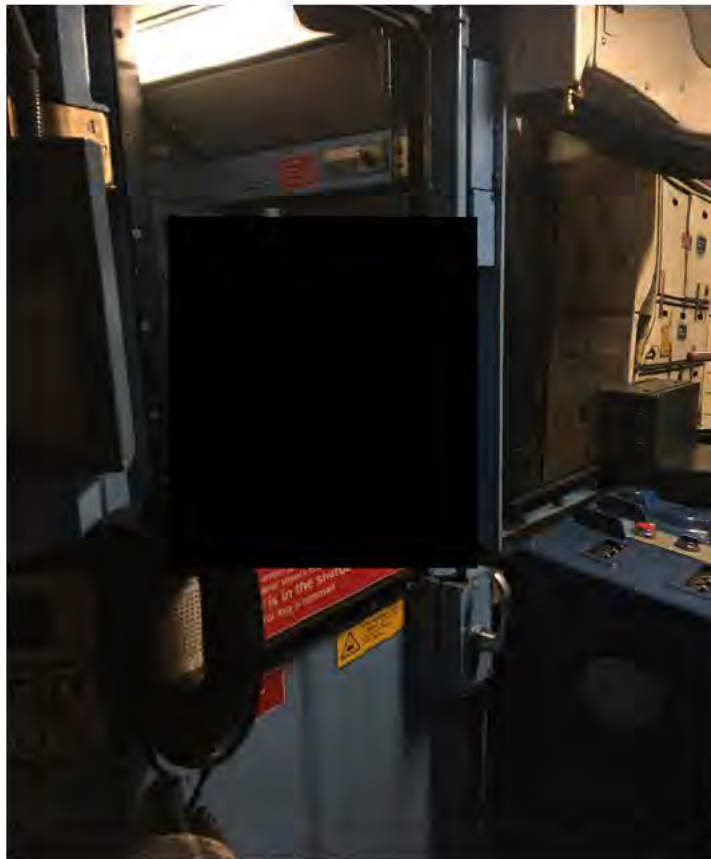


Figure 6 – View of OPO Monitor Array from Driving Position

The current LU Category 1 Standard SI150; Telecommunications – OPO CCTV, section 3.1 (general requirements) states:

*'The train operator or staff in the Operational Control Centre (OCC) undertaking controller assisted dispatch duties shall have a clear view of the PTI Corridor which includes the Critical Area of the PTI for train dispatch, whilst customers remain behind the yellow line'.*

*The definition of 'PTI Corridor' in the definitions section of the same document is described as 'a corridor parallel to the train body skin, including any gap between train and platform and not less than 100mm into the train profile measured at platform level. The height of the PTI Corridor shall be two (2) metres from the platform to cover the height of door aperture of the rolling stock when berthed in the platform'.*

The document further described the Critical Area of the PTI as *'The Critical Area of the PTI includes the white line, any gap between the platform and the train and a minimum of 100mm of the train measured at platform level. Therefore, its width will vary depending on the curvature of the platform'.*

Additionally, LU Guidance document G150; Telecommunications – OPO CCTV, gives guidance on the area of interest:

*'To provide an accurate image of the platform, the train operator or the OCC staff undertaking controller assisted dispatch duties should be presented with images containing:*

- a) a clear view of the PTI Corridor and
- b) the Critical Area of the PTI
- c) the coverage of the defined PTI Corridor of not less than:
  - i) for 5, 6, 7 and 8 camera solutions, (3 and 4 images per display) 1300mm;
  - ii) for 2, 3, and 4 camera solutions, (2 images per display) 1500mm;In width parallel to the train body skin, of the platform and the gap;
- d) visibility of all the door apertures
- e) the nosing stone and the tactile strip
- f) The clear view of all Passenger Edge (Screen) Doors (PED) and PED indicators’.

Both the previous and current standards shown have included a definition of PTI that is broadly similar and does not extend below the platform level; “the area where the platform and train interface, which is normally accessible to passengers”.

The FIR understands that there is not normally a requirement to bring equipment or installations up to a current standard unless it is done through a project or programme environment. This does not preclude upgrading, but the standards are there to support best practice for new delivery and as such it is expected that the operating business will request projects to bring things up to an improved state on the basis that there is a business need or it is required for the safety case.

In this location, the OPO system does provide a full view of the length of the platform and has been checked that a person is visible in a ‘walk test’ where (standing) they can be viewed at all points of the PTI corridor.



Once the train operator has departed the station by as little as 1m, the monitor array is no longer visible.

The cameras are positioned so that the limit of each camera range is overlapped by the next camera. Consistency is achieved (in this case) through painted ‘overlap markers’ on the platform, which are checked daily by station staff by viewing the monitors to ensure alignment is correct. This check had been performed on the day of the incident.

Part of the simulation was to ascertain the actual view of the train operator of train 210 at the time of the incident.

However, the FIR understands that monitoring the PTI is focussed on the movement of passengers across the PTI from platform to train and vice-versa. It is anomalies in this movement that are observed by the Train Operator, and reactions of passengers surrounding a PTI incident at the pre-departure stage. The FIR noted that the standards and guidance are focussed on the PTI at platform level and above. There does not appear to be any requirement to monitor the sub-platform void.

A mannequin was placed in to the PTI at the incident location. It was not physically possible to position the mannequin as low as the PCI was and as such was more prominent, but the resulting image can be seen in Figure 8, which compares the view of the walk test and with just the mannequin *in situ*. The person performing the walk test is, on each occasion, standing on the overlap marker on the platform. It became apparent that, despite the overlap being achieved between cameras 4 and 5, the close view of camera 5 was beyond the incident location at the extreme of view of the previous camera.

The FIR accepted that, if the purpose of the OPO equipment is to monitor the transition across the PTI above platform level for a person of a defined height, then it was by the letter of that definition fit for purpose. However, the FIR noted that the white line had been breached (from station CCTV), and this was not clearly visible at the extremes of the OPO camera view. It is strongly felt that there is the opportunity to go beyond this definition to encompass a wider scope and improve the views to include wherever possible enhanced views of higher risk features such as large PTI gaps.

