Railway Accident Investigation Unit

Ireland

INVESTIGATION REPORT

Vehicle struck by train at Corraun level crossing, XX024, Co. Mayo, 12th February 2014

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Reader guide

All dimensions and speeds in this report are given using the International System of Units (SI Units). Where the normal railway practice, in some railway organisations, is to use imperial dimensions; imperial dimensions are used and the SI Unit is also given.

All abbreviations and technical terms (which appear in italics the first time they appear in the report) are explained in the glossary.

Descriptions and figures may be simplified in order illustrate concepts to non-technical readers.

Paragraphs from the report will be referenced throughout the report for ease of reading.

Report preface

The RAIU is an independent investigation unit within the Department of Transport, Tourism and Sport (DTTAS) which conducts investigations into accidents and incidents on the national railway network, the Dublin Area Rapid Transit (DART) network, the LUAS, heritage and industrial railways in Ireland. Investigations are carried out in accordance with the Railway Safety Directive 2004/49/EC and the Railway Safety Act 2005.

The RAIU investigate all serious accidents: A serious accident means any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety.

The RAIU may investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident. RAIU investigations are conducted for the purpose of accident and incident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations in order to prevent accidents and incidents in the future and improve railway safety.

It is not the purpose of an RAIU investigation to attribute blame or liability.

Report summary

At approximately 09:55 hours (hrs) on Wednesday 12th February 2014, an An Post van approached Corraun Level Crossing with the Level Crossing gates open and drove onto the Level Crossing. At the same time, the 09:35 hrs Iarnród Éireann (IÉ) passenger service from Ballina to Manulla Junction was travelling through Corraun Level Crossing and struck the van. On impact, the van was thrown clear of the train and into the adjacent drainage ditch before coming to a stop.

The Local Resident was working in close proximity but out of sight of the level crossing, heard the accident and made his way to the scene where he rendered assistance to the van driver, who was travelling unaccompanied.

The driver of the van was seriously injured and conveyed from the scene by ambulance to Mayo General Hospital, Castlebar. There were no other injuries as a result of this accident.

The immediate cause of the accident was that the An Post van did not stop, as required, at the Level Crossing and drove into the path of the oncoming train. Contributory factors associated with the incident are accident:

- CF-01 – The gates at the Level Crossing were secured open, allowing the van to enter the Level Crossing without stopping;
- CF-02 – The Level Crossing was regularly misused by the local users, whereby the gates are regularly tied open.

The underlying causes associated with this accident are:

- UC-01 – There is a history of misuse at the Level Crossing; with local users regularly misusing the Level Crossing;
- UC-02 – IÉ did not take sufficient actions at the Level Crossing to prevent its regular misuse, despite the RAIU making a safety recommendation related to preventing level crossing misuse in 2009 and re-iterating in 2011.

An additional observation in this accident is:

- AO-01 – The addition and purpose of the decision point line on user worked level crossings is not obvious to users of the Level Crossing and may cause confusion with statutory stop lines still at some level crossings.

As a result of this investigation, the RAIU have made three safety recommendations:

- IÉ should consider options to upgrade the crossing to minimise direct action by the users;
- IÉ should carry out a full review of known misused user worked level crossings on public and private roads and either upgrade the level crossing or introduce measures to minimise their misuse;
- IÉ should ensure that where a Decision Line is present at a level crossing, that the purpose of this Decision Line is appropriately conveyed to the level crossing users.

Contents

The accident

Summary of the accident

1 At approximately 09:55 hrs on Wednesday 12th February 2014, an An Post van drove onto Corraun Level Crossing, the driver was travelling unaccompanied. (referred to as the Level Crossing for the remainder of the report), Co. Mayo, see Figure 1.

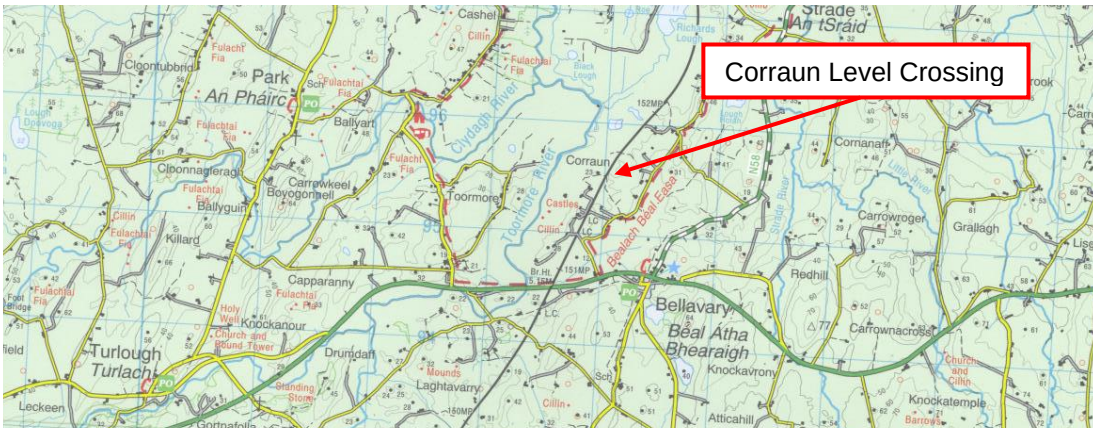

Figure 1 – Location of the Level Crossing XX024, Corraun, County Mayo

2 At the same time, the 09:35 hrs passenger service from Ballina to Manulla Junction (train identification number A863) was travelling through the Level Crossing and struck the van. On impact, the van was thrown clear of the train and into the adjacent drainage ditch before coming to a stop. The train came to a full stop 311 metres (m) past the Level Crossing, see Figure 2.

Figure 2 – Scene of the accident

3 A local resident who was in a field close to the Level Crossing heard the accident and rendered assistance to the An Post van driver until the Emergency Services arrived, (who will be referred to as the Van Driver for the remainder of the report). The Van Driver was found to be seriously injured and conveyed from the scene by ambulance to Mayo General Hospital, Castlebar (the local resident did not witness the incident occurring).

4 None of the six passengers on board the train or the two members of IÉ staff (driver and mentor driver) were injured as a result of the accident. The passengers were de-trained and escorted back to the Level Crossing by IÉ staff to continue their journey by bus.

General description of the railway

Infrastructure

5 The railway line from Ballina to Manulla Junction is a single *bidirectional line*, trains travelling towards Ballina are in the *down direction* and those travelling towards Manulla Junction are in the *up direction*. The track is plain line with *flat bottom continuously welded rail* (CWR) mounted on concrete sleepers in ballast.

6 No factors in relation to the condition of the track were found to have contributed to the accident.

7 The Level Crossing is referred to locally as Corraun Level Crossing, and is situated between Foxford and Manulla Junction railway stations in terms of the railway. It is located approximately 10.5 kilometres (km) from Castlebar and 1.2 km from Ballyvary.

8 The Level Crossing is accessed from an unrestricted private road, 75m from a third class regional road (L57721), located off the N5 (Castlebar – Swinford) adjacent to Ballyvary, to which the public have unrestricted access, see Figure 3. The third class regional road has a speed limit of 80 kilometres per hour (km/h).

9 IÉ have designated the level crossing as an 'Occupational Crossing' (O) type crossing and is identified by IÉ as asset number XX024. 'O' Type crossings are unattended level crossings, on private roads, where the level crossing gates are normally closed to road traffic. They require the user to open and close the level crossing gates in order to cross the railway.

Figure 3 – Corraun Level Crossing, XX024

10 This 'O' Type level crossing is similar to OP Type Level Crossings, which are located on public roads. The Level Crossing will be discussed further in the Evidence section of this report.

Rolling stock

11 The train involved in the accident was the 09:35 hrs passenger service from Ballina to Manulla Junction, train identification number A863. The service was due to arrive in Manulla Junction on time at 10:03 hrs.

12 The service was operated by a two piece Diesel Multiple Unit (DMU) comprising of unit 2817 (leading unit) and unit number 2818. The train had a total length of 43 m and has a maximum permissible speed of 70 miles per hour (mph) (112 km/h).

13 The *on-train data recorder* (OTDR), fitted to the leading carriage, recorded that the train had been travelling at a speed of 80 km/h (the speed limit of this section of track is 95 km/h) on the approach to the Level Crossing.

14 The OTDR identifies that the brakes were applied 27 m past the Level Crossing, with the front of the train coming to a stop 311 m past the Level Crossing. The braking performance was within the IÉ specifications for a train of this type.

15 The OTDR also recorded that the train horn had been sounded at the location of the *whistle board* and on approach to the Level Crossing. The train horn was again sounded twice as the train approached the Level Crossing. The OTDR also confirms that the front facing lights on the train were switched on and functioning correctly.

16 No factors in relation to the condition of the train were found to have contributed to the accident.

Signalling and communications

17 The single track route from Ballina to Manulla Junction is signalled using two and three aspect *colour light signals,* controlled by the Mayo Line Signalman, located in Athlone Signalling Centre, *Track Circuit Block* (TCB) regulations apply to this route. The means of communication between the train drivers and the Mayo Line Signalman on this route is through train radio.

