Railway Accident Investigation Unit

Report

Report into the Collision at Level Crossing XN 104 between Ballybrophy and Killonan on the 28th of June, 2007

RAIU
Railway Accident Investigation Unit

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1 Introduction

The Railway Accident Investigation Unit (RAIU) is a functionally independent investigation unit within the Railway Safety Commission. The purpose of an investigation by the Investigation Unit is to improve railway safety by establishing, in so far as possible, the cause or causes of an incident with a view to making recommendations for the avoidance of incidents in the future, or otherwise for the improvement of railway safety. It is not the purpose of an investigation to attribute blame or liability.

The Railway Accident Investigation Unit's investigations are carried out in accordance with the Railway Safety Act 2005 and the Railway Safety Directive 2004/49/EC.

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2 Executive Summary

At approximately 20.00 hours (hrs) on the 28th of June, 2007, the 18.55 service from Ballybrophy to Limerick, train identification number A464, collided with a tractor and trailer at a farm crossing (XN 104). The crossing is located on the Ballybrophy to Killonan line situated at 35 miles 777 yards in the Roscrea to Birdhill section. The tractor and trailer were returning to a field to collect silage for storage when they were struck by the train. The train was not derailed and came safely to a stop 81 m beyond the crossing. The tractor and trailer uncoupled. The tractor struck fencing and then came to a stop on top of the adjacent signalpost, to the right of the direction of travel of the train, parallel to the railway line, facing the direction of Ballybrophy. The trailer struck fencing on the Down side and came to a stop in the ditch to the left of the direction of travel of the train, at an angle of approximately 60º to the railway line. The train crew established that the attendance of the emergency services was not required for the passengers, crew or the tractor driver. No injuries were reported and arrangements were made for the passengers to continue their journey by bus. The line was re-opened on the 29th of June at 15.45 hrs following removal of the train, tractor and trailer, and once repairs had been carried out to signalling equipment, track and the crossing.

Immediate cause:

- The tractor crossed the railway without stopping and checking for the approach of a train.

Causal factors:

- The gates of the crossing were being left open for movements back and forth while work was going on in the adjacent field;
- There was limited visibility of the line from the tractor due to vegetation at the lineside.

Underlying causes:

- The tractor driver was unfamiliar with the correct procedure for using unmanned level crossings as set out in Iarnród Éireann's publication "The SAFE use of unattended Railway Level Crossings".

Recommendations

The following safety recommendations are made.

Recommendations arising from conclusions:

- Iarnród Éireann to review the various sources of information relevant to level crossings and develop a standard, or suite of standards, consolidating information on: civil engineering specifications; signage specifications; visibility of approaching trains; and inspection and maintenance. Ensuring effective implementation and compliance.

- Iarnród Éireann to develop a robust system that identifies current landowners who have crossings on their property and records the delivery of information to them. This should include the distribution of information to known contractors and should consider timely reminders coming up to the silage season.

- Iarnród Éireann to develop and implement a vegetation management programme that addresses vegetation management on a risk basis, prioritising high risk areas.

Recommendations to address other matters observed during the investigation:

- Iarnród Éireann to ensure that a system is put in place for effective implementation of existing standards and to manage the timely introduction of new and revised standards, this should include departmental instructions.

- Iarnród Éireann to review the standards relating to on-board data recorders, ensuring that correct operation, accuracy and post incident downloads are effectively addressed.

- Iarnród Éireann to review the 'Monitoring the Speed of Trains' standard, including assessing the effectiveness of monitoring by means of signal cabin train registers.

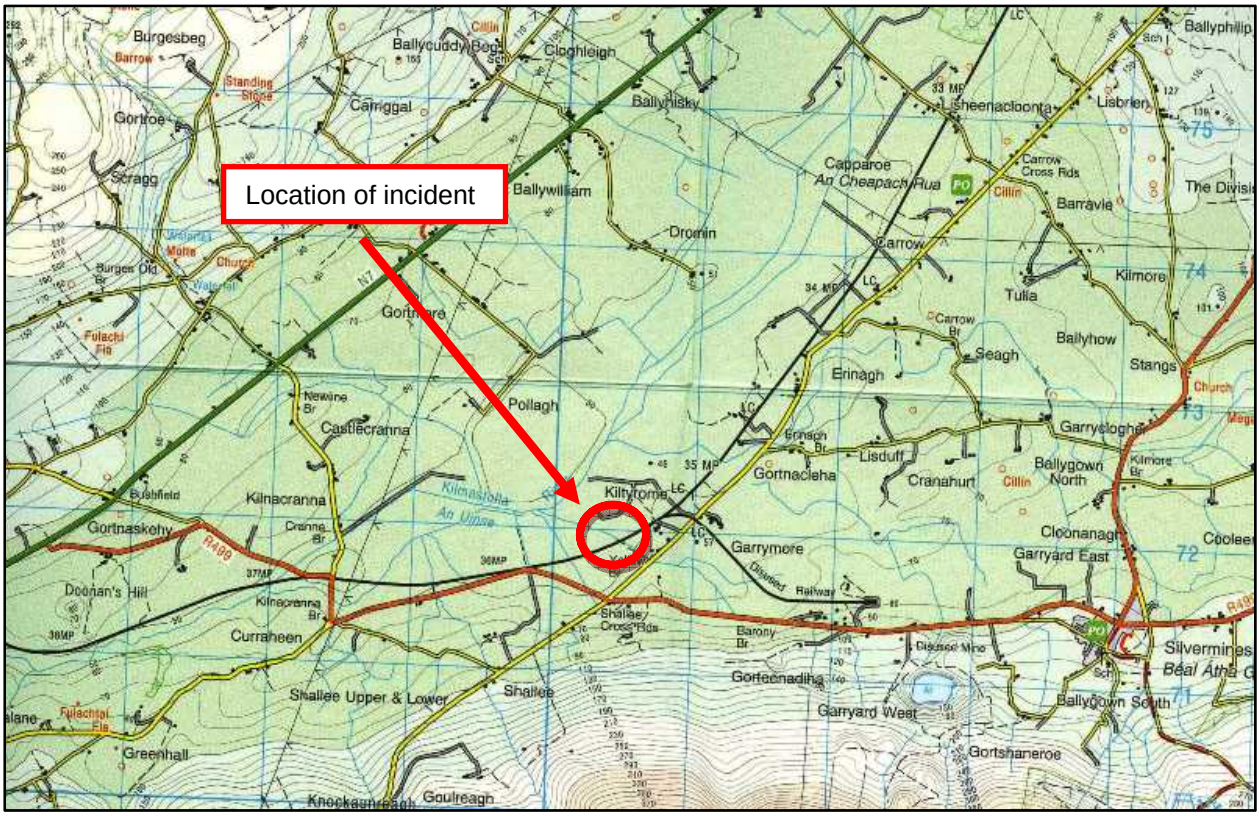
- The Railway Safety Commission to review and issue 'Guidelines for the Design of Railway Infrastructure and Rolling Stock'.