1

2

3

Figure 7 – OPO Monitor Array Layout

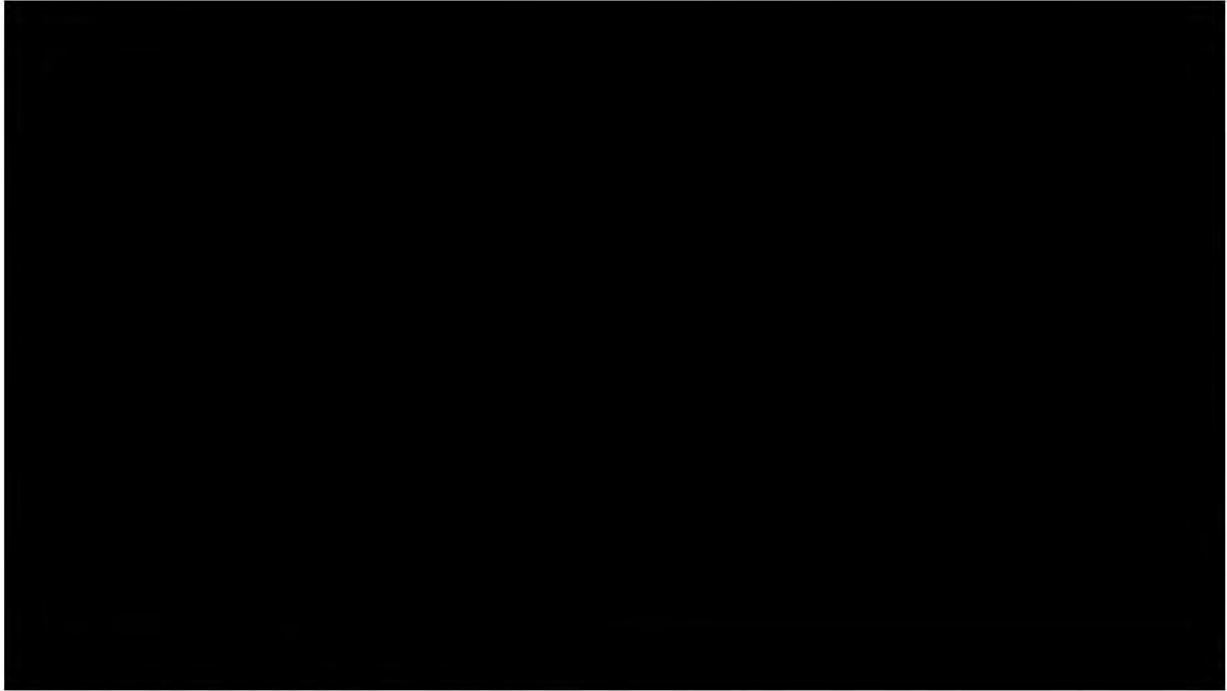


Figure 8 – Comparison of walk test and simulation

#### 11.4.3 Train operator Procedures and PTI Management

The Train Operator's actions for despatching the train appear in London Underground Rule Book 8 'Managing the Platform Train Interface'. Section 3.5 (despatching the train) states:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

In the account taken from the Train Operator of train 210, there are multiple references to an acute knowledge of this procedure, and of having carried it out at several locations. The FIR finds no evidence to suggest that it was not carried out on this occasion.

#### 11.4.4 Physical PTI Condition

The physical state of the PTI was examined. All required markings (white painted platform edge, yellow line and 'mind the gap' text) were present and in good condition. It was noted that under platform lighting was present. The lighting seemed to have little effect and was present in conjunction with painted track bed markings, which were in poor condition [Figure 9]. Whilst not connected to this incident, the FIR questioned the effectiveness, purpose and process of installation of the under platform lighting and track bed marking. No risk assessment was found for these markings, but it was noted that they are in place on other curved platforms.

In regard to the track bed marking, further investigation found that there appears to be no standard for installation (for quality, materials, purpose or triggers for installation), and no ownership for maintenance.



Figure 9 – PTI Track Bed Markings.

## 11.5 PTI Risk Management

The TfL Safety, Health and Environment (SHE) Directorate have provided the following to describe the management structure of risk assessment in relation to PTI risk:

*The risk arising from the PTI on the northbound platform at Waterloo is assessed and managed through the following processes:*

### a) The LU Quantified Risk Assessment (QRA)

*The LU QRA is a high-level summary of risk across the network on a line basis. The QRA for PTI was last completed in 2017 and consists of a number of components:*

- *Fall into the gap between the train and platform*
- *Caught in the train doors or platform edge doors*
- *Customer on the platform struck by train*
- *Customer dragged by train*
- *Fall from platform onto track (no train in platform)*

*It assesses the risk of customer PTI fatalities across LU as 1.95 occurrences per year and on the Bakerloo line as one occurrence every 9 years.*

*The QRA outlines the generic controls in place across the network which contribute to the management of PTI risk. It does not provide the granularity for the local management to identify and manage customer PTI risks on their line; this is provided through the Customer Risk Assessment process.*

### Customer Risk Assessments

#### b) *Waterloo station (all platforms)*

*This risk assessment was last completed on 6 September 2018; it assessed the risk to customers on the Jubilee, Northern, Waterloo and City and Bakerloo line platforms. It assessed the likelihood of a passenger falling into the gap between the train and the platform as a Medium risk the with control measures in place being 71-80% effective. The reason for this being that all specified controls were in place and working on the station but a joined-up approach and plan with Line Operations needed to be fully effective.*

#### c) *Bakerloo line (whole line)*

*This risk assessment was last completed on the 25<sup>th</sup> September 2018; it assessed the risk to passengers across all Bakerloo line platforms. It assessed the likelihood of a customer falling into the gap between the train and the platform as high risk with the control measures in place being 95% effective. No further actions are identified on the risk assessment to reduce this risk which would be expected if a risk is identified as high.*

#### *d) PTI – Safety and Performance Reporting*

*Providing a PTI incident is reported through the Electronic Incident Report Process (EIRF) as per TfL Standard S5557 – Incident Reporting and Investigation, it is recorded on the TfL 'InfoExchange' system.*

*There are seven categories of PTI incidents, 4 of which are considered to be high risk:*

- Falls from platform*
- Caught in doors with a potential for dragging / Dragging*
- Falls down the gap*
- Contact between person and moving train*

*Note: the remaining three categories of PTI incidents are considered to have lower potential to cause injury or fatality, and are recorded and monitored, but are less significant.*

*All PTI incidents are communicated within LU through the following channels:*

- Weekly 'Visualisation meetings'*
- SHE period reports*
- Quarterly SHE Performance Reports*

#### *e) PTI Strategy*

*In 2016 LU implemented a 3-year PTI strategy which was updated in 2018. This strategy is reviewed every year with the next review being due by August 2020. This has been delayed as a result of the COVID-19 pandemic. These reviews are documented and the goal of this is to review progress against the Three Year Plan PTI Strategy and review the actions identified in that document, update the work that is currently being undertaken within London Underground to reduce the customer risk associated with the PTI and outline the improvements that can be made to our equipment, governance and processes to achieve a year on year reduction in the number of PTI incidents and zero life changing or fatal PTI incidents.*

*The overall objectives of the last review (undertaken in August 2019) were to:*

- ensure existing PTI mitigations are robust and adequate*
- update the governance structure for PTI risk for LU to reflect organisational restructuring to ensure the risk was managed and a clear vision and strategy is in place for managing PTI risk*
- review and updated the costed timetable plan for making improvements to PTI management and allow LU to achieve the targeted level of zero fatalities and life changing*

*injuries and 10% fewer customer injuries at the PTI in three years from the date of the Three-Year Plan document being published*

- *continue to raise the profile of the hazards at the PTI by engaging employees and customers with the overall aim to reduce the risks*
- *review whether new projects and strategies do consider PTI risk at each stage of project or asset development*
- *ensure knowledge continues to be shared across TfL and the industry to develop best practice*

*f) Network PTI Group*

*The Network PTI Group meets quarterly to capture work and best practice on other lines. These meeting are attended by the line PTI Group Chairs (or deputies) and chaired by the Head of Line Operations Safety Lead. The Head of Line Operations Safety Lead will also own the Network PTI plan identifying all network and line PTI initiatives. The Network PTI Group is the forum for the line PTI chairs to share knowledge and best practice from their lines, receive an update on network initiatives from the Chair, provide an update on individual line initiatives (as detailed in the Network PTI plan), and will also allow Line PTI Chairs to gain support and advice for funding innovation and improvements.*

