Railway Accident Investigation Unit

Ireland

Annual Report

2016

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.

Thirty-nine preliminary examination reports (PERs) were completed in 2016. One of these occurrences was not related to the railway (where a body was found close to the line, but not related to any railway activity and was investigated by An Garda Síochána), and of the thirty-eight remaining PERs, one full investigation was commenced. The full investigation commenced was as a result of an accident on the Difflin Light Railway, Oakfield Park, Co. Donegal, where a young girl sustained serious injuries to her legs, after being dragged under the 'Santa Express' train.

The RAIU published two investigations reports that took place in 2015 on the Iarnród Éireann (IÉ) network, namely:

- Operational incidents at Ardrahan on the 23rd October 2015 & Spa on the 28th November 2015;
- Dangerous occurrence between Ballybrophy and Portlaoise on the 12th September 2015.

The RAIU also published a trend investigation into the occurrences of Signals Passed at Danger (SPADs) on the IÉ network between 2012 and 2015, namely the 'Investigation into SPADs on IÉ Network, from January 2012 to June 2015'.

A total of seventeen new safety recommendations were issued as a result of these investigations. There are safety recommendations made in relation to: the technology associated with rolling stock and train protection systems; traffic regulations and signalling systems; human factors associated with the occurrence of incidents; safety communications; operations during degraded conditions; speed boards; and near miss reporting, reporting and the culture in IÉ.

As of the end of 2016, the RAIU have issued a total of 131 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 131 RAIU safety recommendations issued to date, eighty-one have been closed out as having been addressed, twenty-one are complete and awaiting verification that they have been addressed, and a further twenty-nine remain open.

Within the unit, a position for a Senior Investigator became vacant in October 2012, and remained vacant at the end of 2016 with recruitment likely to occur in 2017. This shortfall in resources continues to be an ongoing concern and at times has had an adverse effect on the RAIU's output and ability to maintain a 24/7 on call facility.

David Murton
Chief Investigator

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The Organisation

The RAIU comprises of a Chief Investigator and a team of two full time Senior Investigators, each with the ability to perform the role of Investigator in Charge, as necessary. A third Senior Investigator position became vacant in October 2012, and as of the end of 2016 the position has been advertised and is in the process of being filled. 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, 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 2015 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 cross auditing for 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 RAIU continued engaged in consultation on the 'Fourth Railway Package, which proposed a recast of the Railway Safety Directive (RSD) (2004/49/EC) on safety on the Community's railways which was adopted to provide a common regulatory framework for railway safety. The RSD established a framework for harmonising the content of safety rules, safety certification and the investigation of accidents. The proposed Directive will also give the European Railway Agency (ERA) sole responsibility for authorising the placing on the market of certain vehicle

types. The proposal also aimed to clarify existing provisions of RSD 2004/49/EC, add new definitions and make changes to reflect other legislative changes adopted since the directive came into force.

The European Parliament voted on December 14 2016 to adopt the final wording of the Fourth Railway Package, concluding almost five years of intense negotiations over the European Commission's proposals.

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Investigation Activities

Summary of Preliminary Examination Reports during 2016

1st January 2016 to 31st December 2016

The following outlines the thirty-nine PERs undertaken by the RAIU into occurrences on the railways in 2016. 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	06 January 2016	Dundalk, Louth	Incident	Rolling Stock	Wrongside door failure of an Enterprise door, where the driver noticed that an isolated door was open in service & the driver reported issues with the door interlocking light.	0
Transdev	06 January 2016	Benburb Street	Accident	Collision	A motor vehicle did not obey traffic signals and entered Benburb Street from Temple Street West; and struck Tram 3021 which had been travelling along Benburb Street towards Heuston Station.	0
IÉ	9 January 2016	North of Dundalk, Louth	Serious Accident	To persons due to rolling stock in motion	A male deliberately placed himself in a place of danger by stepping in front of the Belfast to Dublin Enterprise service; and was fatally injured.	**1 Fatality** due to self-harm
IÉ	12 January 2016	Tara Mines, Dublin	Accident	Derailment	During a shunt movement, involving faulty hand points, the leading carriage of a nine wagon train travelling from Tara Mines to North Wall derailed when the front wheels went in the intended direction and the rear wheel travelled in the other direction.	0
Transdev	29 January 2016	Suir Road, Dublin	Accident	Collision	A motor vehicle did not obey traffic signals on Suir Road; and struck a tram which had been travelling from Suir Road Stop towards Stephen's Green.	0
IÉ	1 February 2016	Newbridge, Kildare	Accident	To persons due to rolling stock in motion	A male, jumped from a bridge, and deliberately placed himself in a place of danger by stepping in front of the Cork to Heuston service.	**1 Injury** due to self-harm
IÉ	3 February 2016	Portarlington, Laois	Accident	To persons due to rolling stock in motion	A male, jumped from a bridge, and deliberately placed himself in a place of danger by stepping in front of the Portlaoise to Heuston service.	**1 Injury** due to self-harm
IÉ	7 February 2016	Killarney – Tralee	Incident	Infrastructure	A landslip occurred near the 43.5 milepost on the Killarney to Tralee line. There was no rolling stock involved. The location was being monitored due to a previous landslip and there had been maintenance planned at the location.	0

Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries
Transdev	8 February 2016	Dundrum, Dublin	Accident	To persons due to rolling stock in motion	A pedestrian at Dundrum Stop was struck by a tram departing Dundrum Stop when they bent down to pick something up. The pedestrian suffered very minor injuries.	**1 Injury** to pedestrian
Transdev	22 February 2016	Wolfe Tone Street, Dublin	Accident	Collision	A motor vehicle did not obey traffic signals and entered Wolfe Tone Street sticking a tram which had been travelling inbound, after departing Jervis Stop.	**1 Injury** to van driver
Transdev	10 March 2016	Old Belgard Road, Dublin	Accident	Collision	A motor vehicle did not obey traffic signals and entered Junction A04 (Old Belgard Road/Embankment) from Embankment Road; and struck a tram which had been travelling outbound, towards Tallaght.	**4 Injuries** to tram driver and 3 tram passengers
Transdev	16 March 2016	Abbey Street, Dublin	Accident	Collision	A tram made minor contact with a van that exited the loading bay at Eason's and entered the tramway as the tram was in approach. No injuries were reported.	0
IÉ	20 March 2016	Skerries Station, Dublin	Serious Accident	To persons due to rolling stock in motion	A male deliberately placed himself in a place of danger on the track at Skerries Station and was fatality injured by the passing of the Belfast to Connolly Service.	**1 Fatality** due to self-harm
Transdev	30 March 2016	Mayor Street Lower, Dublin	Accident	To persons due to rolling stock in motion	A cyclist travelling behind an inbound tram, on Mayor Street Dublin, was struck by the passing outbound tram; and received minor injuries.	**1 Injury** to cyclist
IÉ	20 April 2016	Bray, Wicklow	N/A	N/A	The body of a male was found 300 metres from Bray Train Station. The fatality is likely the result of a fall from the nearby cliff.	**1 Fatality** due to third party actions
IÉ	23 May 2016	Rathpeacon, Cork	Incident	Infrastructure	A collapsed culvert was found during routine inspections. The RAIU were notified as it resulted in the closure of the line for a period of over six hours. No trains were affected by the collapse.	0
IÉ	23 May 2016	Cork Station	Incident	Traffic operation & management	The 14:20 hrs passenger service from Cork to Dublin, was given permission to enter a Single Line Working section between Cork and Mallow by the Signalman at Cork Cabin without first obtaining the permission from the CTC Signalman.	0
IÉ	25 May 2015	Dalkey, Dublin	Accident	Others	A DART pantograph inverted at a location outside Dalkey, damaging the pantograph and the overhead catenary wire.	0
IÉ	4 June 2016	Shankill, Dublin	Incident	Energy	Centralised Traffic Control granted an electrical isolation for the Shankill Section for maintenance works, but did not de-energise the power from the overhead cables.	0
Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries

IÉ	5 June 2016	Castleknock Station, Dublin	Accident	To persons due to rolling stock in motion	As Train P671 Maynooth to Connolly service approached Castleknock Station, a female jumped off the platform directly in front of the train and was struck by the train, in an act of self-harm. She suffered minor injuries.	**1 Injury**
IÉ	7 June 2016	Tara – Pearse Station	Incident	Control-Command & Signalling	At 19:15hrs on June 7th 2016, LOK reported that the driver of the 18:17 Malahide to Bray DART stopped at signal DC416 which was displaying a red aspect. However, the in cab warning system was displaying a 50km proceed indication.	0
IÉ	7 June 2016	Coolmine Station	Accident	Fire	At 10:43hrs the driver of Train P608 Drogheda to Pearse service made an emergency call to the Suburban Signalman at CTC that there was a fire onboard the train and he was detraining the passengers at Coolmine Station. Fire was the result of a broken injector pipe.	0
IÉ	27 June 2016	Drogheda, Louth	Incident	Rolling Stock	The driver of the 07:35 Enterprise (Connolly to Belfast) was able to take traction with a door open. This wrong side door failure was witnessed by the train guard who contacted the driver and stopped the set in a matter of feet. This set had recently returned to traffic from an overhaul program. Train travelled to Belfast where maintenance tested door and subsequently removed set from service. No property damage of injuries as a result of this wrong side door failure.	0
IÉ	27 June 2016	Ennis	Incident	Other	Train A786, the 13:40 hrs service from Limerick Junction to Galway, was due to hold outside station at Signal GL421 to allow this Train A485 to access the platform, to allow Train A485, the 13:45 hrs passenger service from Galway to Limerick Junction into the main platform at Ennis Station. However Train A786 continued towards Ennis Station, and passed signal GL421 at danger without authority. The SPAD was a Cat A SPAD with a SPAD Risk Ranking (SRR) of 20, making it a high risk SPAD.	0
Transdev	12 July 2016	Tallaght Stop, Dublin	Accident	Derailment	A tram, performing a shunting movement to return to the Red Cow Depot, derailed as it travelled over the spring points.	0
IÉ	13 July 2016	Drogheda Station, Louth	Accident	Derailment	A train dropped ballast, during a possession, derailed when travelled over some of the dropped ballast.	0
IÉ	16 July 2016	Kent Depot, Cork	Accident	Derailment	A train derailed in Kent Depot when it was travelling into the shed, as a result of gauge spread.	0
Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries

Transdev	28 July 2016	Benburb/ Blackhall Place Junction	Accident	To persons due to rolling stock in motion	A cyclist, whose bicycle brakes failed, collided with a tram at the junction of Benburb Street and Blackhall Place.	**1 Injury** to cyclist
IÉ	1 August 2016	Portlaoise Train Care Depot, Co. Laois	Accident	Derailment	A train, shunting in the depot, derailed as it travelled over a set of trap points.	0
IÉ	8 September 2016	Killiney Station, Dublin	Accident	To persons due to rolling stock in motion	A male deliberately placed himself in a position of danger by stepping in front of the Howth to Bray service, when the train was approaching Killiney Station; and was fatally injured.	**1 Injury** due to self-harm
Transdev	22 September 2016	Naas Raod, Dublin	Accident	To persons due to rolling stock in motion	A pedestrian was struck by a tram on the Naas Road. The pedestrian was walking along the tram line.	**1 Injury** to pedestrian
Transdev	28 October 2016	Bow Lane Crossing, Smithfield, Dublin	Accident	Collision	A bus, who did not obey the traffic signals, collided with a bus at a traffic junction in Smithfield.	**7 Injuries** to bus and LUAS passengers
Transdev	2 November 2016	Amien St, Dublin	Incident	Other	A tram (3018) was blocked at Amien St due to busy traffic, resulting in the tram (3007) travelling in the opposite direction having a 'Do Not Proceed' signal, however, when the traffic clearing the tram travelled past this signal. The driver immediately realised he had a SPAD and stopped the tram.	0
IÉ	9 November 2016	North Wall Depot, Dublin	Accident	Derailment	As a train was carrying out a shunting movement in the depot derailed as it travelled over a set of hand points, as a result of gauge spread.	0
IÉ	14 November 2016	Coolmine Level Crossing, Dublin	Serious Accident	To person due to rolling stock in motion	A male deliberately placed himself in a position of danger by stepping in front of the Maynooth to Pearse service; he was fatally injured. The male had accessed the track through Coolmine Station.	**1 Fatality** due to self-harm
Transdev	14 November 2016	Belgard Road/ Embankment	Accident	Collision	A truck, with its jib extended, struck the OCS, pulling them away from the stay-wires. The service was temporarily suspended.	0
IÉ	20 November 2016	Inchicore Works, Dublin	Accident	Derailment	A train was derailed as it was propelled over a set of handpoints; the propelling was an unauthorised movement.	0
Transdev	7 December 2016	Hospital Stop	Accident	Collision	A car did not obey the red traffic signal and travelled onto Belgard Square North, when it was struck by a tram. The car was wedged onto the tram, and stopped when the car struck an OCS pole.	**1 Injury** to LUAS passengers
Railway Body	Date of occurrence	Location of occurrence	Classification of occurrence	Classification subset	Summary	Fatalities/ Injuries

Difflin Light Railway	17 December 2016	Oakfield Park, Donegal	Accident	To persons due to rolling stock in motion	A young girl, travelling on the Santa train, fell from the train, whilst the train was in motion and became trapped under the train and was dragged along the train line. She suffered injuries to her legs which required hospitalisation.	**1 Injury** to child passengers

In summary, removing the self-harm occurrences (three fatalities, four injuries), IÉ have had:

- Accidents: Six derailments; one fire; and, an accident with a DART pantograph;
- Incidents: Two infrastructure incidents (embankment & culvert); two rolling stock incidents (wrong side door failure); one control-command & signalling incident (wrongside signal failure); one traffic operation & management incident (operating irregularity during SLW); one energy incident (isolation issue on DART); and one other incident (SPAD).

In relation to Transdev, where there were no self-harm occurrences & no fatalities, Transdev have had:

- Accidents: Eight collision accidents (three cars, three vans and one bus); four persons struck due to tram in motion (two pedestrians, two cyclists); and, one derailment;
- Incidents: one incident (SPAD).

Summary of Full Investigations commenced in 2016

1st January 2016 to 31st December 2016

From the thirty-nine PERs, one full investigation was commenced.

Girl fell from train on the Difflin Lake Railway (Santa Express) on the 17th December 2015

On the 17th December 2016, a young girl and her family were at Oakfield Park, Raphoe, Co. Donegal, when they travelled on the 'Santa Express' train operated by Difflin Lake Railway.

During the train trip, the girl fell from an open carriage, trapped her leg under the train, and was dragged a short distance under the train. The girl suffered serious injuries to her leg.

Full Investigations Published in 2016

1st January 2016 to 31st December 2016

The RAIU published three investigation reports in 2016, which resulted in a total of seventeen new safety recommendations.

Investigation into SPADs on IÉ Network, from January 2012 to June 2015

RAIU Report No: R2016 – R001 Published: 11/04/2016

On the 8th December 2013, two trains were travelling towards each other in the same section of track, only stopping when the signalman made a call for the trains to stop, the trains stopped 175 m apart at Millstreet Station Platform. As part of the initial RAIU investigation, the RAIU reviewed other Category A SPADs in IÉ in 2013; and although none of these SPADs resulted in fatalities, the consequences of SPADs can lead to multiple fatalities.

As a result, the RAIU made the decision to expand the investigation to include all Category A SPADs from January 2012 to June 2015, inclusive, in order to see if there were any trends into the types and causations of SPADs on the IÉ network. A total of forty-five SPADs were reviewed by the RAIU. These Category A SPADs were divided into different event types, namely: SPADs during normal train operations; SPADs during degraded train operations; and Start Against Signal (SAS) and Start on Yellow (SOY) SPADs. The investigation focused on three main SPADs, the SPADs at Millstreet on the 8th December 2013, the SPAD at Gortavogher on the 19th December 2013 and the SPAD at Muine Bheag on the 9th April 2013 as these best reflect the SPAD event type on the IÉ network. The following is a summary of the RAIU findings resulting from this investigation:

SPAD at Signal TL223, Millstreet, on the 8th December 2013

On the 8th December 2013, the IÉ 11:50 hours (hrs) passenger service from Tralee to Heuston (Train A303) was running late. In an effort to minimise delays, the Centralised Traffic Control (CTC) Signalman and the Traffic Regulator made the decision to change the crossing point of Train A303 and the 12:10 hrs Cork to Tralee passenger service (Train A304) to Millstreet Station (Cork), instead of Banteer Station (the routes are on a bi-directional single line track with crossing loops). It was expected that Train A304 would arrive first at Millstreet Station (a one-platform station), disembark passengers and shunt into the crossing loop. However, both trains approached Millstreet Station at the same time. As Train A303 approached Millstreet Station, it passed signal TL223 at danger without authority. The SPAD resulted in the two trains occupying the same section of line, travelling towards each other, until the CTC Signalman put out a general call for the trains to stop. Both train drivers applied the brakes and the trains came to a stop 175 metres (m) apart on the platform at Millstreet Station. IÉ awarded a SPAD SRR of 21 to this Category A SPAD therefore categorising it as a high risk SPAD.

