Railway Accident Investigation Unit

Ireland

Annual Report

2017

RAIU

Railway Accident Investigation Unit

Foreword

The purpose of the Railway Accident Investigation Unit (RAIU) is to independently investigate occurrences 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.

Forty preliminary examination reports (PERs) were completed in 2017. Of these forty PERs, two full investigations were commenced into occurrences that occurred on the Iarnród Éireann (IÉ) network, namely:

- Near miss at Knockcroghery Level Crossing, XM065, Co. Roscommon on the 31st January 2017;
- DART derailment at Dun Laoghaire on the 13th September 2017.

Two investigation reports were published in 2017 into occurrences on IÉ and Difflin Light Rail networks, namely:

- Difflin Light Rail Passenger Fall, Co. Donegal, on the 17th December 2016;
- Near miss at Knockcroghery Level Crossing, XM065, Co. Roscommon on the 31st January 2017.

A total of nine new safety recommendations were issued as a result of these investigations. The safety recommendations directed at Difflin Light Rail include recommendations in relation to the: physical and procedural safeguards for carrying small children on trains; reviews of their Safety Management Systems (SMS) and risk assessments; and a review of responsibilities under the Safety and Welfare at Work Regulations as to dedicated First Aid areas. Safety recommendation directed at IÉ include the: positioning (including associated risk assessments) of closed circuit television (CCTV) level crossing cameras; and the training and instructions (interim and permanent) for Level Crossing Control Operatives (LCCOs).

As of the end of 2017, the RAIU have issued a total of 140 safety recommendations since the appointment of a Chief Investigator for the RAIU in 2007.

The Commission for Railway Regulation (CRR) monitors the implementation of safety recommendations and has advised that of the 140 RAIU safety recommendations issued to date, ninety-six have been closed out as having been addressed (which accounts for almost 70% of the recommendations), seven are complete and awaiting verification that they have been addressed, and a further thirty-seven remain open.

Within the unit, a position for a Senior Investigator became vacant in October 2012, and was permanently filled in 2017.

David Murton
Chief Investigator

Contents

The Organisation 5

The Organisation 5

Railway Networks within the RAIU's remit 5

Non-investigation Activities 5

Investigation Activities 7

Summary of Preliminary Examination Reports during 2017 7

Summary of Full Investigations commenced in 2017 11

Full Investigations Published in 2017 12

Tracking Safety Recommendations 16

Monitoring of RAIU safety recommendations 16

Status of RAIU safety recommendations 17

Status of individual RAIU safety recommendations 19

Table 1 – RAIU safety recommendations closed in 2017 20

Table 2 – RAIU safety recommendations complete in 2017 23

Table 3 – RAIU safety recommendations open in 2017 24

Table 4 – RAIU safety recommendations closed prior to 2017 27

Appendix 1 – Irish & European Laws 33

Appendix 2 – Railway Organisations 34

Appendix 3 – Classification of occurrences & investigations by the RAIU & other bodies 35

General Information & Non-Investigation Activities

The Organisation

The Organisation

The RAIU comprises of a Chief Investigator and a team of three full time Senior Investigators, each with the ability to perform the role of Investigator in Charge, as necessary. The RAIU also has an administrator assigned to the Unit.

In July 2014, S.I. No. 258 of 2014, the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2014 was enacted. The purpose of these Regulations was to restate the national law that gives effect to Chapter V (which provides for railway accident and incident investigation and reporting) of Directive 2004/49/EC on safety of the Community's railways. These Regulations provide for the establishment, of the National Investigation Body (NIB), the RAIU, in the Department of Transport, Tourism & Sport (DTTAS), to investigate railway accidents and incidents in accordance with these Regulations. These regulations are fully enacted and there was no further impact on the RAIU in 2015.

For full details of the changes to Irish legislation and other relevant European & Irish Legislation, see Appendix 1.

Railway Networks within the RAIU's remit

There are ten railway systems within the RAIU's remit, these are:

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

For further information on these organisations', see Appendix 2.

Non-investigation Activities

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 European Union (EU) Agency for Railways. To this end, the RAIU participated in the 2017 NIB plenary meetings and provided input on the direction of NIB related work. RAIU is also a member of the EU Agency for Railways taskforce set up to develop a system of peer review of the NIBs.

The RAIU continues to participate in Memorandums of Understanding 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.

The Unit has published guidance for Coroners' Courts and An Garda Siochána and has established a working relationship with the Garda Forensic Investigators through their training facility at Templemore.

The European Parliament voted on December 14th 2016 to adopt the final wording of the Fourth Railway Package, concluding almost five years of intense negotiations over the European Commission's proposals. The RAIU is working with the DTTAS on the transposition of the Directive into National Legislation.

Investigation Activities

RAIU

Investigation Activities

Summary of Preliminary Examination Reports during 2017

1st January 2017 to 31st December 2017

The following outlines the forty Preliminary Examination Results (PER) undertaken by the RAIU into occurrences on the railways in 2017. A PER is created upon the notification of an occurrence from a railway organisation.

For the definitions and classification of occurrences & the investigation of occurrences by the RAIU and other bodies, see Appendix 3.

Railway Body	Date of occurrence	Location of Occurrence	Classification of Occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ	21 January 2017	Malahide, Louth	Accident	To persons due to rolling stock in motion	A male, who is believed to have been graffiting railway infrastructure, was seen crouching on the track. The driver braked but was unable to stop the train, before it struck and injured the male.	**1 Injury** due to deliberate entry onto railway.
IÉ	31 January 2017	Knockcroghery Roscommon	Incident	Others	A motor vehicle did not obey traffic signals and entered the hatched area of the CCTV Level Crossing, when the barriers were lowered by the LCCO. The motor vehicle was able to position itself clear of the train which resulted in a near miss.	0
IÉ	6 February 2017	Kilbarrack, Dublin	Incident	Others	Due to high winds, there were issues with the barriers of the CCTV level crossings, and procedures were put in place to maintain rail traffic through the area.	0
IÉ	6 March 2017	Parkwest, Dublin	Serious Accident	To persons due to rolling stock in motion	A male, deliberately placed himself in the five foot, with his back to the train, and was struck and fatally injured.	**1 Fatality** due to self-harm
IÉ	1 April 2017	Clongriffin, Dublin	Accident	To persons due to rolling stock in motion	A male, deliberately placed himself in the five foot, as the train was close, he jumped clear of the train and was injured after falling.	**1 Injury** due to attempted self-harm
IÉ	1 April 2017	Straide, Mayo	Serious Accident	To persons due to rolling stock in motion	A female, entered the railway line at level crossing XX032 and was attempting to pull her dog from the line when they were both struck and fatally injured.	**1 Fatality** due to deliberate entry onto railway
Transdev	4 April 2017	Dr Steeven's Lane, Dublin	Accident	To persons due to rolling stock in motion	A male, jumped in front on the inbound tram and was trapped under the tram, sustaining injuries.	**1 Injury** due to deliberate entry onto tramline
IÉ	6 April 2017	Cherry Orchard Park West Station, Dublin	Incident	Rolling Stock	The ICR driver pressed the Door Close button and the Blue Door Interlock Light incorrectly illuminated while the doors were still in the process of closing, the train was taken out of service. The fault was found to be as a result of placing an incorrect wire into one of the relays.	0