*g) PTI Working Groups*

*Each London Underground line has a PTI working group, attended by line Senior Managers, Managers, Trade Union Health & Safety Representatives and the SHE Team. The purpose of the working groups is to provide a forum for exchange of information on PTI issues between Health and Safety Representatives, Managers and other stakeholders from across the organisation and to identify key issues and appropriate action to improve safety and reduce risk at the PTI. Where items are identified that cannot be addressed at a line level they are raised at the Network PTI Group.*

The FIR appreciated that there is a complex system of integrated systems to consider and mitigate risk in PTI management. The panel made several points which it felt required attention:

- It was understood that TfL has a cadre of safety professionals who can be turned to in order to obtain information. However, if they were not immediately available or information was required outside office hours, it was noted that the system available to find individual risk assessments was somewhat disjointed, and it was difficult or not possible to obtain required information using the systems available, for example, when using the LU WoCRA (Workplace and Customer Risk Assessment) database. Other systems may be available, but cannot be specified as they are not obviously apparent to a non-subject matter expert.
- It was observed that, as stated above, some CRAs are reliant on the actions of another to be effective. It was not necessarily clear in an individual CRA that this was the case; i.e. that one would need to consult a different CRA (and which one) alongside the one being

studied to obtain the full picture. Furthermore, it was not clear on what assurance processes are in place to ensure that integration between CRAs occurred.

- A review of the applicable CRAs for this location was undertaken. It was observed that the generic nature of the risk assessment for a station could mean that multiple platforms with different physical and customer behavioural characteristics would be included under one encompassing assessment, and that elements of a specific platform based mitigation measure would/may not be reflected to a reader of an overall risk assessments for the station. The panel understands that the Rail Safety and Standards Board (RSSB) advocates platform specific risk assessment for the UK rail industry.

There were discussions around if there should have been specific COVID related risk assessments completed, as in normal situations there would have been an increased public presence that may have raised the alarm earlier. However, it was identified that the risk assessment in existence should cover all eventualities and furthermore, similar conditions exist at the extremes of the day, so would be encompassed by the assessment in place.

It was considered if there were any concessions against standards for this platform – after investigation no concessions were identified.

#### 11.6 Potential Improvements.

A number of possible ways to improve the view of the PTI were discussed. It was identified that two main avenues of work had already been undertaken and were ongoing.

##### 11.6.1 The 'GAPS' Programme

The Getting Active about PTI Safety (GAPS) Programme was formed to reduce the risk of incidents at the Platform Train Interface (PTI) and is addressing obscured /oblique camera views on the priority platforms for the Bakerloo, Central & Victoria (BCV) and Jubilee, Northern & Piccadilly (JNP) Lines.

A part of this programme includes the GAPS Obscured Views Project (OVP). The objective of the GAPS OVP is to improve the train operators' view of the PTI at each of the priority platforms by minimising the obscured OPO camera views to As Low As Reasonably Practicable (ALARP).

Following a review of the PTI and associated Track to Train CCTV and OPO camera systems with the Line PTI groups a significant number of platforms were identified where a clear view of the PTI is at least partially obscured and/or obstructed by passengers waiting to board the next train or entering or exiting the platform. These platforms were risk assessed to provide a priority list.

The GAPS OVP is addressing these issues raised by obscured view by amending the OPO CCTV camera systems which include the implementation of new OPO CCTV camera solutions, the addition of new cameras or the relocation of existing cameras. Each solution is tailored to the specific requirement of that platform and is agreed with the Line PTI group prior to implementation. In addition, the GAPS OVP has also relocated platform furniture, signage and yellow lines and platform end barriers have been painted yellow to provide greater contrast with customers crossing the PTI.

Waterloo platform 3 was identified as being within the scope of this project. The priority for which tranche a platform was placed in was based on a risk assessment methodology laid out defined in the GAPS Video Report. The platforms were then divided into tranches of works as this made it more manageable for both the GAPS project team and for the contractors. The tranches of work were large enough to give economies of scale and small enough to manage effectively. The project moved away from strict priority order as bunching the platforms together into geographical locations drove efficiencies and gave some cost savings. As an example, if a contractor was awarded a platform at Stratford, such as Central line platform 6 which was defined as a high priority (number 8 on the priority list), they were also awarded all the platforms at Stratford. Waterloo platform 3 is in the next tranche of works (tranche 4) since it is ranked 28 on the priority list. Waterloo platform 4 will also be included in this tranche as part of this package, despite being assessed as number 75 in priority order. This methodology was agreed locally at the Line PTI groups and with Health and Safety Trade Union representatives.

Tranche 1 is complete and Tranche 2 & 3 are due for completion in later 2020. The Northern Line Tranche 1 is currently in the design phase.

As stated, the purpose of this project is to improve obstructed views. The FIR accepts that there may have been improvements had the work been undertaken prior to the incident, but as it was not the purpose of the work to improve views of the sub-platform void, it is not possible to assess if a tangible difference would have been achieved. However, the panel feels that, in conjunction with other potential options, this incident should form part of the considerations of any work planned.

#### 11.6.2 The Platform Train Interface Strategy

As detailed in section 11.5 (e), this ongoing process reviews the actions identified in the original document developed in 2016 and update and improve where possible. It is a high-level process, driving the work of the different level PTI Steering Groups, as well as the GAPS project. In the strategy document, there are a range of potential improvement options (primarily under appendix 'A', focussed on PTI solutions for upgrade work on sub-surface lines) and the current status of each option.

#### 11.7 Training

The FIR considered the training given to Train Operators in relation to their responsibilities under London Underground Rule Book 8, as detailed in section 11.4.3 of this report. It is clear from the actions of the train operators, knowledge displayed and a review of the Competence Management System records that the fundamental elements are known and checked on a periodic basis. The FIR is satisfied that train operator training addresses the requirements of this Rule Book section.

It was noted that the local management team had identified this platform as being of increased risk and had issued awareness guidance in 2018/2019. The management team have reissued this guidance to Bakerloo line Train Operators.

Following on from previous FIRs (Notting Hill Gate 31/01/18 and Newbury Park 17/05/19), a recommendation to provide additional training and guidance in 'scanning' OPO monitors. The

panel is aware that work is ongoing in this area but has made an observation in relation to timescales of deployment.

## 12.0 Human Factors

### 12.1 Train Operator of train 210

#### 12.1.1 Train Operator History



#### 12.1.2 Health, Wellbeing and Fatigue.

In the post-incident interview, the Train Operator stated that they were fit and healthy when booking on for duty, and no concerns were identified.

The working hours of the Train Operator were reviewed. On the incident day, their duty started at 08:17, with the incident occurring within two hours of this. On the day before, their duty was from 07:40 to 15:40, and in the two week period prior to that the train operator was on leave for over two weeks.

The FIR does not believe that fatigue for this Train Operator was a factor in this incident.

#### 12.1.3 Ergonomics, Equipment and Job Requirements

In undertaking the despatch procedure under normal operating conditions, there are three items of equipment to check:

- [Redacted]
- [Redacted]
- [Redacted]

The FIR reviewed the actions that a train operator is required to complete and the location of the equipment to be checked. The assets are spread over a wide viewing area, meaning the individual has to physically turn their head and focus on each asset in turn using their foveal (or central) vision.

