Railway Accident Investigation Unit Ireland

INVESTIGATION REPORT

Signal Passed at Danger, Keelogues Level Crossing, 13th August 2024

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Report Description

Report publication

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Report structure

This report is written to conform as closely as possible to the structure set out in the "Commission Implementation Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be followed for railway accident and incident investigation reports" having regard to "Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety".

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 to illustrate concepts to non-technical readers.

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Preface

The RAIU is an independent investigation unit within the Department of Transport which conducts investigations into accidents and incidents on the national railway network including the Dublin Area Rapid Transit (DART) network, the LUAS light rail system, heritage and industrial railways in Ireland. Investigations are carried out in accordance with the Railway Safety Directive (EU) 2016/798 enshrined in the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020; and, where relevant, by the application of the Railway Safety (Reporting and Investigation of Serious Accidents, Accidents and Incidents Involving Certain Railways) Act 2020.

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 or tramline safety regulation or the management of safety. During an investigation, if the RAIU make some early findings on safety issues that require immediate action, the RAIU will issue an Urgent Safety Advice Notice outlining the associated safety recommendation(s); other issues may require a Safety Advice Notice.

The RAIU may investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident.

The RAIU may also carry out trend investigations where the occurrence is part of a group of related occurrences that may or may not have warranted an investigation as individual occurrences, but the apparent trend warrants investigation.

The RAIU investigation shall analyse the established facts and findings (i.e. performance of operators, rolling stock and/or technical installations) which caused the occurrence. The analyses shall then lead to the identification of the safety critical factors that caused or otherwise contributed to the occurrence, including facts identified as precursors. An accident or incident may be caused by *causal, contributing* and *systemic factors* which are equally important and should be consider during the RAIU investigation. From this, the RAIU may make 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.

Summary

At approximately 10:00 hours (hrs) on the 13th August 2024 two Signalling, Electrification and Telecommunications (SET) technicians (Technicians 1 and 2) arrived at Keelogues Level Crossing (LC) XX011 to carry out routine maintenance. They agreed that Technician 1 would act as the *Track Safety Co-ordinator* (TSC) and Technician 2 as the SET *Work Protector* (WP). They then commenced work in a building adjacent to LC XX011 housing the SET equipment.

Concurrently, at Ballina Freight Yard, a freight train (Train K520) was being prepared for its scheduled departure to Waterford Freight Yard.

At 10:50 hrs Technician 1 contacted the Mayo Line Signalman and requested *signal protection* in connection with the work being undertaken. At 10:54 hrs Technician 1 contacted the Level Crossing Control Operative (LCCO) to inform them that they had signal protection and that they would be working at LC XX011; work then commenced on LC XX011.

At 11:02 hrs the Mayo Line Signalman contacted Technician 1 and informed them that signal protection would need to be given up to allow an Up direction train (Train K520) to proceed through LC XX011.

At 11:05 hrs Technician 1 contacted the LCCO and requested that LC XX011 was operated (barriers lowered) to test it, which would have required *local initiation* of the crossing to be selected. After the test had been undertaken, Technician 1 informed the LCCO that work was not complete and so LC XX011 was left in local initiation (and not in *auto initiation*). At 11:06 hrs Technician 1 then contacted the Mayo Line Signalman to give up the signal protection.

At 11:33 hrs Train K520 passed the initiation point for LC XX011, but as the level crossing was still on local initiation the crossing did not automatically initiate, and the barriers did not lower. Consequently, the Up Stop (US) signal, Signal XX011 US, protecting LC XX011 remained at danger (red) and its associated Up Distant (UD) signal, Signal XX011 UD, remained at caution (single yellow).

At 11:36 hrs Train K520 passed Signal XX011 UD showing a single yellow and continued at 40 miles per hour (mph) (64 kilometres per hour (km/h)).

Approximately 320 metres (m) from Signal XX011 US, the driver of Train K520 (Driver K520) became aware of the signal at danger and made an emergency brake application.

However, Train K520 passed Signal XX011 US at danger without authority, coming to a stop approximately 100 m past the signal and approximately 100 m before LC XX011.

The signal passed at danger (SPAD) risk ranking (SRR) was scored 16 (on a scale between 0 and 28) making it a medium risk SPAD.

The RAIU have identified the following causal factor (CaF) which resulted in the incident:

- CaF-01 – The SPAD occurred because Driver K520 did not respond appropriately to Signal XX011 UD displaying a yellow (caution) aspect, by reducing speed; and, by the time Driver K520 observed that Signal XX011 US was at red, there was insufficient braking distance to stop Train K520 before passing the signal at danger.

The following contributory factors (CoF) were identified:

- CoF-01 – Driver K520 did not apply appropriate error prevention techniques for the cautionary and stop signal aspects;
- CoF-02 – Technician 1 did not contact the LCCO to remove LC XX011 from local initiation, preventing the auto initiation of LC XX011 and causing Signal XX011 US to be maintained at danger (red);
- CoF-03 – The route between Ballina and Athlone and the mid-section crossing signals are not equipped with an in-cab warning or train protection systems, which had they been fitted, may have prompted Driver K520 to respond to the single yellow at Signal XX011 UD or in the case of a train protection system, provided warning and enforced braking which may have prevented the SPAD.

A single systemic factor (SF) to the incident was identified:

- SF-01 – The procedures applicable to LCCOs do not detail a process for returning the level crossing to normal operation after maintenance work has been completed.

The RAIU investigation has resulted in the following safety recommendations in relation to the factors and an additional observation:

- Safety Recommendation 2026002-01 – The Head of Health & Safety Iarnród Éireann Infrastructure Manager (IÉ-IM) in conjunction with the Chief Engineer SET and the Infrastructure Manager Operations (IMO) Head of Operations to review the instructions in place for maintenance of level crossings to ensure that all the relevant staff are advised when maintenance is taking place and completed on all level crossings;
- Safety Recommendation 2026002-02 – IÉ-IM to review how real-time information, regarding train running on lines that contain level crossings under their control, can be relayed to LCCOs as and when circumstances such as train delays, that affect normal operations, require it.

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RAIU Investigation and its context

Decision & motivation to investigate this occurrence

1 On the 13th August 2024, the RAIU on-call investigator received a notification of an operational irregularity at Keelogues Level Crossing XX011 on the Manulla Junction to Ballina branch.

2 The RAIU conducted a preliminary examination and the RAIU's Chief Investigator made the decision to conduct a full investigation into the incident, given its impact on railway safety (*Article 20* (2)(c) of Directive (EU) 2016/798, Article 20, Obligation to Investigate), as under slightly different circumstances the incident may have led to serious accident with the potential for a fatality or serious injuries to road users, due to the risk of Train K520 passing through the level crossing with the barriers in the raised position (see footnote 22 for the actual risk versus the potential risk).

Scope & limits of investigation

3 The RAIU have established the scope and limits of the investigation as follows:

- Establish the sequence of events leading up to, during and after the incident;
- Identify any other precursors which led to the incident;
- Establish, where applicable, causal, contributing and systemic factors;
- Examine the work environment and equipment of the Level Crossing Control Centre (LCCC).

Technical capabilities & investigation methods

4 The RAIU's Chief Investigator allocated RAIU Senior Investigators, trained in accident investigation, to conduct this investigation, as appropriate.