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ	28 April 2017	Drogheda, Dublin	Incident	Rolling Stock	The 29000 driver pressed the Door Close button and the Blue Door Interlock Light incorrectly illuminated. A member of staff reported the doors open to the driver and the train was taken out of service. The fault was found to be the failure of two relays simultaneously.	0
Transdev	30 April 2017	Hospital Stop, Dublin	Accident	To persons due to rolling stock in motion	A person deliberately knelt down in front of the tram as it approached; and was struck by the tram, and received serious head injuries.	**1 Injury** due to attempted self-harm
Transdev	5 May 2017	Cheeverstown Dublin	Accident	Collision	A motor vehicle did not obey traffic signals and drove into the side of the tram as the tram was travelling through Cheeverstown Road. One passenger and the tram driver were treated at hospital.	**2 Injuries** to tram driver and 1 tram passengers
IÉ	7 May 2017	Skerries, Dublin	Serious Accident	To persons due to rolling stock in motion	As the train travelled into Skerries Station, a female jumped from the platform in front of the train in a deliberate act of self-harm and was fatality injured.	**1 Fatality** due to self-harm
IÉ	17 June 2017	Cork Maintenance Depot, Cork	Accident	Collision	A four-piece train was fouling one of the roads at the depot, when a two-piece train struck it as it entered the deport	0
Balfour Beatty Rail Ireland (BBRI)	28 June 2017	Limerick Junction, Limerick	Accident	Derailment	An on-track machine derailed as it entered the sidings at Limerick Junction, due to the points being set incorrectly.	0
IÉ	4 July 2017	Tipperary	Accident	Level Crossing	A train struck a car at LC XL083 when a car entered the level crossing, without stopping at the stop line, as the gates were open. Two teenage girls were in the car, and were uninjured.	0
Transdev	8 July 2017	Fatima, Dublin	Serious Accident	To persons due to rolling stock in motion	A tram saw clothing (which was a female) on the track and applied the emergency brake, but the tram continued over the person causing fatal injuries.	**1 Fatality** due to self-harm
Transdev	27 July 2017	O'Connell St, Dublin	Accident	To persons due to rolling stock in motion	A pedestrian walked in front of a tram as it was crossing the junction between Abbey Street and O'Connell Street. The pedestrian suffered minor injuries.	**1 Injury** to pedestrian
IÉ	31 July 2017	Killester, Dublin	Incident	Rolling Stock	A DART driver saw what he thought was an open door on the Belfast to Dublin service. The driver reported no loss of door interlock light but the door was off the bottom runner. The train was taken out of service and the entire fleet checked. The fault was due to the roller link arm fracturing, all faulty parts were replaced.	0
IÉ	31 July 2017	Multyfarnham, Westmeath	Serious Accident	To persons due to rolling stock in motion	A male was struck and fatally injured after he deliberately accessed the railway line at a level crossing and placed himself in front of the train	**1 Fatality** due to self-harm

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ	31 July 2017	Cookstown Road/ Embankment Road	Accident	Collision	A car travelled through a stop signal and into a tram at the junction of Cookstown and Embankment roads.	0
IÉ	2 August 2017	Seafin LC, Boyle – Sligo	Accident	Level Crossing	A train made contact with the rear of a jeep as it passed through Seafin LC (XS112). There was minor damage to the train and car and the car driver was uninjured.	0
Transdev	5 August 2017	Steeven's Lane, Dublin	Accident	To persons due to rolling stock in motion	A tram struck a pedestrian as he was crossing Steeven's Lane, the pedestrian walked away uninjured.	0
Transdev	24 August 2017	Murphystown/ Glencairn Junction, Dublin	Accident	To persons due to rolling stock in motion	A tram struck a pedestrian as he ran through the junction of Murphystown and Glencairn roads; resulting in minor injuries to the pedestrian.	**1 Injury** to pedestrian
IÉ	25 August 2017	Killarney – Farranfore	Accident	Level Crossing	A tractor attempted to cross at XT129 and when he saw the train began reversing. However, the train clipped the forks of the tractor. Minor damage and no injuries.	0
IÉ	13 September 2017	Dun Laoghaire, Dublin	Accident	Derailment	A passenger train derailed after it travelled over points that had been scotched and clipped. The train remained upright and passengers were detrained by emergency services.	0
BBRI	25 September 2017	Edgeworthst-own Station, Co. Longford	Incident	Other	A tamper was involved in a signal passed at danger (SPAD) when it lost traction on the approach to signal SL768 and passed it by approximately half a metre.	0
IÉ	2 October 2017	Skerries, Dublin	Serious Accident	To persons due to rolling stock in motion	A person deliberated placed themselves in a place of danger as a train approaches and was struck by the train and fatally injured.	**1 Fatality** due to self-harm
IÉ	4 October 2017	Newbridge, Kildare	Accident	Collision	A train struck a buffer stop at Newbridge Station, likely as a result of low adhesion.	0
IÉ	5 October 2017	Laois Train Car Depot, Laois	Accident	Derailment	A train was stabled in the depot after wheel re-profiling, brakes were not applied. When a staff member entered the train cab, the train began to roll away and eventually derailed over catch points.	0
Transdev	9 October 2017	Harcourt Street, Dublin	Accident	Collision	A car did not obey traffic signals and was struck at the junction of Iveagh Gardens and Harcourt Street	0
IÉ	26 October 2017	Killonan, Limerick	Serious Accident	To persons due to rolling stock in motion	A female deliberately placed herself in danger and was struck and fatally injured by a train.	**1 Fatality** due to self-harm
IÉ	29 October 2017	Ennis – Limerick Line	Accident	To persons due to rolling stock in motion	A male was trespassing on the line when he was struck and injured by a train.	**1 Injury**
Transdev	31 October 2017	Embankment/ Cookstown, Dublin	Accident	Collision	A car disobeyed signals and collided with a tram at the junction of Embankment Road and Cookstown Way, two tram passengers reported injuries.	**2 Injuries** to tram passengers