18 No factors in relation to the condition of the signalling and communications systems were found to have contributed to the accident.

Operations

19 The line from Ballina to Manulla Junction has seven passenger services, in each direction, Monday to Saturday, with six services on Sundays. Additionally, there are sixteen scheduled freight services per week Monday to Saturday travelling on this route.

20 The speed limit of this section of track is 95 km/h, there were no temporary speed restrictions in force on that section of line where the Level Crossing is situated at the time of the accident.

Fatalities, injuries and material damage

Fatalities and injuries

21 As a result of the accident, the Van Driver sustained six fractured ribs, fractured nose and eye socket, chipped shinbone and an injury to his left leg.

22 There were no injuries to the six passengers and two members of IÉ staff on board the train at the time of the accident.

Material damage

23 The An Post van was a Volkswagen Caddy, first registered in 2012. It had received a full service in the week prior to the accident. As a result of the accident, the van suffered severe frontal damage forward of the bulkhead and the force of the impact dislodged the engine and gearbox from the front chassis legs, see Figure 4. The Van Driver had not reported any defects to the van before the accident.

Figure 4 – Van and Level Crossing damage

24 There was damage to the Level Crossing infrastructure as a result of this accident, see Figure 4.

25 The front of the train was slightly damaged (Figure 5) and there was light damage to the front side panel of the leading carriage, 2817 (Figure 6).

Figure 5 – Damage to front of train

Figure 6 – Damage to side of train

Parties and roles involved in the accident

Parties directly involved in the accident

26 IÉ is the *railway undertaking* (RU) that owns and operates mainline and suburban railway services in Ireland. IÉ is also the railway infrastructure manager (IM), managing the design, installation, testing, inspection, maintenance, renewal and operation of the railways physical assets.

27 An Post is a major commercial organisation providing a wide range of services which encompass postal, distribution and financial services.

Roles directly involved in the accident

28 The IÉ staff, directly involved in the accident, were the:

- Train Driver – IÉ certified competent driver, who was driving the train at the time of the accident. He was an experienced train driver who was accompanied by a mentor on this occasion for route knowledge as he had recently transferred from another District within IÉ;
- Mentor Driver – IÉ certified competent driver who was observing the Train Driver as he was undergoing route knowledge supervision of the Train Driver.

29 The Van Driver was an employee of An Post and the local postman for this area. The Van Driver was an experienced driver and familiar with the area and a frequent user of the Level Crossing. The route over the Level Crossing was part of his normal daily postal delivery route.

30 The Local Resident was the person who came to the assistance of the Van Driver after the accident.

Roles not directly involved in the incident

31 The RSC is the national safety authority, which is responsible for the regulatory oversight of the Safety Management System (SMS) and enforcement of railway safety in the Republic of Ireland in accordance with the Railway Safety Act 2005 and the European Railway Safety Directive.

32 The Road Safety Authority's (RSA) aim is to save lives and prevent injuries by reducing the number and severity of collisions on the road. Some of the ways that the RSA works to improve road safety in Ireland are by:

- Developing and implementing information and education campaigns to increase awareness of road safety and promote safer driving;
- Undertaking accident and road safety research in order to develop measures and recommendations to improve road safety;
- Producing road safety strategy documents and monitoring their implementation.

33 DTTAS – The role of the DTTAS is to deliver highly critical aspect of Ireland's economic activity including further development to the transport infrastructure and services and the support and enhancement of significant tourism and sport sectors.

34 External Consultant NTTX Ltd, were engaged by IÉ to assist the IÉ Signage Review Group in focusing on the human factor aspects of level crossing signage. They were also key to ensuring that the messages conveyed through each of the signs were in alignment with the key safety risks.

External circumstances

35 The weather at the time of the accident was recorded at the Met Éireann Ireland West Airport-Knock weather station as 5 millimetres (mm) of rainfall with an average wind speed of 20 – 25 knots with gusts up to 74 knots. A temperature of -1.9 degrees Celcius was recorded.

36 Witness statements reported heavy rainfall, sleet and high winds; this can be verified by the RAIU staff who attended the scene later that morning. In addition, IÉ were forced to close many parts of the railway network due to the adverse weather conditions on the day of the accident.

RAIU Investigation

RAIU decision to investigate

37 In accordance with the Railway Safety Act 2005, the RAIU investigate all serious accidents. Given that under slightly different conditions, this accident may have led to a serious accident where there would have been potential for fatalities and serious injuries, to the Van Driver, passengers and IÉ staff due to the possible derailment of the train, a decision was made to investigate under article 19 (2) of the Railway Safety Directive (EC, 2004).

Scope of investigation

38 The RAIU must establish the extent of the investigation to ensure that only pertinent information is recovered and reviewed. Therefore, for this incident, the RAIU have defined the following scope:

- Establish the sequence of events;
- Establish, where applicable, the immediate cause, contributory factors (CF) and *underlying causes* (UC) and *root causes* (RC);
- Examine the operation of the signalling system and level crossing;
- Examine relevant records and documents from An Post in relation to the Van Driver;
- Examine An Post risk assessments and safety statements;
- Examine IÉ, RSC and RSA documentation in relation to the operation of level crossings;
- Examine relevant previous RAIU safety recommendations;
- Identify any *additional observations* (AO) indirectly associated with the accident, where applicable.

Investigation and evidence

39 During the on-site and off-site investigation the RAIU collated the following evidence:

- Witness evidence from parties involved in the incident;
- Other evidence from members of the RU and IM with information pertaining to the incident;
- RU and IM standards, procedures and other documentation;
- Standards, procedures and documentation from other relevant bodies
- RSA documentation;
- Interviews with parties involved and relevant witnesses;
- Previous RAIU reports into similar occurrences.

Evidence

Level crossing infrastructure

General description

40 The Level Crossing is located 151 miles, 365 yards, from Dublin (Broadstone), on the Manulla Junction to Ballina line. It is located approximately 10.5 km from Castlebar and 1.2 km from Ballyvary, see Figure 7.

41 As previously mentioned, the Level Crossing has been designated an 'O' Type level crossing. 'O' Type crossings are unattended level crossings on private roads, where the level crossing gates are normally closed to road traffic, and require the user to open and close the level crossing gates in order to cross the railway.

42 The Level Crossing gates are 4.66 m (16 feet) wide metal gates positioned on each side of the Level Crossing, which open away from the railway. The surface of the intersection of the road with the track is covered in rubber units, which provide a level surface over the track. *Cattle grids* are installed adjacent to these rubber units, on each side of the roadway, where it crosses the track. There is concrete post and wire fencing running between the gates and the boundary hedges.

Access to the Level Crossing

43 The Level Crossing is located 450 m from the N5, the national road from Castlebar to Swinford, see Figure 7.

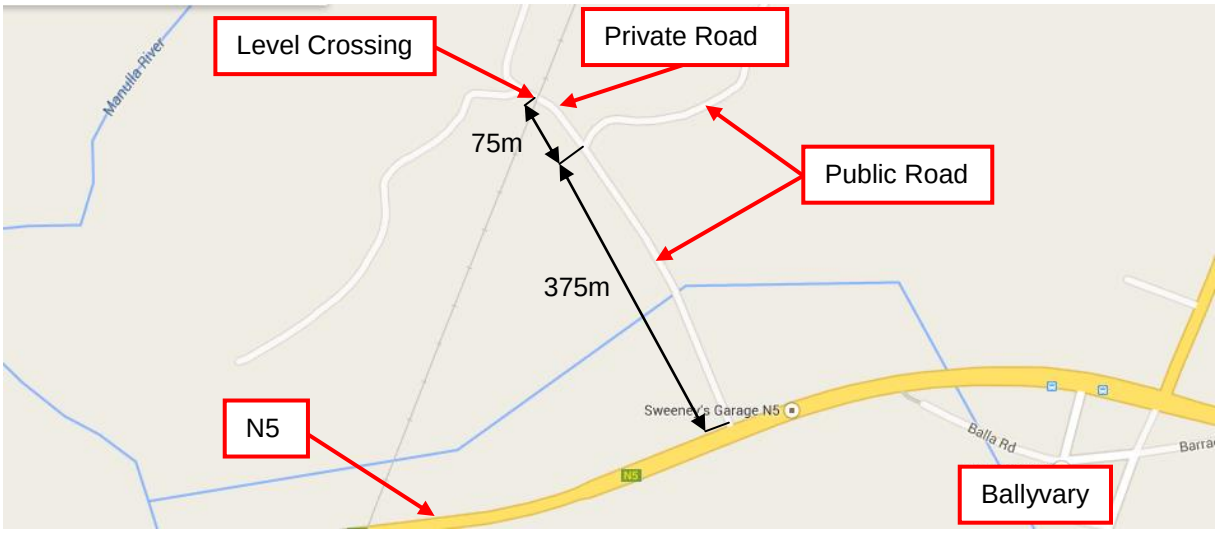

Figure 7 – Access roads to Level Crossing

44 The third class public road L57721 (identified as 'Public Road' in Figure 7) is accessed from the N5 National Road and runs a distance of 375 m to the access point of the private road (identified as 'Private Road' in Figure 7), see Figure 9.

