RAIB

Rail Accident Investigation Branch

# Rail Accident Report

## Track worker struck by a train at Stoats Nest Junction, near Purley
## 6 November 2018

Report 07/2019
July 2019

This investigation was carried out in accordance with:

- the Railway Safety Directive 2004/49/EC;
- the Railways and Transport Safety Act 2003; and
- the Railways (Accident Investigation and Reporting) Regulations 2005.



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# Preface

The purpose of a Rail Accident Investigation Branch (RAIB) investigation is to improve railway safety by preventing future railway accidents or by mitigating their consequences. It is not the purpose of such an investigation to establish blame or liability. Accordingly, it is inappropriate that RAIB reports should be used to assign fault or blame, or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The RAIB's findings are based on its own evaluation of the evidence that was available at the time of the investigation and are intended to explain what happened, and why, in a fair and unbiased manner.

Where the RAIB has described a factor as being linked to cause and the term is unqualified, this means that the RAIB has satisfied itself that the evidence supports both the presence of the factor and its direct relevance to the causation of the accident. However, where the RAIB is less confident about the existence of a factor, or its role in the causation of the accident, the RAIB will qualify its findings by use of words such as 'probable' or 'possible', as appropriate. Where there is more than one potential explanation the RAIB may describe one factor as being 'more' or 'less' likely than the other.

In some cases factors are described as 'underlying'. Such factors are also relevant to the causation of the accident but are associated with the underlying management arrangements or organisational issues (such as working culture). Where necessary, words such as 'probable' or 'possible' can also be used to qualify 'underlying factor'.

Use of the word 'probable' means that, although it is considered highly likely that the factor applied, some small element of uncertainty remains. Use of the word 'possible' means that, although there is some evidence that supports this factor, there remains a more significant degree of uncertainty.

An 'observation' is a safety issue discovered as part of the investigation that is not considered to be causal or underlying to the event being investigated, but does deserve scrutiny because of a perceived potential for safety learning.

The above terms are intended to assist readers' interpretation of the report, and to provide suitable explanations where uncertainty remains. The report should therefore be interpreted as the view of the RAIB, expressed with the sole purpose of improving railway safety.

Information about casualties is based on figures provided to the RAIB from various sources. Considerations of personal privacy may mean that not all of the actual effects of the event are recorded in the report. The RAIB recognises that sudden unexpected events can have both short and long term consequences for the physical and/or mental health of people who were involved, both directly and indirectly, in what happened.

The RAIB's investigation (including its scope, methods, conclusions and recommendations) is independent of any inquest or fatal accident inquiry, and all other investigations, including those carried out by the safety authority, police or railway industry.

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# Track worker struck by a train at Stoats Nest Junction, near Purley, 6 November 2018

## Contents

# Summary

At around 00:28 hrs on the morning of 6 November 2018, a passenger train from London Victoria to Three Bridges, travelling at about 69 mph (111 km/h), struck and fatally injured a track worker in the vicinity of Stoats Nest Junction, near Purley. The accident occurred after the track worker had placed equipment on the track as part of the arrangements for the protection of an engineering possession. Having placed the protection equipment, the track worker then walked along the track until he reached the end of the protected area, and continued walking with his back to rail traffic on an open line. He may have been going to look at some lineside equipment, and believed that no trains would approach on the line he was walking along. He was probably fatigued, and may have been distracted by personal issues linked to the fact that a second person, the possession support assistant who was supposed to be with the track worker, was not present as he had not attended for work that night.

Underlying factors associated with the accident were the nature of the work which exposed the track worker to risk while he was putting out protection for the possession; that the labour supplier's management processes had not sufficiently identified and addressed the risk of fatigue among zero hours contracted staff; and that the labour supplier's management processes had neither identified nor prevented staff absenting themselves from work without being detected.

The RAIB has made two recommendations and identified three learning points. One recommendation is addressed to Network Rail, to improve the way its labour suppliers manage the risks associated with the use of workers on zero hours contracts, in particular the management of their lifestyle and fatigue. The second recommendation is addressed to Vital Human Resources Ltd, the labour supplier, to commission an independent review of the actions it has taken following the accident at Stoats Nest Junction to assess their effectiveness in detecting and preventing the type of behaviour seen in the accident, and reduce the risks from fatigue. The RAIB has previously made recommendations about reducing the exposure of staff to risk while carrying out possession protection duties, and these are still being considered by the railway industry.

A learning point highlights the need for safety-critical staff to be aware that distraction caused by family issues or other employment may affect their fitness for duty. Other learning points highlight the importance of track workers being alert to the risks on the railway, even when they believe that they are working under protection, and the limitations of the railway industry's 'Sentinel' system if it is used for establishing the presence of staff on site.

# Introduction

## Key definitions

1 Metric units are used in this report, except when it is normal railway practice to give speeds and locations in imperial units. Where appropriate the equivalent metric value is also given.

2 The report contains abbreviations. These are explained in appendix A. Sources of evidence used in the investigation are listed in Appendix B.

# The accident

## Summary of the accident

3 At around 00:28 hrs on Tuesday 6 November 2018, train 1H72[1], the 00:02 hrs Southern service from London Victoria to Three Bridges, struck and fatally injured a track worker at Stoats Nest Junction, near Purley, Greater London (figure 1).

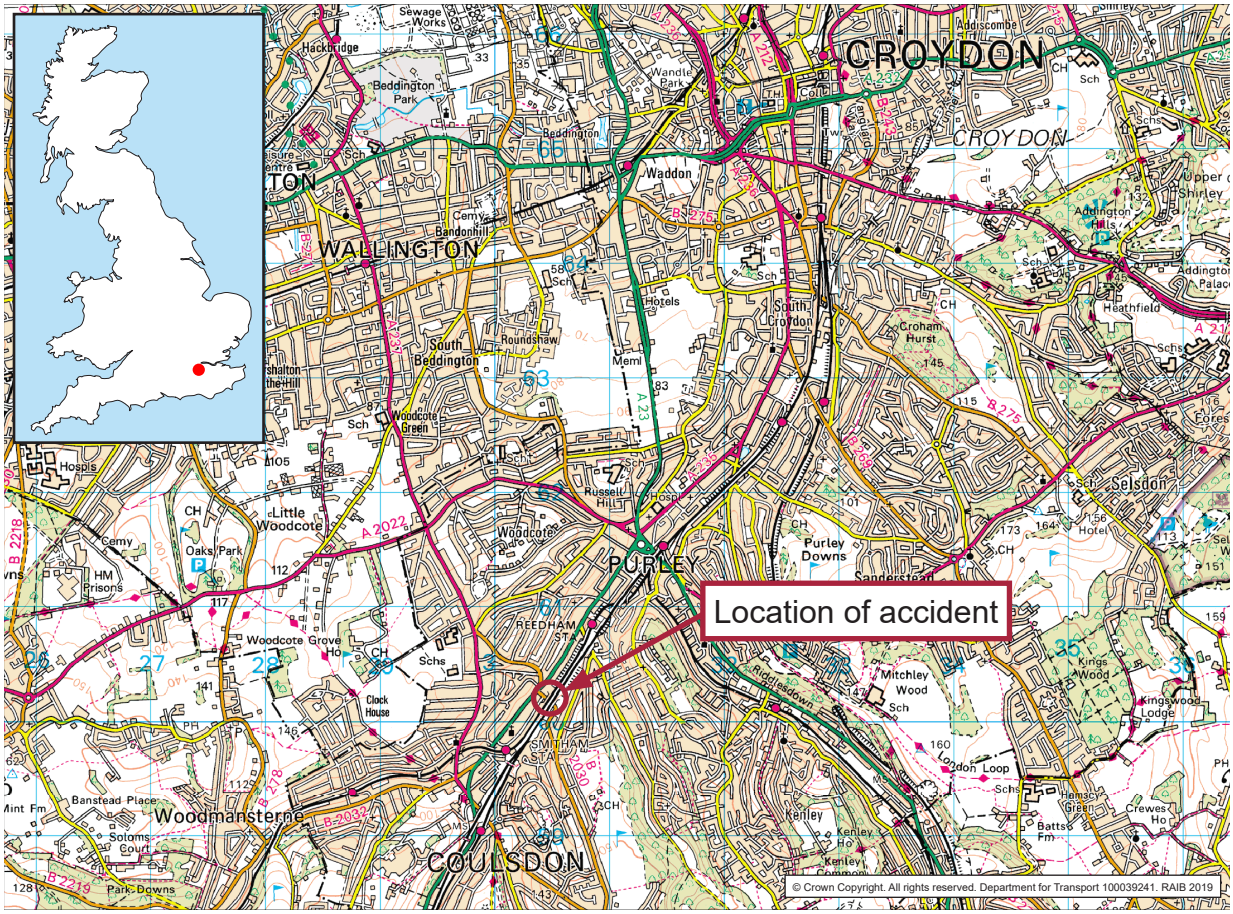


*Figure 1: Extract from Ordnance Survey map showing location of accident*

## Context

### Location

4 Stoats Nest Junction is located at the 14¼ milepost on the route between London Victoria and Brighton, approximately 3.5 miles (5.6 km) south of East Croydon (figure 1).

[1] An alphanumeric code, known as a 'train reporting number', is allocated to every train operating on Network Rail infrastructure.

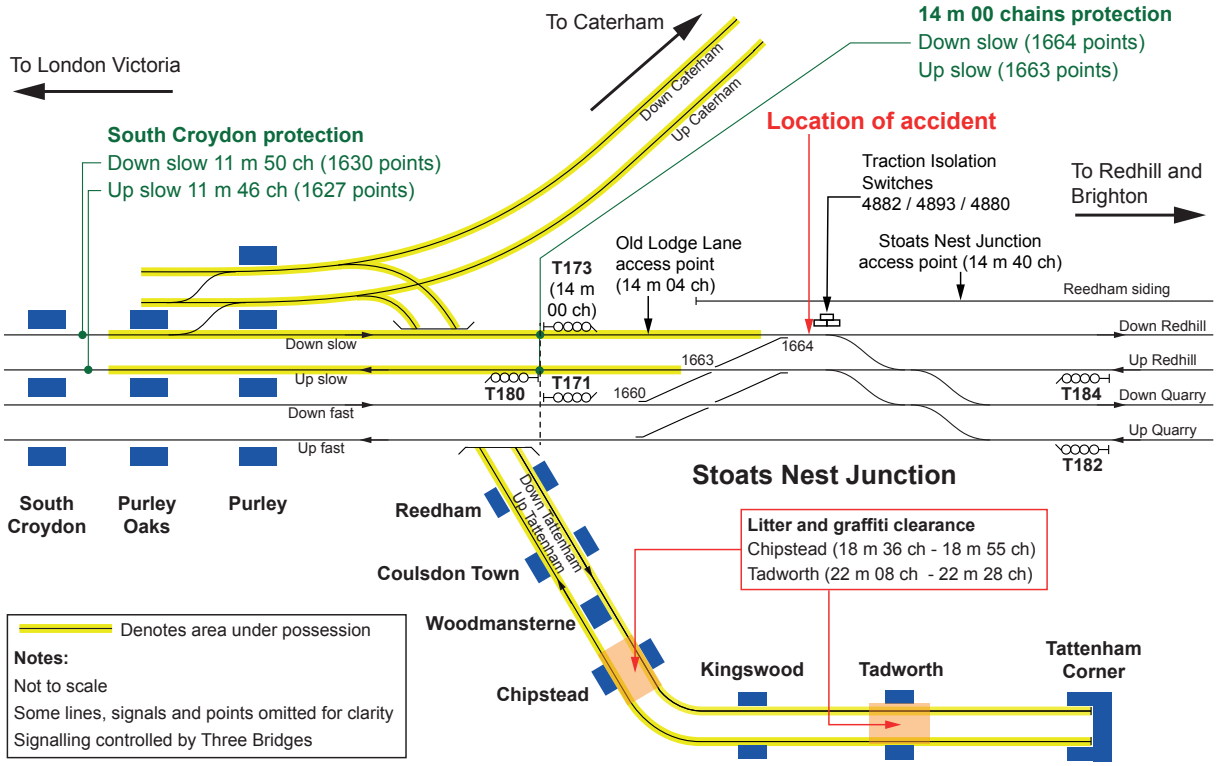


*Figure 2: Line diagram showing Stoats Nest Junction and other key locations*

5 The railway through Stoats Nest Junction runs generally north (to Croydon and London) and south (to Gatwick, Three Bridges and Brighton). It comprises four lines: two fast lines and two slow lines. The slow lines, which become the Redhill lines south of the junction, are to the east of the fast lines. At Stoats Nest Junction, a series of crossovers connect the fast and slow lines. Adjacent to the down slow line are the two Reedham sidings, both disused. There are also two adjacent lines to the west of the main lines, which are part of the branch line to Tattenham Corner. All the lines in the area, except for the Reedham sidings, are electrified at 750 V DC using the third rail system (figure 2).