5 The RAIU collated evidence through the submission of Requests for Information (RFIs).

6 Related to this investigation, the RAIU collated and logged evidence related to the traffic operations and SET maintenance activities onsite; such as statements, interviews, voice communications, On Train Data Recorder (OTDR), voice communications and competency records.

7 The RAIU reviewed documentation from IÉ-IM, IÉ-RU and the Commission for Railway Regulation (CRR)[1]. For a full list of the documentation reviewed and referenced, see the References section of this report.

Communications & evidence collection

8 Communications were conducted through established processes (such as RFIs).

9 Relevant stakeholders were issued the draft investigation report for comment, comments were reviewed and responses on their comments returned. In this instance the stakeholders were: IÉ-IM, IÉ-RU and the CRR.

10 All relevant parties co-operated fully with the RAIU investigation; with no difficulties arising.

[1] The CRR is the National Safety Authority (NSA) for the Republic of Ireland and 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.

Description of the occurrence & background information

Description of the occurrence type

11 The incident involved an operational irregularity with a freight train on the 13th August 2024. In terms of categorisation, the EU Agency for Railways categorisation for this occurrence is an: Incident – Traffic Operations and Management.

Background to the occurrence

12 The operational irregularity occurred at LC XX011 located to the east of Castlebar in County Mayo (see Figure 1). The route concerned forms part of the branch line between Manulla Junction and Ballina. The nearest station to the location is Manulla Junction.

Figure 1– Location of the incident

13 LC XX011 was receiving planned maintenance when the incident occurred, known as a Service B.

14 The weather at the time of the incident was dry and visibility was good.

Deaths, injuries & material damage

15 There were no injuries or damage as a result of the incident.

Other consequences as a result of the incident

16 There was 105 minutes delay to Train K520 and thirty-five secondary delay minutes.

Parties and roles associated with the incident

Parties involved in the incident

IÉ-RU

17 IÉ–RU is the railway undertaking who operated the scheduled Train K520 that was involved in the incident. IÉ-RU also employed Driver K520 and maintained all the rolling stock involved. The IÉ-RU operates under a Safety Certificate issued by the CRR. The IÉ-RU Safety Certificate was renewed on 23rd March 2023 for a period of five years (valid at the time of incident).

IÉ-IM

18 IÉ–IM is the infrastructure manager who owns, maintains and operates the railway infrastructure in Ireland and operates under a Safety Authorisation certificate issued by the CRR. The IÉ-IM Safety Authorisation is issued in conformity with Directive (EU) 2016/798, S.I. No 476 of 2020 and Commission Regulation (EU 2018/762). The authorisation was renewed on the 24th March 2022 for a period of five years (valid at the time of the incident).

19 The IÉ-IM departments involved in the incident and relevant to this investigation are:

- IMO Department – which operates the signalling system and LCCC monitors the operation of the network and provides the first level of response to incidents;
- SET Department – which maintains the signalling system and level crossing equipment.

Roles involved in the incident

20 The IÉ-IM roles involved, directly and indirectly, are as follows:

- Mayo Line Signalman – The signalman who operates the signalling system for the Mayo Line Workstation and is certified competent under the IÉ-IM operations competence management system;
- Galway Line Signalman – The signalman who operates the signalling system for the Galway Line Workstation and is certified competent under the IÉ-IM operations competence management system;
- LCCO – An IMO staff member located at Athlone LCCC who is responsible for the operation of level crossings and associated signalling and is certified competent under the IÉ-IM Operations competence management system;
- Technician 1 – An SET Department technician employed as a SET department technician, acting as the TSC for the work at LC XX011;
- Technician 2 – An SET Department technician acting as the WP for the work at LC XX011.

21 The following IÉ-RU role was involved in the incident:

- Driver K520 – Driver of Train K520 (Ballina to Waterford Freight Yard); certified competent under IÉ-RU's competence management system and issued with a valid Train Driving Licence and Complementary Certificate.

Rolling stock

General description

22 Train K520 (the 11:10 hrs Ballina to Waterford Freight Yard) was formed of an Class 071 diesel electric locomotive (no. 081) and eighteen vacuum braked container flat wagons (see Figure 2 for an illustration of an 071 and freight wagons). The weight of the train on the day was nominally 638 tonnes[2].

Figure 2 – Class 071 locomotive

23 The maximum permitted speed of the freight train *consist* is 50 mph (80 km/h).

24 Class 071 are also equipped with a train radio system that enables direct communication between the signalmen and drivers.

[2] Freight train manifests use a nominal value for containers, rather than an actual weight.

Continuous Automatic Protection

25 Class 071 locomotives are equipped with the *Continuous Automatic Warning System* (CAWS) but are not equipped with any *automatic train protection* (ATP) system[3].

26 The CAWS works by repeating the aspects shown by the lineside colour light signals on an Aspect Display Unit (ADU) inside the driver's cab (see Figure 3). The ADU continuously displays the aspect that was shown by the previous signal until updated approximately 350 m before the next signal. The ADU then displays the aspect shown by that signal. Each time a signal showing a restrictive aspect (double yellow, single yellow or red) is encountered on a fitted route, an audible warning is sounded which must be cancelled by the driver.

Figure 3 – CAWS ADU in a Class 071 locomotive

[3] Consequently, there is no speed supervision below the vehicles maximum speed and no supervision of braking for signals or permanent speed restrictions.

27 On routes not fitted with CAWS, there is no in-cab reminder of the previous signal aspect and no audible warnings. The last warning received on the display can be disabled by the driver on exit from a CAWS area to avoid any in-cab display conflict with the signals being observed.

28 The locomotive was equipped with an OTDR which records key measurements such as speed, power applied and brake pressures and horn use.

Infrastructure

Permanent Way

29 The railway between Ballina Station and Manulla Junction, where the Ballina Branch joins the line to Westport is a single-track line used by trains in both directions (bi-directional). Trains towards Athlone /Dublin are described as being in the Up direction, with movements towards Ballina being in the Down direction.

30 The route is used by both passenger and freight trains.

31 The maximum permissible speed on the single line is 60 mph (100 km/h) for passenger trains at the location of the incident. Freight trains are restricted to a maximum of 50 mph (80 km/h).

Keelogues Level Crossing (LC XX011)

32 LC XX011 (see Figure 4) is a *mid-section closed circuit television (CCTV) crossing* located at 148 3/4 MP[4].

33 LC XX011 is on a regional road where the road speed limit is 80 km/h.

34 LC XX011 is protected by traffic light signals, audible warning devices and full barriers.

Figure 4 – LC XX011

[4] Mileage is measured from the former terminus at Broadstone, Dublin.

Signalling

General description

35 The signalling on the Ballina Branch is a mixture of two and three aspect colour light signalling controlled under Track Circuit Block regulations. Train detection is carried out through axle counters.

36 The Mayo Line to Westport and Ballina is not equipped with CAWS or a train protection system. Therefore, the safe control of trains is fully reliant on drivers observing and then reacting to signals on the route[5].

37 Primary control of train movements on to and off the single line is carried out from the Mayo Line *Personal Computer – Electronic Control Point* (PC-ECP) workstation.