Figure 8 – View from National Road (N5) onto Third Class Public Road (Public Road)

45 From the access point of the private road, which is unrestricted to members of the public, the road runs a distance of 75 m until it reaches the Level Crossing, see Figure 9.

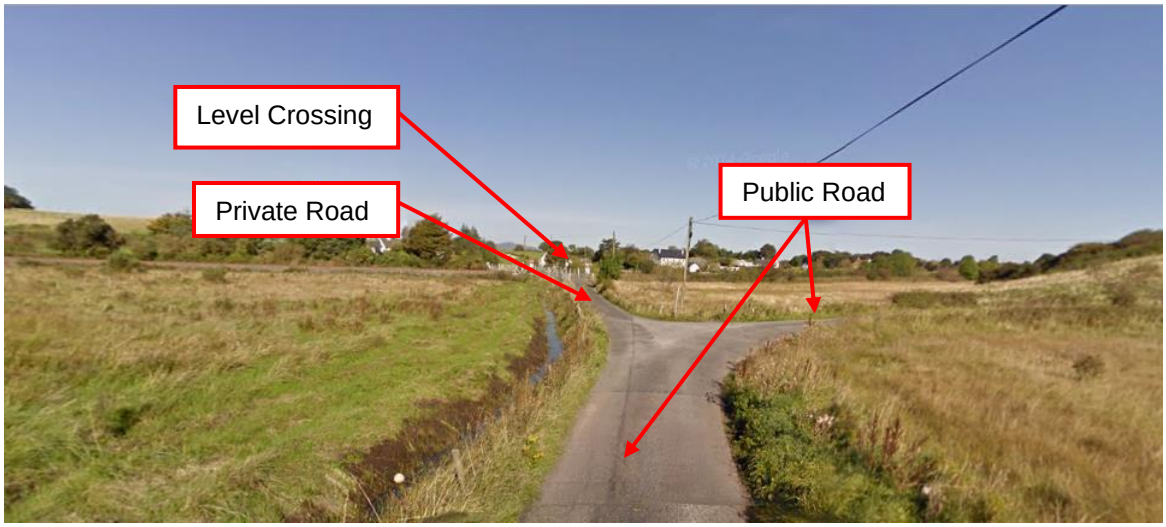

Figure 9 – View from public road onto private road (with the Level Crossing)

46 There is signage and road markings present on the Level Crossing (which will be discussed later in the report). The level crossing is not protected by roadside traffic signals and there is no *lineside telephone* provided at the Level Crossing.

Signage on the approach to the level crossing

47 There are no warning signs situated on the N5, the third class public road or the private road which services the Level Crossing.

48 Previous to this accident, the RAIU conducted an investigation into a car strike on a private road, Investigation Report 2012-R001, 'Car Strike at Murrough Level Crossing, XG173, County Galway, 14th February 2011', published on the 8th February 2012. The RAIU made a safety recommendation in relation to signage on the approaches to level crossings, specially related to private roads, recommending that "IÉ should liaise with local authorities where private road level crossing can be accessed from a public road to ensure there is advance warning to road users".

49 As a result of this earlier safety recommendation, IÉ have contacted all County Councils that have charge of public roads accessing private roads where there are level crossings present requesting the installation of warning signs on the approaches to the level crossings.

50 IÉ contacted Mayo County Council by letter on the 10th April 2013 identifying that there was no advance signage at this Level Crossing. A meeting was held between IÉ and Mayo County Council on the 7th May 2013, in relation to this Level Crossing and other affected level crossings. In written correspondence to IÉ on 18th August 2013, Mayo County Council state that the issue of signage on the approach road was "not in their charge".

51 At the time of the accident, IÉ were developing a programme of works to include the erection of approach signage at level crossings on private roads, where County Councils would not erect this signage. As a result, the approach signage for this Level Crossing is in the programme of works, but had not taken place at the time of the accident.

Signage at the Level Crossing

52 The signage on the Level Crossing was replaced by IÉ in January 2013, see Figure 10.

Figure 10 – The Level Crossing

53 The signage present on the Level Crossing is as follows:

- 'Stop' signs located within the railway boundary, on poles to the driver's nearside behind the gates. These stop signs are to the same specification as required on public roads by Section 6 of the Road Signs Manual (Department of Transport, 2010);
- 'Stop' signs located on the centre of the metal gates, with the same specification set out above;
- IÉ 'Danger' sign, in the English language, including the statements: "unattended railway crossing"; "stop, look both ways, listen, cross safely, shut the gates"; "you must shut the gates – save lives" and penalty notice, see Figure 11 (left);
- IÉ 'Danger' sign in the Irish language, including the above statements in Irish, see Figure 11 (centre);
- IÉ 'Keep these gates shut' sign which includes requirements related to closure of the gates and penalty notices associated with the failure to close gates, see Figure 11 (left).

54 Signage on exiting the level crossing includes the:

- IÉ "Have you shut the crossing gates?" signage, which is located on the rear of the IÉ "Danger" signage, see Figure 11 (right).

Figure 11 – Examples of signage at the level crossing

55 The signage at the Level Crossing is compliant with IÉ Technical Management Standard CCE-TMS-380, 'Technical Standard for the Management of User Worked Unattended Level Crossings' issued July 2013 (which will be referred to as CCE-TMS-380 for the remainder of the report).

56 These particular Level Crossing warning signs, in place at the time of the accident, were the subject of a safety recommendation by the RAIU in Investigation Report 2012-R001, 'Car Strike at Murrough Level Crossing, XG173, County Galway, 14th February 2011'. The RAIU recommended that "IÉ should review the suitability of the signage at user worked level crossing on public and private roads, ensuring the human factors issues are identified and addressed".

57 As a result of this earlier safety recommendation, IÉ engaged external consultants NTTX Ltd, to review signage at user worked level crossings. On the 1st January 2013 NTTX Ltd published their report entitled 'Signage Review: User Worked Level Crossings'. The report recommended the removal of some of the existing signage and other signs to be replaced with a new design intended to deliver a balance of key safety messages with functional simplicity.

58 On the signage similar to the signs illustrated in Figure 11 the NTTX Ltd stated (quoted directly):

- The words on these signs are helpful to users, and clearly indicate danger. However, there is no mention that the user is at a railway crossing or that trains are very fast and quiet;
- These signs are considered to be "busy and confusing" for the following reasons:

    - The use of multiple colours is distracting and tends to lead to a focus on the colour rather than the words;
    - Several fonts are in use;
    - The pictograms tend to distract from the key messages;
    - Reservations that the Puffing Billy depicts a slow moving heritage railway or other leisure activity, a steam train associated with fun, children's books and cartoon entertainment, and a train will approach from the right;
    - The exclamation marks are displayed in two contrasting styles and backgrounds.

59 On foot of the NTTX report, IÉ developed new signage in conjunction with their consultants (NTTX Ltd) in Figure 12. This signage is currently undergoing a trial period, at a number of level crossings, such as XM240. (The trial is still on going at the time of publication.)

Figure 12 – New signage

60 It can be see that only the new signage and Stop sign is now present at the new type level crossings, see Figure 13.

Figure 13 – New signage on trial at Level Crossing XM240

61 As this signage is still undergoing its trial stage, the RAIU safety recommendation remains open by the Railway Safety Commission pending the outcome and assessment of the trial programme.

Road markings at the Level Crossing

62 There is no continuous white stop line (referred to as the Stop Line for the remainder of the report) sometimes associated with the 'Stop' sign (referred to as the Stop Sign for the remainder of the report), on the approaches to the Level Crossing.

63 According to Article 11 of the 'Traffic (Signs) Regulations, 1962' a Stop Line is not mandatory but "may be used to indicate the point beyond which traffic shall not proceed when halting in compliance with a road regulation". The regulations also specify the design requirements of the line, stating "a stop-line shall consist of a continuous white line, not less than eight inches and not more than ten inches wide, extending in the case of a one-way roadway, across the full width of the roadway and, in any other case, across the roadway from the left edge to the centre thereof". This is consistent with the DTTAS's Manual on Road Signs (published in 2010), where Section 5 states that a Stop Sign imposes a requirement on all approaching traffic to stop. It is generally associated with a Stop Line.

64 The Stop Sign should ideally be sited 1.5 m in advance of the Stop Line but in circumstances where this would lead to impaired visibility of the Stop Sign, this may be increased to a distance

not exceeding 6 m. Although, IÉ recognise that the Stop Line is the most suitable road marking for level crossings, IÉ do not consider this to be usable on roads with limited road width.

65 As a result on this and as a result of the safety recommendation made by the RAIU on the 29th July 2009 as a result of an investigation into an accident at Cappadine, entitled "Collision between a train and a road vehicle at level crossing XN125, Cappadine, on the Ballybrophy to Killonan line 31st of July 2008", which recommends that "IÉ should assess the risks relating to road users' behaviour in identifying a safe stopping position at User Worked Level Crossings and based on the outcome of this risk assessment, IÉ should introduce measures to allow safe use of this type of level crossing": IÉ consulted with the DTTAS in relation to a substitute line on roads with limited road widths.