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
IÉ	11 November 2017	Laois Train Care Depot	Accident	Derailment	A train derailed over gapping points while the driver carrying out manoeuvres on his own.	0
IÉ	17 November 2017	Sydney Parade, Dublin	Accident	To persons due to rolling stock in motion	A male deliberated placed himself in front of a train at Sydney Parade Station; he was struck and sustained serious injuries.	**1 Injury** due to self-harm
IÉ	20 November 2017	Raheny, Dublin	Serious Accident	To persons due to rolling stock in motion	A female deliberately placed herself in a position of danger by stepping in front of a train at Raheny Station; she was fatally injured.	**1 Fatality** due to self-harm
IÉ	1 December 2017	Bray/ Greystones, Dublin	Serious Accident	To persons due to rolling stock in motion	A male, trespassing on the line, was fatality injured when he was struck by a train at Tunnel 4.	**1 Fatality** due to trespass
IÉ	14 December 2017	Killarney – Farranfore	Incident	Control Command & Signalling	A train driver was given permission to cross a level crossing during degraded conditions; however, as he approached the level crossing, he saw that the barriers were raised to road traffic and stopped his train.	0
IÉ	16 December 2017	Connolly, Dublin	Accident	Collision	A train collided with a buffer stop at Connolly Station during a shunting manoeuvre.	0
IÉ	22 December 2017	Kildare	Accident	Derailment	An on-track machine derailed over a set of point in Kildare Yard during a shunting manoeuvre.	0

In summary, removing the twelve self-harm and trespass occurrences (four injuries, eight fatalities), IÉ have had:

- Accidents: Three collisions, three derailments and three accidents at level crossings (involving collisions with vehicles);
- Incidents: Three rolling stock incidents (involving doors), two other incidents involving level crossings and one incident related to control, command and signalling.

Balfour Beatty Rail Ireland (BBRI), operating on the IÉ network, had two accidents involving derailments and one incident related to a Signal Passed at Danger (SPAD).

In relation to Transdev, removing the six self-harm and trespass occurrences (one fatality, four injuries and one uninjured), Transdev have reported to the RAIU, four collision accidents with motor vehicles.

Summary of Full Investigations commenced in 2017

1st January 2017 to 31st December 2017

From the forty PERs, two full investigation were commenced, one of which was the 'Near miss at Knockcroghery Level Crossing, XM065, Co. Roscommon, on the 31st January 2017', this report was completed in 2017, as is therefore outlined in the 'Summary of Full Investigations Published in 2017' section of this report. The other investigation is related to the DART derailment at Dun Laoghaire on the 13th September 2017.

DART derailment, Dun Laoghaire, 13th September 2017

On 13th September 2017, the DART passenger service from Howth to Bray (Train E222) was made up of a six car 8100 Electrical Multiple Unit. On route, Train E222 was delayed due to a loss of points detection, at Points 115, and the subsequent signal displaying a red aspect at Signal DL37S.

Arrangements were made to have the points scotched and clipped by a Points Operator. After completing the task the Points Operator advised the Controlling Signalman and the Controlling Signalman gave the driver of Train E222 permission to pass signal DL37S at danger.

A few minutes later, at approximately 18:04 hrs the leading bogies of Train E222 derailed while crossing over Points 115 before coming to a stop. The driver immediately reported the accident to the Controlling Signalman who arranged signal protection to both lines.

A number of passengers self-evacuated from the train on to the permanent way before a controlled evacuation of the passenger was arranged by IÉ staff.

Full Investigations Published in 2017

1st January 2017 to 31st December 2017

The RAIU published two investigation reports in 2017, which resulted in a total of nine new safety recommendations.

Difflin Light Rail Passenger Fall, Co. Donegal on the 17th December 2016

RAIU Report No: R2017 – 001 Published: 7th November 2017

On Saturday 17th December 2016, a 'Santa Express' train service was operating at Difflin Light Railway (DLR), a 4.5 km narrow gauge railway based in Oakfield Park, Raphoe, Co. Donegal. The Santa Express excursion included a return train ride from Oakfield Park Station to visit Santa's Grotto.

At approximately 17:00 hrs, shortly after departing Santa's Grotto, a family of nine (including a six year old girl) boarded the Santa Express, for their return journey to Oakfield Park Station. The train travelled a short distance, before starting to travel around a right hand curve, when the six year girl fell from the train, became entangled with the side of the train and was dragged a short distance along the gravel before the train came to a stop. The child sustained injuries to her legs that required hospital treatment, a skin graft as an outpatient, and subsequent check-ups.

The immediate cause of the accident was that a small child fell out of an open carriage of a moving train as it was travelling around a curve. Contributory and underlying to this occurring were the fact that there were insufficient physical or procedural safeguards to prevent small children, whose feet do not touch the ground in a seated position in a coach, from falling from an open carriage. The root cause associated with this accident was that the existing risk assessment, within the Safety Management System's (SMS) documentation, did not identify the risk posed by small children. Additional observations, made by the RAIU during their investigation, include:

- DLR were not fully adhering to the requirements of their own SMS, in that they failed to carry out the emergency plan as required after the occurrence of an accident; they did not report the accident to the RAIU or CRR; staff were not seasonally re-briefed; risk assessments were not reviewed periodically as called for by DLR's SMS;
- There was no dedicated first aid location at DLR to treat injuries to staff or passengers.

The RAIU have made the following four safety recommendations as a result of the investigation:

- 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;
- 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;
- DLR should review their SMS, in its totality, and ensure that there are internal monitoring procedures that mandates the periodic checking of application of SMS processes and practises;
- DLR should review their responsibilities under the Safety and Welfare at Work Regulations as to dedicated First Aid areas.