3 The Incident

3.1 Description of the incident

On the 28th of June, 2007, a local contractor was hauling silage across a level crossing identified as XN 104, an unattended field crossing. The contractor was working for a farmer who had purchased grass for silage from the landowner. See figure 1 for the location of the incident.

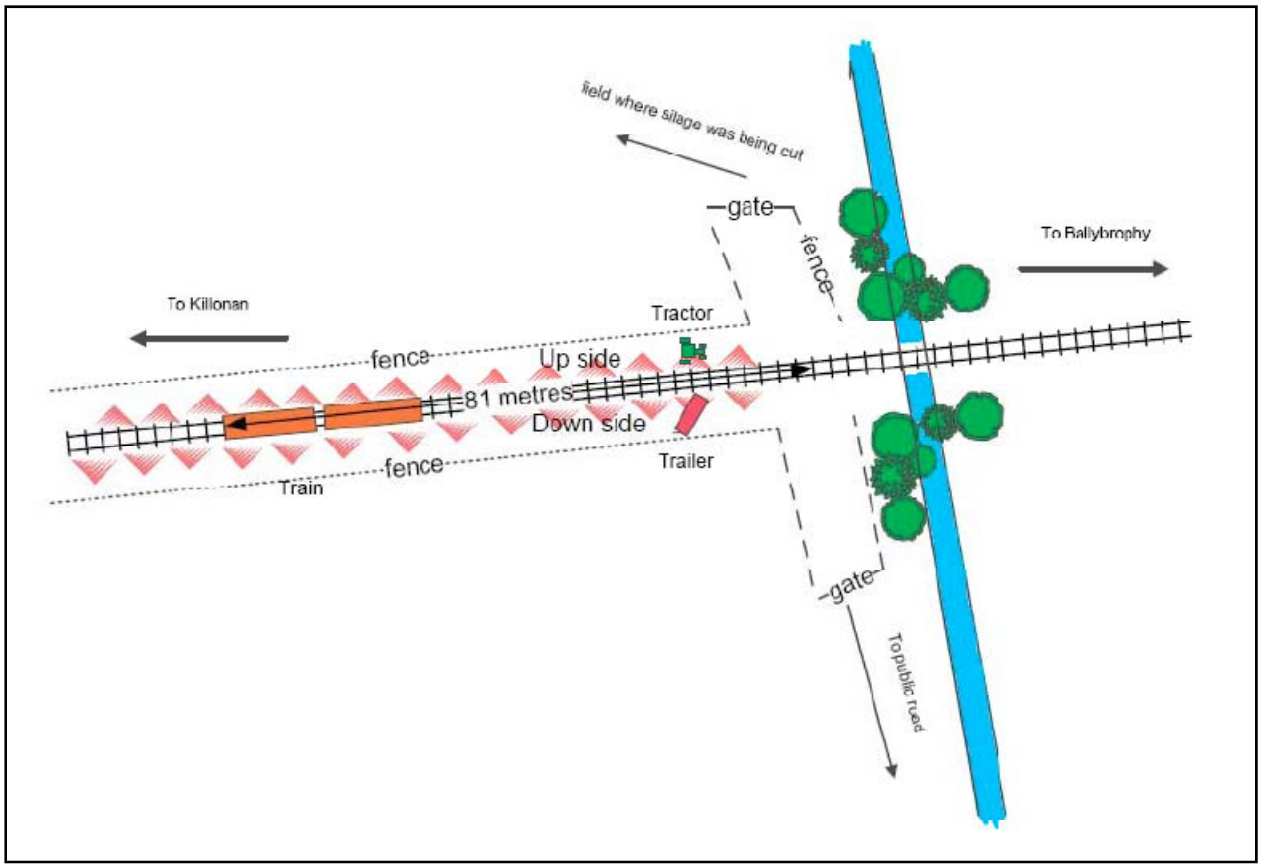
Figure 1 - Location Map (Ordinance Survey Ireland, 2003)



Ordinance Survey Ireland Licence No. EN 0058208. © Ordinance Survey Ireland Government of Ireland.

A harvester and three tractors and trailers were working across the crossing. It is not known who originally opened the crossing gates but it is clear that the tractors and trailers worked back and forth over the crossing and that the gates were left open while this happened. At approximately 20.00 hrs, having dropped off a load of silage, one of the tractors and trailers was traversing the crossing to the field when it was struck by the 18.55 hrs passenger service from Ballybrophy to Limerick, train identification A464. The site layout can be seen in figure 2.

Figure 2 - Site Map



The tractor and trailer uncoupled. The tractor struck the crossing fencing and came to a stop on top of the adjacent signalpost, parallel to the railway line on the same side as the field from which the grass was being harvested, facing towards Ballybrophy. The trailer came to a stop in the ditch on the opposite side of the railway line, at an angle of approximately 60º to the railway line. The train was not derailed and came safely to a stop 81 m beyond the crossing. The trailing door leaf of the leading left side door of carriage 2753 was detached from the train and was located in the ditch beside the trailer. There was a train driver, ticket checker and 11 passengers on board the train at the time of the incident. The positioning of the train, tractor, trailer and door leaf can be seen in figures 3 and 4.

