RAIB

Rail Accident Investigation Branch

Rail Accident Report



Collision between a passenger train and a van at Bax level crossing
13 July 2025

Report 12/2026
November 2026

This investigation was carried out in accordance with:

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

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This report is published by the Rail Accident Investigation Branch, Department for Transport.

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.

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

Any information about casualties is based on figures provided to 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. 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.

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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Collision between a passenger train and a van at Bax level crossing, 13 July 2025

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Summary

At around 12:42 on 13 July 2025, a passenger train travelling from Ramsgate to London Victoria collided with a stationary delivery van on Bax user worked crossing near Teynham in Kent. The train was travelling at approximately 71 mph (114 km/h) when the accident occurred. The driver of the van was fatally injured.

Bax user worked crossing has outward opening gates to either side of the railway and is fitted with an overlay miniature stop light system, which shows a green light if no trains are approaching. This will change to show a red light, and an audible warning will sound, once a train is detected approaching the crossing. The correct operation of the crossing is described by signs. These instruct users to check that a green light is showing before opening both gates, before crossing with a vehicle, and again before closing both gates.

RAIB's investigation found that the van was stationary on the level crossing because the green light shown by the miniature stop light system when the delivery driver arrived almost certainly led them to believe that it was safe to enter the crossing once the entry gate had been opened, despite the exit gate still being closed. RAIB also found that the signage at the crossing and the lack of road markings did not effectively guide the delivery driver to use the correct crossing procedure.

Underlying factors were that a project to develop and implement new signage for use at private crossings, such as Bax, did not sufficiently consider how diverse information sources may influence crossing user behaviour. In addition, RAIB found that, once Network Rail had fitted miniature stop lights at a crossing, it became unlikely that further upgrades would take place, and reliance on signs being understood and obeyed remained essential for safe crossing usage. RAIB also found that the training and guidance provided to the delivery driver, who was self-employed but working on behalf of a logistics company, had not prepared them to use the crossing safely.

Although not linked to the accident on 13 July 2025, RAIB observed differing interpretations of the concept of an authorised user within railway processes for identifying and assessing risk at level crossings.

RAIB has made four recommendations. The first is addressed to Network Rail and asks for a review of the design of user worked crossings to reduce risk to users. This is supported by the second recommendation, which asks the Department for Transport, working in consultation with the Office of Rail and Road and relevant rail industry bodies in Great Britain, to update the framework of legal requirements, and guidance to road users relating to user worked level crossings. The third is addressed to the Health and Safety Executive, to review guidance to organisations employing people to drive or ride for work, or engaging self-employed people to do so, on the safe use of user worked crossings. The fourth asks Network Rail to review the concept of the role of authorised users in the guidance it provides to its staff.

Introduction

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 and acronyms, which are explained in appendix A. Sources of evidence used in the investigation are listed in appendix B.

3 The timings used in this report are based on RAIB's analysis of the various data sources. The timestamps used by those systems for which data is available have been synchronised with the CCTV cameras at Bax level crossing.

The accident

Summary of the accident

4 At around 12:42 on 13 July 2025, train reporting number 1P34, the 11:53 passenger service from Ramsgate to London Victoria, collided with a stationary parcel delivery van on Bax user worked crossing (UWC) near Teynham in Kent (figure 1). The train, operated by Southeastern, was travelling at approximately 71 mph (114 km/h) when the accident occurred. The driver of the van was fatally injured.

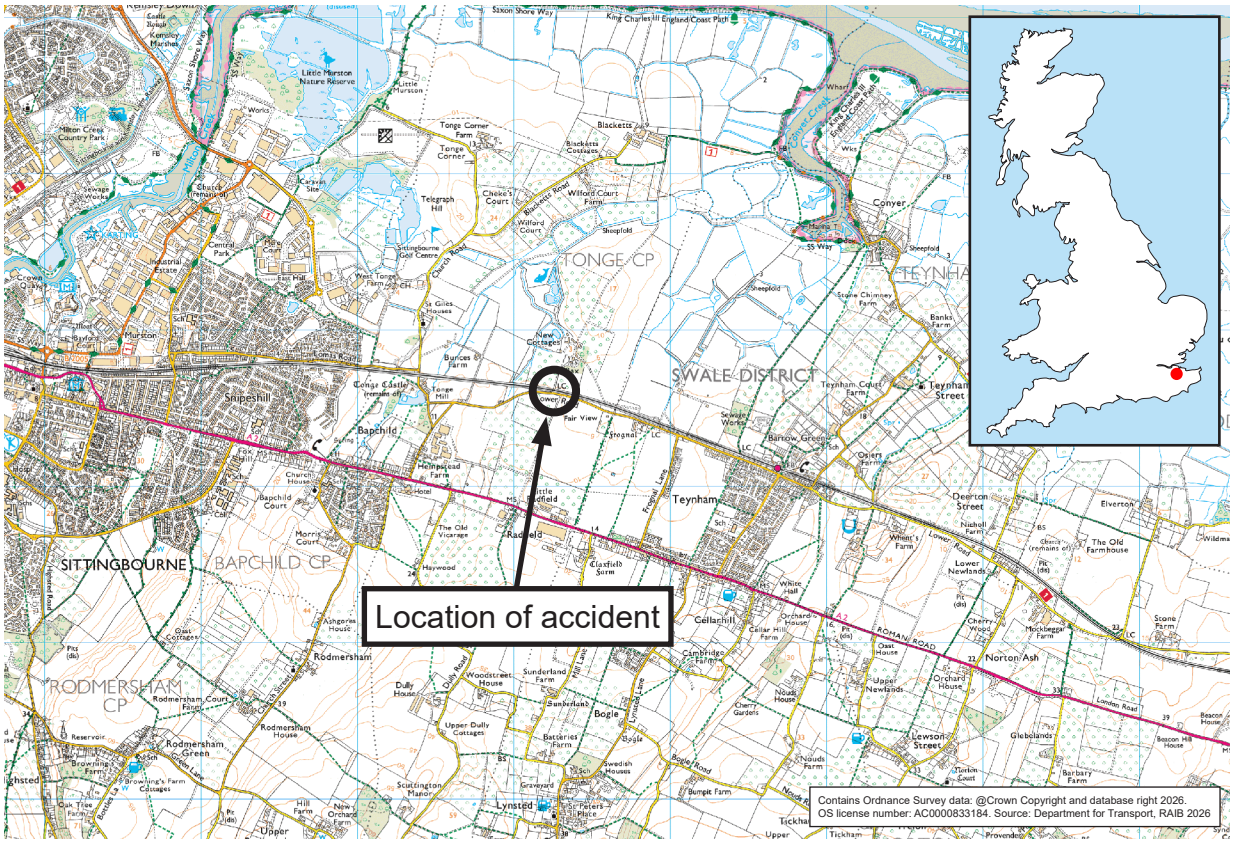


Figure 1: Extract from Ordnance Survey map showing the location of the accident at Bax level crossing.

5 There were three reported minor injuries to passengers on the train. The train did not derail, but significant damage was caused to the leading cab, coupling and side of the front four vehicles, including a broken bodyside window. The van was also severely damaged.

Context

Location

6 Bax UWC is located between Sittingbourne and Teynham on the London Victoria to Ramsgate (via Herne Hill and Chatham) line, 47 miles and 2 chains from a zero point at London Victoria station. It is on a private lane which runs from a main road, Lower Road, to residential properties and local businesses in an area known as Bax (figure 2).



Figure 2: Overview of accident site showing geographical relationship of main features.

7 The London Victoria to Ramsgate line is a double-track railway that runs broadly west to east through the area. The two tracks are the Up Chatham line and the Down Chatham line (figure 3). The Up Chatham line conveys trains towards Sittingbourne and London, while the Down Chatham line carries traffic in the opposite direction. At Bax level crossing, the permissible speeds on the Up and Down Chatham lines are 90 mph (145 km/h) and 80 mph (129 km/h) respectively.

8 The lines are electrified using a third rail conductor energised at 750 V DC. There is an intentional gap in the conductor rail over the crossing. Signalling in the area is operated in accordance with the track circuit block regulations and uses colour light signals controlled from the East Kent signalling centre in Gillingham, Kent. Train detection at the location is provided by axle counters.

9 There is an alternative access route to Bax which avoids the need to use the level crossing (figure 2). This route comprises an underpass, identified as bridge number VIR215, located at 47 miles and 23 chains. The underpass is reached via another private road that also connects to Lower Road. The underpass beneath the railway has a height restriction of 2.6 metres (figure 4), which is displayed on a sign on the bridge, although this is almost entirely faded and hard to read.

10 The Environment Agency's flood maps indicate that the underpass is prone to flooding both from pluvial (surface water) and fluvial (river) sources. This has been reported as a regular occurrence during heavy rainfall. Flooding of the underpass increases usage at Bax level crossing.

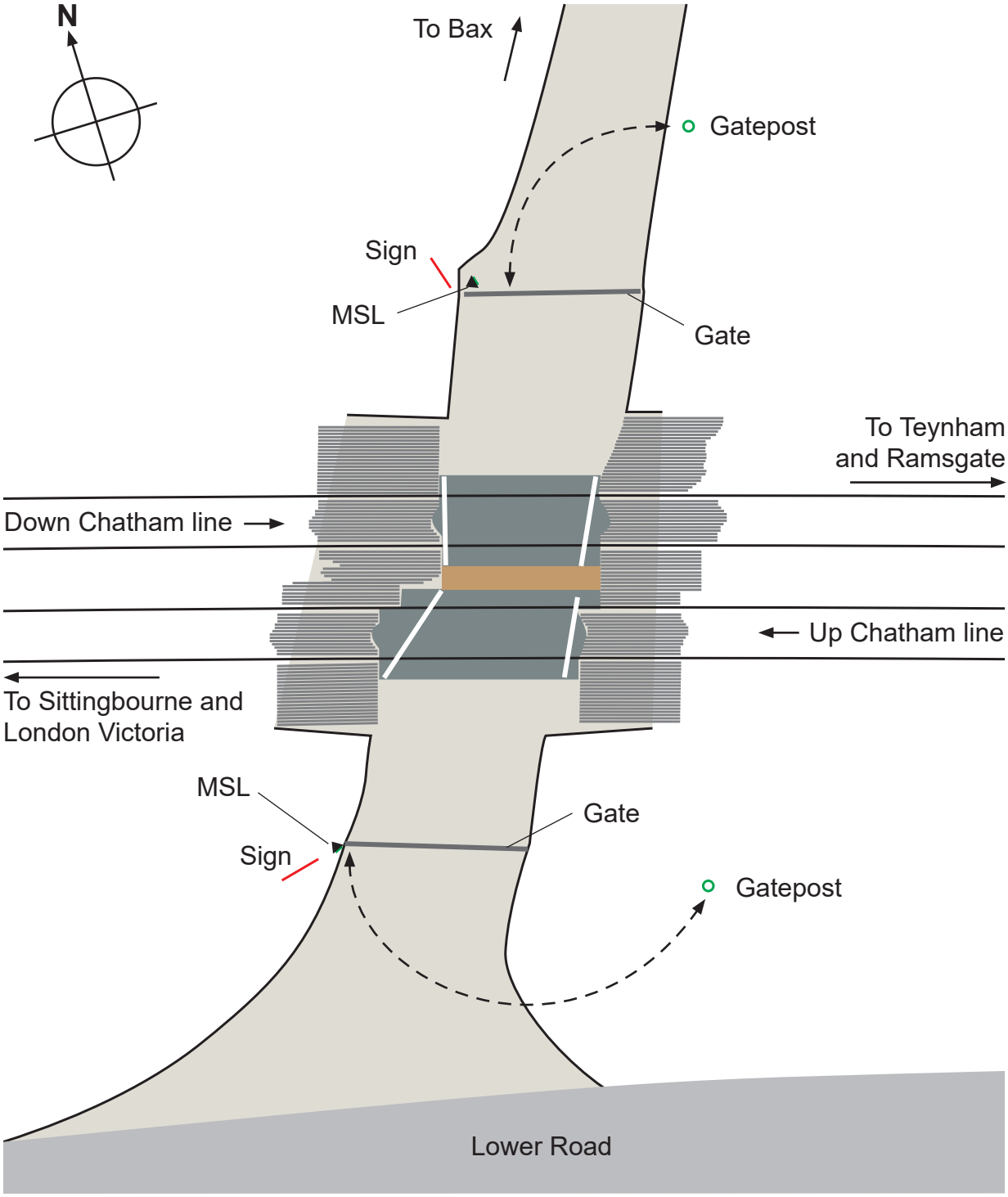


Figure 3: Track and crossing layout.



Figure 4: Bridge number VIR215 looking from Lower Road side approach.

Organisations involved

11 Network Rail is the owner and maintainer of the railway infrastructure at this location, including the level crossing and the nearby underpass. The railway here is part of Network Rail's Kent route, within its Southern region (each region acts as a devolved management organisation within the company). Network Rail also employs the staff responsible for gathering data about the crossing and for assessing and managing its safe use.

12 Southeastern is the operator of train 1P34 and is the employer of its traincrew.

13 GG Logistix is a service delivery company. It leases vans with Amazon livery and contracts self-employed drivers to drive them and carry out deliveries. GG Logistix contracted the delivery driver involved in the accident and provided them with the parcel delivery van.

14 Amazon UK Services Limited (Amazon) is a parcel delivery company that had contracted GG Logistix as a service delivery partner to undertake 'last-mile' deliveries (the final step of moving a parcel to a customer's door).

15 All parties co-operated freely with this investigation.

Train involved

16 Train 1P34 was formed of two 4-car class 375 units. These were unit numbers 375905 (leading) and 375608 (trailing).

17 There is no evidence that the way the train was driven had any effect on the accident.

The level crossing

18 Bax is a private UWC situated off Lower Road, west of the village of Teynham. The road over the crossing leads to a number of private houses and businesses. The crossing has outward opening gates to either side of the railway and is fitted with a miniature stop light (MSL) system, which shows a green light if no trains are approaching. This will change to show a red light, and an audible warning will sound, once a train is detected as approaching the crossing (see paragraph 48). The crossing is also fitted with level crossing signs in accordance with the relevant legal requirements (see paragraph 49 and figure 5). There is additional signage present at the crossing beyond that required by law.

