RAIB

Rail Accident Investigation Branch

Rail Accident Report

Collision between a train and a tractor, White House Farm User Worked Crossing 25 September 2011

Department for Transport

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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.

Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Email: enquiries@raib.gov.uk
Telephone: 01332 253300
Fax: 01332 253301
Website: www.raib.gov.uk

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Contents

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Summary

At approximately 10:13 hrs on Sunday 25 September 2011, the 10:10 hrs service from Kings Lynn to Ely operated by First Capital Connect struck a tractor on White House Farm[1] User Worked Crossing[2] (UWC).

The impact between the train and the tractor caused the front of the tractor to be separated from the driving cab. The tractor driver remained in the cab of the tractor, but suffered a broken collarbone, lacerations and bruising.

The tractor moved onto the crossing when the train was no more than 100 metres away and travelling at 70 mph (113 km/h). The train driver sounded the train's horn and applied the emergency brake, but was unable to prevent the collision. The second wheelset on the train derailed after the collision occurred, but the train remained upright and in line while stopping. The train driver suffered a chest injury and shock in the accident. No-one else on the train was injured. Evacuation of passengers took place after three hours because equipment providing electrical power to trains had become dislodged and was hanging close to the track.

At the time of the accident, there were frequent movements of tractors and trailers over the crossing because of activity associated with the harvesting of sugar beet in an adjacent field. The tractor driver was telephoning the signaller at Kings Lynn to ask for permission to cross on each occasion. This was not the normal method of working; usually, crossing users would check that it was safe to cross before doing so and the signaller at Kings Lynn would not be aware that the crossing was being used.

The accident occurred because the signaller gave the tractor driver permission to cross before seeking confirmation that the train had passed. The tractor driver did not check for approaching trains because he considered that the signaller's permission to cross was sufficient guarantee that it was safe to do so.

The Rail Accident Investigation Branch has made no recommendations. However, three learning points directly relevant to the causes or consequences of this accident have been identified:

- signallers need to be made aware of the need to ensure that safety-critical messages are delivered in the right way;
- when non-standard methods are to be applied for operating a UWC, it is important that all parties involved jointly review the proposed method of working, which should then be documented and confirmed in order that misunderstandings can be avoided; and
- the availability of staff for earthing[3] overhead line equipment at remote locations.

[1] Also known locally as Hatson's User Worked Crossing.

[2] User worked crossings are normally provided on private land with specific authorised users identified. Other people may use the crossing with the permission of the authorised user, but it is the responsibility of the authorised user to brief those additional users on how to cross safely.

[3] The earthing of overhead line equipment is made using a device to provide an electrical connection between the structure and the earth to ensure that the structure shares the same zero potential as earth, and is thus safe for people in the vicinity.

The RAIB has identified a further four learning points related to matters observed during its investigation, but not directly relevant to its cause or consequences. They cover:

- the measurement of sighting distances as part of the assessment of safety at level crossings;
- engagement between Network Rail and authorised users when assessing risk at UWCs so that the way in which the crossing is used can be considered as part of the exercise;
- checks on telephones and the accuracy of signs at level crossings; and
- keeping information on authorised users current.

Introduction

1 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.

2 The RAIB does not establish blame or liability, or carry out prosecutions.

3 The findings from the RAIB's investigation into the accident at White House Farm UWC are based on:

- witness statements from key people involved;
- the on-train data recorder from the train involved;
- measurements made by the RAIB at the crossing;
- recordings of voice communications between users of the crossing and the signallers at Kings Lynn on 24 and 25 September 2011;
- Network Rail's level crossing file for White House Farm UWC; and
- Network Rail's level crossing management process documents.

Background

4 White House Farm UWC is located between Kings Lynn and Watlington stations, being approximately 2 miles (3.2 km) from the former and 4 miles (6.4 km) from the latter (figures 1 and 1). The railway runs on a low embankment and is a single track line, used by trains in both directions. The maximum permitted speed for trains is 90 mph (145 km/h).