The RAIU investigation found that the immediate cause of the SPAD was that Driver A303 did not see that Signal TL223 was displaying a stop aspect and continued driving towards Millstreet Station.

Possible contributory factors to Train A303 arriving at Millstreet Station Platform were:

- The current basic overrun protection in the Millstreet area does not provide sufficient protection to trains on single lines with crossings loops;

- Driver A303 lost situational awareness, as he thought Signal TL223 was displaying a green aspect;
- Driver A303 had an incorrect expectation that Signal TL223 would be displaying a green aspect as he had never approached the signal displaying a red light; this incorrect expectation was reinforced by the fact that the barriers for Level Crossing XE061 were lowered on his approach and there were passengers waiting on the platform. Furthermore, he had not been made aware by radio or by any other means and he was unaware that the crossing point for the trains had changed;
- Driver A303 did not apply any form of Error Prevention Technique (EPT) on the approach to the yellow aspect of Signal TLR223 to remind him that Signal TL223 would be displaying a red aspect;
- Driver A303 did not apply any EPT to refocus on his driving duties after he had become stressed, distracted and preoccupied by the events at Killarney Station during the same journey, where two young children were left unattended, which resulted in Driver A303 having to return to the station. Driver A303 had also become distracted by the fact that he was unable to provide relief duties for another service, due to the late running of the train. Driver A303 may have also become distracted by the speed board, located directly after Signal TL223; and the flashing lights of Level Crossing XE061;
- The CTC Signalman and the Traffic Regulator were unaware that they had inadvertently reduced the overrun protection for the trains, as they allowed Train A304 onto the platform instead of holding it outside the station.

Underlying causes associated with the incident, include:

- The Traffic Regulator's Manual does not include specific instructions or any form of dynamic risk assessment in relation to the alteration of the scheduled movements of trains;
- IÉ's Lineside Signal Sighting & Spacing Signalling Standard (I-SIG-2043) does not adequately address the risks associated with distraction features in the vicinity of signals, in particular, the positioning of speed boards in the vicinity of signals.

The root cause associated with the incident was:

- Non-technical skills, such as EPT, are not adequately promoted, trained for, assessed or monitored during driving training and driver competency management as outlined in IÉ-RU's suite of Operations SMS documents (namely OPS-SMS-3.0, OPS-SMS-3.1, OPS-SMS-3.2 & OPSSMS-3.5).

SPAD at Signal XX098, Gortavogher, on the 19th December 2013

On the 19th December, in Gortavogher (County Clare), lightning strikes resulted in signal and level crossing equipment failures with the touch screen in the Mallow level crossing control centre (LCCC) not showing the status of a number of signals at the level crossings in the area; resulting in the Galway Line Signalman (GLS) and the level crossing control operative (LCCO) despatching emergency operatives (EOs) to assess and manage the level crossings. The LCCO did not inform the GLS not to allow any trains to enter the section until the EOs were onsite, and as a result, the GLS informed the driver (Driver A780) of the

05:55 hrs passenger service from Limerick to Galway (Train A780), that there were faults with the level crossings which would be managed by EOs and gave the Driver A780 the proceed aspect to enter the section. As Driver A780 approached the first level crossing with reported faults (XE071) he stopped in rear of the stop signal until the EO cleared the signals and Driver A780 travelled through the level crossing without incident. However, the signals at the next level crossing with reported faults (XE098) were not illuminated and Driver A780 only became aware of the situation when it was too late and travelled through the level crossing with the barriers raised to road traffic (the EO was onsite but had not taken local control of the level crossing). Due to issues with the train radio operating in the cab, Driver A780 travelled for a further eleven kilometres (km) before coming to a stop. IÉ assigned an SRR of 18 to this Category A SPAD; therefore categorising it as a medium risk SPAD.

The RAIU investigation into this SPAD event found the immediate cause of the Driver A780 travelling past signal XE098DS at danger was that the GLS allowed Train A780 into the section of track where it was known there was two faulty level crossings, as the LCCO had not told the GLS not to allow trains into the section until the EOs had arrived. Contributory factors to Train A780 passing Signal XE098DS were:

- Driver A780 had not travelled toward Level Crossing XE098 cautiously, as set out in the Rule Book, as he had an incorrect expectation that he would approach Level Crossing XE098 with the signals operational;
- The visibility of the signals was affected by the adverse weather conditions, which resulted in Driver A780 losing situational awareness as to his location in terms of the level crossing and resulting in him, not seeing Signal XE098DS until it was too late to stop;
- The LCCO did not have clear understanding of the LCCC instructions, which resulted in him not telling the GLS not to allow trains into the section until the EOs had local control. In addition, the LCCO was not aware that he had to get the EO to verify the status of the level crossing;
- The GLS did not fully appreciate the role of the EO and was not aware that EOs were required to verify the status (to the LCCO) of the level crossing before allowing trains to approach them.

Underlying causes to the SPAD were:

- The LCCC Instructions are not user friendly, which has resulted in the LCCOs reverting to the Rule Book which is not fully comprehensive in terms of the operation of CCTV level crossings;
- The roles and responsibilities of the LCCOs and the Signalman are not fully established, in that the LCCOs appear to have gained more responsibility over recent years, which is not supported by any documentation.

The root causes were that the roles of the LCCO and GLS do not appear to be fully outlined in any formal documentation.