People involved

The van driver

19 The driver of the van, Brandon Hatcher, was a 23-year-old self-employed delivery driver, who had been undertaking work for GG Logistix since July 2024. The driver's usual delivery area was close to Ashford and Sittingbourne. Although the area covered on the day of the accident was not their usual one, the driver had worked there previously. However, it is probably the case that they had not used the crossing at Bax before (see paragraph 28). The delivery driver held a full UK driving licence, applicable to the van they were driving.

20 The delivery driver had been promoted to a lead driver within a year of starting work with GG Logistix. Lead drivers are those who consistently show a high level of driving ability as scored by an in-cab 'Netrodyne' device fitted in the delivery vans. This scores the drivers on a number of criteria, including how close they are to the vehicle in front, remaining under the speed limit, and general careful driving. The data is collected by a third party and shared with Amazon and their delivery service partners for the purposes of investigating any safety-related issues.

Staff

21 The driver of train 1P34 had 32 years' experience on the railway as a driver. They held the relevant route knowledge and driving competencies for their duties on the day of the accident.

External circumstances

22 The crossing is in a rural area with little ambient noise. The accident happened during daylight hours on a clear day with a temperature of around 23°C recorded at a nearby weather station in Teynham. At the time of the accident, the sun was high and its position did not affect the view of the signs or the crossing. There were no other users present at the crossing at the time of the accident.

23 There is no evidence that external circumstances affected the accident.

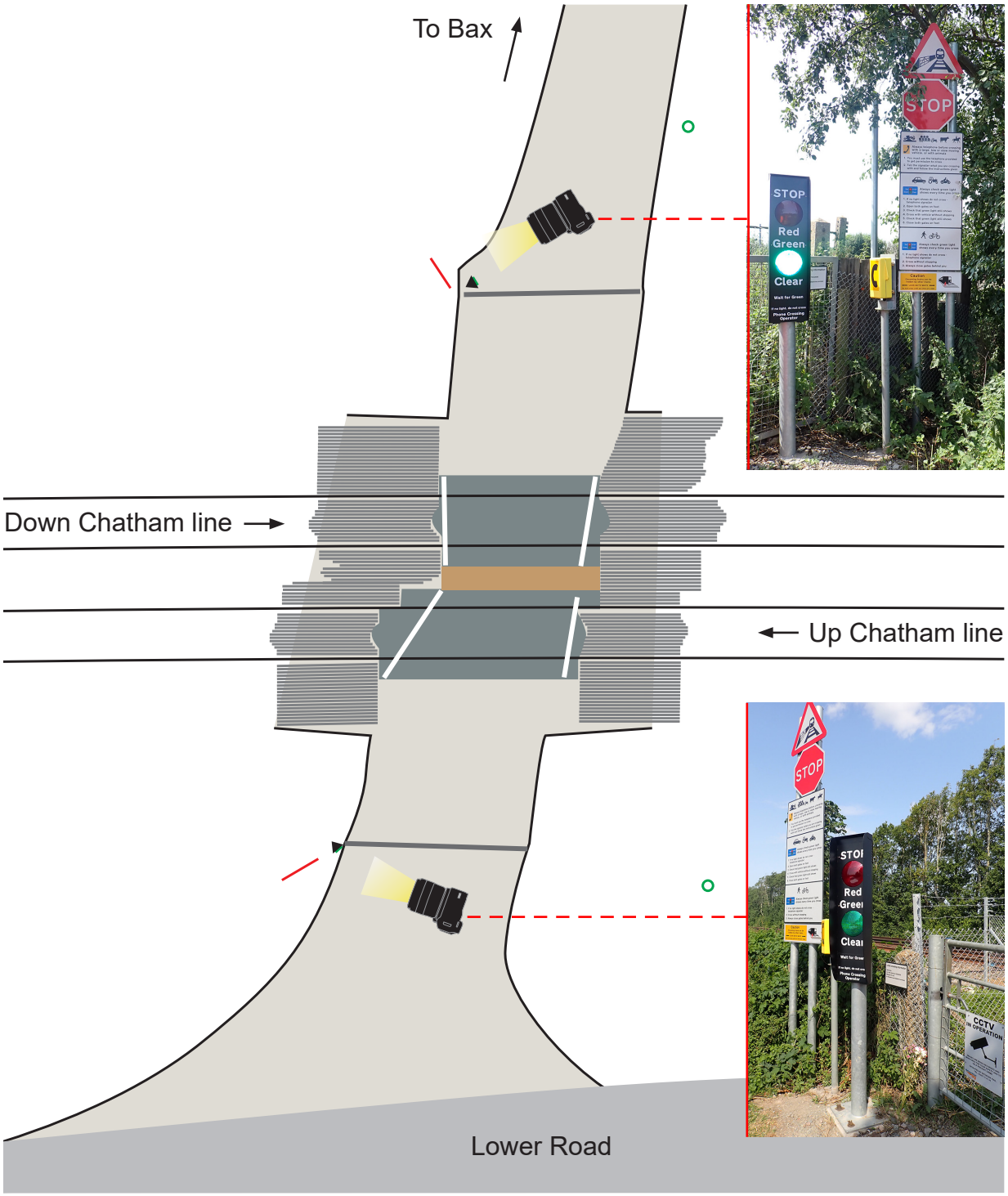


Figure 5: Crossing layout with main instructional signs and MSL locations; other signs omitted for clarity.

The sequence of events

Events preceding the accident

24 At around 08:45 on 13 July 2025, the delivery driver left home for work, a commute of between 35 and 55 minutes.

25 On arrival at the Amazon depot in Aylesford, the driver undertook the required start-of-day van checks via an application on their mobile phone. No defects were identified, and the driver was ready to start delivery work by 10:00. At this point, delivery drivers receive their suggested delivery route via a navigation application on their phone. This route comes directly from Amazon and is configured to support efficient delivery, in a similar way to other navigation applications. There is no planned or target time for each delivery.

26 Between around 10:00 and 12:30, the delivery driver completed seven deliveries in the vicinity of Sittingbourne. GG Logistix can see how each driver is progressing and the data for the day of the accident showed that the delivery driver was progressing without any delays.

27 At around 12:31, the delivery driver approached Bax UWC, travelling eastwards from Sittingbourne along Lower Road (figure 6). This was their first use of the crossing on 13 July. The parcel delivery van had a maximum height of 2.78 metres and was therefore unable to fit through the underpass (paragraph 9). The application that the driver was using for navigation is programmed with appropriate height restrictions and so instructed the driver to use Bax UWC rather than the underpass.

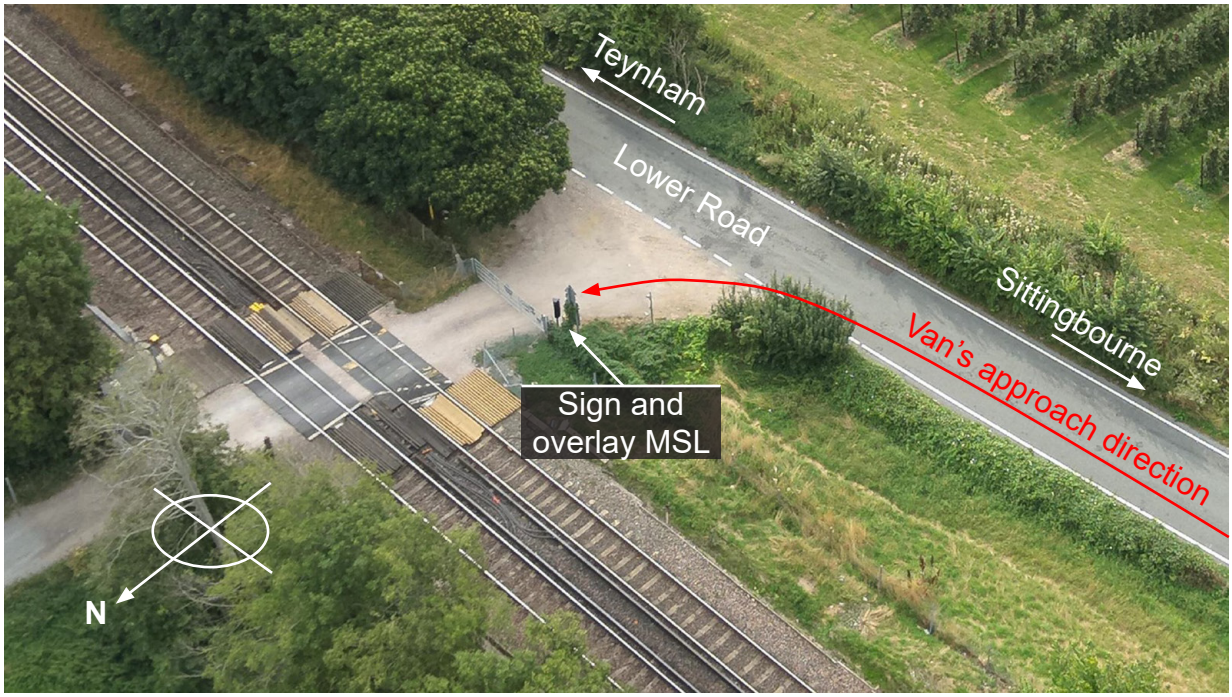


Figure 6: The van's approach direction for the first crossing on 13 July (courtesy of British Transport Police with RAIB annotations).

28 CCTV evidence shows that the van came to a stop at the crossing, and the driver alighted from the van. They walked towards the gate latch and appeared to observe the MSL, which was displaying a green light at the time. The driver then stepped forward and briefly looked around at the other signs. RAIB has been unable to ascertain if the delivery driver had used this crossing previously, but witness evidence suggests that it is probable that they had not used this or any other user worked crossing before.

29 The driver started to open the gate. It then became apparent that the van was parked too close to the gate for it to open fully, so the driver had to reverse the van. This manoeuvre is likely to have resulted in the rear of the van encroaching onto the main road. Once the gate was fully opened, the driver moved the van forward, momentarily stopping before driving onto the crossing (figure 7).

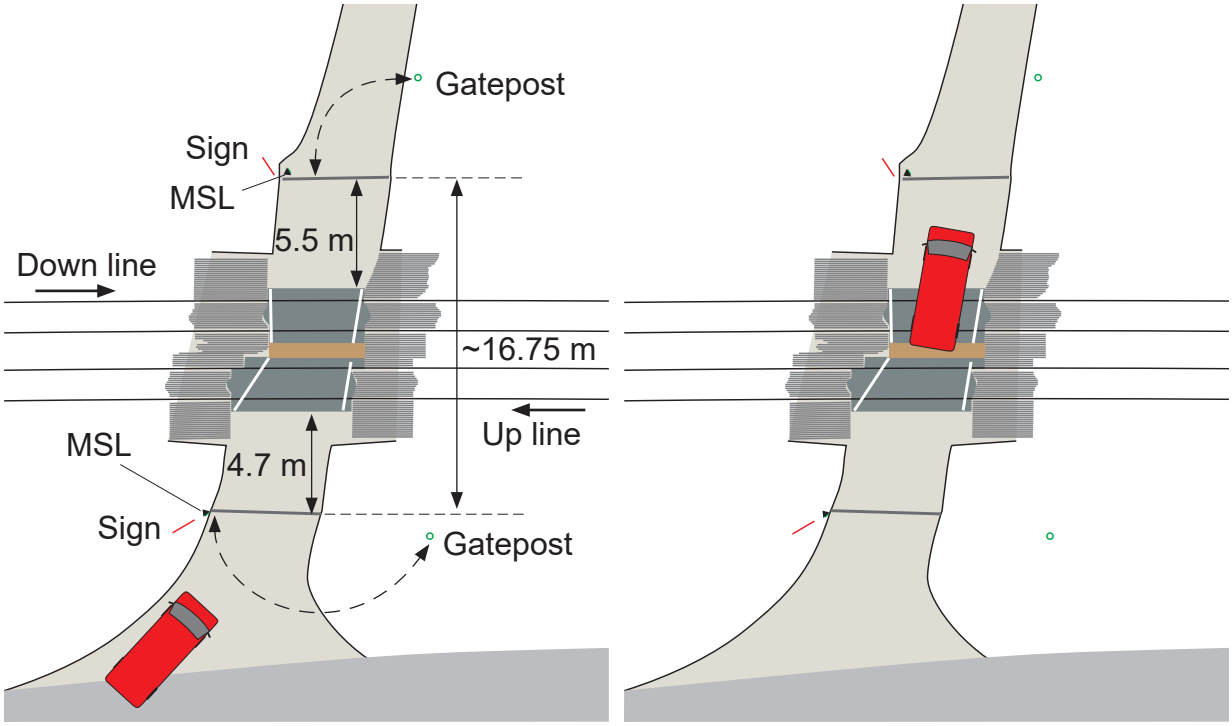


Figure 7: Diagram showing the van's positions for the first crossing on 13 July.

30 After entering the crossing, the driver stopped the van, as the exit gate on the Bax side was still closed (figure 8). The delivery driver alighted from the van, closed the entry gate on the Lower Road side, and walked to the far side to open the other gate. After returning to the van, the driver drove the van off the crossing and stopped to close the Bax side gate.

31 The driver completed three deliveries to residential properties and a local business at Bax.

Events during the accident

32 At 12:41, the driver was ready to leave Bax and drove back to the crossing. They stopped the van with enough clearance to fully open the gate on the Bax side.