66 As a result of this consultation, IÉ, in agreement with the DTTAS, have commenced painting what they refer to as Decision Lines on the roads, in the place of the Stop Line. These Decision Lines are to indicate, to the level crossing user, the safe distance that a vehicle user can stop without the vehicle encroaching onto the path of trains, this is sometimes referred to as the 'decision point' i.e. the point where the motorist decides to cross if safe to do so.

67 This Decision Line is a 300 millimetres (mm) continuous white line which is painted from the left edge to the centre onto the roadway; it continues as a broken white line from the centre to the right edge of the roadway. The line is located approximately 3 m from the nearest rail on each side of the level crossing road approaches, see Figure 14.

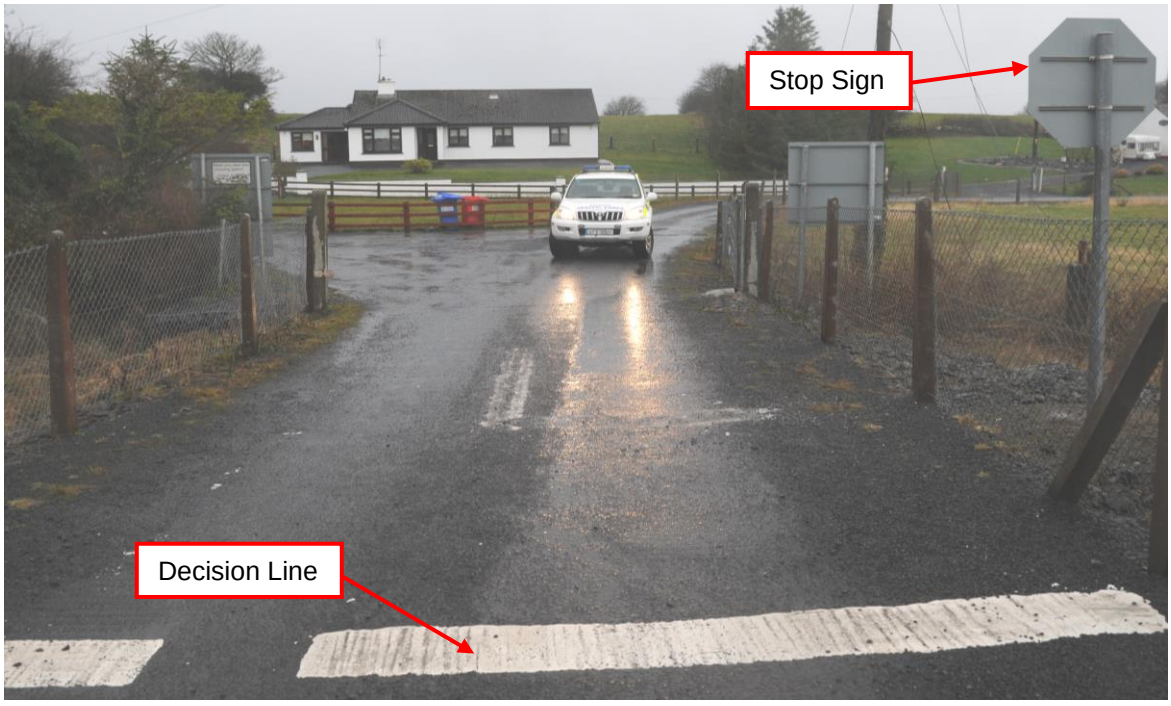

Figure 14 – Decision Line & Stop Sign

68 At the Level Crossing, the Decision Line is marked with a broad white line broken at one end, consistent with the IÉ programme outlined above. It is located beyond the regulation Stop Sign. The location where the Stop Line should be located can be seen in Figure 14; in this instance, the Stop Line was burnt off by the IÉ Contractor after they initially painted it, in error, instead of the Decision Line.

69 It should be noted that all approaches to this type of level crossing now have these Decision Lines, except one crossing, which has the standard Stop Line (due to it being a wide road).

70 There is no other signage or road markings associated with this Decision Line to convey its meaning, i.e. that is the Decision Lines are to indicate, to the level crossing user, the safe distance that a vehicle user can stop without the vehicle encroaching onto the path of trains. However, it should be noted, that the new type signage states "Stop behind white line painted on road", see Figure 15. To date, it has not been established how effective this new signage is in conveying a message to the road user, as the trial period is still ongoing.

Figure 15 – New type signage "Stop behind white line painted on road"

Viewing distance at the Level Crossing

71 The maximum permitted line speed for the section of railway line through the Level Ccrossing is 60 mph (95km/h). IÉ technical standard CCE-TMS-380 sets the *viewing distance* for this type of crossing, at this line speed, at 300 m.

72 The Level Crossing was surveyed on the 20th June 2013 and the viewing distance met the required of CCE-TMS-380, in full, recording the viewing distances as:

- Up side, looking Up (towards Manulla Junction) – 1000m;
- Up side looking Down (towards Ballina) – 716m;
- Down side, looking Up (towards Manulla Junction) – 1000m;
- Down side, looking Down (towards Ballina) – 764m.

73 There is an annual inspection of all level crossings by IÉ and a vegetation management programme to ensure that crossings have the correct and safe viewing distance for users. Vegetation work had been carried out on the Ballina Line in May, July and August 2013.

74 Whistle Boards are located at 341m on the Up side towards Ballina and at 334 m on the down side towards Manulla Junction.

Inspection and maintenance of Corraun Level Crossing

75 The crossing is patrolled each Monday by a Patrol Ganger in compliance with 'Track and Structures Inspection Requirements' IÉ Technical Management Standard CCE-TMS-360, in conjunction with IÉ Technical Management Standard CCE-TMS-361 'Technical Standard for Track Patrolling'.

76 The last scheduled work on the crossing took place in January 2013 which consisted of minor repairs and replacing the signage to have it comply with the requirements set out in CCE-TMS-380.

Operation of O/OP Type level crossings

Introduction to the operation of O/OP type level crossings

77 As an introduction to the use of 'O' type level crossing, this section of the report will describe three documents related to the safe use of level crossings available to members of the public. The documents in place at the time of the accident, and still current at the time of publication of this report, are as follows:

- The RSA's 'Rules of the Road', last updated in December 2013;
- IÉ's 'The SAFE use of Unattended Railway Level Crossings', last updated in April 2013;
- The RSC's 'Third Party Guidance on Railway Risk, Volume 3, Crossing the Railway', document number RSC-G-012-A, published in April 2008.

78 All three documents are available on their respective websites. However, it should be noted that the 'Rules of the Road' are the only document which is mandatory and on which a driver would be tested as part of the driving test for the provision of a driving licence.

Operation of unattended level crossings according to the RSA's Rules of the Road

79 The RSA's 'Rules of the Road' contains guidance on the operation of unattended level crossings with iron gates (O/OP type crossings). The document includes an illustration of the approach signage for level crossings (Ref W121 Traffic Signs Manual), see Figure 16. This sign, according to the Rules of the Road, means "Level crossing ahead, guarded by gates or lifting barriers". The document also provides an illustration depicting an unattended level crossing, see Figure 17.

Figure 16 – Approach signage

Figure 17 – Unattended level crossing gates as depicted in the Rule of the Road

80 It is noted that the Rules of the Road illustration depicts the Decision Line. No other signage (IÉ signage) is depicted in the illustration.

81 The document states that "these unattended level crossings are found on minor roads. The railway is normally guarded by iron gates which must be kept shut – there is no other protection. The user has the responsibility to open and shut the gates". It continues "these crossings can be dangerous to use and drivers should use all available help to cross safely. It is preferable for drivers to use a bridge or an attended or automated level crossing where one is available".

82 The Rules of the Road describes actions that the driver "should" and "must" do when operating the level crossing, see Figure 18. These include actions related to preparation to cross, crossing and requirements to shut the gates.

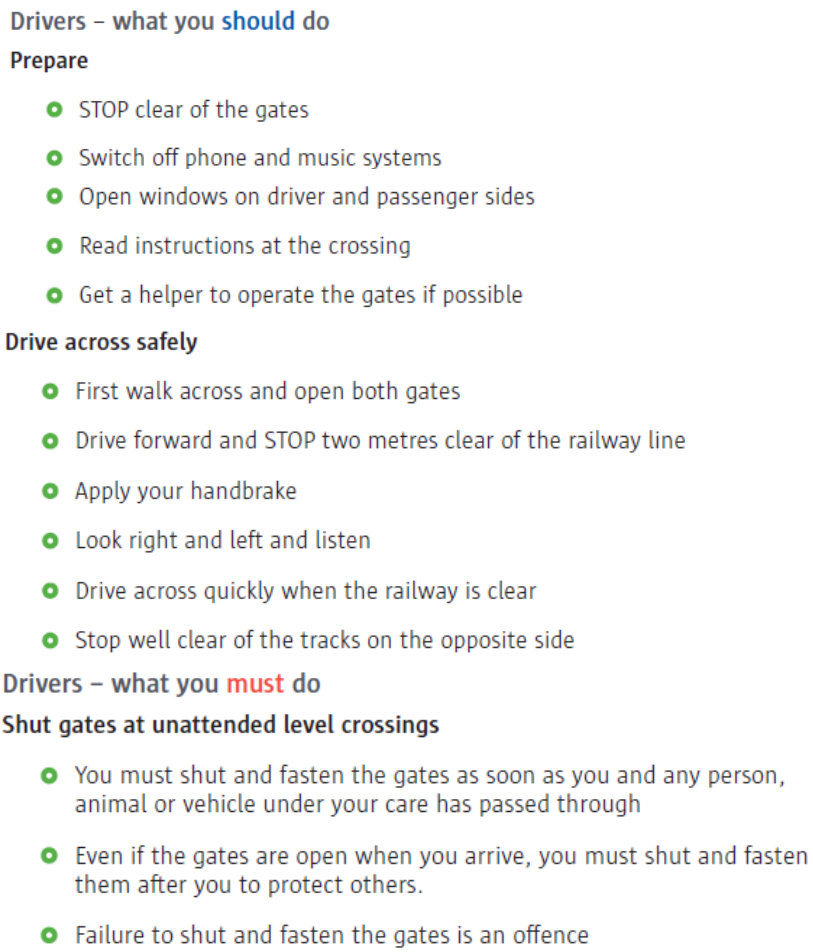

Figure 18 – Driver requirements set out in the RSA's Rules of the Road

83 The requirement to shut the gates is further highlighted in the document, stating that failure to close to gates is an offence, see Figure 19.