[5] Had CAWS been fitted to the crossing signals, it would have given Driver K520 a warning approaching Signal XX011 UD that required a positive action to acknowledge it and then provided an in-cab visual indication for several hundred metres before Signal XX011 US was visible. Similarly, a train protection system would have alerted the driver as the braking point approached for the XX011 US and then intervened if no action was taken, significantly reducing the likelihood of the SPAD. It should be noted that the RAIU made a safety recommendation in 2016 in relation to train protection systems, stating that: "IÉ-IM must introduce adequate train protection systems on IÉ network for the protection of trains; this system should be robust and to an acceptable standard within Europe; and have the appropriate ATP and speed supervision functionality". This was published in the RAIU's Investigation Report, Investigation into SPADs on IÉ Network, from January 2012 to June 2015, Report No. R2016-R001, published on the 11th April 2016. At the time of publication of this report, the safety recommendation remains open.

Signals associated with the incident

38 LC XX011 is protected by a two-aspect *distant signal*[6] and a two-aspect *stop signal,* on approach, in each direction.

39 In the Up direction are the UD signal, Signal XX011 UD; and, the US signal, Signal XX011 US (see Figure 5).

40 Signal XX011 UD is visible for a distance of approximately 375 m on approach. The required reading distance was calculated to be 286 m (based upon a maximum permissible speed of 80 mph (129 km/h))[7].

41 Signal XX011 US is visible for a distance of approximately 650 m on approach. The required reading distance for the signal was also calculated to be 286 m.

42 The position of the signals was not contributory to the incident.

Figure 5 – Signal XX011 US

[6] The term distant is used in the Athlone and Mallow Level Crossing Centre Instructions reflecting the fact that the signals at automatic CCTV crossings replaced mechanical distant semaphore signals, which were worked in association with stop signals (where provided) from the crossing by the crossing keeper.

[7] The actual maximum permitted speed is 60 mph (96 km/h).

Operations

Operation of Mid-Section CCTV Crossings

Auto and Local Initiation

43 As LC XX011 is a mid-section CCTV crossing, it is remotely supervised by LCCOs, who are responsible only for the operation of level crossings and associated signalling. The LCCOs for LC XX011, are located at Athlone LCCC in the same building, but in a separate room, from the signalmen operating signalling on the route[8].

44 In Athlone LCCC, LCCOs have available to them monitors displaying the CCTV images from the level crossing and each level crossing has a dedicated monitor situated on a fixed rack above the touchscreen panel controlling the level crossing. The touchscreen includes information such as: barrier status indication; buttons for selecting “crossing clear”; signal indications e.g. UD and US signals; initiation (i.e. auto and local); and SPAD indication.

45 On the touchscreen panel, the “Initiation” button has two functions i.e. “Auto” and “Local”[9]. When the “Initiation” button is in the “Auto” position the barriers will lower and raise automatically; the LCCO will not be able to select the “Barriers – Raise” and “Barrier – Lower” buttons.

46 For normal trains running through a section of line, an auto initiation[10] will advise the LCCO of the approach of a train[11] through an audible alarm.

[8] The Mayo Line PC-ECP workstation is situated alongside the Galway Line PC-ECP workstation in the same building as Athlone LCCC. The two workstations are in a separate room to the LCCOs.

[9] Placing “Initiation” button to “Local should not be confused with Local Control of the crossing during which an Emergency Operator is in charge of the crossing and is located at the crossing”.

[10] The initiation point location for LC XX011 is approximately 4 miles (6.43 km) before LC XX011 in the Up Direction.

[11] For the mid-section CCTV crossings at Athlone LCCC there is no visible indication for the direction and identity of a train on the relevant single line except for when a train reaches the initiation point for each individual crossing when an alert is sounded. The RAIU consider this to be an additional observation, AO-01, (paragraph 135), which warrants a safety recommendation, Safety Recommendation 2026002-02 (paragraph 152).

Instructions and procedures relating to the maintenance of the crossing

Introduction

47 I-SIG-2483, Maintenance Procedure for Automatic Level Crossings (to be referred to as I-SIG-2483 for the remainder of this report), provides the detailed procedure to be followed by the SET technicians for servicing an automatic level crossing.

48 The tasks in the procedure also require the application of other operational and safety instructions in parallel to protect the staff and the safety of trains whilst the work is taking place. These include the:

- IÉ Rule Book – Applicable to all parties, which contains instructions on how the railway is operated, which includes the safety of trains during maintenance work;
- Athlone and Mallow Level Crossing Centre Instructions – Applicable to LCCOs and detail how the crossing equipment operates;
- LCCO Handbook – Designed to provide LCCOs with the knowledge and skills required to apply the highest standards of professionalism.

Work to be done on signalling equipment

49 IÉ Rule Book, Clause 1.2, If work is to be done on signalling equipment (Section E, Operation of Signalling Equipment during failure or while work takes place, Clause 1.0 Principles), the SET Technician must:

- Obtain the Signalman's permission before starting work which will involve the disconnection or affect the operation of signalling equipment;
- Arrange this in accordance with the requirements of the relevant signal engineering instructions when a disconnection(s) is necessary;
- Tell the Signalman when normal working may resume[12].

50 There is no instruction requiring SET technicians to contact or seek permission from LCCOs in Section E.

[12] There is a note, under these requirements which states: “Note: there are some exceptions to this principle (Clause 1.2) when routine maintenance is done”. Clause 4.4, What you must do when routine maintenance work is to be done, outline procedures for “before starting routine maintenance work”, but there is nothing relevant to the incident in terms of telling the signalman that normal services can resume.

Maintenance Procedure for Automatic Level Crossings (I-SIG-2483)

51 I-SIG-2483 details maintenance tasks for automatic level crossings, including general guidance and advice on known problems and adjustments. Clause 4.2, Working on Equipment, includes the following:

- Work which shall interfere with the normal operation of level crossing equipment may not be undertaken without the agreement of the Signalman or LCCO;
- Before carrying out work which would affect the operation of a level crossing, replace, and maintain at danger all signals reading over the crossing;
- Level crossing equipment shall be isolated before the commencement of work that could affect the operation of the equipment and only restored to service when working correctly;
- The last operation for all services is to test that the apparatus functions correctly. If the installation is working correctly, advise the Signalman or LCCO that maintenance and testing work is complete.

52 The works on the day were related to a Service B type maintenance activity[13], Appendix A, Maintenance of Automatic Level Crossings, is an eight-page document about the planned maintenance service for automatic level crossings. For maintenance document (Appendix A.2) relevant to this incident, it notes at before the commencement of tasks that "Before commencing maintenance, obtain the level crossing controller's and signaller's permission for work to be done and arrange protection as necessary" (see Figure 6).

A.2 Automatic Full Barrier Level Crossing: Service B

Automatic Full Barrier Level Crossing Maintenance: Service B

Level Xing Name: _____ **Level Xing No:** _____

Note: Before commencing maintenance, obtain the level crossing controller's and signaller's permission for work to be done and arrange protection as necessary.

Figure 6 – Maintenance Services Document

53 While noting, the document is comprehensive in terms of outlining the maintenance service activity, there is no prompt at the end of the Appendix A2 to remind SET technicians to tell the signalman and LCCO when normal working may resume at the level crossing. Instead, the requirement is referenced in the main body of the standard applicable to all types of service activities.

[13] A Service B type maintenance activity is an activity that is undertaken annually.

Professional Driving Handbook

Introduction

54 The Professional Driving Handbook is a manual that prescribes the standards of professionalism and driving techniques to be applied by IÉ-RU drivers. The handbook comprises of three sections:

- Section One – Prescribes core principles and supporting instructions to be applied by all IÉ train drivers. These are mandatory and form part of normal assessment and monitoring;
- Section Two – Provides supporting guidance on useful techniques which can assist drivers to reduce the likelihood of error, manage lifestyle, plus guidance on competence management;
- Section Three – Contains additional information to support the IÉ Rule Book and other operating instructions.

