Railway Accident Investigation Unit

Ireland

Annual Report

2023

RAIU

Railway Accident Investigation Unit

Summary

The Railway Accident Investigation Unit (RAIU) is an independent investigation unit within the Department of Transport and is concerned with the investigation of accidents and incidents on Irish railways with a view to establishing their cause/s and make safety recommendations to prevent their reoccurrence or otherwise improve railway safety. It is not the purpose of an investigation to attribute blame or liability.

In 2023, the RAIU published five investigation reports.

The first report published was in February 2023 and was the investigation into an Iarnród Éireann (IÉ) dangerous occurrence of a train being involved in a double *Signal Passed at Danger* (SPAD) at Clontarf Road Station on the 7th December 2021, which occurred during Storm Barra; this investigation focused the driving technique of DART drivers and competency management of these drivers, resulting in twelve safety recommendations.

Also in February 2023, the RAIU published the report into the train collision with track equipment between Newbridge and Kildare which occurred on the 27th August 2021, which concentrating on authorisation and access to *T3 Possession* worksites, resulting in seven safety recommendations.

In June 2023, the RAIU published the report into the collision of an *Road Rail Vehicle (RRV)* Dumper with a member of IÉ infrastructure maintenance staff, Tivoli, Cork, on the 6th July 2022; which focussed on safety requirements in the IÉ Rule Book during T3 Possessions and the RRV Dumper plant; with the investigation resulting in three safety recommendations.

The next investigation was published in October 2023 and was in relation to the failure of a current return cable of a Transdev Dublin Light Rail (TDLR) Luas tram, at Connolly Stop, on the 25th October 2022; with the investigation looking at the result of the metallurgical analysis of the current return cable and it's failure mechanism; this investigation resulted in five safety recommendations.

The final investigation report published in December 2023 was related to the self-detrainment of passengers between Shankill & Bray, on the 24th July 2022. The investigation focussed on onboard conditions on the trains (as a result of hot weather), passenger communications, staffing at stations, crowding on trains, and IÉ's suite of documents related to customer disruptions and the management of stranded trains. This investigation resulted in twenty safety recommendations.

The five reports resulted in a total of forty-seven safety recommendations being made.

A total of 303 safety recommendations have been issued since the appointment of a Chief Investigator for the RAIU in 2007 to the end of 2023.

The Commission for Railway Regulation (CRR) monitors the implementation of safety recommendations and has advised that of the 303 safety recommendations issued: 174 have been closed out as having been addressed; evidence has been submitted or further evidence has been requested by the CRR for thirty-four recommendations; and ninety-five recommendations remain open or in progress. Although rail and tram travel statistically remains a safe means of travel and good progress has been made in closing out safety recommendations, continued cooperation from the industry is still required.

In 2023, sixty-one preliminary examination reports (PERs) were completed by the RAIU, thirty-seven originated from IÉ (IÉ-Infrastructure Manager (IÉ-IM) and IÉ Railway Undertaking (IÉ-RU)), sixteen from TDLR and one from a heritage railway. The main themes across the PERs using the European Union Agency for Railways categories were: Derailments; Collisions; Rolling Stock; Traffic Operation and Management; and, To Persons Rolling Stock in Motion.

The PERs resulted in three in full investigations being commenced, namely: two separate investigations into broken rails in Tipperary and Kildare on the IÉ network, which occurred in February 2023; and a collision between a car and an IÉ train at Level Crossing XM190, near Claremorris, on the 9th September 2023.

Finally, during 2023, the RAIU had to plan for the upcoming retirement of two Senior Investigators; which required the recruitment of two new Senior Investigators, who started training in January 2023.

David Murton
Chief Investigator

7th August 2024

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Introduction to the RAIU

Legal Basis

The RAIU is an independent investigation unit within the Department of Transport (DoT) which conducts investigations into accidents and incidents on the national railway network, 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's role and aim

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.

During an investigation (full investigation or PER), if the RAIU make some early findings on safety issues that require immediate action, the RAIU will issue an Urgent Safety Advice Notice (USAN) or Safety Advice Notice (SAN) outlining the associated safety recommendation(s).

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 purpose of RAIU investigations is to make safety recommendations, based on the findings of investigations, 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.

The following railway systems within the RAIU's remit:

- The IÉ national heavy rail network;
- The Luas light rail system in Dublin operated by TDLR;
- The Bord Na Móna (BnM) industrial railway;
- Seven operational heritage & minor railway systems.

For further information on these organisations see Appendix 1.

Organisation

In the early part of 2023, the RAIU comprised of a Chief Investigator, five Senior Investigators and an administrator.

One Senior Investigator retired in 2023; another is due to retire in 2024.

Two Senior Investigators were appointed in 2023 and commenced training in January 2023.

Organisation Flow

The Commission for Railway Regulation (CRR)

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

European Union (EU) Agency for Railways

As part of its role as an NIB, the RAIU actively participates in the development of accident investigation processes and procedures through the work of EU Agency for Railways. To this end, the RAIU participated in the 2023 NIB plenary meetings and provided input on the direction of NIB related work.

The RAIU is also a member of the EU Agency for Railways taskforce set up to develop a system of peer review of the NIBs. In addition, the Chief Investigator chairs a task force dealing with the dissemination of accident investigation learning and investigation techniques.

Memorandums of Understandings (MoUs) & co-operating bodies

The RAIU continues to participate in Memorandums of Understanding (MoU) with the Transportation Safety Board of Canada, the Rail Accident Investigation Branch of the United Kingdom and with the Irish Health and Safety Authority (HSA).

The RAIU also continued to work with both An Garda Síochána and the Coroner's Society of Ireland.

Peer Review of the RAIU

Since 2018, European and other NIBs have volunteering for peer review by other NIBs, with the support of the EU Agency for Railways, in accordance with Article 38(2) of Regulation (EU) 2016/796, whereby NIBs were required to establish a programme of peer reviews where all NIBs were encouraged to participate so as to monitor their effectiveness and independence. Since its inception members of RAIU staff have contributed to many of these peer reviews.

In November 2022, the RAIU were subject to a peer review; its scope covered: organisation; investigation activities and processes; staff training; resources; handling safety recommendations. The findings of the report were issued in December 2022. Four areas of improvement were identified as:

- The report structure used by NIB should be assessed in order to follow up more closely the report structure set out by the annex to the 2020/572 regulation (it should be noted that this has not been adopted, in full, by any NIB to date);
- The NIB should consider the need for refresher training of investigators in order to maintain their competence (this was specific for two investigators who have been in the roles for over thirteen years);
- Accelerate the process of concluding of creating an Memorandum of Understanding, that defines the on-site working arrangements, between the RAIU and An Garda Síochána;
- The NIB should take steps to include in the contingency planning some arrangements in place about who will act as Chief Investigator in case that the Chief Investigator would be ill or unavailable.

In relation to the status of these areas of improvement, three are considered to be complete, as of the end of 2023:

- In October 2023, during the 53rd NIB Network meeting, the RAIU difficulties in the report structure set out by the annex to the 2020/572 regulation; whereby it was agreed, by ERA, that NIBs were not required to "follow closely", the structure out by the annex to the 2020/572 regulation and as such, the RAIU consider this area of improvement to be voided;
- Two long-term investigators are undergoing refresher training;
- The RAIU continue to engage with An Garda Síochána to attempt to develop a Memorandum of Understanding, that defines the on-site working arrangements, between both parties;
- The Chief Investigator has nominated one of the Senior Investigators to act as Deputy Chief Investigator.

Investigation Activities

Investigation Activities

Notification of incidents and accidents to the RAIU

The RAIU must be notified of railway incidents and accidents, either through immediate notification; monthly bulk notifications (see Appendix 2 for schedules); or the reporting after the death of an individual within thirty days of an accident. The RAIU also receive the daily incident reports (DIRs) from IÉ.

In terms of immediate notification of an incident or accident (and in some instances a monthly bulk notification), the on-call investigator will carry out a preliminary examination and create a PER.

In 2023, the RAIU commenced reviewing the DIRs from IÉ; in some instances, an preliminary examination was conducted as a result of information received in the DIRs and a PER created.

PERs include information on who and when reported the occurrence; details of the occurrence (including the relevant asset information, times, locations and relevant parties); the categorisation of the occurrence (see Appendix 3); and the RAIU decision on whether a full investigation is warranted.

In 2023, the RAIU compiled sixty-one PERs.

IÉ Notifications

IÉ 2023 Daily Incident Reports

IÉ circulate the DIRs, for the previous day, to the RAIU every morning. The RAIU review and log these occurrences.

In 2023, IÉ reported 6,857 incidents through the DIRs. Of these 738 incidents were related to anti-social behaviour and another 849 were related to trespass onto the railway line/ premises.

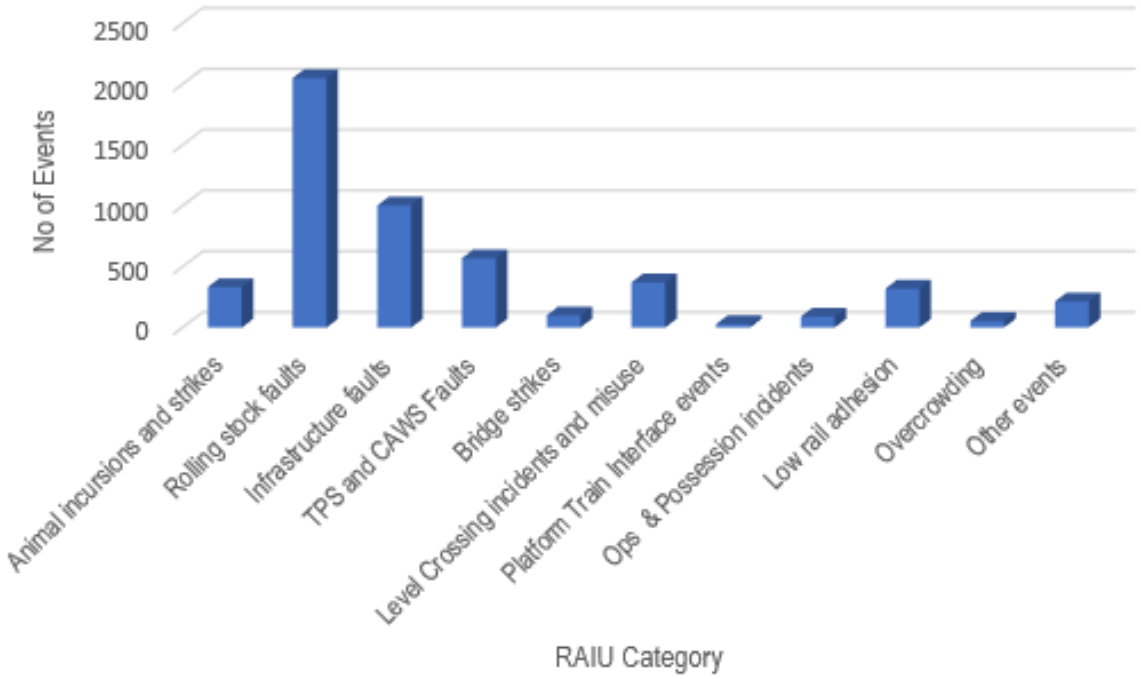
Excluding the anti-social behaviour and trespass incidents and passenger illness, injuries emotional distress events (not involving moving trains) there are 5,134 incidents. Starting with the largest, the RAIU have categorised the incidents as follows:

- 2,050 (40%) rolling stock faults – these can range from minor issues such as faulty air conditioning to more serious incidents such as underframe fires or wheelset damage);
- 1004 (19%) Infrastructure faults – these range from minor infrastructure faults such as reports of poor drainage to broken rails and failing structures;
- 570 (11%) Train Protection System (TPS) and Continuous Automatic Warning System (CAWS) faults – these can range from reports of momentary loss of CAWS code to total failures of the system with almost all system events involve 'right side' or 'fail to safe'. These systems are shared between train and infrastructure and the cause is not immediately apparent at the time of recording in the logs;
- 371 (7%) Level crossing incidents – this includes minor non-compliance events such as level crossing gates left open at user worked unattended level crossings through to damage to crossing barriers, near miss events and collisions between trains and road vehicles;
- 333 (6%) animal incursions – this includes all reported animal incursions and collisions with animals, ranging from small animals such as dogs through to deer and cattle at the higher risk end;
- 320 (6%) LRA events – These events are reported events where low adhesion affects traction or braking and could have had an impact on safety in different circumstances, but no operational incident occurred. Note: incidents with an actual safety incident outcome are categorised elsewhere under operational incidents;
- 214 (5%) other occurrence – these are a wide range of incidents which do not meet the other RAIU categories. These range from events of limited direct safety consequence e.g. late hand back of engineering possessions through to staff injuries in the workplace;
- 100 (2%) bridge strikes – these range from contact with sacrificial beams or minor contact with the bridge deck, arch or parapet to serious damage resulting in line closure;
- 89 (2%) operational and possession incidents (2%) – these range from events with limited safety impact such as 'fail to call events' by passenger trains to incidents such as higher consequence events such as near misses with staff;

- 55 (1%) overcrowding events – these range from discomfort due to limited seat availability through to platform closures for safety reasons;
- 28 (<1%) platform train interface (PTI) events– injuries and mishaps to passengers boarding and alighting from trains not in motion, ranging from staff rendering assistance through to passengers requiring hospital attention.

The above figures are presented in the bar chart below:

DIR incidents by RAIU category



IÉ 2023 Preliminary Examination Reports

PERs from 1st January 2023 to 31st December 2023

Reporting Railway Body*	Date of occurrence	Location of Occurrence	Classification of Occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ-IM	04 January 2023	Drumcondra, Dublin	Serious Accident	To persons due to rolling stock in motion	A male accessed the railway from Drumcondra Station and was struck by two trains (the first train driver was unaware of the person being struck.	**1 Fatality** due to apparent self-harm
IÉ-RU	14 January 2023	Levington Level Crossing, Westmeath	Accident	To persons due to rolling stock in motion	A female purposefully accessed the line through Lake Level Crossing and was struck and injured, by a train, at Levington Level Crossing	**1 Injury** due to apparent self-harm
IÉ-RU	10 February 2023	Cherryville Junction, Kildare	Incident	Traffic Operations & Management	The 09:40 hrs empty service from Dublin Heuston to Galway, approached Signal HK213 at danger, the driver applied the emergency brake when he saw the red signal, however the train passed the signal my ten metres. IÉ calculated the SPAD risk ranking to be 22 (high – due to the potential conflicting point at Cherryville Junction).	0
IÉ-RU (DIR)	15 February 2023	Ballinasloe, Galway	Incident	Rolling Stock	On the 11th February, during wheel turning, a wheel was turned below the last turning size allowable, the duty manager inadvertently issued a concession for the vehicle to enter service. During another task, four days later, the issue was detected. The train was in service, and passengers, were removed from the affected carriage and a temporary speed restriction was imposed for the duration of the journey before being taken out of service.	0
IÉ-IM	22 February 2023	Emly, Tipperary	Incident	Infrastructure	A broken rail (thermit weld) was found after the Signalman saw that a track remained occupied on the passing of a train (see page 48).	0
IÉ-IM	23 February 2023	Newbridge, Kildare	Incident	Infrastructure	A broken rail (flashbutt weld) was found after the Signalman had a number of reports, from drivers, that there was an issue with the CAWS (see page 48).	0
IÉ-IM	27 February 2023	Ardgillan, Dublin	Incident	Traffic Operations & Management	A track patroller was involved in a near miss with the passenger train, with the track patroller only getting into clearing the line four seconds before the arrival of the train at his location.	0
IÉ-RU (DIR)	04 March 2023	Connolly Station, Dublin	Accident	Fires	The driver of a 29000 DMU, while stopped at Connolly Station, noticed smoke coming from the underframe of train. The fire was extinguished. Fleet Technical Support identified that some insulation had detached from the underfloor and came in contact with the exposed exhaustion section.	0
IÉ-RU (RAIB UK)	29 April 2023	Moira, County Down, Northern Ireland	Serious Accident	To persons due to rolling stock in motion	A male passenger himself in a position of danger near Drumbane Road Level Crossing, and he was struck by a train and fatality injured.	**1 Fatality** due to apparent self-harm

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ-IM	02 May 2023	Thomastown, Kilkenny	Incident	Traffic Operations & Management	A signalman granted permission to a gate keeper to open the gates to road traffic, when one train had passed; forgetting that there was another train also in the section.	0
IÉ-IM	03 May 2023	Hazelhatch, Dublin	Accident	Derailment	An RRV derailed after side casting ballast onto the line, resulting in minor damage to a sleeper; the RRV operative did not have the steering lock safety pin in position during the rail movements.	0
IÉ-IM	13 May 2023	Curragh, Kildare	Accident	Derailment	An RRV was involved in track panel relaying when the RRV continued over a section of line where the track had been removed and derailed.	0
IÉ-IM	20 May 2023	Enfield to Kilucan, Meath	Accident	Collision	As an RRV was travelling to a worksite, one of the RRVs failed to stop at the worksite and collided with another RRV in the convoy, resulting in minor damage to the RRV and a minor head injury to the RRV operator.	**1 injury** to contractor
IÉ-IM	24 May 2023	Thurles to Limerick Junction, Tipperary	Incident	Traffic Operations & Management	Signal LJ360 is a section signal and the protecting signal for Monard Level Crossing (XL065). Due to an issue with the traffic direction switch signal LJ360 could not be cleared and as a result the Level Crossing did not initiate on the train's approach and as a result the level crossing was open to road traffic when the SPAD occurred. The Driver applied the brakes to emergency, and the train came to a stop approximately 100 metres from the level crossing.	0
IÉ-RU	07 June 2023	Brickhill, Clare	Accident	Collision	There was a reported bridge strike, by a skip lorry, at underbridge, UBE36. The line was closed for examination of the bridge, which deemed the bridge unsafe, and the line remained closed for a number of days to allow for repairs.	0
IÉ-IM	14 June 2023	Ballysadare, Sligo	Serious Accident	To persons due to rolling stock in motion	Two females accessed the railway line from Collooney Station and started walking in the direction of Sligo, when they were struck by a passenger train; fatally injuring one female and injuring the other female.	**1 Fatality & 1 Injury** due to trespass
IÉ-IM	15 June 2023	Inchicore, Dublin	Accident	Derailment	During driver training in sidings, a locomotive was being buffered up to a wagon as part of coupling / uncoupling training activity when the wagon derailed. The single wagon was stood on plain line near to some points, was scotched and had its handbrake applied. The wagon climbed over the scotch and one axle derailed.	0
IÉ-IM	15 June 2023	Connolly, Dublin	Accident	To persons due to rolling stock in motion	A male, unsteady on his feet, disembarked onto Connolly Platform 5, cleared the yellow line (passenger clearance marking), and stumbled back towards the train, which had begun departing the platform. The male fell between the moving train and the platform, sustaining minor head and hand injuries.	**1 Injury** due to passenger incursion

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ-RU	09 July 2023	Portlaoise, Laois	Serious Accident	To person due to rolling stock in motion	As a passenger service approached and overbridge, a male jumped from the bridge and into the path of the train, he was struck, and fatality injured.	**1 Fatality** due to apparent self-harm
IÉ-RU	09 July 2023	Portlaoise, Laois	Serious Accident	To person due to rolling stock in motion	As a passenger service approached and overbridge, a male jumped from the bridge and into the path of the train, he was struck, and fatality injured.	**1 Fatality** due to apparent self-harm
IÉ-RU	12 July 2023	Portmarnock, Dublin	Serious Accident	To person due to rolling stock in motion	As a passenger service approached Portmarnock Station, a male walked off the platform and was struck and fatally injured.	**1 Fatality** due to apparent self-harm
IÉ-RU	15 July 2023	Thurles, Tipperary	Serious Accident	To person due to rolling stock in motion	As a passenger service approached an overbridge, a male stepped out from behind the bridge and was fatally injured.	**1 Fatality** due to apparent self-harm
IÉ-RU	17 July 2023	Charleville, Cork	Accident	Derailment	During works involving depositing ballast an RRV dumper derailed and struck the platform.	0
IÉ-RU	17 July 2023	Tullamore, Offaly	Accident	To person due to rolling stock in motion	As a passenger service approached Tullamore Station, a female jumped from the overbridge adjacent to the station into the path of the approaching train. The train travelled over the female, who suffered minor injuries	**1 Injury** due to apparent self-harm
IÉ-RU	18 July 2023	Sallins, Kildare	Serious Accident	To person due to rolling stock in motion	As a non-stop passenger service was passing through Sallins Station, a person jumped from the platform and was struck by the train and fatally injured.	**1 Fatality** due to apparent self-harm
IÉ-RU	31 July 2023	Clare Abbey, Clare	Incident	Infrastructure	During track patrolling, subsistence was identified in the five foot, and all traffic was stopped for repairs.	0
IÉ-IM	29 August 2023	Connolly, Dublin	Incident	Control Command & Signalling	As a passenger service (operated by an Intercity Railcar (ICR) approached Signal DC345, displaying a red aspect; the in-cab CAWS displayed a green aspect for approximately five seconds. The driver contacted Centralised Traffic Control (CTC) and was instructed to isolate the CAWS, and a second person joined the driver for the remainder of the journey and was then inspected by Chief Mechanical Engineer's (CME) Department staff, who carried out rigorous testing, but could not identify the fault.	0
IÉ-IM	02 September 2023	Kildare, Kildare	Accident	To person due to rolling stock in motion	As a passenger service departed Kildare Station, it stuck and injured a person that positioned themselves on the line and was seriously injured.	**1 Injury** due to apparent self-harm
IÉ-IM	06 September 2023	Clongriffin, Dublin	Serious Accident	To person due to rolling stock in motion	As a passenger travelled out of Clongriffin Station, it struck an injured a person on the line.	**1 Fatality** due to apparent self-harm

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ-RU	09 September 2023	Ballyhaunis, Mayo	Accident	Level Crossing	As a passenger service was approaching level crossing XM190, a car also approached the level crossing (with the user operated gates open). The train sounded the horn and applied the brakes; however, the train struck the car (see page 49 for summary details).	**1 Minor & 1 Serious Injury** to car occupants
IÉ-IM	15 September 2023	Clongriffin Station, Dublin	Incident	Rolling Stock	A driver reported that an amber bodyside indicator light was illuminated (under normal circumstances the amber light illuminates when a passenger door is open) on a train passing on the adjacent line (which was not in passenger service). The driver of the affected train was requested to examine the train for a suspected wrong side door failure. It was established that the cantrail light was illuminated on one unit whilst blue door interlock light was illuminated, and a brake release and traction power were available. The train was withdrawn from service.	0
IÉ-RU	29 September 2023	Leixlip, Kildare	Serious Accident	To persons due to rolling stock in motion	As a train was travelling non-stop between Broombridge and Maynooth, the train struck and fatally injured a person who had accessed the line from Leixlip Station and was struck travelling towards Maynooth.	**1 Fatality** due to apparent self-harm
IÉ-RU	06 October 2023	Sallins, Kildare	Serious Accident	To persons due to rolling stock in motion	As a train was travelling non-stop between Portlaoise and Heuston, the train struck and fatally injured a person who had accessed the line from Sallins Station and was struck and fatally injured.	**1 Fatality** due to apparent self-harm
IÉ-IM	09 October 2023	Clonnydonnin, Westmeath	Incident	Traffic Operations & Management	A track patroller was involved in a near miss with a passenger service, only clearing the line two seconds before the train passed. There was dense fog at the time of the incident, meaning that the track patroller should not have been on the line.	0
IÉ-RU	11 October 2023	Bray, Wicklow	Incident	Control, command & signalling	A passenger service (operated by an ICR) departed Bray Station on a yellow aspect, while the CAWS upgraded to green for twenty seconds. The driver contacted CTC and was instructed to isolate the CAWS.	0
IÉ-IM	19 October 2023	Rush & Lusk, Dublin	Serious Accident	To persons due to rolling stock in motion	Two passengers accessed the railway line, likely to change platforms (instead of using the footbridge). They were struck by a non-stop passenger service, and one was fatally injured.	**1 Fatality** due to trespass
IÉ-RU	26 October 2023	Inchicore Works, Dublin	Accident	Derailment	As Locomotive 219 was approaching Hand Points (HP)1, HP1 were gaping. When the lead bogie of Locomotive 2019 travelled through HP1, HP1 moved back to its natural position and the second bogie of Locomotive 219 followed a different route; resulting in both bogies of Locomotive 219 on different roads the trailing bogie derailed.	0
IÉ-RU	26 October 2023	Coolmines, Dublin	Incident	Others	The was an incorrect reporting by drivers of abnormal CAWS upgrades, however, examination found CAWS was operating correctly.	0

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ-RU	27 October 2023	Birdhill, Tipperary	Incident	Traffic Operations & Management (resulting in derailment)	A Rail Milling Machine was exiting a T3 possession into a siding in Birdhill when the machine moved before the route was set for the movement and derailed. Permission had not been granted for the movement; a violation of the requirements set out in Section T, Part Three, of the IÉ Rule Book.	0
IÉ-IM	06 December 2023	Bray, Wicklow	Incident	Traffic Operations & Management	A track worker entered Bray Tunnel no. 4 without obtaining a line blockage (which was required), as a result the track worker was involved in a near miss with a track recording vehicle.	0
IÉ-IM	09 December 2023	Emly, Tipperary	Incident	Traffic Operations & Management	An RRV entered Emly level crossing with the barriers raised to road traffic.	0
IÉ-IM	22 December 2023	Drogheda, Louth	Accident	Derailment	A train derailed as it travelled over an underfloor lathe as a result of the lathes offside lifting rollers being in the incorrect position.	0
IÉ-IM	23 December 2023	Killucan, Westmeath	Serious Accident	To persons due to rolling stock in motion	A train struck and fatally injured a member of the public who positioned themselves in front of the oncoming train near 37 3/4 MP between Enfield and Killucan	**1 Fatality** due to apparent self-harm
IÉ-IM	27 December 2023	Enniscorthy, Wexford	Incident	Infrastructure	A train drove through a minor landslide before the driver brought the train to a stop. The location had been subject to persistent rain which saturated the soil.	0
IÉ-IM (DIR)	28 December 2023	Adamstown, Dublin	Incident	Traffic Operations & Management	While on the track, a Chief Civil Engineer's (CCE) Department staff member acknowledged an approaching train while in a position of safety between the Up Slow and the Down Slow. The CCE staff member then proceeded to move across the Down Slow and the Down Fast in front of another train. The driver applied the brake and the CCE staff member crossed safely.	0

* Note, IÉ-RU and IÉ-IM operate a rotational oncall meaning that although IÉ-IM may report an incident, they incident may be an IÉ-RU incident and vice versa.