**Note:** The foveal system of the human eye is the only part of the retina that permits 100% visual acuity. The line of sight is a virtual line connecting the fovea with a fixation point in the outside world. In terms of visual acuity, foveal vision may be defined as vision using the part of the retina in which a visual acuity of at least 20/20 is attained. Vision within the fovea is generally called 'central vision', while vision outside of the fovea is called peripheral, or indirect vision. Peripheral vision is more sensitive to movement.

Under normal operating circumstances, that is without service delays, the FIR believes that a significant proportion of the much shorter dwell time would involve viewing the OPO monitors, but even then the wide view of equipment to review would make continuity of view impractical. Under the degraded operating circumstances experienced, the extended period in the platform would increase the tasks to be undertaken by the Train Operator. This would include monitoring of radio traffic, making of PA announcements and checking of the starting signal periodically which would make continuous surveying of the monitors, due to the nature of the tasks, impossible. There is no defined requirement to continuously survey the monitors.

When these factors are combined with the limited view afforded to the Train Operator (which would have shown minimal movement to be picked up with the peripheral vision) it is understandable in this instance that the Train Operator would not have detected the presence of the PCI.

## 12.2 Train Operator of train 214

### 12.2.1 Train Operator History.



### 12.2.2 Health, Wellbeing and Fatigue.

In the post-incident interview (which occurred the following day as the Train Operator was sent home due to distress) the Train Operator did not mention any detrimental issues prior to the start of duty on the incident day.

The working hours of the Train Operator were reviewed. On the incident day, their duty started at 07:27, with the incident occurring within three hours of this. On the day before, their duty was from 07:17 to 15:12 This was preceded by three rest days. Three duties of similar timings and duration were performed on the days prior to that.

The FIR does not believe that fatigue for this Train Operator was a factor in this incident.

### 12.2.3 Ergonomics, Equipment and Job Requirements.

As previously stated, the Train Operator of train 214 was held at the signal to the rear of Waterloo platform 3. On obtaining a clear signal, they accelerated in to the platform area. In

the Train Operator's statement, they identify that their attention was on the platform, the speed of the train and the stopping point of the train. As such, this would require focus on:

1. The platform area – to the upper right of the train operator view. It should be noted, that due to the curved platform, the full length of the platform would have to be repeatedly checked as more came into view.
2. The speed of the train. This is indicated on the console directly in front of the Train Operator and requires the Train Operator to look downwards to read it.
3. The stopping mark. Again, due to the curved platform, there is the need to repeatedly assess the position of the stopping mark in relation to the train.

These focal points create a need to change view between down-centre (close), upper right (mid-range) and upper centre-left (distant), all of which would leave the PCI in the periphery of vision. Without noticeable movement and with the PCI wearing dark clothing, the FIR believes it is unlikely that the presence of the PCI would have been identified in these circumstances.

### 12.3 Customer Behaviours

Review of station CCTV at Elephant and Castle station shows that the PCI was quite unstable in his gait. The reason for this remains unknown, but the FIR believes it to be a causal factor in relation to both the original fall and potentially the inability to extricate himself from the gap. The height from the track bed is 0.58m, suggesting that for whatever reason the PCI remained kneeling or sitting, the consequence of which made him less visible to the Train Operator.

In the interaction with the station cleaner, no request for assistance was made, only for directions.

### 12.4 Staff Interaction

It was noted that the PCI was observed by some staff members at Elephant and Castle station, but was not approached. A cleaning contractor offered assistance and took the PCI to a platform help point, but it was not used. The PCI repeatedly asked for 'East London' but did not request assistance at any point.

The FIR noted the following:

- Passengers being unsteady on their feet for a range of reasons, whilst not prevalent, are also not uncommon. It is impractical to intervene on every occasion, and methods to obtain assistance are available both on stations and trains.
- It is possible that, as the incident took place at the early stages on the pandemic, that COVID and distancing may have been a consideration in the lack of approach.
- The cleaning contractor's actions were in excess of their responsibilities and should be commended.

## 13.0 Similar Incidents

### 13.1 Previous LU Incidents

A review of previous Formal Investigation Reports and external safety reports identified the following incidents which had similar aspects to this incident:

#### 13.1.1. Clapham South, northbound Northern line platform; 12<sup>th</sup> March 2015.

A female passenger's coat became trapped in the train doors, resulting in her being dragged a short distance before falling between the train and the platform of the moving train. Whilst not immediately in view of the CCTV, once identified the Train Operator applied the emergency brake and stopped the train. The passenger was transferred to hospital and was discharged the same day with no life changing or life threatening injuries.

This incident, whilst a 'trap and drag' type example, is recorded here as there was an RAIB recommendation which stated (in part):

*London Underground should review the feasibility and effectiveness of measures to reduce risks associated with passengers being trapped in train doors and then dragged at the platform-train interface (PTI). The review should include measures already considered for all or part of the London Underground network, techniques already used by other railway operators, measures already considered by RSSB and measures made possible by the latest technology available when the review is undertaken. The review should include, but not be restricted to, consideration of:*

- *improving detection of objects trapped in train doors;*
- *improving the ability of passengers to pull out objects trapped in doors (including by improving door seal arrangements);*
- *improving train operator views of the PTI at despatch (eg increasing the number of CCTV cameras, repositioning cameras and providing larger monitors);*
- *enhancing the methods available to staff performing SATS duties when they need to alert train operators, or stop trains, in an emergency;*
- *using gap fillers or alternative means to reduce the gap between platforms and both moving and stationary trains;*
- *adapting platform markings to reduce passenger crowding close to trains/doors; and raising passenger awareness of the safety risks associated with objects, fingers and hands becoming trapped in doors.*

The FIR considers that significant work has been undertaken to address the elements of the recommendation, and that it has been complied with. The items in bold (our emphasis), whilst previously addressed, are considered as being worthy of review.

### 13.1.2 Waterloo, southbound Bakerloo line platform; 20<sup>th</sup> September 2015.

A female passenger alighted a southbound Bakerloo line train, and moved away from the train towards the exit. The train doors closed, and within two seconds the passenger fell in to the gap between the train and the platform edge. The train departed and was brought to a stop five cars in to the tunnel by the activation of a passenger emergency alarm on the train. The passenger sustained fatal injuries.

It is notable that there are significant similarities between this previous incident and the current FIR:

- The passenger was unstable on their feet.
- They had fallen between the gap between the train and the platform.
- They were not observed in the sub-platform void by the Train Operator.

Similar underlying factors were identified, in that a small window of opportunity to observe the fall was available, and the passenger was wearing dark clothing, making them difficult to identify.

All recommendations were completed for this FIR.