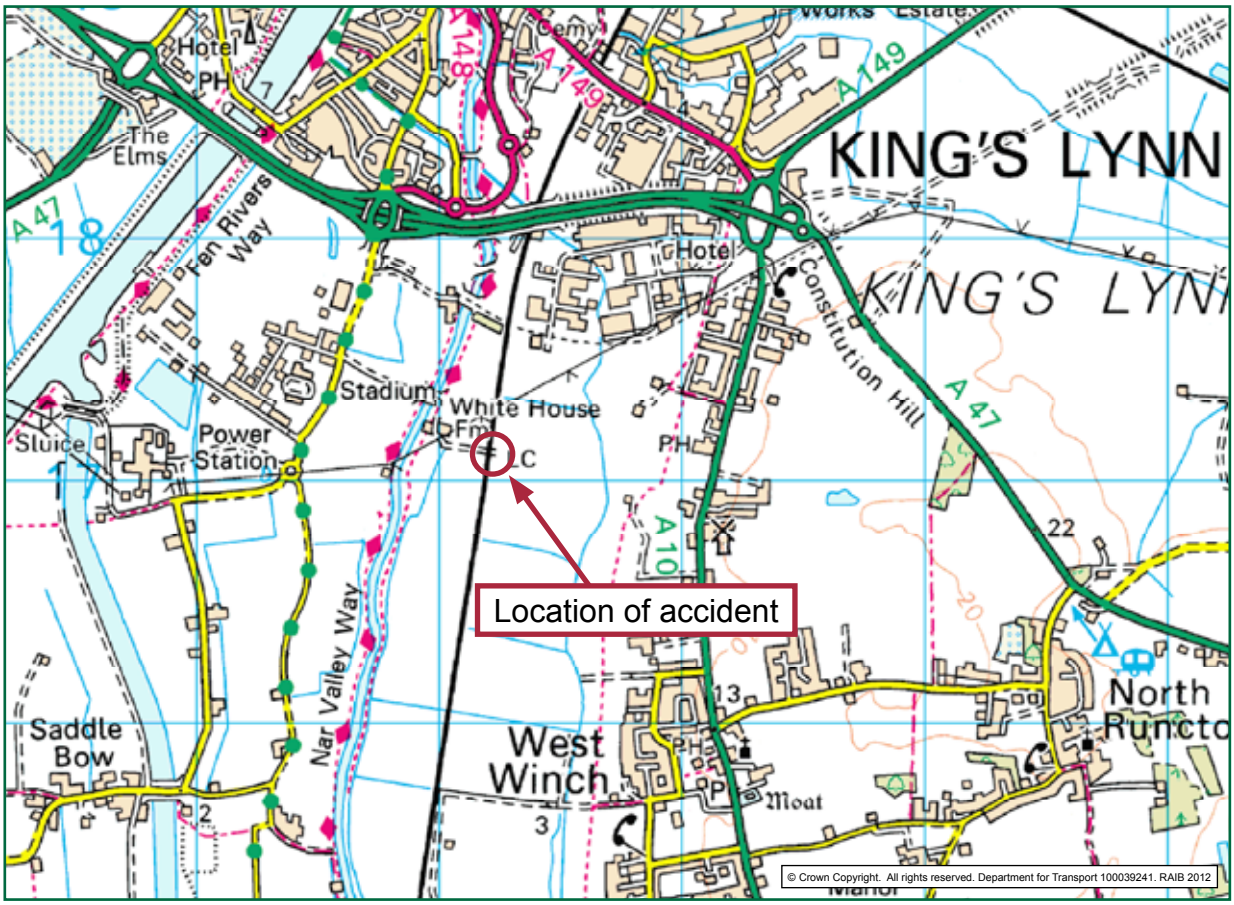

Figure 1: Ordnance Survey map showing location of accident

5 The line is signalled under the track circuit block regulations[4]. Southbound trains enter the single line under the control of the signaller at Kings Lynn while northbound trains enter the single line under the control of the signaller at Magdalen Road (Watlington).

[4] The set of regulations applying to those sections of the railway where the safe operation of trains is achieved by proving the status of the line as far as the overlap beyond the next signal using track circuits or axle counters. The regulations are part of the railway rule book.

Figure 2: Google Earth image showing the location of White House Farm UWC

6 The crossing is not equipped with telephones. The normal method of operation is for users to look to make sure that no train is approaching before crossing. The signaller is thus usually unaware that the crossing is being used. Network Rail staff had estimated that, from the crossing, it was possible to see 1167 metres when looking towards Kings Lynn and 1388 metres when looking towards Watlington (referred to as the 'sighting distances'). They calculated that crossing users needed a maximum sighting distance of 1127 metres, based on the maximum time it would take a vehicle to cross (28 seconds[5]), multiplied by the maximum permitted train speed (40.23 metres/second[6]). Since the available sighting distance was greater than the minimum mandated in its standards, Network Rail concluded that there was no requirement to provide telephones or whistle boards.