6 There is a railway access point for vehicles at Stoats Nest Road, a short distance south of the junction (figure 3). There is also a pedestrian access point (adjacent to the down slow line), which was used by the track worker prior to the accident, located on Old Lodge Lane (figures 4 and 5) at 14 miles and 88 yards, 792 yards (723 metres) north of the Stoats Nest Road access point.

7 The accident occurred on the down slow line, which is used by trains travelling towards Brighton, approximately 22 yards (20 metres) south of the 14¼ milepost.

8 The maximum permitted speed on the slow lines in the area is 80 mph (128 km/h), and on the fast lines it is 90 mph (144 km/h). The permitted speed for trains using the crossover from the down fast to the down slow line at Stoats Nest Junction is 70 mph (112 km/h).

9 A planned engineering possession[2] of the up and down slow lines was scheduled to take place between 00:01 hrs and 05:10 hrs on 6 November 2018 between South Croydon Junction and Stoats Nest Junction (figure 1). The possession also included the whole of the branch lines from Purley to Caterham and Tattenham Corner. The work to be carried out during the possession was litter clearing and graffiti cleaning at stations on the Tattenham Corner branch line. The work was to be protected by possession limit boards and detonators placed at the signals near the limits of the possession. A possession limit board is a portable red sign with a red lamp on top. It is placed between the rails to mark the boundary between the section of line that is under possession, and lines open to normal traffic. Possession limit boards are supplemented by three explosive detonators placed 20 metres apart on the head of one rail, which give an audible warning if a train runs over them. The possession limit boards and detonators are applied and removed at the start and end of the possession by a person acting as possession support, who in third rail electrified areas should be accompanied by a possession support assistant (see paragraph 59).

10 At Stoats Nest Junction, the protecting signals for the south end of the possession were T173 on the down slow line and T184 on the up Redhill line. Signal T173 is on a gantry north of the access point at Old Lodge Lane. The actual limits of the possession at Stoats Nest Junction were clear of (ie immediately north of) points 1664 on the down slow line and switch diamonds[3] 1663 on the up slow line (figure 2).

11 The third rail traction power supply is controlled from the Electrical Control Room at Brighton.

12 The signalling on the route through Stoats Nest Junction is controlled from the signal box at Three Bridges.

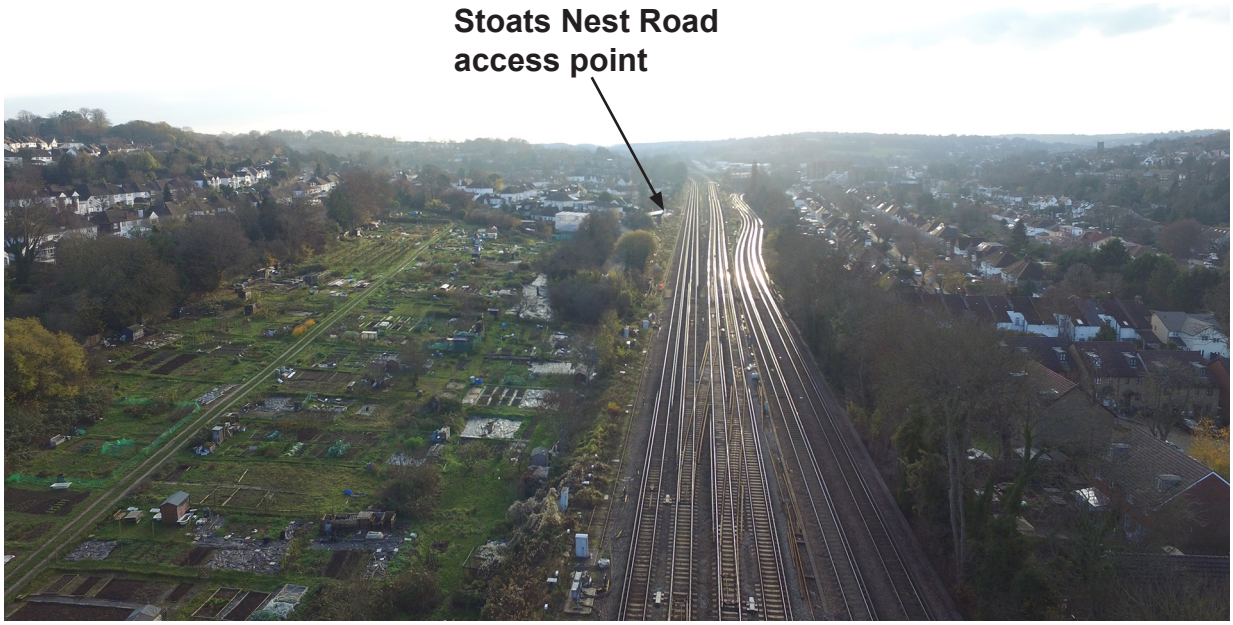


*Figure 3: Image looking south towards Stoats Nest Road access point*

[2] During an engineering possession the lines concerned are blocked to normal traffic and made available for maintenance or other engineering work.

[3] A switch diamond is where two tracks cross at such an acute angle that moveable rails are used to provide continuous support for wheels and flanges through the obtuse portion of the crossing.

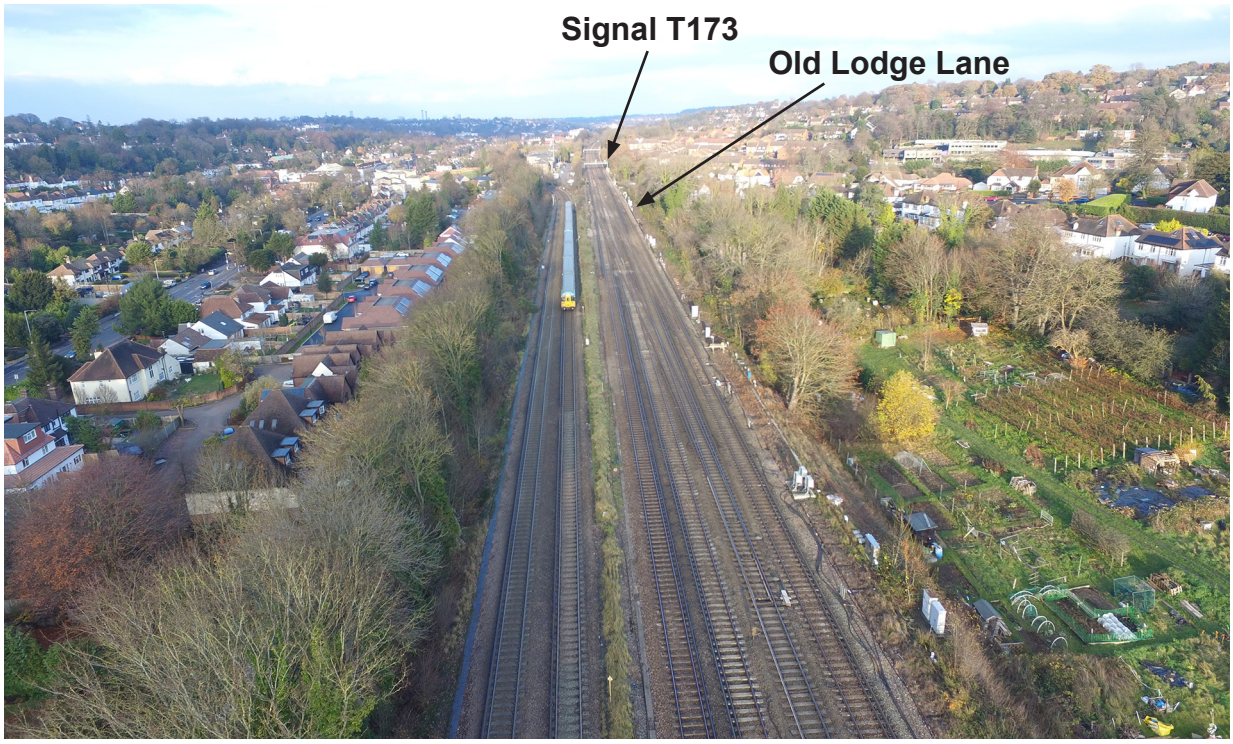


*Figure 4*: *Image looking north towards Old Lodge Lane and signal T 173*

## Organisations involved

13 Network Rail owns, operates and maintains the railway infrastructure. At the time of the accident, Network Rail's South East Route had labour contracts with suppliers who provide staff to Network Rail and its contractors for planning and undertaking some maintenance work.

14 Vital Human Resources Ltd (part of Morson Group and referred to as Vital for the remainder of this report) is an agency that engages self-employed individuals on zero hours contracts to work on specific tasks for contractors working on Network Rail infrastructure. Such work is notified to Vital staff a week in advance of a shift by e-mail and subsequently confirmed by text message the day before the date of work.

15 Vital supplied the controller of site safety (COSS)[4], carrying out the role of possession support (commonly referred to as a 'block road man'), who was involved in the accident. He is referred to as the COSS for the remainder of this report.

16 Vital also supplied two possession support assistants (PSAs), a second COSS (acting in the role of possession support at the north end of the possession), and the person in charge of the possession[5] (PICOP). This PICOP was also in charge of a separate possession of the Redhill lines south of Stoats Nest Junction which was planned for 01:00 hrs to 05:00 hrs. The northern end of this possession was a short distance south of the location of the accident. Vital also supplied two PSAs and a COSS for this possession.

[4] Controller of site safety (COSS) is a qualification required by people who are appointed to be responsible for the safety of themselves and others when working on or near the railway.

[5] The person in charge of the possession (PICOP) is responsible for all arrangements connected with the safety of people working in an engineering possession. Certified competence in this role is required by anyone undertaking this duty on Network Rail infrastructure.

17 Govia Thameslink Railway Limited (GTR), which trades as Southern, operated the train involved in the accident and employed the train driver.

18 Network Rail, Vital and GTR freely co-operated with the investigation.

## Train involved

19 Train 1H72 was formed of two class 377 electric multiple units (eight carriages). This type of unit is not fitted with forward facing CCTV equipment. The train was travelling at about 69 mph (111 km/h) at the time of the accident. It was the last service scheduled to cross from the down fast to the down slow/Redhill line that evening. The RAIB has found no evidence that the maintenance or the condition of the train was a factor in the accident.

