



Rail Accident Investigation Branch

Rail Accident Report



**Collision between a train and a road vehicle on
the Leighton Buzzard narrow gauge railway
25 August 2007**

This investigation was carried out in accordance with:

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

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Contents

Introduction	4
Summary	5
Background	5
The Accident	7
The crossing at the time of the accident	7
Events during the accident	7
Events following the accident	7
The train	9
The tractor	9
Previous incidents	9
Railway Safety Principles and Guidance	9
Analysis	11
Identification of the immediate cause	11
Identification of casual factors	11
Review of other factors	11
Conclusions	13
Observations	13
Actions reported as already taken in response to the collision	14
Recommendations	15
Appendices	16
Appendix A: Glossary of abbreviations and acronyms	16
Appendix B: Glossary of terms	17

Introduction

- 1 The sole purpose of a Rail Accident Investigation Branch (RAIB) investigation is to prevent future accidents and incidents and improve railway safety.
- 2 The RAIB does not establish blame, liability or carry out prosecutions.
- 3 Access was freely given by Leighton Buzzard Railway Ltd to their staff, data and records in connection with the investigation.
- 4 Appendices at the rear of this report contain glossaries:
 - acronyms and abbreviations are explained in appendix A;
 - technical terms (shown in *italics* the first time they appear in the report) are explained in appendix B.

Summary

- 5 At approximately 12:40 hrs on the 25 August 2007 the 12:20 hrs train from Pages Park to Stonehenge Works on the Leighton Buzzard Railway (LBR), collided with a tractor at low speed on Cavalry Horse *User Worked Crossing* (UWC) on the outskirts of Leighton Buzzard, Bedfordshire. One passenger was slightly injured, and damage was caused to the locomotive and the tractor.