Section One, Professional Driving Policy

55 Section One, Professional Driving Policy includes Key Principle 4, Professional driving during normal operations, which details the core professional techniques for train movements during normal operations.

56 A number of key techniques to reduce error are included, with further supporting guidance on techniques are provided within Section 2; these are based on techniques which drivers have found beneficial in minimising error, such as non-technical skills, commentary driving and risk triggered commentary (discussed in paragraphs 61 to 66).

57 Clause 4.2, Driving under restrictive signal aspects, outlines typical errors when running under restrictive aspects, including: assuming that a signal will upgrade to a less restrictive aspect; not taking positive action to reduce the train speed; lack of concentration between the caution and red signal; and over-reliance on previous experience, as well as mitigating techniques that can be applied.

58 To minimise the errors, the following techniques for minimising error when running under restrictive signal aspects, include:

- Take positive action according to the operating conditions. This will involve planning ahead and will involve reducing / shutting off power, coasting or applying the brake;
- "Switch on" to routes not fitted with CAWS or ATP using techniques such as risk triggered commentary;
- Never "Chase signals" showing restrictive aspects, i.e. never assume that a signal showing a restrictive aspect will clear to a less restrictive aspect on approach, irrespective of what may have happened previously in your experience;
- Always expect the next signal to be displaying a red aspect. It is important not to allow yourself to become distracted. Concentrate on the job in hand – stopping at the red signal;
- If you are unsure about the aspect you received in the previous signal, or you become disorientated by fog, always apply the brakes and be prepared to stop at the next signal;
- Ensure that you take appropriate action if a signal clears from a red aspect to a *cautionary aspect* as the train approaches it; remind yourself of the cautionary aspect i.e. accelerate more gently;
- Be mindful of the risk of inattention, especially when running on successive signals showing restrictive aspects or when repetitively acknowledging the CAWS.

59 The following speed / range must be used on approach to a signal at danger under normal rail head conditions:

- Adopt the 15 x 20 Rule – No more than 15 mph (24 km/h) at the CAWS downgrade and where practicable; stop 20 m from the signal;
- In areas where there is no CAWS, aim to be driving at no more than 15 mph (24 km/h) 200 m back from the signal and stop 20 m from the signal. Whenever possible, position your train so the signal is visible through the front cab window.

Section Two, Guidance and supporting information

Introduction

60 Section 2, Guidance and supporting information, contains guidance and supporting information on such items as non-technical skills, situational awareness and risk triggered commentary which are outlined below.

Non-technical skills

61 Non-technical skills are the actions and behaviours which complement technical skills. Train drivers apply these skills all the time through the identification of hazards and risk and systematically self-checking their actions, controlling distractions at critical times and prioritising the most important tasks.

62 During the course of training and assessments, trainers, mentors and assessors will assess whether drivers are not only carrying out tasks in accordance with the rules, but also the actions and techniques to reduce the likelihood of error. For assessing non-technical skills there are defined positive and negative indicators to measure drivers against.

Situational awareness

63 Situational awareness is a key non-technical skill for train driving that comprises of: perception of the hazards in the environment; the comprehension of their meaning taking into account rules, traction, route knowledge; the projection of their status in the near future (anticipation of future events).

64 Situational awareness is maintained by:

- Remaining alert to the surroundings – continually scanning the cab and the environment ahead, switching attention to maintain an overall view;
- Filtering the important and unimportant information;
- Allocating attention to the relevant information;
- Not becoming transfixed on a particular object or task.

Risk Triggered Commentary

65 The risk triggered commentary technique which, whilst not mandatory, can be applied by train drivers to help stay focused when carrying out a movement or a task that carries a high level of risk of error. It uses the process of verbal commentary and repeating back the risk and action to take and is aimed at ensuring that essential information remains in your short-term memory. An example listed of when risk triggered commentary may be used is on approach to cautionary /red signals. This technique promotes repeating essential information (the red aspect) on a risk or hazard until the train has stopped or the signal clears.

66 This reflects the fact that very little information is retained in the short-term memory beyond a time between eight and eighteen seconds. In the example given in Figure 7 the signal aspect is visible on approach and present in the short-term memory but as soon as the signal is passed, the image of the signal fades and the action required may be forgotten by the time eighteen seconds has elapsed if no action is taken to refresh this or reinforce it.

Figure 7 – Risk triggered commentary

Training and Competency Management

Introduction

67 Driver training is undertaken internally within IÉ-RU. This includes theory training at the Inchicore or Mallow training centres, then practical training in the workplace before final assessment.

68 SET technician training is undertaken internally by IÉ-IM and is divided into safety competencies (e.g. PTS and TSC) and technical competencies which are trained separately. After qualification these are then periodically re-assessed in the workplace.

Driver Competency Management

Introduction

69 IÉ-RU has a documented competency management framework to maintain safety. At the time of the incident, key requirements relevant to driver competence were detailed in the procedures:

- Ops-SMS-3.1, Competence Management System – Train Drivers;
- Ops-SMS-3.2, Driver Development and Support System.

Ops-SMS-3.1, Competence Management System – Train Drivers

70 Ops-SMS-3.1 is the principal standard for managing driver competence. This standard is designed to ensure persons who drive trains consistently achieve the standards of competence required for their work; it also determines: how and by who competence is assessed; and, the frequency and the records that need to be kept of those assessments.

71 The assessment process normally runs over a two-year time period and includes formal workplace assessments such as cab rides, unannounced monitoring such as OTDR, questioning, simulation and a review of supporting records. The assessment process also includes a grading of one to five to measure levels of competence and application of non-technical skills.

72 Clause 9.3.1 details the assessments over the two-year cycle, which must include:

- Four formal driving assessments (FDA) when a practical assessment is undertaken;
- Two OTDR downloads;
- Four safety critical communication assessments;
- One interim review;
- One summary assessment;
- Safety briefing and update days.

Ops-SMS-3.2 Driver Development and Support System

73 Ops-SMS-3.2[14] was aimed at providing additional support and development to assist drivers to improve competence and safety performance. For a driver involved in an operational incident, the application of this standard would normally result in additional support and monitoring. The level of support provided is proportionate to the severity of the incident and the safety profile of the driver. A driver development and support system (DD&SS) plan is required to be produced.

Competence of the Driver K520

74 Driver K520 first qualified in 2013, initially working in the Dublin area before transferring to Ballina Depot in 2014. In the preceding two years before the incident, Driver K520 was assessed at the required frequencies.

75 Driver K520 completed a competency cycle on the 11th April 2023, which included a knowledge assessment, before commencing a new two-year assessment cycle.

76 Between the start of the new competency cycle and the date of the incident Driver K520 was assessed on the following dates:

- 16/08/2023 – FDA on a passenger service;
- 18/10/23 – A safety critical communications assessment;
- 06/03/2024 – FDA on a freight train;
- 05/04/24 – A safety critical communications assessment;
- 10/04/24 – An OTDR download of a passenger service.

[14] Ops-SMS-3.2 was withdrawn in 2024 and replaced a re-issued Ops-SMS-3.1.