## Staff involved

### *The controller of site safety (COSS)*

20 The COSS was first employed by Vital in 2015, having been sponsored for his personal track safety (PTS)[6] competence by a previous labour supplier in July 2015. He was recertified for PTS, as the applicable rules require every two years, in July 2017. At that time he applied for and was passed as competent to undertake duties as an individual working alone (IWA). In 2016 he had gained the competence which allowed him to apply short-circuiting straps to the DC third rail in connection with the process intended to ensure electrical safety during engineering work. In 2017 he also undertook training for the COSS competence, but was unsuccessful in the assessment which followed the training. He later reapplied, and passed the assessment for COSS in January 2018. In August 2018 he passed his possession support[7] competence, also at the second attempt. Between August and November 2018 he had worked 36 times in the role of possession support.

21 There were no issues identified with his medical fitness (June 2015) or drugs and alcohol screening (September 2016). Post-accident drug and alcohol toxicology results were negative.

22 At the time of the accident the COSS was wearing high-visibility clothing and a hard hat with a head torch, and was in possession of the correct 'safe work pack' documentation. The safe work pack (including COSS briefing sheets) is generated by a planner and used by safety critical staff to carry out the work safely. After the work has been done, the pack should be returned for audit in compliance with Network Rail's company standard NR/L2/OHS/019 'Safety of people at work on or near the line'.

### *The possession support assistant (PSA)*

23 The possession support assistant (referred to as the PSA for the remainder of this report) who was engaged to act as PSA at Stoats Nest Junction for the possession work on 5-6 November 2018, was the brother of the COSS involved in the accident. He was sponsored for his PTS by a previous labour supplier and was first employed by Vital in 2017. He gained his competence for DC third rail strapping in May 2018 (see paragraphs 33 and 59 to 65).

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[6] Training in Personal track safety (PTS) is the basic qualification required by anyone who works on or near the railway track.

[7] Training and Certification of competence in possession support is required by anyone undertaking those duties on Network Rail infrastructure.

### *The person in charge of the possession (PICOP)*

24 The PICOP had 21 years' experience working as both an employee and sponsored contractor in the rail industry. He registered with Vital as a PICOP in 2012 and was engaged by Vital to manage two Network Rail possessions on the night of 5-6 November (South Croydon Junction to Stoats Nest Junction and, Stoats Nest Junction to Brighton - see paragraphs 16 and 37).

### *The train driver*

25 The driver of train 1H72 joined Southern as a train driver in 2005 and was based at Brighton.

### External circumstances

26 The weather was dry, and the temperature was around 9° Celsius. The walking route from the Old Lodge Lane access point to the location of the accident (approximately 400 metres) was in darkness. The COSS had a working head torch as part of his safety equipment, and some external light was available from nearby street lighting and lighting at the access points.

# The sequence of events

## Events preceding the accident

27 The possession of the slow lines north of Stoats Nest Junction on the night of 5-6 November (paragraph 9) had been planned in advance, and details were published as item 87 in the Weekly Operating Notice[8] for the route, which was issued during the previous week. On Wednesday 31 October, Network Rail's planner sent the 'safe work pack', which detailed the arrangements for the possession, to his responsible manager for review and authorisation. The authorised safe work pack was then returned to the planner, who subsequently forwarded the pack to the COSS. On Friday 2 November the COSS emailed the planner to confirm he had read and accepted the pack.

28 On Saturday 3 November the COSS was due to work on a possession at Selhurst, London (overnight shift, 22:00 hrs to 07:00 hrs). During the evening and prior to the possession, the COSS attended Network Rail's offices at Cover House at Three Bridges, Sussex, where he was briefed by Network Rail's operational delivery manager (ODM). After the briefing, the COSS enquired about the documents for the forthcoming work on 6 November. As the PICOP for the 6 November possession was not present, the ODM briefed the COSS, and noticed that the documents showed Stoats Nest Road as the authorised access point for the possession limits, and showed that staff should walk north along the down cess (the area alongside the east side of the track) to place the protection for the possession. Stoats Nest Road access point was shown on the safe work pack because it can be used by vehicles and pedestrians. The ODM advised the COSS to use an alternative access point on Old Lodge Lane, which has pedestrian access only, as it was closer to the planned location for the protection blocking points. As the COSS had not previously used Old Lodge Lane as an access point, the ODM used mapping databases to show him where it was. The ODM gave the briefing pack to the COSS and advised him to attend Cover House on 6 November and speak to the PICOP in charge of the work.

29 While the COSS was at Cover House, witness evidence indicates that he had another conversation with a work colleague. Part of this conversation related to the COSS's desire to develop himself and gain the competence in using lineside electrical isolation equipment, such as traction isolation switches (see paragraphs 81 to 84).

30 The COSS left Cover House and travelled to Selhurst to undertake his possession support duties. Once the work was completed, the COSS left for home at around 03:30 hrs on Sunday 4 November, arriving at around 04:30 hrs, and went to sleep. Evidence from his mobile phone indicates that the COSS, who had a young family, was awake at around 13:00 hrs. On Sunday evening he left home to travel to Selhurst at about 18.15 hrs (for the 19:00 to 05:00 hrs shift). He left work on the morning of Monday 5 November at around 03:30 hrs and travelled home, arriving at around 05:30 hrs. Witness evidence suggests that he then went to sleep. He awoke in time to call a friend at 08:57 hrs to arrange to go round to his house and help him with painting and decorating.

[8] A Weekly Operating Notice (WON) is a document published by Network Rail providing information on engineering work (eg possessions), speed restrictions, alterations to the network and other information.

31 At 10.30 hrs on Monday, Vital sent a text message to all relevant staff (COSSs, PSAs and PICOPs) notifying them of the location and times for that evening's night shift (22:00 hrs to 06:00 hrs).

32 At around 10:45 hrs, the COSS walked a short distance to his friend's house and started decorating, later staying for an evening meal.

33 At 17:36 hrs the PSA finished a daytime shift with a parcel delivery company and called his brother (the COSS), leaving a message for him to call him back.

34 At 17:46 hrs the COSS returned the call to his brother. The PSA advised the COSS that he was now very tired from driving throughout the day and asked the COSS to sign him into the site as the PSA, and cover his planned night shift by placing the protection without him. This would allow the PSA to stay at home, while receiving payment for the shift (see paragraphs 99 to 102).

35 At around 20:45 hrs the COSS returned home and spent time with his family, and prepared his food for the night shift. Although the COSS had been asked to meet the PICOP at Cover House, when he left home at around 22:00 hrs he travelled directly to Old Lodge Lane (figure 5).

36 At 22:47 hrs the COSS called the PICOP to report for duty, and said that he was now parked in his vehicle on Old Lodge Lane ready to place the protection for the planned possession starting at 00:01 hrs.

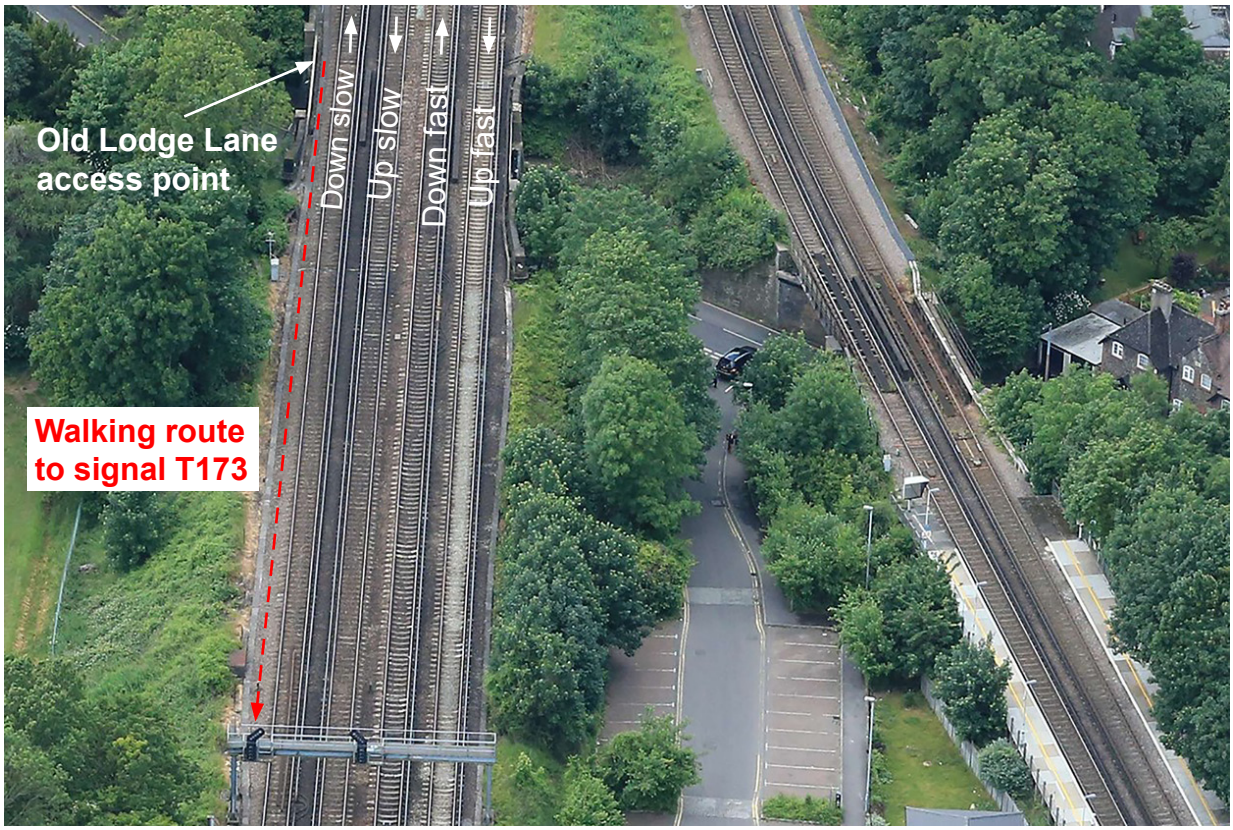


*Figure 5: Routeview image showing Old Lodge Lane access point, up and down slow and fast lines and signal T173 (image courtesy of Network Rail)*

37 At 22:59 hrs the PICOP called the COSS back and confirmed the night's arrangements. The PICOP asked the COSS why he had not gone to the correct access point, shown as Stoats Nest Road. The COSS explained the conversation he had had with the ODM, who knew the location and where the protection equipment was to be sited, and that the alternative access point was closer and safer. The PICOP agreed that the new access point was a closer option. The PICOP did not request details of the PSA, as he presumed he was with the COSS and expected the COSS to brief the PSA. The PICOP advised the COSS to be ready for a phone call which would instruct him to place the protection.

38 Witness evidence suggests that the COSS then waited in his vehicle. At 00:02 hrs on 6 November he began a phone call to a work colleague (see paragraphs 75 to 80).

39 At about this time, the train involved in the accident departed from London Victoria.

40 At 00:15 hrs the PICOP called the signaller at Three Bridges and agreed the signal protection limits for the possession at Stoats Nest Junction. At 00:17 hrs the PICOP called the COSS. The COSS ended his call with his colleague (he presumably observed or heard a notification on his phone for a 'call waiting or missed call') and immediately spoke to the PICOP. The PICOP instructed the COSS to put the protection out and call him back when this had been done.

41 After the COSS finished speaking to the PICOP, he called his work colleague back to apologise for ending the previous call so abruptly. He advised his colleague that he now had to end the call as he was about to place the protection for the possession.