Figure 3 – Location of Tractor, Trailer & Train

Figure 4 – Location of Train Door Leaf

The train driver tried unsuccessfully to contact the signaller at Birdhill cabin. He then checked the train and the condition of the passengers. He returned to the driving cab to again try to contact the signaller at Birdhill and was unsuccessful. He then contacted the District Traction Executive (DTE) using his personal mobile phone and informed him of the accident. Following this he went to check on the condition of the driver of the tractor. The train crew established that the attendance of the emergency services was not required for the passengers, crew or the tractor driver. The DTE contacted the District Manager (DM), who in turn advised Central Traffic Control (CTC) at 20.12 hrs. CTC contacted the Birdhill signalman at approximately 20.20 advising him of the occurrence. No injuries were reported and arrangements were made for the passengers to continue their journey by bus.

The line was opened on the 29th of June at 15.45 hrs following the removal of the train, tractor and trailer, and once repairs had been carried out to signalling equipment, track and the crossing.

4 The investigation

4.1 The level crossing

The level crossing is situated in the townland of Shallee, on the outskirts of Birdhill in County Tipperary. The level crossing is an unattended field crossing located at 35 miles 777 yards on the Ballybrophy to Killonan line in the Birdhill to Roscrea section. The crossing is situated on a right hand curve in the Down direction of the railway. The purpose of a field crossing is to allow movement from one field to another. They are unattended crossings that are operated by the user.

The gradient profile of the crossing can be seen in figure 5, this shows the rising gradients on both approaches to the crossing. On the Killonan side of the crossing there are deep ditches on either side. The approaches from the public road and the field can be seen in figures 6 and 7 respectively.

Figure 5 – Gradient Profile of XN 104 (Iarnród Éireann, 2007)

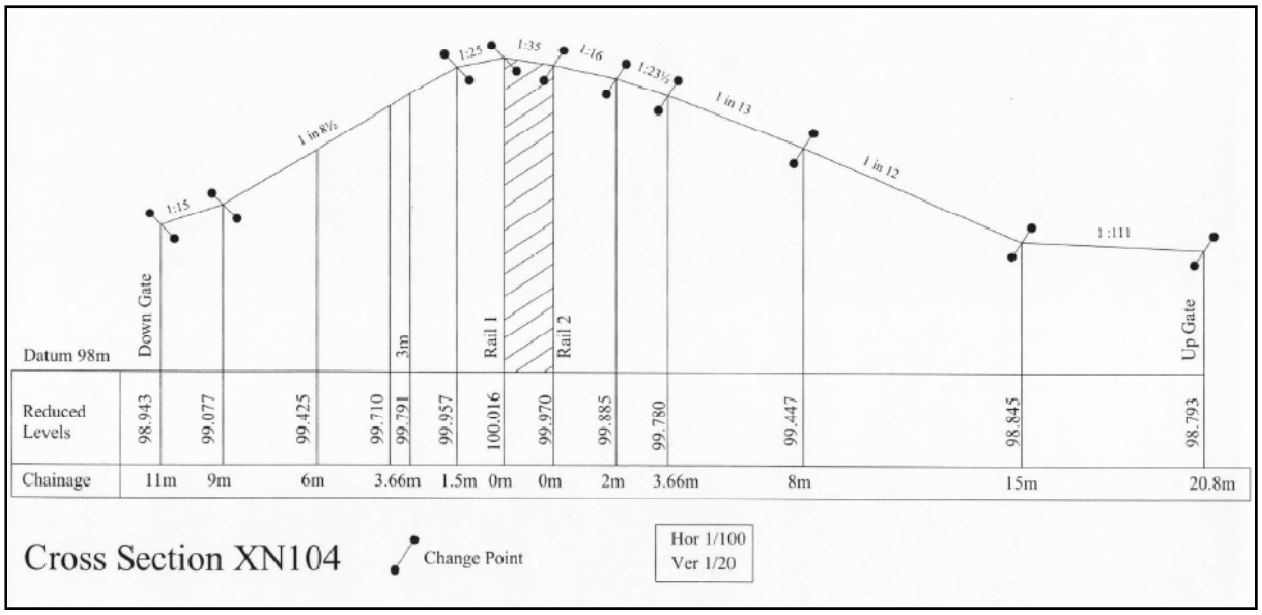


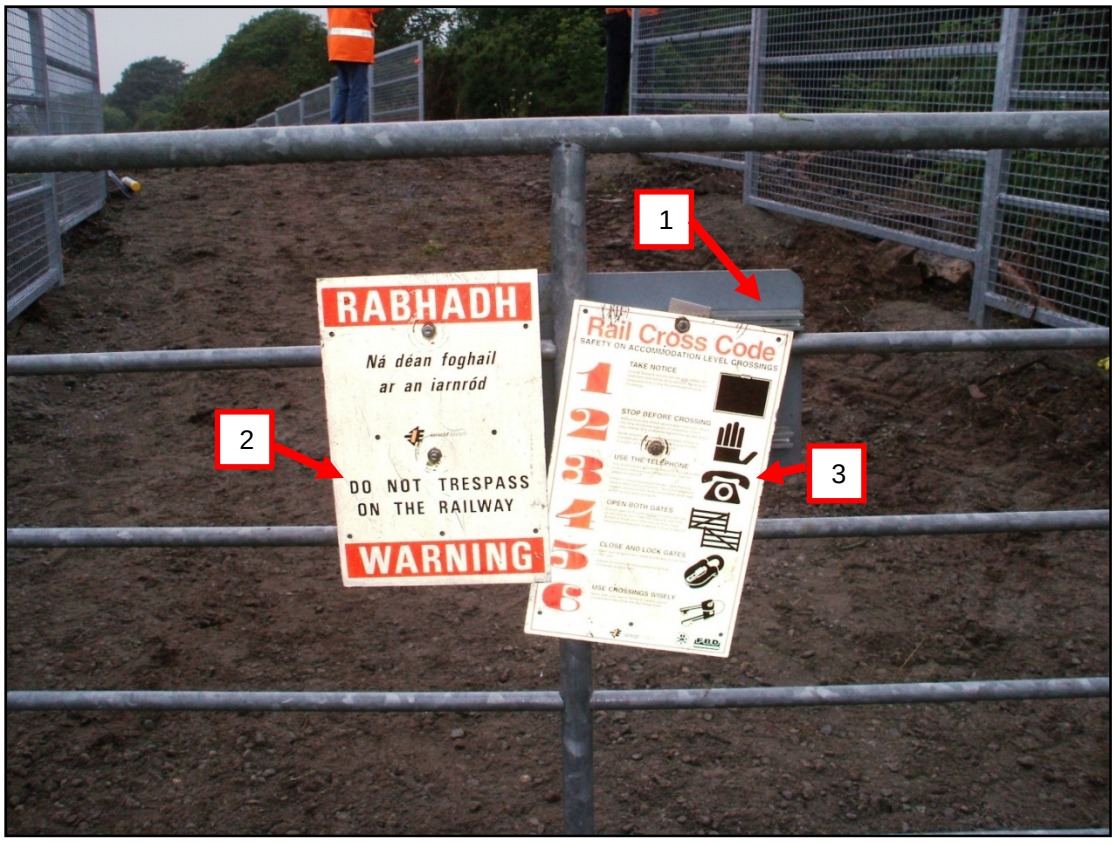
Figure 6 - Approach to XN 104 from public road