Near miss at Knockcroghery Level Crossing, XM065, Co. Roscommon , on the 31st January 2017

RAIU Report Number: R2017-002 Published: 20th December 2017

At approximately 11:10:56 hrs, the 09:45 hrs passenger service from Westport to Heuston (Train A805) triggered the initiation for Level Crossing XM065 (a CCTV level crossing with lights and full barriers), which resulted in the road traffic lights flashing to indicate to road users that rail traffic was approaching. Two cars approached the level crossing from the Athlone direction, after this initiation had commenced, with one car stopping on the yellow box area (Car 1), within the confines of the level crossing and one stopping close to the level crossing barriers. When the Level Crossing Control Operator (LCCO) attended to the level crossing, the view of the car on the level crossing was obscured, but the LCCO froze the barriers for the second car which is positioned near the level crossing. When the LCCO saw the second car (Car 2) clear the level crossing, he began the closing sequence again and cleared the level crossing (the car on the level crossing could not drive off the level crossing); which resulted in the barriers fully lowering with the first car trapped in the confines of the level crossing.

The immediate cause of Train A805 passing through LC XM065 with a car inside the lowered barriers, was as a result of the LCCO clearing the level crossing while the car was within the confines of the level crossing. Contributory factors associated with the incident are:

- Car Driver 1 did not adhere to the road traffic legislation related to this type of crossing, in that, the driver did not stop clear of the level crossing; and drove past the red warning lights;
- When the LCCO attended to the LC XM065, fifteen seconds after the initiation alarm, Car 1 was partially obscured by the barriers, the road flashing red signals and a street light resulting in the LCCO not seeing Car 1;
- As the barriers were not fully raised, and remained frozen in a midway position, until the LCCO cleared the level crossing, Car 1 could not clear the level crossing; as another car had driven onto the crossing preventing Car 1 from exiting;
- The obstruction of Car 1 was enabled by the poor positioning of the level crossing cameras at Level Crossing XM065, resulting in poor views on the LCCO's display monitors;
- The LCCO did not utilise the appropriate non-technical skills to fully assess Level Crossing XM065 before clearing the level crossing.

The underlying cause associated with this incident:

- There was not an adequate risk assessment process for the position of Closed Circuit Television (CCTV) level crossing cameras;
- There was no adequate 'non-technical skills' training or documentation to assist LCCOs in their duties.

The following additional observation is made by the RAIU:

- The Level Crossing Control Centre (LCCC) Instructions was a document of intense text which is difficult to read, and reads as more of a technical document than a guide for LCCOs.

The RAIU have made the following five safety recommendations as a result of this investigation:

- The Signalling, Electrical and Telecommunications (SET) Department should review the camera position at Level Crossing XM065, and other similar CCTV level crossings, to ensure that the LCCOs have optimum, unobstructed, views of level crossings;
- The SET Department should develop a formalised risk assessment process for the positioning of CCTV cameras and associated design works;
- IÉ- Infrastructure Manager (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;
- IÉ-IM should review the human factors and non-technical skills training for LCCOs, and introduce further training, where applicable. In addition, IÉ- IM 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;
- IÉ-IM should review and update the LCCC Instructions, to make them more user friendly for LCCOs.

Tracking Safety Recommendations

RAIU

Railway Accident Investigation Unit

Tracking Safety Recommendations

Monitoring of RAIU safety recommendations

Under the Railway Safety Act 2005, the CRR[1] is responsible for monitoring the implementation of RAIU recommendations. All safety recommendations issued by RAIU are addressed to the CRR unless otherwise stated and the implementers are identified in the recommendation. The recommendations issued by the RAIU are reviewed by CRR for acceptability and where CRR accept the recommendations it monitors their implementation. The figure below identifies the three status codes assigned to recommendations by CRR and the definition of each.

Status	Description
Open	Feedback from implementer is awaited or actions have not yet been completed. Open recommendations are those for which CRR has received some or no update from the organisation or organisations responsible for implementing the recommendation and for which further action is deemed to be required by CRR. This status is assigned by CRR.
Complete	Implementer has taken measures to effect the recommendation and the CRR is considering whether to close the recommendation. Complete recommendations are those where the organisation responsible for implementing the recommendation is satisfied that it has carried out the necessary actions to address the recommendation and for which CRR has received evidence of implementation that it will review to determine whether or not the recommendation is closed. This status is advised to CRR by the organisation or organisations responsible for implementing the recommendation.
Closed	Implementer has taken measures to effect the recommendation and the CRR has considered these and has closed the recommendation. Closed recommendations are those for which CRR is satisfied that the organisation responsible for implementing the recommendation has taken suitable action to address the recommendation. This status is assigned by CRR.

[1] Formerly the Railway Safety Commission (RSC); the name was changed on the 29th February 2016 under Statutory Instrument (S.I.) No. 69 of 2016, Change of name of the Railway Safety Commission to Commission for Railway Regulation (Appointed Day) Order 2016.

Status of RAIU safety recommendations

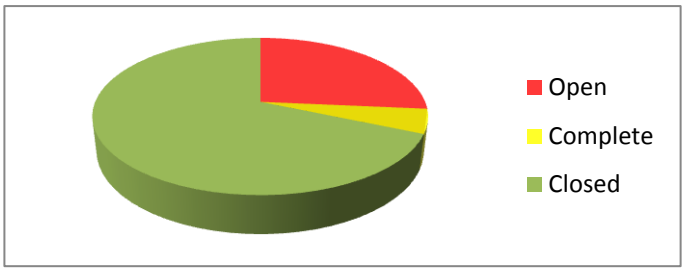
The CRR, as the National Safety Authority (NSA) for Ireland, holds meetings with the relevant stakeholders to monitor the progress of safety recommendations.

As of the 31st December 2016, the RAIU have made 140 recommendations. All recommendations were accepted by their addressee and implementer. The status of the recommendations as of the end of 2017 was thirty-seven open, seven complete and ninety-six closed recommendations as illustrated below.