## Events during the accident

42 Around 00:18 hrs the COSS, now carrying the two possession limit boards and six detonators, entered the railway via the Old Lodge Lane access gate, and walked up the steps (figure 6) to the down slow cess. The COSS then walked towards signal T173 (figures 5 and 7).


*Figure 6: Access gate at Old Lodge Lane*

*Figure 7: Signal T173 gantry*

43 Signalling data shows that at 00:19:56 hrs a train on the up fast line passed through Stoats Nest Junction. Based upon the times derived from a RAIB reconstruction of the events, it is likely that this train passed through the junction as the COSS was walking towards T173 signal.

44 The COSS then placed the protection equipment on the up and down slow lines (figure 8) and at 00:21 hrs he called the PICOP to confirm he had placed the protection (figures 9a and 9b). The PICOP asked the COSS to be available to lift the protection at around 04:40 hrs.

*Figure 8: RAIB reconstruction showing protection (detonators and possession limit boards) being placed on up slow line*

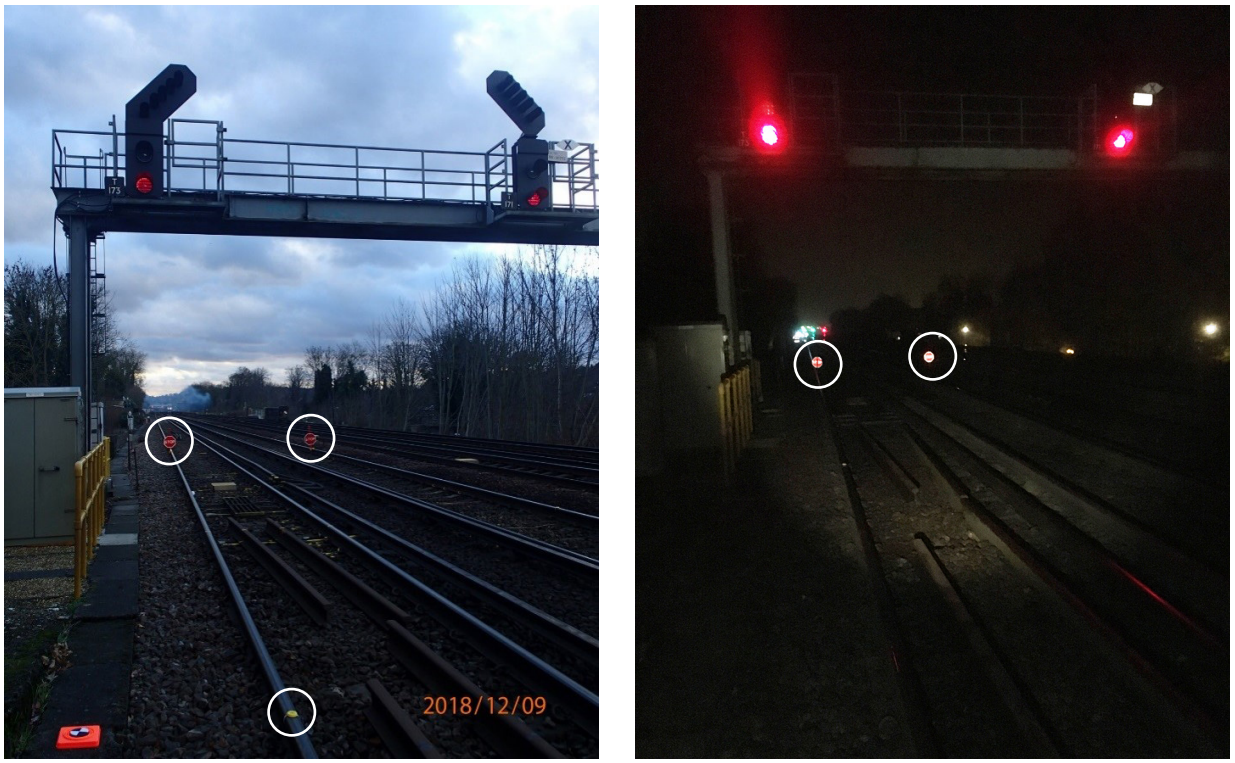


*Figure 9: (a) showing a reconstruction of the position of the possession limit boards and detonators and (b) showing signal T173 and the possession limit boards after the accident on 6 November 2018*

45 At 00:24 hrs the PICOP called the signaller to confirm that the protection for the north and south ends of the possession was now in place, and the signaller then granted the possession.

46 Between 00:24:39 hrs and 00:25:09 hrs, signalling data shows that another northbound train passed through the area on the up fast line. Based upon the times derived from the reconstruction, the RAIB believes the COSS, who had not returned to his vehicle, had now passed the pedestrian access point on Old Lodge Lane and was walking south on the down slow line towards points 1664 (figures 10 and 11).

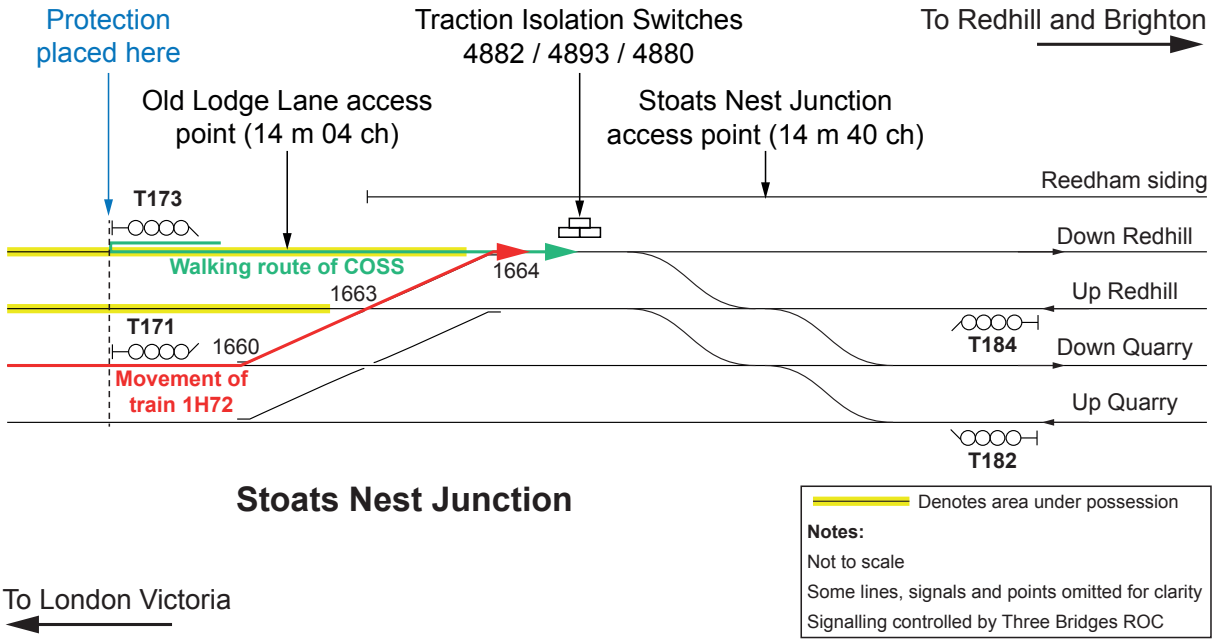


*Figure 10: Diagram showing the walking route taken by the COSS and path of train 1H72 prior to the accident*

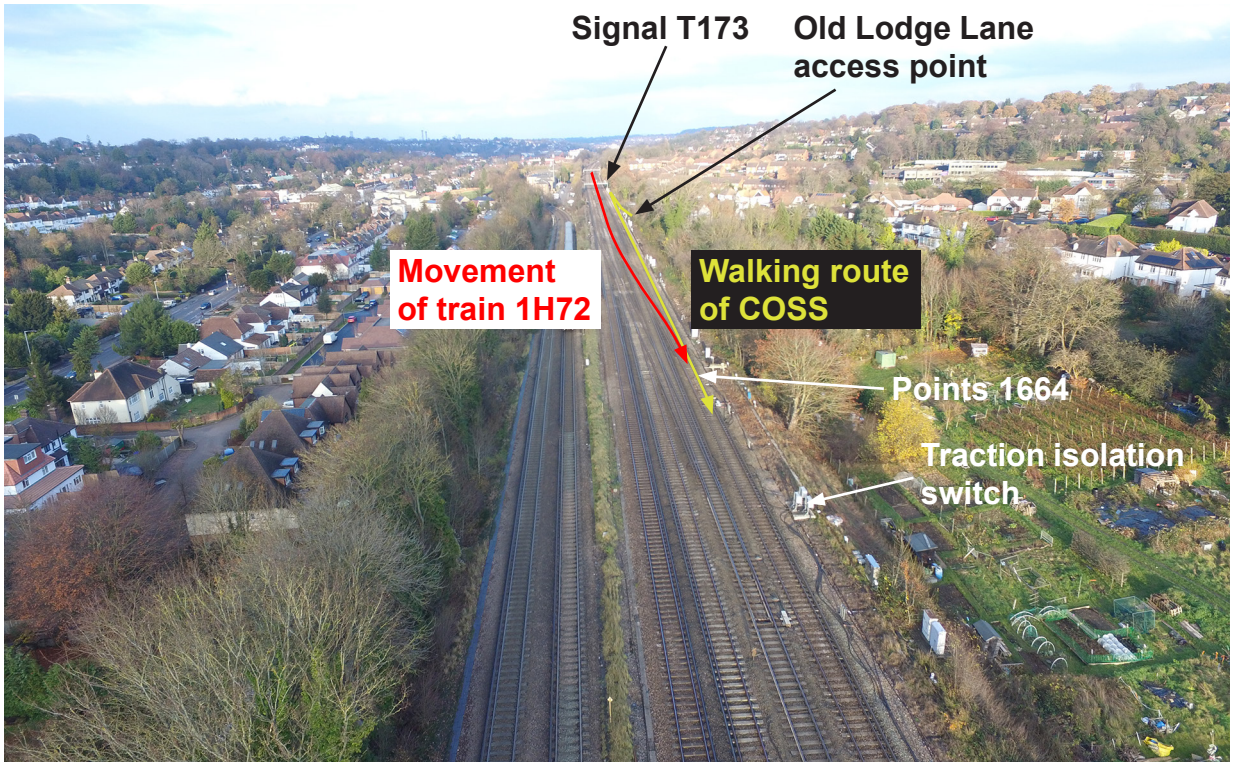


*Figure 11: Aerial image showing locations of Old Lodge Lane access point, including the walking route taken by the COSS towards points 1664 (yellow line), the route of train 1H72 (red line) and the location of the trackside equipment*

47 At 00:24 hrs, train 1H72 left East Croydon and then ran on the down fast line towards Stoats Nest Junction. Signals indicated to the driver that the route was set from the down fast to the down Redhill line. The COSS was still walking south and approaching points 1664 on the down slow line.

48 At 00:27:55 hrs train 1H72 passed signal T171 on the down fast line. Five seconds later the train entered the crossover from the down fast line to the down Redhill line at 70 mph (112 km/h). As the train entered the junction, the train driver observed the high-visibility clothing worn by the COSS and sounded the train's horn. The on-train data recorder (OTDR) showed the horn being sounded at 00:28:01 hrs. The train driver reported that he believed the COSS was walking in the cess of the down slow line (figure 11). The driver reported that the COSS was alone, and that he did not turn around, but raised his arm to acknowledge that he had heard the warning horn.