77 During these assessments, no items were identified for review or concern.

78 All the communications assessments also received the highest grading, indicating no concerns.

79 Driver K520 had one previous recorded incident, a SPAD in 2016 at Westport during shunting operations; a DD&SS was implemented in accordance with Ops-SMS-3.2, which lasted a period of two years.

80 Driver was not on a DD&SS at the time of the incident.

Competency Management of SET Staff

81 SET technicians are assessed on both safety competencies and technical competencies. All competencies were found to be in date.

82 Both Technician 1 and Technician 2 had the track safety qualifications of TSC, WP and PTS and assessment on IÉ Rule Book, Section E, Operation of Signalling equipment during failure or whilst work takes place.

83 Technician 1 had multiple technical competencies, which included CCTV LC Assessment, assessed on the 19th October 2023.

84 Technician 2 had technical competency for working on points and was assisting Technician 1 on the level crossing Service B.

Events before, during and after the incident

Events before the incident

85 Driver K520 booked on at 09:00 hrs at Ballina after the required rest period, having worked the previous day[15].

86 Driver K520 was rostered to work Train K520 as far as Athlone where another driver would relieve them for the onward journey.

87 At approximately 10:00 hrs the two SET Technicians arrived at LC XX011 to carry out a Service B (paragraph 52 and 53) on LC XX011. They entered the building adjacent to the crossing, which housed to SET equipment, to start work.

88 At 10:48 hrs[16] Technician 1 contacted the Mayo Line Signalman and requested signal protection which was granted between Ballina and Manulla Junction.

89 At 10:51 hrs Technician 1 contacted the LCCO to inform them that they were working at LC XX011 and that they had signal protection in place. No request was made to place the level crossing into local initiation at this stage.

Events during the incident

90 At 11:02 hrs the Mayo Line Signalman contacted Technician 1 and advised them they would have an Up train departing Ballina in approximately five minutes; which would require the signal protection to be given up.

91 At 11:05 hrs Technician 1 contacted the LCCO and asks them to test the level crossing operation using their crossing controls, which they did immediately, remaining on the phone whilst doing so; this required local initiation to be selected.

[15] The fatigue and risk from Driver K520's shift for the day of the occurrence and for the fourteen and thirty days previous was assessed by IÉ-RU using the Fatigue and Risk Index Calculator (A tool developed by the Health and Safety Executive in the United Kingdon to calculate the fatigue and risk in rosters). The outputs indicate that fatigue from the roster and work pattern was not considered to be contributory to the incident.

[16] Analysis of the voice recordings shows that there are variances between the digital time clocks on the recorders. As a result, the RAIU has corrected the timings to a unified timeline in correct chronological sequence that is +1 or -1 minute to actual time on the day.

92 The LCCO confirmed that the level crossing was showing as fault free on the operating panel and asked Technician 1 if they were finished working on the crossing. Technician 1 stated “No, I’ll be ringing you back”.

93 At 11:06 hrs, Technician 1 contacted the Mayo Line Signalman and handed back the signal protection to allow Train K520 to proceed, stating they would then call the Mayo Line Signalman after the passage of the train. The Mayo Line Signalman then set the Up direction route for Train K520.

94 At this point, Technician 1 did not contact the LCCO to re-instate auto initiation due to a lapse of concentration.

95 At approximately 11:14 hrs Train K520 departed from Ballina Freight Yard for Waterford Freight Yard.

96 At 11:33 hrs, Train K520 reaches the initiation point for LC XX011. At this point, the audible alert sounded for auto initiation and the CCTV monitor switched on, but the level crossing operation sequence did not begin.

97 At approximately 11:36 hrs Train K520 passed Signal XX011 UD at single yellow, travelling at 40 mph (64 km/h), with traction power was still applied at this time[17]. Driver K520 subsequently stated that “I passed the distant with a proceed[18] aspect, but it did not register and I forgot the next Signal XX011”.

98 Driver K520 acknowledged that they did not apply any error prevention techniques, such as *risk triggered commentary,* on the approach to the or after the distant signal (Signal XX011 UD). Driver K520 said of the approach to LC XX011 that they had “done that journey, more or less, the day before” and “had no reason in my head to get a red signal”, stating that they believed that all signals would be at proceed from Ballina to Manulla Junction.

99 At 11:38 hrs, Train K520 initiates another level crossing, LC XX001 (Barrackland), LC XX001 is the next mid-section CCTV crossing beyond LC XX011 in the direction of travel of Train K520 (between Ballina and Manulla Junction).

[17] As shown in the OTDR.

[18] A single yellow aspect is a classified as a proceed aspect, but in this case, the driver was acknowledging that the meaning of the signal was ‘caution – be prepared to stop at the next signal’.

100 At 11:39 hrs, the LCCO contacted the Mayo Line Signalman asking if there was a power failure at LC XX001 (Barrackland) due to the auto initiation of that level crossing, not realising that the initiation had been caused by Train K520. The Mayo Line Signalman informed the LCCO that there was a train in the section (Train K520); but the direction of the travel of the train was not discussed in the call.

101 The LCCO then stated that there were SET technicians at LC XX011 who had not phoned back to say they have finished. The Mayo Line Signalman stated the SET staff member (Technician 1) had phoned them back to say they were finished and given up the signal protection. The LCCO acknowledged this and said they would "allow LC XX001 to lower".

102 At 11:39:03 hrs Driver K520 saw Signal XX011 US displaying a danger (red) aspect and made an emergency brake application with approximately 350 m to the signal whilst travelling at 40.4 mph (65 km/h).

103 At 11:39:30 hrs Train K520 passes Signal XX011 US at danger, simultaneously triggering a SPAD alarm at the Athlone LCCC.

104 The SPAD alarm activated the road traffic signals and audible alarms at LC XX011, but the barriers remained raised[19].

105 A few seconds later, Train K520 comes to a stop approximately 100 m beyond Signal XX011 US, approximately 100 m from the road crossing.

106 At 11:40 hrs Driver K520 contacted the Mayo Line Signalman to advise that they had passed the signal at danger. Before Driver K520 could inform the Mayo Line Signalman of the SPAD, the Mayo Line Signalman asked Driver K520 if the crossing stop signal was at red[20], and stated that SET staff (Technicians 1 and 2) were working on the crossing.

107 Driver K520 then informed the Mayo Line Signalman that they had passed the signal (Signal XX011 US) at danger. The Mayo Line Signalman instructed Driver K520 not to move the train before ending the call.

[19] The LCCO Handbook states that a SPAD Alarm may activate even when there are no trains present in the vicinity. This can be the result of a track circuit or axle counter failure or when the Signalman tests the generator at stations which also provide power to certain level crossings for example.

[20] The Mayo Line Signalman could not see the signal aspect displayed on LCCC controlled signals on their Workstation as these crossings are not interfaced with the Signalling interlocking and so was not immediately aware a SPAD had occurred.

108 At 11:41 hrs the Mayo Line Signalman contacted the Mainline Regulator to advise them of the SPAD.

109 At the same time, LCCO contacted Technician 1 to advise they aren't getting the "crossing clear" at LC XX011. Technician 1 said "I tested the crossing and handed it back that time and everything was normal"[21]. LCCO informs Technician 1 that they had a SPAD alarm activated for LC XX011. LCCO asked Technician 1: "You handed back to the Signalman?", who confirmed they had (this being in relation to the signal protection). Technician 1 then told the LCCO that the train (Train K520) is "sitting at the signal now"; the LCCO terminates the call, stating that they will have to contact the signalman.