Figure 7 – Approach to XN 104 from field

The signage at the crossing was attached to the gates, see figure 8. The signage consisted of:

1. Crossing number (fixed to back of gate);
2. Do Not Trespass on Railway;
3. Rail Cross Code.

Figure 8 – Signage on Gate of XN 104



There were no marker boards on either side of the crossing indicating the safe stopping point clear of the railway for crossing users.

Vegetation lined both the Up and Down sides of the railway at the crossing on the approach from Ballybrophy, restricting views of approaching trains from Ballybrophy for crossing users. This vegetation measured in excess of 3 metres (m) in height on the Down side and in excess of 2 m in height on the Up of the railway, see figure 9. On the approach from Killonan there was low level vegetation on the Up and Down sides of the railway at the crossing.

Figure 9 – Approach from Ballybrophy

There are 12 foot wide gates on both sides of the railway, these were fitted with bolts that did not align with the gate posts and wire was being used to maintain the gates closed, see figures 10 and 11. New fencing had been erected on both sides of the approach from the public road and the field.

Figure 10 – Gatepost on public road side

Figure 11 – Gatepost on field side

4.2 The railway infrastructure

The line from Ballybrophy to Killonan is single track with jointed rail. The maximum speed on this line is 65 kilometres per hour (km/h) and there is a temporary speed restriction (TSR) of 40 km/h between 35 miles 440 yards and 35 miles 1320 yards, which had been imposed since February 2006 due to track condition. The TSR commencement sign is located at crossing XN 102. The advance warning sign for the TSR is located at the 34 ¼ Milepost. There is a whistleboard located at 34 miles 700 yards.

The signalling system is Manual Token Block between Ballybrophy and Roscrea and Electric Token System between Roscrea and Birdhill as well as between Birdhill and Killonan. The trackside signals are a combination of semaphore and colour light.

4.3 Communications

The communication system on the Ballybrophy to Killonan line consists of a half-duplex open channel analogue radio system referred to as mode C, which provides communication between signal cabins and train radios, and lineside telephones. This system allows communication with the local signalman. Due to limitations with Mode C good radio coverage is only available within a radius of approximately 2 to 3 miles of the signal cabins, there are areas of limited or no radio coverage known as Black Spots. Trains operate in passenger service on the Ballybrophy to Killonan line with 2 crew members due to the limitations of Mode C. On the day of the accident the driver was unable to establish contact with the signalman using the train radio.

There is a signalpost with a telephone box adjacent to the crossing on the Killonan side. These telephones are normally kept locked as they are intended for the use of railway employees only. During the accident the tractor struck the signalpost preventing use of the lineside telephone.

4.4 The train

The train was a two carriage 2700 class diesel multiple unit (DMU) consisting of single units 2751 and 2753, with unit 2753 leading. The class 2700s entered service in 1999. The approximate weight of each of the units is 44,757 kilos (kg). Both 2753 and 2751 are fitted with event recorders supplied by Cesis.

4.5 The tractor-trailer

The tractor involved was a John Deere 6290S, 4 x 4 with an enclosed cab and weighed 5900 kg. The trailer was a “Herron” two axle silage unit approximately 6 m long by 2.25 m wide. It had a tare weight of 4500 kg, a payload of 16,000 kg giving a gross weight of 20,500 kg. The trailer was unladen at the time of the incident. The tractor and trailer were owned and operated by a local agricultural contractor who was engaged by a farmer to harvest and haul silage from fields which necessitated repeatedly crossing the railway line at crossing XN104.

4.6 Fatalities, injuries & material damage

There were no major injuries to the train crew, passengers or the tractor driver. The signalpost adjacent to the crossing was knocked over during the incident. The track gauge was widened by 1/2”. Fencing was damaged on both sides of the crossing

4.6.1 Damage to infrastructure

The signalpost adjacent to the crossing was knocked over during the incident. Fencing was damaged on both sides of the crossing. The track gauge was widened by ½ an inch. All repairs to signalling equipment, track and the crossing were carried out before the line was returned for normal service on the 29th of June, 2007.

4.6.2 Damage to train

Damage to front carriage (DMU 2753):

The head and marker lights were broken, the driver’s window was broken, the wiper on both cab windows were damaged, there was a small amount of damage to the leading gangway, four doors were damaged and needed to be replaced, including partial door mechanism replacement. One of the doors was sheared off the carriage. The sand box and suspension shock absorbers needed replacing. There was damage to the fibreglass bodywork on the front and side of the carriage that required 40% of fibreglass on front of unit and 30% of fibreglass along one side of the carriage to be replaced.

Damage to rear carriage (DMU 2751):

There was bodywork damage along 90% of one side of the carriage that required repair. The external driver's cab door and the associated driver's ladder handrails were damaged and required straightening.

4.6.3 Damage to tractor and trailer

The tractor received extensive damage to the cab, rear axle and hauling gear from the collision upon impact and was written off by the insurance assessor.

The trailer also received extensive damage to the hauling gear, under frame and body work and was also written off by the insurance assessor.