Categorisation of IÉ-IM & IÉ-RU Preliminary Examination Reports

Introduction

In 2023, the RAIU completed forty-five PERs in relation to occurrences reported by IÉ-IM and IÉ-RU.

The following is a compilation of the categories of PERs related IÉ-IM and IÉ-RU occurrences.

Serious accidents and accidents to persons due to rolling stock in motion

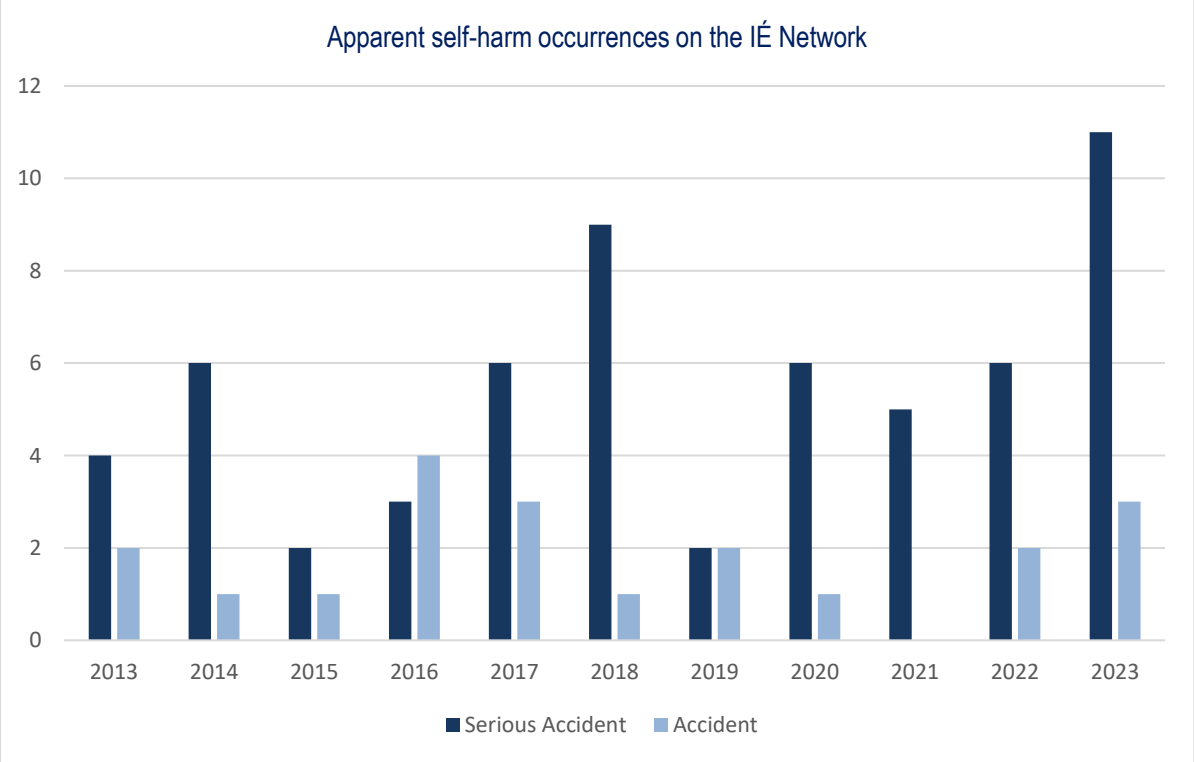
Workplace accidents

There were no workplace accidents to person due to rolling stock in motion in 2023, however there were a number of near misses between staff and trains.

Apparent self-harm serious accident and accidents on the IÉ Network

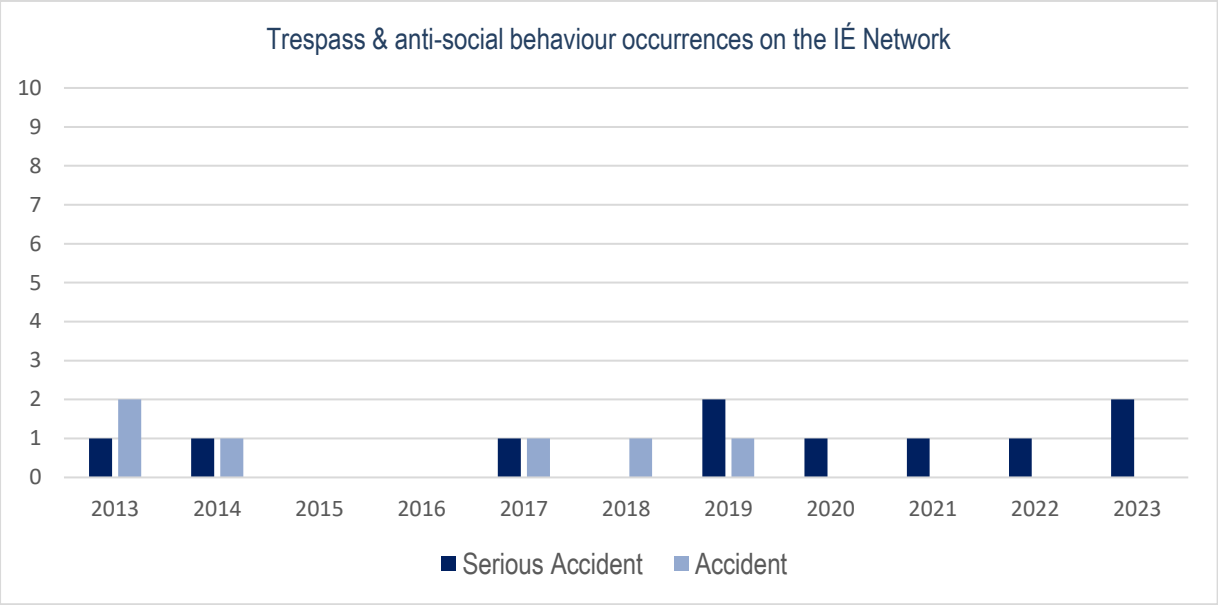
In general, the RAIU do not conduct a full investigation into occurrences related to apparent self-harm as a full investigation is unlikely to result in any safety recommendations to prevent similar occurrences in the future.

In 2023, there were eleven reported serious accidents (fatalities) and three accidents (non-fatal) as a result of apparent self-harm occurrences on the IÉ network. The figures below indicate no significant downward trend in the number of self-harm occurrences in 2023 and the previous ten year period.



Trespass onto the IÉ Network

There were two reported fatalities as a result of trespass on the IÉ network in 2023, with the previous six years indicating low numbers.



Note, both 2023 serious accidents involved pairs of people trespassing, resulting in one further injury.

Platform Train Interface

There was one other injury as a result of a platform interface occurrence, related to anti-social behaviour.

Traffic operations & management

General reporting

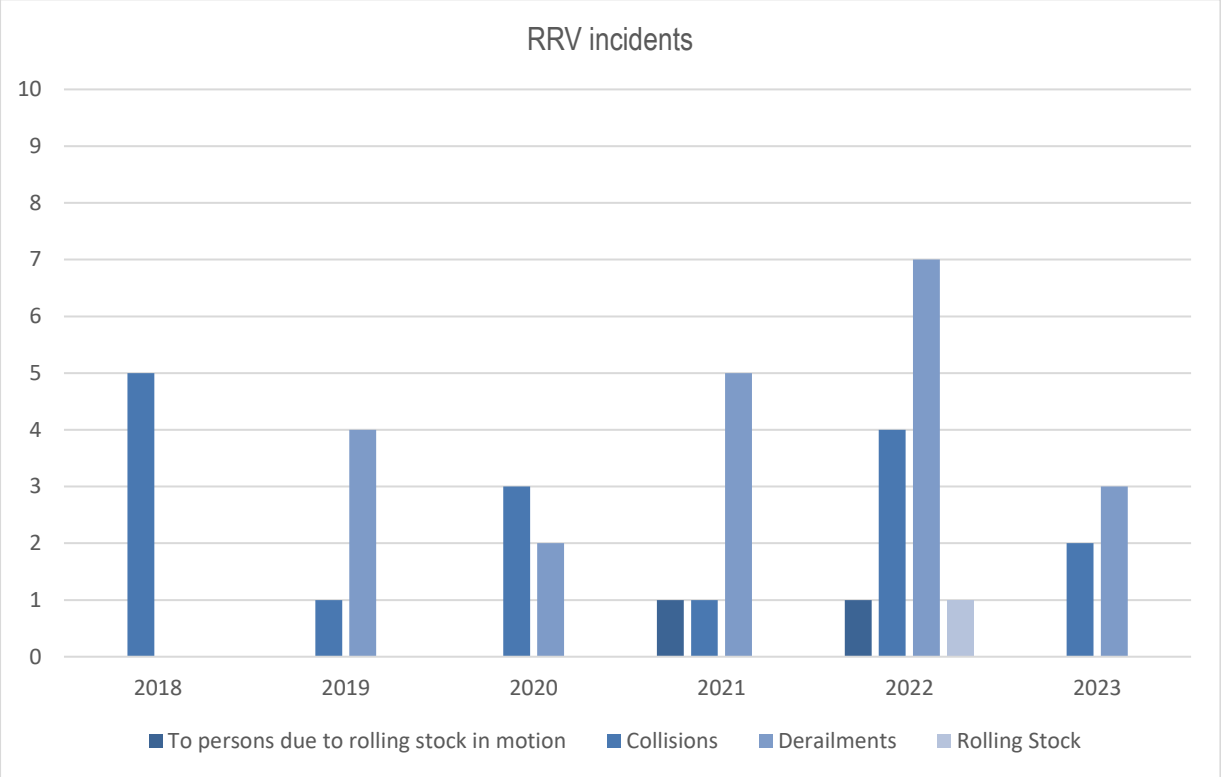
In 2023 there were nine incidents related to traffic operations and management reported, these included:

- Four reported near misses with IÉ-IM staff members (although it should be noted that one of these incidents was downgraded, as, on review of the evidence, the staff member was in a position of safety);
- Two SPADs (with SPAD risk rankings of 17 (medium) and 22 (high));
- One incident as a result of signalman error;
- One incursion of an RRV onto a level crossing with the barriers open to road traffic;
- One incursion of an RRV onto the railway where the possession had not been granted.

RRV accidents on the IÉ network (derailments and collisions)

In terms of RRV incidents in 2023, there were four incidents, consisting of three derailments and one collision. This is a significant reduction on occurrences on 2022, where thirteen incidents were reported.

IÉ-IM have been notifying the RAIU of RRV occurrences since 2018, see figures below.



The RAIU carried out a trend investigation into RRV incidents and accidents which was published at the end of 2019, resulting in twenty safety recommendations. As of the end of 2023, eight safety recommendations remain open, seven are closed and five are either where evidence has been submitted or further evidence required.

The RAIU will continue to assess RRV accidents and incidents on an individual basis and conduct a full investigation, when warranted. In 2023, the RAIU published a full investigation into the "Collision of an RRV Dumper with a member of IÉ infrastructure maintenance staff, Tivoli, Cork, 6th July 2022", see pages 31 to 34.

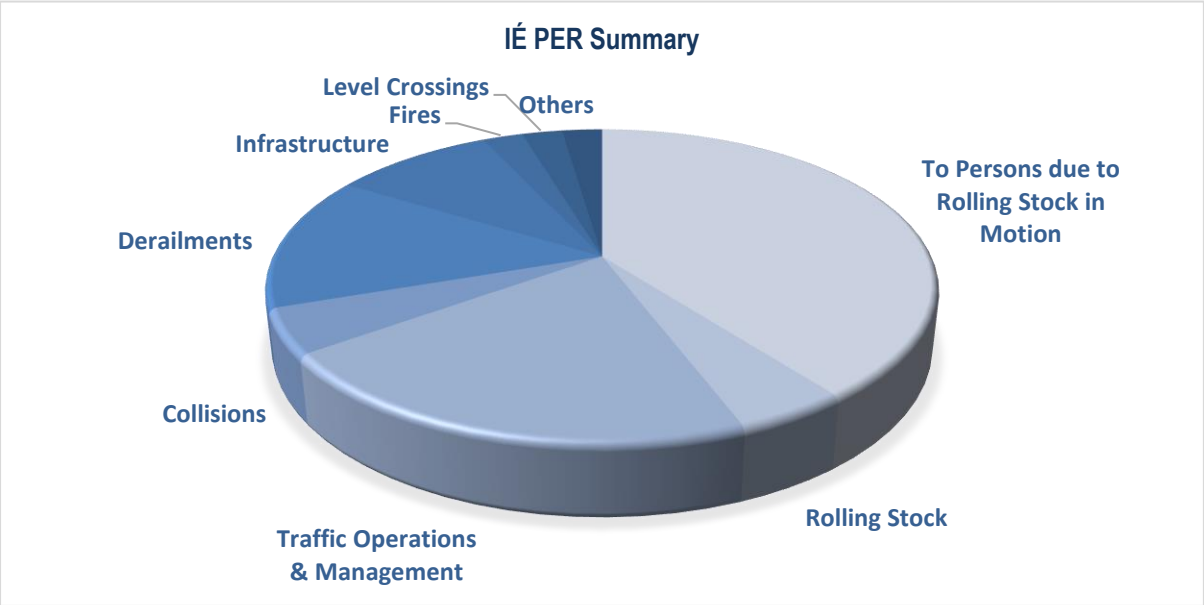
Other occurrences on the IÉ network

In terms of the other occurrences on the IÉ network in 2023, these included:

- Four infrastructure occurrences (two broken rails and two occurrences of landslip/ subsistence);
- Three derailments (two derailments of locomotives in Inchicore Works sidings and a derailment as a train travelled over an underfloor lathe in Louth);
- One collision (bridge strike);
- Two control, command & signalling occurrences related to CAWS;
- One level crossing accident related to a train collision with a car;
- Two rolling stock incident (one related to the blue door interlock light and one related to wheel turning);
- One fire to a train underframe;
- One other occurrence reported by a driver which was later found not to be a fault.

Summary of PERs

The pie chart below shows the percentages, in terms of categories, of the PERs for IÉ:



IÉ 2023 Monthly Bulk Notifications

The monthly bulk notifications (not including immediate notifications) for IÉ (IÉ-IM & IÉ-RU) are as follows:

Month / ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2.01 Unexpected failures of assets that led to an unsafe condition													
2.02 Unintentional divisions of rolling stock released for service													
2.03 SPADs with no risk of conflicting movements	2		1		2							2	7
2.04 Fires, smoke or explosions on rolling stock not requiring the evacuation of passengers	3		4	1			2			1			11
2.05 Collisions with large objects or large animals	8	3	3	7	11	7	4	8	20	13	16	7	107
2.06 Non railway vehicles damaging or fouling a railway line													
2.07 Collisions between light rail vehicles and road vehicles													
2.08 Any other occurrence where an investigation remit has been issued internally					1	1	2			3	2		9
Total	13	3	8	8	14	8	8	8	20	17	18	9	134

The majority of occurrences related to collisions with large objects or large animal. Two of the 2.08 occurrences involved striking multiple small animals (dogs) and one other 2.08 occurrence involved striking a metal frame at Dublin Port. This gives a total of 110, an increases from 83 (2.05 and relevant 2.08 occurrences) in 2023.

In terms of SPADs, twelve were reported in 2023 (including through immediate notifications), this is an increase from the ten reported in 2022, this is significantly higher that the four reported in 2021 and eight in 2020. The RAIU will continue assess incidents of SPADs on an individual basis and where an investigation is warranted, an investigation will be commenced e.g. the investigation of "Dangerous occurrence involving a Double SPAD at Clontarf Road Station, 7th December 2021" which was published in 2023.

TDLR Notifications

TDLR Preliminary Examination Reports

PERs from 1st January 2023 to 31st December 2023

Reporting Railway Body	Date of occurrence	Location of Occurrence	Classification of Occurrence	Classification subset	Summary	Fatalities/ Injuries
TDLR	07 January 2023	Rialto Tram Stop	Accident	To persons due to rolling stock in motion	A female crossed Rialto Tram Stop into the path of an oncoming tram; she was struck by the tram and suffered minor injuries.	**1 Injury** due to pedestrian incursion
TDLR	16 January 2023	O'Connell Street, Dublin	Accident	To persons due to rolling stock in motion	A male crossed a junction at O'Connell Street into the path of an oncoming tram; he was struck by the tram and suffered head injuries.	**1 Injury** due to pedestrian incursion
TDLR	19 January 2023	Kylemore, Dublin	Incident	Energy	During maintenance works a section of line (Suir Road to Kylemore) was isolated, however, when the works were complete, power was not re-instated to the section. When the first tram entered the section, the tram lost power due to the main circuit breaker in the tram opening due to non-detection of power.	0
TDLR	13 February 2023	O'Connell Street, Dublin	Accident	Fires	During maintenance works at O'Connell Electrical Sub-Station (ESS), a maintenance check on an emergency push button resulted in a fire. Staff immediately extinguished the fire, and the ESS was bypassed.	0
TDLR	06 March 2023	Broombridge Depot, Dublin	Incident	Rolling Stock	Three bolts, used to secure the slewing ring, on the underframe of a tram, were found to be broken during maintenance.	0
TDLR	13 March 2023	Carrickmines Stop, Dublin	Incident	Rolling Stock	A tram lost power while at Carrickmines Stop due to non-detection of power from the OHLE resulting in the tram coming to a stop. The driver exited the cab and saw that the pantograph had flipped.	0
TDLR	31 March 2023	Red Cow, Dublin	Incident	Rolling Stock	A driver reported a tram brake control unit (TBCU) fault indication on the driver's console. On inspection it was found that wheel flats were present and bolts, used to secure the pressure ring on the wheel, had sheared off.	0
TDLR	04 April 2023	Red Cow, Dublin	Accident	Collision	When a tram (with a damaged and unsecured pantograph) was being stabled at the depot, the pantograph struck the overhead line (which is lower in depot locations).	0
TDLR	21 April 2023	Museum Stop, Dublin	Accident	To persons due to rolling stock in motion	A female placed her arm between the door leaves as the door was closing, once closed the female pulled her arm from the leaves, injuring her arm.	**1 Injury** due to trap-and-drag
TDLR	28 June 2023	Tallaght, Dublin	Incident	Rolling Stock	A passenger trapped a walking stick in the door leaves of a tram and the tram took traction and departed the stop with the walking stick. The tram was later found to have failed the obstacle detection test.	0

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
TDLR	11 September 2023	Benburb Street, Dublin	Accident	Collision	As a tram was travelling through a junction on a proceed aspect, a car travelled through a red light and was struck by the tram injuring a tram driver and a tram passenger.	**2 Injuries** to tram driver and passenger
TDLR	11 September 2023	Museum Stop, Dublin	Accident	To person due to rolling stock in motion	As a tram was coming to a stop at Museum Stop, a person, hiding behind a lighting pole stepped in front of the tram and was struck and injured.	**1 Injury** due to apparent self-harm
TDLR	13 September 2023	Dawson Stop, Dublin	Accident	To person due to rolling stock in motion	As a tram was departing Nassau Street on proceed aspects, travelling to Dawson Stop a pedestrian ran into the side of the tram and was injured.	**1 Injury** due to pedestrian incursion
TDLR	28 November 2023	Queen Street, Dublin	Accident	Collision	A tram departed a stop on a proceed aspect when a car travelled through a red light and was struck by the tram and injured.	**1 Injury** due to RTC
TDLR	29 November 2023	Sandyford, Dublin	Incident	Traffic Operations & Management	When tram 5033 was exiting Sandyford depot for a depot shunt move via Sandyford central platform the tram entered a de-energised zone. At the time of the incident no work had commenced, and earthing protection was not in place.	0

Categorisation of TDLR Preliminary Examination Reports

Introduction

In 2023, the RAIU completed fifteen PERs in relation to occurrences reported by TDLR.

The following is a compilation of the categories of PERs related TDLR occurrences.

To Persons due to Rolling Stock in Motion

In 2023, there were five accidents related to person due to rolling stock in motion:

- Three were related to pedestrian incursions onto the tram line in non-segregated areas;
- One was due to apparent self-harm;
- One was as a result of a trap and drag accident.

In relation to apparent self-harm injuries, these remain low, with four occurring in the previous six years, one being fatal.

In terms of the other occurrences, the 2023 are the highest numbers to date as seen in the figure below.

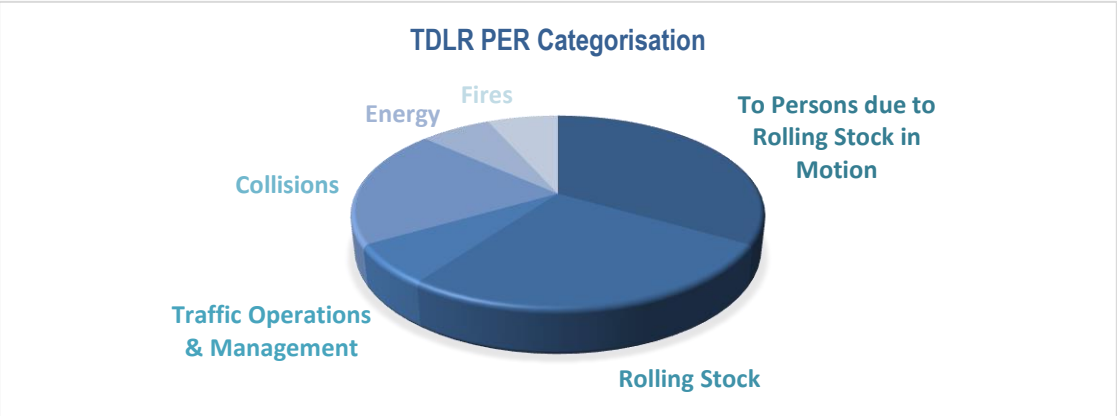
Type & Year	2023	2022	2021	2020	2019	2018	2017
Serious Accident	0	0	0	0	1	0	0
Accident	4	0	2	2	5	1	3

Other occurrences on the Luas network

In terms of other occurrences on the Luas network in 2022, the notified occurrences are as follows:

- Four rolling stock occurrences (related to door obstacle detection, wheel faults, pantograph and underframe);
- Three collisions (two road traffic collisions (RTCs) and one collision of a pantograph striking an overhead line in a depot);
- One traffic operations and management incident (a tram entering a de-energised section in a depot);
- One energy incident (isolation issue);
- One fire (ESS location).