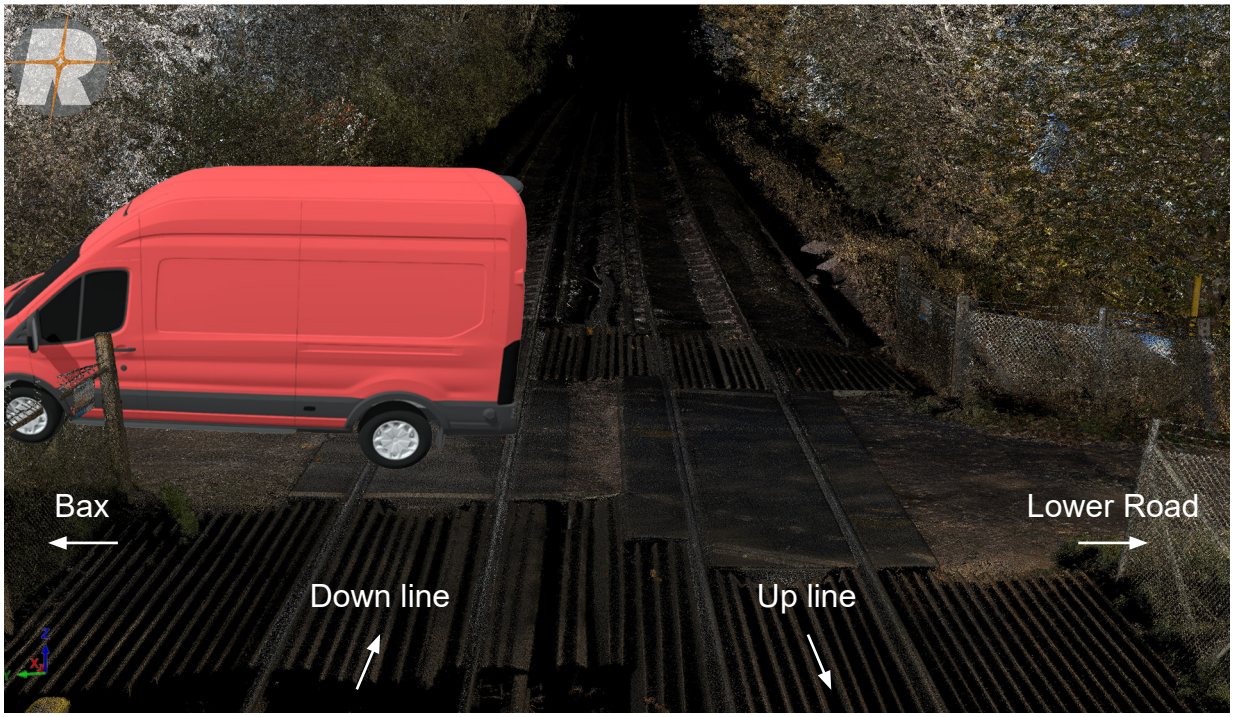


Figure 8: Approximate position of the van while stationary during the first crossing on 13 July.

33 At this point, as shown on the level crossing CCTV, the MSL was displaying a green light. After opening the gate, the driver moved the van onto the crossing, where it stopped at 12:42:02. The exit gate on the Lower Road side was still closed. The driver alighted from the van and walked back to close the gate on the Bax side (figures 9 and 10).

34 At around 12:42, train 1P34 passed Teynham station, approximately 1 mile from Bax UWC, travelling at 90 mph (145 km/h). The train was running on green (proceed) signals. Train drivers are not provided with any indication if Bax UWC is occupied or not.

35 At 12:42:24, as the delivery driver was about to secure the gate on the Bax side of the crossing, the audible alarms started sounding and the MSLs changed to show a red light. This occurred because train 1P34 was approaching the crossing. Because of the track curvature, the train would not have been visible from the crossing at this time (figure 11).

36 The delivery driver responded to the warnings and moved quickly towards the gate on the Lower Road side, which they reached at 12:42:32. They attempted to open the gate by pushing it, then returned to the van. At 12:42:39, as they were about to re-enter the van, they realised that the gate had not opened fully and was still obstructing the van's exit. The delivery driver therefore returned to the gate to reopen it.

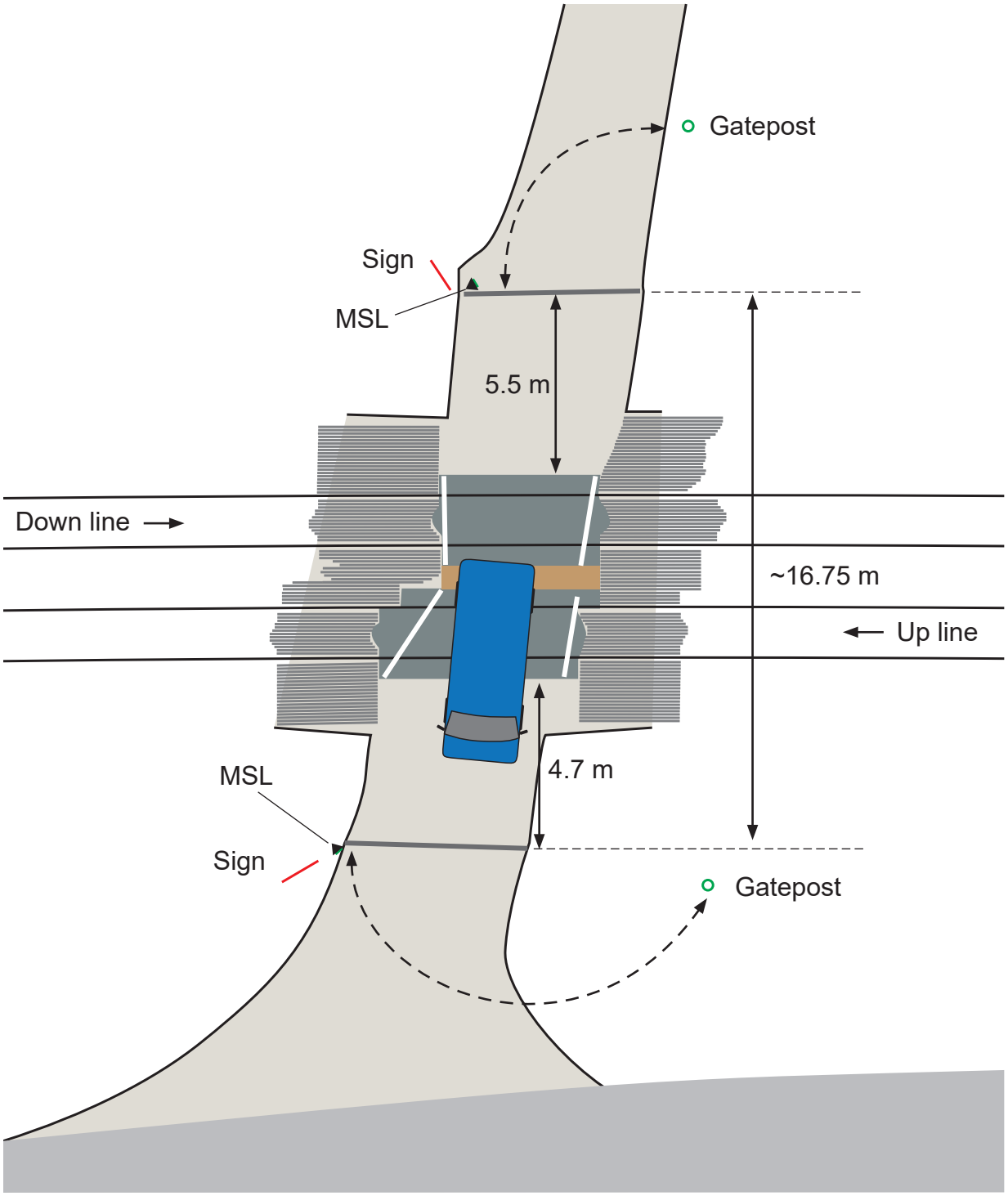


Figure 9: Approximate position of the van while stationary during the second crossing on 13 July.

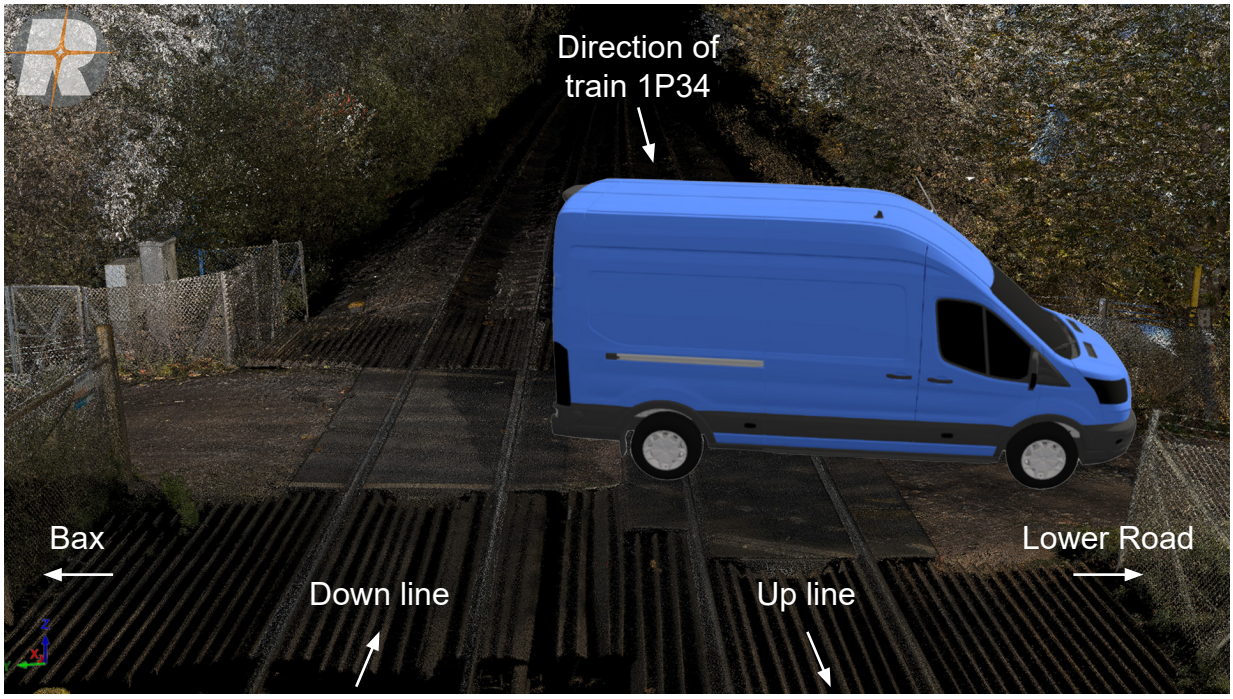


Figure 10: Approximate position of the van while stationary during the second crossing on 13 July.

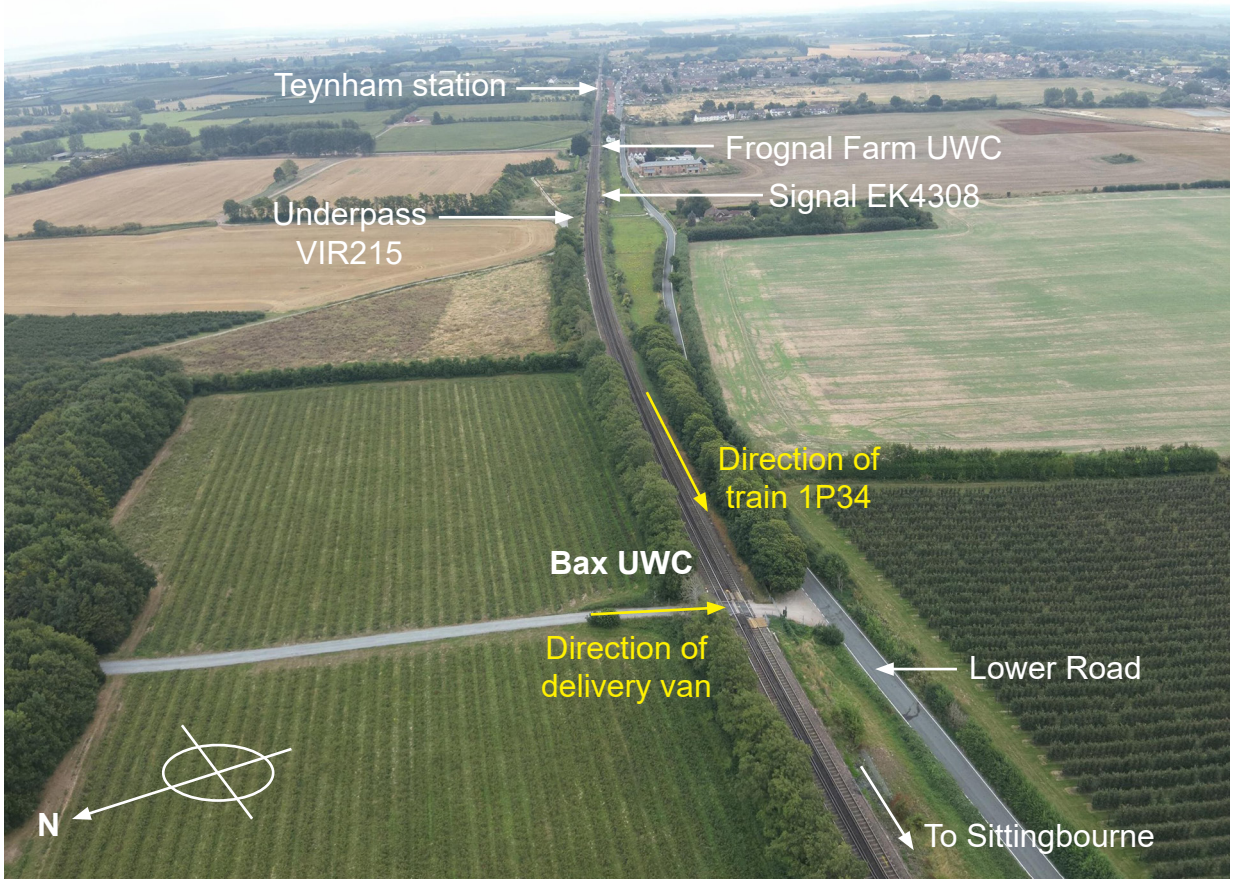


Figure 11: Overview showing track curvature and main features on approach to the crossing (courtesy of British Transport Police with RAIB annotations).