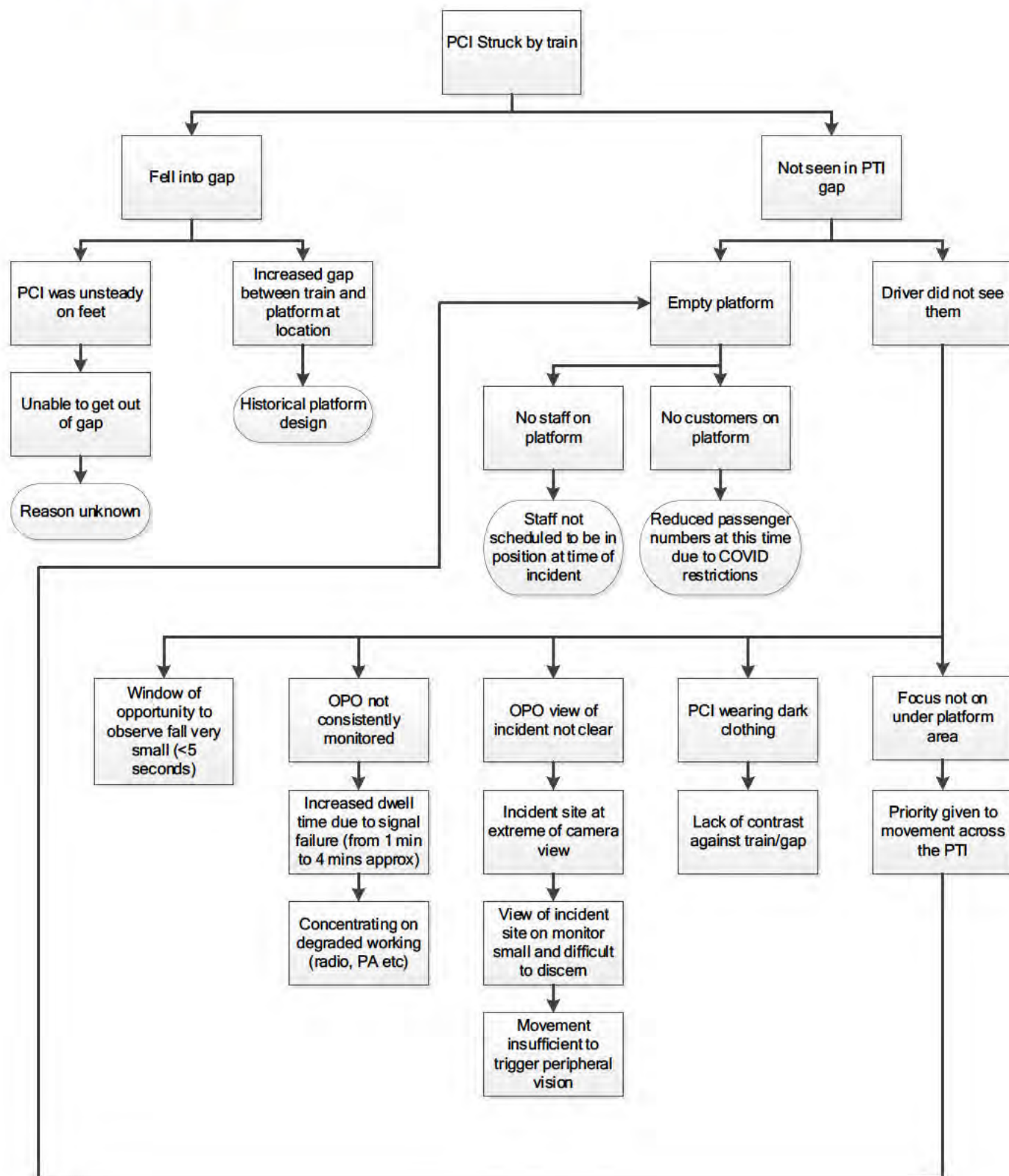
### 13.1.2 Reported Incidents

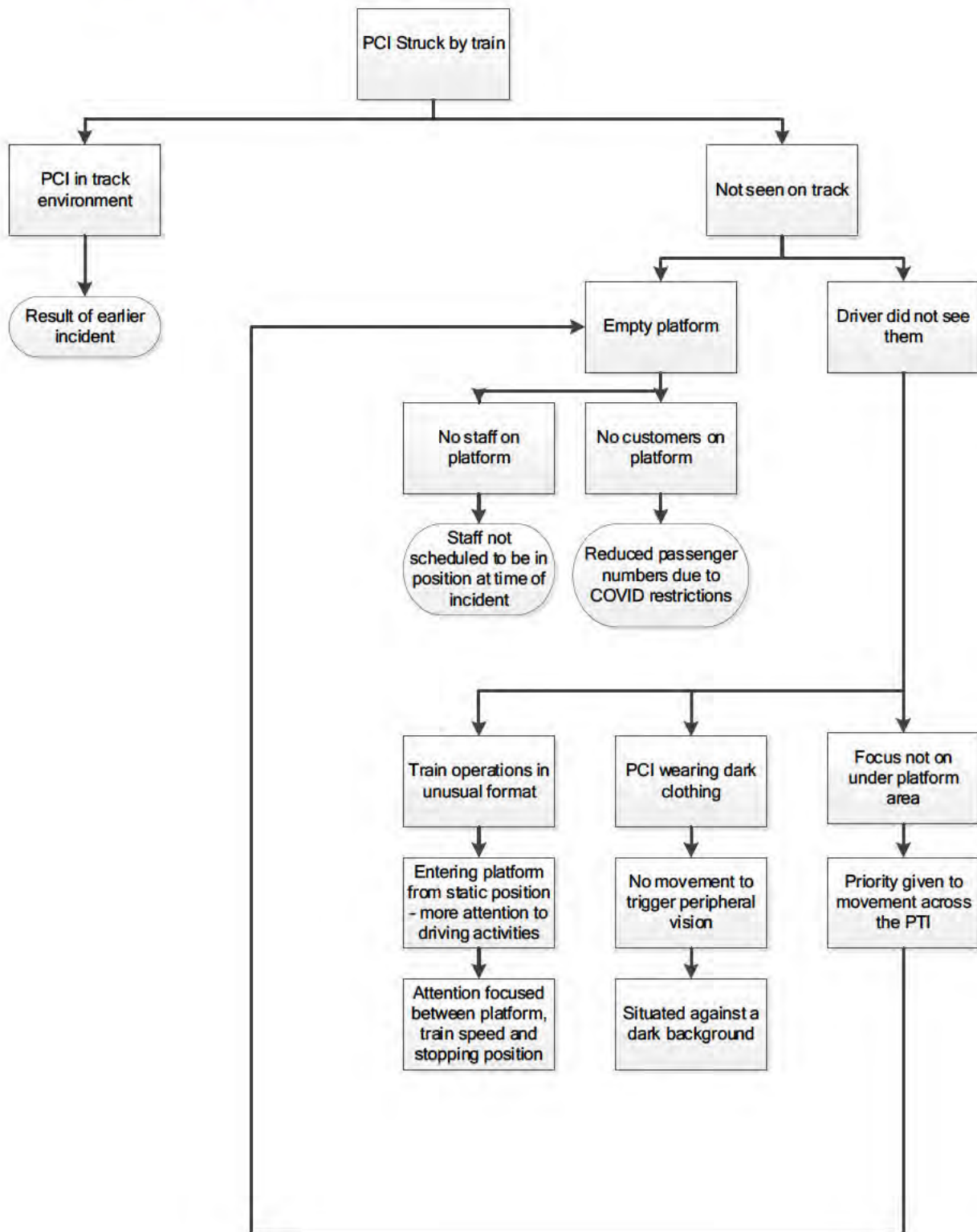
A review of reports in relation to 'fall into gap' incidents at Waterloo platform 3 between April 2017 and March 2020 was undertaken.