The pie chart below shows the percentages, in terms of categories, of the PERs for TDLR



2023 Monthly Bulk Notifications

TDLR 2023 Monthly Bulk Notifications

The monthly bulk notifications (not including immediate notifications) for TDLR are as follows:

Month / ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2.01 Unexpected failures of assets that led to an unsafe condition													
2.02 Unintentional divisions of rolling stock released for service													
2.03 SPASs with no risk of conflicting movements	4	5	1	1	6	2	1	3	2	4	1	1	31
2.04 Fires, smoke or explosions on rolling stock not requiring the evacuation of passengers													
2.05 Collisions with large objects or large animals													
2.06 Non railway vehicles damaging or fouling a railway line	2	3			1			2	1			1	10
2.07 Collisions between light rail vehicles and road vehicles	2	1	4	4	7	1	5	4	2	4	4	2	40
2.08 Any other occurrence where an investigation remit has been issued internally	4	5	1	1	3	2		2	2				20
Other occurrences Involving contact with pedestrians.	2	2	4	5	3	6	5	2	3	5	5	5	47
Other occurrences Involving contact with cyclists/ scooters.	1	2	1		1	2		1	2			1	11
Other occurrences Involving anti-social behaviour e.g. scutting.	1	1		1	1	1	1		1		3		10
Other occurrences Any other occurrences	1	1	4			1	2	7	3	2	2	1	24
Total	17	20	15	12	22	15	14	21	16	15	15	11	193

The total of 193, is significantly higher than the 2022 number of 144 occurrences.

Half the occurrences (ninety-eight) related to contact with pedestrians, road vehicles or cyclists, this is similar to the 2022 figure of eighty-eight.

Notification from other railway organisations

There was one other accident on the rail network in 2023, involving Bord na Mona whereby on the 6th May 2023, as a double rake train passed through Mount Lucas Level Crossing a member of the public opened the crossing gates to road traffic. The gates were connected to derailing points resulting in the last three wagons (of sixteen wagons) derailing as they were not clear of the derailer. There were no injuries or damage reported.

2023 Full Investigations

Full Investigations published in 2023

1st January 2023 to 31st December 2023

The RAIU published five investigation reports in 2023, which resulted in a total of forty-seven new safety recommendations, the investigations are as follows:

- Dangerous occurrence involving a Double SPAD at Clontarf Road Station, 7th December 2021, RAIU Report No: 2023-R001, published: 16th February 2023;
- Collision with track equipment between Newbridge and Kildare, 27th August 2021, RAIU Report No: 2023 – R002, published: 23rd February 2023;
- Collision of an RRV Dumper with a member of IÉ infrastructure maintenance staff, Tivoli, Cork, 6th July 2022, RAIU Report No: 2023-R003, Published: 7th June 2023;
- Failure of a Current Return Cable on a Luas Tram, Connolly Stop, 25th October 2022, RAIU Investigation Report No: 2023-R004, published: 13th October 2023;
- IÉ self-detrainment of passengers from DART trains, between Shankill and Bray, 24th July 2022, RAIU Investigation Report No: 2023-R005, published: 22nd December 2023.

At approximately 15:59 hrs on 7th December 2021 the 15:31 hrs IÉ DART passenger service from Malahide to Bray (Train E120) was stopped at Clontarf Road Station Up Platform. The signal to the rear, Signal DN295 was displaying a Red Aspect to protect Train E120. At around the same time, the 15:40 hrs DART passenger service from Howth to Bray (Train E240) was approaching Signal DN287 at Clontarf Road Station.

The train's speedometer and On Train Data Recorder (OTDR) showed the train was travelling at 79 kilometres per hour (km/h); the permitted line speed for the section is 75 km/h and reduces to 30 km/h on approach to Clontarf Road Up Platform. The OTDR shows the train braking system initiated an Automatic Train Protection (ATP) penalty brake as the train was travelling at a speed (79 k/h) greater than the target speed (30 km/h). The ATP brake application, in trying to reduce the train speed, resulted in the train's Wheel Slip Protection (WSP) system activating to prevent the wheels from locking up and sliding on the degraded railhead caused by Storm Barra.

At 16:01 hrs Train E120 departed Clontarf Road Station with a planned stop at the Crew Ramp at Fairview Depot for a change of driver (the driver of E120 who brought the train to the Crew Ramp will be known as Driver E120a for the remainder of this report and the replacement driver will be known as Driver E120b). When Train E120 departed Clontarf Road Station the aspect of Signal DN295 situated at the south end of Clontarf Road Station Up Platform changed from green to red to protect Train E120 as it stopped at the Crew Ramp, Fairview.

At 16:03 hrs Train E240 passed Signal DN287 situated at the north end of Clontarf Road Station at danger without authority (known as a SPAD) and continue travelling through Clontarf Road Station. The driver of Train E240 (Driver E240), could see Train E120 ahead and phoned the Central Signalman at CTC to advise that he felt the train was sliding and was going to run into Train E120.

The Central Signalman contacted Driver E120b to enquire if the train was moving and on receipt of conformation requested Driver E120b to continue moving; had Train E120 not commenced moving, Train E240 would likely have collided with the rear of Train E120.

Train E240 passed Signal DN295 at danger without authority and came to a stop before the Crew Ramp at Fairview. Driver E240 contacted the Central Signalman to advise that the train had come to a stop.

The RAIU found that Train E240 passed Signal DN287 at danger and subsequently passed another signal, Signal DN295, at danger at Clontarf Road (Double SPAD) as a result of the following causal factors (CaF):

- CaF-01 – Driver E240 had an over-reliance on the ATP system to control the speed of the train;
- CaF-02 – Low Rail Adhesion (LRA) was present as a result of Storm Barra;
- CaF-03 – There was a sharp speed downgrade, from 75 km/h to 30 km/h, on the approach to Signal DN285R;
- CaF-04 – Driver E240 did not apply correct driving techniques, as set out in the IÉ Professional Handbook, by adequately reacting to downgrades in speed (75 km/h to 30 km/h on the approach to Signal DN285R) and the LRA conditions present on the day;
- CaF-05 – The sanding stopped during the incident which reduced the effectiveness of the train's ability to stop.

Contributing factors (CoF) to the incident are as follows:

- CoF-01 – A previous OTDR assessment of the driver did not identify Driver E240's overreliance of the ATP system to control the speed of the train;
- CoF-02 – A previous internal investigation report into a SPAD in 2016 (which identified that there was an over-reliance by that driver on the ATP system), made two recommendations, in 2017, related the ATP systems (for drivers and District Traction Executives (DTEs)); which may have potentially avoided the incident on the 7th December 2021, remained open.

Systemic factors (SF) to the incident were identified as:

- SF-01 – The competency management system for drivers did not identify that drivers may be over-reliant on the ATP resulting in no requirement for DTEs to check for ATP penalty brake applications;
- SF-02 – The risks associated with "driving into the bonds" was not fully appreciated, as no urgency was applied to closing internal IÉ-IM safety recommendations made in 2017, in relation to a SPAD in 2016, and remained open at the time of the incident, which identified that there was an over-reliance, by drivers, on the ATP system.

As a result of the incident, the RAIU made six safety recommendations:

- Safety Recommendation 2023001-01 – The Head of Health & Safety IÉ-RU should arrange for the development and issue of a guidance document for drivers outlining the understanding of the ATP equipment and the driving technique required. New training, monitoring and assessment material should be developed from this guidance;
- Safety Recommendation 2023001-02 – The Head of Health & Safety IÉ-RU should arrange for the development of a briefing for DTEs on analysis of driving trends by use of the OTDR;
- Safety Recommendation 2023001-03 – IÉ-RU CME should upgrade the OTDRs on the 8500 Electrical Multiple Unit (EMU) fleet to the most up-to-date version, to ensure that digital signals are recorded for ATP penalty brake applications;
- Safety Recommendation 2023001-04 – IÉ-RU CME should consider retrofitting all EMU fleets with a Remote Diagnostic System, whereby a rule can be introduced so that DTEs are immediately notified of ATP penalty brake applications;
- Safety Recommendation 2023001-05 – IÉ-IM CCE should consider, based on a risk-based approach, the introduction of Traction Gel Applicators (TGAs) at more locations;
- Safety Recommendation 2023001-06 – IÉ-IM SET should undertake a review of I-SIG-2145, Calculation of Signal Spacing Distance, to consider if the risk approaches identified in the standard are effective in relation to the calculation of the spacing of signal distances, in particular, in relation to sharp speed decreases on the approach to signals and consideration should be given to incorrect driving techniques (i.e. driving into the bonds). A review of the use of derogations should also be undertaken.

In addition, the RAIU made six safety recommendations as a result of additional observations, as follows:

- 2023001-07 – IÉ-IM SET should put systems in place to ensure that the train simulator staff are provided with updated signal layout schematics as and when required e.g. altered signal positions;
- 2023001-08 – IÉ-RU CME should update its commissioning documents, to ensure that maintenance tasks commence after installation;
- 2023001-09 – IÉ-RU CME should review the 8500 EMU sanding improvement plan (2016) against current standards with a view to updating and implementing the sanding improvements to current standards;
- 2023001-10 – IÉ-RU Ops should update the OTDR Download Assessment Form for DART drivers with only tasks pertinent to DART drivers; allowing DTEs to carry out comprehensive assessments of the DART drivers' driving techniques;
- 2023001-11 – IÉ-RU Ops should update its competency assessment processes to ensure that the assessments carried out, are the most beneficial, in terms of identifying driver discrepancies;
- 2023001-12 – IÉ-RU Ops should brief all drivers on the importance of making an open call in an emergency situation rather that calling the Signalmen direct.

Collision with track equipment between Newbridge and Kildare, 27th August 2021

RAIU Report No: 2023 – R002 **Published: 23rd February 2023**

At 23:00 hrs on the 26th August 2021 a work detail incorporating: three IÉ-IM CCE staff (Engineering Supervisor (ES), Person in Charge (PIC) and General Operative (GO)) and eight contracted staff, met for a safety briefing at a works compound adjacent to the old Curragh Station, County Kildare. The work scheduled by the CCE Infrastructure Department was to replace a defective nine metre (m) section of rail. The work crew were briefed by the ES on their duties for the night and given site safety information including that the work would be under an Absolute Possession (T3 Possession). After the briefing, the ES and GO, followed by the contractors, drove to the access point close to the intended work site. They waited a few minutes until the ES confirmed the last timetabled train passed the worksite (although there was an unscheduled train to pass which was unknown to the ES), and then the ES stated that they were "good-to-go". The T3 Possession had not been prepared or granted at this stage i.e. the line should not have been accessed and no work should have commenced. When the work detail arrived at the site of the defective rail, the GO started to loosen the bolts which fix the rail to the concrete sleeper, while one of the contracted welders started digging the ballast out from around where the clamp was to be placed (the clamp is part of holding gear equipment that is clamped to the rail during rail replacement works). The two other contracted welders started to attach the clamp to the Down Leg of the Up Line. The contractor that was digging the ballast, turned to put down his shovel, when he saw the lights of an approaching train and shouted "train on" and all staff quickly moved to a position of safety.

The train (Train J283), an unscheduled empty train was travelling from Limerick Junction to Heuston Station, approached the worksite and struck the clamp which was clamped onto the rail. The driver of Train J283, Driver J283, brought the train to a stop and contacted the Mainline Signalman to report the collision and near-miss with staff.

The RAIU identified the following causal factors associated with the accident as:

- CaF-01 – The ES instructed the work party to access the work site without the authorisation of the Person in Charge of Possession (PICOP); a violation of the requirements set out in Section T, Part Three, of the IÉ Rule Book. The ES erroneously thought that the last train had passed through the worksite;

- CaF-02 – The work detail entered the work site, as they accepted the authority of the IÉIM ES's position (both IÉ-IM and contracted staff), and assumed they were safe to enter the T3 Possession. This level of acceptance indicates an element of "authority gradient", which is further emphasised when the PIC (who took over the roles of the ES), rejected the GOs requests to cease work after the accident; and, they re-commenced working.

A contributing factor was identified as:

- CoF-01 – The Safety Tours, as set out in the "Safety Tours and Compliance Verification" document (CCE-SMS-008), were ineffective at capturing rule breaks prior to possessions being granted, such as work parties accessing the railway before the possession being granted and equipment left near the railway line overnight.

A systemic factor was identified as:

- SF-01 – The Safety Tour Form differs from the checks required to be completed in the Guidelines for Safe Possession Management, the guidance part of the Safety Tour Form asks if the movements are planned and safely controlled, however, this information does not have to be recorded.

The RAIU made three safety recommendations related to the above identified factors, as follows:

- 2023002-01 – IÉ-IM and IÉ-RU should consider developing a system, whereby Signalmen must provide a Unique Possession Authority Number, or similar, when authorising T3 Possessions to the PICOP; this number or safeguard should be provided to all staff prior to entering a T3 Possession.
- 2023002-02 – IÉ-IM should review the current system of supervising and monitoring T3 Possessions, in terms of possession arrangements (e.g. Authority Number) and safety documentation (e.g. method statements); this review should identify improvements in terms of managing T3 Possessions. At a minimum, IÉ-IM should:
    - Expedite an increase in the supervision and monitoring of T3 Possessions by Engineering Department staff through updating CCE-SMS-001, specifically increasing monitoring prior to possessions being granted (while the IÉ-IM review and updating of supervision and monitoring of T3 Possessions is being undertaken);
    - Revise the current process of monitoring possessions through Safety Tours, CCESMS-008, to ensure the requirements of all guidelines are recorded in the Safety Tour Form;
    - Once the Safety Tours, CCE-SMS-008, documentation has been reviewed and updated, verify that the Safety Tours are being carried out correctly, and in full accordance with the guidelines, through an auditing process.
- 2023002-03 – IÉ-IM should promote a positive culture between staff, at different grades, to ensure ground level staff (including contractors) feel confident to challenge more senior staff in terms of safety. This can be achieved through staff briefing days, safety campaigns and development of a means for staff to provide feedback on supervision activities.

The RAIU also made four additional observations related to: transfer of information to the competency management of staff; the correct reporting of accidents internally; postaccident inspection of rolling stock; and inspection quality of work that affects track safety. As a result, the RAIU made five safety recommendations related to these additional observations:

- 2023002-04 – IÉ-IM should introduce processes to ensure that information submitted to the RAIU is correct and submitted within the requested timeframes.
- 2023002-05 – The IÉ CCE Department (Engineering Department Division 3) should ensure the requirements of CCE-TMS-422 (2022) are met in full.
- 2023002-06 – IÉ-IM should conduct a full review on the reporting of accidents by IÉ-IM staff and contractors, consideration should be given to:
    - Reviewing CCE-SMS-007 and CCE-SMS-005 to identify any areas where improvements can be made related to the reporting of safety related occurrences; where areas of concern are identified these should be addressed;
    - Enhance and promote its confidential reporting system to ensure all staff (with a particular emphasis on contracted staff) can report issues related to safety and welfare;
    - Promote a positive culture, associated with the reporting of occurrences, in an effort to eliminate on-site authority gradients whereby staff cannot challenge supervisors.
- 2023002-07 – The CCE Department review and update CCE-SMS-001 and CCE-SMS008 with a view to addressing the monitoring and supervision of works, in terms of quality of works that affects track safety, which are carried out under internal method statements (and contractor) method statements.

On the 6th July 2020, there were four separate worksites within a T3 Possession in which engineering works on the Cork-Cobh-Midleton lines was being undertaken. The work being carried out in worksite one entailed track panel relaying and steel bridge repairs between Woodhill and Tivoli.

There were thirteen items of hired plant and machinery in the worksite, including six RRV Dumpers, which were used for drawing stone from a lineside stockpile at Tivoli access point on the Cobh side of the Up Line. On completion of the loading movement the RRV Operators (RRVOs) awaited directions from the Person In Charge (PIC)-RRV to tip the stone over the course of the track relaying works.

Two RRV Dumpers, located on the Up Line, were laden with stone ballast with the buckets facing Cobh. The RRVOs configured the driving positions of the RRV Dumpers for the reversing movement. The directional lights were configured to white lights on the Cobh end (direction of travel) and red lights at the Cork end.

Engineer 1, who was on site supervising the works, was coming to the end of his shift and was giving an update briefing to Engineer 2 who had arrived on site for the late shift. After discussing an unforeseen issue in relation to soft ground conditions, Engineer 1 agreed to remain on site in order to discuss the matter further with their Regional Manager, who had arranged to visit the site. Engineer 1 decided to make a number of work-related phone calls on his company issued mobile phone and moved to a position of safety, walking from the Down Side to the Up Side cess, close to the leading RRV Dumper.

While on the Down Side, Engineer 2 requested the PIC-RRV to move the two stone laden RRV Dumpers a short distance along the Up Line towards Cobh to allow the placement of track panels on the Down Line. The PIC-RRV walked towards the leading RRV Dumper observing that the line ahead was clear before shouting and indicating by hand due to the noisy environment to the leading RRVO to move in the direction of Cobh.

The RRVO checked his reversing camera monitor located at 90° to his driving position on his right-hand side before looking through the rear windscreen over the RRV Dumper bucket laden with stone, before slowly moving forward. At approximately the same time Engineer 1 (located on the Up Side cess) decided to return to Engineer 2 (located on the Down Side). Engineer 1 walked a few metres in the cess, before the terrain got difficult, and crossed into the five foot a few metres ahead of the leading RRV Dumper.

Engineer 1 continued to walk for a few metres in the five foot, in the direction of Cobh on the Up Line, before feeling something striking his back. Engineer 1 turned around and realised it was the RRV Dumper and instinctively decide to "go to ground" and lay as flat as possible in the five foot, knowing the RRV Dumper was going to travel over him. The RRV Dumper had travelled approximately twelve metres from its stationary position at this time. The RRV Dumper slowly travelled over Engineer 1, with Engineer 1 sustaining a cut to his nose and minor abrasions to his arm.

The RRVO was unaware that he had struck and travelled over Engineer 1 until he was alerted by another member of staff. The RRVO then brought the RRV Dumper to a stop, clear of Engineer 1. All work on site was stopped and medical attention was given by staff on site before an ambulance crew attended the scene and advised Engineer 1 that he did not have to attend the hospital.

The RAIU have identified the following causal factors to the accident:

- CaF-01 – Engineer 1 did not follow the personal safety requirements outlined in the IÉ Rule Book such as maintaining vigilance (staying alert, looking up frequently); crossing in front of approaching trains and not going between vehicles;
- CaF-02 – Engineer 1 did not consider the RRVO's blind-spot or gain the attention of the RRVO despite seeing him in the cab, even though Personal Track Safety (PTS) Certification training highlights that RRVOs of RRV Dumpers do not have a clear view ahead due to the design of the vehicle and the load it is carrying;
- CaF-03 – Engineer 1 did not follow the risk controls for the identified hazards in Risk Assessment RA14658 such as maintaining a safe distance from RRVs; and, ensuring the RRVO had full visibility;
- CaF-04 – Engineer 1 did not look at the RRV Dumper's directional lights which were white, indicating that the RRV Dumper was about to make a forward movement;
- CaF-05 – The RRVO's view through the rear windscreen was obstructed by the RRV Dumper's bucket and load it was carrying. The reversing camera and monitor installed to improve visibility for the RRVO in reversing movement was positioned to the RRVO's right, whereby the RRVO could not see the full forward view without moving his head.

The following may have been a contributory factor:

- CoF-01 – RRVO did not switch off the RRV Dumper while stationary on the track as per instruction and had the directional lights set for forward movement for approximately ten minutes on instruction of the PIC-RRV. This may have given Engineer 1 the incorrect impression that the RRV Dumpers were not going to move imminently and the noise of the re-starting of the RRV Dumpers may have alerted Engineer 1 to their imminent movement.

No systemic factors were identified.

Due to a previous RAIU safety recommendation and measures taken by IÉ-IM, there is an absence of safety recommendations related to:

- Anti-Collision Devices (ACDs);
- RRV movements – Additional instructions have been issued to staff in relation to RRVs and their movements;
- RRV Dumper monitors – Additional monitors have been installed on all RRV Dumpers ensuring that RRVOs can now maintain an active view of the camera monitor and the line ahead while the RRV is in motion.

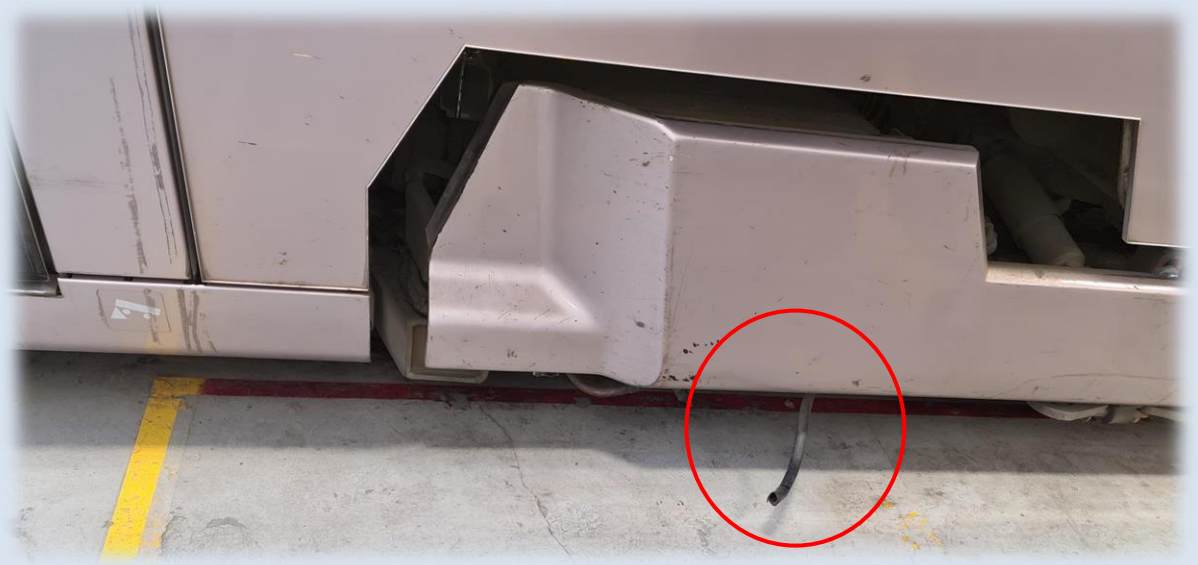
Although not causal, contributing, or systemic to the accident the RAIU make the following additional observations:

- AO-01 – PTS Certification training does not include guidance on the head lights and tail lights for trains ("white lights" are coming towards you, or "red lights" are travelling away from you); and, specifically, for RRVs, does not mention the configurable directional lights and the requirement to have red lights displayed at both ends when stationary;
- AO-02 – RA14658 (Hazard 4, RRV Movements) does not adequately address the risks associated with RRVs Movements in terms of requirements to switch engines off when stationary on the track; and, for RRVs to display red lights at both ends of the vehicle (so they always remain visible);
- AO-03 – Although the use of mobile devices is covered in the IÉ Rule Book, IÉ-IM does not have a comprehensive stand-alone mobile device policy document.

These additional observations warrant the following safety recommendations:

- Safety Recommendation 2023003-01 – IÉ-IM PTS Certification training should include training on the head lights and tail lights for trains ("white lights" are coming towards you, or "red lights" are travelling away from you); and, specifically, for RRV Dumper, explain the configurable directional lights and the requirement to have red lights displayed at both ends when stationary;
- Safety Recommendation 2023003-02 – IÉ-IM CCE should re-examine the risk assessment related to RRV movements, where previous control measures cannot be implemented (i.e. RRV engines cannot be switched off), alternatives should be considered;

- Safety Recommendation 2023003-03 – IÉ-IM should produce and circulate a policy document for the use of mobile phones and all handheld electronic devices for the acceptable, safe and secure use and management of these devices when working on the railway.



At approximately 08:08 hrs on 25th October 2022 Tram 3012 was departing Connolly Stop, when the driver of Tram 4012 (Driver 4012), approaching Connolly Stop in the opposite direction, saw what they thought was a hose protruding from the underframe of Tram 3012.

Driver Tram 4012 contacted the Traffic Supervisor responsible for the Red Line in the Luas Network Management Centre (LNMC) who in turn contacted the driver of Tram 3012. The Traffic Supervisor advised the driver of Tram 3012 (Driver 3012) to continue in passenger service to the Red Cow where the service would terminate and transfer into the Red Cow Maintenance Depot.

Tram 3012 served all stops as required to the Red Cow without incident where it was taken from service and transferred to the Red Cow depot for investigation.

On investigation it was found that what was initially reported as a hose was in fact Side 1 (S1) Current Return Cable of Motor (M)1 Bogie 176DU, which had severed. In addition Side 3 (S3) Earth Shunt Cable also on M1 Bogie 176DU had also severed and the S3 Axle End Assembly was showing signs of extreme overheating. Side 1 and Side 3 are on adjacent wheelsets diagonally opposite on Motor Bogie 176DU of Tram 3012.