4.7 Weather conditions

The incident occurred during daylight hours. The weather at the time of the accident was overcast with light rain.

5 Analysis

5.1 The incident

The safe working of unattended railway level crossings is critically dependent on the gates remaining closed at all times following use. Given that the location of the signage at XN 104 was on the gate, if crossing users do not immediately close the gates after crossing and another user approaches the crossing, there is nothing to draw their attention to the presence of the crossing and the associated risk. The gates at the crossing were left open and the vehicles moved back and forth from the field where the silage was collected to the unloading point on the other side of the crossing. Iarnród Éireann offer a facility of providing staff in the silage season to manage movements across unattended level crossings, this facility was not used or requested in this instance. As the train approached the level crossing the tractor and trailer drove out in front of the train. The train driver applied the brakes, but there was no possibility of avoiding a collision due to the proximity of the train to the crossing. The driver of the train had booked on duty at 15.45 hrs and had a rest period of 15 hrs 45 minutes since his last turn of duty; the driver had two days off four days prior to the incident. There were no issues identified of concern regarding the driver's competence to drive trains.

Iarnród Éireann publish a booklet "The SAFE use of Unattended Railway Level Crossings" (Iarnród Éireann, 2006), within this publication there is a section that covers " special farm activities, such as silage making, hay making and harvesting, necessitating repeated movements across the railway" (Section 17). The current version of this booklet was published in November 2006 and the previous version was published in 2002 (Iarnród Éireann, 2002). Although the distribution of these booklets was carried out locally, there is no record or evidence to establish that the landowner at XN 104 or other local farmers had received either booklet.

5.2 The level crossing

There is no record of any incidents at this crossing and it was not known for mis-use.

The infrastructure was last inspected on the 27/06/2007 and no issues were noted on the report of inspection. Standards I-PWY-1107 'Track and Structure Inspection Requirements' (Iarnród Éireann, 2006, I-PWY-1107) and I-PWY-1307 'Standard for Track Patrolling' (Iarnród Éireann, 2006, I-PWY-1307) were in place at the time of the incident. Standard I-PWY-1307 had been briefed to the local patrol gangers on the 19/04/2007, but it had not yet been fully implemented and some staff were still reporting based on previous versions of the standards.

It was not possible to securely close and padlock the gates at the crossing as per section 7.4 of "The SAFE use of Unattended Railway Level Crossings" (Iarnród Éireann, 2006) due to the position of the gates and gateposts.

Currently there is no company standard that clearly identifies the specification and signage required at crossings. I-PWY-1307 prompts staff to check for missing signage but gives no reference to a list of signage that should be fitted. A list of signage for Accommodation Crossings was provided by Iarnród Éireann (see appendix 1). In addition, the Maintenance of Way Technical Information Sheet MW50, dated 01/01/1983 (MW50) (Iarnród Éireann, 1983) identifies a list of signage to be fitted as does the Report of Committee of Inquiry into Accommodation Level Crossing Safety, dated 13/07/1990 (Iarnród Éireann, 1990). The signage at the crossing was inconsistent with all three lists of required signage for this type of crossing. The signage that was present was attached to the gate and hence when the gate is open there is no visual reminder of the crossing ahead. Following a short audit of several crossings in the local vicinity it was observed that signage also varied between crossings.

The view from the crossing was restricted by vegetation. Unfortunately, it was not possible to measure the viewing distances accurately as the vegetation was accidently lowered by the on-track machine that

was assisting with the recovery of the vehicles. However, from the photographs taken on site it is evident that the views were restricted. The combination of the rising gradient and vegetation meant that it was not possible for the train driver to see the tractor and trailer or the tractor driver to see the train until the tractor was fouling the railway line.

I-PWY 1307 mentions visibility at crossings in the annual survey form but does not give guidance on appropriate distances and the position from which these are to be checked and there is no mention of crossing user visibility in the prompt list. MW50 (Iarnród Éireann, 1983) details the viewing requirements of approaching trains for Accommodation Crossing users to cross safely with normal vigilance. These are based on the Corás Iompair Éireann Report of Committee Derailment at Goold's Cross on 5th August, 1965, dated February 1966 (Coras Iompair Éireann, 1966). MW50 gives the position of measurements to be taken at 3.66 m (12 feet) from the nearest running line and at a height of 1.22 m (4 feet) above ground. It also takes into account a reaction time of 1.5 seconds (s), a crossing speed of 1.34 m/s, a crossing distance of 5.5 m and a standard vehicle length of 7.3 m based on an agricultural tractor and trailer. Based on the above:

Minimum View (m) = [Safe Crossing Time of 11 s (crossing time + reaction time)] x Speed of train (m/s)

This can be approximated as follows for a single line, according to MW50:

View (m) = [Speed of train (miles per hour)] x 5

For the Ballybrophy to Killonan line this gives minimum required view at accommodation crossings of 200 m for the permanent speed restriction of 65 km/h (40 miles per hour, mph) and 125 m for the temporary restriction of 40 km/h (25 mph).

The following viewing distances were recorded on the side that the tractor and trailer approached from. The view was measured at a distance of 3.66 m (12 feet) from the nearest running rail and 1.22 m (4 feet) above ground level, this was 21 m. Using a John Deere tractor the viewing distance from the driver's cab was also measured, this was 54 m at a distance of 3.66 m (12 feet) from the nearest rail. It should be noted that these distances were measured after some of the vegetation had been lowered.

The Iarnród Éireann vegetation management program on the Ballybrophy to Killonan line cleared vegetation along the line for approximately 20 miles between Ballybrophy and Cloughjordan (Milepost 0 to 20). The instruction given to the contractor hired to carry out the work was to clear vegetation for 16 feet either side of the railway. There was no priority given to vegetation clearing around specific railway infrastructure, such as signals and level crossings.

Based on the information above, it can be established that the viewing distance at the time of the incident was below the Iarnród Éireann requirements, which could have been achieved had the vegetation been cut back to improve visibility.

The 1990 report (Iarnród Éireann, 1990) identifies the desirable gradient for the approach to crossings from a distance of 5 m. This recommends a gradient of 1 in 10. The gradient on the approach to the crossing on the Down side is in excess of this.