37 Train 1P34 was travelling on a left-hand curve at 90 mph (145 km/h) when the crossing would have begun to come into view, around 450 metres away. The crossing is not fully visible until an approaching train is around 300 metres away. It was around this point that the train driver saw something on the crossing and made an emergency brake application. The on-train data recorder on train 1P34 (OTDR, sometimes known as the 'black box') recorded this brake application as occurring at 12:42:45, when the train was about 250 metres from the crossing. When the train was around 190 metres from the crossing, the train driver began sounding the train's warning horn in a long blast.

38 At 12:42:51, the OTDR recorded that the driver's safety device (a safety system that records a train driver pressing a pedal in the cab to confirm their presence) was released. This occurred because the train driver left the driving seat and moved behind the vestibule doors in the cab in the belief that this might offer them some protection from the imminent impact.

39 The collision occurred at 12:42:51. CCTV footage shows that the delivery driver had just returned to the driver's door of their van after pushing the gate open for a second time when the collision took place.

40 During the collision, the train pushed the van for around 52 metres, severely damaging it in the process. The van later caught fire. The delivery driver was thrown clear of the van and was fatally injured.

41 The train came to a stand approximately 380 metres from the level crossing.

Events following the accident

42 Once train 1P34 had come to a stand, the driver operated the train's hazard lights and attempted to make a railway emergency call (REC) using the Global System for Mobile Communication – Railway (GSM-R) radio fitted in the driving cab. The driver realised that the GSM-R equipment was not functioning. This was due to a circuit breaker tripping as a result of the collision. At around this time, they also observed another train approaching on the adjacent Down Chatham line.

43 The driver of the approaching train saw smoke in the area and noted that train 1P34's hazard lights were on. The driver of the second train applied the train's brakes and brought it to a stand with its leading cab in line with the leading cab of train 1P34. Following a brief exchange between the two drivers through their cab windows, the driver of the second train made a REC call to the signaller at 12:44. At around the same time, the driver of train 1P34 used a passenger's mobile phone to call the emergency services. The first responding unit from the emergency services to attend was from Kent Police, who arrived at the accident site at 13:00.

44 Post-incident testing of train 1P34 covered multiple systems on the train and showed that the braking system was working as designed. The only defects noted with the train were due to damage sustained in the accident.

Background information

The crossing

Design and operation

45 The majority of UWCs on the railway network are on private roads and were originally provided to enable landowners to access their land by crossing the railway. These landowners and their successors, and anyone who has the right or permission to use the crossing, are designated by Network Rail as the 'authorised users' of the crossing. Authorised users are given information by the railway about how to use the crossing. They are expected by Network Rail to arrange, as far as possible, to pass this information on to their employees and other people who may have to visit the premises served by the crossing.

46 Since most UWCs are on private roads, most members of the public are unfamiliar with them. Furthermore, it can be impractical for an authorised user of such a crossing on a private road to brief everybody who needs to use it (such as delivery drivers) before they encounter it for the first time. Safe use of such crossings may therefore rely solely on vehicle users understanding crossing signage (and other features if they are provided) and acting on that information. The potential weaknesses in the authorised user concept are discussed further in paragraphs 130 to 136.

47 Bax UWC is fitted with an MSL system and telephones (paragraph 18). The type of MSL system fitted at Bax UWC is known as an overlay MSL (OMSL) and operates independently of the railway signalling system. MSLs are fitted at Bax crossing because there is insufficient sighting of approaching trains for users to determine whether it is safe to cross by looking for approaching trains. The MSLs fitted at Bax UWC have large diameter lights (see paragraph 74 and figure 16).

48 The OMSL system fitted at Bax UWC displays a green or red light to indicate whether it is safe for a user to cross (see paragraph 74). The crossing is also fitted with an audible alarm that sounds while the OMSL system is displaying a red light. At Bax UWC the OMSL system is not interlocked with the crossing's gates, meaning that they can be opened even when the MSL is displaying a red light. When no light is displayed, or if a user is crossing with a long vehicle or animals, instructions provided by the crossing's signage require the user to contact the signaller using the telephone. The signaller will then advise the user when it is safe to cross.

49 Bax UWC is fitted with level crossing signs as detailed in the Private Crossings (Signs and Barriers) Regulations 2023 (the 2023 regulations). The regulations specify which signs should be fitted to a railway crossing on a private road and include diagrams detailing their design; they do allow other signs to be used as appropriate. There are three other signs fitted at Bax UWC which are not in the regulations but which are required for other operational or legal reasons, such as anti-trespass warnings (figure 12 and figure 13).



Figure 12: Signs and relevant diagram numbers as detailed in the Private Crossing (Signs and Barriers) Regulations 2023, with additional signs not prescribed in the 2023 regulations in the red box.

History of the crossing

50 Before the installation of the OMSL system in March 2024, Bax UWC had only been fitted with telephones. All crossing users were required by instructions on signs to stop and contact the signaller by telephone to ask whether it was safe to cross.

51 In March 2017, Bax UWC, along with the nearby Frognal Farm UWC (figure 11), was fitted with power operated gate opener (POGO) equipment. The POGO equipment allows a crossing user to remotely control the opening and closing of both gates by pressing buttons positioned on either side of the crossing.

52 The POGO equipment was not interlocked with the signalling system, meaning gates could be opened even if a train was approaching. The instructions at the crossing advised users to contact the signaller on the telephone to check whether it was safe to do so. The POGO system at Bax UWC was decommissioned in July 2017 following three near miss incidents in 4 months. It was completely removed in November 2019.

53 On 23 October 2017, a delivery driver did not notice the telephone at Frognal Farm UWC and pressed the button to operate the gates without first seeking permission from the signaller. The gates opened, so the driver returned to the van and began to drive over the crossing, believing it was safe to do so. An approaching train collided with the van on the crossing. The van was severely damaged, and the delivery driver suffered serious injuries. This accident was investigated by RAIB (see paragraph 148). The POGO system at Frognal Farm UWC was decommissioned after the accident.

Risk assessment

54 Network Rail holds responsibility for managing the safety of level crossings on its infrastructure. As part of discharging its responsibility, it undertakes narrative risk assessments (NRAs) to identify and control the hazards associated with each crossing. Network Rail's most recent NRA for Bax UWC before the accident was dated March 2025. This noted that an average of 33 crossing users and 151 trains per day passed over the crossing. Users were identified as being mainly farmers and infrequent users such as delivery drivers. The role of authorised users was mentioned as a mitigation measure for road vehicles using the crossing.

55 Network Rail assesses the risk of its level crossings on two criteria. These are:

- the risk to an individual user of the crossing (rated from A to M, where A is the highest risk)
- the collective risk of harm to crossing users and those onboard trains (rated from 1 to 13, where 1 is the highest risk).

The March 2025 NRA for Bax UWC rated it as B2. This assessment placed Bax UWC as the highest risk crossing among the 96 UWCs on the Kent route, and second highest of all the 328 level crossings on the route. A previous NRA, completed in December 2020 and before the OMSL system was fitted to Bax UWC, gave the crossing a higher score of A2.

56 As part of the NRA process, Network Rail considers several risk mitigation measures in a hierarchical order, based on the principles of prevention given in the Management of Health and Safety at Work Regulations 1999. This is known as optioneering. The first mitigation considered is closure of the crossing. Where this is not possible, other options are considered which could introduce new or improved technology to upgrade the crossing's protection. Network Rail's decision-making process assesses the safety benefit of each mitigation measured against its cost.

57 This process had been followed by the local team during the March 2025 NRA for Bax UWC. The NRA considered a number of options and assessed their suitability, including:

- A bridge replacement. The NRA noted that any replacement bridge would need to accommodate large farm machinery and would need to be substantial enough to carry such vehicles, meaning that funding for it would be unlikely.
- Closure with a diversion. This option was considered in conjunction with the nearby crossing at Frognal Farm. This needed agreement with the authorised user at Frognal Farm. This was not forthcoming, and this option was discounted.
- Minor works. This considered improving the approaches to the crossing by upgrading the current crushed stone surfacing with concrete. This was a recent suggestion by the level crossing manager and was going through Network Rail's internal process of consideration at the time of the accident.
- Underpass. The nearby underpass (paragraph 9) gives an alternative route to the dwellings and business at Bax. However, the underpass is unable to accommodate high-sided or large vehicles that need to access Bax. While an upgrade to the underpass had been proposed by a third party who regularly accessed Bax, no feasibility study or design work had been done at the time of this investigation and there was no immediate plan to undertake this work.

Method of use

58 The current primary instruction sign provided at Bax UWC (figure 13) was fitted in March 2024. It shows three different methods of use, depending on who, or what kind of vehicle, is intending to cross. Pictograms are used to group types of crossing users with the applicable method of use. None of these groups shows a pictogram of a van, and it is left to crossing users driving vans to decide which of the methods of use is relevant to them.

59 RAIB considers that a van, such as the one driven by the delivery driver, would most likely be seen as closely related to the method of use shown against the pictograms of a car and a tractor without trailer, as opposed to the longer road vehicles drawing trailers. According to the instructions on the sign, drivers of the group of vehicles including cars and tractors are not required to contact the signaller before using the crossing.

60 The instructions on the sign for this category of user are:

- *'Always check green light shows every time you cross*
- *If no light shows do not cross - telephone signaller*
- *Open both gates on foot*
- *Check that green light still shows*
- *Cross with vehicle without stopping*
- *Check that green light still shows*
- *Close both gates on foot'*

Diagram 125

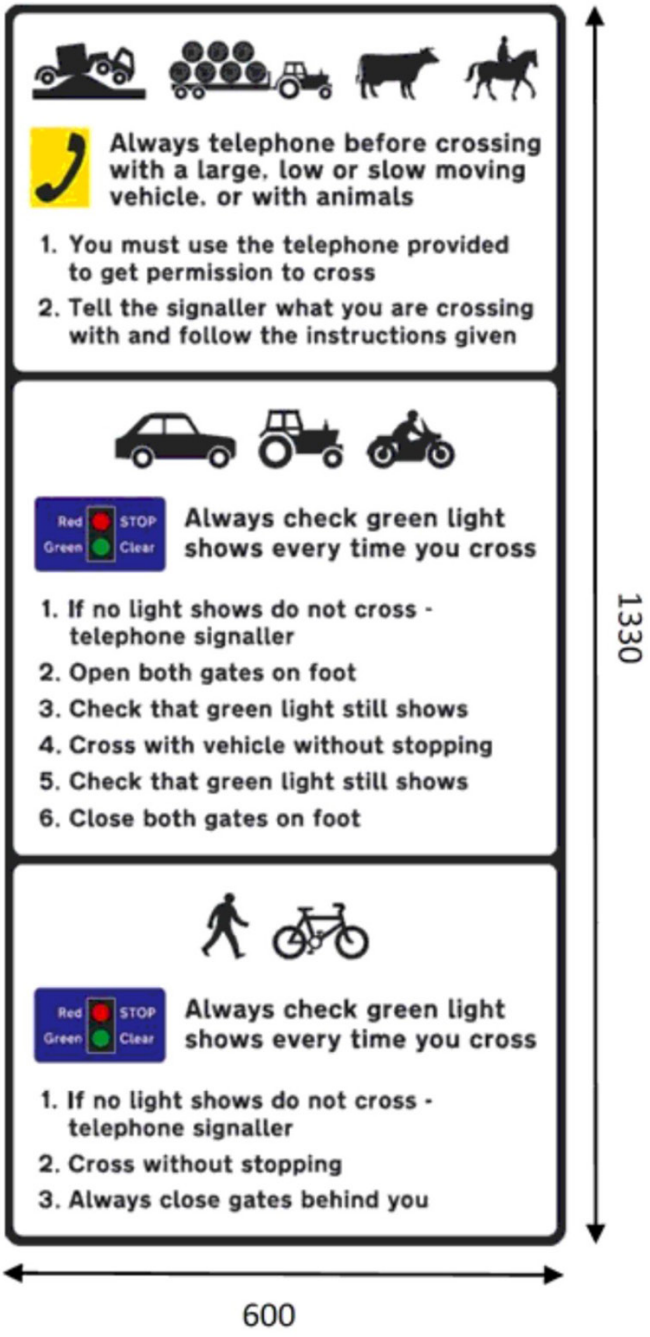


Figure 13: Sign designed to diagram 125, as detailed in the 2023 regulations (dimensions shown are in millimetres).

Analysis

Identification of the immediate cause

61 **The van was stationary on the level crossing as train 1P34 approached, because the exit gate was closed.**

62 CCTV cameras fitted at Bax UWC showed the van was stationary on the level crossing when the MSLs started to warn of the approaching train. At this point, the exit gate on Lower Road side was still closed. The delivery driver was in the process of closing the Bax side gate they had opened to enter the crossing.

63 The sighting by users of approaching trains on the Up Chatham line when standing on the Bax side of the crossing is around 477 metres. The delivery driver was on this side of the level crossing as the MSL changed to red (which they would not have been able to see from where they were positioned) and the audible alarm started to sound. At that point, the train would have been around 1,126 metres (or 28 seconds) from the crossing and not visible to them.

64 Unlike road vehicles, trains are not required to be able to stop within the distance that their driver can see to be clear ahead. Therefore, at the majority of railway crossings in the United Kingdom, including UWCs such as Bax, there is no requirement for train drivers to check that a crossing is clear before proceeding over it.

65 CCTV footage shows that the van was driven onto the crossing while the exit gate was still closed. The delivery driver stopped the van to close the entry gate and then open the exit gate while the van was still foul of the up line (paragraph 33).