84 There is no warning that a driver may approach a crossing situated on a private road accessible by the public without warning signage on the approaching public roads.

Figure 19 – RSA highlighted information

85 These instructions are simplified in the Rules of the Road documents as the "Rail Cross Code", see Figure 20.

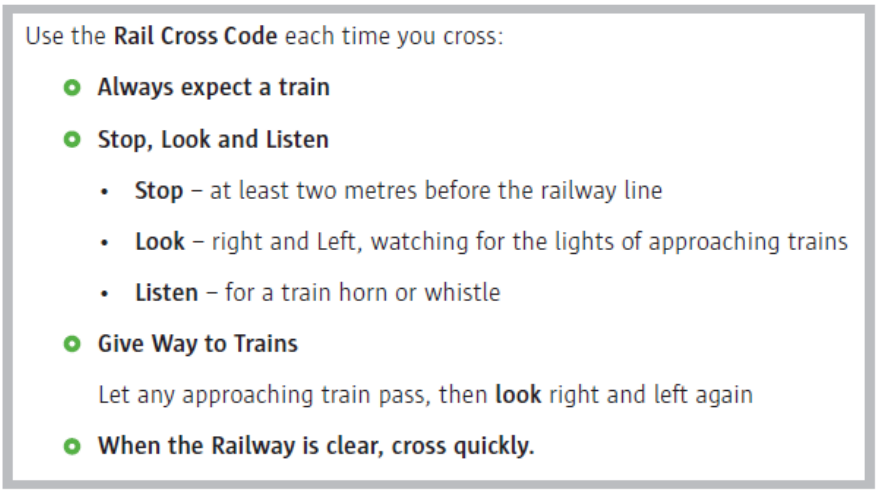

Figure 20 – RSA's Rules of the Road "Rail Cross Code"

IÉ's The SAFE use of Unattended Railway Level Crossings

86 IÉ's booklet 'The SAFE use of Unattended Railway Level Crossings' was first published in November 2006, with the latest edition, published in April 2013, in place at the time of the accident. The IÉ booklet instructs the driver of a vehicle to:

- Stop clear of the railway line where you get a good view along the track in both directions;
- Look for the approach of trains, especially in poor visibility or at night;
- Watch out for the light of an approaching train;
- Listen for horns or the sound of an approaching train;

- When using the level crossing, open both gates before attempting to bring a vehicle cross the railway line, open the opposite gate first;
- Before attempting to cross, always examine the railway from the best vantage point to check for approaching trains.

87 These instructions are displayed primarily on the level crossing signage and reinforced in the IÉ booklet ‘‘The Safe Use of Unattended Level Crossings’ and on the IÉ website.

88 There are six registered users of the Level Crossing at Corraun, all of these users have received a copy of the booklet from IÉ. The Van Driver did not have a copy of the booklet as he was not a registered user of the Level Crossing.

The RSC’s Third Party Guidance on Railway Risk

89 The RSC’s ‘Third Party Guidance on Railway Risk, Volume 3, Crossing the Railway’, document number RSC-G-012-A (referred to as RSC-G-012-A for the remainder of the report) identifies the hazards associated with unattended level crossing (such as O/OP crossings), see Figure 21.

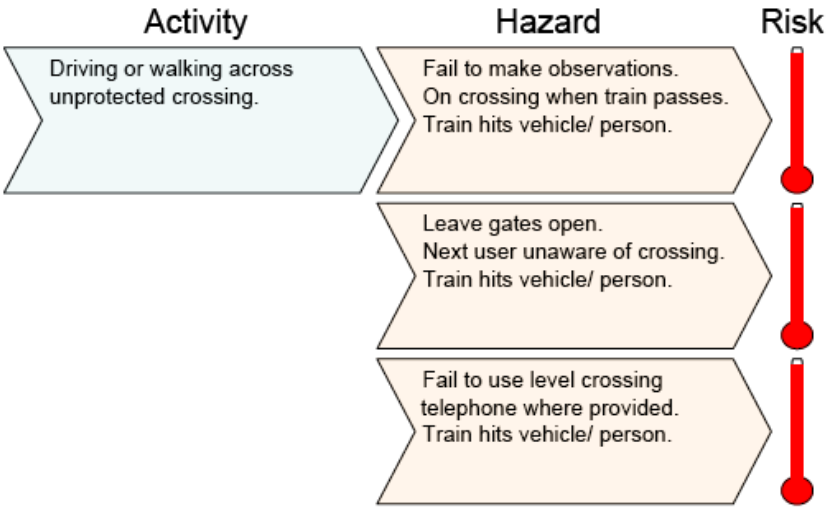

Figure 21 – RSC Hazards associated with unprotected crossings

90 RSC-G-012-A refers to the IÉ booklet ‘The Safe Use of Unattended Level Crossings’ for comprehensive guidance related to the use of unprotected crossings; RSC-G-012-A does not reference the RSA’s Rules of the Road.

Operation of the Level Crossing

Misuse of the Level Crossing

91 Misuse is identified as an offence in Part 14, Section 131(1) of the Railway Safety Act 2005, stating that: "Where a person fails to shut and fasten the gate of a level crossing or passage to which this section applies, as soon as he or she or any animal or vehicle under his or her care has passed through the level crossing or passage, he or she is guilty of an offence and is liable on summary conviction in respect of every such offence to a fine not exceeding €1,000."

92 Level crossings are required to be inspected by Patrol Gangers during each patrol in accordance with CCE-TMS-360 and IÉ's technical management standard 'Technical Standard for Track Patrolling' CCE-TMS-361 (Version 1.1 in place at the time of the accident). In the instance of this Level Crossing, this inspection occurs every Monday.

93 On finding level crossing gates open, Patrol Gangers are required to close the gates and note the misuse. A record of the misuse is maintained by the Permanent Way Inspector (PWI). In relation to this Level Crossing, records show that the Patrol Ganger last found the gates open on the 10th of February 2013, two days before accident.

94 The RAIU inspected a random sample of eighteen patrol ganger report forms dating back to the 6th August 2013 and on all forms it was noted that the patrol ganger had found the gate open and had closed the gates before continuing his patrol. This information is collated and stored centrally by IÉ to help identify level crossings that are subject to frequent user misuse.

95 On the day of the accident, post-accident examination of the gates found that both gates had been tied open. The up side gate was tied open with a nylon cord and the down side gate was tied open by the wire of a mobile phone charger, see Figure 22.

Figure 22 – Gates tied open with mobile phone charger

96 IÉ, the RSC and the RSA launched a public awareness campaign in April 2013 specifically directed at preventing misuse at unattended level crossings.

97 RAIU report 08022801 issued 2nd March 2009, recommended that "IÉ must identify crossings that are regularly misused and take proactive action to manage the increased risk created by this misuse", this recommendation was reiterated in investigation report 2011-R007.

98 IÉ have notified the RSC that they have taken measures to effect the recommendation. However, the RSC have not closed off the recommendation to date, with the status of the recommendation being recorded as 'complete' at the time of the incident.

Risks associated with the Level Crossing

99 A risk register is maintained by the IÉ Senior Track & Structures Engineer (STSE) for all level crossings on the IÉ network, the risk register shows that IÉ have not identified any outstanding risks on the register for the Level Crossing at the time of the accident. Risks associated with mis-use are included in the Level Crossing Risk Model (LCRM).

100 The LCRM is a tool used for the calculated and ranking of collective and individual risk at level crossings. The risk model plays an important role in assisting IÉ in its evaluation and decision making process as it provides a risk evaluation of all crossings.

101 The LCRM allows decision support for the management of risk both on an on-going day to day basis as well as overall from a strategic point of view. It is used by IÉ daily to evaluate the continually changing risk profile at crossings, as this risk profile is always variable, by evaluating the risk, including the tolerability of risk at crossings.

102 It also allows more strategic decision support for the undertaking of other aspects of IÉ's overall strategy for managing user worked level crossings.