The crossing was reviewed against the Railway Safety Commission's publication 'Guidelines for the Design of Railway Infrastructure and Rolling Stock, Section 5 – Level Crossings', Issue 01, (Railway Safety Commission, 2002) which is in draft form. Section 5.3.2, table 1 and section 5.8 identify conditions for suitability of user worked crossings, which includes accommodation crossings. The guidelines say that the viewing time of an approaching train should be the railway company's crossing time plus a margin of 5 seconds. Using the Iarnród Éireann crossing time from MW50, this would give a viewing time prior to the arrival of a train of 16 seconds (crossing time of 11 seconds plus 5 seconds). This gives a viewing distance of 178 m for the crossing, based on the temporary speed restriction of 40 km/h in metres per second (which is 11.11 m/s multiplied by 16 seconds).

Comparing the viewing distance measured following the incident of 21 m with the Iarnród Éireann required distance of 125 m and the Railway Safety Commission's guidance of 178 m, it can be established that the viewing distance was considerably restricted.

5.3 The train data recorder

A download of the information on both event recorders was made on the 29/06/2007. The download from the leading unit, 2753, was unsuccessfully carried out by Iarnród Éireann, therefore the data from the rear unit, 2751, was analysed by Iarnród Éireann and the pertinent information is shown below.

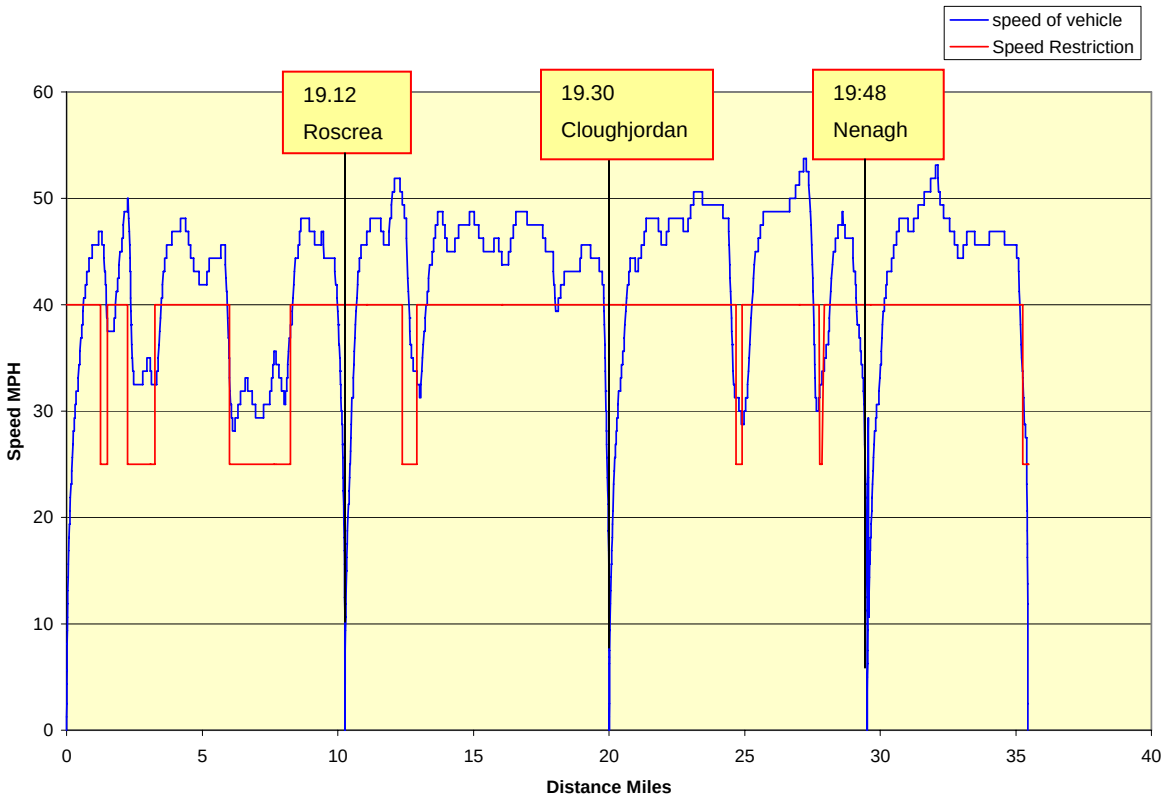
Train and download details.

Unit	**2753**
Train	18.55 Ballybrophy to Limerick
I.D.	A464
Date of accident	28/06/07
Actual date of Download	29/06/07
Event recorder date	29/06/07
Actual time of download	10.55
Event Recorder time	09.53
Wheel Diameter	0822

Unit	**2751**
Train	18.55 Ballybrophy to Limerick
I.D.	A464
Date of accident	28/06/07
Actual date of Download	29/06/07
Event recorder date	29/06/07
Actual time of download	08.58
Event Recorder time	08.00
Wheel Diameter	0850

Graph 1 shows the speed check for the journey from Ballybrophy to the crossing. The speed of the vehicle as recorded by the event recorder is shown in blue. The speed restrictions as outlined in the working timetable and weekly circular week ending 01/07/2007 are shown in red. The timetabled stops are indicated. The speed of the train was regularly above the permanent and temporary speed restriction permitted. Monitoring the speed of trains is carried out in accordance with Iarnród Éireann's standard RSS2-1 'Checking the Speed of Trains' (Iarnród Éireann, 1998). This provides for monitoring train speed by: using the information in Signal Cabin Train Register Books or CTC; downloading the data recorder of the train; radar speed guns; and on-board checks using stop watches and mileposts. The monitoring of train speeds in the Ballybrophy to Killonan section was found to be heavily reliant on the Signal Cabin Train Register Books. This is not always an effective way to monitor the speed of trains. In 2007, only 25% of the planned radar monitoring was carried out. In the same period from 24 planned monitors by means of downloads from on board data recorders only 2 were carried out and both of these were post incident downloads.