Identification of causal factors

66 The accident occurred due to a combination of the following causal factors:

a. The green light almost certainly led the delivery driver to believe that it was safe to enter the crossing once the Bax side gate was open, despite the Lower Road side gate still being closed (paragraph 67).

b. The signage present and lack of road markings at the crossing did not effectively guide the driver to use the correct crossing procedure (paragraph 78).

Each of these factors is now considered in turn.

The green light

67 **The green light almost certainly led the delivery driver to believe that it was safe to enter the crossing once the Bax side gate was open, despite the Lower Road side gate still being closed.**

68 For warnings to be effective, they should:

- attract attention
- affect knowledge, defined as 'making the individual aware of the hazard, consequences and what to do to avoid the hazard'[1]
- lead to appropriate decision-making

69 There are two visual warnings provided at this crossing. These are the signs and the OMSL system's lights. According to a theory of allocation of visual attention,[2] four components predict the allocation of visual resource. These are:

- saliency - how much it stands out
- effort - the cost to the human of attending to the warning
- expectancy - the likelihood of seeing the warning
- value - the importance or relevance of the warning.

70 Saliency refers to the degree to which something stands out against other items in the environment. A visually salient warning will be noticeable, capture attention and will be more likely to improve comprehension of risk. A salient visual stimulus will be looked at for longer, which in turn makes it more likely to attract attention and for the intended warning to be later recalled.

71 MSLs have been subject to the legal regulations governing traffic signs since 1996 and their current use is detailed in the 2023 regulations (paragraph 49). Further guidance on MSL design was given in Network Rail standard NR/L2/SIG/11201/Module X40, 'Signalling Design: Level Crossings: Miniature Stop Lights', issue 3 dated March 2021, which was current at the time of the accident. This states that '*visual warnings and signage shall be sited and aligned such that users have an unambiguous and clear view of them as they approach the crossing*'.

72 Before their first crossing on 13 July, the delivery driver approached Bax UWC from Sittingbourne. From this direction of approach, the instructional signs at Bax UWC are only visible once a user has turned off Lower Road and is at the crossing gates (figure 14). Network Rail standard NR/L2/XNG/30020 Module A28, 'Signage for level crossings', issue 3 dated March 2024, states that signs shall be positioned facing users on the approach to the crossing and should be visible from 15 metres away.

[1] Wolgalter M and others, 'Research-based guidelines for warning design and evaluation', Applied Ergonomics: 33, pages 219 to 230 (2002).

[2] Wickens C and others, 'Engineering psychology and Human performance', Routledge (2022).



Figure 14: Approximate viewing angle the instructional sign can be seen on approach (courtesy of British Transport Police with RAIB annotations).

73 On their return trip, the approach taken by the delivery driver meant that they would have seen the MSL system's lights before the signs, as the signs were to the right of the lights and slightly obscured by foliage. The driver would have had a clearer view of the signs once they approached more closely (figure 15).

74 There are two types of lights that can be used at OMSL crossings. These are small diameter lights (100 mm in diameter) and large diameter lights (200 mm in diameter) (figure 16). The lights used at Bax UWC are of the large diameter type. The size of these lights means that they may seem to users to be more like road traffic signals than the small diameter type, although both display only two aspects rather than three. In NR/L2/XNG/30020/S22, issue 1 dated December 2025, it is stated that these larger diameter lights are preferred for vehicular crossings because they are developed to the British Standard for highway traffic lights. As a result of its investigation into the accident at Oakwood Farm in 2015 (see paragraph 152), RAIB made a recommendation regarding the conspicuity of smaller diameter MSLs and suggested they should be more prominent (see paragraph 165).

75 Red and green lights have widely understood meanings. These are that red means stop and green means go. Humans use shortcuts and frameworks called schemas to make it easy to organise information, knowledge, and understand new information quickly, with minimal cognitive effort. In this case, the large diameter lights at Bax UWC would likely be categorised by users with the existing schema of 'traffic lights'.



Figure 15: Approach to Bax UWC from Bax side of the crossing taken on the day of the accident showing foliage blocking the signs and making the MSLs visible first. The MSL was in 'dark mode' following the accident, so its lights are not illuminated.



Figure 16: Small diameter lights within a sign (left) and large diameter lights (right).

76 RAIB considers that the MSL system lights at Bax are the most salient stimulus in this environment due to their size, prominence, and brightness. They are also likely to feel familiar to the user as they are comparable to the road traffic signals that are seen on roads. This visual salience affects more than just a person's attention; it can also influence their choice of behaviours,[3] with something more likely to attract attention potentially being perceived as more valuable.

77 People are also more likely to prefer a more salient option. In this case, this means that they may attend to MSL system lights rather than the crossing's signs. However, the lights alone do not convey enough information about the hazards which are present or the safe use of UWCs.

[3] Armel KC and others, 'Biasing simple choices by manipulating relative visual attention', Judgement & Decision Making, pages 396 to 403 (June 2008).

The signs and road markings

78 **The signage and lack of road markings at the crossing did not effectively guide the driver to use the correct crossing procedure.**

79 During their first use of the crossing on 13 July, the delivery driver drove their van onto the crossing without first opening the exit gate. This required them to stop the van on the crossing. While the van was stopped on the crossing, the delivery driver got out of the van, closed the entry gate, and then opened the exit gate before driving off the crossing (paragraphs 27 to 30). Even though this was not the intended way for the crossing to be used, and resulted in the van stopping on the crossing in a hazardous position, foul of the line, the fact that this usage passed without incident may have reinforced a belief in the delivery driver that this was the correct method of operation.

80 Once on the crossing, the driver was faced with a sign on the internal side of each gate. These signs advised users of the maximum penalty for not closing the gates (figures 17 and 18). Another sign, visible just beyond the crossing gates, close to the position of the gate post, asked users if they had closed the gate (diagram 165 on figure 13). Either of these signs could have influenced a user to close the first gate before opening the second. The messages were brief and prominently positioned, with little competing signage to distract users. As a result, they may have been more influential than the signs located beside the MSL system's light. This may explain why the delivery driver closed the entry gate before opening the exit gate on two occasions.

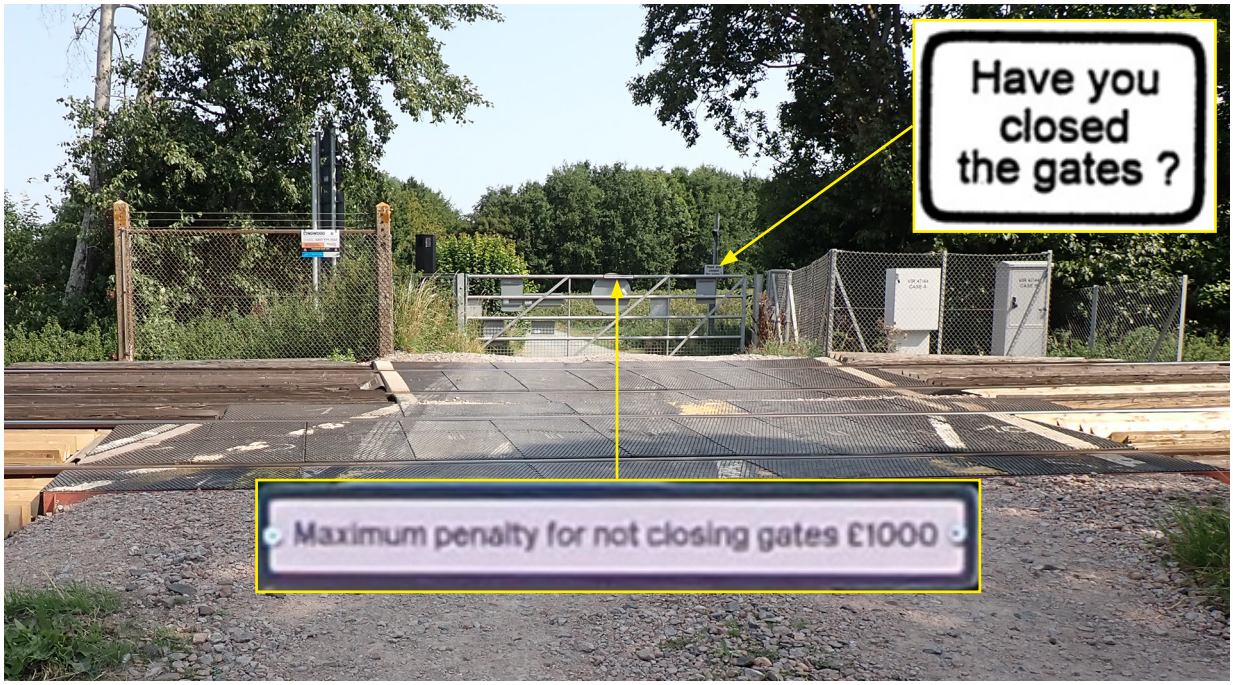


Figure 17: Lower Road side looking towards Bax side gate showing the two signs visible to a user once on the crossing.

81 The investigation identified evidence from social media indicating that at least one other user had crossed Bax UWC using a similar method to that adopted by the delivery driver. Witness evidence further suggests that this was not an isolated occurrence, and that the same method of use had been observed at other Network Rail UWCs.

Signs

82 The delivery driver made their second crossing of Bax UWC at around 12:41 (paragraph 32 and figure 15). The CCTV recorded sound. At 12:41:25, a vehicle door closing can be heard, although the vehicle is not visible on camera. The delivery driver appears on the footage at 12:41:26. By 12:41:43, the delivery driver can be seen to walk up to and open the Bax side gate and move out of camera shot. During the time they are in view of the CCTV camera, the delivery driver does not appear to look at the crossing's signage. This contrasts with the driver's first use of the crossing, when they were seen to look briefly towards the sign (paragraph 79).



Figure 18: Bax side of the crossing looking towards Lower Road as viewed from within the crossing, with the visible signs highlighted.

83 Effective signage should clearly convey the potential hazard which is present, its potential consequences, and the instructions to follow. The explicit presentation of warnings may play an important part in compliance. It is also necessary to avoid assuming that the hazards and consequences are clear and obvious.[4]

84 There are several different signs required at a level crossing. These were present at Bax UWC. The provision of numerous signs introduces additional information for users to process, and unnecessary or excessive warnings can reduce the effectiveness of signs in providing safety-critical information. This means that the number of signs present at Bax could lead to important information being missed and other, less important, information being focused on, particularly given that the lights are the more salient cue for users (paragraph 77).

[4] Laughery KR and Smith DP, 'Explicit information in warnings', Handbook of warnings, Wogalter MS (ed), pages 419 to 428, Mahwah, NJ: Erlbaum (2006).

85 At Bax UWC, the MSL system's lights are mounted on a separate post, to the side of the signs instructing users how the crossing operates (figure 19). Because the lights are positioned separately from the instructional signs and are more salient and recognisable to road users, they may give the impression that the two are not complementary to each other and that the lights can be read and understood without reference to the signs. This may also mean that the 'close the gate' signs had more potential to be seen by users due to their location, which is directly in the vision of crossing users.



Figure 19: View from point where gate is opened and latched, looking towards MSL and sign on the Bax side of crossing.

86 The instruction signs at the crossing also contain a lot of text. Brevity may promote comprehension of a warning because people are more likely to read shorter text. Concise wording of a warning may make it more effective, especially where time to read and understand may be at a premium, as is the case with road signs.[5] This again may mean that the close the gate signs were more easily comprehended by users.

87 In this instance, it is probably the case that the delivery driver's general unfamiliarity with UWCs (paragraph 28), their understanding of the hazards present, the number and positioning of signs, and the amount of information they contained, combined with the salience of the MSL system's lights, led to the importance of the instructions in the signs being missed by the delivery driver.

[5] Laughery KR and Smith DP, 'Explicit information in warnings', Handbook of warnings, Wogalter MS (ed), pages 419 to 428, Mahwah, NJ: Erlbaum (2006).

Road markings

88 Bax UWC has no markings to show positions of safety or demarcation of the danger area. Without any demarcation, users must rely on the signs and their own judgement to understand that it is unsafe to stop a vehicle in the danger area. This danger is not specifically detailed on the instruction sign, although it is implied by the statement '*cross with vehicle without stopping'*.

89 The 2023 regulations identify road markings in the Traffic Signs Regulations and General Directions 2016 (TSRGD) that can be used at level crossings. These include stop lines (diagrams 1002.1 and 1022) and yellow box markings (diagram 1045, similar to the yellow hatching used in road box junctions).

90 Network Rail standard NR/L2/XNG/30020/R03, 'Requirements for station, footpath, bridleway and user-worked level crossings', issue 1 June 2022, which applies to UWCs such as Bax, states that, where surface systems allow, a stop line should be provided. It also refers to the requirements for crossing surface markings detailed in Network Rail standard NR/L2/XNG/30020/R01, 'General requirements for level crossings', issue 1 June 2022. This states that '*where the surface system allows, surface markings should be provided in accordance with the Traffic Signs Regulations and General Directions 2016 (TSRGD) and the Department for Transport (DfT) Traffic Signs Manual* (*TSM*)'.

91 NR/L2/XNG/30020/R01 provided guidance that a yellow box, as per diagram 1045, was a possible measure that could be used to prevent 'blocking back' at level crossings. Blocking back occurs when a vehicle on a crossing's exit prevents another user from clearing the crossing's surface. As guidance, this was not a requirement but should have been followed unless an alternative solution offered better results, with the alternatives being documented. The annotation to diagram 1045 states that it applies to an '*area of carriageway subject to two-way traffic, at a level crossing, which vehicles must not enter in a manner which then causes any part of the vehicle to remain at rest within the marked area due to the presence of a stationary vehicle*'. This shows that these markings are not intended for user worked crossings, as the impediment to vehicles exiting is not caused by another vehicle, but rather by the crossing's gates.

92 At the time of the design of the OMSL installation at Bax UWC, a number of retrospective requirements and best practice were considered for implementation. This included introducing stop lines and demarcation in the danger area with yellow hatching. It is possible that the presence of these surface markings would have alerted the delivery driver that they should not enter and stop on the crossing unless the exit was clear, as would be the case at a road box junction.[6] The provision of stop lines and yellow hatching was not included in the scheme as they were not mandated by NR/L2/XNG/30020/R03 and NR/L2/XNG/30020/R01 respectively. The crushed stone surface system at Bax UWC also would not have allowed stop lines to be introduced (paragraph 57).