103 In terms of risk ranking, IÉ allocate a risk rating to level crossings which is a comparative rating against all level crossings on the network. The Level Crossing had an individual risk ranking of 94 out of 1,050; meaning that it was ranked 94th highest out of 1,050 level crossings, in terms of risk, on the network; meaning it is in the top 11% of high risk level crossing. IÉ regarded the level crossing as high risk, due to the misuse, but tolerable with the safety mitigation measures in place (such as signage).

Van Driver

104 As mentioned previously the Van Driver was the local An Post postman. His usual time for crossing the Level Crossing was approximately 08:50 hrs, a time when no trains were scheduled in the area. However, on the day of the accident, he was running late due to the inclement weather.

105 The Van Driver had passed the DTTAS Driving Test and had undergone relevant An Post driver training and had been issued with a Rules Manual and three An Post specific publications:

- An Post Safety Guide for Staff;
- Driving for Work Manual;
- Delivery & Collections Operations Manual.

106 These publications set out the An Post's Safety Statement and give employees relevant information and guidance regarding the Health and Safety at Work Act 2005. The 'Delivery & Collections Operations Manual' states that when driving a company vehicle an employee will "observe the Rules of the Road at all times". This is also stated in the 'Driving for Work Manual'.

107 The Van Driver was a frequent user of the Level Crossing and had approached the Level Crossing with the gates open on several occasions. On these occasions, he stopped at a safe position in advance of the Level Crossing and looked for approaching trains. He had also approached the Level Crossing with trains approaching and on these occasions had stopped and waited until the trains had passed until crossing over the Level Crossing.

Sequence of events

General introduction to the sequence of events

108 The following paragraphs highlight key events which occurred before, during and after the accident. Not all events associated with the level crossing are included, only those relevant to this accident.

Events before the accident

109 The Level Crossing had a history of frequent misuse, related to open gates; with the gates last being reported open on the 10th February 2014. The Patrol Ganger closed the gates in this instance.

110 The gates of the Level Crossing had been left open by a previous user at some time after this; and tied open with nylon cord and a mobile phone charger.

111 On Wednesday 12th February, the Mayo area, along with many parts of Ireland was suffering from adverse weather conditions, with heavy rain, high winds and reduced visibility.

112 At 09:35 hrs the Ballina to Manulla Junction service departed Ballina on time with the Train Driver and Mentor Driver, he was travelling within the speed limits, both corroborated the poor weather conditions at the time.

113 At 09:55:01 hrs the Train Driver sounds the horn at the whistle board associated with the Level Crossing. At a distance of approximately 112 m before the Level Crossing the train is travelling at a speed of 50 mph (80 km/h).

114 At approximately the same time, the Van Driver (who was running approximately 45 minutes behind his routine time) approaches the Level Crossing while the gates were open. The Van Driver has no recollection of the accident but could verify the weather was unusually bad and visibility extremely poor on the day of the accident.

115 At 09:55:06 hrs the Train Driver sees the van approaching the Level Crossing from his left and sounds the horn for a second time. The train is now approximately 57 m from the Level Crossing and travelling at a speed of 50 mph (80 km/h). The Mentor Driver who was on the right hand side of the driving cab did not see the van before the collision.

Events during the accident

116 As the train is travels through the Level Crossing, the Train Driver applies the brake; however, the train makes contact with the van.

117 The van is thrown clear of the railway line an into an adjacent drainage ditch. The van comes to a stop approximately 80 m from the point of contact.

118 The train comes to a full stop 311 m beyond the crossing.

Events after the accident

119 The Train Driver made an emergency call to the controlling Mayo Line Signalman; while the Mentor Driver made his way back to the Level Crossing to assist the Van Driver and assess the damage.

120 The Van Driver was out of the van and at the rear of the van being assisted by the Local Resident who had heard but not witnessed the accident; and assisted the Van Driver until the emergency services arrived on scene.

121 The emergency services arrived at approximately 10:10 hrs and the Van Driver was conveyed to Mayo General Hospital, Castlebar, for treatment for his injuries.

122 The passengers remained on board the train until alternative arrangements were made for their onward travel and were escorted back to the Level Crossing where they continued their journey by private bus.

123 The Train Driver and Mentor Driver were both tested for drug and alcohol and both tested negative.

Similar occurrences

124 There has been a long history of misuse at O/OP level crossings on the IÉ network. In December 1967 four people were killed and three seriously injured at Knockaphunta level crossing XM250 when their van was struck by a train.

125 More recently, An Garda Síochána attempting to prosecute a number of members of the public related to this misuse. In 2007, four Castlebar residents were brought before the local district court on charges of failing to close the Level Crossing gates at Knockaphunta after travelling across the railway; the residents were not convicted by the district court for the offence. In 2012 a driver of a motor vehicle was prosecuted at Castlebar District Court for misuse of Level Crossing XM250 at Knockaphunta (Mayo) and fined €2,000.

126 There have been ten similar incidents, on user worked level crossings, reported to the RAIU since 2007, to the date of publication of this report. These incidents are as follows (where a full RAIU investigation was conducted, the report number is included):

- XN104 – Roscrea to Birdhill line, 28th June 2007 a tractor and trailer were struck by a train no injuries reported, RAIU Report 07062801;
- XX032 – Dillons Crossing, Ballina to Manulla Junction, 28th February 2008 a tractor was struck by a train, the tractor driver was fatally injured, RAIU Report 08022801;
- XN125 – Cappadine Crossing, Ballybrophy to Killonan line, 31st of July 2008 a private car was struck by a train no injuries reported, RAIU Report 08073101;
- XE039 – Ennis to Limerick line, 27th June 2010, a farmer was struck by a train and fatally injured herding cattle across the crossing, RAIU Report 2011-R005;
- XM096 – Ballina to Athlone line, 2nd September 2010, a tractor was struck by a train the tractor driver was fatally injured, RAIU Report 2011-R006;
- XM250 – Knockaphunta Crossing, Athlone to Wesport line, 24th October 2010 a private car was struck by a train, no injuries reported, RAIU Report 2011- R007;

- XG173 – Murrough Crossing, Athenry to Galway line, 14th February 2011 a private car was struck by a train, no injuries reported, RAIU Report 2012-R001;
- XE020 – Carrols Crossing, Limerick to Galway line, 20th June 2012 a tractor struck a train, no injuries reported, RAIU Report 2013-R002;
- XN125 –Cappadine Crossing, Ballybrophy to Killonan line, 3rd September 2012 a private car was struck by a train, no injuries reported, RAIU Preliminary Report only;
- XM250 – Knockaphunta Crossing, Athlone to Westport line 8th June 2014 a private car struck a train, no injuries reported. At the time of publication of this report, this incident is still under investigation by the RAIU.

127 Of these occurrences, two resulted in fatalities to the road users and one fatality to a farmer using his crossing to facilitate cattle crossing his fields.

Analysis

The Level Crossing

Access to the Level Crossing

128 The Level Crossing is located 450 m from the N5, the national road from Castlebar to Swinford. It is located on a private road, which has unrestricted access from a third class public road L57721, see Figure 23. As a result, it is easily accessible to members of the public (paragraph 44).

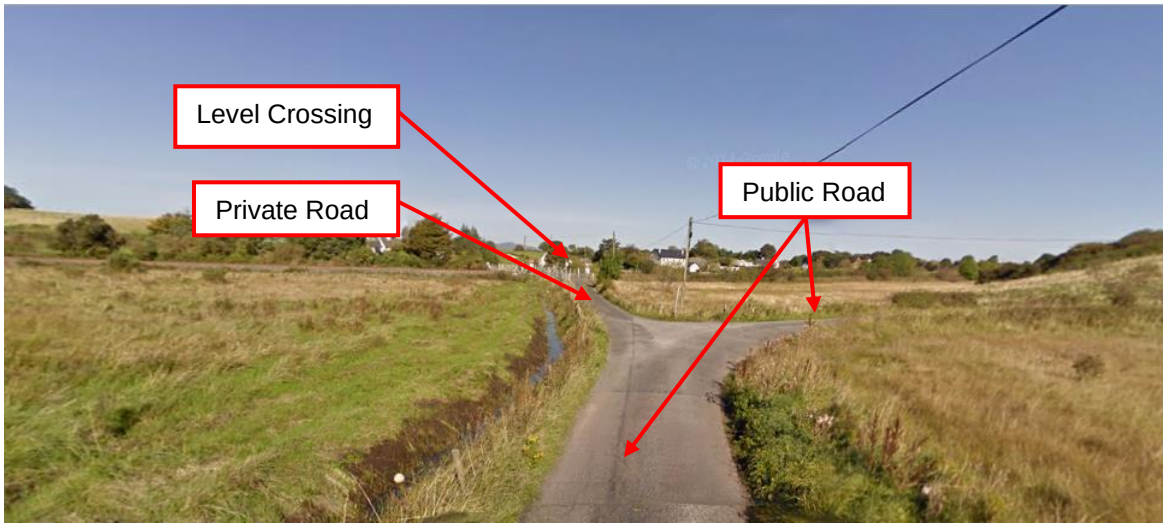

Figure 23 – View from public road onto private road (with the Level Crossing)

Signage on the approach to the level crossing

129 There are no advance warning signs situated on the N5, the third class public road or the private road which services the Level Crossing (paragraph 47).