Year	Number of Occurrences	Severity
2017-18	6	3 x Minor 3 x No injury reported
2018-19	5	4 x Minor 1 x No injury reported
2019/20	4	4 x No injury reported

## 14.0 Root Cause Analysis

### 14.1 Train 210





## 15.0 Conclusions

This formal investigation identified that train 210 departed the platform with a male passenger in the gap between the train and the platform. The train had been delayed by a signal failure and it was during this delay with the train held in the platform that the passenger disembarked from the train.

On leaving the train, the passenger stumbled backwards and fell into the gap. He remained in that location and after 75 seconds, the train departed striking the passenger as it moved.

On a review of station CCTV, the passenger had been observed walking very unsteadily at Elephant and Castle station. Contract cleaning staff interacted with him, but no assistance was sought other than directions. The reason for the passenger's unsteadiness is not known but may be a contributing factor as to why he was unable to extricate himself from the gap, as the distance from the track bed is 0.58m. However, there are other speculative reasons which could have exacerbated this, such as sustaining an injury in his fall, or being caught on sub-platform train equipment.

The FIR considered if any station or train assets contributed to the incident. It concluded that all assets were fit for purpose, fully maintained and with no defects that would have contributed to the incident. However, it was identified that in relation to the OPO cameras, the reason that system was fit for purpose is because the defined purpose does not take situations like this incident into account. The OPO equipment does fulfil the requirement to monitor passenger movement across the PTI, but it does not address the (albeit newer) need to be able to effectively observe the PTI corridor. The equipment is capable of seeing a person standing on the platform, but it is very difficult to see a smaller area of someone in an unexpected location, even if the white line has been broken.

The FIR also considered why the train operator of train 210 departed the platform with a person in the gap between the train and the platform. The train was in the platform for an extended period (four minutes), with the passenger leaving the train and falling after nearly three minutes of that period. There is no requirement for the Train Operator to constantly observe the OPO monitors during the dwell time in the platform, and it is likely that the train operator would have been occupied with other tasks. It is possible that the passenger could have been observed when falling, but with the ratio of time taken to fall to the length of time in the platform being 1:50, it would be fortuitous. As can be seen from the image in figure 8, to identify someone primarily in the gap from that view is very difficult. The FIR concluded that the train operator of train 210 acted reasonably in the circumstances.

The train operator of train 214 actions were considered. It was accepted that the concentration on the focal points identified in their statement would make observation of the passenger in the track environment difficult. Combined with the dark clothing against a dark background, the FIR concluded that the Train Operator of train 214 acted reasonably in the circumstances.

In relation to the impact of COVID-19, it is unlikely that this is a factor. Although the platform was empty of other passengers to raise the alarm, a similar scenario could occur in normal circumstances at different times. No operational process or response would have been different in a non COVID-19 scenario.

In summary, the FIR concludes that a series of unique and specific events resulted in a tragic and unforeseen accident. Whilst it is accepted that improvements in the OPO system may have assisted, it is equally possible that it would not as it would be a situation where those improvements may not

have covered this particular unknown. It is only with the data acquired from this incident can strategy be informed better going forward.

## 15.1 Immediate Causes

### 15.1.1 Train 210

- The PCI fell into the gap between the train and the platform, and the train departed from the platform striking him.

### 15.1.2 Train 214

- The PCI was struck by a train whilst in the track environment subsequent to the initial incident.

## 15.2 Causal Factors

### 15.2.1 Train 210

- The PCI was unsteady on his feet and was unable to get back out of the gap.
- A gap existed between the train and the platform.
- The Train Operator did not observe the PCI during his pre-departure checks.
- The platform was empty of customers to assist or raise the alarm.

### 15.2.2 Train 214

- The PCI was in the track environment.
- The Train Operator did not observe them.

## 15.3 Underlying Factors

### 15.3.1 Train 210

- The window of opportunity to observe the PCI falling was small (<5 seconds)
- The OPO monitors were unlikely to be consistently monitored over the extended dwell time in the platform due to a signal failure, and the train operator would be engaged in other tasks.
- The OPO view afforded to the train operator was not clear as it was at the extreme distant view of the camera range.

- The PCI was wearing dark clothing and was difficult to see in the sub-platform void and against the dark paint of the train.
- The focus of the Train Operator would likely be on the act of crossing the PTI from platform to train and vice versa.

#### 15.3.2 Train 214

- Alert not raised due to absence of staff or passengers on platform.
- Train operation was in non-routine format, requiring more attention to driving duties.
- The PCI was wearing dark clothing against a dark background.
- Train Operator focus on PTI above platform.

## 16.0 Observations

Whilst the FIR did not identify any factors which would have definitively prevented the accident, it did find areas in which it is believed that safety performance can potentially be improved as part of the investigation.

### 16.1 Drugs and Alcohol Post Incident Testing (from section 10.1).

It was noted that no post incident testing was carried out on the driver of the second train. There is no inference of any concern regarding the Train Operator, as it is accepted that the driver was sent home in a state of distress and had also been in the presence of a Police Officer with no concerns raised while a statement was taken. The wording around the necessity of this testing is unclear. TfL reference document R2692 A2 0 - Alcohol and drugs at work information for managers and employees – states that employees 'may be subject to alcohol and drugs testing following any incident which caused or had the potential to cause death or major injury, or substantial damage to property', giving some latitude in the matter. Another document, TfL HSE Bulletin no.19 in 2018 - Drug and Alcohol testing following an Incident - states that testing 'should be done as soon as possible after every dangerous operational incident'. It goes on to say that that 'all managers are reminded that in the event of a dangerous incident, all relevant members of staff and contractor staff involved in the incident are required to be post incident tested as per TfL requirements. The panel observed that the instructions and guidance in this area are inconsistent and should be properly clarified and aligned. It was also noted that updates and review of existing material, such as the 'Managing Essentials' training documentation and other learning media, should be reviewed and updated in a collaborative approach between SHE and Human Resources (as the policy owner) to ensure currency and consistency. Recommendation 1.

## 16.2 Rolling Stock Livery (from section 11.1).

During the simulation exercise, it was identified that the dark blue paint at the bottom of the train was a barrier to identifying a person in the PTI gap, particularly if they were in dark clothing. It was accepted that to repaint trains is a significant endeavour, and that whatever colour was selected could cause similar clashes, but it was noted that a lighter colour contrast could assist with identification of anything or anyone in the PTI, and should be a consideration when livery design is planned. This observation will be taken forward by the Chair, Head of 4LM Implementation & Operations Delivery.

## 16.3 Non-Standard OPO Pre-Start Checks (from section 11.3.1)

It was noted that local arrangements had been introduced in checking this equipment. It appears to vary across different lines, and across different locations. This can range from checking printed images for comparison with live feeds, to locally applied markers on OPO cabinets to align against the overlap markers. The panel felt that consistency in checks would be beneficial and should be reviewed and defined. Recommendation 2.