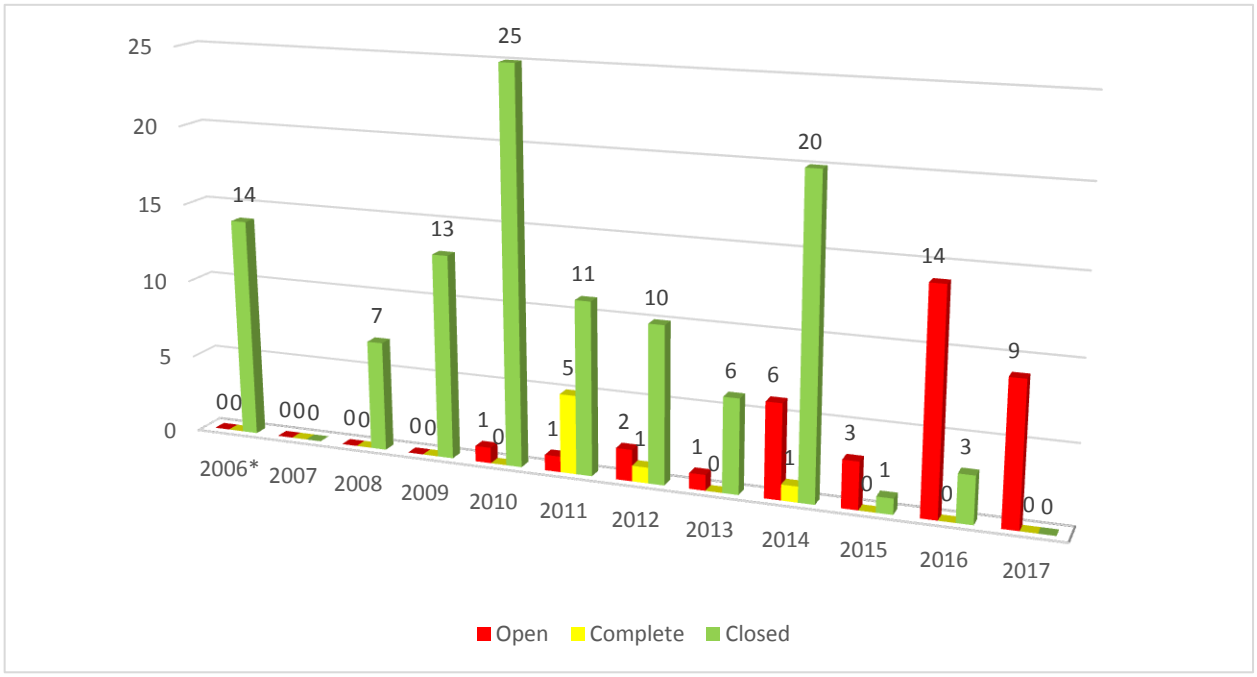
Year	Number of Reports	Number of Recommendations	Status of Recommendations		
			Open	Complete	Closed
2007	0	0	0	0	0
2008	1	7	0	0	7
2009	5	13	0	0	13
2010	6	26	1	0	25
2011	7	17	1	5	11
2012	3	13	2	1	10
2013	3	7	1	0	6
2014	6	27	6	1	20
2015	2	4	3	0	1
2016	3	17	14	0	3
2017	2	9	9	0	0
Totals	38*	140	37	7	96

*Two other reports were published by the RAIU in 2010 & 2013 which did not warrant any safety recommendations.

The overall progress with the closure of recommendations, in 2017, is shown in the adjacent pie-chart. Of the 140 recommendations: 69% have been closed; 5% have been completed and 26% remain open.



The graph below illustrates, by year, the number of recommendations, closed, complete and open.



Status of individual RAIU safety recommendations

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

Table	Recommendation Status	Comment
Table 1	Closed in 2017	Safety recommendations that were closed by the CRR in 2017.
Table 2	Complete in 2017	Safety recommendations completed, or that remain complete, as of the end of 2017.
Table 3	Open in 2017	Safety recommendations which remain open in 2017.
Table 4	Closed prior to 2017	Safety recommendations closed prior to 2017 i.e. closed in 2016 or earlier.

Table 1 – RAIU safety recommendations closed in 2017

This section identifies the safety recommendations closed in 2017 (in order of occurrence date).

Report	Recommendation	Actions taken to close the recommendation
Derailment of empty train due to collision with landslip debris outside Wicklow Station, 16th November 2009 (published 15/11/10)	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.	The following was been advised / submitted, to the CRR, by way of evidence of completion: • Guidance on Third Party Works; • CCE Briefing Document - Guidance on Third Party Works; • CRR record of Closure Form for associated outcome No. 15/14-A- AR5.
Derailment of an on track machine at Limerick Junction Station on the Dublin to Cork Line, 3rd July 2009 (published 10/06/10)	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.	IÉ introduced New Technical Standard for the Inspection of points & crossings, CCE-TMS-365 Issue No. 2.2 dated 2/12/14 (note V1.0 dated 24/10/12 replaced I-PWY-1159 which was the standing in place at the time of the occurrence).
Secondary suspension failure on a train at Connolly Station, 7th May 2010 (published 05/05/11)	IÉ should ensure all work in rolling stock maintenance depots is carried out in accordance with its control process.	IÉ submitted by way of evidence of completion an evidence form and 2016 CME Annual Audit Report as way of evidence of closure of this recommendation. The CRR are satisfied that the CME department have processes in place to monitor rolling stock maintenance activity and are responsible for managing fleet risks.
	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.	IÉ submitted evidence for the closure of this recommendation which the CRR accepted. The CRR plans to undertake an inspection in Q2 of 2018 to specifically consider this area.
Person struck at level crossing XE039, County Clare, 27th June 2010 (published 11/07/11)	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.	IÉ updated CCE Standard TMS-380 - Technical Standard for the Management of User Worked Unattended Level Crossings v.2 issue date 7 April 2015 (Note First Issue 1.0 27/1/2012, i.e., after the occurrence) to include Section 5.2 Managing Viewing Distances; which was accepted by the CRR.
Gate Strike at Buttevant Level Crossing (XC 219), County Cork, on the 2nd July 2010 (published 27/06/11)	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.	IÉ SET identified one similar level crossing at Clonsilla and has prepared new instructions and have implemented additional safeguards at these level crossings.
Road vehicle struck at level crossing XM096, County Roscommon, 2nd September 2010 (published 04/10/11)	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.	IÉ have reviewed and changed the signage and the new signage has been trialled and safety validated; which has been accepted by the CRR.