93 Other minor works were also considered when the OMSL system installation was designed for Bax UWC. However, a decision was made not to bring the crossing up to full compliance, as its current state did not prohibit the proposed fitment of MSLs. The residual risk was left by Network Rail to be managed locally using the NRA process (paragraph 54).

[6] Highway Code rule 174 and The Traffic Signs Regulations and General Directions 2016 Schedule 9 parts 7 and 8.

94 Bax UWC has been upgraded several times over many years as a result of ongoing risk assessments. Network Rail standard NR/L2/XNG/30020/G22, 'Efficient delivery guidance for overlay miniature stop light level crossings', issue 1 dated June 2019, states that '*the layout of the level crossing does not need to be brought into compliance with current standards before fitting an MSL. Compliance issues can be dealt with separately either before or after MSL fitment'*. This is intended to help Network Rail reduce risk at crossings in a cost-effective and prioritised manner, rather than having to complete all work to bring a crossing up to current compliance before fitting MSLs.

Identification of underlying factors

The impact of diverse information sources

95 **The project to develop and implement new signage for use at private crossings such as Bax UWC did not sufficiently consider how different information sources may influence crossing user behaviour.**

96 In 2015, the Department for Transport (DfT) gave funding to the Rail Safety and Standards Board (RSSB[7]) to review signage used at private crossings. This marked the start of a project to update the Private Crossings (Signs and Barriers) Regulations 1996 (the 1996 regulations).

97 The case for change made by DfT listed factors such as:

- A 106% growth in van traffic since the 1996 regulations had come into force. This gave the potential risk of a rise in inexperienced drivers using UWCs, as well as corresponding difficulties for authorised users in briefing them.
- An increase in rail network traffic and train speeds.
- Advancements in technology which the 1996 regulations did not cover, such as POGOs and their related signage.
- RAIB's 2009 class investigation into the safety of private crossings, which included a recommendation that the requirements for signs at private crossings should be reviewed (see paragraph 167).

The need for change was also highlighted by RAIB's investigation into the accident at Frognal Farm in 2017 (see paragraph 161 of RAIB report 12/2018). This investigation made recommendations relating to signage at UWCs.

98 RSSB carried out the review under project T983 'Signs at private road level crossings'. The review was completed in conjunction with an external contractor and involved Network Rail, the Office of Rail and Road (ORR, the health and safety regulator for railways in Great Britain) and DfT. It included workshops, laboratory trials, and virtual reality trials. Proposed signs for UWCs were tested as part of the virtual reality trials.

[7] RSSB is a not-for-profit company owned by major industry stakeholders and is the independent safety, standards, and research body for Great Britain's rail network.

99 The research report arising from the review was published in May 2015. It made 12 recommendations for improvements and new measures which could be taken, including redesigned signs. The report recommended that the proposed measures undergo further testing to assess their legibility on the road and to examine road user behaviour in response to them. In terms of the detailed instruction signs for UWCs, it suggested that some live trials should take place at a number of locations before new signs were fully adopted.

100 From June 2016, DfT, ORR and Network Rail continued to develop designs for signs based on the recommendations made in project T983. Network Rail commissioned an external contractor to undertake a live trial in 2019 at Cannock Chase on a mocked up UWC. This trial considered legibility, comprehension, and usability of signage. The results of the live trial were published in report CPR2707 'Trial of user worked level crossing signs' in 2019.

101 A sample of 80 people took part in the trial. The participants were of different ages and had varying levels of experience of using level crossings. More participants were unfamiliar with level crossings than were regular users. The participants were of different ages and had varying levels of experience of using level crossings, with a higher proportion being unfamiliar with level crossings than regular users. MSLs of the large diameter type (later fitted at Bax UWC) were not yet used by Network Rail, so were not included in the trials.

102 The approach route to the trial crossing was the same for pedestrians and car drivers and gave users a straight path, with time to take in the details of any signs at the crossing. This configuration used during the trial was not representative of some real-life situations such as the layout at Bax UWC, especially when approaching from the Lower Road side.

103 One of the designs trialled was a UWC with POGO equipment (paragraph 51) and an MSL with the small diameter type of lights (paragraph 74). This setup used an interlinked system which prohibited the POGO opening the gates when the MSL system displayed a red light. If there was a green light displayed, both gates would open on the pressing of the button (figure 20). This type of crossing significantly reduces a user's time on the railway infrastructure as they only need to cross the railway once, rather than the five times needed to open and close both gates manually before and after crossing. It also ensures a clear route off the crossing for a user before they enter.

104 According to report CPR2707, users found that the UWC with POGO and MSL was the most difficult to understand and use correctly. Most users recognised the green light being shown by the MSL system, but a small number did not notice it change to show a red light and continued to cross.

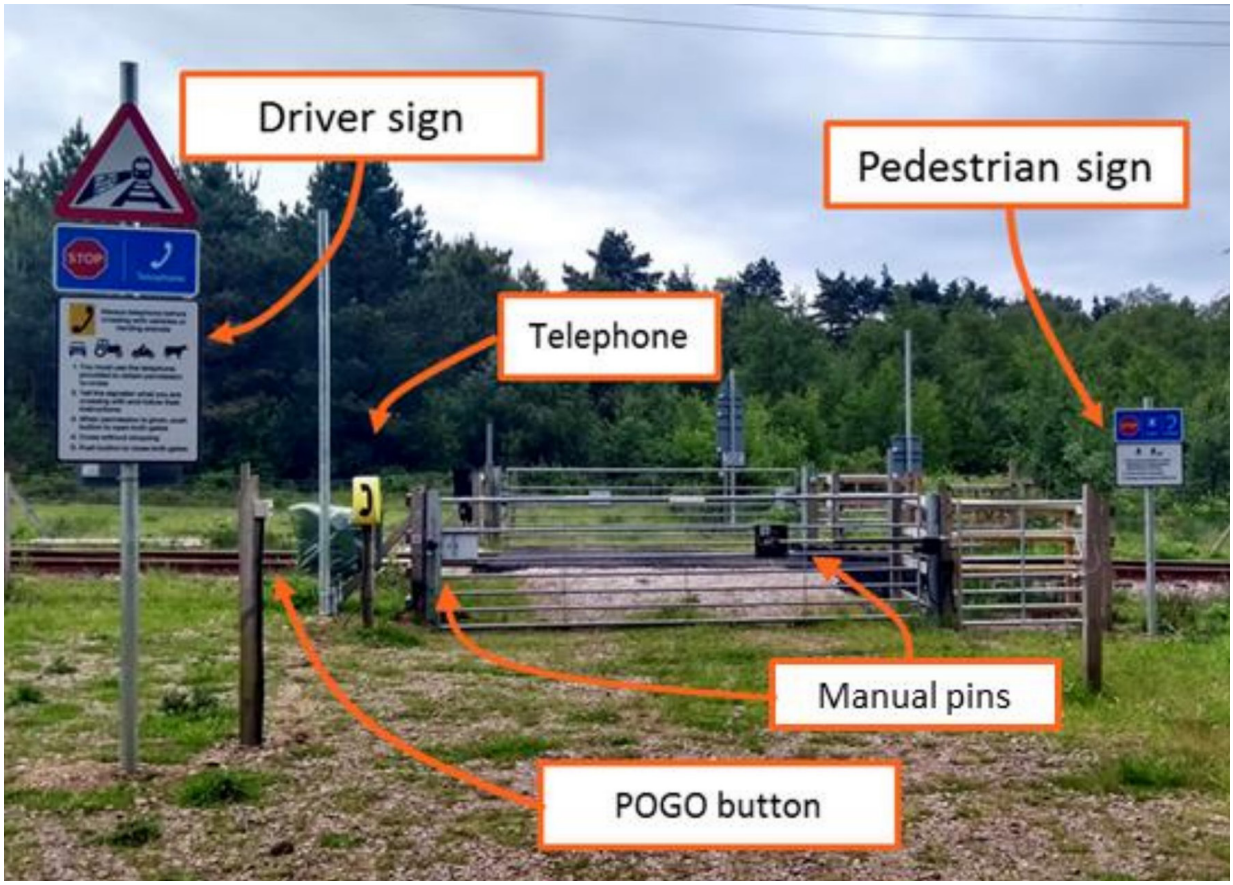


Figure 20: Mock-up UWC used at live trials on Cannock Chase (courtesy of TRL).

105 In the results and conclusion sections of report CPR2707, details are given from the findings of the user trials. This summary covers all types of level crossing setups and the signage. The findings included:

- A number of users reported to have understood the signs.
- With the MSL lights set to green, all car drivers noticed the signs.
- When the MSL lights changed from green to red, approximately half the users telephoned the signaller. Almost all others waited for the light to change to green. One pedestrian user did continue over the crossing after noticing the light changing to red.
- Almost all users faced with a faulty condition and no lights stopped to read the signs.
- Two users walked past the signs without reading them and continued over the crossing. The report stated that this was not '*due to the layout of wording on the signs, as the signs were not read'.*
- Half of participants interpreted the signs correctly and telephoned the signaller. Some users reported that the '*signage level was sufficient', 'gave sufficient info'* or *'were good, readable and clear'*.

- Other users found the signs to be too complicated and not positioned well: '*looks quite complicated', 'there is a lot to take in'*, '*signs for pedestrians too small', 'lots of signage, a lot of it didn't apply'*. Conversely, a few pedestrians said the signage was understandable, '*information was straightforward and in layman terms so easy to understand*', suggesting the wording of the instructions may not be designed for all demographics.
- Most participants noticed the stop sign before the crossing and the 'remember to close the gate' sign following the traverse, therefore confirming the safety benefit of the redesigned signs.

106 In summary, the report identified that most users had a positive experience, but that some found it confusing and expected the crossing to open automatically. The overall finding was that new signage had a significant safety benefit. The report went on to recommend live trials which were carried out at Jacky Duffin Wood and Thorney Marsh crossings. These crossings had the new signage used in the trial and, in the case of Jacky Duffin Wood, was also fitted with MSLs which were linked to the POGO gates.

107 The in-service trial of an MSL-linked POGO system at Jacky Duffin Wood was subsequently installed in 2019. This trial identified that the system still has limitations and risks. A user could leave the gates open after crossing because another button needed to be pressed to close the gates. The MSLs could change to red as a user was about to cross after the gates had opened on a green light, or another user could tailgate someone and cross on a red light.

108 At the end of the report, there is an action log added to the annexes in which ORR stated that:

> '*Some of the signs contain up to 7 stages in the instructions. This is a lot for people to retain in their working memory when using the crossing is likely to be secondary to their main task, such as delivering a parcel or getting the harvest in before it rains*.'

The action was not marked as closed.

109 The trial involved a small number of participants, of whom approximately 20% were employed by Network Rail. In addition, the mock-up crossing did not include other signs which are mandatory at crossings. As a result, it is difficult to judge how far the findings can be generalised for real-life scenarios.

110 Feedback from this trial, as well as work done by Network Rail after readability and disability equality tests, led to minor changes to the signs before DfT began the process of passing the new signs into legislation.

111 A DfT report, 'Improving Signage at Private Level Crossings', dated April 2022, stated that the 2019 research:

> '*found that the new signage has a significant safety benefit to unfamiliar pedestrians and car drivers alike, in most situations and for most crossing types*. *The trials also found that a number of users did not initially read the signs and assumed that the crossing operated or opened automatically when approached by a vehicle. However, once the signs were read, they were able to operate the crossing successfully and safely*.'

This recognition that some users did not read the signs during the trial did not affect progress towards bringing signs into legislation.

112 Two consultations were held by DfT, one in April 2022 and one in April 2023. After these were closed, the new signs were passed into revised legislation by the 2023 regulations. Witness evidence suggests that there was some pressure on Network Rail, in part resulting from ongoing incidents and accidents at crossings, to get the new signs passed into legislation and onto the railway network without further delay.

Introduction of OMSLs

113 An OMSL system, with the large diameter lights, and new signage were fitted to Bax UWC 5 years after the trial, in March 2024. RAIB found no evidence that, when the larger diameter type of light was introduced, Network Rail considered how the introduction of this new type of light, which was significantly different from the small diameter lights then in use, might affect how users interacted with the crossing signs. This was despite the large diameter lights providing an additional and potentially more prominent source of information for users of UWCs which were fitted with them (paragraph 74).

114 The only documents Network Rail has been able to share with RAIB from the time that the larger diameter light was introduced are in relation to it being visually different to the small diameter lights prescribed in the 2023 regulations and relating to its product acceptance (the process by which Network Rail assures itself that a product complies with relevant standards and is suitable for use on its infrastructure).

115 Given that a number of incidents have previously occurred at UWCs fitted with MSL systems using small diameter lights (such as the accident at Oakwood Farm UWC; see paragraph 152) larger diameter lights were, perhaps understandably, seen as an improvement as they were more conspicuous due to their size and had a different background (paragraph 74, figure 17). The lights also provide additional guidance below them, which instructs users to ‘Wait for Green’ to encourage correct use of the crossing.

116 RAIB has found no evidence that research was carried out to consider how lights, signs, and a user’s previous experiences can change the perception of a crossing and how the information is presented and received. There also does not appear to have been any research on how the more salient larger diameter lights might change a user’s interactions between the various information sources present at UWCs.

Risk management at level crossings

117 **The fitment of MSLs leads to further upgrades to UWCs by Network Rail becoming very unlikely, although safe use of the crossing remains reliant on users reading, understanding and obeying multiple instructions on signs.**

118 Network Rail standard NR/L2/XNG/001, ‘Provision and Risk Management of Level Crossings’, issue 3 dated December 2020, gives a hierarchy of control measures when considering options to reduce the risk at a crossing.