## 16.4 OPO Camera View Improvement (from section 11.4.2)

The FIR understands that the OPO system in strict terms achieves the purpose for which it was installed. However, it is felt that improvements can be made to enhance the far-distance view of cameras. It is accepted that the GAPS project improvements are not intended to address issues such as this incident, but once funding is secured for the next tranche of works this incident should be included to inform outputs from any work undertaken, especially in relation to views of high risk PTI zones. Recommendation 3.

## 16.5 Under-Platform Void Enhancements (from section 11.4.4)

Under-platform lighting and track bed paint enhancement is evident across the network, particularly in curved platform locations. Whilst it is understood that the general purpose of this is to draw attention to a hazard, there do not appear to be any standards, structure or maintenance regime for these installations. Without such processes in place, it is difficult to understand what triggers are for deployment, what the improvements achieve and if they continue to achieve them without maintenance. Recommendation 4.

## 16.6 PTI Risk Assessments (from section 11.5)

Several issues were identified around the risk assessment process for the PTI.

### 16.6.1 Accessibility of Risk Assessments.

The interconnected nature of several components required to give the overall picture were difficult to locate in some cases. As part of ongoing transitional work to a new recording system, the repositories in which the risk assessments currently sit should be reviewed to ensure all risk assessments are captured correctly and the locations communicated. Recommendation 5.

### 16.6.2 Cross Referencing of Risk Assessments.

It seems that some risk assessments should be read in conjunction with others to realise the full benefit. It would be advantageous to have a cross-referencing system in each risk assessment, identifying those which it compliments. **Recommendation 6.**

### 16.6.3 Suitable & Sufficient Assessments of PTI Risk

The generic nature of the risk assessments can cover a large range of platform types, and consideration should be given to incorporating platform specific risk assessments where additional risks are identified, cross referencing RSSB guidance where appropriate. **Recommendation 7.**

## 16.7 Improvements from PTI Strategy Review (from section 11.6)

The FIR notes that several previously identified mitigation options were considered and reviewed in the strategy report, some of which were not taken forward. Whilst there is no doubt that for this specific strategy review there would have been proportionate reasons for this, such as cost, effectiveness and scheduled upgrade plans, however, there is no rationale stated.

The FIR believes that, in light of this incident and changing timescales associated with planned improvement and advances in technological innovation, it is appropriate that a review of those potential options to mitigate risk around the PTI previously identified in the review is undertaken for this location.

This review should also revisit the previous potential options considered for the other high risk network locations, and if found to be not reasonably practical, the reasons should be documented. The findings of the review should be fed in to the Network PTI Group to inform decision making on a network wide basis. **Recommendation 8.**

## 16.8 'Scanning' Training Input (from section 11.7).

As stated, the FIR notes this work is ongoing following on from recommendations in two previous FIRs. It has been identified that clarity is required on where ownership of the scheme sits, and this may be causing delays to implementation. The Chair of this FIR will collaborate with the stakeholder areas and previous action owners to progress this work as appropriate.

It should be noted that this piece of work is intended to be an additional aid to train operators. The absence of this aid in no way has reduced or reduces the efficacy and fitness of current arrangements.

## 17.0 Recommendations

Recommendation I	
Linked to Observation 16.1	
Purpose	To clarify the requirements of, and update communications on, post-incident drug and alcohol testing.
Action	Review and reissue TfL HSE Bulletin no.19 in '2018 - Drug and Alcohol Testing Following an Incident' to align with the requirements of TfL reference document 'R2692 A2 0 - Alcohol and drugs at work information for managers and employees'. As it is accepted that testing will not always be practicable, included in this reissued bulletin should be the aspiration to perform testing 'whenever possible', as consistent with the reference document.
Action Owner	Delroy Douglas – Safety, Health and Environment Business Partner.
Action Target Date	Within 6 weeks of DRACCT Approval.
Validation	Distribution of updated bulletin.
Validator	Emma Burton – Senior Safety, Health and Environment Manager.
Validation Target Date	2 weeks after distribution of bulletin.

Recommendation 2	
Linked to Observation 16.3	
Purpose	To standardise the process of pre-start OPO system checks on the Bakerloo line and share output with Network PTI group for wider implementation.
Action	<p>(a) To review current procedures and establish fitness for purpose. Develop a consistent risk based approach and procedure for Bakerloo Line Station Staff when undertaking pre-start OPO checks, potentially by enhancing existing procedures. The updated procedure should seek to eliminate the need for site specific unauthorised solutions, considering compliance measuring mechanisms.</p> <p>(b) The outputs from this work should be shared with the Network PTI group to consider best practice opportunities.</p>
Action Owner	<p>(a) Dave Johnson – Train Operations Manager and Line PTI Lead</p> <p>(b) John Woodcock – Network PTI Chair</p>
Action Target Date	<p>(a) 12 weeks post DRACCT Approval.</p> <p>(b) 8 weeks post completion of part (a)</p>
Validation	<p>(a) Procedure updated and rolled out</p> <p>(b) Review of report and implementation plan.</p>
Validator	Dave Mead – Line Operations Modernisation Lead.
Validation Target Date	4 weeks after Action Target Date.

Recommendation 3	
Linked to Observation 16.4	
Purpose	<p>To utilise the existing GAPS project to enhance Train Operator OPO views at Platform 3 at Waterloo. The purpose of the GAPS project is to manage risks associated with obscured views (to note: obscured views were not a factor in this incident)</p> <p>It is accepted that the primary purpose of the GAPS project has other aims, and that this incident platform is scheduled for inclusion in the next tranche of works.</p>
Action	<p>The GAPS project team should:</p> <ul style="list-style-type: none"> <li>a) Reassess the priority status of this platform, either giving it 'standalone' status, or by prioritising the package of works that this platform resides in.</li> <li>b) Once funding has been approved, Identify and incorporate wherever possible solutions to improve clarity of view at the extreme distance of camera range in conjunction with the Network PTI Group.</li> </ul>
Action Owner	Jim Redmond - Operational Delivery Manager.
Action Target Date	<ul style="list-style-type: none"> <li>a) Within 13 weeks of DRACCT Approval.</li> <li>b) TBC once funding is approved and a project plan is in place.</li> </ul>
Validation	Review of updated GAPS project plan for this platform, ensuring considerations identified by this FIR are incorporated wherever possible.
Validator	Emma Burton – Safety, Health and Environment Senior Business Partner.
Validation Target Date	4 weeks after Action Target Date.

Recommendation 4	
Linked to Observation 16.5	
Purpose	On the Bakerloo line, gain an understanding of the reasons for under-platform lighting and track pit painting, what the aim of them is, and what maintenance regimes are in place to achieve those aims. This should be compared against arrangements on other lines and used to inform network-wide arrangements.
Action	Identify current under-platform mitigation arrangements, processes and standards, and role of LU Asset Operations in relation to maintenance regime of under-platform mitigation measures.  Liaise with the Network PTI Group, SHE and Engineering to develop system wide arrangements.
Action Owner	Dave Johnson – Train Operations Manager and Bakerloo line PTI Lead
Action Target Date	Within 16 weeks of DRACCT Approval.
Validation	Production of report of findings for PTI group review
Validator	Dave Mead – Line Operations Modernisation Lead
Validation Target Date	4 weeks following PTI group review.