Report	Recommendation	Actions taken to close the recommendation
Fog signal activation in Dart driving cab, Bray, on the 6th March 2012 (published 19/09/2013)	IÉ should introduce appropriate procedures and standards for the safe issue, storage and transportation of fog signals.	IÉ-RU reviewed and changed their procedures for the issue, storage and transportation of fog signals. Operating procedure produced and record of distribution to CCE Managers supplied to CRR and this recommendation was accepted as closed by the CRR.
	IÉ drivers (and other staff) should receive adequate training in the safe handling of fog signals.	IÉ submitted evidence to the CRR in relation to this recommendation and the recommendation was closed.
Tractor struck train at level crossing XE020, 20th June 2012 (published 17/06/2013)	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.	IÉ have moved the whistle boards have been relocated and mirrors have been fitted. A sealed surface has been installed and new vandalism covers for the gates installed. In addition a Permanent Speed Restriction has been put in place. The CRR have accepted these changes.
	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.	IÉ recalibrated the LCRM system at the end of 2013 and issued associated guidance (CCE-QMS-005-041). IÉ have stated that "LCRM is a decision making tool and does not replace engineering judgement in terms of implementing mitigation measures". The CRR conducted and inspection (No 112/16-I) and have accepted the closure of this recommendation.
	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.	The CRR undertook an audit of the IMO department in late 2016 and have accepted that systems appear to be in place in relation to access to IAMS for location details for provision to emergency services; and have closed this recommendation.
Trend Investigation: Possession incidents on the Iarnród Éireann network (published 27/01/14)	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.	IÉ have introduced new operating procedures that address the process to be followed when an absolute possession is required to be taken at short notice. The CRR have accepted this and closed the recommendation.
Summary of Investigation into SPADs on the IÉ network from January 2012 to July 2015	IÉ-IM should review the functionality of signals in the Connolly area so that the instances of abnormal upgrades or downgrades.	IÉ undertook a review and found no faults, with the trend of downgrades considered low and the numbers decreasing. The CRR accepted this information and closed the recommendation.
	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.	IE-RU engaged Trinity College Dublin to undertake a study of driver behaviour and SPAD occurrences. The CRR accepted this and closed the recommendation.
	IÉ-RU should introduce a near miss reporting system, whereby, drivers may report near misses without the fear of sanctions being imposed.	IÉ submitted evidence to demonstrate that a system of near miss reporting has been introduced; the 'close call' system offers an additional method of reporting near misses or other events. These actions were accepted by the CRR and the recommendation closed.
	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 SOY SPADs.	IÉ produced and submitted procedure CCE-TMS-385 (Section 4.5 deals with the placement of PSR boards). This was accepted by the CRR and the recommendation was closed.

Report	Recommendation	Actions taken to close the recommendation
Operational incidents at Ardrahan on the 23rd October 2015 & Spa on the 28th November 2015	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.	Works complete on all required fleets, and the CRR have closed the recommendation.

* Light blue indicates recommendations associated with IÉ & dark blue Transdev.

Table 2 – RAIU safety recommendations complete in 2017

This section identifies the safety recommendations completed, or that remain complete, as of the end of 2017.

Report	Recommendation	Status
Laois Traincare Depot Derailment, 20th January 2010 (published 19/01/11)	IÉ should ensure that the Signal Sighting Committee is informed when train drivers report difficulties viewing a signal and the Signal Sighting Committee should verify that the reported difficulties are addressed effectively.	This recommendation remains complete in 2017.
Person struck at level crossing XE039, County Clare, 27th June 2010 (published 11/07/11)	IÉ should ensure that risk assessments are produced for all user worked level crossings to identify all hazards specific to particular level crossings.	This recommendation remains complete in 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.	This recommendation remains complete in 2017.
Road vehicle struck at level crossing XM096, County Roscommon, 2nd September 2010 (published 04/10/11)	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.	This recommendation remains complete in 2017.
Car Strike at Knockaphunta Level Crossing (XM250), County Mayo, 24th October 2010 (published 19/10/11)	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.	This recommendation remains complete in 2017.
Car Strike at Murrough Level Crossing XG 173, 14th February 2011 (published 08/02/12)	IÉ should ensure that they adopt their own standards in relation to design changes to any PEIO that has the potential to affect safety.	This recommendation remains complete in 2017.
Structural failure of a platform canopy at Kent Station, Cork, 18th December 2013 (Published 07/11/14)	IÉ IM should review the structural and annual inspection regimes for Building & Facilities (B&F) to ensure all assets are inspected in accordance with the prescribed standards and any associated documentation is completed appropriately.	This recommendation remains complete in 2017.

* Light blue indicates recommendations associated with IÉ, dark blue Transdev & lilac the CRR.

Table 3 – RAIU safety recommendations open in 2017

This section identifies the safety recommendations which remain open in 2017.

Report	Safety recommendation	Status
Malahide Viaduct Collapse on the Dublin to Belfast Line, on the 21st August 2009 (published 16/08/10)	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.	This recommendation remains open in 2017.
Car Strike at Murrough Level Crossing XG 173, 14th February 2011 (published 08/02/12)	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.	This recommendation remains open in 2017.
Tram derailment at The Point stop, Luas Red Line, 13th May 2010 (published 11/05/11)	Veolia 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.	This recommendation remains open in 2017.
Runaway locomotive at Portlaoise Loop, 29th November 2012 (published 19/09/13)	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.	This recommendation remains open in 2017.
Fog signal activation in Dart driving cab, Bray, on the 6th March 2012 (published 19/09/2013)	IÉ should ensure that their procurement and quality control processes verify that goods received are of the correct specification as those ordered.	The status of this recommendation is open for IÉ-RU & closed for IÉ-IM in 2017. The RAIU have filed both under open.
Trend Investigation: Possession incidents on the Iarnród Éireann network (published 27/01/14)	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.	This recommendation remains open in 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.	This recommendation remains open in 2017.
Operating irregularity during Single Line Working (SLW) between Dundalk and Newry, 23rd March 2013 (published 28/04/14).	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.	This recommendation remains open in 2017.
	IÉ should review current communication procedures with regard to the updated communication equipment now available.	This recommendation remains open in 2017.
Tram fire on approach to Busáras Luas Stop on the 7th November 2013 (published 28/08/14)	Transdev 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.	This recommendation remains open in 2017.
Structural failure of a platform canopy at Kent Station, 18th December 2013 (published 07/11/14)	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.	This recommendation was placed as open in 2017.
Vehicle struck by train at Corraun level crossing, XX024, Co. Mayo, 12th February 2014 (published 30/04/15).	IÉ should consider options to upgrade the crossing to minimise direct action by the users.	This recommendation remains open in 2017.
	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.	This recommendation remains open in 2017.