49 As the front of the train approached the down Redhill line the train driver's angle of view changed, and he then realised that the COSS was not in a position of safety in the cess, and was in fact walking on the track the train was now travelling on. The driver immediately sounded the warning horn again, continuously for five seconds (from 00:28:04 hrs to 00:28:09 hrs), and also applied the emergency brake. The train driver reported that the COSS again raised his arm to acknowledge he had heard the warning, but he did not turn around (paragraphs 73 to 74) and continued to walk south until at 00:28:09 hrs the train, which was still travelling at about 69 mph (111 km/h), struck him and he was killed instantly.

## Events following the accident

50 The train came to a stand close to Stoats Nest Road access point, a short distance south of the junction (figure 13). At 00.29 hrs the driver used the train radio system to make an emergency call to the signaller, who called the emergency services.

51 Shortly after the accident, the PICOP was on the telephone to Network Rail's route control manager, when information relating to the accident came to the route control manager's attention. The route control manager told the PICOP that there had been an accident in the area of Stoats Nest Junction and asked if the PICOP had any staff working in that location. The PICOP was confused by this information, as the only members of staff scheduled to work at that location were not yet due to arrive there, as the work (item 88) was not scheduled to start until 01:00 hrs. Other staff, such as the COSS and PSA, who were working in connection with the other possession (item 87) that had been granted, had no reason to be in the area of Stoats Nest Junction, as he knew that they had been intending to use the Old Lodge Lane access point, north of the junction.

52 The PICOP began to contact all of his staff, for both possessions, to ascertain their whereabouts. Between 00:33 hrs and 00:59 hrs the PICOP and other staff made many attempts to contact the COSS and the PSA.

53 At that stage the PICOP was unaware that the PSA had actually been signed in by the COSS as being present on site, when he was in fact at home in bed (paragraphs 86 to 90). The PSA was by now awake and aware that people were trying to contact him. The PSA did not answer these calls, but tried to call his brother.

54 At 00:59 hrs the PSA, having made numerous unanswered calls to his brother, answered a call from a trusted work colleague who informed him that his brother had been involved in an accident. The work colleague instructed the PSA to answer the next call he was about to receive from the PICOP. The PSA then spoke to the PICOP, who informed him that his brother had died in an accident.

55 Network Rail advised the emergency services, who had begun to search the area for the PSA, that he had not been present.

56 A Network Rail manager, on receiving initial information about the accident, asked a duty night manager from Vital to attend the scene to locate the COSS and PSA (paragraphs 114 to 115). The manager attended and was later asked to supply lighting equipment to assist British Transport Police officers in illuminating the scene.

57 The train driver was distressed by the accident and was given support. Network Rail staff and British Transport Police arranged the controlled evacuation of the passengers to road transport.

58 Traction current was turned on at 04:40 hrs, train 1H72 left the site at 05:00 hrs, and all lines were then reopened.

# Key facts and analysis

## Background information

### The role of the 'block road man's' possession support assistant (PSA)

59 The PSA role is mainly used in southern England, where much of the railway is electrified using the third rail system. The person carrying out possession support duties (sometimes called the 'block road man') is required to place and remove detonators from the running rails, and fix possession limit boards between the running rails, and in doing so they often have to step over electrically live conductor rails.

60 The PSA is present to observe the person placing protection, to ensure someone is available to call for assistance if an incident occurs during this task.

61 The RAIB has not been able to determine when the role of the PSA was introduced, and Network Rail has been unable to provide any national or local instructions on the role and responsibilities of the PSA. Although the role of the PSA is not defined in any standard or railway rule book module, it is likely that it was introduced in accordance with guidance on compliance with the Electricity at Work Regulations 1989, issued by the Health and Safety Executive.

### Electricity at Work Regulations 1989

62 The Electricity at Work Regulations 1989, Regulation 14 'Work on or near live conductors' states:

> *No person shall be engaged in any work activity on or so near any live conductor (other than one suitably covered with insulating material so as to prevent danger) that danger may arise unless – (a) it is unreasonable in all the circumstances for it to be dead; and (b) it is reasonable in all the circumstances for him to be at work on or near it while it is live; and (c) suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.*

63 The accompanying guidance to the Regulations, issued by the Health & Safety Executive, states (paragraph 211) that the precautions necessary to comply with regulation 14(c) should be commensurate with the risk, and (paragraph 214):

> *suitable precautions [for a person working near live conductors] should include accompaniment by another person or people if the presence of such a person or people could contribute significantly to ensuring that injury is prevented.*

64 Paragraph 215 of this guidance states:

> *A duty holder's judgement as to whether someone carrying out work, subject to regulation 14 should be accompanied, should be based on considerations of how injury is to be prevented.*
>
> *If an accompanying person can substantially contribute towards the implementation of safe working practice, then they should be present.*
>
> *They should be trained to recognise danger and, if necessary, to render assistance in the event of an emergency.*

65 Network Rail may use employees or contract staff to undertake the role of possession support, placing and removing protection for planned possessions. That person, who has to be a qualified COSS, places the protection equipment, and the task of the PSA is to accompany and observe the possession support from a position of safety nearby, and to call for assistance if an incident occurs.

## Identification of the immediate cause

66 **The COSS was walking with his back to traffic on an open line, as the train approached.**

67 The RAIB investigation gathered witness, documentary, and electronic communications evidence, supported by a reconstruction of the events. From the evidence available, the RAIB has concluded that the COSS was struck while walking on the down Redhill line with his back to oncoming traffic, having walked along the down slow line from the location where he had placed the possession protection, to the position where he was struck.

## Identification of causal factors

68 The evidence available to the RAIB was insufficient to provide a certain explanation of the actions of the COSS. However, taken together it suggests that the accident occurred due to one or more of the following causal factors:

a. the COSS probably believed that no trains would approach on the line he was walking along (paragraphs 69 to 74);

b. the COSS was probably fatigued and possibly distracted by personal and financial issues (paragraphs 75 to 80);

c. the COSS was probably distracted by going to look at the traction isolation switch equipment at Stoats Nest Junction (paragraphs 81 to 85); and

d. the PSA did not attend the site of work: this is possibly causal (paragraphs 86 to 90).

Each of these is now considered in turn.

## Actions of the COSS

**69 The COSS probably believed that no trains would approach on the line he was walking along.**

70 At the time of the accident the COSS had the safe work pack documentation for the planned possession on his person. This showed where the protection was to be placed on the up and down slow lines (at 14 miles at signal T173) and the limits of the protection for this work. Witness evidence relating to the COSS was that, if he had not previously worked at a location, he would routinely check the signal number plate and the identification plate for any nearby points, to reassure himself that he had placed the protection in the correct position. Witnesses also said that the COSS preferred to walk on the even surface of the sleepers in the four-foot, the space between the rails, as he did not like to walk on uneven ballast, whether in the cess or on other authorised walking routes. During training in personal track safety (PTS), staff are advised that when they have to walk along the line, they should use an authorised walking route or proper pathway if there is one. Otherwise they should walk in the cess, and only walk in the four-foot if it is necessary to do so and, wherever possible, facing oncoming trains.

71 It is probable that the COSS saw two trains passing on the fast lines (paragraphs 43 and 49) and this may have reinforced a view that no trains were travelling on the slow lines.

72 The driver of train 1H72 sounded the warning horn when he first observed the COSS. The driver reported that the COSS raised one arm above his head to acknowledge he had heard the warning, but did not turn around. It is probable that the COSS did not turn around as he believed the train would simply pass him by on the fast line.

73 Although a safe, reasonably even walking route, clear of the track was available between Old Lodge Lane and Reedham sidings, the COSS did not use it. As train 1H72 approached and crossed over from the down fast to the Redhill line, the COSS was outside the limits of protection and was still walking in the four-foot of the down slow line (figures 10 to 12). From his training and experience it is likely that the COSS would have understood that walking in the four-foot was not recommended or safe in these circumstances, and he was probably doing so out of habit.

74 When the train driver realised the COSS was actually walking in the four-foot he continuously sounded the horn, while applying the emergency brake. The COSS again acknowledged he had heard the warning given by the train driver by raising his arm again, but did not move to a position of safety. These actions indicate that the COSS still believed that no train would be travelling on the line he was still walking on.

## Fatigue

**75 The COSS was probably fatigued and possibly distracted by personal and financial issues.**

76 When the accident occurred the COSS had probably only had about 12 hours sleep in the previous 48 hours, and about 3.5 hours sleep in the previous 24 hours. It is likely, given the known effects of sleep debt, that the resulting fatigue affected his judgement and may have impaired his reactions to events during the night of 5-6 November.

77 On Monday 5 November the COSS had arrived home in the early hours of the morning, and had only had a short period of rest before spending the day helping a friend to decorate his house (from 10.45 hrs until approximately 19:00 hrs). The COSS later went home, and then travelled to work with no further opportunities for sleep or a nap. Although the possession protection work the COSS was paid to do is not physically tiring, the physical work he had done during the day, combined with the limited amount of sleep he had had, meant that it is probable the COSS was fatigued when he arrived at Old Lodge Lane.

78 Witness and electronic evidence shows that during that evening, before the accident, the COSS had a telephone conversation with his brother, who was due to work with the COSS in the role of PSA. During this conversation, witness evidence indicates that the PSA told the COSS that he was tired because he had spent the day driving and doing parcel delivery work and that he was not intending to undertake his night shift. The COSS was unhappy with the behaviour of his brother and the predicament it had put him in. This was because he was worried that any check during the shift would reveal the absence of the PSA. Witness evidence indicates that this practice, in which pay was claimed although staff were not present for the shift, and which is commonly referred to as 'ghosting', had occurred before (see paragraphs 99 to 103).

79 Following this conversation, the brothers did not talk to, or message each other again. Shortly before the accident, the COSS had a long telephone conversation with a colleague, during which it was clear that he was still distracted by his brother's request to cover for him and the issues it could cause for him if Vital caught him being involved in 'ghosting'. Covering for the PSA also required the COSS to forge a signature on the safe work pack.

80 Witness evidence indicates that the COSS had financial commitments which could have been jeopardised if he was found to be involved with 'ghosting', and as a result deprived, even temporarily, of his work for Vital. This fact may have exacerbated his distress about the situation he found himself in.

## Self development of the COSS

81 **It is probable that the COSS was distracted by going to look at the traction isolation switch equipment to the south of Stoats Nest Junction.**

82 Witnesses stated that the COSS was keen to educate himself. He had applied for his COSS competence in 2017, but had initially failed to achieve the required standard, because he had not achieved the required level of underpinning knowledge and confidence to perform as a COSS. He reapplied for the course and successfully achieved the required standard in January 2018. The COSS completed the mentoring scheme which is required as part of the process to achieve the competence of COSS, but most of his work was to act as possession support. Prior to the accident he had gained very little experience of acting as a COSS managing the safety of a work gang on the railway.

83 Because he was working under a zero hours contract, the COSS was keen to gain more competencies so that he would have the greatest possible number of opportunities for work with Vital in future. He had held a competence in Level B Strapping since June 2016 (paragraph 20). This qualified him to test that the conductor rail was not energised and to fit short-circuiting straps, but not to operate trackside isolating switches. Three days before the accident, on Saturday 3 November (paragraph 29), the COSS had a conversation with a colleague about a previous possession that he had worked in. He was reportedly feeling unhappy about not having the competence to be able to use the lineside electrical isolation equipment. He explained to his colleague that he intended to gain the competence for using this equipment and reportedly said he would then have 'all the tools in the tool box and get better pay'.

84 When he arrived at 1664 points (probably to check the identification number plate attached to the bearer/sleeper – see paragraph 64), the COSS, who was wearing a head torch, would have been able to see that at the side of the line a short distance beyond those points there were hook switch and traction isolation switch cabinets (figures 11 to 13). The RAIB believes that the COSS may have then become distracted by this equipment. With his attention focused on the equipment, he continued walking towards the switch cabinets, probably to look more closely and educate himself in preparation for taking this training.