Recommendation 5	
Linked to Observation 16.6.1	
Purpose	To make awareness and accessing of customer risk assessments as simple as possible for all users of the system.
Action	Review current customer risk assessment storage location, ensuring that the risk assessments are captured correctly. Particular attention should be given to advising users of the locations and methods of access. Consideration should be given to using a small group of operational staff to locate specific information to test the systems.
Action Owner	Vanessa Cates – Safety, Health and Environment Assurance Manager.
Action Target Date	16 Weeks following DRACCT approval.
Validation	Review of findings and actions
Validator	Emma Burton – SHE Senior Business Partner
Validation Target Date	4 weeks after report completion

Recommendation 6	
Linked to Observation 16.6.2	
Purpose	To increase awareness of when a risk assessment should be cross-referenced with another to obtain full understanding.
Action	<p>Review risk assessments, ensuring where possible that any that are cross-referenced to other relevant risk assessments are easily identifiable.</p> <p>Set the requirements and communicate to all risk assessors the need for cross-referenced risk assessments and that these are easily identifiable to ensure a full assessment of risk is undertaken.</p>
Action Owner	Vanessa Cates – Safety, Health and Environment Assurance Manager.
Action Target Date	16 Weeks following DRACCT approval.
Validation	Review of findings and actions
Validator	Emma Burton – Safety, Health and Environment Senior Business Partner.
Validation Target Date	4 weeks after report completion.

Recommendation 7	
Linked to Observation 16.6.3	
Purpose	To ensure that the SHE Management System enables suitable and sufficient assessment of the risks at the platform train interface and appropriate documentation of the controls, including ensuring that specific risks at locations are considered and recorded, along with the controls, in risk assessments where appropriate.
Action	<p>(a) Review the current LU risk assessment process for assessing PTI risks and documenting controls, considering RSSB guidance and any other good practice, to identify any required potential improvements to LU's approach to managing PTI risk. This should include consulting with other train operating companies for their experience of using the RSSB guidance / process in practice. This should also identify where it would be appropriate for location specific mitigation measures to be included in CRAs at high risk PTI platforms. This review should specifically consider how LU manages risks associated with situations where someone has fallen between the train and the platform (specifically the train operators' ability to identify and respond to these situations).</p> <p>(b) Finalise action plan of implementation of Recommendations from (a) review</p>
Action Owner	Phil Flint – Safety, Health and Environment Business Partner.
Action Target Date	<p>(a) 13 weeks following DRACCT approval.</p> <p>(b) To be confirmed post completion of (a)</p>
Validation	Review of findings and actions.
Validator	Nicola Perrins – Safety, Health and Environment Senior Business Partner.
Validation Target Date	4 weeks after report completion.

Recommendation 8	
Linked to Observation 16.7	
Purpose	To review possible solutions in relation to platforms with wide gaps.
Action	<p>(a) Incorporating Operations and Assets viewpoints, review and produce a report identifying possible engineering, process and staffing recommendations and controls, including options considered as part of the PTI Strategy review, particularly in relation to Platform 3 at Waterloo.</p> <p>(b) Take learnings to Network PTI group for wider implementation across the network, as appropriate.</p>
Action Owner(s)	<p>Dave Mead - Line Operation Modernisation Lead.</p> <p>Andrew Brice – Head of Profession; Permanent Way</p>
Action Target Date	10 weeks following DRACCT approval.
Validation	Review of report detailing options considered.
Validator(s)	Marian Kelly – Head of Safety, Health and Environment.
Validation Target Date	4 weeks after report completion.

## 18.0 Appendices

### 18.1 Formal Investigation Panel Members

Name	Title	Organisation
Pat Hansberry (Chair)	Head of 4LM Implementation & Operations Delivery	London Underground
Jeremy Wall (Lead Investigator)	Duty Operations Manager Engineering	London Underground
Jyoti Palit	Incident Investigations Manager	London Underground
Delroy Douglas	Safety, Health and Environment Business Partner	London Underground
David Johnson (line PTI champion)	Train Operations Manager	London Underground
Yousuf Rossi	Service Control Manager	London Underground
Jim Redmond	Operational Delivery Manager	London Underground
Gideon Smit	Communications Manager	London Underground
Bradley Kane	External Communications Manager	London Underground
Trevor Hardy	Technical Head - Telecommunications	London Underground
Anna Ponting	Senior Engineering Systems Performance and Integration – Human Factors Specialist.	London Underground

Cat Cray	Health & Safety Representative (Stations)	RMT
Anthony Leonard	Health & Safety Representative (Stations)	TSSA
Jim McDaid	Health & Safety Representative (Trains)	RMT
Jason Wyatt	Health & Safety Representative (Trains)	ASLEF

## 18.2 Persons Interviewed

Title	Organisation
Train Operator of train 210 – statement provided to the Bakerloo line Management Team	London Underground
Train Operator of train 214 – statement provided to the Bakerloo line Management Team	London Underground
Cleaning Contract Staff Member	ABM

### 18.3 Consultation – Non Panel Members

Title	Organisation
Maintenance Delivery Manager - Power & Electrical	London Underground
Engineering Support Manager - Fleet	London Underground
Network Incident Response Manager	London Underground
Senior Operating Officer	London Underground
SHE Senior Business Partner	London Underground

#### 18.4 Documentation

Title	Reference	Revision
LU Category 1 Standard: Telecommunications – OPO CCTV	SI 150	A2
Drug and Alcohol testing following an Incident	HSE Bulletin no 19 in 2018	-
Alcohol and drugs at work information for managers and employees	R2692	A2
Platform Train Interface Strategy Review 2018	-	August 2019 Review
London Underground Rule Book 8 – Managing the Platform Train Interface	January 2020	5.1
Incident Report Form	001082007	-
Incident Report Form	001081873	-
LUCC Daily Network Performance Report	-	26/05/20
LUCC SAFE Entry	Item 37	26/05/20
Person Under Train Impulse Card	V2	April 2016
Senior Operating Official Hot Debrief: Person Under Train -	-	26/05/20

Waterloo		
Competence Management System Report - Train Operator 210	-	Retrieved 27/05/20
Competence Management System Report - Train Operator 214	-	Retrieved 04/06/20
Holistic Report - Train Operator 210	-	Retrieved 02/06/20
Holistic Report - Train Operator 214	-	Retrieved 27/05/20
GAPS Project OPO CCTV Video Review Report	-	November 2017
Platform Train Interface Strategy Review 2018	Review 2	August 2019
London Underground Category 1 Standard: Lighting of London Underground Assets	SI066	A5
London Underground Category 1 Standard: Low Voltage Electrical Installations	SI069	A5
LU Guidance document: Telecommunications – OPO CCTV Systems	GI50	A2

## 19.0 Abbreviations and Glossary

BTP	British Transport Police
CCTV	Closed Circuit Television
CRA	Customer Risk Assessment
ERU	Emergency Response Unit (LU)
LU	London Underground
NIRT	Network Incident Response Team - consisting of a Network Incident Response Manager (LU) and a BTP Officer
OPO	One Person Operation
ORR	Office of Rail and Road
PCI	Person Central to Incident
PTI	Platform Train Interface
QRA	Quantified Risk Assessment
RAIB	Rail Accident Investigation Branch
RSSB	Rail Safety and Standards Board
SCD	Short Circuiting Device
SHE	Safety, Health & Environment (LU)