7 Signs at the crossing included two telephone numbers. One was for drivers of vehicles with overhanging loads who were required to call if they were in doubt as to whether their load might foul the overhead lines (sign A in figure 3). This telephone number connected the user with Network Rail's control centre for the Kings Lynn route. The other telephone number was for emergency use and connected the user with the signaller at Kings Lynn (sign B in figure 3). Drivers of vehicles that were unusually long, wide, slow, heavy or slow-moving were required to 'contact the operator' (sign C in figure 3), although there was no indication of which of the two telephone numbers was the right one to use.

[5] The figure of 28 seconds is obtained from Network Rail's procedure for safety assessments of level crossings and is a 'standard' value for a HGV or tractor and trailer to cross a single line over a crossing that is no more than 7 metres in length.

[6] Equivalent to 90 mph (145 km/h).

Figure 3: Signs at White House Farm UWC

The sequence of events

Events before the day of the accident

8 On 26 August 2011, a Mobile Operations Manager (MOM) from Network Rail discussed access arrangements for Network Rail staff needing to visit the crossing with a representative from the farm. The farm is located several hundred metres from the nearest road along a track which has a locked gate near to the road. The farm's representative told the MOM that the telephone number for emergency use (paragraph 7) was not working (he had tried to use it to contact the railway for other (non-emergency) reasons before the MOM's visit). The MOM provided him with an alternative number for Kings Lynn signal box.

9 During the course of the conversation, the farm's representative mentioned that there would be a significant number of tractor and trailer movements over the crossing at the end of September, when sugar beet was to be harvested from fields located to the east of the crossing and transferred to a stockpile to the west of the crossing. Options for managing the period of intensive operation were discussed but the parties involved did not come to a clear understanding about the method that would be employed.

10 The MOM was left with the impression that a farm worker would be located on the ground at the crossing to telephone the signaller every time that a vehicle needed to cross. He wrote to the signallers at Kings Lynn with an explanation of the arrangements that he believed would apply. The representative from the farm, who now had the different telephone number for Kings Lynn signal box, supplied that number to the staff who would be involved in harvesting the sugar beet. He did not provide a separate member of staff on the ground at the crossing; he instructed tractor drivers to call the signaller each time they wished to cross.

11 The harvesting of the sugar beet commenced on Saturday 24 September 2011. During the day, there were 91 transits of the crossing involving conversations between users and the signaller at Kings Lynn. All but one of the conversations involved the tractor driver who was involved in the accident the following day. On each occasion that the tractor crossed, the driver called the signaller on a mobile phone seeking permission to cross. It was apparent from the content of the phone calls that they were being made by the tractor driver rather than by anyone located on the ground at the crossing. The tractor driver remained on the phone while crossing and informed the signaller when the tractor and trailer were clear of the railway. During the harvesting period on Saturday 24 September 2011, there were 26 train movements over the crossing. On four occasions, the signaller informed the tractor driver that he could not authorise him to cross immediately because a train was approaching.

Events on the day of the accident

12 The signaller on duty at Kings Lynn signal box on the morning of 25 September 2011 had not been on duty the previous day. Just before 08:00 hrs, the signaller and the tractor driver had a short discussion about the arrangements for the day, during which the tractor driver confirmed that he would be remaining on the phone while the tractor crossed. Shortly afterwards, the tractor made its first transit over the crossing.

13 Over the next two hours, the tractor driver made 13 transits of the crossing; three trains passed over the crossing in the same period. On none of these occasions did a train movement coincide with a time when the tractor driver wished to cross. When the tractor driver approached the crossing at 10:07 hrs on the last trip before the accident occurred, the signaller at Kings Lynn mentioned that a train would be leaving Kings Lynn in three minutes. The information was imparted during a two-minute conversation between the signaller and the tractor driver about the best telephone number for the tractor driver to use when contacting Kings Lynn signal box.

14 Shortly after 10:12 hrs, the tractor driver approached the crossing from the field. In the meantime, train 1T60, formed of a four-car class 365 electric multiple unit, departed from Kings Lynn at 10:10 hrs and was also approaching the crossing. The tractor driver stopped on the ramp leading up to the crossing, called the signaller and asked for permission to cross. The signaller responded with the following words:

"OK, the line is clear for you to cross…train just passed you hasn't he?"

15 The tractor driver, on hearing part or all of the phrase, "OK, the line is clear for you to cross…" immediately started to move the tractor onto the crossing. As he did so, he became aware of the approaching train, but the front of the tractor was already foul of the line.

16 Based on witness statements and information from the on-train data recorder, it is apparent that at the time the tractor started to move towards the crossing, the train was no more than 150 metres away and travelling at 70 mph (113 km/h). The train was no more than 100 metres away when the tractor moved onto the crossing. The train driver reacted by sounding the horn when he realised the tractor was moving towards the crossing and then applied the brake in the emergency position. Given the close proximity of the train to the crossing, a collision was unavoidable and the train struck the tractor while still travelling at 70 mph (113 km/h).