119 Closure is seen as the safest and preferred option. If closure is not possible, the next preferred level of mitigation is to introduce new technologies. An OMSL system is one of these technologies. Other work, such as the fitment of CCTV or improvements to approaches and sighting, can be done at UWCs alongside the fitment of any MSL system to try and encourage safe use. These options are further down the hierarchy of controls.

120 The third preferred option is to upgrade the crossing so that it has additional levels of protection. This could include converting the crossing to become an automatic crossing with barriers. However, these solutions may be considered disproportionately costly for the improvement in safety benefit achieved.

121 Evidence supplied by Network Rail suggests the order is more fluid than a strict hierarchy. The order in which the engineering controls are applied are, in practice, varied depending on the crossing type, location, risk profile and the professional judgement of staff. The controls are seen as more of a range of options for staff to consider. However, based on witness evidence from this investigation and others, RAIB considers that there is a general practice that once MSL systems are fitted to UWCs, it is very unlikely other upgrades would be undertaken to further mitigate risk. This is despite the implementation of the available cost-effective risk controls, such as MSLs, not removing the reliance on potentially unfamiliar users understanding how UWCs should be correctly used (see paragraph 125).

122 Even with OMSLs fitted the risk ranking of the crossing remained at B2, the highest risk UWC in Kent, and there were no further significant upgrades proposed by the local level crossing team after MSLs were fitted (paragraph 57).

Delivery driver training and guidance

123 **The training and guidance provided by GG Logistix to the delivery driver was not effective in preparing them to use the crossing safely.**

124 Network Rail includes information on how to use level crossings safely on its website. Use of level crossings is also covered in the Highway Code, with specific instructions for using UWCs given under rule 296. It is assumed that holders of a full UK driving licence are fully aware of the contents of the Highway Code and hence will be aware how to use a UWC.

125 However, RAIB found that the Highway Code does not show the type of sign used at Bax UWC (figure 12, diagram 101), nor other signs prescribed by the 2023 regulations, and instead only shows signs associated with other types of level crossing that are more commonly encountered on public highways. As many road users rarely encounter UWCs, there is therefore a risk that the signs provided at such crossings may be misunderstood, particularly by users encountering them for the first time. It is also of note that some UWCs are situated on public highways (this is discussed further in RAIB's investigation into a 2021 near miss at Coltishall UWC, see paragraph 144).

126 The Health and Safety Executive publishes guidance to delivery companies on its website, under the heading of 'Delivering safely'. The guidance states that:

> *'This guidance has limited application to deliveries and collections at domestic premises where the recipient has no duties under the Health and Safety at Work etc Act 1974, however companies still need to take reasonable steps to prevent accidents during these deliveries and collections.'*

127 The guidance requires suppliers, carriers (such as delivery companies) and recipients to exchange information on suitable routes to a workplace or business, but does not identify level crossings as something that should be considered when determining those routes.

128 The delivery driver was self-employed and drove under contract for GG Logistix. Although self-employed, when they started to drive for GG Logistix they received a mixture of classroom and practical training, all of which was delivered internally. This training was an evolution of material initially mandated by Amazon, although responsibility for delivering it had been passed from Amazon to the delivery service partners before the delivery driver started working for them. The Amazon training material focused on protocols for attendance at Amazon premises, use of technology, and expectations in relation to the customer delivery, rather than driving safely.

129 The content of the training given to the delivery driver was produced by a safety trainer contracted by GG Logistix. This incorporated some of the Amazon material as well as items raised by the management team at GG Logistix and their lead drivers. The risk presented by level crossings, and particularly UWCs, to delivery drivers and the railway was not specifically recognised by GG Logistix and was not covered within this training.

Observations

130 **There are differing interpretations of the concept of an authorised user as it applies to level crossings.**

131 Authorised users are people with a legal right to cross the railway by virtue of owning or renting the land on which the crossing is located. The ORR states:

> '*Authorised user is a term used to describe those who have the right to use a private level crossing. The term authorised user is not defined in law, but the Occupiers' Liability Act 1957 and 1984 require occupiers of premises or land to ensure the safety of visitors on their property*'.

132 The DfT report 'Improving Signage at Private Level Crossings', dated April 2022, stated that there has been a rise in the number and diversity of UWC users, including an increase in use by delivery drivers who are likely to have no previous experience of them. It also recognised that it will not always be possible for an authorised user to brief a crossing user, or know when, or who, will be using a UWC. It drew a conclusion that the crossing owner, in this case Network Rail, remained the primary duty holder when it comes to the health and safety of crossing users. To do this, Network Rail had to ensure that the signage and barriers are designed to minimise the risk to users, including those unfamiliar with UWCs.

133 The DfT stated that the concept of an authorised user is '*an outdated term without a proper legal basis*'. During the consultation on the private level crossings regulations in 2022 (paragraph 112), it was proposed that the concept of the authorised user would not be carried forward into legislation. As such, the term 'authorised user' is not defined in the revised 2023 regulations and any obligation to brief visitors and employees is covered by other legal provisions.

134 The term authorised user is still referred to in Network Rail's risk assessment process for level crossings described in NR/L2/XNG/001. The standard states that a letter will be sent to the authorised users to, among other instructions, '*remind them of their legal obligations to brief invitees, employees, and tenants on safe crossing protocols'*. This letter also states:

> *'In addition to keeping yourself safe you have a duty of care to visitors and employees.*
>
> *It is critical that anyone you invite to use the level crossing also understands how to cross safely.*
>
> *Please use all available options to explain to others how to use the level crossing safely. For example, when ordering items online, make use of additional instruction text boxes for this purpose, note that access over a level crossing is required, make it clear that the driver must follow the instructions displayed on signage and that they will need to open the crossing gates when safe to do so.'*

135 Authorised users may also be mentioned in the mitigation measures section of a level crossing risk assessment as one of the controls to identified risks. However, dependent on the location of the crossing, the ability of an authorised user to be aware of all users of a crossing and brief them accordingly will vary greatly. At a UWC such as Bax, where there are business and private residences, it may not be known with certainty if visitors will use the crossing and when. On other UWCs which are wholly contained within private land and not part of a private road, such as those used to access one field from another, it may be easier to predict who needs to be briefed and when.

136 RAIB has previously reported on the potential weaknesses in the authorised user concept in its class investigation into safety at UWCs (see paragraph 167), at Frognal Farm (see paragraph 148) and at Coltishall (see paragraph 144).

Previous occurrences of a similar character

137 RAIB identified a number of previous investigations that are relevant to this accident.

Collision between a train and a delivery van at Home Farm level crossing, 11 February 2023

138 At around 13:00 on Saturday 11 February 2023, a van was driven onto Home Farm UWC and was subsequently struck by a train travelling at about 30 mph (48 km/h). RAIB's preliminary examination found that the accident occurred because the van was driven onto the level crossing area when a train was approaching. While the van was stopped short of the tracks, the front of the van remained close enough to be struck by the train.

139 The correct method of operation at Home Farm UWC was described on the signs at the crossing which require the drivers of all vehicles to contact the signaller and get permission to cross the railway. Records show there was no call made to the signaller to ask for permission to cross at Home Farm on this occasion.

140 RAIB did not conduct a full investigation into this incident. However, RAIB were concerned that this incident was very similar to one which occurred at Frognal Farm level crossing in October 2017 (see paragraph 148) also involving a delivery vehicle. RAIB wrote to the delivery company and asked it to brief its drivers about the correct use of this type of level crossing and to raise this issue at any cross-industry forums of which it is a member. RAIB sent copies of this letter to Network Rail, ORR, DfT and the Health and Safety Executive, so that they were aware of the contents.

Collision at Kisby User Worked Crossing, 19 August 2021

141 At around 09:00 on Thursday 19 August 2021, a freight train collided with agricultural machinery being towed over the railway by a tractor at Kisby UWC, in Cambridgeshire (RAIB report 12/2022). The train was travelling at about 66 mph (106 km/h) when it struck the machinery. The train driver suffered minor injuries in the accident, and the tractor driver was uninjured. The locomotive and one wagon derailed, with both suffering some damage. There was also extensive damage to the infrastructure of the railway.

142 The accident happened because the tractor driver did not telephone the signaller before crossing the railway to seek permission to cross. This was a consequence of the tractor driver not being briefed about the requirement to call the signaller and the driver's belief that they could cross safely by looking for approaching trains. This probably arose because the authorised user, the person owning land on both sides of the level crossing, was not briefing crossing users in a way which resulted in correct use of the crossing, and railway staff were unaware that this was the case until shortly before the accident.

143 RAIB found that Network Rail was not effectively managing the safe use of Kisby, and some other UWCs with telephones, and that this was an underlying factor for the accident.

Collision at Coltishall Lane User Worked Crossing, 21 January 2021

144 At 17:21 on 21 January 2021, a passenger train narrowly avoided a collision with two cars at Coltishall Lane UWC in Norfolk (RAIB report 03/2022). Road traffic over the crossing was higher than usual as a result of drivers seeking a diversionary route for their journeys, following an earlier road traffic accident on a nearby main road. Both road approaches to Coltishall Lane UWC were classified as public highways.

145 The safe use of the crossing relied solely on telephones to warn users in road vehicles of approaching trains, and the near miss occurred because car drivers did not telephone the signaller before using the crossing. The investigation found that this may have been because the car drivers were unfamiliar with the crossing, because the signs at the crossing were ineffective in prompting users on how to cross safely, and because the level crossing gates had already been opened. It is also possible that factors such as the increased level of road traffic may have affected the behaviour of road users and their decision-making.

Collision at Smiths Lower Cefn User Worked Crossing, 22 June 2020

146 At 13:44 on Monday 22 June 2020, a Transport for Wales train struck a van which was foul of the track at Smiths Lower Cefn UWC, near Welshpool. When the collision occurred, the delivery driver was in the area of the vehicle's open offside door. The collision caused the van to spin around, projecting the delivery driver into an adjacent field. The delivery driver suffered serious, life-changing injuries because of the collision. Based on the evidence found on site, and the position of the van as was seen on the train's forward-facing CCTV, RAIB's preliminary examination found that it was possible that the far side gate of the crossing began to swing back as the van crossed, causing the driver to stop and attempt to get out of the van while it was still foul of the line.

147 Based on the evidence gathered, RAIB concluded that the accident occurred because the delivery driver did not call the signaller in control of the crossing to get permission to cross before doing so. RAIB could not determine with certainty why they did not do so. The delivery driver was unfamiliar with the crossing, and with UWCs in general, and RAIB considered that it was probably the case that the delivery driver did not read some, or all, of the instructions given on the signage at the crossing before using it.

Collision at Frognal Farm User Worked Crossing, 23 October 2017

148 On 23 October 2017, a passenger train collided with a parcel delivery van at Frognal Farm UWC, near Teynham, in Kent (RAIB report 12/2018). The train was travelling at 89 mph (143 km/h). The train did not derail, and no one on the train was hurt, but the train was damaged by the impact. The van was severely damaged, and the delivery driver suffered serious injuries.

149 The delivery driver was delivering a parcel to a property on the far side of the crossing. They initially went to an incorrect address, where they were given directions which involved going over the crossing to reach the correct address. The level crossing was equipped with POGO gates, controlled by a button at the side of the approach road, and a telephone which vehicle drivers were required to use to contact the signaller to obtain permission to cross. Being unfamiliar with UWCs, the delivery driver did not notice the telephone and pressed the button to operate the gates. They opened, and so they returned to their van to drive over the crossing, believing it was safe.

150 There were multiple signs associated with the crossing which were placed in a way that meant they did not stand out to the van driver. The driver had been told that they needed to press a green button to open the gates at the crossing, and they were focused on locating this button. The fact that the gate opened when the button was pressed, coupled with the van driver's previous experience of other types of level crossing, may have reinforced their view that it was safe to cross.

151 RAIB found that an underlying cause of the accident was that the system where authorised users are responsible for briefing visitors about the safe way to use private crossings is unreasonable in present-day circumstances.

Collision at Oakwood Farm User Worked Crossing, 14 May 2015

152 On 14 May 2015, a passenger train collided with a tractor at Oakwood Farm UWC near Knaresborough, North Yorkshire (RAIB report 07/2016). The train was carrying 66 people and travelling at 65 mph (105 km/h) but did not derail in the accident. The collision caused the front of the tractor to become detached from its cab. The tractor driver suffered minor injuries, and the train driver was treated for shock. However, in different circumstances the consequences could have been much worse.

153 The tractor driver began crossing the railway after the MSL system fitted to the crossing (which was of a type which used the small diameter lights) started to display a red light. Oakwood Farm UWC was one of a small number in the country that had been fitted with POGO gates. RAIB found that it was likely the tractor driver did not recheck the MSL system's lights after first stopping on the approach to the crossing to press the button to open the gates. This button had not originally been intended to open the gates; it should only have been capable of being used to close them. It was situated at such a distance from the crossing that the time it took for the tractor driver to stop, open the gates and then drive onto the crossing, was greater than the time between the warning light turning red and the arrival of the train. There was no sign at the button to warn the driver to recheck the warning light before going over the crossing. The investigation also found that the warning light was not conspicuous among the many signs present at the crossing.

154 The underlying causes of the accident were that Network Rail did not ensure that the risks at the crossing were adequately mitigated, and that the process for the introduction of the gate operating equipment was not adequately managed.

Summary of conclusions

Immediate cause

155 The van was stationary on the level crossing as train 1P34 approached, because the exit gate was closed.

Causal factors

156 The causal factors were:

a. The green light almost certainly led the delivery driver to believe that it was safe to enter the crossing once the Bax side gate was open, despite the Lower Road side gate still being closed (paragraph 67), **Recommendations 1, 2 and 3.**

b. The signage and lack of road markings at the crossing did not effectively guide the driver to use the correct crossing procedure (paragraph 78), **Recommendations 1, 2 and 3.**

Underlying factors

157 The underlying factors were:

a. The project to develop and implement new signage for use at private crossings such as Bax UWC did not sufficiently consider how different information sources may influence crossing user behaviour (paragraph 95), **Recommendation 1, 2 and 3.**

b. The fitment of MSLs leads to further upgrades to UWCs by Network Rail becoming very unlikely, although safe use of the crossing remains reliant on users reading, understanding and obeying multiple instructions on signs. (paragraph 117), **Recommendation 1.**

c. The training and guidance provided by GG Logistix to the delivery driver was not effective in preparing them to use the crossing safely (paragraph 123), **Recommendation 3.**

Additional observations

158 Although not linked to the accident on 13 July 2025, RAIB observes that:

a. There are differing interpretations of the concept of an authorised user as it applies to level crossings (paragraph 130), **Recommendation 4**.