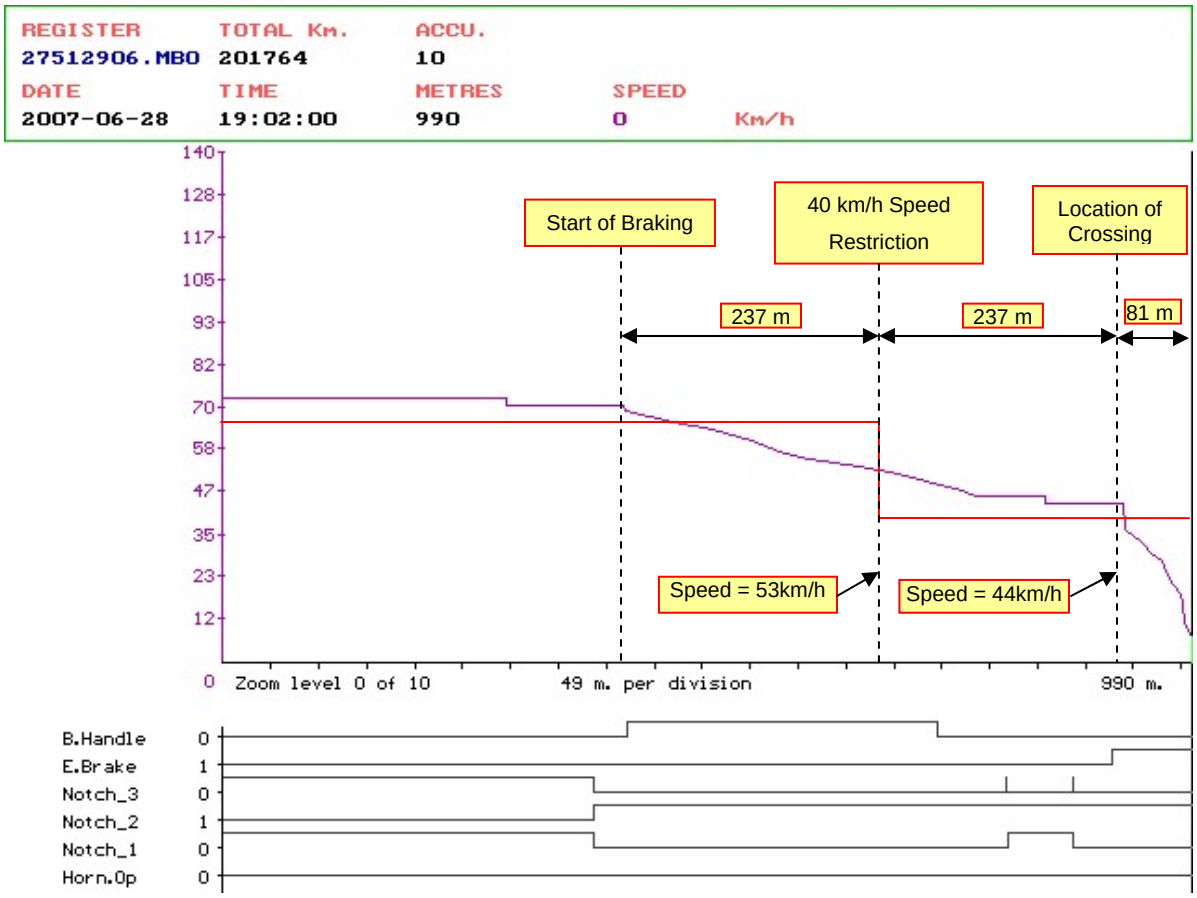
Graph 1 – Speed Profile for Journey from Ballybrophy to Incident



The location where the train came to a stop was measured as 81 m beyond the crossing. Graph 2 shows information from the event recorder for the last 990 m before coming to a stop. The event recorder from unit 2751 does not record the activation of the horn from unit 2753. The purple line indicates the speed of the train while the red line shows the temporary and permanent speed restrictions as outlined in the Working Timetable and Weekly Circular for the week ending 01/07/2007.

At approximately 510 m from the crossing, approaching the TSR, the driver applied the brake and the train speed can be seen to reduce. At the commencement of the TSR, 237 m from the crossing, the train speed was 53 km/h. Brake application was maintained until the train slowed to approx 46 km/h. The driver applied the emergency brake whilst travelling at a speed of 44 km/h and the train came to a stop 81m beyond the crossing. The collision with the tractor and trailer would also have contributed to this deceleration.

Graph 2 – Lead up to incident



Maintenance of 2700 DMU data recorders is carried out to verify that all configured signal inputs are being correctly recorded by the data recorder, as well as to check that the wheel diameter calibration, time and date are set correctly. As part of this, weekly and three monthly exams are carried out. It has not been possible to establish whether the maintenance checks for unit 2753's data recorder were carried out at the appropriate time as the relevant records were not available. Neither the required post incident form logging the condition of train equipment nor calibration of the data recorder were carried out at the time of the incident. Therefore, it has not been possible to establish whether the data recorder on unit 2753 was calibrated correctly and whether there was any fault condition present at the time of the incident.

6 Conclusions

6.1 Immediate cause, contributory factors, underlying causes

Immediate cause:

- The tractor crossed the railway without stopping and checking for the approach of a train.

Causal factors:

- The gates of the crossing were being left open for movements back and forth while work was going on in the adjacent field;
- There was limited visibility of the line from the tractor due to vegetation at the lineside.

Underlying causes:

- The tractor driver was unfamiliar with the correct procedure for using unmanned level crossings as set out in Iarnród Éireann's publication "The SAFE use of unattended Railway Level Crossings".

7 Recommendations

The following safety recommendations are made.

Recommendations arising from conclusions:

- Iarnród Éireann to review the various sources of information relevant to level crossings and develop a standard, or suite of standards, consolidating information on: civil engineering specifications; signage specifications; visibility of approaching trains; and inspection and maintenance. Ensuring effective implementation and compliance.

- Iarnród Éireann to develop a robust system that identifies current landowners who have crossings on their property and records the delivery of information to them. This should include the distribution of information to known contractors and should consider timely reminders coming up to the silage season.

- Iarnród Éireann to develop and implement a vegetation management programme that addresses vegetation management on a risk basis, prioritising high risk areas.