17 The driver of the train vacated the cab shortly before the train struck the tractor. The impact between the train and the tractor caused the front of the tractor to be separated from the driving cab (figure 4). The tractor driver remained in the cab of the tractor, but suffered a broken collarbone, lacerations and bruising.

18 Debris from the front half of the tractor became lodged under the train (figure 5). In the aftermath of the collision, the second wheelset on the train was derailed, but the train remained upright and in line, stopping approximately 320 metres from the crossing. There were 41 passengers and a Revenue Protection Inspector on the train. None were injured.

Figure 4: The cab section of the tractor (trailer still attached)

Figure 5: Debris under the front of train 1T60

19 The train driver suffered a chest injury and shock in the collision and was not in a position to call the signaller immediately after the accident. The Revenue Protection Inspector made an emergency call to the signaller at Magdalen Road shortly after the train stopped. He used his own mobile phone, into which he had programmed signal box numbers. The cab secure radio equipment on the train had been damaged in the accident and was not working. The signaller made the necessary arrangements for the emergency response.

20 A solid metal counterweight (weighing approximately 1100 kilograms) on the front of the tractor was detached in the collision and it struck and dislodged a stanchion supporting the overhead line equipment which supplies traction current to trains. The power lines were left hanging near the track (figure 6). It was necessary for the equipment to be isolated and earthed before passengers could be evacuated from the train. The evacuation did not start until approximately 13:00 hrs.

Figure 6: Damage to overhead line stanchion and equipment caused by counterweight from tractor

Identification of the immediate cause[7]

21 **The tractor moved onto White House Farm Crossing when train 1T60 was no more than 100 metres away, and unable to stop.**

Identification of causal factors[8]

The actions of the signaller

22 **The signaller gave permission for the tractor driver to cross the railway before establishing that train 1T60 had passed. This was a causal factor.**

23 The tractor driver moved his vehicle because he responded immediately to the first part of the communication from the signaller stating that the line was clear for the tractor to cross (paragraph 14).

24 Kings Lynn signal box is equipped with a track layout diagram which indicates when a train is in the general area of White House Farm UWC. An indicator illuminates when the train is travelling over a section of line which is 1438 metres long. White House Farm is located at the approximate midpoint of this section, and a four-coach train is approximately 80 metres in length. The signaller cannot tell exactly where the train is in relation to the crossing.

25 Given that the indicator was illuminated, the signaller should, before giving permission, either have asked the tractor driver for confirmation that a train had just passed[9] or waited until the indicator light was extinguished, rather than assuming that the tractor driver had called because he had just seen the train pass.

26 The signaller was experienced. He had worked on the railway for 27 years, mainly as a signaller, and had operated Kings Lynn signal box since 1998. His communication skills had last been reviewed on 21 December 2010 by a Local Operations Manager using a sample of five telephone voice recordings. The signaller had been assessed as good or satisfactory across a range of parameters.

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[7] The condition, event or behaviour that directly resulted in the occurrence.

[8] Any condition, event or behaviour that was necessary for the occurrence. Avoiding or eliminating any one of these factors would have prevented it happening.

[9] Since this method was being applied on a single track railway, there was no ambiguity about which train has just passed. On a double track railway, there is a danger that the user may confirm having seen a train just pass, but actually be referring to another train travelling in the opposite direction. Under these circumstances, there is a risk that the user could be authorised to cross when a train was approaching.

The actions of the tractor driver

27 **The tractor driver moved onto the crossing immediately that the signaller gave permission for him to cross. This was a causal factor.**

28 The tractor driver had been working the previous day on transporting the sugar beet from the field to the stockpile and by the time of the accident had made more than one hundred crossings. On the vast majority of occasions he had spoken to the signaller before crossing, but he had also crossed twice on the morning of 25 September 2011 without the signaller's permission because the signaller's phone had been engaged. On these occasions, he checked that no train was approaching before moving onto the crossing (the normal method of working at White House Farm UWC).

29 When the tractor driver received the signaller's permission to cross immediately before the accident, he did not check that it was safe to do so before moving his tractor. As far as he was concerned, the signaller's permission was all the assurance he needed that it was safe to cross.

The method of working

30 **The method adopted for working White House Farm UWC during the period of intensive use on 24 and 25 September 2011 had not identified and controlled the potential risk arising from mis-communication between the signaller and the tractor driver. This was a causal factor.**

31 The Network Rail MOM was under the impression that a farm worker would be located at the crossing to call the signaller when a tractor needed to cross (paragraph 10). However, the tractor driver had been briefed by his manager to call the signaller each time he wished to go over the crossing.