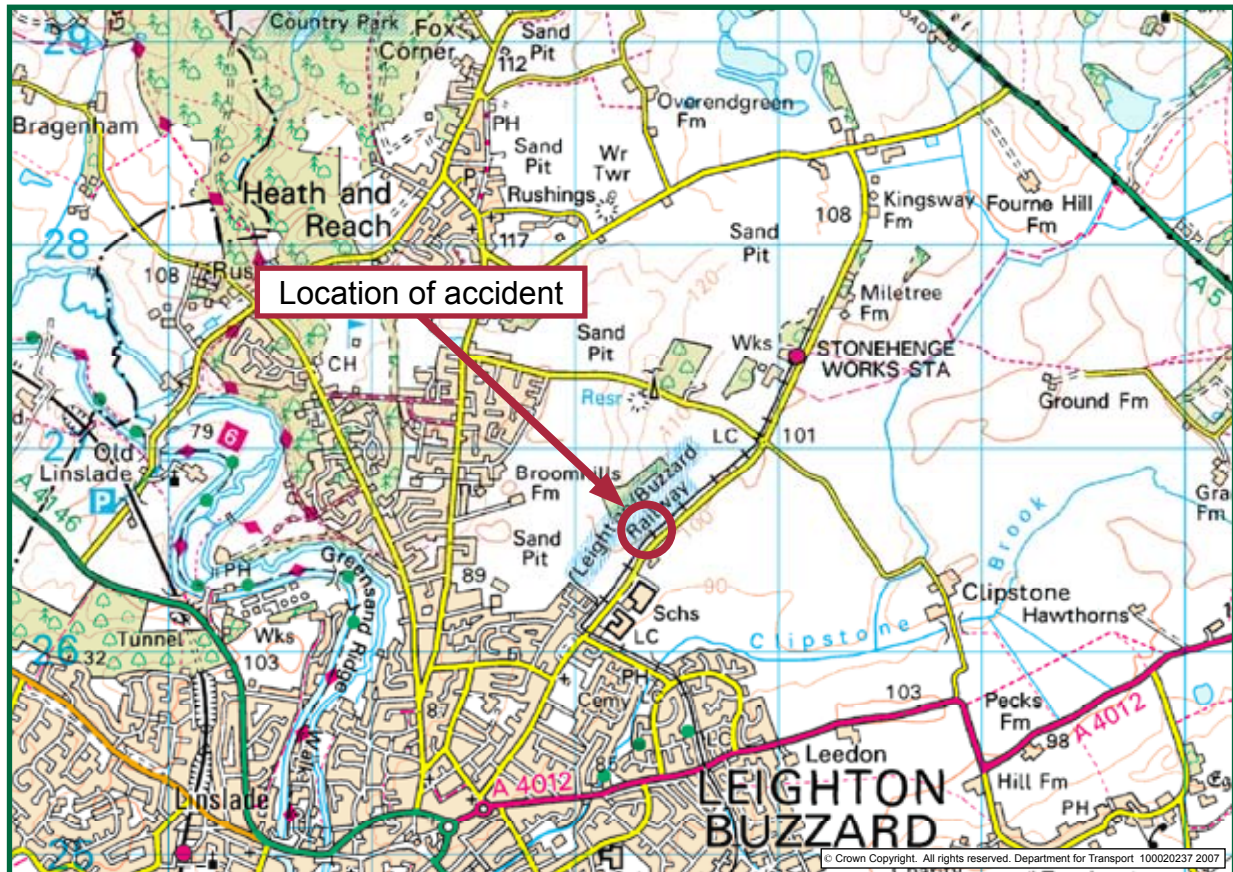


Figure 1: OS map of Leighton Buzzard Railway

Background

Leighton Buzzard Railway

- 6 The line was built in 1919, without any statutory powers, and was originally used for the transportation of sand from local quarries. Although the sand traffic continued until 1977, a preservation society was formed in 1967 and ran passenger services on the line at weekends from 1968. After the cessation of the sand traffic the line was transferred to the ownership of the Leighton Buzzard Railway Ltd.
- 7 The line runs from Pages Park station in Leighton Buzzard to Stonehenge Works, a distance of 2.85 miles (4.56 km), and incorporates a number of level crossings; these include eleven *footpath crossings* and five *user worked crossings* where the train travels over the line operating on *line of sight* (Figure 2). Trains have priority at all crossings.