Recommendations to address other matters observed during the investigation:

- Iarnród Éireann to ensure that a system is put in place for effective implementation of existing standards and to manage the timely introduction of new and revised standards, this should include departmental instructions.

- Iarnród Éireann to review the standards relating to on-board data recorders, ensuring that correct operation, accuracy and post incident downloads are effectively addressed.

- Iarnród Éireann to review the 'Monitoring the Speed of Trains' standard, including assessing the effectiveness of monitoring by means of signal cabin train registers.

- The Railway Safety Commission to review and issue 'Guidelines for the Design of Railway Infrastructure and Rolling Stock'.

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

1. The vegetation at XN104 has been cut back and the views are in excess of 300 m for both views on the up and down side of the crossing. Ongoing upgrading work, which had commenced at the time of the incident, was completed by the end of April, 2008.

2. The review of signage requirements is ongoing and a number of internal meetings have taken place to discuss this and other issues relating specifically to level crossings.

3. The specific recommendations regarding briefing drivers on adherence to speed restrictions and reviewing the speed monitoring regime for the Limerick District have both been fully implemented.

4. The Iarnród Éireann Safety Audit Unit conducted an audit on various aspects of the management and operation of User Operated Level Crossings, i.e. unattended public road crossings, occupation and farm crossings.

5. The crossing users have been written to and a copy of 'The SAFE use of Unattended Railway Level Crossings' booklet has been issued to them.

6. Iarnród Éireann is continuing to implement the programme of closing and upgrading level crossings started in 1999 funded from the Railway Safety Programme. Further improvement and closure of level crossings will be considered as part of the 2009 – 2013 Railway Safety Programme.

7. There is a comprehensive review currently taking place of the data recorders. The purpose of this is to review the maintenance examination regime and examine the current control structures that are in place for data recorder downloads, software and hardware. When this review has been completed, clear, process driven improvements will be recommended and implemented where needed to ensure that all aspects of data recorders have adequate controls in place to ensure that the integrity of the overall system is proven and maintained.

9 Additional information

9.1 Acronyms

CTC Central Traffic Control

DM District Manager

DMU Diesel Multiple Unit

DTE District Traction Executive

hrs Hours

m Metre

mph Miles per hour

RAIU Railway Accident Investigation Unit

9.2 Glossary of Terms

Central Traffic Control – Main signalling centre based in Dublin.

Data recorder – A device fitted to trains to store key train parameters and driver actions.

Diesel Multiple Unit – Self propelling train carriage powered by diesel, which can operate as single units or coupled together.

Down Direction – Direction of travel leading away from Dublin.

Down Side - The left hand side of the track in the direction of travel away from Dublin.

Electric Token System - A system which uses electric token instruments at each end of the block section. The instruments contain a number of tokens, and are interlocked in such a way that removal of a token from one of the instruments prevents removal of another token until the first token is replaced in one of the instruments. Possession of this token allows a train to enter the section.

Manual Token – A system whereby there is only one token for the block section. Possession of this token allows a train to enter the section.

Railway Safety Programme – An investment programme to improve the safety of the Iarnród Éireann railway funded by the Department of Transport.

Signal Cabin Train Register Book – A log of times of train movements recorded at a signal cabin.

Up Direction – Direction of travel leading towards Dublin.

Up Side – The left hand side of the track in the direction of travel to Dublin.

9.3 References

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Accommodation Level Crossing Signage

Nr.	Sign	Drawing No.	Nr. in LC Safety Booklet	Crossing Type		Dimensions (WxH) (All dims in mm)	Position	Remarks
				Field	Occupation			
1	Warning Stop Before You Cross The Railway	W496/124	18.5.1	No	Yes	1200 x 1000 - 2 Posts	50 m before LC on LHS	This will be used in advance of Occupation Crossings where no accident has occurred.
2	Warning Accident Black Spot	W496/124	18.5.2	No	Yes	1200 x 1200 - 2 Posts	50 m before LC on LHS	This will be used in advance of Occupation Crossings where an accident has occurred.
3	Puffin Billy	W496/103 B	18.5.3	Yes	Yes	Equilateral Triangle 780 each side - 1 Post	1 m before LC Gate on LHS	Above the 'Danger Railway Level Crossing' Sign.
4	Danger Railway Level Crossing	W496/128	18.5.4	Yes	Yes	730 x 920 - 1 Post	1 m before LC Gate on LHS	Below the 'Puffing Billy' Sign.
5	Stop Sign	W496/133	18.5.5	Yes	Yes	750 x 750 - 1 Post	Directly at LC Gate on LHS	Fix to a separate pole. Add white line, where feasible.
6	Stop, Look, Listen	W496/114	18.5.6	Yes	Yes	450 x 600 - 1 Post	1 m before LC Gate on RHS	
7	Keep These Gates Shut	W496/116	18.5.7	Yes	Yes	750 x 600 - 1 Post	Directly at LC Gate on LHS	Put on the same pole as the 'STOP' Sign.
8	Level Crossing Numberplate	W496/100	18.5.8	Yes	Yes	560 x 240 - 1 Post	Inside cattlegrid fence	At least 3730 mm from RE of nearest rail so that the views are not obstructed. Fixing it to the fence would eliminate the need for 2 poles.
9	Stop Behind the Black and Yellow Markers	W496/102	18.5.9	At LC's with BYM Posts	At LC's with BYM Posts	1200 x 600	Replace STOP sign with this one.	The provision of Black and Yellow Marker (BYM) Posts is at the DE's discretion. Use this sign instead of the STOP sign where BYM Posts are provided.
10	Do Not Trespass on the Railway	W496/106	18.5.10	Yes	Yes	260 x 380 - 1 Post	2.5 m from the RE of the nearest rail facing the roadway.	At the far side of the cattlegrids from the roadway. This sign must not interfere with the views. Outside structure gauge.
11	Have You Shut The Crossing Gates?	W496/127	18.5.11	Yes	Yes	630 x 430 - 1 Post	5 m from LC Gate on LHS	Must not be allowed to obstruct the 'Stop, Look, Listen' sign when coming from the opposite direction.

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