32 The normal method of operating the crossing was for the user to assess whether it was safe to cross. The circumstances under which the user might need to obtain authority to cross were described on the signs at the crossing (paragraph 7). Drivers of vehicles deemed unusually long, wide, slow, heavy or slow-moving were required to call 'the operator' before crossing. The sign did not define these terms.

33 Network Rail had estimated that sighting at the crossing was 1167 metres when looking towards Kings Lynn (paragraph 6). This meant that the sighting time for a train approaching from that direction at maximum permitted speed (90 mph, equivalent to 40.2 m/s) was around 29 seconds. Analysis of voice communications during the weekend of 24/25 September 2011 indicates that it was actually taking a maximum of 14 seconds for the tractor and trailer to cross.

34 However, Network Rail's MOM and the representative from the farm had agreed that an alternative method of operating the crossing should be adopted for the weekend of 24/25 September 2011 (paragraphs 9 and 10). The MOM accepted that an alternative method of working was desirable because of the high volume of traffic that would operate over the crossing that weekend.

35 There were three possible methods considered for operating the crossing:

- The 'normal' method of working, involving the tractor driver opening and closing gates and looking out for trains. If this method had been adopted, there would have been a significant reduction in the number of crossings that could have been made in a day and on each trip the tractor driver would have needed to get out of and into the vehicle twice and open and close both gates.
- Place a member of farm staff at the crossing to look out for approaching trains and provide a positive indication (eg hand signal) to the tractor driver as to whether it was safe to cross or not.
- Involve the signaller in the method of operation, by getting the tractor driver to call him every time that the tractor needed to cross.

36 The MOM and the farm's representative did not reach a clear understanding about the method of working to be used (paragraphs 9 and 10). In practice, the method adopted involved the tractor driver telephoning the signaller every time he needed to cross the line, using a mobile phone. The gates at the crossing were left open throughout the day because of its intensive use. Although this had not been agreed in the discussion between the MOM and the representative from the farm in August, the tractor driver had told each signaller involved that the gates would be left open. No train driver reported the gates as being left open during 24 or 25 September, probably because the amount of activity taking place in close proximity to the crossing indicated that it was in frequent use.

37 The method adopted for operating the crossing during the period of intensive use involved the signaller in a central role. The signaller would not normally have been involved in, or even aware of, vehicle movements over the crossing. It introduced the potential for the misunderstanding which ultimately caused the accident, by transferring responsibility for safe use of the crossing from the user (who could see whether it was safe to cross by looking for trains) to the signaller (who was remotely located from the crossing and not in a position to determine the exact position of a train in relation to it). Although this method of operation was envisaged for the occasional unusual load (paragraph 7), it was not the optimum method for 90 crossings per day. In effect, the crossing was being operated in degraded mode over the weekend of 24/25 September 2011.

Factor affecting the consequences of the accident

Time taken to evacuate the train

38 Evacuation of the train commenced three hours after the accident. This did not cause any particular discomfort to passengers who, mindful of the circumstances, waited patiently.

39 There was a need to earth the dislodged overhead line equipment (paragraph 18) before evacuation could commence. The nearest staff competent to undertake earthing were at Cheshunt, almost 100 miles, and around two hours' drive, away. By the time that they had been deployed, travelled to Kings Lynn and applied the earthing equipment, almost three hours had elapsed since the accident.

40 Network Rail has no staff in the Kings Lynn area trained in earthing, although MOMs are trained to undertake switching of the overhead line equipment and to remove objects from the overhead line. If local staff had been on-hand, earthing could have been accomplished earlier. Passengers could have been evacuated as soon as coaches for their onward transit were available. The coaches were in place 90 minutes after the accident and evacuation might therefore have been accomplished approximately 75 minutes earlier than was achieved on 25 September 2011. It should also be noted that delays in earthing can impede fire-fighting operations as fire crews will normally seek assurance that the overhead line is earthed before applying water to a fire or working in close proximity to electrical conductors.

Observations[10]

Error in the measurement of sighting distances from White House Farm UWC

41 Network Rail has a process in place for periodic inspection and risk assessment of all level crossings. White House Farm UWC had last been visited on 18 January 2011 in response to a near-miss that had occurred on the crossing on 31 December 2010 involving a Heavy Goods Vehicle crossing in front of a train. The MOM who undertook the visit had estimated the sighting distance towards Kings Lynn as 985 metres, which was less than the required sighting distance of 1127 metres (paragraph 6). On this occasion, he used the emergency plan to estimate the sighting distance. The plan contains mileages for key access points such as crossings and bridges. He based his estimate on the mileages given in the plan for White House Farm UWC and the A47 road bridge, which could be seen from the crossing.