85 The RAIB has found no other factors or equipment which could have provided a visual 'trigger' to distract the COSS or provide a reason for him to walk beyond the limits of protection. This distraction, in combination with factors described in paragraphs 70 to 80, probably led to the COSS walking in the four-foot of the down slow line and not reacting to the approaching train.

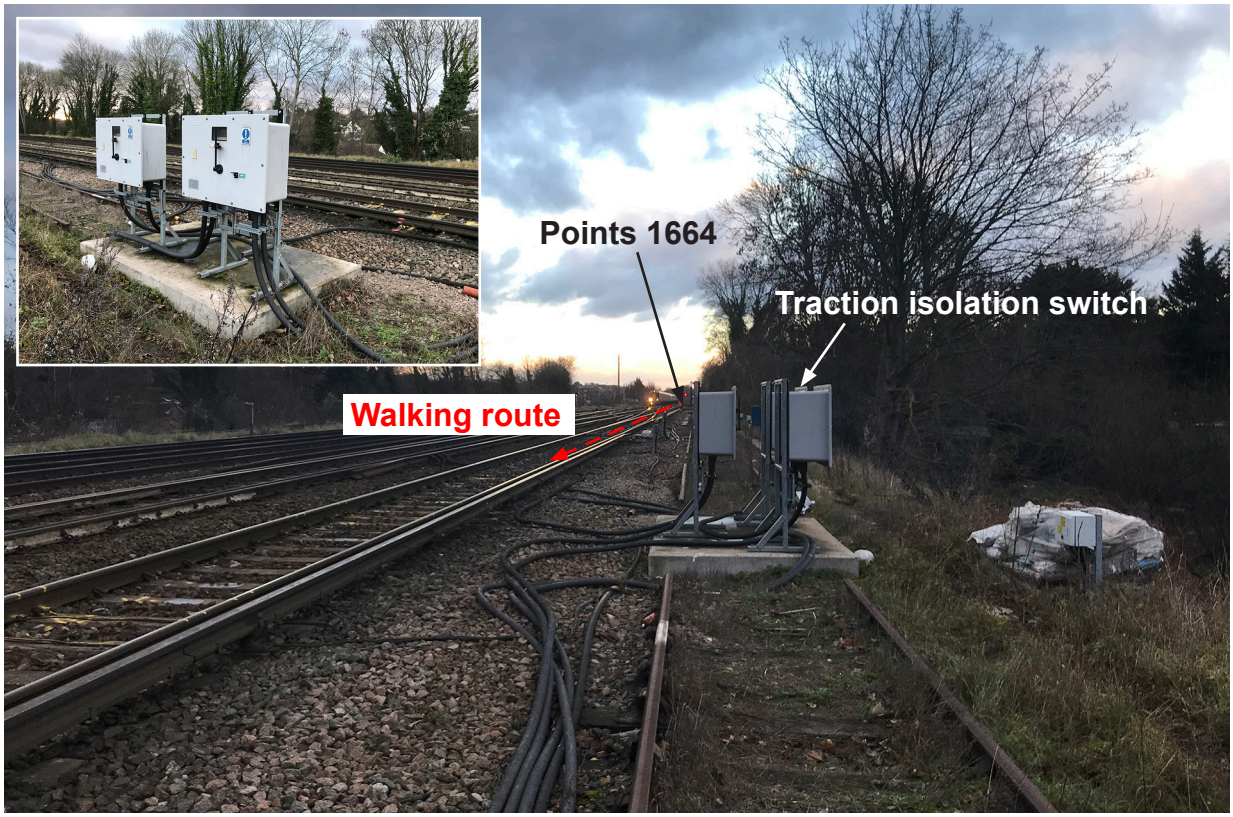


*Figure 12: Image showing the location of the traction isolation switch equipment (inset image) in the cess running parallel to the down Redhill (slow) line*

The possession support assistant (PSA)

86 **The PSA did not attend the site of work. This is possibly causal.**

87 Documentary, witness and electronic evidence shows that the PSA had not undertaken his shift on the previous night (4 November 2018). On that occasion, he had been due to work with a different COSS, and had contacted him stating he was tired and did not want to attend, but wanted his colleague to cover, enabling him to be paid, and he would 'return the favour'. The investigation identified that the PSA had done this on at least seven previous occasions he had been scheduled to work, both with his brother and with other COSS-qualified staff.

88 On 5 November the PSA advised the COSS that he was not intending to undertake his shift as he was again tired from his other paid employment. In these circumstances, prior to the start of work the COSS should have advised the PICOP that he could not undertake possession support duties because the PSA was not present. He did not do so, perhaps because of their family relationship.

89 However, witness evidence suggests that the COSS had himself, on one previous occasion, offered to cover another COSS going home early. Witness evidence also indicated that there had been other instances in which staff who had not been engaged by Vital were lifting protection on behalf of Vital staff who had gone home.

90 The RAIB is unable to determine if the PSA being present would have prevented the accident from occurring. However, it is possible that had the PSA attended his shift, the COSS's briefing to the PSA would have outlined the work to be completed and the limits of the protection. This might have led to the PSA questioning the actions of his brother as he walked towards and past the limits of protection. The PSA might also have reacted differently to the train's horn. It is also possible, though, that had the PSA been present he might have simply followed the actions of the COSS (the PSA also preferred to walk in the four-foot) and the accident could have resulted in two fatalities.

## Other possible factors considered

91 Although some of the following possibilities cannot be entirely discounted, evidence strongly suggests that the following were not factors in this accident:

a. **The COSS was walking away from his vehicle as he was concerned about on-call managers attending the worksite during the night and discovering that the PSA was not present.** Although being away from the vehicle would have provided the COSS with the necessary time to contact his brother, this factor is not considered to be a plausible explanation because such contact would almost certainly not have allowed the situation to be recovered from the COSS's perspective because the PSA was at home and too far away.

b. **The COSS had been tasked to attend Stoats Nest Road access point to undertake other work (eg help with the planned possession (item 88) starting at 01:00 hrs).** The RAIB found no documentary, witness, open source social media or electronic data to support the COSS being either aware of the possession starting at 01:00 hrs, or having any contact with the staff tasked with duties linked to that work.

c. **The COSS had noticed activity at Stoats Nest Road access point, and was walking towards it to find out what was happening.** Witness evidence, electronic data and analysis derived from the RAIB's reconstruction of the events shows that prior to the accident the COSS would not have been in a position to see or be distracted by any activity occurring at Stoats Nest Road access point (figure 13).

d. **The COSS had mistaken or forgotten the whereabouts of the access point through which he entered the railway.** The RAIB believes that the COSS intentionally walked past Old Lodge Lane access point for the reasons previously explained (paragraphs 70 and 84).

e. **The COSS was walking towards Stoats Nest Road access point to take a personal needs break.** There were no welfare facilities at Stoats Nest Road access point so it would not appear to be a more likely personal needs break location than somewhere nearer the possession limit (figures 13 and 14).


*Figure 13: Image showing the location of the traction isolation equipment and Stoats Nest Road access point*

*Figure 14: Image showing the down Redhill (slow) cess and walkway*

## Underlying factors

### Vital's management of fatigue

92 **Vital had not effectively identified and addressed the fatigue levels of its contracted staff.**

93 Vital's contract with people that it engages stipulates that all staff should be fit for duty and not tired. All shift patterns are calculated, using Vital's fatigue calculator, to ensure that hours worked and travel time comply with the company's fatigue management policy. This policy, last revised in 2015, stated that employees and operatives had a duty of care and responsibility to not be fatigued, and to be fit for duty when they reported for work. The company would roster duties (including travel time) to staff in accordance with its fatigue risk calculator and the Working Time Directive 1998[9].

94 The nature of the duties involved in placing possession protection, for which a COSS is accompanied by a PSA who may or may not assist them, created opportunities for staff to either sleep during the time between placing and lifting the protection, not turn up for work or go home early. All of these scenarios could result in staff feeling that they had obtained a sufficient amount of rest during the night, and could therefore take on other employment during the day. Vital's safety briefings aimed to educate contract staff on fatigue and associated personal responsibilities by providing guidance (in the form of booklets and verbal briefings) on food, lifestyle and sleep, but there was nothing in these safety briefings to highlight the risk of fatigue as a result of other employment during the day.

[9] The Working Time Directive 2003/88/EC is a Directive in European Union law which gives workers the right to paid leave, rest breaks, and rest of at least 11 hours in any 24 hour period. The directive also outlines the restrictions on excessive night work and the maximum hours that can be worked in any given week. More information is provided in the following links: https://www.gov.uk/maximum-weekly-working-hours or http://www.hse.gov.uk/contact/faqs/workingtimedirective.htm.

95 Although 'napping' between duties can be considered to be good practice to mitigate the effects of fatigue, the opportunity to obtain daytime employment, and retain a night time job can result in even greater levels of fatigue. This is likely to have resulted in the tiredness of the PSA involved in this investigation, and the practice of 'ghosting' taking place. The nature of the possession support role in which the COSS was acting probably also led him to expect that he would be able to reduce any sleep debt by resting in his vehicle after placing the protection.

96 Witness evidence showed that some Vital staff had accepted the risk of being caught asleep or not turning up for work. They believed that the result was normally no invitation to work for at least two weeks whilst an investigation took place, but it was also possible that the 'missing' person would simply be asked to present themselves at the site. It appeared to staff that the financial benefits of having a second job could outweigh the risk of being caught and losing two weeks' pay. Vital had therefore not effectively deterred its staff from undertaking this type of work when excessively tired.

## Vital's management of 'ghosting'

97 **Vital's management processes had not effectively identified and dealt with the practice of 'ghosting'**

98 On the night of the accident, the PICOP was unaware that the PSA had actually been signed in by the COSS as being present on site (paragraph 79), when he was in fact at home in bed.

99 In November 2016 Network Rail and Vital identified staff involved in 'ghosting' at Streatham Junction. During this incident a COSS who had previously placed protection had fallen asleep and could not be contacted. The PSA who was supposed to be in the company of that COSS was contacted and found to be in bed at his home address. Network Rail and Vital believed it to be an isolated example, and Vital permanently ceased to use the individuals involved. Vital's practice was for its night turn managers to perform spot checks on locations during the night to ensure possession management in which its staff were engaged was being carried out correctly, and following this incident these checks were extended in an attempt to identify instances of 'ghosting'.

100 Witness evidence shows that the PSA's non-attendance on 5 November 2018 had not been an isolated incident and evidence indicates that he had not attended work on several other occasions. Witness evidence also shows that other Vital staff were either going home early or not attending their shifts. The practice of 'ghosting' had occurred on other occasions since 2016, but PSAs who were found not to be present were simply instructed to return to site, and no further action was taken to formally investigate the matter.

101 A number of completed safe work packs were found within the COSS's motor vehicle. The investigation identified that other safe work packs were not being routinely returned in accordance with NR/L2/OHS/019, and that this failure had not been identified by either Vital or Network Rail. Had these documents been examined, evidence of incidents of 'ghosting' might have been identified. Information obtained from British Transport Police also indicates that the practice of 'ghosting' involving other contractors had been the subject of police investigations for more than ten years.