Report	Safety recommendation	Status
Car strikes train at Level Crossing XM 250, Knockaphunta, Co. Mayo, 8th June 2014 (published 04/06/15)	The CRR, 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.	This recommendation remains open in 2017.
Summary of Investigation into SPADs on the IÉ network from January 2012 to July 2015 crossing, XX024, Co. Mayo, 12th February 2014 (published 11/04/16)	IÉ-IM must introduce an adequate train protection systems 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.	This recommendation remains open in 2017.
	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 train protection system introduced on the network.	This recommendation remains open in 2017.
	IÉ RU should review the culture within the company so that actions taken after SPAD's 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.	This recommendation remains open in 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.	This recommendation remains open in 2017.
	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.	This recommendation remains open in 2017.
	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.	This recommendation remains open in 2017.
	IÉ-RU and IÉ-IM should carry out a review of the interfaces between different operational staff (i.e. drivers, LCCOs, signalmen and EOs) 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.	This recommendation remains open in 2017.
	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.	This recommendation remains open in 2017.
	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.	This recommendation remains open in 2017.
Dangerous occurrence between Ballybrophy and Portlaoise, 12th September 2015 (published 6th September 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.	This recommendation was issued in 2017.
	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.	This recommendation was issued in 2017.

Report	Safety recommendation	Status
Difflin Light Rail Passenger Fall, Co. Donegal 17th December 2016 (published 7th November 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.	This recommendation was created in 2017.
	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.	This recommendation was created in 2017.
	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.	This recommendation was created in 2017.
	DLR should review their responsibilities under the Safety and Welfare at Work Regulations as to dedicated First Aid areas.	This recommendation was created in 2017.
Near miss at Knockcroghery Level Crossing, XM065, Co. Roscommon, 31st January 2017 (published 20th December 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.	This recommendation was created in 2017.
	The SET Department should develop a formalised risk assessment process for the positioning of CCTV cameras and associated design works.	This recommendation was created in 2017.
	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.	This recommendation was created in 2017.
	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.	This recommendation was created in 2017.
	IÉ IM should review and update the LCCC Instructions, to make them more user friendly for LCCOs.	This recommendation was created in 2017.

* light blue indicates recommendations associated with IÉ, dark blue Transdev, lilac the CRR & light pink the DLR.

Table 4 – RAIU safety recommendations closed prior to 2017

This section identifies the safety recommendations closed prior to 2017:

Report	Safety Recommendation	Year Closed
Collision at Level Crossing XN104 between Ballybrophy and Killonan, 28th June 2007 (published 18/06/08)	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
Report into the derailment of a Tara Mines freight train at Skerries, 10th January 2008. (published 06/04/09)	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
Fatality at Level Crossing XX032 between Ballina and Manulla Junction, 28th February 2008 (published 02/03/09)	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
Near miss at Ballymurray level crossing, 14th June 2008 between Athlone and Westport. (published 11/05/09)	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, on the Ballybrophy to Killonan line, 31st of July 2008 (published 29/07/09)	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, on the Limerick Junction to Rosslare Strand line, 2nd December 2008. (published 01/12/09)	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

Report	Safety Recommendations	Closed
Collision of a Locomotive with Passenger Carriages at Plunkett Station in Waterford on the Limerick to Rosslare Line, 29th March 2009. (published 04/03/10)	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 on the Dublin to Cork Line, 3rd July 2009. (published 10/06/10)	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 16/08/10)	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

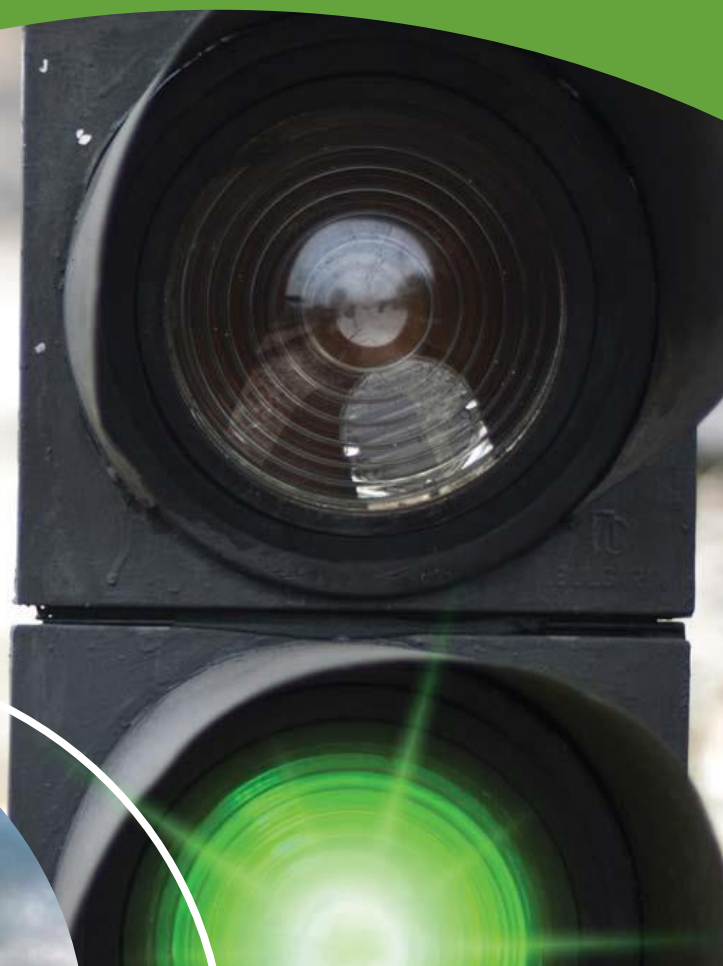
Report	Safety Recommendations	Closed
Irregular operation of Automatic Half Barriers at Ferns Lock, County Kildare, on the Dublin to Sligo Line, 2nd September 2009 (published 26/08/10)	IÉ should review the competencies of all signalmen to ensure that when signalmen are assigned relief duties they have 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 15/11/10)	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 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 Derailment, 20th January 2010 (published 19/01/11).	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
Secondary suspension failure on a train at Connolly Station, 7th May 2010 (published 05/05/11)	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
Road vehicle struck at level crossing XM096, County Roscommon, 2nd September 2010 (published 04/10/11)	IÉ should put in place a formal process for identifying and communicating with known users of user worked Level Crossings.	2014
	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 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 Murrough Level Crossing XG 173, 14th February 2011 (published 08/02/12)	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
	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
Gate Strike at Buttevant Level Crossing (XC 219), County Cork, 2nd July 2011 (published 27/06/12)	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
Tractor struck train at level crossing XE020, 20th June 2012 (published 17/06/2013)	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