110 At 11:41 hrs, LCCO calls the Mayo Line Signalman, but the call is answered by the Galway Line Signalman who advises that they cannot get "crossing clear" at LC XX011, further stating "we had a SPAD alarm here about a minute ago" and asks whether the train was a "down train". The Galway Line Signalman replies "The train is going up. Ye got a SPAD indication for Keelogues?"; with the LCCO confirming they did.

111 The Galway Line Signalman then terminated the call in order to contact Driver K520 and ensure the train is stopped. This call occurred in parallel with the Mayo Line Signalman speaking to Driver K520.

112 Concurrent, with the above events, Technician 2 alerted Technician 1 that the level crossing road traffic signals and klaxons had operated and a train (Train K520) was stopped between the Signal XX011 US and LC XX011.

Events after the incident

113 At 11:43 hrs, Technician 1 contacted the Mayo Line Signalman, stating that the LCCO was confused about the direction the next train is proceeding and that they could not obtain crossing clear on LC XX011. The call is initially answered by the Galway Line Signalman as the Mayo Line Signalman is on another call. At this point in the call, the Galway Line Signalman handed over the call over to the Mayo Line Signalman. Technician 1 said that a train (Train K520) has passed the signal at danger, to which the Mayo Line Signalman replied that they were aware.

114 At 11:44 hrs the Mayo Line Signalman contacted Driver K520 to complete the SPAD form. Driver K520 stated he thought the signal before LC XX011 (Signal XX011 UD) was showing a proceed aspect.

[21] However, it was not handed back to the LCCO.

115 All other post-incident procedures were carried out accordingly, to relieve Driver K520 and recover services.

116 Arrangements were made for Driver K520 to be tested for drugs and alcohol on the return to Ballina Station; the result was negative.

117 At approximately 14:30 hrs drugs and alcohol testing took place on Technicians 1 and 2 at Claremorris. Both members of staff tested positive, requiring a re-test and a declaration of any medication in accordance with the IÉ Drugs and Alcohol Policy. Technician 1 tested positive for prescription medication. Technician 2 resigned from IÉ following the positive drugs test.

118 IÉ calculated the SRR to be 16 (on a scale between 0 and 28) making it a medium risk SPAD[22].

[22] The actual and potential risk per the formal SRR was:

- Actual Risk: As the train was travelling at a lower than permitted speed (40.4 mph (65 km/h)), the train was brought to a stop approximately 100 m from the road crossing. At the time of the occurrence there were no public vehicles or members of the public traversing the crossing;
- Potential Risk: If the train had been travelling at the permitted 50 mph (80 km/h) the stopping distance would have been greater and a collision at the road crossing could have occurred if there were any road vehicles or members of the public traversing the crossing.

Previous occurrences

Trend in SPAD occurrences

119 The CRR actively monitor SPAD events, the CRR's 2024 Annual Report, which states "SPADs are a particular precursor event that the CRR monitors at its Safety Performance Review Meetings with IÉ-RU. The trend in recent years has seen a decline in these precursors and is visible within the dotted trendline within the figure below. This trend continues for 2024 with the total number of SPADs at 11 for the year" (see Figure 8 for the figure refenced).

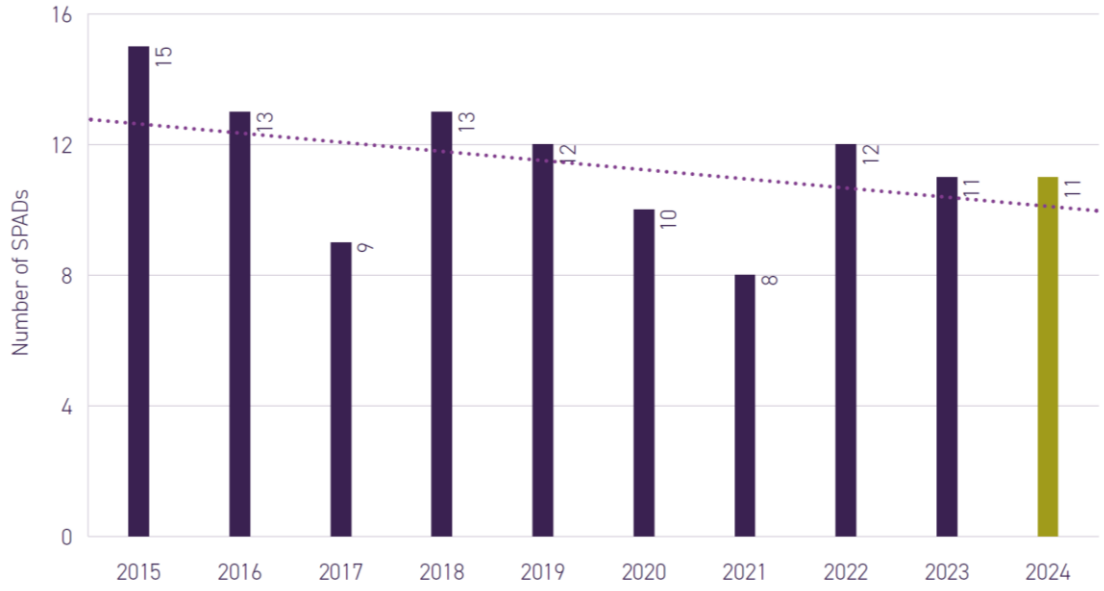

Figure 8 – CRR Annual Report graph showing SPADs numbers from 2015 to 2024

RAIU investigations into SPADs

120 The RAIU has carried out the following investigations relevant to IÉ-RU Signals Passed at Danger occurrences:

- Trend investigation in SPADs on the IÉ network between January 2012 and June 2015;
- Double SPAD at Clontarf Road on the 7th December 2021.

121 In addition, the RAIU is also currently investigating the SPAD at Mallow (Signal MW813) on the 8th February 2025.

Analysis

Train Driving

Professional Driving Handbook

122 The Professional Driving Handbook, Clause 4.2, Driving under restrictive signal aspects, from Section One, Professional Driving Policy, outlines the typical errors when running under restrictive aspects, including: not taking positive action to reduce the train speed; lack of concentration between the caution and red signal; and over-reliance on previous experience (paragraph 57).

123 To minimise these errors, the following relevant advice for when running under restrictive signal aspects, includes: to “switch on” to routes not fitted with CAWS using techniques such as risk triggered commentary; not allowing yourself to become distracted (concentrate) and be mindful of the risk of inattention; and, to take positive action according to the operating conditions (paragraph 58).

124 Section Two, Guidance and supporting information, contains guidance and supporting information on such items as: non-technical skills through the identification of hazards and risk and systematically self-checking their actions, controlling distractions at critical times and prioritising the most important tasks (paragraph 61); situational awareness through remaining alert and allocating attention to the relevant information (paragraph 64); and, risk triggered commentary through the process of verbal commentary and repeating back the risk and action to take and is aimed at ensuring that essential information remains in your short-term memory (paragraph 65).

Actions of Driver K520

125 The OTDR indicates that as Train K520 approached and then passed Signal XX011 UD, Driver K520 did not react to the cautionary aspect (Signal XX011 UD) and maintained a speed of approximately 40 mph (65 km/h) (footnote 17); with Driver K520 acknowledging that the cautionary aspect did not “register” (paragraph 97); and they did not apply any error prevention techniques such as risk triggered commentary (paragraph 98).