Previous RAIB recommendations relevant to this investigation

159 The following recommendations, which were made by RAIB as a result of its previous investigations, have relevance to this investigation.

Previous recommendations that had the potential to address one or more factors identified in this report

Collision at Frognal Farm User Worked Crossing, 23 October 2017, RAIB report 12/2018

160 The report into this accident was published in August 2018. RAIB made four recommendations in its report. Recommendations 1, 2 and 3, which have been closed, are relevant to the circumstances of the accident at Bax UWC.

161 Recommendation 1 reads as follows:

> *Recommendation 1*
>
> *The intent of this recommendation is to enable crossing users who may be unfamiliar with user worked crossings to safely operate and traverse such crossings, in view of the increasing number of reasons that people may need to use user worked crossings without necessarily having been briefed on their use.*
>
> *Network Rail, with Office of Rail and Road and Department for Transport support, should review and revise the information offered to users of private level crossings, including consideration of signage wording and diagrams, the conspicuity and placement of signage, and the actions that the user needs to take, including operation of the gates or barriers, and communication with the signaller.*
>
> *The review should also consider, alongside the presentation of information, practicality and feasibility of the current arrangements by which authorised users are expected to brief and inform other potential users of the crossing, in view of the increased dependence of occupiers on delivered goods and services from a plethora of sources, and other factors which may increase the number of crossing users (paragraphs 129a.i, 129a.iii, 129a.iv).*

162 In 2022, ORR reported to RAIB that the recommendation was closed as Network Rail had completed its actions on both aspects of the recommendation, by producing new signs for user worked crossings and rolling them out on a site-by-site basis while the updated signage regulations were being progressed by the DfT. Network Rail has also addressed the authorised user aspect of the recommendation by producing improved briefing materials and by acting on DfT's clarification on the responsibilities of authorised users, as landowners, in the consultation on the new signs.

163 Recommendation 2 reads as follows:

Recommendation 2

The intent of this recommendation is to bring the law covering signs at private level crossings up to date and into line with good practice, to effectively convey the safe method of traversing the crossing to the user. This recommendation strengthens recommendation 8 of the RAIB's class investigation into safety at user worked level crossings, which was made in June 2009 and has not yet been implemented.

As part of its support for the work identified in recommendation 1, the Department for Transport, in consultation with the Office of Rail and Road, should change the requirements for signs prescribed by law for use at private crossings, taking into account the need to convey information and instructions clearly and unambiguously to diverse users (paragraph 131a).

164 In 2026, ORR reported to RAIB that the recommendation was closed. The work required was completed with ORR, Network Rail and RSSB to bring a new suite of private crossing signage into legislation. Work on the new signage began in 2015 and resulted in two consultations, in 2022 and 2023, leading to legislation being passed by Parliament on 18 November 2023. The view of ORR is that these are the signs that infrastructure owners must now place at private crossings where a risk assessment indicates they are required.

165 Recommendation 3 reads as follows:

Recommendation 3

The intent of this recommendation is to improve the understanding that users of private level crossings equipped with power operated gates have of the process for using such crossings safely, so that the risks created by automating part of a user worked crossing are appropriately mitigated. This recommendation repeats recommendation 2 of the RAIB's report on the accident at Oakwood Farm level crossing on 14 May 2015 because there is evidence that the original recommendation was not being implemented as intended.

Network Rail should develop and implement a programme for a timely review of the safety of other user worked crossings it has fitted with POGO equipment and those it intends to fit in the future. The review should be based on a proper understanding of the risks associated with POGO equipment and include particular consideration of the following:

a) the types of location where the installation of POGO equipment is likely to be unsuitable;

b) the design standard for crossings fitted with POGO equipment;

c) the ways in which users in different types of vehicles operate the crossing gates, including the function of the gate operating buttons;

d) the clarity of instructions to enable unfamiliar users to use the crossings safely and to minimise reliance on the briefing of all visitors by authorised users (which is not always practicable);

e) improving the conspicuity of the miniature stop lights (eg using two miniature stop lights on each side of the crossing, the use of larger 'road traffic light' style red and green lights, flashing red miniature stop lights, or wig wag

lights) and the number and clarity of the signs, to minimise confusion and distraction; and

f) whether the opening of the gates should be disabled unless the miniature stop lights are displaying green lights.

This review should draw on the findings from recent relevant research (eg RSSB's research into signs at private level crossings (T983) and human factors advice). Any measures for safety improvements at such crossings should then be implemented at higher risk locations and incorporated into the standards for future designs.

In addition, the review should consider, where manual crossings are partly or fully automated, making the process by which the user is informed it is safe to cross simple and intuitive and as fail safe as possible, ensuring the user is guided to make contact with the signaller where required (paragraphs 129b, 129c i).

166 In 2021, ORR reported to RAIB that Network Rail had undertaken a number of measures including: the introduction of interim improvements at level crossings with POGO equipment or user operated lifting barriers to reduce the opportunity for any reoccurrence; implementing standard changes to improve the design and application of POGO equipment; developing and concluding product acceptance to interlink gates and miniature stop lights (where provided); and promoting the use of enhanced instructional signage at level crossings with POGO equipment in advance of legislative change. The recommendation was closed by ORR as Network Rail had completed its actions taken in response.

Class investigation into safety at user worked crossings

167 In 2009 RAIB undertook a class investigation into UWCs (report RAIB report 13/2009). This investigation used data from a series of accidents and incidents which occurred at UWCs between June 2006 and December 2008, and other information on crossing use, research programmes and current initiatives gathered by RAIB from level crossing operators, train operators, and crossing users. The report looked at possible measures to reduce the risk at UWCs.

168 As a consequence of its class investigation, RAIB made a submission to the Law Commission and the Scottish Law Commission in connection with the joint project to review the law relating to level crossings. This proposed changes to the law in connection with:

- consultation on planning applications which may affect level crossings
- rights of way over private crossings
- protection measures for level crossings
- duties of crossing users
- the mechanism for permanent closure of crossings.

169 RAIB also made eight recommendations, which were targeted at Network Rail, Northern Ireland Railways, the Heritage Railway Association, and DfT, covering the following areas:

- involvement of the crossing user in the preparation of risk assessments
- additional factors that should be included in risk assessments

- marking of the point from which a decision to cross should be made
- improved protection at crossings where adequate sighting is not achievable
- closure of crossings not adequately protected
- assessment of alternative methods of crossing protection
- review of the requirements for signs at crossings.

170 ORR reported to RAIB that all but one of these recommendations had been closed. ORR stated that Network Rail considered a number of points as not being reasonably practicable or that existing measures had met the intent of the recommendations.

171 RAIB raised concerns that the application of new technology had been limited in relation to recommendation 4, which asked Network Rail to take into account the results of the current trials with new technology and to consider how the protection of UWCs without telephones or lights could be improved. This recommendation was categorised as 'non-implemented' by ORR.

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

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

172 GG Logistix has included information on UWCs and other types of level crossings in their training. The information now included is a mixture of information from Network Rail and from the Highway Code. It also includes pictures from Bax UWC.

173 Amazon has reported that, as of July 2026, its routing guidance application highlights level crossings using a universal icon. This feature does not specify the type of level crossing and is not designed to provide guidance on how to use them. Amazon is considering whether additional relevant information can be incorporated into its routing guidance regarding level crossings. This work is in its early stages and is under ongoing review.

Other reported actions

174 Network Rail has added an additional sign at Bax UWC (figure 21) stating that both gates must be open before crossing. This sign is not of a type contained in the 2023 regulations.



Figure 21: New sign added to Bax UWC gates close to latch.

175 Other works completed at Bax UWC since the accident include:

- Approaches on both sides of the crossing have been improved and are now fully tarmacked with white STOP lines painted outside of the gate swing to ensure users stop their vehicles clear of the gates (figure 22).
- The Lower Road side gate has been moved towards the railway and is now 3 metres from the nearest running line.
- The Bax side gate has been moved towards the railway and is now 4 metres from the nearest running line.
- Both gate catches have been changed to be self-latching, and the gates have been replaced.



Figure 22: Improved approaches on Lower Road side and Bax side.

176 Network Rail, working with National Highways (the public body responsible for England's motorways and major A roads), has published a toolkit for professional road drivers. This includes three educational short films, including one about the safe use of UWCs.[8] Network Rail has also expanded and clarified information about safely using UWCs on its website.[9]

177 Network Rail has sent a letter to the 10 largest delivery companies and supermarkets. Network Rail reported that although the supermarkets with delivery services had responded and were engaging with them, there had been a less positive response from delivery companies.

178 An overlay automatic half barrier type of level crossing is in development to be trialled by Network Rail. This will resemble the existing automatic half barrier level crossing currently seen on public roads but will use its own dedicated train detection, separate from the wider signalling system, to detect approaching trains and operate the level crossing sequence.

179 DfT has paused the development of the Welsh language signs for level crossings pending the outcome of this investigation.

[8] https://www.drivingforbetterbusiness.com/network-rail-toolkit/.

[9] https://www.networkrail.co.uk/who-we-are/safety-in-the-community/level-crossing-safety/using-level-crossings-safely/.

180 British Transport Police is actively engaging with delivery companies in relation to level crossings. British Transport Police is also engaging with an external provider to look at training material specifically for delivery driver training to give them awareness of level crossings. The long-term plan is for this to be rolled out to delivery companies or as an offer of training delivered by the external provider. There is also a possibility of training based on the material that has been created being made suitable for delivery in schools.

Recommendations

181 The following recommendations are made:[10]

1 *The intent of this recommendation is to review the layout and information present at user worked crossings to ensure that they can be used safely.*

Network Rail should review the design of user worked level crossings to ensure that they can be used safely by a foreseeable range of users, including those unfamiliar with this type of crossing or with individual locations.

The review should identify whether opportunities exist to develop new solutions, or to modify existing solutions, that could further reduce risk and/or provide more cost-effective options for those responsible for assessing and managing risk at user worked crossings.

The review should consider:

- the circumstances of this and other relevant accidents and incidents
- the needs of users who may be unfamiliar with such crossings or with individual locations
- how user-centred design can be used to prevent unsafe behaviours
- the technical and engineering solutions available for providing safeguards at user worked crossings such as the provision and design of gates, barriers, warning lights and audible alarms
- the layout of user worked level crossings and the information provided to users, including the type, layout and positioning of signage and road markings.

The review should draw on relevant human factors research, applicable guidance, and good practice from other countries (paragraphs 156a, 156b, 157a and 157b).

[10] 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, recommendations 1 and 4 are addressed to the Office of Rail and Road, recommendation 2 is addressed to the Department for Transport, and recommendation 3 is addressed to the Health and Safety Executive, to enable them to carry out their 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.

2 *The intent of this recommendation is that the framework of legal requirements and guidance for road vehicle users relating to user worked crossings be revised as appropriate.*

Based on the findings identified during the review undertaken in response to Recommendation 1, the Department for Transport, working in consultation with the Office of Rail and Road and relevant rail industry bodies in Great Britain, should develop a timebound plan to update as required the legal requirements, and guidance to road vehicle users, relating to user worked level crossings.

This recommendation may also apply to the Northern Ireland Department for Infrastructure as the Rail Safety Authority for Northern Ireland and Northern Ireland Railways (paragraphs 156a, 156b and 157a).

3 *The intent of this recommendation is that delivery drivers receive appropriate guidance and training on the safe use of user worked crossings.*

The Health and Safety Executive, working with the Office of Rail and Road, Network Rail and other railway infrastructure managers in Great Britain, should review its guidance to ensure that organisations employing people to drive or ride for work, or engaging self-employed people to do so, are provided with appropriate advice, or are directed to appropriate resources, on the procedures required to safely use user worked crossings.

Based on the findings of this review, the Health and Safety Executive should develop a timebound plan to revise the relevant guidance as appropriate.

This recommendation may also apply to the Health and Safety Executive for Northern Ireland, the Northern Ireland Department for Infrastructure as the Rail Safety Authority for Northern Ireland, and Northern Ireland Railways (paragraphs 156a, 156b, 157a and 157c).

4 *The intent of this recommendation is to clarify the role of the authorised user within the risk control hierarchy for level crossings.*

Network Rail should review its current guidance relevant to level crossings to ensure that its staff are provided with information concerning the status and role of the authorised user which is consistent with relevant legislation.

This recommendation may also apply to other infrastructure managers (paragraph 158a).

Appendices

Appendix A - Glossary of abbreviations and acronyms

Abbreviation / acronym	Full term
AHB	Automatic half barrier
DfT	Department for Transport
GSM-R	Global System for Mobile Communications-Railway
MSL	Miniature stop light
NRA	Narrative risk assessment
OAHB	Overlay automatic half barrier
OMSL	Overlay miniature stop light
ORR	Office of Rail and Road
OTDR	On train data recorder
POGO	Power operated gate opener
RSSB	Rail Safety and Standards Board

Appendix B - Investigation details

RAIB used the following sources of evidence in this investigation:

- information provided by witnesses
- information taken from the train's OTDR
- CCTV recordings taken from the level crossing
- site photographs and measurements
- weather reports and observations at the site
- rail industry logs
- staff training and competence records
- Rule Book modules, railway industry standards and Network Rail company standards
- a review of previous RAIB investigations that had relevance to this accident.

This report is published by the Rail Accident Investigation Branch,
Department for Transport.

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