102 Several other witnesses not directly involved in the accident corroborated the regular occurrence of 'ghosting' and the working practices that had been identified during the investigation. Vital had believed the incident in 2016 had been an isolated one, and there was no evidence of a culture of 'ghosting' (paragraph 99). The company undertook a survey after the accident at Stoats Nest Junction, that included an amnesty so that no-one responding to it would be the subject of any disciplinary action. Vital reported that the survey showed that there appeared to be a consistent message coming from the workers: although they stated that they were aware that the practice existed, workers also stated that they were not aware of any specific occasions on which it had occurred in relation to the PSA role, apart from the 2016 incident and in connection with the accident at Stoats Nest Junction.

103 The management processes used by Vital had neither prevented nor identified 'ghosting'. Furthermore, the company had concluded that the practice had stopped without sufficiently investigating or reviewing why it was occurring in the first place.

## Processes for implementing protection

104 **The processes for setting up possessions still require people to place protection on the track, in close proximity to lines over which train services are running.**

105 The COSS had previously undertaken the task of placing and lifting possession protection on many occasions, and evidence suggests that he had been diligent in confirming that he had done so at the correct location.

106 The use of possession limit boards and detonators to mark the limits of an engineering possession is a long-standing practice on the national rail network. It is intended to act as a last line of defence against the possibility of an error that leads to a train moving beyond the limits, either into or out of a possession, by giving the driver and anyone else in the vicinity a visual and audible warning of the movement.

107 A previous RAIB investigation into a track worker fatality east of Reading (RAIB report 21/2008) identified that the requirement for possession support staff to access the track to place and remove protection carries an inherent risk. Staff accessing the railway expose themselves to potential hazards not just from train movements, but also electrification, hazardous materials, and slips, trips and falls. Moreover, the added value of placing possession limit boards and detonators is arguably small compared to the risks faced by possession support staff. The previous RAIB report recommended that Network Rail critically review its possession management process to reduce the need for staff to be on track. Trials carried out by Network Rail included setting up possession protection without possession limit boards or detonators where there are no trains or other vehicles in or around the possession. The recommendation was reported to be implemented as of 1 April 2011, as Network Rail had carried out a critical review. However, options for reducing the need for possession support staff to access the track, such as the protection arrangements in the trials described above, were not taken forward because of difficulties in implementing the associated Rule Book changes as well as industrial relations concerns.

108 During the RAIB's investigation into a near miss at Camden South (RAIB report 16/2017), Network Rail told the RAIB that it was currently pursuing a Track Worker Safe Access Strategy, focused on medium- and long-term improvements to the reliability of protection systems. Elsewhere, technology is in use on some parts of the infrastructure which enables remote operation of track circuits (via a smart phone app), thereby providing additional protection for track work while reducing the time required for workers to be on track in order to place the protection. In the longer term, other technological solutions are envisaged which will further reduce the dependence on physical protection being placed by possession support staff by enabling them to interact directly with the signalling and/or train control system.

109 Implementation of the recommendations from the reports into events at Reading East Junction and Camden Junction South is outstanding, and there are no timescales for the widespread implementation of such solutions at present (see paragraphs 128 to 142). Since the RAIB believes these previous recommendations, which involve a full review of this practice, address this underlying cause, no further recommendation is made in this report.

## The zero hours contract regime

110 **The railway industry's use of staff on zero hours contracts for night work creates conditions in which it is difficult to manage fatigue effectively.**

111 Although it is not possible for the RAIB to be certain about the effects of working patterns on the people involved in this accident, there is particular risk of fatigue in cases where the ability to get sufficient sleep is disrupted by working shifts in multiple jobs. The PSA had taken on additional daytime employment with a parcel delivery company. Witness and documentary evidence shows the PSA had been working on both day and night shifts for some months, and prior to the accident, his daytime shifts had been extended from six, to eight, or ten hour shifts, which was linked to the pre-Christmas parcel traffic. The PSA had worked a combined total of 102 hrs for Vital and the delivery company between 22 and 31 October 2018 (RAIB only took into account 50% of the scheduled hours for Vital, because of the likely opportunity for rest during the shifts (paragraph 95)). During the weekend before the accident the PSA had worked 17 hours for the delivery company, and was scheduled to work 60 hours for it during the week commencing 5 November 2018.

112 The nature of the zero hours working created the opportunity for the PSA to have daytime employment, and the work that he had done during the day, together with the combination of day and night work, was the cause of the PSA being fatigued and requesting his colleagues to cover his absence ('ghosting') on 4 and 5 Nov 2018. A recent survey[10] has found that 32% of 'gig' workers (ie those in the type of job most associated with zero hours contracts) hold at least two jobs. Information from the Office for National Statistics (ONS) indicates[11] that more than 25% of people on zero hours contracts want more hours work each week, compared with 7% of other people in employment.

[10] https://www.whatinvestment.co.uk/gig-workers-juggle-jobs-2554780/.

[11] https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/articles/contractsthatdonotguaranteeaminimumnumberofhours/april2018.

113 Because of the nature of the employment relationship, Vital had not identified if the people it engaged had other employment likely to affect their ability to perform safety critical duties on the railway. The first time that a person works for Vital they sign a contract outlining their responsibilities, one of which is that the member of staff must report fit for duty. The application pack provides an opportunity for individuals to declare employment outside the rail industry, although this is only effective at the time the contract is first signed. However, the management of fatigue had not been effective (paragraphs 92 to 96) and the risks of increased levels of fatigue associated with the potential for secondary employment arising from the nature of the role of possession support and PSA (paragraph 94) had not been identified. The investigation also identified that Network Rail does not monitor or audit the way in which its labour suppliers manage fatigue in night-time contract staff, including accounting for additional daytime employment they have.

## Factors associated with the emergency response

114 **British Transport Police on-scene management of potential trauma affecting untrained railway staff was not effective.**

115 Following reports of the accident, a Vital manager was sent to the access point to try to locate the COSS and PSA. BTP officers at the scene presumed that the Vital manager (wearing Vital hi-visibility clothing) had the required training and preparedness for attending such a scene, and asked if he could assist them with supplying additional lighting, which he did. This presumption led the police not to consider the risk of psychological trauma to the manager when attending a site where a person he knew had suffered from fatal injuries. As a result of his experiences, the member of staff has been receiving counselling since the accident (paragraph 146).

## Observation

### Checking of completed safe work packs

116 During the investigation, it became clear that a number of safe work packs were not being returned to Network Rail following completion of the work to which they related. This meant that there was no opportunity to detect forged or missing signatures of people who were supposed to have been on site. The packs that provided such evidence of 'ghosting' had been either destroyed, or had not been returned to Vital. Network Rail's process NR/L2/OHS/019 requires that Vital sends these packs to Network Rail's ODM for audit. Neither Vital nor Network Rail had identified this omission, and the opportunity to identify incidents of 'ghosting' was missed.

117 The investigation also identified another practice connected with 'ghosting', that involved misuse of the Sentinel system to provide evidence that the person was on site, when in fact they had not attended (paragraph 144 (ii)). The Sentinel scheme is run by Network Rail. It is intended to record and manage the competence and fitness of employees and contractors who work on Network Rail's managed infrastructure. Records of each person's training, certification and medical fitness are held on a central database. Qualified staff are issued with an identity card which features codes enabling it to be scanned to give access to the database. They are required to carry this card with them whenever they are at work, and present it for checking on request. This enables persons in charge of work, such as COSSs, to verify that individuals have relevant competencies, such as PTS and possession support, and current certification to enable them to work. The system can also be used to record when people start and finish work, and thereby enable monitoring of hours worked for fatigue management and other purposes.

118 Any attempts to use a card to falsely claim attendance, or otherwise misuse the system, should be subject to investigation by Network Rail and/or its contractors. Prior to the accident the misuse of Sentinel cards in connection with ghosting had not been identified by Vital or Network Rail.

## Previous occurrences of a similar character

119 Between October 2005 and November 2018, the RAIB had investigated seven accidents in which track workers have been killed by being struck by trains. Some of the investigations resulted in recommendations with relevance to the circumstances of the accident at Stoats Nest Junction; these can be found in the section on previous RAIB recommendations relevant to this investigation commencing at paragraph 127.

120 The accident at Stoats Nest Junction was the first fatality involving a track worker being struck by a train in the UK since the death of a lookout at Newark in January 2014, which is described in RAIB report 01/2015. None of the recommendations made in that report were relevant to the circumstances at Stoats Nest Junction. However, there were some common factors with the accident at Saxilby in December 2012 (RAIB report 21/2013), in which a COSS was struck by a train while supervising a group of workers carrying out track maintenance.

121 In the case of the Saxilby accident, the deceased COSS was also an employee of a labour supply company. The RAIB's investigation found that the company had no effective performance review regime for managing the competence of people it hired for work on Network Rail. The RAIB made two recommendations covering improvements in this area (see paragraph 133).

# Summary of conclusions

## Immediate cause

122 The COSS was walking with his back to traffic on an open line, as the train approached (paragraph 66, see paragraphs 128 to 142).

## Causal factors

123 The evidence available to the RAIB was insufficient to provide a certain explanation of the actions of the COSS. However, taken together it suggests that the accident occurred due to one or more of the following causal factors:

i. the COSS probably believed that no trains would approach on the line he was walking along (paragraph 68(a));

ii. the COSS was probably fatigued and possibly distracted by personal and financial issues (paragraph 68(b), **Recommendations 1 and 2**);

iii. the COSS was probably distracted by going to look at the traction isolation switch equipment (paragraph 68(c), **Recommendation 1**); and

iv. the PSA did not attend the site of work: this was possibly causal (paragraph 68(d), **Recommendations 1 and 2**, see paragraphs 128 to 142).

## Underlying factors

124 Underlying factors were:

i. Vital had not effectively identified and addressed the fatigue levels of its contracted staff (paragraphs 92 to 96, **Recommendations 1 and 2**);

ii. Vital's management processes had not effectively identified and dealt with the practice of 'ghosting' (paragraphs 97 to 102, **Recommendations 1 and 2**);

iii. the processes for setting up possessions still require people to place protection on the track, exposing those people to risk in the transition period before the possession is taken (paragraphs 104 to 109, no recommendation, see paragraphs 128 to 142); and

iv. the railway industry's use of staff on zero hours contracts for night work creates conditions in which it is difficult to manage fatigue effectively (paragraphs 110 to 112, **Recommendations 1 and 2**).

## Factors associated with the emergency response

125 British Transport Police on-scene management of potential trauma affecting untrained staff was not effective (paragraph 114, no recommendation, see paragraph 146).

## Observations

126 Some safe work packs were not being returned to Network Rail for checking after completion of the work to which they related (paragraph 116, no recommendation, see paragraphs 144 iii and iv).

# Previous RAIB recommendations relevant to this investigation

127 The following recommendations, which were made by the RAIB as a result of its previous investigations, have relevance to this investigation as both investigations highlight the risks of using staff to place and lift protection.

Fatal accident at Reading East, RAIB report 21/2008, Recommendation 3

128 On 29 November 2007, a track worker was struck and killed by a train while walking on the line east of Reading station. He was on site to remove detonator protection from the up and down relief lines following a possession. An underlying factor was the requirement for staff to access the track in order to place and remove detonator protection.

129 Recommendation 3 was addressed to Network Rail. This recommendation read as follows:

> *Network Rail should look critically at the possession management process to reduce the need for staff to be on the track for the purpose of taking or giving back a possession.*

130 Network Rail reported that it had carried out a review in response to recommendation 3 and concluded that the existing arrangements for protecting possessions would be retained. Network Rail proposed no further action.

131 The Office of Rail Regulation (ORR, now the Office of Rail and Road) reviewed Network Rail's response and proposed no further action unless it became aware that the information provided was inaccurate. However ORR reported that it was continuing to press for improvements in this area.