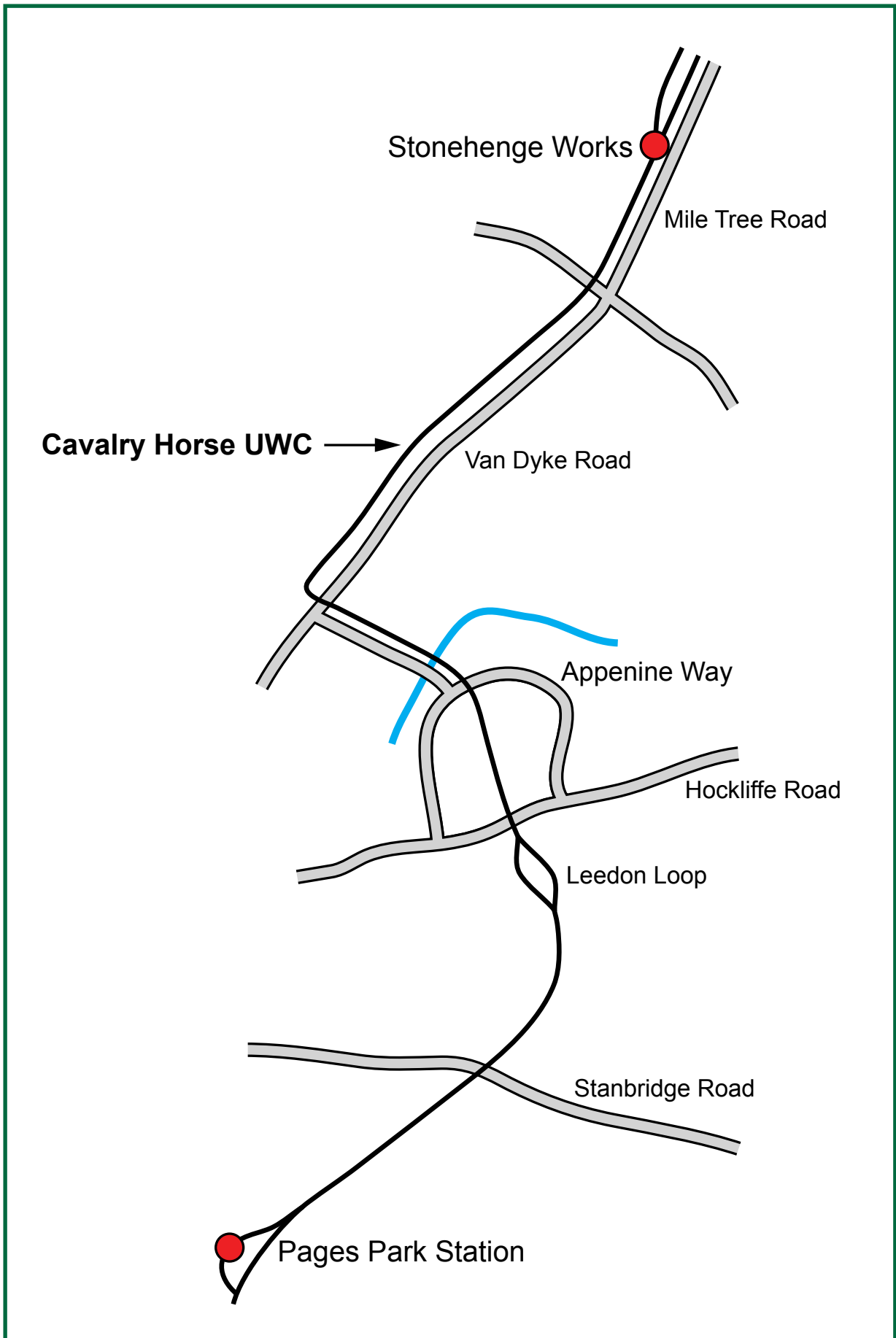


Figure 2: Route map of Leighton Buzzard Railway and location of incident

The Accident

The crossing at the time of the accident

- 8 Cavalry Horse user worked crossing gives access from Van Dyke Road to a field on the north west of the line. It is located 2.34 miles (3.74 km) from Leighton Buzzard (Pages Park) station, and 0.51 mile (0.82 km) from Stonehenge Works station.
- 9 Hedges, 1.5 to 2 m in height, run parallel both sides of the railway. On the north-west side of the crossing, nearest to Pages Park, another hedge runs at right angles to the railway (separating two fields) and this hedge was appreciably higher, approximately 3 m. Drivers of tractors can see all approaching trains when crossing from Van Dyke Road to the field. When crossing from the field to the road, a tractor driver could see trains approaching from Stonehenge Works, but could only see a train approaching from Pages Park after the front of the tractor was foul of the line.
- 10 The approach to the crossing by rail is a long straight, and train drivers have good visibility of the crossing itself. However, because of the hedge, train drivers from Pages Park could not see vehicles approaching the crossing from the field until they were on the crossing.
- 11 The rail speed over the crossing is 10 mph (16 km/h), the maximum speed for the line.
- 12 There are no signs for the crossing for either road or rail users.
- 13 There is a gate on the north-west side of the crossing. The gate, which was provided by the farm and not the railway, was in poor condition and could not be closed. There is no gate between the railway and the highway on the south-east side.
- 14 The weather at the time of the incident was dry and warm with little cloud. The visibility was good.

Events during the accident

- 15 At approximately 12:20 hrs, steam locomotive, number 11, hauling three carriages, departed Pages Park station, en route to Stonehenge Works station. There were thirty seven passengers and four staff on board.
- 16 The train driver was accompanied by a *fireman* on the locomotive.
- 17 The locomotive was running chimney first. The driver was positioned on the right-hand side in the direction of travel (the south-eastern side of the locomotive).
- 18 Approximately 5 m short of the crossing the driver saw a tractor appear onto the crossing from his left hand side. He immediately applied the brakes, but was unable to prevent a collision. The tractor was pushed to one side by the locomotive, which stopped with its last carriage on the crossing and still in contact with the tractor (Figure 3).