The last maintenance intervention which involved contact with S1 Current Return and S3 Earth Shunt Cables took place twenty days before the incident, as part of the wheel turning preparation; where both cables were detached to facilitate the wheel turning. The work must be carried out in accordance to Work Instruction, TDLR-LUAS-WI-00814 (WI-00814), Preparation before and after wheel turning (2019), the ends of the Current Return and Earth Shunt Cables need to be checked for corrosion; and if corrosion is present, this must be reported to the team leader. Also, as part of WI-00814, the contact surfaces of the Current Return and Earth Shunt Cables must be coated with a small amount of contactal paste before being re-attached.

The post-incident inspection identified soiling and oxidation on the Lugs of S1 Current Return and S3 Earth Shunt Cables; and the absence of contactal paste. It is probable that that some corrosion on surface of the Lugs was present during the wheel turning process twenty days previous as it is unlikely that the extent of corrosion on the Lugs post-incident had accumulated in that time period (in addition, the absence of contactal paste made the Lugs more susceptible to soiling and oxidation).

Analysis of the failed components found that soiling and oxidation on the Lugs resulted in the overheating of the Lugs which, in turn, conducted into S1 Current Return and S3 Earth Shunt Cables.

This returned in elevated temperature creep strain accumulating in both the S1 Current Return and S3 End Shunt Cables, over a significant period of service (again indicating that it was probable there was oxidation and corrosion of the Lugs twenty days previous). In both cables, successive failures of individual strands caused the electrical and mechanical loading on the remaining strands to be increased. Eventually, a point was reached when the cumulative failures of individual strands caused the S1 Current Return Cable to separate completely.

Separation of the S1 Current Return Cable caused the electrical load on the S3 Earth Shunt Cable to instantaneously increase significantly as the return circuit found the only alternative path through S3 Earth Shunt Cable causing it to fail immediately.

Outlined above is the failure mechanism, the RAIU have identified the following causal factors to this failure mechanism:

- CaF-01 – Soiling and oxidation on S1 Current Return and S3 Earth Shunt Cables ends, which was likely to have been present during the wheel turning process twenty days before the incident, was not reported to the team leader, as set out in WI-00814;
- CaF-02 – Contactal paste (used to protect against soiling and oxidation) was not coated on the contact surfaces of S1 Current Return and S3 Earth Shunt Cables at the time of re-attachment as part of the wheel turning process twenty days before the incident, as required by WI-00814.

The following may have been a contributory factor:

- CoF-01 – WI-00814 does not have any supporting guidance documents in relation to identifying defects, to assist maintenance technicians in their requirements to report defects to the team leaders.

Although not causal, contributing, or systemic to the incident, the RAIU make the following additional observations:

- AO-01 – TDLR did not immediately notify the RAIU of the incident and partially disassembled evidential components from Tram 3012 prior to notification;
- AO-02 – Tram 3012 remained in passenger service with a live high voltage cable protruding from the underframe; as the TDLR suite of documents for Traffic Supervisors in the safe management of trams does not contain any reference on how to respond to equipment protrusions from a tram;

- AO-03 – There is no location on the Wheel Turning Certificate to record the torque wrench asset number or torque testing, as set out in WI-00814;
- AO-04 – Fleet audits carried out by the Maintenance Team Manager did not identify that the tasks outlined in Paragraph 14 of WI-00814 were not carried out as prescribed and a torque wrench was not signed out for the completion of the task.

As a result of the RAIU investigation, the RAIU make the following safety recommendations:

- Safety Recommendation 2023004-01 – TDLR should develop supporting guidance documentation to WI-00814, Preparation before and after wheel turning, to include information on possible defects e.g. photographs of unacceptable levels of corrosion on the Current Return and Earth Shunt cable Lugs;
- Safety Recommendation 2023004-02 – TDLR should consider updating LNMC Manual Document (TDLR-OP-M-0001) to include guidance for Traffic Supervisors in relation to actions to be taken in the case of failed cables and hoses;
- Safety Recommendation 2023004-03 – TDLR should consider updating WI-00814, Preparation before and after wheel turning to include the recording of the testing and serial number of the torque wrench into TDLR-FRM-ENG-023 Citadis 401 Wheel Turning Certificate Issue A November 2020;
- Safety Recommendation 2023004-04 – TDLR should consider updating the Wheel Turning Certificate to provide a space for the torque wrench registration number conformation of test and torque value achieved when reattaching the Current return and Earth Shunt cables with a space for sign off;
- Safety Recommendation 2023004-05 – For instances where rolling stock is withdrawal from service as a result of damage; TDLR should develop notification procedures to identify where immediate notification to the RAIU is required.

IÉ self-detrainment of passengers from DART trains, between Shankill and Bray, 24th July 2022

On Sunday 24th July, the weather conditions were sunny and hot. It was the day of the 2022 Bray Air Display and the 2022 All-Ireland Senior Football Championship Final in Croke Park, with both events drawing thousands of people.

A door fault on a DART train during the morning resulted in delays to services and increased dwell times. This resulted in large numbers of passengers accumulating on the platforms, many with small children and buggies. When boarding, passengers were reluctant to move down the carriage away from the entrance doors due to the heat.

IÉ staff and crowd control plans were in place at major stations on the DART line including Bray. Passengers accumulating at unmanned stations were left frustrated due to a lack of information and trains arriving already close to capacity. As DART trains are driver only and with no station staff IÉ-RU had no way of implementing processes and procedures to manage the overcrowding on trains.

With services getting busier, the standby DART train was brought into service; it was the 13:45 hrs Connolly to Bray service (Train E268), which departed Connolly Station late. It was followed by the 13:05 hrs Howth to Greystones service (Train E103) which also departed Connolly Station late. Train E103 was followed by the 13:25 hrs Malahide to Bray service (Train E208) which also departed Connolly Station late.

All trains arriving into Bray Station were stopping on Platform 2. It was taking approximately eight minutes to detrain passengers and clear the train from Platform 2 to allow the next train to stop on Platform 2.

At 14:47 hrs, the 12:46 hrs service from Malahide to Bray (Train E206) arrived at Platform 2 at Bray, and passengers began alighting from the train. The next train scheduled to stop on Platform 2 was Train E268.

On Train E268's approach to Bray Station, Signal BR28 (located 500 m from Bray Station) was red as Train E206 was still detraining on Platform 2.

The air conditioning was off on Train E268 (unbeknown to Driver E268), and as the windows were sealed (by design) there was no forced or passive ventilation on the train, leading to increasingly uncomfortable conditions for passengers, with reports of some passengers suffering from heat exhaustion.

The driver (Driver E268) did not make any passenger announcements using the passenger address system. After being stopped for five minutes and thirty-two seconds, one of the passengers (Pax 1) who was travelling with young children and an older person, opened a passenger door by means of the emergency opening device, and passengers began self-detraining.

Within a minute of the door being opened, Driver E268 saw passengers on the line and made an emergency call to the Controlling Signalman.

At this stage the 14:43 hrs Bray to Malahide (Train E804) had departed Bray Station and the Controlling Signalman instructed the driver of Train E804 (Driver E804) to stop as a result of passengers on the railway line and placed the relevant signals at danger.

As Train E268 was stopped, this resulted in Trains E103 and E208 also being stopped at Signals BR26 and BR26 (between Shankill and Bray), respectively. These trains did not have air conditioning; and, as they were stationary there was no forced ventilation; there was also insufficient passive ventilation through the opened windows due to crowding, resulting in increasingly uncomfortable conditions for these passengers.

Passengers on delayed Trains E103 and E208 were aware that passengers had begun self-detraining from Train E268 through messaging, calls and social media (including IÉ's Twitter account). The drivers of the two trains (Driver E103 and Driver E208) did make announcements, however, passengers on these trains also began self-detraining.

At this stage, the drivers of all trains made announcements for passengers to remain on the trains, however, passengers continued to self-detrain.

Train E804, travelling away from Bray, was subject to a controlled detrainment.

It was also reported that passengers alighted from the platforms at Dalkey, Killiney and Shankill Stations and started walking on the railway line, towards Bray.

Up to approximately 2,000 passengers, detrained (self-detrained and controlled detrained) or alighted from station platforms.

The self-detrainment of Trains E268, the first train to self-detrain, was as a result of the following causal factors:

- CaF-01 – The weather at the time of the incident was hot and sunny and Train E268 was crowded. The air conditioning was not switched on; and there was no remote diagnostics system fitted to the train to alert relevant staff members that the airconditioning was off. In addition, the windows were unopenable and exposed to the sunlight. These combined factors, coupled with the hot weather, resulted in increasingly uncomfortable conditions on Train E268 with some passengers exhibiting signs of heat exhaustion;
- CaF-02 – Passengers were on Train E268 for a prolonged length of time due to delays, prior to being stopped at Signal BR28 awaiting platform clearance;
- CaF-03 – Driver E268 did not communicate with the passengers in terms of what was happening as set out in the Professional Driving Handbook and Ontrain Customer Communications Booklet; incorrectly assuming he was not required to do so. Driver E268 had not received any information, from CTC, to communicate to passengers, which in part, may be a reason for not making any announcements;
- CaF-04 – Ultimately, Pax 1's desire to get off the train, with his family, onto a live railway, outweighed the need to stay on Train E268; citing that the conditions on Train E268 were "unbearable", therefore Pax 1 opened the train doors;
- CaF-05 – Once the doors were opened, fellow passengers began self-detraining.

As with Train E268, passengers on Trains E103 and E208 were on the trains for a prolonged length of time prior stopping. The following causal factors are related to the selfdetrainments of Trains E103 and E208:

- CaF-06 – The passive ventilation, through the opened windows, was insufficient in the crowded conditions and there was no forced ventilation as the trains were stationary resulting in increasingly uncomfortable conditions for passengers;
- CaF-07 – Drivers E103 and E208, although making some announcements, these were insufficient at deterring the passengers from self-detraining. There were also reports from passengers that the driver announcements were difficult to decipher due to poor sound quality of the public address system which led to further passenger frustration.

It was reported, by drivers and Garda Control (Bray) that passengers alighted from the platforms at three stations and started walking on the track towards Bray. A mother also reported that her child partially fell between the platform and the train (uninjured) as a result of issues surrounding the boarding of the trains. The RAIU have identified the following causal factor:

- CaF-08 – There was no staff on busy outlying station platforms to implement adequate station crowd control plans, including the evacuation of stations in a safe manner once the incident was underway.

Contributing factors (CoF) related to the passenger self-detraining from Trains E268, E103 and E208 are as follows:

- CoF-01 – The number of passengers self-detraining was likely as a result of the demographic of those travelling, a large number of families with babies and young children were on the trains. This may have resulted in passengers considering that risk of self-detraining was worth taking, to ensure the welfare of their children;
- CoF-02 – The trains were stopped in relatively close proximity to Bray Station (especially Train E268), the likely destination for a most passengers, meaning that passengers knew they would be able to walk to Bray Air Display after self-detraining;
- CoF-03 – It is likely that passengers on Train E103 and E208, were aware of the selfdetrainment of Train E268 as a result of phone calls, messaging and social media, which may have influenced passengers in their decision to detrain;
- CoF-04 – IÉ's Twitter account continuously referred to the self-detrained passengers as "trespassing", which greatly annoyed some passengers on the stranded trains and may have influenced their decision to self-detrain;
- CoF-05 – When IÉ's Twitter account then tried to communicate the need for passengers to remain on the trains, the passengers did not accede;
- CoF-06 – The passengers who phoned IÉ's Emergency Line, seeking assistance, were not provided with any reassurances or useful information; which in turn would not have dissuaded them from self-detraining.

Systemic factors in relation to the self-detraining have been identified as follows:

- SF-01 – There is no Traction Manual for the 8520 Class DART fleet for drivers to refer to when setting up the air conditioning on a train resulting in Driver E268 not having a full understanding of the Heating, Ventilation & Air Conditioning (HVAC) system;
- SF-02 – There is no Safety Management System (SMS) documentation in relation to the management of crowding on trains for large spectator events;
- SF-03 – The drivers involved had not undergone the customer communications module introduced in 2018;
- SF-04 – IÉ standards and training refer to "customer-friendly" communications; however, this "customer-friendly" approach to dealing with passengers, in particular, passengers in distress (where it is of utmost importance) was not evident on the day.

In terms of the IÉ response to the incident, it appears that CTC thought that they could recover the situation at an early stage in terms of the management of Train E268, however, the situation continued to escalate, whereby it became unrecoverable in that Trains E103 and E208 also began self-detraining; and passenger were reported to have alighted from platforms onto the railway line, with up to 2,000 passengers on the railway line. The RAIU found the following to be causal factors:

- CaF-09 – The suite of documents related to customer disruptions and selfdetrainments were ineffective on the day of the incident, with most documents not adequately addressing the risks associated with self-detrainment, (as they were reliant on reactive rather than proactive actions), leading to IÉ being completely ill prepared to manage the incident;
- CaF-10 – IÉ-RU's response, by the CTC Duty Manager not declaring an Major Customer Disruption (MCD), meant that sufficient resources were not deployed to CTC. Although noting that the incident was an escalating situation rather than an immediate major incident, there was no shared awareness of the circumstances in order to recognise that a minor operational occurrence had the potential to develop into a major incident.

There were no contributory factors identified in terms of the response to the incident.

There is a dearth of documentation associated with the risk of self-detrainments and as such, adequate control mechanisms could not be adopted; despite the risk of selfdetrainments being a reasonably foreseeable risk as a result of a self-detrainment at Dun Laoghaire in 2017. The RAIU have identified the following systemic factors in terms of the response to the incident:

- SF-05 – The RAIU issued safety recommendation 2018001-003 on the 15th August 2018, which reads "IÉ-RU should review their suite of documents which reference major customer disruptions and emergencies and address any deficiencies in relation to the management of passengers on trains and uncontrolled impromptu evacuations. These documents should then be briefed to staff who have roles in relation to customer disruptions and emergencies to ensure they are aware of their responsibilities"; had this safety recommendation been addressed with the vigour that was warranted, the incident may not have escalated;
- SF-06 – In addition, had IÉ addressed, in full, the recommendations set out in their internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, published on the 27th September 2017, which included: a requirement to update the MCD Response Handbook and the formation of a rigorous customer disruptions training exercise to ensure appropriateness, preparedness and compliance in the event of any future disruptions, the incident may not have escalated;
- SF-07 – There is no requirement for more senior members of IÉ staff to be present in CTC during major events;
- SF-08 – Many IÉ-RU documents, which should reference self-detrainment, do not adequately address the risks associated with self-detrainments, including: Local Emergency Plan for Bray Station; Passenger Comfort Risk Register; Emergency Scenario Response Risk Register; MCD Response Handbook.

Although not causal, contributing, or systemic to the incident, the RAIU make the following additional observations (AO):

- AO-01 – From the advertising, the passengers are likely to have had an expectation that their train journeys would be managed appropriately, with staffed stations and platforms, etc, leading to passenger frustrations. However, the events of the day, described in this report, do not reflect this, and the frustrations of the passengers increased significantly throughout the incident;
- AO-02 – IÉ-RU verified that the public address systems were operating in accordance with their own standards. However, a number of complaints were made to IÉ Customer Care Department in relation to the public announcements system on the trains in terms of volume;
- AO-03 – Manager CTC & Train Performance was not included in the planning in terms of platform allocation for incoming trains into Bray Station which may have minimised shunting of trains and passenger detraining times;
- AO-04 – There are no instructions for drivers, in the IÉ Rule Book in relation to selfdetrainments or stranded trains;
- AO-05 – Passengers experienced difficulties during the evacuation process, when walking over the trespass guards; this issue is not addressed in the existing Train Evacuation Briefing Notes or any emergency documentation;
- AO-06 – Although, it is noted that IÉ were acting in what they considered the best interests of passengers, IÉ failed to comply with directions given by members of An Garda Síochána; this is likely as a result of no formal established procedures;
- AO-07 – IÉ's internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, made eight recommendations; the status of which could not be verified, in a timely manner, by IÉ;
- AO-08 – Only half the stations enroute to Bray were staffed, with reports of crowding at stations and issues boarding trains; with no Persons In Charge of Platform (PICs) present to manage the passenger flow.

The RAIU have made the following safety recommendations as a result of the incident and additional observations:

- 2023005-01 – IÉ-RU Head of Health & Safety, in conjunction with the CME Department, should develop Traction Manual for the entire 8500 Class DART fleet; this should include guidance on the air conditioning. Once complete, this should be briefed to drivers to ensure drivers fully understand how the air conditioning operates;
- 2023005-02 – IÉ-RU Head of Health & Safety should include a check that the heating, ventilation and air conditioning systems are operational in the train preparation instructions;

- 2023005-03 – IÉ-RU should update its Passenger Comfort Risk Register to adequately address the issues related to crowding on trains (with special consideration given to crowding during adverse weather conditions). Based on this, IÉ-RU should develop an operational SMS document for the management of crowding on trains;
- 2023005-04 – IÉ-RU should conduct a full review of how crowding at outlying stations is managed during major events, including reviews to local crowd control plans, PTI and train dispatch documentation; to ensure that the relevant stations are staffed appropriately to adequately manage the passenger flows;
- 2023005-05 – IÉ-RU should review its planning and management processes for large events, considerations should be given to:
    - How and what information is provided to passengers prior to the event (such as information in relation to predicted scale of passengers using the trains and likely conditions for their journey in order to manage passengers' expectations);
    - How passengers' expectations are managed for the duration of the event (such as using real time information and making this freely available through passenger announcements at stations and on the IÉ App and social media accounts);
- 2023005-06 – IÉ-RU should review its Ontrain Customer Communications Booklet and Professional Driving Handbook, and provide drivers with additional training, to enhance driver communications with passengers. The documentation and training should consider best practice and, at a minimum, the following requirements:
    - An initial announcement to be made within a specified short period of time, even if the reason for the delay is not known at that point;
    - A further announcement to be made as soon as further information is available about the cause and likely consequences of the delay;
    - Further announcements, at specified intervals, should be made whenever new facts suitable for informing and/or reassuring passengers become available;
    - In critical conditions, announcements should be made to dissuade passengers from detraining, these should include making announcements highlighting the risks involved with detraining and their safest option is to remain on the train.
- 2023005-07 – IÉ-IM should carry out a review to determine the suitability of direct messaging (visually and/or verbally) from CTC directly onto trains, consideration should be given as to whether it would improve onboard passenger communications.
- 2023005-08 – IÉ-RU should consider developing processes, in the case of emergency situations, to provide information through social media channels; these communications must be customer-friendly in order to encourage passengers to follow any directions given.

- 2023005-09 – IÉ-IM should develop suitable instructions and guidance for operational staff at CTC to help them determine when a train should be considered as stranded (consideration should be given to the proximity of the stranded train to a station); the timeframe within which this needs to be declared and the actions that then need to be taken must be set out. Where appropriate, these instructions and guidance should be included in the IÉ Rule Book and relevant associated documentation;
- 2023005-10 – IÉ-RU should review their suite of documents which reference major customer disruptions and emergencies (in particular, in terms of stranded trains) and address the management of passengers on these trains. Considerations should be given to, but not limited to, the effective development of the following:
    - A common understanding and shared awareness of the circumstances in order to recognise when minor operational occurrences have the potential to develop into major incidents unless decisions are taken in a timely and decisive manner;
    - Effective communication and information sharing arrangements between the controlling signalman/ traffic regulators to the driver/s;
    - Assist driver/s in managing, informing and reassuring passengers in order to encourage passengers to stay onboard the train/s;
    - Anticipate and understand the needs of passengers in a train stranding situation (information, air conditioning, etc.) and to focus action plans accordingly;
    - Anticipate the need to provide on-site support to drivers of such trains in managing passengers' needs;
- 2023005-11 – IÉ-IM, and IÉ-RU, should review and formalise its processes for the attendance and allocation of staff requirements at CTC for major events, to determine what members of staff need to be present;
- Safety Recommendation 2023005-12 – IÉ-RU and IÉ-IM should carry out an incident simulation in terms of a scenario involving an incident with the potential for selfdetrainment. As part of this simulation, the relevant stakeholders (An Garda Síochána, Dublin Fire Brigade, etc.) should be invited to participate. Any lessons learnt such be adopted into the relevant guidance documents;
- 2023005-13 – IÉ-RU should review its high level emergency preparedness, crowd control plans, risk assessments, train evacuation briefing notes and all other relevant document to include guidance on self-detrainments. Once complete, they should be circulated to the relevant departments and stations, for briefing;
- 2023005-14 – IÉ-RU CME should carry out an assessment on the quality of the public address systems on EMUs against good practice standards and address any deficits;
- 2023005-15 – IÉ-RU Health & Safety should ensure that train preparation instructions should include a check that public address systems are working prior to trains entering service;
- 2023005-16 – IÉ-IM & IÉ-RU should review the suite of documents in relation to the planning of large events to ensure that all key personnel are involved in the planning of events;

- 2023005-17 – IÉ-IM should update the IÉ Rule Book to include instructions for drivers in the event of self-detrainment and/ or stranded trains; these requirements should then be incorporated into the relevant associated documents;
- 2023005-18 – IÉ-IM should develop procedures for the evacuation of passengers over trespass guards, these should then be included in the Train Evacuation Briefing Notes and other relevant documents which reference evacuations;
- 2023005-19 – IÉ should engage with the relevant parties of An Garda Síochána to ensure that there is a shared understanding at CTC of when and how instructions from An Garda Síochána should be complied with. This can be practiced through IÉ-RU incident simulations where An Garda Síochána are in attendance;
- 2023005-20 – IÉ-IM and IÉ-RU should develop a system whereby internal recommendations as a result of safety related incidents are logged with an allocated timeframe, and the actions taken verified, and the status recorded.

Full investigations commenced in 2023

Three full investigations into reported occurrences were commenced in 2023:

- Broken rail near Emly Level Crossing, County Tipperary, 22nd February 2023;
- Broken rail, Newbridge, County Kildare, 23rd February 2023;
- Collision between a car and a train at Prendergast's Level Crossing (XM190), County Mayo, 9th September 2023.

Broken rail near Emly Level Crossing, County Tipperary, 22nd February 2023

On the 22nd February 2023, at 07:56 hrs, the Signalman at Centralised Traffic Control (CTC) saw that a track circuit (near Emly LC) remained occupied after the passage of the 07:00 hrs passenger service from Cork to Heuston.

The Signalman contacted the Signal Electrical and Telecommunications (SET) Department to report the track circuit fault. SET staff members deployed to the location, and found a broken rail.

The location of the broken rail, had been subject to thermit welding the previous night, whereby the welders had some difficulties with the equipment associated with stressing the rails in preparation for welding. Just as the SET staff member had discovered the broken rail a train was approaching on the Up line. It was the 09:25 hrs passenger service from Cork to Heuston (Train A209). The SET staff member stepped out to a position of safety and signalled the train to stop. Train A209 travelled over the broken rail before coming to a stop.

Broken rail, Newbridge, Kildare, 23rd February 2023

On the morning of the 23rd February 2023, as the 07:00 hrs Newbridge to Grand Canal Dock passenger service (Train P402) travelled on the Up line near Newbridge, Co Kildare; the driver saw an abnormal Continuous Automatic Warning System (CAWS) downgrade on the train's in-cab display and reported it to the Mainline Signalman. A number of other drivers reported the same abnormal downgrade at the same location.

The SET Department were advised, and an SET member of staff was dispatched to site to investigate and discovered a broken rail.

The broken rail was found to have fractured through a flash butt welded joint. The rail had been installed on the 28th January 2023 (five days earlier). The flash butt welding of the rail had been carried out off-site at IÉ-IM's Portlaoise Rail Welding Plant.

Collision between a car and a train at Prendergast's Level Crossing (XM190) Mayo, 9th September 2023

At approximately 15:15 hrs on the 9th September 2023 the 12:45 hrs Heuston to Westport passenger service was approaching Prendergast's Level Crossing, located between Ballyhaunis and Claremorris, when, at the same time a 2009 silver Skoda Octavia was approaching the level crossing, by road.

The gates at the level crossing had been left open to road traffic by a previous user, and the car did not stop on arriving at the level crossing.

When the driver of the A804 saw the car approaching the level crossing he sounded the horn and applied the emergency brake but there was insufficient time to bring the train to a stop and the train collided with the car.

The car was propelled approximately 31 m into an adjacent field.

The two occupants of the car were treated at the scene before been air lifted to hospital.