Report	Safety Recommendation	Closed
Bearing failure on a train at Connolly Station, 18th October 2012 (published 26th September 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
Runaway locomotive at Portlaoise Loop, 29th November 2012 (published 19/09/13)	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 competency management system for train drivers to ensure that all driving tasks are routinely assessed.	2016
Trend Investigation: Possession incidents on the Iarnród Éireann network (published 27/01/14)	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
Operating irregularity during SLW between Dundalk and Newry, 23rd March 2013 (published 28/04/14).	IÉ should review the signalling infrastructure cross -border with a view to commissioning the bi-directional signalling.	2014
DART wrongside door failure, Salthill & Monkstown Station, 10th August 2013 (published 30/07/14)	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 28/08/14)	Transdev 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
	Transdev 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
	Transdev 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
	Transdev 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
	Transdev should ensure that Alstom, review their incident / accident investigation process to ensure that investigations are of sufficient depth and produce clear recommendations.	2015

Report	Safety Recommendation	Closed
Structural failure of a platform canopy at Kent Station, 18th December 2013 (published 07/11/14)	IÉ-IM should establish a formalised procedure for managing the risk associated with the adverse effects of high winds.	2015
Rock fall at Plunkett Station, Waterford, 31st December 2013 (published 18/12/14)	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 STSE.	2015
	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 30/04/15).	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
Summary of Investigation into SPADs on the IÉ network from January 2012 to July 2015	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

* Light blue indicates recommendations associated with IÉ & dark blue Transdev.

Appendices



Appendix 1 – Irish & European Laws

In April 2004, the European Parliament passed 'Directive 2004/49/EC of the European Parliament and of the Council of 29 April 2004 on safety on the Community's railways and amending Council Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification'. This directive is referred to as the Railway Safety Directive and set out the requirement for each European Union member state to establish a NSA to oversee the regulation of railway safety and a National Investigation Body (NIB) to act as an independent accident investigation body.

The Railway Safety Act 2005 was passed on the 23rd December 2005, transposing the Railway Safety Directive into national legislation and creating the framework for the establishment of the CRR. On the 1st January 2006 the CRR was established transferring the regulation of railway safety from the then Department of Transport. The Railway Safety Act 2005 established the CRR to act as the NSA and perform the duties outlined in the Railway Safety Directive associated with the licensing of railways. The RAIU was established as a functionally independent unit within the CRR to act as the NIB, independently investigating railway occurrences. The roles of the CRR and the RAIU were subsequently elaborated upon under the European Communities (Railway Safety) Regulations 2008, Statutory Instrument number 61 of 2008 (SI no. 61 of 2008) dated the 6th March 2008.

In July 2014, S.I. No. 258 of 2014, the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2014 was enacted. The purpose of these Regulations was to restate the national law that gives effect to Chapter V of Directive 2004/49/EC on safety of the Community's railways. Chapter V provides for railway accident and incident investigation and reporting. These Regulations provide for the establishment, of the national investigation body, the Railway Accident Investigation Unit, in the Department of Transport, Tourism and Sport to investigate railway accidents and incidents in accordance with these Regulations. Prior to these Regulations, the Railway Accident Investigation Unit operated in accordance with the Railway Safety Act 2005 as amended by the European Communities (Railway Safety) Regulations 2008 (S.I. No. 61 of 2008). These Regulations replace and repeal the provisions for investigation of accidents and incidents by the Railway Accident Investigation Unit under that Act and make some consequential amendments to that Act.

Appendix 2 – Railway Organisations

There are ten railway systems within the RAIU's remit, these are:

- The Iarnród Éireann (IÉ) national heavy rail network;
- The Luas light rail system in Dublin;
- The Bord Na Móna industrial railway;
- Nine heritage & minor railway systems (of which four 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 a safety management system (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. Balfour Beatty Rail Ireland (BBRI) is part of the Balfour Beatty Group, and have been operating as an RU on IÉ's rail system since March 2014. BBRI operate and maintain On Track Machines (OTMs) on behalf of IÉ. BBRI staff comprises of a number of OTM Driver Operators (OTMDOs) and fitter groups which are located throughout Ireland; their Safety Certificate is issued in conformity with European Directive 2012/34/EU and S.I. 249 of 2015. The performance of the national heavy rail system is reported to the European Railway Agency (ERA) in accordance with European reporting requirements.

The Luas light rail system is owned by the Railway Procurement Agency. Transdev Transport is the RU that operates passenger services, the passenger stops and the Central Control Room. Transdev 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 in 2017 included: Cavan & Leitrim Railway; Difflin Railway; Fintown Railway; Irish Steam Preservation Society; Lartigue Monorailway; Waterford and Suir Valley Railway;. Each of these acts as the RU and IM for their system.

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

Classification of occurrences

Occurrences fall into one of three types as defined in S.I. 258 of 2014:

- 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 the S.I. 258 of 2014. 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:

- Article 19(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 19(2) – Investigation into accidents and incidents, which under slightly different conditions might have led to serious accidents on the IÉ network;
- Article 21(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).

Within seven days of a decision to carry out a full investigation, the RAIU advise the relevant railway undertaking of the decision. In accordance with S.I. 258 of 2014, 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 Department of Transport, Tourism and Sport. 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 S.I. 258 of 2014, for all occurrences notified to the RAIU the relevant railway organisation must carry out an investigation and produce a report within six months.

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