126 Driver K520 had an incorrect expectation that they would be travelling on proceed aspects from Ballina to Manulla Junction, in part, as a result of travelling the route previously on proceed aspects (paragraph 97).

127 Only on approach to Signal XX011 US did Driver K520 take positive action to stop at the signal (paragraph 102), but the stopping distance for Train K520 was greater than the distance remaining to Signal XX011 US.

128 The Professional Driving Handbook identifies common types of incidents and provides techniques and guidance for the avoidance of errors; had these been applied by Driver K520 on the day of the incident, it is likely that the signal would not have been passed at danger.

Maintenance Procedure for Automatic Level Crossings

Documentation

129 Appendix A.2, Maintenance of Automatic Level Crossings in I-SIG-2483 states that "Before commencing maintenance, obtain the level crossing controller's and signaller's permission for work to be done and arrange protection as necessary" (paragraph 51). However, there is no prompt at the end of the document to remind SET technicians to tell the signalman and LCCO when normal working may resume at the level crossing (paragraph 52).

130 The requirement for SET technicians to inform the LCCO, is also not included in the IÉ Rule Book (paragraphs 48 and 49).

Actions of Technician 1

131 Technician 1 did not tell the LCCO that they had completed work at LC XX011, this was as a result of a lapse of concentration.

Conclusions

Causal, contributing, and systemic factors

132 During the process of handing back LC XX011 for the passage of Train K520, Technician 1 forgot to advise LCCO that work was complete and to return LC XX011 to normal operation, which maintained Signal XX011 US at danger and its associated distant Signal XX011 UD at caution. Train K520 then passed Signal XX011 US at danger as a result of the following causal factor:

- CaF-01 –The SPAD occurred because Driver K520 did not respond appropriately to Signal XX011 UD displaying a yellow (caution) aspect, by reducing speed; and, by the time Driver K520 observed that Signal XX011 US was at red, there was insufficient braking distance to stop Train K520 before passing the signal at danger (paragraph 127).

133 The following contributory factors were identified, in terms of Driver K520 passing Signal XX011 US at danger:

- CoF-01 – Driver K520 did not apply appropriate error prevention techniques for the cautionary and stop signal aspects (paragraph 128);
- CoF-02 – Technician 1 did not contact the LCCO to remove LC XX011 from local initiation, preventing the auto initiation of LC XX011 and causing Signal XX011 US to be maintained at danger (red) (paragraph 131);
- CoF-03 – The route between Ballina and Athlone and mid-section crossing signals are not equipped with an in-cab warning or train protection systems (paragraph 36), which had they been fitted, may have prompted Driver K520 to respond to the single yellow at Signal XX011 UD or in the case of a train protection system, provided warning and enforced braking which may have prevented the SPAD (footnote 5).

134 A single systemic issue was identified factor was identified:

- SF-01 – The procedures applicable to LCCOs do not detail a process for returning the level crossing to normal operation after maintenance work has been completed (paragraphs 129 and 130).

Additional Observations

135 Although not causal, contributing or systemic to the incident, the RAIU makes the following additional observation:

- AO-01 – After the initial incident had occurred, there was confusion by the LCCO with regard to the presence of a train in the section, its direction and identity when communicating with Technician 1 and the Mayo Line Signalman; this is likely to have been caused by the limited information displayed to the LCCO.

Measures taken since the incident

Measures taken by IÉ-RU

Safety Alert

136 A Preliminary Safety Alert was issued on the details of the SPAD on the 16th August 2025 (RU Ops SA96).

Drugs & Alcohol

137 IÉ's Drugs and Alcohol Policy (Version: October 2024) and poster was also issued to all departments of IÉ-RU and IÉ-IM by the IÉ Director of Health and Safety reminding all staff of the Company's Drug and Alcohol Policy.

Internal Investigation Report

138 IÉ-IM carried out their own internal investigation into the incident (Report of Investigation: Signal XX011US (Keelogues) passed at danger, Report No: R1301-2025-44, published 2nd December 2025), making two recommendations:

- The Head of Health & Safety IM in conjunction with the Chief Engineer SET and the IMO Head of Operations to review the instructions in place for work on crossings to ensure that all the relevant staff are advised when work is taking place and completed on all crossings;
- The Head of Human Factors to conduct research into methodologies to enhance attention and vigilance and reduce the potential of drivers forming a false mental model when driving.

Driver K520

139 After the incident, Driver K520 was temporarily stood down from operational duties and a learning review took place in accordance with Ops-SMS-3.2, Driver Development and Support, as discussed in paragraph 73. Driver K520 was then returned to operational duties with a development plan focussed on the non-technical skills of maintaining awareness and concentration.

140 However, on the 19th May 2025. Driver K520 had another SPAD incident at Signal XM139 DS under similar circumstances.

141 Driver K520 has since moved to an alternative non-operational role.

Safety Recommendations

Introduction to safety recommendations

142 In accordance with the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020), RAIU safety recommendations are addressed to the NSA, the CRR, and directed to the party identified in each safety recommendation.

Absence of safety recommendations due to measures in progress

Drugs & Alcohol

143 It was noted that the two SET technicians tested positive for drugs (paragraph 117). IÉ-IM issued a notice in relation to their drugs and alcohol policy (paragraph 137) and one staff member resigned (paragraph 117). As a result, no further RAIU safety recommendation is warranted.

Train Protection System

144 The RAIU previously made the following safety recommendation in 2016: IÉ-IM must introduce an adequate train protection system on all of the IÉ network for the protection of trains; this system should be robust and to an acceptable standard within Europe; and have the appropriate ATP and speed supervision functionality (footnote 5).

145 By way of update, IÉ has progressed with a program to install European Train Control System (ETCS) on the complete network. A tender was issued for the national rollout in October 2024 with a value of €60 million.

146 At the time of publication of this report approximately 120 km of trackside infrastructure has been installed in the Dublin and Cork areas, with these works being carried out in association with other infrastructure upgrades. However, no date has been set for the installation of the Westport / Ballina routes or for the fitment of existing freight locomotives. At present, these developments are unfunded and no definitive infrastructure or rolling stock program has been issued.

147 As the RAIU safety recommendation remains open, another safety recommendation is not warranted.

Non-Technical Skills

148 The RAIU note the recommendation made in IÉ's internal report, namely: The Head of Human Factors to conduct research into methodologies to enhance attention and vigilance and reduce the potential of drivers forming a false mental model when driving (paragraph 138).

149 This recommendation recognises the ongoing interim risks of drivers not reacting to cautionary aspects whilst driving routes and traction without functional CAWS or ETCS, pending the rollout of the ETCS system.

150 As a result, the RAIU makes no further recommendation.

Safety recommendations as a result of this incident

151 The task list documentation associated with the maintenance of automatic level crossings did not include a requirement for SET technicians to tell the signalman and LCCO when normal working may resume at the level crossing (paragraph 53). A counterpart requirement for the SET technicians to inform the LCCO, is also not included in the IÉ Rule Book (paragraph 50). As a result, the RAIU make the following safety recommendation to address SF-01 (paragraph 134), as follows:

Safety Recommendation 2026002-01

The Head of Health & Safety IÉ-IM in conjunction with the Chief Engineer SET and the IÉ-IM Head of Operations to review the procedures and instructions in place for the maintenance of level crossings to ensure that all the relevant staff are advised when work is taking place and completed on level crossings.