2023 Urgent Safety Advice Notice / Safety Advice Notice

1st January 2023 to 31st December 2023

The RAIU did not issue any one Urgent Safety Advice Notice (USAN) or Safety Advice Notices (SAN) in 2023.

Tracking Safety Recommendations

RAIU

Railway Accident Investigation Unit

Tracking Safety Recommendations

Monitoring of RAIU safety recommendations

In accordance with the Railway Safety Act 2005 (Government of Ireland, 2005a) and the European Railway Safety Directive (European Union, 2020), recommendations are addressed to the national safety authority, the CRR. The recommendation is directed to the party identified in each recommendation. The CRR also monitors the RAIU safety recommendations from USANs and SANs.

The CRR safety recommendation statuses are open/in progress, submitted, further evidence requested and closed; and are defined below.

Status	Description
Open/ In Progress	Feedback/evidence from the Railway Organisation is pending; or actions have not yet been completed.
Submitted	The Railway Organisation has made a submission to the CRR advising that it has taken measures to affect the recommendation and the CRR is considering whether to close the recommendation.
Further Evidence Requested	The CRR has reviewed a submission (or further submission) but considers that further evidence is necessary to close the safety recommendation.
Closed	The CRR has reviewed a submission (or further submission) and is satisfied that the safety recommendation has been addressed.

Status of RAIU safety recommendations

RAIU Safety Recommendations in numbers

The CRR, as the National Safety Authority (NSA) for Ireland, holds meetings with the relevant stakeholders to monitor the progress of safety recommendations.

As of the 31st December 2023, the RAIU have made 303 recommendations from investigation reports, USANs and SANs. All recommendations were accepted by their addressee and implementer.

The status of the recommendations as of the end of 2023 is illustrated on the following page, note that 55% of the safety recommendation have been addressed and are closed.

Year	No. of Reports/ U/SANs	Number of Recommendations	Status of Recommendations				Percentage Closed
			Open / In Progress	Submitted	FER	Closed	
2008	1	7	0	0	0	7	100%
2009	5	13	0	0	0	13	100%
2010	6	26	1	0	0	25	96%
2011	7	17	0	0	0	17	100%
2012	3	13	0	0	0	13	100%
2013	4	9	0	0	0	9	100%
2014	6	28	1	0	1	26	92%
2015	2	4	0	0	0	4	100%
2016	3	17	5	0	2	10	58%
2017	2	9	0	0	2	7	77%
2018	2	8	1	0	1	6	75%
2019	5	36	9	1	5	21	58%
2020	4	18	5	0	8	5	27%
2021	8	35	15	0	10	10	28%
2022	3	16	15	0	1	0	0%
2023	5	47	43	2	1	1	2%
Totals	66	303	95	3	31	174	55%

Status of individual RAIU safety recommendations

In terms of the individual safety recommendations, the safety recommendations are compiled in the following tables:

Table	Title
Table 1	RAIU safety recommendations made in 2023
Table 2	RAIU safety recommendations closed in 2023
Table 3	All RAIU Safety Recommendations & their status

Table 1 – RAIU safety recommendations made in 2023

The below are safety recommendation made in 2023. In 2023, one recommendation was closed, one at status FER and one submitted.

Report/USAN/SAN	Recommendation
Dangerous occurrence involving a Double SPAD at Clontarf Road Station, 7th December 2021 (RAIU Report 2023-R001, published 16th February 2023)	The Head of Health & Safety IÉ-RU should arrange for the development and issue of a guidance document for drivers outlining the understanding of the ATP equipment and the driving technique required. New training, monitoring and assessment material should be developed from this guidance.
	The Head of Health & Safety IÉ-RU should arrange for the development of a briefing for DTEs on analysis of driving trends by use of the OTDR.
	IÉ-RU CME should upgrade the OTDRs on the 8500 EMU fleet to the most up-to-date version, to ensure that digital signals are recorded for ATP penalty brake applications.
	IÉ-RU CME should consider retrofitting all EMU fleets with a Remote Diagnostic System, whereby a rule can be introduced so that DTEs are immediately notified of ATP penalty brake applications.
	IÉ-IM CCE should consider, based on a risk-based approach, the introduction of TGAs at more locations.
	IÉ-IM SET should undertake a review of I-SIG-2145, Calculation of Signal Spacing Distance, to consider if the risk approaches identified in the standard are effective in relation to the calculation of the spacing of signal distances, in particular, in relation to sharp speed decreases on the approach to signals and consideration should be given to incorrect driving techniques (i.e. driving into the bonds). A review of the use of derogations should also be undertaken.
	IÉ-IM SET should put systems in place to ensure that the train simulator staff are provided with updated signal layout schematics as and when required e.g. altered signal positions.
	IÉ-RU CME should update its commissioning documents, to ensure that maintenance tasks commence after installation
	IÉ-RU CME should review the 8500 EMU sanding improvement plan (2016) against current standards with a view to updating and implementing the sanding improvements to current standards.
	IÉ-RU Ops should update the OTDR Download Assessment Form for DART drivers with only tasks pertinent to DART drivers; allowing DTEs to carry out comprehensive assessments of the DART drivers' driving techniques.
	IÉ-RU Ops should update its competency assessment processes to ensure that the assessments carried out, are the most beneficial, in terms of identifying driver discrepancies.
	IÉ-RU Ops should brief all drivers on the importance of making an open call in an emergency situation rather that calling the Signalmen direct.
Collision with track equipment between Newbridge and Kildare, 27th August 2021 (RAIU Report No. 2023-R002, published 23/02/2023)	IÉ-IM and IÉ-RU should consider developing a system, whereby Signalmen must provide a Unique Possession Authority Number, or similar, when authorising T3 Possessions to the PICOP; this number or safeguard should be provided to all staff prior to entering a T3 Possession.

Report/USAN/SAN	Recommendation
Collision with track equipment between Newbridge and Kildare, 27th August 2021 (RAIU Report No. 2023-R002, published 23/02/2023)	IÉ-IM should review the current system of supervising and monitoring T3 Possessions, in terms of possession arrangements (e.g. Authority Number) and safety documentation (e.g. method statements); this review should identify improvements in terms of managing T3 Possessions. At a minimum, IÉ-IM should: • Expedite an increase in the supervision and monitoring of T3 Possessions by Engineering Department staff through updating CCE-SMS-001, specifically increasing monitoring prior to possessions being granted (while the IÉ-IM review and updating of supervision and monitoring of T3 Possessions is being undertaken); • Revise the current process of monitoring possessions through Safety Tours, CCESMS-008, to ensure the requirements of all guidelines are recorded in the Safety Tour Form; • Once the Safety Tours, CCE-SMS-008, documentation has been reviewed and updated, verify that the Safety Tours are being carried out correctly, and in full accordance with the guidelines, through an auditing process.
	IÉ-IM should promote a positive culture between staff, at different grades, to ensure ground level staff (including contractors) feel confident to challenge more senior staff in terms of safety. This can be achieved through staff briefing days, safety campaigns and development of a means for staff to provide feedback on supervision activities.
	IÉ-IM should introduce processes to ensure that information submitted to the RAIU is correct and submitted within the requested timeframes.
	IÉ-IM should introduce processes to ensure that information submitted to the RAIU is correct and submitted within the requested timeframes.
Collision of an RRV Dumper with a member of Iarnród Éireann infrastructure maintenance staff, Tivoli, Cork, 6th July 2022 (RAIU Report No. 2023-R003, published 07/06/2023)	IÉ-IM PTS Certification training should include training on the head lights and tail lights for trains ("white lights" are coming towards you, or "red lights" are travelling away from you); and, specifically, for RRV Dumper, explain the configurable directional lights and the requirement to have red lights displayed at both ends when stationary.
	IÉ-IM CCE should re-examine the risk assessment related to RRV movements, where previous control measures cannot be implemented (i.e. RRV engines cannot be switched off), alternatives should be considered.
	IÉ-IM should produce and circulate a policy document for the use of mobile phones and all handheld electronic devices for the acceptable, safe and secure use and management of these devices when working on the railway.
Failure of a Current Return Cable on a Luas Tram, Connolly Stop, 25th of October 2022 (RAIU Report No. 2023-R004, published 13/10/2023)	TDLR should develop supporting guidance documentation to WI-00814, Preparation before and after wheel turning, to include information on possible defects e.g. photographs of unacceptable levels of corrosion on the Current Return and Earth Shunt cable Lugs.
	TDLR should consider updating LNMC Manual Document (TDLR-OP-M-0001) to include guidance for Traffic Supervisors in relation to actions to be taken in the case of failed cables and hoses.
	TDLR should consider updating WI-00814, Preparation before and after wheel turning to include the recording of the testing and serial number of the torque wrench into TDLR-FRM-ENG-023 Citadis 401 Wheel Turning Certificate Issue A November 2020.
	TDLR should consider updating the Wheel Turning Certificate to provide a space for the torque wrench registration number conformation of test and torque value achieved when reattaching the Current return and Earth Shunt cables with a space for sign off.
	For instances where rolling stock is withdrawal from service as a result of damage; TDLR should develop notification procedures to identify where immediate notification to the RAIU is required.

Report/USAN/SAN	Recommendation
Self-detrainment of passengers between Shankill & Bray, 24th of July 2022 (RAIU Report No. 2023-R005, published 22/12/2023)	IÉ-RU Head of Health & Safety, in conjunction with the CME Department, should develop Traction Manual for the entire 8500 Class DART fleet; this should include guidance on the air conditioning. Once complete, this should be briefed to drivers to ensure drivers fully understand how the air conditioning operates.
	IÉ-RU Head of Health & Safety should include a check that the heating, ventilation and air conditioning systems are operational in the train preparation instructions.
	IÉ-RU should update its Passenger Comfort Risk Register to adequately address the issues related to crowding on trains (with special consideration given to crowding during adverse weather conditions). Based on this, IÉ-RU should develop an operational SMS document for the management of crowding on trains.
	IÉ-RU should conduct a full review of how crowding at outlying stations is managed during major events, including reviews to local crowd control plans, PTI and train dispatch documentation; to ensure that the relevant stations are staffed appropriately to adequately manage the passenger flows.
	IÉ-RU should review its planning and management processes for large events, considerations should be given to: • How and what information is provided to passengers prior to the event (such as information in relation to predicted scale of passengers using the trains and likely conditions for their journey in order to manage passengers' expectations); • How passengers' expectations are managed for the duration of the event (such as using real time information and making this freely available through passenger announcements at stations and on the IÉ App and social media accounts).
	IÉ-RU should review its Ontrain Customer Communications Booklet and Professional Driving Handbook, and provide drivers with additional training, to enhance driver communications with passengers. The documentation and training should consider best practice and, at a minimum, the following requirements: • An initial announcement to be made within a specified short period of time, even if the reason for the delay is not known at that point; • A further announcement to be made as soon as further information is available about the cause and likely consequences of the delay; • Further announcements, at specified intervals, should be made whenever new facts suitable for informing and/or reassuring passengers become available; • In critical conditions, announcements should be made to dissuade passengers from detraining, these should include making announcements highlighting the risks involved with detraining and their safest option is to remain on the train.
	IÉ-IM should carry out a review to determine the suitability of direct messaging (visually and/or verbally) from CTC directly onto trains, consideration should be given as to whether it would improve onboard passenger communications.
	IÉ-RU should consider developing processes, in the case of emergency situations, to provide information through social media channels; these communications must be customer-friendly in order to encourage passengers to follow any directions given.
	IÉ-IM should develop suitable instructions and guidance for operational staff at CTC to help them determine when a train should be considered as stranded (consideration should be given to the proximity of the stranded train to a station); the timeframe within which this needs to be declared and the actions that then need to be taken must be set out. Where appropriate, these instructions and guidance should be included in the IÉ Rule Book and relevant associated documentation.

Report/USAN/SAN	Recommendation
Self-detrainment of passengers between Shankill & Bray, 24th July 2022 (RAIU Report No. 2023-R005, published 22/12/2023)	IÉ-IM should develop suitable instructions and guidance for operational staff at CTC to help them determine when a train should be considered as stranded (consideration should be given to the proximity of the stranded train to a station); the timeframe within which this needs to be declared and the actions that then need to be taken must be set out. Where appropriate, these instructions and guidance should be included in the IÉ Rule Book and relevant associated documentation.
	IÉ-IM, and IÉ-RU, should review and formalise its processes for the attendance and allocation of staff requirements at CTC for major events, to determine what members of staff need to be present.
	IÉ-RU and IÉ-IM should carry out an incident simulation in terms of a scenario involving an incident with the potential for self-detrainment. As part of this simulation, the relevant stakeholders (An Garda Síochána, Dublin Fire Brigade, etc.) should be invited to participate. Any lessons learnt such be adopted into the relevant guidance documents.
	IÉ-RU should review its high level emergency preparedness, crowd control plans, risk assessments, train evacuation briefing notes and all other relevant document to include guidance on self-detrainments. Once complete, they should be circulated to the relevant departments and stations, for briefing.
	IÉ-RU CME should carry out an assessment on the quality of the public address systems on EMUs against good practice standards and address any deficits.
	IÉ-RU Health & Safety should ensure that train preparation instructions should include a check that public address systems are working prior to trains entering service.
	IÉ-IM & IÉ-RU should review the suite of documents in relation to the planning of large events to ensure that all key personnel are involved in the planning of events.
	IÉ-IM should update the IÉ Rule Book to include instructions for drivers in the event of self-detrainment and/ or stranded trains; these requirements should then be incorporated into the relevant associated documents.
	IÉ-IM should develop procedures for the evacuation of passengers over trespass guards, these should then be included in the Train Evacuation Briefing Notes and other relevant documents which reference evacuations.
	IÉ should engage with the relevant parties of An Garda Síochána to ensure that there is a shared understanding at CTC of when and how instructions from An Garda Síochána should be complied with. This can be practiced through IÉ-RU incident simulations where An Garda Síochána are in attendance.
	IÉ-IM and IÉ-RU should develop a system whereby internal recommendations as a result of safety related incidents are logged with an allocated timeframe, and the actions taken verified, and the status recorded.
In the first column: Light blue indicates recommendations associated with IÉ-IM & IÉ-RU; dark blue indicates recommendations associated with TDLR.	

Table 2 – RAIU safety recommendations closed in 2023

This section identifies the safety recommendations closed in 2023 (in order of occurrence date, oldest first).

Report/USAN/SAN	Recommendation
Vehicle struck by train at Corraun level crossing, XX024, Co. Mayo, 12th February 2014 (published 30/04/15)	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.
Difflin Light Rail (DLR) Passenger Fall, Co. Donegal on the 17th December 2016 (published 7/11/2017)	DLR should review the physical and procedural safeguards for the operation of their trains, to prevent small children whose feet do not touch the ground in a seated position, from falling from open carriages.
Wrongside Door Failure at Ashtown Station, 12th August 2018 (published 25th June 2019)	IÉ-RU CME should review their scheduled maintenance examinations, for multiple-unit fleets, with a view to developing a means to check the connection is correct on the electrical head.
Overhead Line detachment, Pearse Station, 1st October 2020 (published 22/09/2021)	IÉ-RU CME should carry out, in conjunction with the Original Equipment Manufacturer (OEM), a condition assessment to determine the correct period for the overhaul of the IÉ-RU pantographs.
	IÉ-RU CME to include requirements to check pantograph maintenance activities in the Compliance Coordinators documentation records / check sheets.
Dangerous occurrence involving a Double SPAD at Clontarf Road Station, 7th December 2021 (RAIU Report No. 2023-R001, published 16/02/2023)	IÉ-IM Chief Civil Engineer (CCE) should consider, based on a risk-based approach, the introduction of TGAs at more locations.
Light blue indicates recommendations associated with IÉ; yellow indicates DLR	

Table 3 – All RAIU Safety Recommendations & their status

This section includes all RAIU safety recommendations and their status as of the end of 2023.

Report	Safety Recommendation	Status / Year Closed
Collision at Level Crossing XN104 between Ballybrophy and Killonan, 28th June 2007 (published 2008)	IÉ to review the various sources of information relevant to level crossings & develop a standard, or suite of standards, consolidating information on civil engineering specifications; signage specifications; visibility of approaching trains; & inspection and maintenance. Ensuring effective & compliance.	**2015**
	IÉ to develop a robust system that identifies current landowners who have crossings on their property and records the delivery of information to them. This should include the distribution of information to known contractors and should consider timely reminders coming up to the silage season.	**2010**
	IÉ to develop and implement a vegetation management programme that addresses vegetation management on a risk basis, prioritising high risk areas.	**2015**
	IÉ to ensure that a system is put in place for effective implementation of existing standards and manage the timely introduction of new and revised standards, this should include departmental instructions.	**2014**
	IÉ to review the standards relating to on-board data recorders, ensuring that correct operation, accuracy and post incident downloads are effectively addressed.	**2010**
	IÉ to review the "Monitoring the Speed of Trains" standard, including assessing the effectiveness of monitoring by means of signal cabin train registers.	**2010**
	The CRR to review and Issue 'Guidelines for the Design of Railway Infrastructure and Rolling Stock'.	**2010**
Fatality at Level Crossing XX032 between Ballina and Manulla Junction, 28th February 2008 (published 2009)	The CRR should carry out a review of the suitability of this type of level crossing on public roads. This review should include, but not be limited to. Factors such as continual misuse, signage, user mobility, environmental and human factors.	**2013**
	IÉ should, taking into account the close proximity of the three level crossings, close or upgrade some or all of these crossings.	**2013**
	IÉ must identify crossings that are regularly misused and take proactive action to manage the increased risk created by this misuse.	**2015**
	IÉ are to put in place procedures that will capture and manage near miss reports.	**2010**
Report into the derailment of a Tara Mines freight train at Skerries, 10th January 2008 (published 2009)	IÉ should put in place a risk-based process to ensure ongoing review of the suitability of the temperature settings of the Hot Axle Box Detectors.	**2010**
	IÉ are to identify the necessary maintenance requirements for all Class D bearings, including producing detailed maintenance procedures taking into account their operational conditions and allowing for traceability of safety critical components, with assistance being sought from the Original Equipment Manufacturer where appropriate.	**2010**
Near miss at Ballymurray level crossing, 14th June 2008 between Athlone and Westport (published 2009)	IÉ should ensure all safety critical staff have undertaken safety critical communications training and that their ongoing competency management systems specifically monitors the quality of safety critical communications.	**2010**
	IÉ should put in place safe work methods for the maintenance of Automatic Half Barriers (AHBs), these methods should include risk assessments for any hazards identified in the maintenance of AHBs.	**2010**

Collision between a train and a road vehicle at level crossing XN125, Cappadine, 31st of July 2008 (published 2009)	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.	**2013**
	IÉ should carry out risk assessments on level crossings that fail to meet the viewing distances specified in the CRR guidance and implement appropriate measures in order to meet this guidance as a minimum.	**2013**
Collision of a train with the gates of level crossing XH066, Bridgetown, 2nd December 2008 (published 2009)	IÉ should review the training and competency management of gatekeepers and signalling maintenance personnel.	**2010**
	IÉ should review the design of signal indicators to ensure their design encourages correct interpretation.	**2010**
	The CRR should audit IÉ's training and competency management system to verify its effectiveness.	**2010**
Collision of a Locomotive with Carriages, Plunkett Station, Waterford, 29th March 2009 (published 2010)	IÉ should review their systems for training and competency management of signalmen ensuring working as a relief signalman is taken into account.	**2010**
	IÉ should ensure procedures are put in place for the operation and maintenance of the MU-2-B1 valves.	**2010**
Derailment of an on-track machine at Limerick Junction Station, 3rd July 2009 (published 2010)	IÉ should put in place a formalised process to ensure that life expired points are removed from service, where this is not possible a risk assessment should be carried out and appropriate controls should be implemented to manage the risks identified.	**2017**
	IÉ should ensure On Track Machine maintenance personnel are trained and competent to examine the wheelsets.	**2010**
Malahide Viaduct Collapse on the Dublin to Belfast Line, on the 21st August 2009 (published 2010)	IÉ should put appropriate interface processes in place to ensure that when designated track patrolling staff (who report to two or more divisional areas) are absent from their patrolling duties, that appropriate relief track patrolling staff are assigned to perform these patrolling duties.	**2011**
	IÉ should amend the Track Patrolling Standard, I-PWY-1307, to remove the requirement for track patrollers to carry out annual checks for scour.	**2010**
	IÉ should formalise their "Civil Engineering and Earthworks Structures: Guidance Notes on Inspections Standard", I-STR-6515, which should include guidance for inspectors on conducting inspections and identifying structural defects. On formalising this document IÉ should re-issue, in the appropriate format, to all relevant personnel.	**2010**
	IÉ should introduce a verification process to ensure that all requirements of their Structural Inspections Standard, I-STR-6510, are carried out in full.	**2013**
	IÉ should ensure that a system is put in place for effective implementation of existing standards and to manage the timely introduction of new and revised standards.	**2013**
	IÉ should ensure that a programme of structural inspections is started immediately in accordance with their Standard for Structural Inspection, I-STR-6510, and ensure that adequate resources are available to undertake these inspections.	**2010**
	IÉ should carry out inspections for all bridges subject to the passage of water for their vulnerability to scour, and where possible identify the bridge foundations. A risk-based management system should then be adopted for the routine examination of these vulnerable structures.	**2013**

	IÉ should develop a documented risk-based approach for flood and scour risk to railway structures through: Monitoring of scour risk at sites through scour depth estimation, debris and hydraulic loading checks, and visual and underwater examination; Provision of physical scour / flood protection for structures at high risk; Imposing of line closures during periods of high water levels where effective physical protection is not in place.	**2013**
	IÉ should adopt a formal process for conducting structural inspections in the case of a report of a structural defect from a member of the public.	**2015**
	IÉ should introduce a training, assessment and competency management system in relation to the training of structural inspectors, which includes a mentoring scheme for engineers to gain the appropriate training and experience required to carry out inspections.	**2012**
	IÉ should review their network for historic maintenance regimes and record this information in their information asset management system (IAMS). For any future maintenance regimes introduced on the network, IÉ should also record this information in IAMS.	**2015**
	IÉ should incorporate into their existing standards the requirement for the input of asset information into the technical database system upon completion of structural inspections.	**2010**
	IÉ should carry out an audit of their filed and archived documents, in relation to structural assets, and input this information into their information asset management system.	**2015**
	The CRR should review their process for the closing of recommendations made to IÉ by independent bodies, ensuring that they have the required evidence to close these recommendations. Based on this process the CRR should also confirm that all previously closed recommendations satisfy this new process.	**2016**
	The CRR, in conjunction with IÉ, should develop an action plan in order to close all outstanding recommendations in the AD Little Review (2006) and the International Risk Management Services Reviews (1998, 2000, and 2001). This action plan should include defined timescales for the implementation and closure of all these recommendations.	**Open**
Irregular operation of AHBs at Ferns Lock, County Kildare, 2nd September 2009 (published 2010)	IÉ should review the competencies of all signalmen to ensure that when signalmen are assigned relief duties, they have the required training and experience to perform these duties appropriately.	**2014**
Derailment of empty train due to collision with landslip debris outside Wicklow Station, 16th November 2009 (published 2010)	IÉ should review their vegetation management processes to ensure that vegetation covering substantial earthworks structures is adequately maintained to facilitate the monitoring and inspection of earthwork structures by patrol gangers and other inspection staff.	**2013**
	IÉ should review the effectiveness of their standards in relation to conducting earthworks inspections during periods of heavy rainfall, ensuring that earthworks vulnerable to failure are inspected during these periods by appropriately trained patrol gangers or inspectors.	**2013**
	IÉ should review their Standard for Track Patrolling, I-PWY-1307, for its effectiveness in identifying any third party activities that occur inside and outside the railway boundaries that could affect safety and where any deficiencies are found, IÉ should develop an alternative process for the identification of these third party activities.	**2010**
	IÉ should review their structures list & ensure that all earthworks are identified and included on this list. Upon updating this list, a programme for the inspection of earthworks is to be developed & adopted at the frequency requirements set out by the Structural Inspections Standard, I-STR-6510.	**2015**
	IÉ and the CRR should review their process for the issuing of guidance documents, to ensure that the third parties affected by these guidance documents are made aware of their existence.	**2017**