SPAD at Signal WL167, Muine Bheag, on the 9th April 2013

On the 9th April 2013, at approximately 11:19 hrs, the 10:15 hrs passenger service form Heuston to Waterford (Train A504) approached Muine Bheag Station with signals WLR161 and WL161 displaying double yellow and single yellow aspects, respectively. This signalling sequence was due to, Signal WL167 (on the exit of the station) displaying a red aspect, as a Track Recording Vehicle (TRV) was due to cross Train A504 at Muine Bheag Station. Train A504 was travelling with a driver (Driver A505, who was not the rostered driver for this service) and trainee driver. After performing a number of platform duties, such as

ensuring all passengers disembarked and boarded the train safely, the Person in Charge (PIC) gave the 'Station Works Complete' and the 'Ready to Start' signals despite seeing that Signal WL167 was at danger. The trainee driver saw the PIC give these signals as he was looking out of the cab window and Driver A505 watched the PIC give the signals on the in-cab Man Machine Interface (MMI) screen. Driver A505 did not observe Signal WL167, which is positioned approximately 215 m off Muine Bheag Station Platform. Driver A505 then departed Muine Bheag Station and on approaching Signal WL167 saw that Signal WL167 was displaying a red aspect and immediately applied the emergency brake, coming to a stop a short distance past the signal. The signalman contacted Driver A505 on the train radio to inform him he had passed Signal WL167 at danger and not to move the train.

The RAIU investigation found that the immediate cause of the Driver A505 starting against and travelling past Signal WL167 at danger was that he did not check the signal prior to departing Muine Bheag Station. Contributory factors to Driver A505 not checking Signal WL167 prior to departing the station were that:

- There was no DRA in the driving cab which may have reminded Driver A505 to check the signal prior to starting against Signal WL167;
- Driver A505 had an incorrect expectation that Signal WL167 was displaying a proceed aspect due to an over-familiarisation with the normal signal sequencing at Muine Bheag Station; not knowing that a TRV was due to cross his train at Muine Bheag Station; and receiving the 'Ready to Start' signal from the PIC Muine Bheag;
- Driver A505 was distracted by the presence of the Trainee Driver in the driving cab;
- Driver A505 was unable to apply any EPTs to remind him to check the signal and manage the distraction in the cab, as he did not have appropriate EPT training;
- PIC Muine Bheag giving the 'Ready to Start' signal despite knowing the signal was at danger.

Underlying cause to the SPAD was:

- Training in EPTs and competency management systems are not sufficiently robust, especially for SAS SPADs which account for the largest amount of SPADs on the IÉ network, and where there was, historically, no DRA present in the driving cabs.

Safety recommendations

As a result of these findings, the RAIU made fourteen safety recommendations:

- IÉ-IM must introduce adequate train protection systems on IÉ network for the protection of trains; this system should be robust and to an acceptable standard within Europe; and have the appropriate ATP and speed supervision functionality;
- 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 when upgrading the ATP equipment;

- IÉ-IM should review the functionality of signals in the Connolly area so that the instances of abnormal downgrades are minimised;
- 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;
- 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 Driver Development & Support System (DD&SS) is used for redeveloping competence in driving skills and supporting the drivers in returning to driving duties, after a SPAD event;
- IÉ-RU should introduce a near miss reporting system, whereby, drivers may report near misses without the fear of sanctions being imposed;
- 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;
- 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;
- 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;
- 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;
- 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;
- 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;
- 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-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.

Dangerous occurrence between Ballybrophy and Portlaoise, 12th September 2015

RAIU Report No: R2016 – 002 Published: 6th September 2016

On Saturday morning, 12th September 2015, a joint Balfour Beatty Rail Ireland (BBRI) and IÉ team were working in a T3 Possession1 on the Dublin to Cork Up and Down Lines near to the 54 mile post (MP). The Weekly Circular stated that the T3 Possession was to be shortened (by time) to 05:20 hrs, to allow for

Single Line Working (SLW) on the Down Line from 05:20 hrs. However, according to the method statement for the works, the T3

Possession was to change to SLW on the Down Line at 06:00 hrs. There was one worksite in the T3 Possession where ballast cleaning was being undertaken (by BBRI & IÉ staff) as part of the planned upgrade of the Dublin to Cork Line. At 05:40 hrs, the BBRI ballast cleaning crew members, and two IE staff, were attempting repairs to the ballast cleaner; when an empty passenger train (Train J207) travelling from Laois Train Care Depot (County Laois) to Mallow (County Cork) passed through the ballast cleaning location. The BBRI and IÉ staff were unaware of the train's approach, however, they were in a place of safety as the train passed and as a result there were no fatalities or injuries as a result of this incident; however there was potential for them to be in a position of danger. The staff who were with the ballast cleaner were not briefed that the T3 Possession had been lifted and that SLW was coming into operation on the adjacent line, as a number of IÉ staff responsible for safety on the site were not familiar with the IÉ Weekly Circular relevant to the works. There was also a discrepancy between the number of staff allocated to the works and the number actually present on site.

The immediate cause of Train J207 passing adjacent to the worksite without the prior notification to the ballast cleaning staff was as a result of ES2 informing the Person in Charge of Possession (PICOP) (who in turn informed the Signalman) that the Down Line was clear for trains, without briefing any of the ballast cleaning staff on the introducing of SLW arrangements.

Contributory factors associated with the incident are:

- The Engineering Supervisor (ES2) was not aware of the T3 Possession planned termination time of 05:20 hrs;
- The Resource Allocation Sheet, prepared by IÉ's Infrastructure Planning Team was not effective at ensuring staff rostered for work reported for duty.

The underlying cause associated with this incident was:

- There is no prompt on the Site Safety Briefing Form to ensure all staff are aware of the contents of the current IÉ Weekly Circular.