130 As a result of a previous RAIU safety recommendation (paragraph 49) in relation to erection of advance signage on private roads, IÉ have been in consultation with all affected County Councils, including Mayo County Council in relation to the erection of approach signage (paragraph 50). However, this consultation was not effective in getting Mayo County Council to erect advance signage (paragraph 50). This resulted in IÉ adding the requirement for advance signage to their programme of works; however, the works had not been undertaken at the time of the accident (paragraph 51).

131 In this accident, the approach signage at the Level Crossing was not thought to have contributed to this accident as the Van Driver was a frequent user of the Level Crossing.

Signage on the Level Crossing

132 The information signage meets the internal requirements set out in IÉ's standard CCE-TMS-380 (paragraph 55). However, the RAIU as a result of a previous accident questioned the suitability of this signage, recommending that "IÉ should review the suitability of the signage at user worked level crossing on public and private roads, ensuring the human factors issues are identified and addressed" (paragraph 57).

133 As a result of this safety recommendation, external human factors consultants, NTTX Ltd, have reviewed the signage and developed new signage which is currently being trialled (paragraph 57 - 61). At the time of publication, the trial is currently ongoing.

134 In this accident, the signage at the Level Crossing is not thought to have contributed to this accident as the Van Driver was a frequent user of the Level Crossing.

Road markings at the Level Crossing

135 As a result of a previous RAIU safety recommendation (paragraph 65), IÉ have commenced a programme of placing Decision Lines at user worked level crossings (paragraph 66). These Decision Lines are broad white lines broken at one end (paragraph 67). As a result, IÉ have removed the Stop Lines normally associated with the Stop Signs (paragraph 62), see Figure 24.

Figure 24 – Decision Line & Stop Line

136 Despite removing the normal Stop Line and replacing with the Decision Line, IÉ have provided no information or indication as to what the level crossing user should do on the approach to the Decision Line (paragraph 70). This information is provided in the new signage being trialled by IÉ. As a result, this may lead to an unfamiliar user incorrectly using the Level Crossing (paragraph 70).

137 The stop lines at XX024 was applied by a contractor in error and not in compliance with the tender as given by IÉ, these were burnt off before the decision lines were applied by the contractor.

138 It is unclear if the road markings at the Level Crossing contributed to this accident, as the Van Driver cannot recollect the accident. He can only recall that the weather on his approach to the Level Crossing was very poor. The poor weather may have affected him clearly seeing the Decision Line, although as stated in Para 131 he was a frequent user and is aware of its layout.

Viewing distances at the Level Crossing

139 The viewing distances exceed the requirements set out in CCE-TMS-380. However, it should be noted that weather conditions were very poor at the time of the accident, which may have substantially affected the Van Driver's view of the approaching train (paragraph 71 and 72).

140 Whistle boards are erected on the approaches to the level crossing. On the day of the accident, the Train Driver sounder the horn at the approach to the level crossing, as the Van Driver has no recollection of the accident, it is unknown whether he heard the train horn sounding (paragraph 74).

141 Data shows that the train lights were on at the time of the accident; this was confirmed by the first IÉ personal on the scene.

142 Although the viewing distance at the Level Crossing are not thought to have contributed to the accident, the drivers visibility on the day of the accident would have been affected by the weather conditions at the time. However, the train lights would have been visible to a crossing user.

Inspection and maintenance at the Level Crossing

143 Inspections and maintenance were carried out in line with CCE-TMS-380 (paragraphs 75 and 76).

144 No aspects of the inspection or maintenance regime are thought to have contributed to the accident.

Operation of Unattended Level Crossings

Correct operation of unattended level crossings with gates

145 The RSA's Rules of the Road, IÉ's booklet and the RSC's guidelines RSC-G-012-A set out the requirements of how to correctly operation user operated type level crossings (paragraphs 77 - 90).

146 The RSA's Rules of the Road do illustrate the Decision Line but do not explain what to do when approaching it (paragraph 79).

147 In the case of this accident, these documents are not thought to have contributed to the accident as the Van Driver was a competent local driver, familiar with the safe use of the Level Crossing.

Operation of the Level Crossing

Misuse at the Level Crossing

148 The Level Crossing is subject to constant misuse by users, the gates are found by the Patrol Gangers to be routinely left opened and on occasion tied back for the convenience of users eliminating the need to stop their vehicle when using the Level Crossing (paragraph 93).

149 From the evidence available, it is clear that the gates to the Level Crossing were open before the Van Driver approached (paragraph 95).

150 The RAIU have previously carried out investigations into nine accidents at user worked level crossings. In all of these cases, there has been an element of misuse by users of the level crossings, the overriding factor in not complying with the instruction to close the gates.

151 The constant misuse of the Level Crossing, may result in the users adopting unsafe habits, such as leaving the gates open, coupled with the fact that users rarely encounter a train, an informal approach by the users of the Level Crossing has developed over time. This misuse has continued despite a public awareness campaign in April 2013 (paragraph 96).

152 The RAIU recommended in 2009 and 2011 that IÉ must identify level crossings that are regularly misused and take proactive action to manage the increased risk created by this misuse. IÉ have notified the RSC that they have taken measures to effect the recommendation. However, the RSC have not closed off the recommendation to date, with the status of the recommendation being recorded as 'complete' at the time of the accident.

153 The misuse of the Level Crossing is thought to have contributed to this accident, as the gates were left open prior to the Van Driver approaching the Level Crossing.

Actions taken by parties on the day of the accident

Actions of the Van Driver

154 The Van Driver was a frequent user of the Level Crossing and knew how to operate the Level Crossing correctly. He had also approached the Level Crossing with the gates open and on these occasions stopped and looked for approaching trains.

155 On the day of the accident the Van Driver was making his usual local delivery run; however on this occasion he was approximately 45 minutes later than his usual time (paragraph 104). This was due to the adverse weather conditions which were extremely poor, with strong winds and rain, which made visibility very poor around the time of the accident.

156 The Van Drivers personally issued copy of the RSC's Rules of the Road and An Post safety documents were in his vehicle at the time of the incident (paragraph 105). The Van Driver was unaware of the IÉ's booklet or the RSC's guidance documents. However, he was aware of how the Level Crossing should be operated.

157 The Van Driver was aware of the Level Crossing location but may on this occasion have become disorientated (due to the weather) as to his proximity to the track as he drove onto the approach to the Level Crossing. This may have been as a result of the gates being left open prior to his approach, removing any physical barrier onto the Level Crossing, allowing him to drive into the path of the oncoming train.

Actions of the Train Driver

158 The Train Driver was travelling within the required line speed limits. He sounded the horn at the whistle board location on the approach to the level crossing (paragraph 112).

159 On seeing the van, the Train Driver blew the horn and immediately started braking the train (paragraph 113).

160 The Train Driver contacted the controlling signalman and communicated all the information required to assist the emergency services. The Mentor Driver went directly back to the crossing to assist the injured party.

161 All post-accident actions were carried out correctly and the Train Driver and Mentor Driver tested negative for the presence of drugs and alcohol.

162 The Train Driver could not have taken any further actions to prevent the collision and therefore the actions of the Train Driver did not contribute to the accident.

Conclusions

The Level Crossing

163 The Level Crossing is located on a private road, it has unrestricted access from a public road which connects with the N5; which means it is easily accessible by members of the public (paragraph 128).

164 There is no advance signage to the Level Crossing as it is a private road. This issue was previously subject to an RAIU safety recommendation; and it is noted that IÉ have a programme of works developed for the erecting of advance signage at level crossings on private roads. However, this is not thought to have contributed to the accident as the Van Driver was a familiar user (paragraphs 129 - 131).

165 The signage at the Level Crossing is compliant with IÉ's own standards. The RAIU previously made a recommendation in relation to signage at level crossings and as a result IÉ engaged human factors consultants and New signage is currently being trialled at other level crossings (paragraphs 132 - 134).

166 IÉ have adopted Decision Lines at user worked level crossings; users of the level crossing should remain behind the line until it is safe to cross. There is a Decision Line present at the Level Crossing, but no guidance related to its use; however, it should be noted that the new signage includes this guidance (paragraph 135 - 138).

167 Viewing distances were good and well in excess of the statutory requirements (paragraph 139), although the severe weather would have limited the user's vision and strong winds may have masked any noise from the approaching train (paragraphs 35 - 36).

Operation of the Level Crossing

168 IÉ, the RSC and the RSA all published documents in relation to the safe use of user operated level crossings. It is unlikely that the accident occurred as a result of a competence issue on the part of the Van Driver as the individual was both a local resident and familiar user of the Level Crossing who would have been aware of the correct procedures for using the Level Crossing safely (paragraphs 145 - 147).

169 Non-compliance by users, to close the gates of the Level Crossing, has been identified as an issue in this accident, where the gates are frequently left open; and were open as the Van Driver approached on the day of the accident (paragraphs 148 -151).