	IÉ should review the effectiveness of their Structural Inspections Standard, I-STR-6510, with consideration for the possibility of more thorough inspections being carried out on cuttings to establish the topography & geotechnical properties of cuttings; & from this information identify any cuttings that are vulnerable to failure.	**2015**
Laois Traincare Depot (LTCD) Derailment, 20th January 2010 (published 2011)	IÉ should ensure that the risks relating to use of spring assisted manual points are identified and that appropriate control measures are implemented based on the risks identified.	**2013**
	IÉ should ensure that the SSC is informed when train drivers report difficulties viewing a signal and the Signal Sighting Committee should verify that the reported difficulties are addressed effectively.	**2022**
Secondary suspension failure on a train at Connolly Station, 7th May 2010 (published 2011)	IÉ should ensure all work in rolling stock maintenance depots is carried out in accordance with its control process.	**2017**
	IÉ should review its process of managing the hazard log in relation to the Class 29000s to ensure the adequacy of this process and verify that implementation of closure arguments in the hazard log is effective.	**2017**
	IÉ should evaluate the risks relating to failure of the centre pivot pin to perform its function due to over-inflation of the secondary suspension and determine if any design modifications are required to avoid future failures.	**2016**
Tram derailment at The Point stop, 13th May 2010 (published 2011)	TDLR should introduce a communication protocol between normal and emergency for given situations where a clear understanding between a tram driver and Central Control Room are required.	**2019**
Gate Strike at Buttevant Level Crossing (XC 219), County Cork, 2nd July 2010 (published 2011)	IÉ should identify similar manned level crossings where human error could result in the level crossing gates being opened to road traffic when a train is approaching; where such level crossings exist, IÉ should implement engineered safeguards; where appropriate.	**2017**
	IÉ should review its risk management process for manned level crossings to ensure that risks are appropriately identified, assessed and managed to ensure that existing level crossing equipment is compliant with criteria set out in IÉ's signalling standards, where appropriate.	**2013**
Person struck at level crossing XE039, County Clare, 27th June 2010 (published 2011)	IÉ should ensure that risk assessments are produced for all user worked level crossings to identify all hazards specific to particular level crossings.	**2018**
	IÉ should review their documentation on the measurement of viewing distances at existing user worked level crossings to ensure that the viewing distances provide sufficient views of approaching trains to allow level crossing users cross safely.	**2017**
	IÉ should review their procedures for the management of accidents to ensure that communication with the emergency services is clear and provides the necessary information to locate an accident site without undue delay and access it by the most appropriate point.	**2018**
Road vehicle struck at level crossing XM096, County Roscommon, 2nd September 2010 (published 2011)	IÉ should put in place a formal process for identifying and communicating with known users of user worked Level Crossings.	**2014**
	IÉ should review the effectiveness of its signage at user worked level crossings, and amend it where appropriate, taking into account the information provided in the level crossing user booklet. The review should include the information on the use of railway signals, what to do in case of difficulty when crossing the railway and ensuring the signage is illustrated in a clear and concise manner, taking into account current best practice and statutory requirements.	**2017**
	IÉ should update its risk management system to ensure that interim control measures are put in place where longer term controls to address risks require time to implement.	**2014**
	IÉ should review how it determines the safe crossing time for user worked level crossings to ensure the safe crossing time allows adequate time for movements and includes a safety margin, over and above the crossing time.	**2022**

	IÉ should review its use of disused rail as fencing at user worked LCs to ensure it cannot potentially increase the severity of a collision and where this is the case, replace the disused rail with appropriate fencing.	**2014**
Car Strike at Knockaphunta Level Crossing (XM250), County Mayo, 24th October 2010 (published 2011)	IÉ should upgrade the Level Crossing to ensure that the operation of the Level Crossing is not reliant on any direct action by the level crossing user.	**2019**
Car Strike at Morrough Level Crossing XG 173, 14th February 2011 (published 2012)	IÉ should liaise with local authorities where private road level crossings can be accessed from a public road to ensure there is advance warning to road users.	**2016**
	IÉ should ensure that they adopt their own standards in relation to design changes to any plant, equipment, infrastructure or operations that has the potential to affect safety.	**2018**
	The CRR should ensure that they adopt a formal approach to submissions made by IÉ in relation to design changes to any PEIO that has the potential to affect safety.	**2012**
	IÉ should review the suitability of the signage at user worked crossings on public and private roads, ensuring that human factors issues are identified and addressed.	**2020**
Runaway locomotive at Portlaoise Loop, 29th September 2011 (published 2012)	IÉ should review their Vehicle Maintenance Instructions (VMIs) for locomotives to ensure that there are adequate braking tests at appropriate intervals.	**2016**
	IÉ should adopt a quality control system, for the introduction of new maintenance procedures for locomotives.	**2014**
	IÉ should review their system for introducing new train drivers' manuals, to ensure that train drivers are fully trained and assessed in all aspects of these manuals.	**2018**
	IÉ should review their competency management system for train drivers to ensure that all driving tasks are routinely assessed.	**2014**
Bearing failure on a train at Connolly Station, 18th October 2011 (published 2012)	IÉ should put in place provisions to assist train drivers with the task of identifying if there is a fault present with an axlebox.	**2013**
	IÉ should ensure the competency management system for signalmen includes the assessment of Hot Axle Box Detector (HABD) related functions they perform.	**2014**
	IÉ should put in place formal procedures governing the role of Fleet Technical Services staff in relation to Hot Axle Box Detectors.	**2016**
	IÉ should ensure that a robust system is put in place for the competency assessment of safety critical rolling stock maintenance staff.	**2014**
	IÉ should update its competency management system for train drivers to include assessment of their competency in relation to their tasks following a HABD alarm.	**2014**
Tractor struck train at level crossing XE020, 20th June 2012 (published 2013)	IÉ should close, move or alter the level crossing in order to meet the required viewing distances in IÉ's technical standard CCE-TMS-380 Technical Standard for the Management of User Worked Level Crossings.	**2017**
	IÉ should review their systems of managing level crossings that fail to meet the viewing distances in IÉ technical standard CCE-TMS 380 Technical Standard for the Management of User Worked Level Crossings to ensure that any mitigation measure that is introduced is effective at reducing the risk to level crossing users.	**2016**
	IÉ should audit their Level Crossing Risk Matrix (LCRM) system, to ensure it correctly identifies high risk level crossings; and identifies appropriate risk mitigation measures for individual level crossings.	**2017**

	IÉ staff who may be required to contact the emergency services should have the appropriate information readily available to them in order to give clear instructions to the emergency services in order that they can attend accident sites in a prompt manner. This information should then be updated in IÉ's Rule Book.	**2017**
Fog signal activation in Dart driving cab, Bray, on the 6th March 2012 (published 2013)	IÉ should ensure that their procurement and quality control processes verify that goods received are of the correct specification as those ordered.	**2017**
	IÉ should introduce appropriate procedures and standards for the safe issue, storage and transportation of fog signals.	**2017**
	IÉ drivers (and other staff) should receive adequate training in the safe handling of fog signals.	**2017**
USAN 001 DART Wrongside Door Failure, Salthill & Monkstown Station, 18th August 2013 (issued 2013)	IÉ should put in place mitigation measures to prevent the wrong side failure of the door interlocking equipment on the Dart trains.	**2013**
	IÉ should put in place a system to manage the risks associated with the wrong side failure of the door interlocking equipment on the DART trains.	**2013**
Trend Investigation: Possession incidents on the Iarnród Éireann network (published 2014)	IÉ IM should develop a formal possession planning meeting framework that is consistent through the IÉ network.	**2014**
	IÉ IM should review the application of Back-to-Back possessions and implement actions to eliminate any informal practices that do not comply with IÉ Rule Book.	**2014**
	IÉ IM should establish a possession planning procedure that ensures protection arrangements are based on the work to be delivered and are verified by a suitable member of staff and formally communicated to all relevant personnel.	**2014**
	IÉ-IM should monitor and review entries into Section "Engineering works requiring absolute possessions – Section T Part III" of the Weekly Circular to ensure that the information published in this document is accurate and credible.	
	IÉ-IM should review the current process for late changes to possessions to ensure changes to possession arrangements are verified by a suitable member of staff and formally communicated to all relevant personnel.	**2017**
	IÉ-IM should undertake a review of possession incidents that have occurred over the last four years to ensure that reports are completed & recommendations are identified and addressed.	**2022**
Operating irregularity during SLW between Dundalk and Newry, 23rd March 2013 (published 2014)	IÉ should review the signalling infrastructure cross -border with a view to commissioning the bi-directional signalling.	**2014**
	IÉ should review their training, assessment and competency of Signalmen and Pilotmen in relation to SLW with Pilotman to ensure they are confident in performing their respective duties during SLW and are familiar with the routes covered.	**2022**
	IÉ should review current communication procedures with regard to the updated communication equipment now available.	**2018**
DART wrongside door failure, Salthill & Monkstown Station, 10th August 2013 (published 2014)	The CME (IÉ RU) should review and modify their design for the EMU autocouplers to ensure a more robust coupler circuit that will provide assurance that both coupler electrical heads have connected correctly and that coupler circuits are continuous throughout the train consist. Any modification made should be documented in Rolling Stock Design Standards.	**2014**
	The CME (IÉ RU) should introduce a visual indicator on the driving console to indicate to the driver that coupling has been completed successfully (or a visual or audible indication that coupling has failed).	**2015**

	DART Operations (IÉ RU) should update the applicable EMU Drivers' Manuals to include specific guidance on the requirement for the examination of couplers. The update should also include guidance on associated testing of coupler integrity and guidance on any indications in the driving cab that would assist the driver in detecting any coupler failure.	**2016**
	The CME (IÉ RU) should review and modify the processes set out in their SMS for closing recommendations to ensure recommendations from investigations are recorded, monitored and closed. When these processes have been established, they should be audited (by a party external to the CME) at predefined intervals to ensure compliance.	**2015**
Tram fire on approach to Busáras Luas Stop on the 7th November 2013 (published 2014)	TDLR should ensure that Alstom, as the contracted Vehicle Maintenance Contractor, review maintenance instructions to ensure separation is maintained between hydraulic circuit and the traction cables at installation and during operation.	**2015**
	TDLR should ensure that Alstom, as the contracted VMC, add the interaction between the braking hoses and traction cables and the potential event of a flash fire to the hazard log of the 401 Type Tram and implement all identified mitigation actions.	**2015**
	TDLR should ensure that Alstom, as the contracted VMC, review the performance requirements for the isolation protection system in the MIC bogie to ensure that it meets the requirements of the 401 hazard log or revise the 401 hazard log accordingly.	**2015**
	TDLR should ensure that Alstom, as the contracted VMC, review the requirements for traction cables in the MIC bogie and produce and implement a suitable specification for this component. Installation procedures should also be reviewed to ensure that the free length requirements of these components are fulfilled.	**2017**
	TDLR should ensure that Alstom, review the defect priority matrix with regards to damage to traction cable insulation and fretting between these components and hydraulic hoses. In addition to this, maintenance procedures should be introduced to specify actions for the repair of traction cables.	**2015**
	TDLR should ensure that Alstom, review their incident / accident investigation process to ensure that investigations are of sufficient depth and produce clear recommendations.	**2015**
	TDLR should undertake a review of higher ignition temperature hydraulic oils to identify if they would be feasible in the braking circuit and add a safety benefit.	**Open**
Structural failure of a platform canopy at Kent Station, 18th December 2013 (published 2014)	IÉ-IM should identify all cast-iron structures on the network. From this, a risk-based approach should be taken in relation to the inspection of these assets, during routine inspections, in terms of any risks associated with cast-iron.	**2022**
	IÉ-IM should establish a formalised procedure for managing the risk associated with the adverse effects of high winds.	**2015**
	IÉ-IM should review the structural and annual inspection regimes for Building & Facilities to ensure all assets are inspected in accordance with the prescribed standards and any associated documentation is completed appropriately.	**2022**
Rock fall at Plunkett Station, Waterford, 31st December 2013 (published 2014)	IÉ-IM CCE should complete a thorough review of CCE-STR-STD-2100 in relation to the application of condition ratings on assets to ensure that condition ratings are a true reflection of the condition of the asset; and that the appropriate inspection frequency is applied.	**2015**
	IÉ IM CCE should complete a thorough review of the Cuttings, Embankments and Coastal/River Defences Inspection Card set out in CCE-STR-STD-2100 to ensure that Structures Inspectors have the correct means to complete the card without the requirement for alterations to templates or defined terms. The process of approval of these Inspection Cards should also be reviewed to ensure that they are reviewed and approved by the Senior Track & Structure Engineer.	**2010**
	IÉ-IM CCE should complete thorough reviews of CCE-STR-STD-2100 and CCE-STR-GDN-2802 in terms of maintenance requirements to ensure consistency throughout both documents.	**2016**

	IÉ-IM CCE should fully adopt the compliance verification process and ensure the process includes an effective means of reviewing the quality of documents completed by staff.	**2015**
	IÉ-IM CCE should review its Competence Management System in terms of both: its identification and tracking of mandated refresher training for Structures Inspectors competence; and its annual review of Structures Inspectors inspection work.	**2015**
Vehicle struck by train at Corraun level crossing, XX024, Co. Mayo, 12th February 2014 (published 2015)	IÉ should consider options to upgrade the crossing to minimise direct action by the users.	**2022**
	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.	**2023**
	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.	**2016**
Car strikes train at Level Crossing XM 250, Knockaphunta, Co. Mayo, 8th June 2014 (published 2015)	The CRR, Road Safety Authority (RSA) and IÉ in consultation with any relevant stakeholders should agree a common policy in connection with instructions and warnings related to user worked level crossings.	**2018**
Investigation into SPADs on the IÉ network from January 2012 to July 2015 (published 2016)	IÉ-IM must introduce an adequate TPSs 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.	**Open**
	IÉ-IM should review the functionality of the ATP's running release to ensure that the train protection function in relation to passing a signal at danger is appropriately maintained where drivers are approaching signals displaying red aspects. If this is not feasible with the current equipment it should be included any new TPS introduced on the network.	**Open**
	IÉ-IM should review the functionality of signals in the Connolly area so that the instances of abnormal upgrades or downgrades.	**2017**
	IÉ-RU should commission an independent review, in terms of human factors, to determine why there is a prevalence for the occurrence of SPADs: at certain times of the day; at certain times of drivers shifts; and for drivers with three-five years driving experience.	**2017**
	IÉ-RU should review the culture within the company so that actions taken after SPADs supports learning within the driver grades should errors occur, and that the DD&SS is used for redeveloping competence in driving skills and supporting the drivers in returning to driving duties, after a SPAD event.	**2017**
	IÉ-RU should introduce a near miss reporting system, whereby, drivers may report near misses without the fear of sanctions being imposed.	**2017**
	IÉ-IM should identify high risk signals and, where the technology exists, introduce a mechanism to monitor the approach speed to these signals; to ensure that near misses are identified and managed.	**Open**
	IÉ-IM should review the Traffic Regulator's Manual with a view to introducing guidance for Traffic Regulator's in terms of the management of train delays and the switching of crossing points.	**2018**
	IÉ-IM should review their training and competency management for Traffic Regulators so that they have the appropriate skill set in terms of identifying potential risks associated with the regulating of trains.	**FER**
	IÉ-RU and IÉ-IM should carry out a review of the interfaces between different operational staff (i.e. drivers, Level Crossing Control Operators (LCCOs), signalmen and Emergency Operatives) so that all operational staff can adequately manage train operations during degraded situations. Part of this review should focus on the safety critical communications between operational staff.	**2019**

	IÉ-IM should identify all locations where safety critical communications are not recorded and develop a programme of works for the introduction of recording safety critical communications at these locations.	**Open**
	IÉ-IM should review the procedures applicable to signalman, Level Crossing Keeper, LCCO and level crossing emergency operators with particular emphasis on the actions to be taken by each when a fault is detected at a level crossing. This review should consider circumstances where a train may already have entered the affected section of line, and circumstances where the signal may be missing or extinguished.	**2020**
	IÉ-IM, should review their procedures for the placement of speed boards and brief relevant staff to be vigilant in the placement of lineside signage with respect to the potential for obscuring of signals or otherwise unintentionally providing distractions to drivers, especially in the case where there are fixed colour light signals, or they have potential to cause Start On Yellow SPADs.	**2017**
	IÉ-IM & IÉ-RU should review the current system of reporting SPAD events so that reports are consistent and published within a set period of time.	**2016**
Dangerous occurrence between Ballybrophy and Portlaoise, 12th September 2015 (published 2016)	IÉ-IM should review the Site Safety Briefing procedure to ensure all personnel have made themselves aware of the information contained in the relevant Weekly Circular.	**2018**
	IÉ-IM should review the method of allocation and accountability for general operatives detailed for work sites, to ensure that there are sufficient personnel on site to perform the required duties.	**FER**
Operational incidents at Ardrahan on the 23rd October 2015 & Spa on the 28th November 2015 (published 2016)	IÉ-RU should review all traction fleets that do not have sanding capabilities, and fit suitable systems to minimise the risk of low adhesion incidents. NIR have also closed this recommendation. Although this recommendation was closed for IÉ-RU, it remains open against the Railway Preservations Society of Ireland & other maintenance railway organisations operating on the IÉ network.	**Open**
DLR Passenger Fall, Co. Donegal 17th December 2016 (published 2017)	DLR should review the physical and procedural safeguards for the operation of their trains, to prevent small children whose feet do not touch the ground in a seated position, from falling from open carriages.	**2023**
	DLR should review their risk assessment process to ensure that all reasonably foreseeable risks associated with the operation of trains are identified and suitable control measures identified.	**2018**
	DLR should review the DLR SMS, in its totality, and ensure that there are internal monitoring procedures that mandates the periodic checking of application of SMS processes and practises.	**2018**
	DLR should review their responsibilities under the Safety and Welfare at Work Regulations as to dedicated First Aid areas.	**2018**
Near miss at Knockcroghery Level Crossing, XM065, Co. Roscommon, 31st January 2017 (published 2017)	The SET Department should review the camera position at LC XM065, and other similar CCTV level crossings, to ensure that the LCCOs have optimum, unobstructed, views of level crossings.	**FER**
	The IÉ-IM SET Department should develop a formalised risk assessment process for the positioning of CCTV cameras and associated design works.	**2022**
	IÉ-IM should identify CCTV level crossings with obstructed views and issue interim instructions to LCCOs to fully raise the barriers where there is a possibility of any obstructions on level crossings.	**FER**
	IÉ-IM should review the human factors and non-technical skills training for LCCOs, and introduce further training, where applicable. In addition, IÉ-RU should finalise the Professional Support Handbook for Level Crossing Control Operators; to provide guidance for LCCOs in the areas of human factors and non-technical skills.	**2019**

	IÉ-IM should review and update the Level Crossing Control Centre Instructions, to make them more user friendly for LCCOs.	**2019**
Derailment of DART passenger service, at Points DL115, Dun Laoghaire, 13th September 2017 (published 2018)	IÉ-IM should conduct a full review of IMO-SMS-031, 'Competence Management – Persons required to conduct IM operating duties and associated documentation, to identify deficiencies in training, continuous assessment and the recording of performance of duties to ensure that persons carrying out these duties are competent to do so.	**2019**
	IÉ-IM and IÉ-RU should evaluate the current training, assessment and monitoring of Safety Critical Communications to ensure that communications are carried out to the requirements set out in IÉ Rule Book, and safety critical communications standards IMO-SMS-033 and OPS-SMS-8.1.	**Open**
	IÉ-RU should review their suite of documents which reference major customer disruptions and emergencies and address any deficiencies in relation to the management of passengers on trains and uncontrolled impromptu evacuations. These documents should then be briefed to staff who have roles in relation to customer disruptions and emergencies to ensure they are aware of their responsibilities.	**2021**
	IÉ-IM should update the relevant sections of the General Appendix and other associated documentation to specify where the points clip should be fitted.	**2020**
	IÉ-IM should agree and implement a consistent wording in the Rule Book, General Appendix, training material and oral instructions in relation to the points operator's instructions; and ensure that the importance of the task order is highlighted in the training for points operators	**FER**
	IÉ-IM should review the drawing and specification requirements for points scotches and ensure only scotches manufactured to the required drawing and specification are made available to points operators.	**2022**
	IÉ-RU should brief the relevant staff on the requirements of the IÉ Rule Book (Section M 3.1.2) which states that where emergency detonator protection is not needed, drivers must place a Track Circuit Operating Device on the line(s) concerned to supplement the signal protection.	**2021**
USAN 002 Collision of an ICR with a buffer stop at LTCD, 17th July 2018 (issued 2018)	IÉ should advise all relevant staff that a positive brake cylinder gauge reading in the cab of an ICR is not an indication that a brake is present.	**2020**
Wrongside Door Failure at Ashtown Station, 12th August 2018 (published 2019)	IÉ-RU CME should review VMI Z1C29A0001 'Examination of 29000 class vehicle after an incident / accident' to develop a more thorough and robust VMI that is commensurate with the safety risk of faults occurring after rolling stock has been involved in an incident or accident.	**2021**
	IÉ-RU CME Department should review Vehicle Maintenance Instructions (VMIs) associated with the examination of rolling stock after an incident / accident, for all rolling stock fleets, to develop a more thorough and robust VMI that is commensurate with the safety risk of faults occurring after rolling stock has been involved in an incident or accident.	**2021**
	IÉ-RU CME Department should review their scheduled maintenance examinations, for multiple-unit fleets, with a view to developing a means to check the connection is correct on the electrical head.	**2023**
	IÉ-IM should re-brief Traffic Regulators on the importance of adhering to the Traffic Regulators' Manual in relation to the recording of all telephone conversations within the controlled environment.	**2019**

Collision of an ICR with a buffer stop at Laois Train Care Depot (LTCD), 17th July 2018 (published 2019)	IÉ-RU CME should review their SSOW & Operating Instructions (OI) and associated documents related to the identification, communication and prevention of movement of defective vehicles to ensure relevant staff are made aware of identified defects and that the defective vehicles are adequately labelled and tagged; and these processes and staff responsibilities are fully understood by all CME staff working on trains.	**2022**
	Iarnród Éireann (Railway Undertaking) Chief Mechanical Engineer's Department should review the suite of LTCD documents that relate to the management of moving trains within LTCD to ensure they are consistent and adequately reference any existing supporting documentation (e.g. ICR Hauling Assisting Instructions).	**2021**
	IÉ-RU CME should review its training and competency of CME Drivers and Limited Shunters ensuring the stabling and movement of vehicles (defective or otherwise) are adequately addressed.	**2022**
	IÉ-RU CME should expand the requirements of preparation instructions for rail vehicles to ensure that on completion of these tests the brake status of a train can be fully established; this should include checking the status of circuit breakers and brake isolations.	**2020**
	IÉ-RU CME Department should re-brief staff on the correct procedure for disembarking from a moving train.	**2021**
	IÉ-RU CME should develop a formal procedure for the examination of vehicles prior to moving a train which has been left unattended with no direct handover.	**2020**
	IÉ-RU CME should determine who has overall responsibilities for the movement of trains within the confines of LTCD, including who is allocated the role of Designated Person Responsible for Protection, and clearly brief these responsibilities in the CME Training Course and the SSOW & OI.	**2022**
Vehicle struck by train at Cartron level crossing, XM220, Co. Mayo, 17th August 2018 (published 2019)	IÉ-IM should consider options to upgrade LC XM220 to minimise the requirement of direct action by the users.	**2020**
	IÉ-IM should carry out a full review of known misused user worked level crossings on public and private roads and should develop a programme to either close or upgrade the level crossings to minimise misuse; where possible, level crossings with the highest risks should be addressed first.	**FER**
	DoT should review, in consultation with the relevant stakeholders, their current advance warning signage (W 121) with a view changing the signage to make it clear to road users that they are approaching a user operated level crossing. They should also consider the introduction of other traffic calming measures in efforts to encourage safe road user behaviour. Care should be taken not to inadvertently introduce new risks as a result of their proposed measures.	**Open**
Road Rail Vehicle occurrences on Iarnród Éireann Network from 2015 to 2018 (published 8th October 2019)	The DTTAS should review the Railway Safety Act 2005 and current amendments to make clear the classification of RRVs; consultation should be sought with the CRR; and relevant stakeholders where appropriate.	**Open**
	The CRR & IÉ-IM should review the requirements prescribed in the Railway Safety Act (and current amendments) to ensure they are satisfied that all the requirements of the Railway Safety Act (and current amendments) are met in terms of RRVs being classified as rolling stock.	**Open**
	IÉ-IM should review and improve its current CCE Plant and Machinery Standards; attention should be given to best international practice in RRVs; and, as a minimum, the following should be considered for inclusion: • Applying the requirements set out in the EN 15746/ I.S. EN 15746 standards such as controls & indicators, visibility from the cab, warning systems & communications between work positions, etc. Where, due to a technical impossibility, the design specifications of EN 15746 cannot be met in full, control measures to address these deficiencies should be clearly identified, risks assessed, and suitable controls implemented; • The installing of an appropriate emergency warning system, which, when activated in	**FER**

	emergency, can produce a suitably loud audible alarm and/or visual alarm. In cases, where this is not possible, as a result of a technical impossibility, control measures to address this deficiency should be clearly identified, risk assessed, and suitable controls implemented; • Installing Wheel Slip Prevention and/or sanders on RRVs; • Installing of Anti-Collision Devices on RRVs for the prevention of collisions with other RRVs, rolling stock, infrastructure and staff (through the provision of portable ACDs fitted to staff) on the IÉ network. In cases, where this is not possible, as a result of a technical impossibility, control measures to address this deficiency should be clearly identified, risk assessed, and suitable controls implemented; • Introducing an appropriate means of communication between work positions, whereby the RRVOs and RRVCs can communicate while on-tracking, travelling on the railway and at worksites; • Installing of data recorders on RRVs; • The suitability of the current braking system on Type 9B RRVs where an indirect rail wheel braking system is in place; consideration should be given for the requirement to have all RRVs fitted with direct rail wheel braking systems.	
	IÉ-IM are to engage with the RRV contractors in relation to updated CCE Plant and Machinery Standards; and give clear guidelines on when these new requirements come into full effect.	**2022**
	In relation to existing RRVs, IÉ-IM should assess the operation of existing RRVs to satisfy itself, on the basis of a risk assessment, that there are adequate technical and operational controls to prevent loss of control of RRV occurrences in the future.	**Open**
	IÉ-IM should include, in their post-occurrence procedures, a requirement to verify the performance of RRVs (including braking performance) involved in accident, incidents or dangerous occurrences (near misses) to ensure the requirements of the CCE Plant and Machinery Standards are met in full; this should involve the completion of a full post-occurrence examination of the RRV by the contractor. A requirement that RRVs involved in accidents, incidents or dangerous occurrences (near misses) are not permitted back onto the IÉ network until the post-occurrence procedures have been completed and the RRV is confirmed fit and safe for use.	**2022**
	IÉ-IM should update their CCE Plant and Machinery Standards to include requirements for RRV contractors to provide RRV information: at the acceptance stage; and, at later dates where modifications are made to RRVs. Where this information is not provided, and the requirements of the updated CCE Plant and Machinery are not met, the RRVs involved should not be allowed to operate on the IÉ network.	**2022**
	IÉ-IM must develop a suitable RRVO training course which must incorporate both theory and practical elements for the operation of RRVs; there should be an assessment on completion of this initial training. When a person passes this initial training, they must complete and log supervised hours of RRV operation; and present for a final through assessment. This process should be risk assessed to determine the: number of days training; practical training requirements; number of supervised hours; and final assessment requirements.	**Open**
	IÉ-IM should develop a competency management system for the management of RRVOs competencies; this system should also include instructions related to re-training and monitoring of RRVOs after they have been involved in an accident.	**FER**
	IÉ-IM should conduct a thorough review of their suite of SMS documentation and plant and machinery standards, related to RRV contractors, to identify deficiencies in terms of the management of contractors and their plant. Where deficiencies are identified, IÉ-IM should develop new systems for the management of plant on site, and, for their safety tour and compliance verification processes to ensure contractors regularly inspect and maintain their plant in good condition; rather than the continued issuance of corrective action notices.	**FER**