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

- IÉ-IM should review the site safety briefing procedures to make sure all personnel have made themselves aware of the information contained in the relevant Weekly Circular;
- IÉ-IM should review the method of allocation and accountability for General Operatives detailed for work sites; this is to ensure that sufficient personnel attend and remain on site.

The RAIU report investigated two incidents involving the same Class 2600 rolling stock that occurred within five weeks of each other:

- On Friday 23rd of October 2015 at 19:50 hrs, the 18:00 hrs passenger service, from Limerick to Galway, was involved in a platform overrun and Signal Passed at Danger (SPAD) without authority at Ardrahan Station (Galway) and travelled through Level Crossing XE156 Ardrahan, with barriers raised and open to road traffic;
- On Saturday 28th November at 21:16 hrs, the 19:00 hrs passenger service from Ballybrophy to Limerick, passed signal XN159DS at danger without authority and collided with the level crossing gates at Level Crossing XN159 Spa (Castleconnell, Limerick) as they were being opened.

Incident at Ardrahan on the 23rd October 2015

On Friday 23rd of October 2015 at 19:50 hrs, Train A788 approached Ardrahan Station, it approached the down distant signal, XE156DD (which indicated that the next signal (Signal XE156DS) was displaying a red aspect). The driver of the train, Driver A788 applied brake and felt that the train was not slowing as normally expected, and four seconds after the initial brake application, Driver A788 made a full brake application. At this stage the train was approximately 1158m from Ardrahan Station platform (and approximately 753m from XE156DD) travelling at a speed of 63mph (101 km/h). On passing Signal XE156DD, Driver A788 became more concerned that the train was not going to stop at Ardrahan Station and in rear of Signal XE156DS at danger, and placed the brake into the emergency position. Seventeen seconds later, Driver A788 realised that the train was not slowing sufficiently to stop at Ardrahan Station platform, and begins to sound horn in repeated blasts. The train passed through Ardrahan Station (where it was due to stop at and serve), and then passed Signal XE156DS at danger, and then passed over Level Crossing XE156 Ardrahan with barriers raised for road traffic. The train comes to a stop approximately 894m beyond where it was intended to stop.

Incident at Spa on the 28th November 2015

On the 28th November at 21:16 hrs, Train A464 was operating approximately fifty-five minutes late due to the late running of a connecting service, as it approached Level Crossing XN159 Spa. Train A464 was 961m (1222 yards) from Level Crossing XN159 Spa, travelling at 68 km/h (42 mph), approaching Signal XN159DD, which indicated that the next signal would be displaying a red aspect. On seeing this, Driver A464 placed the brake handle into a braking position, which resulted in severe wheel slide and Wheel Slide Protection activity, Driver A464 then applied a full service train brake, as the train was not slowing as expected. Five seconds later Driver A464 put the train in emergency braking as the train was still not slowing as expected, and begins to sound the horn continuously. At approximately the same time, Gatekeeper XN159 crossed the track to begin the gate opening process, and hears the train approaching and abandons opening the gates and steps out of the way. Train A464 passes through Level Crossing XN159 Spa with gates closed against the train, colliding with the gates and comes to a stop 60m beyond Level Crossing XN159 Spa.

Conclusions for both incidents

The drivers of both incidents used the correct procedures, as they were trained to do, and applied emergency braking early. The investigation found no deficiencies in the physical infrastructure or signalling design and layout. The train brakes performed as designed and had received all relevant maintenance inspections prior to and post each incident. The wheel rail interface contained evidence of contaminants combined with moisture in the Spa incident and contaminants more than likely would have been present in Ardrahan; these conditions would have led to poor adhesion and was a factor.

The immediate cause of both operational incidents was an insufficient level of adhesion, between the rail and the train wheel, to bring the vehicle to a stop before the relevant signals.

Contributory factors associated with the incidents are as follows:

- The incident locations experienced light rain prior to the train services operating, resulting in LRA conditions;
- There was no on-board sanders to improve adhesion, between the rail and the train wheel;
- Contributory factor at Spa only - Gatekeeper XN159 had not opened the gate as in a timely fashion prior to Train A464 expected arrival;
- Contributory factor at Ardrahan only – Incorrect OTDR input resulted in the speed displayed to driver varying by up to 5mph (8 km/h) at 70mph (112km/h).

Safety Recommendations for both incident

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

- 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.

Tracking Safety Recommendations

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

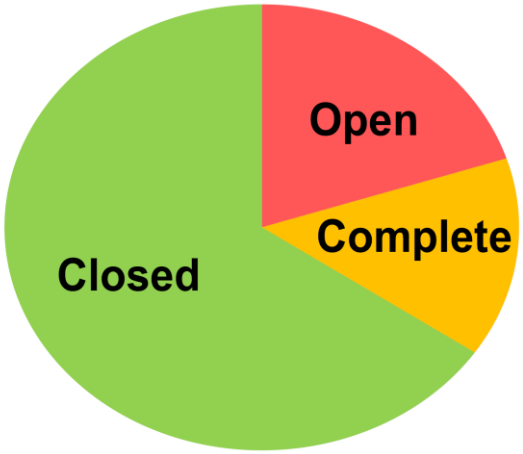
The CRR, as the National Safety Authority (NSA) for Ireland, holds meetings with the relevant stakeholders to monitor the progress of recommendations. An update is included in Appendix A on the status of individual recommendations that were not closed prior to 2015 and the recommendations are listed in chronological order by investigation report. Investigation reports where all recommendations have been closed prior to 2015 can be found in Appendix B. For clarity and completeness a comment has been included on the status of individual recommendations.

As of the 31st December 2016, the RAIU have made 131 recommendations. All recommendations were accepted by their addressee and implementer. The status of the recommendations as of the end of 2016 is included in below.