42 Network Rail's Operational Risk Control Coordinator asked that the sighting distance be re-checked because she had looked at a map of the area and thought that the MOM had underestimated it. The MOM duly returned to the crossing on 10 April 2011. On this occasion, he noted the mileage on the ground at the crossing and at the bridge (mileages are marked at every chain[11] on the ends of sleepers) and calculated the sighting distance to be 1167 metres (and thus compliant). The mileages in the emergency plan were therefore incorrect.

43 However, although the A47 road bridge was visible from White House Farm UWC, it was only the upper part of the bridge that could be seen. Trains pass below the road bridge and are not visible from White House Farm UWC at that point because of a curve in the track. When the MOM calculated the sighting distance on 10 April 2011, he did not realise that trains passing under the A47 road bridge could not be seen from the crossing.

44 After the accident, Network Rail measured the actual sighting distance towards Kings Lynn as 820 metres using a measuring wheel. Sighting distances at the crossing for up trains were therefore non-compliant with the crossing time for a HGV or tractor and trailer as obtained when applying Network Rail's own procedure (paragraph 6 and footnote 4).

Considering how White House Farm UWC is used when undertaking risk assessments

45 Network Rail had not measured the sighting distance from the crossing towards Kings Lynn accurately and did not therefore recognise that sighting times at the crossing were non-compliant (paragraphs 41 - 44). It is likely, however, that sighting distances for some users of the crossing were, in any case, much lower than Network Rail had estimated.

[10] An element discovered as part of the investigation that did not have a direct or indirect effect on the outcome of the accident but does deserve scrutiny.

[11] A chain is 22 yards (20.1 metres).

46 When data gathering for risk assessments is undertaken (paragraph 41), the measurement of sighting distances in both directions is normally taken from the crossing itself. White House Farm UWC is located on a shallow embankment with ramps leading up to each side of the crossing. The crossing is used predominantly by tractors, which means that the point at which a tractor driver assesses whether it is safe to cross is actually several metres back from the crossing because of the need to keep the front of the tractor clear of the line.

47 This makes a significant difference to sighting distances (figure 7). The crossing gate and signage are located 2.6 metres from the nearer rail on the up (east) side of the crossing. Network Rail had estimated the sighting distance towards Watlington to be 1388 metres from this point[12]. The RAIB observed that the sighting distance changed significantly if measured from a point further back from the crossing, for example:

- 475 metres when viewed from a position 3.2 metres from the sign/gate (5.8 metres from the nearer rail); and
- 317 metres when viewed from a position 5 metres from the sign/gate (7.6 metres from the nearer rail).

48 The front of a tractor similar to the one involved in the accident on 25 September 2011 is approximately 3.7 metres from the driver's position. For the purposes of illustration, if the tractor driver were to stop with the front of the tractor approximately two metres from the nearer rail (as is likely if the driver is looking for trains), the sighting distance towards Watlington would be around 500 metres; equivalent to a sighting time of around 12 seconds for a train approaching at 90 mph (145 km/h).

Figure 7: Sighting from White House Farm UWC towards Watlington at 5.8 metres from the nearer rail on the east side of the crossing from a height similar to that of a person sitting in a tractor. Sighting from a point further back would be significantly impaired by the vegetation to the left of the line.

[12] This distance was not verified by the RAIB.

49 Network Rail invites authorised users to provide input to risk assessments. The accuracy of those risk assessments is enhanced when Network Rail is able to achieve a good understanding of how crossings are actually used. This includes consideration of the sighting position of the different type of crossing user to facilitate the identification of a reasonable worst case for sighting at the crossing.

Signs and telephones at the crossing

50 Five different signs were provided at the crossing (figure 6). Two different phone numbers were also provided, but a user could not tell from the signs who would respond. There was a reference to contacting the operator for drivers of designated vehicles (paragraph 7), without any indication of which phone number to use.

51 The number of signs is confusing and the signs lack useful information. The Rail Safety and Standards Board is currently undertaking a research project, 'T983 - Research into signs at private level crossings'. The scope of the research includes determining the instructions, messages and/or warnings that should be conveyed to users of level crossings on private roads, and on private land, to ensure that they carry out the required actions correctly and safely.

52 One of the telephone numbers did not work (paragraph 8). Maintenance staff visiting level crossings check that telephones, where provided, are working, but not whether telephone contact numbers are correct and functioning.