	IÉ-IM should review the ways in which it promotes a positive safety culture that encourages contractors to report accidents, incidents and dangerous occurrences (near misses); this can be achieved through RRVO workshops and the absence of disciplinary procedures on the reporting of occurrences.	**2022**
	IÉ-IM should ensure appropriate procedures are in place for D&A screening for IÉ-IM and contractor staff post RRV occurrence.	**FER**
	IÉ-IM should update their CCE Plant and Machinery Standards to ensure that RRV contractors are either provided with, or required to identify, the hazards associated with track gradient, rail contamination (or other low adhesion conditions) and RRV orientation and position on track through: • Assessing documentation on the site-specific hazards associated with RRV and ensuring these are addressed in contractor's safety documentation; • Setting requirements in relation to the spacing between RRVs when travelling in convoy (e.g. 100 m) and putting in place a regime to ensure these requirements are met; • Training RRVCs/RRVOs on the risks associated with track gradient, rail contamination and RRV orientation and guidance on how to manage these risks in a braking emergency.	**Open**
	IÉ-IM should conduct an audit on RRV contractor's safety documents with a view to identifying deficiencies in terms of safety and ensuring the appropriate safety documentation is produced for the works; IÉ-IM should support and offer guidance to the RRV contractors in terms of the identification of hazards and methods of working on a railway network.	**Open**
	IÉ-IM should make changes to the IÉ Rule Book to ensure that all relevant requirements set out in their CCE Plant and Machinery Standards related to RRVs are incorporated into the IÉ Rule Book.	**2022**
	IÉ-IM should update their CCE Plant and Machinery Standards to include the requirements set out in Section Q 2018 of the IÉ Rule Book related to the collection of pre-operation checklists by the RRVCs from the RRVOs; and ensure these requirements are enforced through compliance verification activities.	**Open**
	IÉ-IM should clearly define, document and explain the role and function of the RRVC in the management of RRVs in Section Q of the IÉ Rule Book and/or relevant CCE Plant and Machinery Standards. This should include: • Location of RRVC when on-tracking, during work, and off-tracking; • The sighting requirements of RRVCs (i.e. an RRVC should be able to see RRVs in their control at all times); • The allocation of RRVCs per quantity RRVs (i.e. how many RRVs per RRVs).	**Submitted**
	IÉ-IM should review and update the training requirements of RRVCs with a view to incorporating: • Basic infrastructure training (e.g. points); • Training in communications with relevant staff; • Practical RRV training to ensure they have confidence in accepting pre-operations checklists from RRVOs as set out in the IÉ Rule Book.	**Open**
	IÉ-IM should brief Signalmen on RRVs operations during possessions (i.e. accessing and egressing worksites and well as travelling to worksites training in terms of RRVs operating in possessions) to ensure points are set correctly for the RRV movements. Training material for Signalmen on the roles of RRVs should be updated to reflect this.	**2022**
	The CRR and IÉ-IM should review their processes of closing out findings from CRR audits; with a view to identifying opportunities to close out findings, such as updates to the IÉ Rule Book.	**2020**

SAN 001 Collision of an ICR with a fixed buffer stop at Laois Train Care Depot, 6th July 2019 (issued 2019)	IÉ-IM should review the selection of fixed buffer stops at locations at LTCD for their suitability and efficacy in protecting staff and infrastructure.	**2020**
	IÉ-IM should conduct review of their current specification for fixed buffer stops and their associated design forms to ensure they are fit-for-purpose; and fixed buffer stops are only selected where appropriate. Based on this review, IÉ-IM should commence a programme of inspections for fixed buffer stop at all locations on the IÉ network to ensure their suitability and effectiveness at protecting passenger, staff, track and infrastructure.	**2020**
Passenger trap-and-drag occurrence on Luas tram at Heuston Stop, 26th March 2019 (published 2020)	TDLR should update their suite of documents for driver training (SM 017 Driver Training Plan), operations (TSI Manual) and competence assessment (SM 018 & SM 019 Competence Assessment) to include a requirement for drivers to conduct a thorough final visual check (using CCTV and mirrors) after obtaining doors closed and locked indications and before moving the tram to confirm that nothing is trapped in the doors.	**Open**
	TII should conduct a risk-based review on whether CCTV platform monitors should be installed at high-use tram stops.	**2020**
	TII should conduct a risk-based review on whether the tram fleet operating on the Red Line should be upgraded with coloured rear view monitors.	**Open**
	TDLR and TII should develop new labels, for the application on tram doors, which warn passengers of the dangers of closing doors.	**2020**
	TDLR, as part of the update to the SMS 018 Competence Assessment, should formally include the assessments that should be conducted every quarter.	**FER**
	TDLR should brief drivers on the operation of the door mechanism, and specifically explain the removal of obstacle detection for the final 10 mm of door travel; this briefing should then be incorporated into their suite of training and competence management documents.	**FER**
	TDLR should develop and implement an induction training and competency assessment program for security staff, which should include training and assessment in the use of safety critical communications.	**FER**
	TDLR should update their Work Instructions to ensure that appropriate testing is conducted for sensitivity of obstacle detection, door impact for closing forces and obstacle removal forces; the requirements set out in I.S. EN 14752 should be used, as appropriate.	**FER**
	TDLR should update their drugs and alcohol policy to include explicit requirements that testing is conducted post incident/accident where the actions of a driver may have contributed to the incident/accident. TDLR should also develop a system whereby a decision not to test an individual is documented with clear justification for the decision provided.	**2020**
	TDLR should update their Chain of Care Procedure mandating that drivers are subject to appropriate developmental supports post incident/accident. Depending on the type of incident/accident, and whether the actions of the driver contributed to the incident/accident, specified periods of time of continuing developmental supports should be set.	**FER**
Near miss with an Iarnród Éireann Patrol Ganger near Woodlawn, Galway, 4th June 2019 (published 2020)	IÉ-IM should review its track inspection methods to see if technological/ mechanised systems and/ or other safety measures could be implemented to eliminate/ minimise track worker exposure to railway hazards whilst undertaking the task of track patrolling.	**FER**
	IÉ-IM should, through their risk assessment process, conduct a review of the patrol lengths, with the objective of identifying all patrol lengths with associated risks, and introducing adequate mitigation measures to eliminate these risks. Consideration should be given to the introduction of technologies (such as anti-collision devices) for use by patrol gangers, with the objective of warning patrol gangers of oncoming trains.	**FER**

Near miss with an Iarnród Éireann SET Worker at Rush and Lusk Station, 20th June 2019 (published 2020)	The IÉ-IM SET Department should develop a formalised process, through their SMS suite of documents, for IÉ-IM SET staff walking/ working alone, which should be completed prior to any member of SET staff going on or near the line; at a minimum consideration should be given to: • Whether it is necessary to go on or near the line to conduct the walk / work; • What local knowledge is required to walk /work safely; • Whether all the requirements of the IÉ Rule Book / SSOW can be met; • What special protection arrangements are required either at night or during the day.	**FER**
	IÉ-IM should brief all staff of their requirements, under the IÉ Rule Book, to wear their high visibility clothing correctly.	**2020**
Collision between an IÉ passenger train and rail-mounted maintenance equipment, Rosslare, Wexford, 11th January 2020 (published 2020)	IÉ-IM should classify and define RMMEs, Trolleys, LMEs and other commonly used plant or equipment on the railway and ensure appropriate safety procedures are in place for their use. IÉ-IM should also assess the need for any associated training and competency related to these changes and if considered necessary prepare training and competency assessment material.	**Open**
	IÉ-IM CCE should ensure that, once defined and classified, change management systems are put in place to ensure RMMEs, Trolleys, LMEs, etc are not altered for other uses, without first having been safety validated in line with company processes.	**Open**
	IÉ-IM should update their Mobile Gang WIs, I-PWY-1490, (Ganger's Handbook) to ensure that all routine light maintenance activities are included. Systems, e.g., training, should be put in place to ensure that relevant staff can undertake dynamic risk assessments should non-routine activities need to be undertaken that are not described in the Ganger's Handbook.	**Open**
	Iarnród Éireann - Infrastructure Manager should clearly define the role of the PWI/APWI and update the relevant documentation accordingly.	**2021**
Collision between a car and a train at Kilnageer, Level Crossing (XM240), Mayo, 29th April 2020 (published 2021)	The RSA should update the "Rules of the Road" to include guidance on the Decision Support System (DSS).	**Open**
	IÉ-IM should update the 'The SAFE use of Unattended Railway Level Crossings' booklet to include guidance on the DSS.	**FER**
	IÉ-RU should put systems in place to ensure ICR train horns meet the current standards for sound pressure levels.	**Open**
	The CRR should review and update Section 5, Level Crossings, of their Guidelines for the Design of Railway Infrastructure and Rolling Stock, to ensure that guidance/reference on the DSS is included.	**2022**
Collision between a Bord na Móna (BnM) Flat Wagon and Kilcolgan Level Crossing Gates, Offaly, 8th June 2020 (published 2021)	BnM should identify locations where derailing points are vulnerable to unauthorised movements and provide a means of securing the derailing points at these locations.	**FER**
	BnM should review and update its Procedure for Rerailing Wagons / Rail Stock to ensure that there are clear instructions in relation to how to: visually check the lifting chains; rerail; and, safety secure rerailed stock.	**2021**
	BnM should develop a training, assessment and continuous assessment programme related to the Procedures for Rerailing Wagons / Rail Stock.	**2021**
	BnM should review its level crossing Risk Register updating where necessary to sufficiently capture all reasonably foreseeable risks. In addition, BnM should consider adding a requirement within its Rail Safety Case Document that requires regularised Risk Management Workshops at which risks, mitigation measures, etc, are reviewed and updated when necessary.	**FER**
	The Engineering Department of BnM should carry out the technical evaluation into the efficacy of the derailing points, etc. identified in Bord na Móna internal investigation report into the collision between a BnM locomotive and the gates of Endrim Gates on the 21st September 2017.	**FER**

	BnM should update their Specification for Crossings to include the requirements of the Department of Transport's Traffic Signs Manual; based on this BnM should update the signage on the approaches to all BnM level crossings.	**FER**
USAN 003 Luas isolation irregularity incident, between Kylemore to Suir Road, on the 5th January 2021 (issued 2021)	TDLR should urgently undertake a review of their safety critical communications for all modes of communication, while the review was being undertaken, TDLR should: • Develop and publish a concise standard for safety critical communications for all modes of communication; • Implement a robust competency management programme for initial and refresher training based on the requirements of this new standard; • Continuously assess safety critical communications to ensure that staff are adhering to safety critical communications set out in the new standard.	**Open**
Person entrapped in lowered CCTV level crossing, Ashfield, Offaly, 24th May 2020 (published 2021)	IÉ-IM SETDepartment should, using a risk-based approach, consider the suitability of the "Signal Controls" functions for Mid-Section CCTV Crossings; should they be deemed to have an unacceptable level of risk, they should be removed from the LCCO's console.	**Open**
	IÉ-IM SET Department should, consider introducing a time delay between the "Crossing Clear" buttons to prevent the LCCO pressing the second Crossing Clear button until the first Crossing Clear button times out. This time can be spent checking the confines of the level crossing for vehicles, pedestrians or other obstructions.	**Open**
	IÉ-IM CCE Department should examine the feasibility of installing signage inside the barriers of CCTV level crossings warning member of the public (MOP) what actions to take in the event of becoming trapped.	**Open**
	IÉ-IM should develop a means to make MOPs more visible should they become trapped inside level crossing barriers and position themselves adjacent to level crossing furniture or other infrastructure; where this cannot be achieved consideration should be given to examining possible initiatives or technologies that could be introduced to provide aid and assistance to LCCOs in identifying persons/obstacles that maybe trapped within the confines of a level crossing.	**Open**
	IÉ-IM should introduce measures to deter pedestrians from using unauthorised routes onto CCTV Level Crossings.	**Open**
	IÉ-IM should conduct a focussed review on the instances of MOP entrapment at Sydney Parade (LC XR004) and Serpentine Avenue (LC XR002) with a view of identifying any actions that can be taken to prevent the re-occurrence of MOP entrapments.	**Open**
Chassis Plate Fracture on General Motors Class 201, Locomotive 224, 7th July 2020 (published 2021)	IÉ-RU CME should review all weld repairs carried out to structures of all rolling stock to assess the risk posed by such weld repairs and mitigate against the failure mode.	**2022**
	IÉ-RU CME should develop a procedure for evaluating maintenance advice received from OEMs or other railway organisations to determine applicability to IÉ fleets and assess any associated risks.	**2022**
	IÉ-RU CME and IÉ-IM CCE should carry out a risk assessment on the implications of the increased axle load of a 201 Locomotive.	**Open**
Overhead Line detachment, Pearse Station, 1st October 2020 (published 2021)	IÉ-RU CME Department should in conjunction with the OEM develop a maintenance regime for the pantographs, taking into consideration the operational conditions and traceability of safety critical components.	**FER**
	IÉ-RU CME Department should carry out, in conjunction with the OEM, a condition assessment to determine the correct period for the overhaul of the IÉ-RU pantographs.	**2023**
	IÉ-RU and IÉ-IM should review the current Engineering Change Request and Safety Approval of Changes documents, to ensure that the appropriate stakeholders are consulted, and the correct processes followed.	**Open**

	IÉ-RU CME Department to include requirements to check pantograph maintenance activities in the Compliance Coordinators documentation records / check sheets.	**2023**
	IÉ-IM SET Department, should evaluate the auto-reclose function of the OHLE control system on the DART network to ensure the safe operation in the event of failures which could expose staff and passengers to live OHLE.	**Open**
	IÉ-RU CME Department to include requirements to check Class 8100 EMU Forward Facing CCTV maintenance activities in the Compliance Coordinators documentation records / check sheets.	**2021**
	IÉ-RU CME Department to review and develop a maintenance strategy for the 8100 EMU OTDRs to ensure that the correct information is recorded.	**2021**
Luas Overhead Line Failure, Stillorgan, 2nd November 2020 (published 2021)	TDLR, along with S2M, should conduct a full review of their inspection processes for Overhead Contact System (OCS) wires to ensure pre-cursors, likely location and faults with the OCS are referenced.	**FER**
	TDLR should conduct a full review and update of their dewirement/incident management documents, to ensure that dewirement incidents are fully addressed; in particular in relation to zone identification for de-energised sections of track in the event of an incident. These documents should then be fully briefed to the Traffic Supervisors.	**FER**
	TDLR should put a process in place that all trams involved in serious incidents have the On Tram Data Recorder (OTDR) downloaded as soon as possible to prevent overwriting of the data.	**FER**
	TDLR should include the electrical resistance measuring of vehicle earth bonding in the planned preventative maintenance regime for all trams.	**Open**
	TDLR should investigate the reason for the build-up of Cupric Oxide on the OCS wire. The investigation should include but not limited to: • Impact of longer trams, and congestion of trams in electrical sections; • Electrical resistance monitoring of tram to identify if high current demand is an issue; • Consequence of trams working in degraded mode on current demand; • The pantograph carbon bands and OCS interface.	**Open**
Luas isolation irregularity, Kylemore to Suir Road, 5th January 2021 (published 2021)	TII, in conjunction with TDLR, should consider fitting Section Insulators with diodes to prevent the passage of current from an energised section into a de-energised section when bridged by a pantograph.	**2022**
	TDLR should consider increasing the visibility of the Isolation Signage (through illuminating); as well as providing a means to secure the Isolation Signage (to prevent the signage being removed by unauthorised persons).	**Open**
	TDLR should review and update the suite of documents related to earthing, switching, possessions and isolations to ensure that the documents are consistent in terms of the actions to be taken, referencing and terminology.	**FER**
Near miss with an IÉ CCE Worker near Gormanston Station, 21st July 2021 (RAIU Report No: 2022 – R002, published 2022)	The IÉ – IM CCE Department should develop a formalised process, through their SMS suite of documents, for IÉ-IM CCE staff walking/ working alone, which should be completed prior to any member of CCE staff going on or near the line; at a minimum consideration should be given to: • Whether it is necessary to go on or near the line to conduct the walk / work; • What local knowledge is required to walk /work safely; • Whether all the requirements of the IÉ Rule Book / SSOW can be met; • What special protection arrangements are required either at night or during the day.	**FER**

Trend investigation into Signals Passed At Stop on the LUAS network (RAIU Report No: 2022 – R003, published 2022)	TII should determine if in-cab technological and/or mechanised systems could be introduced to assist drivers with the prevention of SAS SPAS incidents, taking into account requirements for ensuring safety risk is ALARP. Analysis should include an appraisal of available systems and the effect they may have on mitigating sub-standard driver performance.	**Open**
	TDLR should enhance the TSI Manual operating instructions for all depot and LSS locations based off site-specific risk assessments for the different locations. These enhancements should include step-by-step guidance on how trams are moved at these locations; this should include how verbal permissions are granted by LNMC.	**Open**
	TII should review the technical specification of the onboard AVLS console to see if it is possible to limit the inputting of the AVLS service files to when the tram is stationary; and if so, implement this change.	**Open**
	TDLR should, with the assistance of a qualified human factors expert, review the timings and locations of SPAS incidents to establish reasons as to why drivers are involved in SPAS incidents at certain times and locations	**Open**
	TDLR should, with the assistance of a qualified human factors expert, introduce training in relation to error prevention techniques as a tool for drivers to manage distraction, pre-occupation and incorrect expectation.	**Open**
	TDLR should review its current training regime with a view to increasing training and competency assessment of drivers, in particular in terms of driving in depots and LSS locations and in degraded mode.	**Open**
	TII should, as part of the increased driver training and competency assessment, consider the introduction of a driver training simulator which would assist in driving training in depots, LSS locations and in degraded mode.	**Open**
	TDLR should ensure that tram signals are referenced correctly in the TDLR suite of documents, this in turn should reinforce, to the drivers, which signals are Stop signals.	**Open**
	TDLR should establish a formalised SSC, to include stakeholders from the relevant internal and external departments (e.g. TII and local authorities) to ensure that: • In the event of a SPAS event an SSC is convened, where appropriate, to determine if any immediate actions can be taken at the signal location which may prevent a SPAS re-occurrence; • Any changes to signalling sequencing (including the introduction of new signals) are carried out as per the relevant SMS procedure to ensure that risks are not inadvertently introduced at signals; • Multi-SPAS signals are reviewed to see if there are any trend to the SPAS incidents; • Previous recommendations, related to SPAS events, from internal investigations have been addressed.	**Open**
	TDLR should update the TSI Manual and training and competency management suite of documents to include clear instructions on when emergency brake applications should be made in relation to the prevention of SPAS incidents; these instructions should be properly communicated to the drivers.	**Open**
	TDLR should introduced a SPAS risk scoring process for high-risk SPAS events on the Luas network, to ensure that the severity of a SPAS can be measured (best-practice should be applied if available). This scoring process can be used to assess if risks associated with the SPAS conform to TDLR risk acceptance criteria and are ALARP. The scoring process will also ensure that correct system interventions are applied, where required.	**Open**
	TII should research if technological and/or mechanised systems could be implemented for the entire Luas network to ensure SPAS events are immediately detected, taking into account requirements for ensuring safety risk is ALARP. Analysis should include appraisal of available systems, including systems that report detection of SPAS events to LNMC and to the driver in the cab.	**Open**
	TII should evaluate if it is possible to introduce an audible alarm for suspected SPAS incidents at LNMC.	**Open**