Events following the accident

- 19 One passenger was thrown against a partition in the leading carriage as a result of the emergency stop. First Aid was administered on site. Both the locomotive crew and the tractor driver were slightly shocked, but there were no other casualties.



Figure 3: Position of train and tractor after collision (courtesy Leighton Buzzard Railway)

20 The locomotive's front end was slightly damaged (Figure 4). The tractor's front wheels and steering were more substantially damaged.



Figure 4: Damage to locomotive

- 21 The driver contacted the LBR control by radio to request police attendance for a road traffic accident, and the Duty Operations Manager went to site to assist. The ambulance service attended to assist the injured passenger.
- 22 All passengers remained in the train whilst the LBR notified the RAIB and the Bedfordshire Police. After some 50 minutes, with the agreement of both bodies, and in view of the minimal damage to the locomotive, the train was allowed to complete the journey to Stonehenge Works. It was then taken out of service for tests.

The train

- 23 A *functional brake test* was completed on scene and all brake systems were working correctly.
- 24 While LBR locomotives are not fitted with speed recorders there is no evidence that the train was exceeding the 10 mph (16 km/h) speed limit, and the train stopping in a distance only 5 m greater than its own length supports that it was operating at this speed.

The tractor

- 25 The train driver's report states that the tractor was 'edging' out onto the crossing at slow speed and under control, whilst the tractor driver's evidence is that he was at a stand. In either case the tractor was clearly under control, and so no tests were carried out on it.

Previous incidents

- 26 Whilst history books about the line indicate that the LBR has been involved in repeated accidents on its public road crossings throughout its history, there is no record of any accident at Cavalry Horse crossing within the 40 years that the present management have operated the line.

Railway Safety Principles and Guidance

- 27 Railway Safety Principles and Guidance (RSPG), part 2E, was published in 1996 by the Health and Safety Executive (HSE). It sets out the basic requirements for level crossings. It is now the responsibility of the Office of Rail Regulation (Her Majesty's Railway Inspectorate) (ORR (HMRI)).
- 28 The RSPG guidance is not retrospective, and is normally only applied when a new railway or level crossing is constructed, or when a level crossing is upgraded. Crossings that existed before RSPG was published may not necessarily comply with the RSPG, although it does indicate good practice.
- 29 RSPG sets out the principles and guidance for *open crossings* in Chapter 9, and for user worked crossings in Chapter 10.

- 30 The farm crossings on the LBR could be described as either an open or a user worked crossing. Normally open crossings are at an intersection with a carriageway, whilst user worked crossings provide access or a route to or between fields, as was the case at Cavalry Horse crossing, or over a private agricultural lane. However, a user worked crossing is specifically described in RSPG as having either gates or barriers, which none of the LBR farm crossings have on the road side.
- 31 The legal status of the LBR crossings is uncertain due to the lack of statutory powers for the railway (paragraph 6), but both open and user worked crossings operate on the basis that road users can see the approaching trains in time for them to cross safely or stop.

Analysis

Identification of the immediate cause

- 32 Given the priority for trains on level crossings (paragraph 7), and the relative position of the two vehicles, the immediate cause of the collision was that the tractor was driven onto the crossing as the train was approaching.

Identification of causal factors

- 33 The driver of the tractor had approached the level crossing at extremely low speed, and did not stop before his tractor was foul of the level crossing, because he was unable to see if a train was approaching from the direction of Pages Park (paragraph 9). The lack of adequate visibility at the crossing was a causal factor for the collision.
- 34 Train drivers approaching the crossing can see the surface clearly, but when approaching from Pages Park could not see approaching vehicles, as explained in paragraph 9.
- 35 The LBR employs a contractor to cut hedges along this section of the railway when the railway decides this should take place.
- 36 The LBR had developed its strategy for vegetation cutting over the years of operation by the company. This strategy had initially focused on ensuring that the trains were not hit by vegetation, and more recently on the view from pedestrian and highway crossings. The LBR had not considered the potential visibility of trains by users of the farm crossings.
- 37 The LBR had not reduced the height of the vegetation on the north-west side of Cavalry Horse crossing since 2005, resulting in the vegetation issues described in paragraph 9.
- 38 The lack of recent vegetation cutting at Cavalry Horse crossing was a causal factor for the collision.