Information held by Network Rail on authorised users at UWCs

53 The authorised user at White House Farm UWC changed during 2010. Network Rail was advised of this on 8 November 2010 by the previous authorised user, who included contact details for the company that had purchased the farm. Network Rail did not act on this information, and wrote to the previous authorised user on 11 February 2011 about level crossing safety and on 28 March 2011 regarding a near-miss that had occurred in December 2010 (paragraph 41).

54 In response to the letter of 28 March 2011, the previous authorised user wrote to Network Rail again on 28 April 2011 advising of the change of ownership, but Network Rail did not update its records and staff sent further letters to the previous authorised user on 13 May 2011 and 25 July 2011 (in relation to the two near-miss incidents of December 2010 and May 2011 – see paragraph 57). On the day of the collision, the Operations Risk Advisor sent an email to a number of parties about the accident. The details of the authorised user given in the email were those of the previous authorised user, indicating that Network Rail's records were still not current.

55 Network Rail needs to maintain accurate information regarding authorised users at crossings as it is sometimes necessary for them to be contacted with safety advice. The presence of a new authorised user presents Network Rail with an opportunity to acquaint them with the responsibilities associated with a UWC and to gather intelligence about how the crossing is to be used (paragraph 49).

Previous incidents

Previous incidents on White House Farm UWC

56 Crossing assessments undertaken by Railtrack (until October 2002) and Network Rail (from October 2002) from 2000 onwards were made available to the RAIB. Those assessments record misuse at crossings and near-misses. In the period up to December 2010, the only recorded incident of misuse was when the level crossing assessor who visited in January 2005 found the gates open.

57 In the nine months leading up to the accident, the following incidents were recorded:

- near-miss with a Heavy Goods Vehicle in foggy conditions on 31 December 2010 (paragraph 41);
- near-miss with a quad bike on 4 May 2011; and
- gates left open on 1 June 2011, 13 July 2011, 24 July 2011, 23 August 2011 and 15 September 2011.

Recent accidents on UWCs

58 The RAIB has investigated three other accidents involving trains striking tractors on user worked crossings:

- On 19 October 2005, a train struck a tractor on Black Horse Drove UWC near Littleport in Cambridgeshire (approximately 15 miles from White House Farm UWC)[13]. The tractor driver was fatally injured. Black Horse Drove UWC was equipped with miniature stop lights to assist road vehicle drivers. The report concluded that the lights were functioning at the time and the tractor driver either did not see them or did not re-check them after opening the crossing gates.
- On 2 August 2007, a train struck a tractor on UWC No. XL202 near Limavady Junction in Northern Ireland[14] in circumstances when the crossing was being used more frequently than at most times of the year. The tractor driver was fatally injured. The tractor driver had not seen the approaching train; his view of it may have been obstructed by the configuration of the tractor's driving cab and affected by the position of the sun in relation to the train.
- On 25 August 2007, a narrow-gauge train operating on the Leighton Buzzard Narrow Gauge Railway struck a tractor on Cavalry Horse UWC[15] causing a minor injury to one passenger. The presence of vegetation at the crossing made it impossible for the tractor driver to see the approaching train.

59 In none of the above cases did the RAIB make a recommendation that was relevant to the cause of the accident at White House Farm UWC.

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[13] RAIB report 12/2006, published July 2006.

[14] RAIB report 10/2008, published April 2008.

[15] RAIB report 46/2007, published December 2007.

60 The RAIB has also investigated three collisions between trains and other road vehicles on user worked crossings:

- at Bratts Blackhouse No 1 UWC, near Sizewell, Suffolk on 22 May 2006 involving a car[16];
- at Sewage Works Lane UWC, near Sudbury, Suffolk on 17 August 2010 involving an articulated tanker[17] (recommendation 3 of the investigation report emphasised the need for Network Rail to engage with authorised users when undertaking risk assessments following near-miss incidents); and
- at Fox Park No.1 UWC (on the preserved Wensleydale Railway) on 1 August 2011, involving a car[18].

61 In June 2009, the RAIB published the results of a generic investigation into safety at user worked crossings[19]. The report refers to a collision between a train and a tractor on Loover Barn UWC, near Glynde in Sussex, on 13 June 2008. The crossing was being used intensively over a period of four days. One of the signallers varied the normal method of working which involved use of a device (reminder appliance) to remind him not to signal a train over the crossing when permission had been granted for a road user to cross. Instead, he kept the reminder appliance in place at all times other than when he needed to signal a train over the crossing. This led to him overlooking a track circuit indication showing that a train was in the section of line through Loover Barn UWC and authorising a tractor to cross just before the arrival of the train. The report into safety at user worked crossings recommended that authorised users should be invited to participate in risk assessments in order to ensure all factors are considered, which is now included within Network Rail's procedures (paragraph 49).