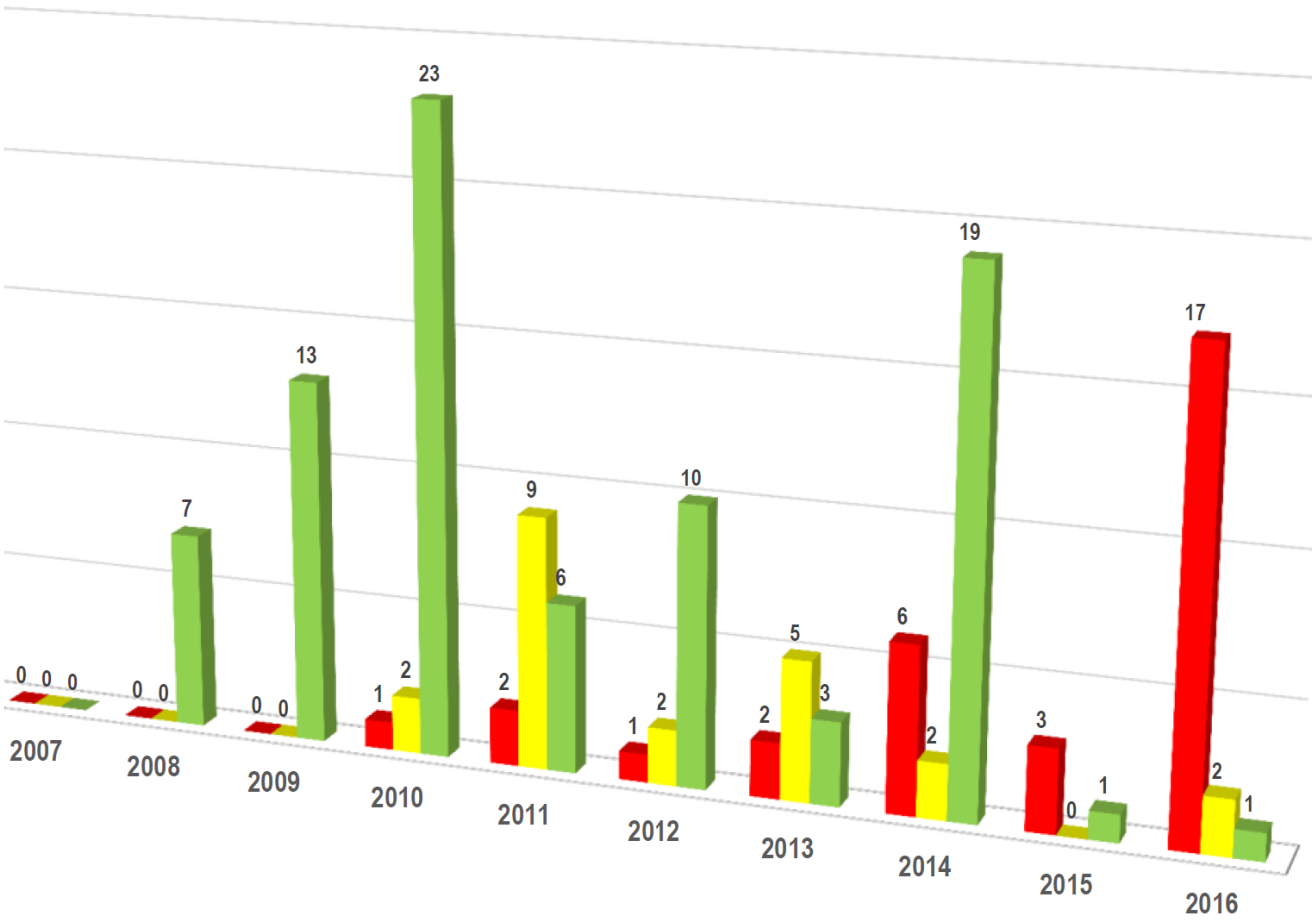
Year	Number of Reports	Number of Recommendations	Status of Recommendations		
			Open	Complete	Closed
2007	0	0	0	0	0
2008	1	7	0	0	7
2009	5	13	0	0	13
2010	6	26	1	2	23
2011	7	17	2	9	6
2012	3	13	1	2	10
2013	3	7	2	4	1
2014	6	27	6	2	19
2015	2	4	3	1	0
2016	3	17	14	2	1
Totals	33*	145	29	21	95

*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 2016, is shown in the adjacent pie-chart. Of the 128 recommendations: 61% have been closed; 16% have been completed and 22% remain open.



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



RAIU Safety recommendations closed in 2016

This section identifies the safety recommendations closed in 2016.

Report	Recommendation	Actions taken to close the recommendation
Malahide Viaduct Collapse on the Dublin to Belfast Line, on the 21st August 2009 (published 16/08/10)	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	The CRR have reviewed, and addressed where required, all previously closed recommendations; and a new process is in place for the closure of safety recommendations and are satisfied that the recommendation is now closed.
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.	Evaluation of secondary suspension system was carried out by ESG; a report was completed and recommendations made, IÉ carried out the recommendations and were reviewed by the CRR and are satisfied that the recommendation is now closed.
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.	IÉ created new standard CCE-TMS-380 (published April 2015) which references correspondence with local authorities, which the CRR have reviewed. The CRR have also reviewed some samples of correspondence to local authorities and are satisfied that the recommendation is now closed.
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.	IÉ have reviewed and updated the VMIs. The CRR have reviewed the new VMIs against previous VMIs and are satisfied this recommendation is now closed.
	IÉ should review their competency management system for train drivers to ensure that all driving tasks are routinely assessed.	IÉ have reviewed some of their competency management systems related to drivers, the CRR have reviewed this and are satisfied this recommendation is now closed.
Bearing failure on a train at Connolly Station, 18th October 2012 (published 26th September 2012).	IÉ should put in place formal procedures governing the role of FTS staff in relation to Hot Axle Box Detectors.	IÉ have submitted an evidence form to the CRR with the following updated documentation: • 2011 Part 3 Instructions: HABD on rolling stock Issue 2; • CME-TMS-001, CME Technical Management System, Issue 6 (12/06/15); • CME-TMS-001-002, FTS Call out Procedure Issue 1, (Dec 2012) & Issue 2 (21/05/13). The CRR have reviewed this documentation and are satisfied that the recommendation is now closed.
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.	IÉ have declared the Level Crossing Risk Matrix to be effective and have revised CCE-TMS-380 (April 2015). The CRR have reviewed these and are satisfied that the recommendation is now closed.
DART wrongside door failure, Salthill & Monkstown Station, 10th August 2013 (published 30/07/14).	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.	IÉ reviewed and re-issued document 'RU 300-001 DART Class 8100 Drivers Manual, Issue 1' on the 03/08/2016. The CRR have reviewed the document and consider that this recommendation is now closed.