Safety recommendations as a result of additional observations

152 After the initial incident had occurred, there was confusion by the LCCO with regard to the direction and identity of the train involved when communicating with Technician 1 and the Mayo Line Signalman (paragraph 113); as a result, the RAIU make the following safety recommendation to address AO-01 (paragraph 135), as follows:

Safety Recommendation 2026002-02

IÉ-IM to review how real-time information, regarding train running on lines that contain level crossings under their control, can be relayed to LCCOs as and when circumstances such as train delays, that affect normal operations, require it.

Additional Information

List of abbreviations

AO	Additional Observations
ATP	Automatic Train Protection
CaF	Causal Factors
CAWS	Continuous Automatic Warning System
CCE	Chief Civil Engineer
CDU	CAWS Display Unit
CoF	Contributory Factors
CRR	Commission for Railway Regulation
CTC	Central Traffic Control
DD&SS	Driver Development and Support System
EU	European Union
ETCS	European Train Control System
FDA	Formal Driving Assessment
hr	hour
IÉ-IM	Iarnród Éireann Infrastructure Manager
IÉ-RU	Iarnród Éireann Railway Undertaking
IMO	Infrastructure Manager Operations
km	kilometre
km/h	kilometres per hour
LC	Level Crossing
LCCC	Level Crossing Control Centre
LCCO	Level Crossing Control Operative
m	metre
MP	Mile Post
mph	miles per hour
NSA	National Safety Authority

OTDR	On-Train Data Recorder
PC-ECP	Personal Computer – Electronic Control Point
PTS	Personal Track Safety
RAIU	Railway Accident Investigation Unit
RFI	Request For Information
SET	Signalling, Electrification and Telecommunications
SMS	Safety Management System
SPAD	Signal Passed at Danger
SRR	SPAD Risk Ranking
TSC	Track Safety Co-ordinator
UD	Up Distant signal
US	Up Stop signal
WP	Work Protector

Glossary of terms

Accident	An unwanted or unintended sudden event or a specific chain of such events which have harmful consequences. For heavy rail, the EU Agency for Railways divides accidents into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Article 20 of Directive (EU) 2016/798, Obligation to investigation	Article 20 (1) Member States shall ensure that an investigation is carried out by the investigating body referred to in Article 22 after any serious accident on the Union rail system. The objective of the investigation shall be to improve, where possible, railway safety and the prevention of accidents. Article 20 (2) The investigating body referred to in Article 22 may also investigate those accidents and incidents which under slightly different conditions might have led to serious accidents, including technical failures of the structural subsystems or of interoperability constituents of the Union rail system. The investigating body may decide whether or not an investigation of such an accident or incident is to be undertaken. In making its decision it shall take into account: (a) the seriousness of the accident or incident; (b) whether it forms part of a series of accidents or incidents relevant to the system as a whole; (c) its impact on railway safety; and (d) requests from infrastructure managers, railway undertakings, the national safety authority or the Member States.
Auto initiation	When an automatic CCTV level crossing has its crossing closure operation sequence started by the passage of a train.
Causal Factor	Any action, omission, event or condition, or a combination thereof that if corrected, eliminated, or avoided would have prevented the occurrence, in all likelihood.
Cautionary Aspect	A single yellow or double yellow aspect.

Consist	The term used for the make-up of the train formation, usually listed vehicle by vehicle in the direction of travel.
Contributing Factor	Any action, omission, event or condition that affects an occurrence by increasing its likelihood, accelerating the effect in time or increasing the severity of the consequences, but the elimination of which would not have prevented the occurrence.
Distant Signal	A signal which indicates the status in advance of the signal in the direction of travel at the gate box ahead.
Down direction	In this incident, trains travelling to Ballina are travelling in the Down direction.
Emergency Control Panel	A signal control panel provided to allow local control to be taken of one or more interlockings.
Electronic Control Point	Term used for a panel used to control one or more interlockings.
Local initiation	When the operation of an automatic CCTV crossing closure sequence is started by the LCCO.
Incident	Any occurrence, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation. For heavy rail, the EU Agency for Railways divides incidents into the following categories: infrastructure; energy; control-command & signalling; rolling stock; traffic operations & management and others.
Interlocking	The railway signalling term given to a system composed of signal apparatus (mechanical, electrical or coded logic) that prevents trains encountering conflicting moves through only allowing trains to receive an authority to proceed, when routes have been set, locked and detected in safe combinations.
Investigation	A process 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

Mid-section CCTV crossing	Level crossings which have signals which are controlled by the Crossing Controller (or Emergency Operator at the crossing).
Mile Post	Marks distances.
Non-technical skills	Non-technical skills are those that underpin and enhance technical skills by helping persons to anticipate (prepare for), identify (be aware of) and mitigate (take action to prevent) risks.
Personal Computer – Electronic Control Point (PC-ECP)	A computer-based control interface with the signalling interlocking used by signalmen to monitor and control the signalling system.
Restrictive aspect	Any aspect (red, yellow or double yellow) other than a green.
Serious Accident	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. For heavy rail, the EU Agency for Railways divides serious accidents into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Signal Protection	Maintaining at danger signals to protect persons or a possession of the line.
Signal Passed at Danger	An event where a part of a train proceeds its authorised movement.
Stop Signal	Any main signal which can show a stop aspect or indication.
Systemic factor	Any causal or contributing factor of an organisational, managerial, societal or regulatory nature that is likely to affect similar and related occurrences in the future, including, in particular the regulatory framework conditions, the design and application of the safety management system, skills of the staff, procedures and maintenance.

Up direction	The direction of traffic towards a defined location – usually (but not always Dublin).
Up line	Up line is term used to describe the normal direction of traffic on railway routes. Each route has an “Up” and “Down” direction which are to or from a specified location - in this accident for Dublin Connolly station. Mileposts are measured from the same location.

References

CRR (2024), CRR Annual Report 2025

IÉ (2024), Drugs and Alcohol Policy

IÉ (2019), HR-QMS-006-005, Drug and Alcohol Testing, Issue 6.0

IÉ-IM (2022), IÉ Rule Book (updated to July 2022)

IÉ-IM (2019), Level Crossing Control Operatives Handbook

IÉ-IM (2021), Train Signalling Regulations and General Instructions to Signalmen Issue, Version 2.1 10/15

IÉ-IM (2022), Athlone & Mallow Level Crossing Control Centre Instructions, Version 8.0

IÉ-IM (2023), I-SIG 2401 Frequency of Signalling Equipment Maintenance, Issue 1.9

IÉ-IM (2023), I-SIG-2483 Maintenance Procedure for Automatic Level Crossings, Version 4

IÉ-IM (2023), Signalling Scheme Plan 532 Mayo Line, Version 1.1

IÉ-IM (2024), Tender document 8736 Train Protection System ETCS Level 1- Trackside National Rollout, www-etenders.gov.ie, accessed 30th March 2026

IÉ-RU (2013), Ops-SMS-3.1, Competence Management Drivers, Issue 1

IÉ-RU (2013), Ops-SMS 3.2, Driver Development and Support, Issue 1

IÉ-RU (2014), Professional Driving Handbook, Issue 4

IÉ-RU (2018), Route Information Book 9 Portarlington – Galway – Westport - Ballina, Version 1.01

RAIU (2016), Investigation into SPADs on the IÉ Network January 2012 to June 2015, Report R2016-R2001