[16] RAIB report 09/2007, published April 2007.

[17] RAIB report 14/2011, published August 2011.

[18] RAIB bulletin 05/2011, published October 2011.

[19] RAIB report 13/2009, published June 2009.

Summary of conclusions

62 The collision between train 1T60 and the tractor occurred because:

a. the signaller gave permission for the tractor driver to cross the railway before establishing that train 1T60 had passed (**paragraph 22, Learning point 1**);

b. the tractor driver moved onto the crossing immediately that the signaller gave permission for him to cross (**paragraph 27, Learning points 1 and 2**); and

c. the method adopted for working White House Farm UWC during the period of intensive use had not identified and controlled the potential risk arising from mis-communication between the signaller and the tractor driver (**paragraph 30, Learning point 2**).

63 The consequences of the accident were affected by the unavailability of local staff trained to earth the overhead line equipment, which delayed the evacuation of train 1T60 by up to 75 minutes (**paragraphs 38 to 40, Learning point 3**).

64 The RAIB has observed that:

a. the sighting distance from White House Farm UWC towards Kings Lynn had not been accurately measured by Network Rail (**paragraphs 41 to 44 and 65, Learning point 4**);

b. the way in which vehicles used White House Farm UWC had not been considered when data gathering for risk assessments of the crossing had been undertaken (**paragraphs 45 to 49, Learning point 5**);

c. the signage at the crossing was confusing and one of the telephone numbers identified on a sign did not work (**paragraphs 50 to 52 and 65, Learning point 6**); and

d. the information held by Network Rail about the authorised user at White House Farm UWC was not up-to-date (**paragraphs 53 to 55 and 65, Learning point 7**).

Actions reported that address factors which otherwise would have resulted in a RAIB recommendation

65 Network Rail has:

- Re-assessed sighting distances at White House Farm UWC and found that they are not compliant. Network Rail intends to install telephones at the crossing to provide users with a direct means of communication with the signaller before they cross (paragraph 64a).
- Restored the telephone number which had previously been out of use (paragraph 64d).
- Updated its records regarding the authorised user at White House Farm UWC (paragraph 64e).

Learning points[20]

66 The RAIB has identified seven key learning points for the railway industry:

Learning point 1

Signallers need to be made aware of the need to ensure that safety-critical messages are delivered in the right way (this is particularly important when dealing with people who are not used to receiving / sending safety-critical information). The voice recording from this accident would form useful training material for Network Rail to illustrate to signallers the effects of getting the order of the words wrong (paragraph 62a).

Learning point 2

Where Network Rail becomes aware that non-standard methods are to be applied to operating a UWC, it is important that all parties involved jointly review the proposed method of working which should then be documented and confirmed in order that misunderstandings can be avoided (paragraph 62b).

Learning point 3

At remote locations, the availability of staff trained in earthing overhead line equipment may assist in speeding up train evacuations and help to expedite fire-fighting (paragraph 63).

Learning point 4

There is a need to remind staff that sighting distances are critical to the assessment of safety at crossings and that they need to be sure that trains can actually be seen at the chosen sighting point when standing at a crossing (paragraph 64a).

Learning point 5

The accuracy of the level crossing risk assessment process is enhanced when engagement with authorised users at UWCs includes consideration of how a crossing is used so that a reasonable worst case for sighting at the crossing can be identified (paragraph 64b). A recommendation to this effect has already been made by the RAIB (paragraph 61).

Learning point 6

Maintenance visits to level crossings should include a check that telephone contact details are correct and functioning and crossing risk assessments should also consider the clarity and accuracy of the information displayed to the user (paragraph 64c).

Learning point 7

It is important that information held on authorised users is current (paragraph 64d).

[20] An issue which the RAIB wishes to draw to the attention of industry bodies and railway staff so that they can take appropriate action.

Recommendations

67 Given previous recommendations made by the RAIB (paragraphs 60 and 61) and the actions already taken by Network Rail (paragraph 65) the RAIB does not consider it necessary to make further recommendations to reinforce the learning points at paragraph 66.

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Any enquiries about this publication should be sent to:

RAIB
The Wharf
Stores Road
Derby UK
DE21 4BA

Telephone: 01332 253300
Fax: 01332 253301
Email: enquiries@raib.gov.uk
Website: www.raib.gov.uk