Review of other factors

Risk assessment

- 39 The LBR had assessed Cavalry Horse crossing, and the other farm crossings on the line, in August 2006, almost exactly a year before the accident. The risk assessment was carried out in line with guidance issued by the *Heritage Railway Association*. It involved allocating a score for the potential consequences from an accident on a scale from one to five, and a score on the likelihood of that accident occurring, again on a scale from one to five. The two scores were then multiplied to give a risk rating between one and twenty five. The LBR considered that any risk scoring over eight or nine should be reduced.
- 40 In the case of Cavalry Horse crossing the LBR marked the consequence score as five, based on the fact that a collision between a train and a vehicle could result in fatalities.
- 41 The LBR marked the likelihood score as one, which is rated as once in every twenty years. As this is the first incident or near miss on any of the farm crossings in forty years the RAIB considers that this rating is appropriate.

- 42 Accordingly, the total risk rating for the crossing was five, indicating, in line with the LBR consideration, that the risk was adequately controlled. However, for the farm crossings the risk arose entirely from the consequences if an accident occurred, and with such severe potential consequences it is appropriate to adopt adequate procedures to ensure that this consequence cannot happen.
- 43 The August 2006 risk assessment identified three specific existing control measures: the speed of trains; the low usage of the crossing and the visibility area.

Visibility for train drivers

- 44 The speed of trains on the crossing is limited to 10 mph (16 km/h), and trains can stop at this speed in approximately 20 to 30 m. The visibility for a train driver approaching at this speed is several times this distance, and the RAIB considers that this control was adequately identified and assessed.

Visibility for road vehicle drivers

- 45 The risk assessment did not identify the need for clear sighting lines for drivers of road vehicles.
- 46 The LBR did not recognise the need to assess and maintain visibility for road vehicle users on its user worked crossings. This was the underlying cause of the collision.

Behaviour of crossing users

- 47 Cavalry Horse crossing gives access to a single field. According to the LBR this field is used to grow grass, and is only rarely visited by agricultural users. The field is let by its owners to tenant farmers, and the tenant regularly changes.
- 48 The LBR had never written to the owner of the field to explain how the crossing should be operated. Thus it is likely that the land owner could not brief tenants on the precautions that they should take to ensure safe operation. The lack of briefing to the land owner was a contributory factor to the collision.
- 49 There are no level crossings within a five mile radius other than over the LBR, so farmers are unlikely to have gained knowledge of level crossing hazards from other railways.
- 50 The lack of briefing to the field owner was a contributory factor to the collision.

Signage

- 51 The LBR risk assessment identified that there were no signs at the crossing, and that they should be provided. However, due to the pressure of other matters, this requirement was overlooked and no steps were taken to identify what signs should be provided, or to provide them. RSPG does not give guidance on signing for user worked crossings, and ORR (HMRI) has, in recent years, agreed specific designs for such signs with heritage railways when necessary. In view of the poor visibility for road vehicle drivers the provision of signage would not have made it possible to cross the line safely, and the lack of signage at the crossing was not a factor in the collision. However, even if the visibility issues are corrected, signs would be beneficial in communicating the priorities and working methods, and they should be provided.

Conclusions

- 52 The immediate cause of the collision was that the tractor was driven onto the crossing while a train was approaching (paragraph 32).
- 53 The causal factors were:
- that road vehicle users crossing from the field to the road had inadequate visibility of trains approaching from Pages Park (paragraph 33); and
 - the lack of recent vegetation cutting at Cavalry Horse crossing (paragraph 38);
- 54 Contributory factors were:
- the lack of briefing to the field owner by the LBR (paragraph 50)
- 55 The LBR's lack of understanding of the need to assess and maintain visibility for road vehicle users on its farm crossings was the underlying cause of the collision (paragraph 46).