Report	Safety Recommendation	Actions taken to close the safety recommendation
Rock fall at Plunkett Station, Waterford, 31st December 2013 (published 18/12/14).	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.	IÉ-IM have reviewed CCE-STR-STD-2100 and created new standard CCE-TMS-408 in its place and have also reviewed CCE-STR-GDN-2802. The CRR have reviewed both these documents and consider this recommendation to now be closed.
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.	On the 24th June 2015, IÉ-IM advised the following: "The Decision line is a term used internally within ÍE. This is actually a STOP line at the decision point similar to a stop line on a public road at road junction. There is also a STOP sign positioned beside it. IÉ IM considers road users who have been issued with a permit or a driver's licence should be familiar with road signage and the rules of the road." The CRR now consider this recommendation to be closed.
Summary of Investigation into SPADs on the IÉ network from January 2012 to July 2015 crossing, XX024, Co. Mayo, 12th February 2014	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.	IÉ have stated that IM-SMS-007 requires that reports are completed within 22 weeks of the investigation remit being issued and that a monitoring process in place to ensure all investigations are completed timely; and at the present time no SPAD investigations are overdue. The CRR, based on this evidence, consider this recommendation to be closed.

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

RAIU Safety recommendations complete in 2016

This section identifies the safety recommendations completed, or that remain complete, as of the end of 2016.

Report	Recommendation	Status
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.	This recommendation remains complete in 2016.
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.	This recommendation remains complete in 2016.
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 2016.
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.	This recommendation remains complete in 2016.
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.	This recommendation remains complete in 2016.
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 2016.
	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.	This recommendation remains complete in 2016.
	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 2016.
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.	This recommendation remains complete in 2016.
	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 2016.
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 2016.

Report	Safety Recommendation	Status
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 complete in 2016.
	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 2016.
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.	This recommendation remains complete in 2016.
	IÉ should audit their Level Crossing Risk Matrix system, to ensure it correctly identifies high risk level crossings; and identifies appropriate risk mitigation measures for individual level crossings.	This recommendation remains complete in 2016.
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.	The status of this recommendation remains closed for IÉ-RU & complete for IÉ-IM. The RAIU have filed both under complete.
	IÉ drivers (and other staff) should receive adequate training in the safe handling of fog signals.	This recommendation remains complete in 2016.
Structural failure of a platform canopy at Kent Station, Cork, 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 remains complete in 2016.
	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 2016.
Summary of Investigation into SPADs on the IÉ network from January 2012 to July 2015 (published 04/06/16)	IÉ-IM should review the functionality of signals in the Connolly area so that the instances of abnormal upgrades or downgrades.	IÉ-IM consider this recommendation to be complete. Evidence to be reviewed by the CRR.
	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.	IÉ-IM consider this recommendation to be complete. Evidence to be reviewed by the CRR.

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

RAIU Safety recommendations open in 2016

This section identifies the safety recommendations which remain open in 2016.

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 2016.
Secondary suspension failure on a train at Connolly Station, 7th May 2010 (published 05/05/11)	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.	This recommendation remains open in 2016.
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 2016.
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 2016.
Tractor struck train at level crossing XE020, 20th June 2012 (published 17/06/2013)	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.	This recommendation remains open in 2016.
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 & complete for IÉ-IM in 2016. 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 2016.
	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.	This recommendation remains open in 2016.
	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 2016.
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 2016.
	IÉ should review current communication procedures with regard to the updated communication equipment now available.	This recommendation remains open in 2016.
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 2016.

Report	Safety Recommendation	Status
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 2016.
	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 2016.
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 2016.
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 was issued in 2016.
	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 was issued in 2016.
	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 was issued in 2016.
	IÉ-RU should introduce a near miss reporting system, whereby, drivers may report near misses without the fear of sanctions being imposed.	This recommendation was issued in 2016.
	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 was issued in 2016.
	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 was issued in 2016.
	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 was issued in 2016.
	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 was issued in 2016.
	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 was issued in 2016.
	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 was issued in 2016.
	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.	This recommendation was issued in 2016.

Report	Safety Recommendation	Status
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 2016.
	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 2016.
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.	This recommendation was issued in 2016.

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

RAIU safety recommendations closed prior to 2016

This section identifies the safety recommendations closed prior to 2016:

Report	Safety Recommendation	Year
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
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
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
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

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
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
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)	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
Runaway locomotive at Portlaoise Loop, 29th November 2012 (published 19/09/13)	IÉ should adopt a quality control system, for the introduction of new maintenance procedures for locomotives.	2014
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 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

Report	Safety Recommendation	Closed
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
	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, as the contracted VMC, 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
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 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

* 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. 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 2016 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 must carry out an investigation and produce a report within six months.

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