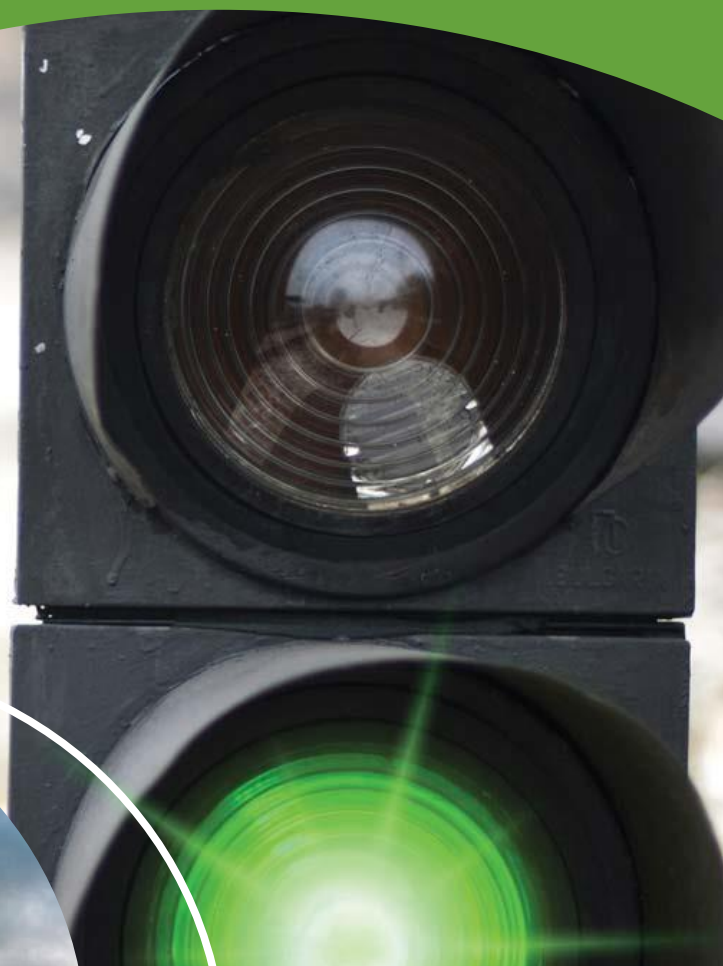
	TDLR to review and strengthen the current process for the management of drivers post SPAS incident, to ensure drivers skill are further developed (through adequate re-training) and they are supported (through increased monitoring) post SPAS incident.	**Open**
	TDLR should develop their internal investigation processes, to develop a: • Training and competency management system for internal investigators; • Manual, or similar, outlining internal investigation processes.	**Open**
Dangerous occurrence involving a Double SPAD at Clontarf Road Station, 7th December 2021 (RAIU Report 2023-R001, published 2023)	The Head of Health & Safety IÉ-RU should arrange for the development and issue of a guidance document for drivers outlining the understanding of the ATP equipment and the driving technique required. New training, monitoring and assessment material should be developed from this guidance.	**Open**
	The Head of Health & Safety IÉ-RU should arrange for the development of a briefing for DTEs on analysis of driving trends by use of the OTDR.	**Open**
	IÉ-RU CME should upgrade the OTDRs on the 8500 EMU fleet to the most up-to-date version, to ensure that digital signals are recorded for ATP penalty brake applications.	**Open**
	IÉ-RU CME should consider retrofitting all EMU fleets with a Remote Diagnostic System, whereby a rule can be introduced so that DTEs are immediately notified of ATP penalty brake applications.	**Submitted**
	IÉ-IM CCE should consider, based on a risk-based approach, the introduction of TGAs at more locations.	**Closed**
	IÉ-IM SET should undertake a review of I-SIG-2145, Calculation of Signal Spacing Distance, to consider if the risk approaches identified in the standard are effective in relation to the calculation of the spacing of signal distances, in particular, in relation to sharp speed decreases on the approach to signals and consideration should be given to incorrect driving techniques (i.e. driving into the bonds). A review of the use of derogations should also be undertaken.	**Open**
	IÉ-IM SET should put systems in place to ensure that the train simulator staff are provided with updated signal layout schematics as and when required e.g. altered signal positions.	**FER**
	IÉ-RU CME should update its commissioning documents, to ensure that maintenance tasks commence after installation	**Open**
	IÉ-RU CME should review the 8500 EMU sanding improvement plan (2016) against current standards with a view to updating and implementing the sanding improvements to current standards.	**Open**
	IÉ-RU Ops should update the OTDR Download Assessment Form for DART drivers with only tasks pertinent to DART drivers; allowing DTEs to carry out comprehensive assessments of the DART drivers' driving techniques.	**Open**
	IÉ-RU Ops should update its competency assessment processes to ensure that the assessments carried out, are the most beneficial, in terms of identifying driver discrepancies.	**Open**
	IÉ-RU Ops should brief all drivers on the importance of making an open call in an emergency situation rather that calling the Signalmen direct.	**Open**
Collision with track equipment between Newbridge and Kildare, 27th August 2021 (RAIU Report No. 2023-R002, published 2023)	IÉ-IM should consider developing a system, whereby Signalmen must provide a Unique Possession Authority Number, or similar, when authorising T3 Possessions to the PICOP; this number or safeguard should be provided to all staff prior to entering a T3 Possession.	**Open**
	IÉ-IM should review the current system of supervising and monitoring T3 Possessions, in terms of possession arrangements (e.g. Authority Number) and safety documentation (e.g. method statements); this review should identify improvements in terms of managing T3 Possessions. At a minimum, IÉ-IM should: • Expedite an increase in the supervision and monitoring of T3 Possessions by Engineering Department staff through updating CCE-SMS-001, specifically increasing monitoring prior to possessions being granted (while the IÉ-IM review and updating of supervision and monitoring of T3 Possessions is being undertaken); • Revise the current process of monitoring possessions through Safety Tours, CCESMS-008, to ensure the requirements of all guidelines are recorded in the Safety Tour Form;	**Open**

	• Once the Safety Tours, CCE-SMS-008, documentation has been reviewed and updated, verify that the Safety Tours are being carried out correctly, and in full accordance with the guidelines, through an auditing process.	
	IÉ-IM should promote a positive culture between staff, at different grades, to ensure ground level staff (including contractors) feel confident to challenge more senior staff in terms of safety. This can be achieved through staff briefing days, safety campaigns and development of a means for staff to provide feedback on supervision activities.	**Open**
	IÉ-IM should introduce processes to ensure that information submitted to the RAIU is correct and submitted within the requested timeframes.	**Open**
	The IÉ CCE Department (Engineering Department Division 3) should ensure the requirements of CCE-TMS-422 (2022) are met in full.	**Submitted**
	IÉ-IM should conduct a full review on the reporting of accidents by IÉ-IM staff and contractors, consideration should be given to: • Reviewing CCE-SMS-007 and CCE-SMS-005 to identify any areas where improvements can be made related to the reporting of safety related occurrences; where areas of concern are identified these should be addressed; • Enhance and promote its confidential reporting system to ensure all staff (with a particular emphasis on contracted staff) can report issues related to safety and welfare; • Promote a positive culture, associated with the reporting of occurrences, in an effort to eliminate on-site authority gradients whereby staff cannot challenge supervisors.	**Open**
	The CCE Department review and update CCE-SMS-001 and CCE-SMS-008 with a view to addressing the monitoring and supervision of works, in terms of quality of works that affects track safety, which are carried out under internal method statements (and contractor) method statements.	**Open**
Collision of an RRV Dumper with a member of Iarnród Éireann infrastructure maintenance staff, Tivoli, Cork, 6th July 2022 (RAIU Report No. 2023-R003, published 2023)	IÉ-IM PTS Certification training should include training on the head lights and tail lights for trains ("white lights" are coming towards you, or "red lights" are travelling away from you); and, specifically, for RRV Dumper, explain the configurable directional lights and the requirement to have red lights displayed at both ends when stationary.	**Open**
	IÉ-IM CCE should re-examine the risk assessment related to RRV movements, where previous control measures cannot be implemented (i.e. RRV engines cannot be switched off), alternatives should be considered.	**Open**
	IÉ-IM should produce and circulate a policy document for the use of mobile phones and all handheld electronic devices for the acceptable, safe and secure use and management of these devices when working on the railway.	**Open**
Failure of a Current Return Cable on a Luas Tram, Connolly Stop, 25th of October 2022 (RAIU Report No. 2023-R004, published 2023)	TDLR should develop supporting guidance documentation to WI-00814, Preparation before and after wheel turning, to include information on possible defects e.g. photographs of unacceptable levels of corrosion on the Current Return and Earth Shunt cable Lugs.	**Open**
	TDLR should consider updating LNMC Manual Document (TDLR-OP-M-0001) to include guidance for Traffic Supervisors in relation to actions to be taken in the case of failed cables and hoses.	**Open**
	TDLR should consider updating WI-00814, Preparation before and after wheel turning to include the recording of the testing and serial number of the torque wrench into TDLR-FRM-ENG-023 Citadis 401 Wheel Turning Certificate Issue A November 2020.	**Open**
	TDLR should consider updating the Wheel Turning Certificate to provide a space for the torque wrench registration number conformation of test and torque value achieved when reattaching the Current return and Earth Shunt cables with a space for sign off.	**Open**
	For instances where rolling stock is withdrawal from service as a result of damage; TDLR should develop notification procedures to identify where immediate notification to the RAIU is required.	**Open**

Self-detrainment of passengers between Shankill & Bray, 24th of July 2022 (RAIU Report No. 2023-R005, published 2023)	IÉ-RU Head of Health & Safety, in conjunction with the CME Department, should develop Traction Manual for the entire 8500 Class DART fleet; this should include guidance on the air conditioning. Once complete, this should be briefed to drivers to ensure drivers fully understand how the air conditioning operates.	**Open**
	IÉ-RU Head of Health & Safety should include a check that the heating, ventilation and air conditioning systems are operational in the train preparation instructions.	**Open**
	IÉ-RU should update its Passenger Comfort Risk Register to adequately address the issues related to crowding on trains (with special consideration given to crowding during adverse weather conditions). Based on this, IÉ-RU should develop an operational SMS document for the management of crowding on trains.	**Open**
	IÉ-RU should conduct a full review of how crowding at outlying stations is managed during major events, including reviews to local crowd control plans, PTI and train dispatch documentation; to ensure that the relevant stations are staffed appropriately to adequately manage the passenger flows.	**Open**
	IÉ-RU should review its planning and management processes for large events, considerations should be given to: • How and what information is provided to passengers prior to the event (such as information in relation to predicted scale of passengers using the trains and likely conditions for their journey in order to manage passengers' expectations); • How passengers' expectations are managed for the duration of the event (such as using real time information and making this freely available through passenger announcements at stations and on the IÉ App and social media accounts).	**Open**
	IÉ-RU should review its Ontrain Customer Communications Booklet and Professional Driving Handbook, and provide drivers with additional training, to enhance driver communications with passengers. The documentation and training should consider best practice and, at a minimum, the following requirements: • An initial announcement to be made within a specified short period of time, even if the reason for the delay is not known at that point; • A further announcement to be made as soon as further information is available about the cause and likely consequences of the delay; • Further announcements, at specified intervals, should be made whenever new facts suitable for informing and/or reassuring passengers become available; • In critical conditions, announcements should be made to dissuade passengers from detraining, these should include making announcements highlighting the risks involved with detraining and their safest option is to remain on the train.	**Open**
	IÉ-IM should carry out a review to determine the suitability of direct messaging (visually and/or verbally) from CTC directly onto trains, consideration should be given as to whether it would improve onboard passenger communications.	**Open**
	IÉ-RU should consider developing processes, in the case of emergency situations, to provide information through social media channels; these communications must be customer-friendly in order to encourage passengers to follow any directions given.	**Open**
	IÉ-IM should develop suitable instructions and guidance for operational staff at CTC to help them determine when a train should be considered as stranded (consideration should be given to the proximity of the stranded train to a station); the timeframe within which this needs to be declared and the actions that then need to be taken must be set out. Where appropriate, these instructions and guidance should be included in the IÉ Rule Book and relevant associated documentation.	**Open**
	IÉ-IM should develop suitable instructions and guidance for operational staff at CTC to help them determine when a train should be considered as stranded (consideration should be given to the proximity of the stranded train to a station); the timeframe within which this needs to be declared and the actions that then need to be taken must be set out. Where appropriate, these instructions and guidance should be included in the IÉ Rule Book and relevant associated	**Open**

	documentation.	
	IÉ-IM, and IÉ-RU, should review and formalise its processes for the attendance and allocation of staff requirements at CTC for major events, to determine what members of staff need to be present.	**Open**
	IÉ-RU and IÉ-IM should carry out an incident simulation in terms of a scenario involving an incident with the potential for self-detrainment. As part of this simulation, the relevant stakeholders (An Garda Síochána, Dublin Fire Brigade, etc.) should be invited to participate. Any lessons learnt such be adopted into the relevant guidance documents.	**Open**
	IÉ-RU should review its high level emergency preparedness, crowd control plans, risk assessments, train evacuation briefing notes and all other relevant document to include guidance on self-detrainments. Once complete, they should be circulated to the relevant departments and stations, for briefing.	**Open**
	IÉ-RU CME should carry out an assessment on the quality of the public address systems on EMUs against good practice standards and address any deficits.	**Open**
	IÉ-RU Health & Safety should ensure that train preparation instructions should include a check that public address systems are working prior to trains entering service.	**Open**
	IÉ-IM & IÉ-RU should review the suite of documents in relation to the planning of large events to ensure that all key personnel are involved in the planning of events.	**Open**
	IÉ-IM should update the IÉ Rule Book to include instructions for drivers in the event of self-detrainment and/ or stranded trains; these requirements should then be incorporated into the relevant associated documents.	**Open**
	IÉ-IM should develop procedures for the evacuation of passengers over trespass guards, these should then be included in the Train Evacuation Briefing Notes and other relevant documents which reference evacuations.	**Open**
	IÉ should engage with the relevant parties of An Garda Síochána to ensure that there is a shared understanding at CTC of when and how instructions from An Garda Síochána should be complied with. This can be practiced through IÉ-RU incident simulations where An Garda Síochána are in attendance.	**Open**
	IÉ-IM and IÉ-RU should develop a system whereby internal recommendations as a result of safety related incidents are logged with an allocated timeframe, and the actions taken verified, and the status recorded.	**Open**
Light blue – IÉ-RU / IÉ-IM; dark blue – TDLR; yellow – DLR; lilac indicates a joint recommendation between IÉ-IM & the CRR; orange indicates a recommendation associated with TII; pink indicates a recommendation associated with TII and TDLR.		

Appendices



Appendix 1 – Railway Organisations

The following railway systems are within the RAIU's remit:

- IÉ, the national heavy rail network;
- The Luas light rail system in Dublin;
- The Bord Na Móna industrial railway;
- Nine heritage & minor railway systems (of which three are currently not operational).

For each of these railway systems there are entities identified as Railway Undertakings (RUs) and Infrastructure Managers (IMs). RUs are defined as organisations that provide the transport of goods and/or passengers by rail on the basis that the undertaking must ensure traction, including undertakings that provide traction only; which operate under an SMS approved by the CRR through the issue of a safety certificate. IMs are defined as organisations that establish and maintain railway infrastructure, including the management of infrastructure control and safety systems; which operate under a SMS approved by the CRR through the issue of a safety authorisation. There are ten organisations that act as RU and IM for a railway network and two organisations that act solely as RUs; there are currently no organisations that act solely as an IM.

The national heavy rail system is owned by IÉ, within IÉ there are separate IM and RU Business Divisions. The heavy rail system is interoperable with the heavy rail system in Northern Ireland and cross border services are operated by IÉ in conjunction with Translink, the RU in Northern Ireland. These operations are carried out under IÉ's Safety Case and Translink is classified as a guest operator. A heritage RU, The Railway Preservation Society of Ireland, also operates steam trains on the heavy rail system several times a year. Rhomberg Sersa operate as an RU on IÉ's rail system; they operate and maintain On Track Machines (OTMs) on behalf of IÉ.

The Luas light rail system is owned by the Railway Procurement Agency. TDLR is the RU that operates passenger services, the passenger stops and the Central Control Room. TDLR is also the IM responsible for the maintenance of the infrastructure.

The Bord Na Móna industrial railway is owned and operated by Bord Na Móna, acting as the RU and IM for the transport of peat on its network. As this is an industrial railway and does not carry passengers it only falls within the RAIU's remit where the railway interfaces with the public, such as at level crossings and bridges.

The operational heritage railway & minor systems are:

- Difflin Lake Railway, Oakfield, Raphoe, Co Donegal;
- Finntown & Glenties Railway, Co Donegal;
- Listowel Lartigue Monorail, Co Kerry;
- Waterford & Suir Valley Railway;
- Irish Steam Preservation Society, Stradbally, Co Laois;
- Lullymore Heritage & Discovery Park Limited, Rathangan, Co Kildare;
- Cavan & Leitrim Railway, Dromod, Co Leitrim.

Appendix 2 – Notification (Immediate & Monthly Bulk)

Immediate notification

The schedule of immediate notifications is as follows:

ID	Schedule of immediate notification occurrences
1.01	Occurrences relating to rolling stock in motion resulting in one or more fatalities or serious injuries. *Exceptions: Serious injury/fatality due to assault or fatality due to natural causes.*
1.02	*Level crossing accidents* involving rolling stock.
1.03	Collisions between rolling stock causing damage or blocking a running line with harmful consequences.
1.04	Collisions of rolling stock with arrestor mechanisms/buffer stops with harmful consequences.
1.05	Derailments of rolling stock.
1.06	Fires, smoke or explosions on rolling stock requiring the evacuation of passengers from a train or a station.
1.07	The release or combustion of dangerous goods being carried on rolling stock.
1.08	Occurrences leading to the closure of a railway line for more than 6 hours. *Exceptions: Weather related occurrences.*
1.09	Any occurrences that lead to extensive damage.
1.10	Wrong side failures of safety critical equipment that led to an unsafe condition requiring withdrawal from service.
1.11	Unintentional divisions of rolling stock where passengers had access to a gangway.
1.12	SPADs resulting in rolling stock exceeding the signal overlap and involving conflicting movements. *Inclusion for IÉ: All High Risk Category A SPADs (Risk Ranking between 20 – 28) should be reported to the RAIU when the SPAD Risk Ranking has been established.*
1.13	Occurrences that under slightly different conditions may have led to a fatality, serious injury or extensive damage.
1.14	Occurrences related to passenger trap-and-drag t in doors when rolling stock is in motion.
1.15	Occurrences of axle bearing failures in service.

Monthly bulk notifications

The schedule for monthly bulk notifications is as follows:

ID	Description
2.01	Unexpected failures of assets that led to an unsafe condition.
2.02	Unintentional divisions of rolling stock released for service.
2.03	SPADs with no risk of conflicting movements. *Inclusion for IÉ: All SPADs, the monthly notification should include the Risk Ranking for all Category A SPADs.*
2.04	Fires, smoke or explosions on rolling stock not requiring the evacuation of passengers.
2.05	Collisions with large objects or large animals. *Exceptions: Where the intent was vandalism or criminal damage.*
2.06	Non railway vehicles damaging or fouling a railway line. *Exceptions: Where the intent was vandalism or criminal damage.*
2.07	Collisions between light rail vehicles and road vehicles.
2.08	Any other occurrence where an investigation remit has been issued internally.

Appendix 3 – Classification of occurrences & investigations by the RAIU & other bodies

Classification of occurrences

Occurrences fall into one of three types as defined in European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020 (S.I. 430 of 2020):

- 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;
- 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;
- Incident – Any occurrence, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation.

For clarity the meaning of the following terms should be noted:

- Harmful consequences – Injury to persons and/or damage to equipment;
- Serious injury – Any injury requiring hospitalisation for over 24 hours.

RAIU investigation of occurrences

The RAIU have investigators on call, twenty-four hours a day, seven days a week, who are notified of reportable occurrences by the RUs in accordance with European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020 (S.I. 430 of 2020). Based on the nature of the occurrence and the legal requirements, a decision is made on whether or not an investigation is required. In accordance with the Railway Safety Directive, the RAIU must investigate serious accidents; accidents and incidents are investigated depending on the potential for safety lessons to be learnt.

Where notified occurrences warrant further investigation to determine whether or not an investigation is warranted a preliminary examination is carried out and one of the following three determinations is made:

- No further investigation – no safety improvements are likely to be identified that could have prevented the occurrence or otherwise improve railway safety;
- Full investigation – there is clear evidence that the occurrence could have been prevented or the severity of the outcome could have been mitigated through the actions of those parties involved either directly or indirectly in the installation, operation and maintenance of the railway;
- Full investigation (Trend) – 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.

Investigations are classified as one of three types under the Railway Safety Directive (2016/798):

- Article 20(1) – Investigations into serious accidents on the IÉ network, the objective of which is possible improvement of railway safety and the prevention of accidents;
- Article 20(2) – Investigation into accidents and incidents, which under slightly different conditions might have led to serious accidents;
- Article 22(6) – Investigations into railway accidents and incidents under national legislation, this includes all investigations relating to the Luas light rail system, the Bord Na Móna industrial railway and the heritage railways.

For each investigation, the level of damage to rolling stock, track, other installations or environment is identified and classified based on the European common safety indicators as follows:

- None;
- Less than €150,000 (<€150,000);
- Equal to or greater than €150,000 (≥€150,000);
- Equal to or greater than €2,000,000 (≥€2,000,000).

The RAIU, as soon as practicable but not later than 2 months after receipt of the notification, decide whether or not to start an investigation concerning the accident or incident European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020. The RAIU advise the relevant railway undertaking of the decision. In accordance with S.I. No. 430/2020 - European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020, the RAIU also notify the ERA within seven days of a decision to carry out a full investigation into an occurrence on the IÉ network.

Investigations by other bodies

The CRR, An Garda Síochána, the Health and Safety Authority and other organisations may carry out investigations in parallel with an RAIU investigation. The RAIU will share its own technical information with these Investigation Bodies; however, the investigations are carried out independently. Based on its investigation, the RAIU produce a report that is provided to all relevant parties, including the Railway Undertaking, the CRR and the DoT. Reports relating to the IÉ network are also provided to ERA. All investigation reports are made available in the public domain once they have been published.

In accordance with the Railway Safety Act 2005 (53(6)), a railway undertaking shall in an expeditious manner carry out an investigation and shall, as soon as practicable but in any event not later than 6 months after the date of the incident, prepare a report on its findings.

Appendix 4 – Abbreviations

ALCC	Athlone Local Control Centre
AO	Additional Observation
APWI	Acting Permanent Way Inspector
ATP	Automatic Train Protection
AVLS	Automatic Vehicle Location System
BnM	Bord na Móna
CaF	Causal Factor
CAWS	Continuous Automatic Warning System
CCE	Chief Civil Engineer
CCTV	Closed Circuit Television
CME	Chief Mechanical Engineer
CoF	Contributing Factor
CRR	Commission of Railway Regulation
CTC	Centralised Traffic Control
DART	Dublin Area Rapid Transit
DIL	Door Interlock Light
DIR	Daily Incident Reports
DLR	Difflin Light Rail
DMU	Diesel Multiple Unit
DoT	Department of Transport
DRA	Driver Reminder Appliance
DSS	Driver Support System
ECO	Electrical Control Operator
EMU	Electrical Multiple Unit
ES	Engineering Supervisor
ESS	Electrical Sub-Station
EU	European Union
FER	Further Evidence Requested
FFCCTV	Forward facing CCTV
GO	General Operative
hrs	hours
HSA	Health & Safety Authority
HSCB	High Speed Circuit Breaker
ICR	InterCity Railcar
IÉ	Iarnród Éireann

IÉ-IM	Iarnród Éireann Infrastructure Manager
IÉ-RU	Iarnród Éireann Railway Undertaking
IM	Infrastructure Manager
km/h	kilometres per hour
LCCO	Level Crossing Control Operator
LME	Light Maintenance Equipment
LNMC	Luas Network Management Central
LRA	Low Rail Adhesion
LSS	Line Signalling System
LTCD	Laois Train Car Depot
m	metre
MCB	Main Circuit Breaker
mm	millimetre
MOP	Member of Public
MoU	Memorandum of Understanding
MP	Mile Post
mph	miles per hour
NIB	National Investigation Body
NIR	Northern Ireland Railways
NSA	National Safety Authority
OCS	Overhead Contact System
OEM	Original Equipment Manufacturer
OHLE	Overhead Light Equipment
OI	Operating Instruction
OTDR	On train/tram data recorder
OTM	On track machinery
PEIO	Plant, Equipment, Infrastructure & Operations
PER	Preliminary Investigation Report
PICOP	Person in Charge of Possession
PIC-RRV	Person in Charge Road Rail Vehicle
PPI	Points Position Indicator
PTI	Platform Train Interface
RAIU	Railway Accident Investigation Unit
RMME	Rail Mounted Maintenance Equipment
RRV	Road Rail Vehicle
RRVO	Road Rail Vehicle Operator

RTC	Road Traffic Collision
RTS	Ready to Start
RU	Railway Undertaking
SAN	Safety Advice Notice
SAS	Start Against Signal
SCADA	Supervisory Control And Data Acquisition
SET	Signalling, Electrical and Telecommunications
SI	Statutory Instrument
SLW	Single Line Working
SMS	Safety Management System
SF	Systemic Factor
SPAD	Signal Passed at Danger
SPAS	Signal Passed at Stop
SSC	Signal Sighting Committee
SSOW	Safe System of Work
TDLR	Transdev Dublin Light Rail
TED	Traffic Event Database
TGA	Traction Gel Applicators
TII	Transport Infrastructure Ireland
TPS	Train Protection System
TRV	Track Recording Vehicle
TSC	Track Safety Co-ordinator
TSI	Tramway Safety Instruction
UF	Underlying Factor
USAN	Urgent Advice Safety Notice
WI	Work Instruction
WSP	Wheel Slip Protection

Appendix 5 – Definitions

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.
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.
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.
Control, Command & Signalling	Control-command and signalling on-board subsystems of vehicles which are (or are intended to be) operated on and control-command and signalling trackside subsystems of the rail network.
Derailing points	A set of points used to derail a rail vehicle.
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.
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
Rake	In the case of BnM vehicles, a rake is a locomotive with sixteen flat wagons.
Road Rail Vehicle	A dual mode vehicle than can operate both on rail tracks and road mostly used for rail infrastructure maintenance.
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 Passed at Danger	Signal passed at danger where not in accordance with the governing safety rules, this includes signals passed at stop.
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.
T3 Possession	Absolute possession no operational train movements. Engineering trains On Track Machinery/ RRV movements are permitted. Planned Engineering Work.

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