Observations

- 56 Rule P2 of the LBR rule book states that all trains approaching a level crossing must sound an audible warning. Drivers on the LBR had developed the habit of not sounding warnings on footpath and user worked crossings. The management of the LBR had not realised that this was so, despite having a developing driver assessment system.
- 57 The RAIB considers that it is unlikely that the lack of audible warning contributed to the accident as the tractor had a full cab, which is adequately sound-proofed, and the driver might not have heard the warning if it was given. Furthermore the driver of the tractor could not have approached the crossing more carefully than he did, given the lack of visibility from the cab.
- 58 Rule P5 of the LBR rule book states that 'speed over level crossings must not exceed 5 mph.....'. Driver practice, and management expectation, was that this should only apply to public road crossings, and the general operating instructions partially reflect this. However, the rules are not clear with regard to speed over footpath and user worked level crossings.
- 59 The LBR expected trains to cross Cavalry Horse crossing at up to 10 mph (16 km/h), and it is likely that the speed of the train was approximately 10 mph (16 km/h). This speed would have been acceptable for the crossing if the vegetation had been adequately cleared to allow the tractor driver to see oncoming trains. Thus, the inconsistency between the rule book wording and actual practice did not contribute to the collision.
- 60 The LBR has re-assessed all its user worked crossings, including updating the risk assessment for road vehicle driver sighting, hedge height reduction and signing.

Actions reported as already taken in response to the collision

- 61 The LBR has met with the landlord of the majority of the land accessed by user worked crossings, and has explained the requirements for operating over these crossings. They have written to all other landlords and tenants using the farm crossings with this information.
- 62 The LBR has developed a dated action plan, with all physical actions to be completed by February 2008, to:
- cut back or crop and lay the hedges at all farm crossings to obtain adequate visibility splays (already completed);
 - cut back trees at all farm crossings where they affect visibility splays (scheduled for completion by February 2008)
 - provide additional reviews of splays throughout the summer season in future;
 - annually re-assess all crossings;
 - provide additional funding to enable crossing visibility splays to be maintained throughout the year;
 - ensure that all farm crossings have working gates on the field side of the railway; and
 - provide and maintain detailed individual records for each crossing.
- 64 At the time of publication of this report the LBR has carried out extensive cutting of hedges, including improving the visibility at Cavalry Horse crossing.
- 65 The LBR has reminded drivers, and amended rule P2, to enforce sounding audible warnings at all level crossings.
- 66 The LBR has amended rule P5 and the general operating instructions to clarify the speed restrictions over all types of level crossings.

Recommendations

67 The following recommendations are made¹:

- 1 The LBR should complete the briefings and works identified in its assessment of field crossings (paragraph 60) dated 25 September 2007, and summarised in paragraphs 61 and 62, to the timescales laid down in that document.
- 2 The LBR should install signing for all farm crossings on the railway so as to ensure that users are informed of how to use the crossing.

¹ Responsibilities in respect of these recommendations are set out in the Railways (Accident Investigation and Reporting) Regulations 2005 and the accompanying guidance notes, which can be found on RAIB's web site at www.raib.gov.uk

Appendices

Glossary of abbreviations and acronyms

LBR

RAIB

RSPG

UWC

Appendix A

Leighton Buzzard Railway

Rail Accident Investigation Branch

Railway Safety Principles and Guidance

User Worked Crossing

Glossary of terms

Appendix B

All definitions marked with an asterisk, thus (*), have been taken from Ellis' British Railway Engineering Encyclopaedia © Iain Ellis. www.iainellis.com

Fireman	Person primarily employed to attend the fire of a steam locomotive.*
Footpath Crossing	A Level Crossing (LC) provided solely for use by pedestrians.*
Functional brake test	A test of train or vehicle brakes to determine their functionality against the standard
Open crossing	A type of level crossing with no barriers, gates, warning system (apart from a whistle board) or monitoring.*
Heritage Railway Association	A body that represents the majority of heritage and tourist railways and railway preservation groups within both the U.K. and Ireland.
Line of sight	Relying on the driver's view of potential obstacles without relying on the use of signalling.
User worked crossing	A level crossing where the barriers or gates are operated by the user.

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