170 The RAIU recommended in 2009 and 2011 that IÉ must identify crossings that are regularly misused and take proactive action to manage the increased risk created by this misuse, these recommendations are recorded by IÉ as complete. However, it is questionable how effective the measures taken have been as there have been two similar occurrences at regularly misused level crossings since 2011; this accident and an accident in Knockaphunta in 2014 which is currently subject to an RAIU investigation (paragraph 152).

Actions of the Van Driver

171 The Van Driver was a competent driver and had been issued with a number of safety documents from An Post (paragraph 154). A combination of familiarity and distraction may have resulted in the Van Driver not fully taking into account the correct crossing procedures and the inherent risk involved at the Level Crossing.

172 On the day of the accident, the Van Driver was delayed on his normal postal route and as a result may not have been expecting to see a train at the Level Crossing (paragraph 155). In addition, the weather conditions at the time of the incident may have affected the actions of the Van Driver (paragraph 157).

Immediate cause, contributory factors and underlying causes, root causes and additional observations.

173 The immediate cause of the accident was that the An Post van did not stop, as required, at the Level Crossing and drove into the path of the oncoming train.

174 Contributory factors associated with the incident are accident:

- CF-01 – The gates at the Level Crossing were secured open, allowing the van to enter the Level Crossing without stopping;
- CF-02 – The Level Crossing was regularly misused by the local users, whereby the gates are regularly tied open.

175 The underlying causes associated with this accident are:

- UC-01 – There is a history of misuse at the Level Crossing; with local users regularly misusing the Level Crossing;
- UC-02 – IÉ did not take sufficient actions at the Level Crossing to prevent its regular misuse, despite the RAIU making a safety recommendation related to preventing level crossing misuse in 2009 and re-iterating in 2011.

176 An additional observation in this accident is:

- AO-01 – The addition and purpose of the decision point line on user worked level crossings is not obvious to users of the Level Crossing and may cause confusion with statutory stop lines still at some level crossings.

Relevant actions taken or in progress

Actions taken by IÉ

177 IÉ are currently undergoing a works programme of erecting advance signage on the approaches to user worked level crossings on private roads.

178 In 2014, IÉ undertook a comprehensive communications strategy throughout the year around the area of user worked level crossings, specifically:

- A number of 'event days' were undertaken with a full day presence at high risk crossings to engage with users about their problems as users and about the dangers of user worked crossings;
- Media events were arranged at key crossings, attended by IÉ senior management, the Garda, the RSA and the RSC to bring about greater mutual understanding of the issues surrounding user worked crossings;
- Radio advertisement campaigns were run in March and November highlighting the issues around the safe use of level crossings. These advertisements were run on sixteen local radio stations which were chosen based on regional proximity to user worked crossings.

179 The detailed communication strategy further involved positive engagement with a range of potential LC user's including:

- Local schools;
- Sports clubs;
- Irish Creamery Milk Supplies Association (Membership 12,500);
- An Post;
- Oil delivery companies;
- An Garda Síochána;
- The Civil Defence;
- Irish Farmers Association;
- Teagasc;
- Agricultural suppliers (Glanbia, Devenish Nutrition, Wex. Fieid Producers);
- Refuse collectors;
- Vets & Doctors.

180 From the infrastructure perspective, IÉ commenced progression of a project involving implementation of technical enhancements at user worked crossings, where it is intended these improvements will be rolled out, on a risk prioritised basis, subject to funding being available.

181 Significant efforts continue to be expended on closing level crossings and a further 16 crossings have been closed since this incident.

Actions taken by An Post

182 An Post have issued a new safety statement/ risk assessment for all drivers entitled 'Accessing/Egressing Unmanned Rail Level Crossings During Driving Duties' published on the 25th April 2014.

Safety recommendations

General description

183 In accordance with the Railway Safety Act 2005 (Government of Ireland, 2005a) and the European Railway Safety Directive (European Union, 2004), recommendations are addressed to the national safety authority, the RSC. The recommendation is directed to the party identified in each recommendation.

184 This RAIU investigation has resulted in three new safety recommendations being made.

New safety recommendations related to the accident

185 This Level Crossing is a frequently misused level crossing. On the day of the accident, had IÉ fully implemented an RAIU safety recommendation made in 2009 and re-iterated in 2011 requiring IÉ to identify and take proactive actions to manage regularly misused level crossings this accident might not have occurred (UF-01, UF-02, UC-01, UC-02). If the Van Driver approached the Level Crossing with the gates closed and would have been in the process of opening the gates as the train passed, therefore the RAIU make the following safety recommendations:

IÉ should consider options to upgrade the crossing to minimise direct action by the users.

186 Given that there have been six similar occurrences to this accident, where misuse was identified as a contributory factor or underlying cause to the accident (UF-01, UF-02, UC-01, UC-02). As a result of the continued misuse, the RAIU make the following safety recommendation:

IÉ should carry out a full review of known misused user worked level crossings on public and private roads and either upgrade the level crossing or introduce measures to minimise their misuse.

187 IÉ have introduced a Decision Line at the Level Crossing, however, the purpose of this Decision Line has not been conveyed to the level crossing users through the use of signage or other means (AO-01); as a result the RAIU make the following means:

IÉ should ensure that where a Decision Line is present at a level crossing, that the purpose of this Decision Line is appropriately conveyed to the level crossing users.

Additional information

List of abbreviations

°C	Degrees Celsius
CCTV	Closed Circuit Television
CF	Contributory Factor
DMU	Diesel Multiple Unit
DTE	District Traffic Executive
ICCN	Intercity and Commuter Network Department
IÉ	Iarnród Éireann
IM	Infrastructure Manager
Kg	Kilogram
km/h	Kilometres per hour
M	Metre
MP	Mile Post
Mph	Miles per hour
No.	Number
OTDR	On Train Data Recorder
RAIU	Railway Accident Investigation Unit
RC	Root Cause
RSC	Railway Safety Commission
RU	Railway Undertaking
SI Units	International System of Units
SMS	Safety Management System
UC	Underlying Cause

Glossary of terms

Accident	An unwanted or unintended sudden event or a specific chain of such events which have harmful consequences including collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Bi-directional line	A track on which trains may be worked in either direction under normal signalling arrangements
Causal factors	Any factor(s) necessary for an occurrence. Avoiding or eliminating any one of these factors would have prevented it happening.
Colour light signals	Signals that convey movement authority to train drivers by means of coloured lights.

Competence	IÉ define competence as the ability to perform activities to the standard expected within employment. In relation to drivers, it includes the practical and theoretical knowledge, experience and skill required to drive trains to ensure the safety of any person who may be affected.
Continuous welded rail	Sections of rail that are welded together.
Contributory factors	Any factor(s) that affects sustains or exacerbates the outcome of an occurrence. Eliminating one or more of these factor(s) would not have prevented the occurrence but their presence made it more likely, or changed the outcome.
Controlling signalman	The signalman designated to control a specific section of track.
Colour light Signals	Signals which convey movement authorities to drivers by means of coloured lights.
Down Direction	In this report trains travelling from Manulla Junction to Ballina
Extensive damage	Damage that can be immediately assessed by the RAIU to cost at least €2,000,000 in total.
Immediate cause	The situation, event or behaviour that directly results in the occurrence.
Incident	Any occurrence, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation.
Infrastructure Manager	Organisation that is responsible for the establishment and maintenance of railway infrastructure, including the management of infrastructure control and safety systems.
National safety authority	The national body entrusted with the tasks regarding railway safety in accordance with European directive 2004/49/EC.
On Train Data Recorder	Device that records data about the operation of train controls and performance
Railway Undertaking	Organisation that operates trains.
Rolling stock	Railway vehicles.
Serious accident	Any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to 5 or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety, where extensive damage means damage that can be immediately assessed by the RAIU to cost at least €2,000,000 in total.
Stop signal	A signal capable of displaying a stop aspect or indication.
Track circuit block	A signalling system that uses track circuits to confirm the absence of trains in order to control the movement of trains.

Up direction	In this report trains travelling from Ballina to Manulla Junction.
Viewing Distance	The distance from which trains must be seen in order to give adequate warning time of approaching trains
Whistle Boards	A trackside sign which indicates a train driver must sound the horn

References

European Union (2004), Directive 2004/49/EC of the European Parliament and of the Council of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (Railway Safety Directive), 2004/49/EC, 29th April 2004.

IÉ (2013), Technical Standard for the Management of User Worked Unattended Level Crossings, CCE-TMS-380.

IÉ (2013), Track and Structures Inspection Requirements, CCE-TMS-360.

IÉ (2013), Technical Standard for Track Patrolling, CCE-TMS-361.

IÉ (2013), The SAFE use of Unattended Railway Level Crossings.

NTTX Ltd (2013), Signage Review: User Worked Level Crossings.

RAIU (2009), Fatality at level crossing XX 032 between Manulla and Ballina on the 28th February 2008.

RAIU (2012), Investigation Report 2012-R001, Car Strike at Murrough Level Crossing, XG173, County Galway, 14th February 2011.

RSA (2013) Rules of the Road.

RSC (2008) Third Party Guidance on Railway Risk, Volume 3, Crossing the Railway', RSC-G-012-A.