132 RAIB noted in its Annual Report for 2011, that it was concerned that the safety benefits of alternatives for possession management were no longer being pursued. In particular, the RAIB was concerned that the placing of protection at the boundary of engineering possessions exposes the staff involved to the risk of being struck by a train.

Fatal accident at Saxilby, RAIB report 21/2013, Recommendation 2

133 On 4 December 2012, a COSS was struck and killed by a train while supervising a group of staff carrying out track maintenance work near Saxilby, Lincolnshire (paragraph 120). He was involved in work taking place on one of the two tracks at that location which was closed to traffic, but stepped back into the path of a train on the adjacent line. He had not implemented a safe system of work for the task that was being done.

134 The RAIB's investigation found that the COSS, who was an agency worker, had not been subject to an effective formal performance review by the agency that had hired him, despite several previous safety incidents in which he had been involved.

135 The RAIB recommended that the agency should review and improve the way it managed the performance of its staff. That recommendation was addressed only to the company involved in the Saxilby accident.

136 Recommendation 2 was addressed to Network Rail, in conjunction with other organisations that sponsored staff via the Sentinel scheme (ie the labour suppliers; see paragraph 117). The relevant part of this recommendation read:

*Network Rail, in consultation with all Sentinel sponsor organisations, should develop and implement arrangements to more effectively manage the risk arising from the use of agency staff undertaking work on and around the track. In developing the arrangements, Network Rail should, as a minimum, define improvements in respect of the following issues:*

*a. The requirement for the performance, attitudes and behaviour of agency staff to be regularly monitored;*

*b. The actions to be taken when deficiencies are identified, in particular the possible mechanisms to remedy the deficiency, reasonable timescales within which the deficiencies should be addressed, and the interim measures that can be applied pending resolution;*

*c. …*

*d. …*

137 In October 2014, ORR informed the RAIB that Network Rail was taking action to implement this recommendation, and that further advice would be given when implementation was complete. At the time of publishing this report, no further details had been received.

Incident at Camden Junction South, RAIB report 16/2017, Recommendation 3

138 At around 01:03 hrs on the morning of Tuesday 28 February 2017, a passenger train travelling towards London Euston station nearly struck a track worker in the vicinity of Camden Junction South. The train was travelling at about 47 mph (76 km/h) at the time. The track worker managed to get clear of the line before the train hit him.

139 About four minutes later, the same train was involved in another near miss with a second track worker around 510 metres further up the line towards London. In this case, the track worker was unable to get clear of the line, but the train stopped just before reaching him. There was no injury or significant delay as a consequence of the incidents.

140 Recommendation 3 addresses a number of factors identified in this investigation. The intent of recommendation 3 was to reduce the exposure of track workers to the risk arising from the need to be on track to place or remove possession limit boards and detonators.

141 So as to avoid duplication, it is not remade in this report. However, shown below is a recap of its wording and an account of the current status:

*Network Rail should, as part of its Track Worker Safe Access Strategy, critically review the possession management process and, where appropriate, reduce the need for staff to be on the track for the purpose of taking or giving back a possession. This review should include consideration of newly developed technologies such as remotely operated track circuit operating devices, and the scope for enabling track workers to protect themselves by interacting directly with the signalling and / or train control system.*

142 The RAIB is currently awaiting a response from the ORR.

## Actions reported as already taken or in progress relevant to this report

143 Vital has taken the following actions:

i. Re-briefed its managers and staff on the accident and factors that have been identified. Vital will continue to use managers to carry out spot checks to identify the practice of 'ghosting'.

ii. Changed the induction process for new staff to include a face to face conversation regarding personal responsibility for fatigue management, with both the manager facilitating the briefing and the staff signing to confirm that the policy has been discussed and understood.

iii. Expanded the reference to personal fatigue management responsibilities within Vital's Fatigue Risk Management (FRM) policy statement section to include a specific section highlighting personal responsibilities for fatigue management outside of work. Staff will be required to formally disclose information regarding any other employment to allow Vital to factor this working time into the fatigue management calculator.

iv. A new wellbeing programme with newsletters and fatigue management briefings have also been provided to new and experienced workers.

v. Following the accident an immediate instruction was given by the Vital management team that family members were not to work together until a full assessment had been undertaken. Vital reports that subsequently the position regarding family members working together has been the subject of a thorough review, including a risk assessment and steps have been taken to manage risks arising from this.

vi. To ensure consistency of practice by PICOP's contacting staff, Vital and Network Rail have jointly developed a pro-forma on which all PICOPs must document the details of their calls with the PSA's on shift. In addition, a further briefing will be delivered across the workforce to cover the following:

   a. Engaging in 'ghosting', attempting 'ghosting' or not reporting clear and obvious incidents of 'ghosting' will be investigated and incident investigations may result in the termination of contract;

   b. Workers are not to leave the site at any point during a shift without first informing and obtaining authority from the PICOP; and

   c. Workers are expected to be awake during their shift (Recommendation 2 of this report says that Vital should review current research in relation to the benefits of napping, and the appropriateness of this instruction in relation to staff performing the role of possession support).

144 Network Rail has undertaken the following actions:

**Safety briefings**

i. On 7 November 2018 all possessions in the area were cancelled and a safety stand down briefing was given to all Vital and Network Rail staff. Counselling services were offered.

ii. In December 2018, Network Rail's South East route launched a 'near miss' improvement plan to improve the selection and mentoring of COSS staff, safety working environment and surveillance of staff (see paragraph 143 (i) and (vi)). The new process in the Sussex (outer) area now requires both the COSS and PSA to attend the PICOP briefing at Three Bridges, and the COSS (possession support) now has to call the PICOP at the start and end of the shift and hand their phone to the PSA to verbally confirm their attendance.

**Safe System of Work (SSOW) packs**

iii. Network Rail is reviewing the methods and reliability of protection systems as part of its track worker safe access strategy, and is trialling two types of electronic safe work pack systems. The project is part of Network Rail's national 'Planning and Delivering Safe Work' (PDSW) programme.

iv. From 1 March 2019 Network Rail (Sussex and Kent - South East routes) is testing an electronic system for safe work packs. It is envisaged that these packs will be returned electronically at the end of the shift making it easy to identify any missing packs.

145 RSSB is undertaking the following actions:

a. RSSB, in conjunction with Network Rail, is currently undertaking a research project (T1155) on the use of detonators in all the situations in which they are currently employed, which includes possession protection. The research activities have been grouped into nine different scenarios where detonators are currently used, to determine if detonators remain the most effective means of controlling and mitigating risk, as well as the risks their use imports. Both qualitative and quantitative risk assessment methods are being used, to understand the risks of detonator use and the benefits which they provide. This report is due to be published in October 2019.

b. Practical testing on the audibility of detonator protection in all circumstances (T1167) has also taken place, including evaluating the practical risk and visual effectiveness of detonators and PLBs in preventing irregular train movements into a possession, when other controls have failed, by alerting train drivers that they are approaching a line on which people may be working. The findings of this research became available in June 2019, and this will help and inform the risk assessment research on the use of detonator protection and possession limit boards.

## Scene management

146 British Transport Police has issued a force-wide briefing note to remind staff not to make assumptions relating to railway industry staff wearing high visibility clothing. Officers managing the scene should confirm who should be at the scene, who should not be allowed to enter, and ask simple questions to establish any railway staff's role and to determine whether they should be exposed to the scene.

# Recommendations and learning points

## Recommendations

147 The following recommendations are made[12]:

1 *The intent of this recommendation is for Network Rail to improve the way it manages the risks associated with the use of workers on zero hours contracts. Examples of some good practice in this area may be found in the actions taken by Vital following the accident at Stoats Nest Junction.*

Network Rail should review how it manages the risks associated with the use of workers on zero hours contracts, and what its requirements are in respect of the systems used by its labour suppliers to manage such staff. This should include consideration of the arrangements for:

- Managing fatigue, including advice on the interaction with other employment, lifestyle, sleeping and eating;
- Managing the competence and fitness of safety critical staff; and
- Supervision of staff who normally work alone and/or outside normal office hours

(paragraphs 123(ii), 123(iii), 123(iv), 124(i), 124(ii), 124 (iv).

2 *The intent of this recommendation is for Vital Human Resources Ltd to validate, and where necessary improve, the way it manages the risk associated with fatigue and 'ghosting'.*

Vital Rail Human Resources Ltd should commission an independent review of the actions it has taken following the accident at Stoats Nest Junction in order to assess their completeness and effectiveness. In particular this should address the following areas:

- The effectiveness of the processes that have been implemented to ensure that persons responsible for safe systems of work are present and the effectiveness of the associated management assurance system;

[12] Those identified in the recommendations have a general and ongoing obligation to comply with health and safety legislation, and need to take these recommendations into account in ensuring the safety of their employees and others.

Additionally, for the purposes of regulation 12(1) of the Railways (Accident Investigation and Reporting) Regulations 2005, these recommendations are addressed to the Office of Rail and Road to enable it to carry out its duties under regulation 12(2) to:

(a) ensure that recommendations are duly considered and where appropriate acted upon; and

(b) report back to RAIB details of any implementation measures, or the reasons why no implementation measures are being taken.

Copies of both the regulations and the accompanying guidance notes (paragraphs 200 to 203) can be found on RAIB's website www.gov.uk/raib.

- The process for briefing the arrangements for reporting of incidents of safety critical staff absence and similar irregularities affecting the safety of staff and the railway;
- The appropriateness of current instructions concerning protection staff sleeping between the placing and lifting of protection; and
- The return of SSOW packs in compliance with Network Rail's NR/L2/OHS/019 process.

Any areas for further improvement should be implemented (paragraphs 123(ii), 123(iv), 124(i), 124(ii), 124(iv)).

## Learning points

148 The RAIB has identified the following learning points[13]:

1 The importance of safety critical staff being fit for duty and appropriately prepared. When working shifts, this includes obtaining adequate sleep to reduce the effects of fatigue throughout the shift and until the next rest period, and reporting when they feel unfit for duty due to fatigue, or other factors such as family issues, which may cause distraction or affect their decision-making.

2 The importance of track workers who are working alone (such as those responsible for placing or removing possession limit boards and detonators) always working in accordance with the requirements of the rule book and being alert to the risks of working on the track.

3 This investigation demonstrates that organisations should be aware of the limitations of the Sentinel system, if they use it for establishing the presence of staff on site.

[13] 'Learning points' are intended to disseminate safety learning that is not covered by a recommendation. They are included in a report when the RAIB wishes to reinforce the importance of compliance with existing safety arrangements (where the RAIB has not identified management issues that justify a recommendation) and the consequences of failing to do so. They also record good practice and actions already taken by industry bodies that may have a wider application.

# Appendices

## Appendix A - Glossary of abbreviations and acronyms

| | |
|---|---|
| COSS | Controller of Site Safety |
| FFCCTV | Forward Facing Closed Circuit Television |
| IWA | Individual Working Alone |
| ODM | Operational Delivery Manager |
| ORR | Office of Rail and Road |
| OTDR | On-Train Data Recorder |
| PICOP | Person in charge of possession |
| PS | Possession Support (also known as Block road man). |
| PSA | Possession Support Assistant |
| PTS | Personal Track Safety |
| SSOW | Safe System Of Work |

## Appendix B - Investigation details

The RAIB used the following sources of evidence in this investigation:

- information provided by witnesses;
- electronic communication data;
- information taken from the train's on-train data recorder (OTDR);
- site photographs and measurements;
- weather reports and observations at the site;
- safe system of work documents and Vital Human Resource documents; and
- a review of previous RAIB investigations that had relevance to this accident.

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