AN COIMISIÚN UM RIALÁIL IARNRÓID
COMMISSION FOR RAILWAY REGULATION

RAILWAY SAFETY PERFORMANCE IN IRELAND 2020

CRR
AN COIMISIÚN UM RIALÁIL IARNRÓID
COMMISSION FOR RAILWAY REGULATION

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Foreword

The Commission for Railway Regulation is pleased to publish its Annual Safety Performance Report for 2020. This report supplements the CRR's Annual Report to the Minister and provides further detail on the safety performance of the railway organisations operating in Ireland.

This is the twelfth year that the Annual Safety Performance Review has been issued. The CRR continuously supervise the safety performance of the principal railway organisations operating in the state. This is done through our Inspectors undertaking audits, inspections and meeting with company executives and managers, to check they are applying and improving their safety management systems.

That said the COVID-19 pandemic made 2020 a most challenging year for the railway sector and the country as a whole. I must firstly, in the context of this 2020 Annual Safety Performance Report, acknowledge the professionalism and continued dedication of the Commission's Supervision Team who continued to work creatively ensuring we continued to fulfil our functions, while fully complying with public health information and Government restrictions.

Given the COVID-19 pandemic there was some curtailment to rail services and consequently passenger numbers on both the Irish Rail network and Luas Tramway saw significant decreases owing to the necessary government restrictions on travel that were imposed for much of 2020. In 2019, Irish Rail carried more than 50 million passenger journeys and the LUAS carried more than 48 million passenger journeys. In 2020, these figures reduced to 17.9 and 19.2 million passenger journeys respectively.

Nonetheless, there were no passenger fatalities on our railways in 2020 and the safety performance of the Irish railway sector was broadly positive. The collection of the data for this report was conducted against the backdrop of COVID 19 and the associated restrictions put in place. The CRR acknowledges the assistance of all who have provided the data that has allowed us produce this report and so continue one of our key mandates of fostering and encouraging railway safety.

Anthony Byrne
Principal Inspector – Supervision & Enforcement

Executive summary

This annual safety performance report of the Commission for Railway Regulation (CRR) is prepared for stakeholders and the general public as per the functions described in Section 10 of the Railway Safety Act 2005. The data used to compile this report is provided periodically throughout the year by the various regulated railway organisations. This data is provided in line with the data specification set by the CRR. This report aggregates this data and compares year on year performance along with commentary on safety performance indicators.

The CRR is the railway safety regulator in Ireland and is responsible for overseeing the safety of all railway organisations, which in 2020, included Iarnród Éireann Infrastructure Manager, Iarnród Éireann Railway Undertaking, Transdev Dublin Light Rail (Luas Operator), Rhomberg Sersa Ireland, Bord Na Móna (where their railway interfaces with public roads), the Railway Preservation Society of Ireland (RPSI) and a number of smaller heritage railways.

The safety performance of the Irish railway sector is broadly positive, both when compared against previous years and European statistics. 2020, however, is an exceptional year as the COVID-19 pandemic has led to a very large decline in the usage of the railway system. Railway system operations (e.g., passenger journeys undertaken or tonnes carried) did not decline by as much, all of which means the pandemic's effect on railway system safety risk is difficult to understand at time of writing.

There were no passenger fatalities in 2020. However, tragically there were eight fatal occurrences on the conventional and light rail networks, one less than in the preceding year. Seven of these occurred on the Iarnród Éireann network and one on the Dublin Light Railway (Luas).

In Iarnród Éireann, 2020 saw a large increase in the number of train collisions from 22 in 2019 to 72 in 2020, which the data suggests is largely caused by collisions with obstacles and animals on the line. Signals Passed At Danger (SPADs) decreased slightly to 10 in 2020, two fewer than in 2019. The majority of these (9) involved Iarnród Éireann Railway Undertaking trains, and they have several initiatives underway in this area to continue the long-term downward trend observed over the last decade.

One of Transdev's safety performance indicators saw a significant increase in 2020, where normalised data shows an increase in collisions between trams and road vehicles. All occurrences are reported to involve errors by road vehicle drivers, which is a signal that there may be systemic problems with regards to operation of road vehicles on or near the tramway. As the report notes, measuring the safety risk related to this indicator requires further analysis, a task that is the legal responsibility of the relevant railway organisation. Caution is again required for interpreting 2020 data given the reduced passenger journeys taken.

Looking wider to Europe, Ireland continues to perform well in terms of the number of accidents. Ireland performs less well when it comes to precursor events such as Signals Passed at Danger (SPADs), wrong-side signalling failures, track buckles and broken rails. The report notes that the European Union Railway Agency has communicated concerns to the sector across Europe regarding the quality of data collected at European Level.

In 2020, the RAIU concluded 4 investigations. These followed a Trap & Drag occurrence at Heuston LUAS stop, a near miss with a track worker at Woodlawn, Co. Galway, a near miss with Signalling Technician at Rush & Lusk Station and a train collision with a piece of civil engineering equipment.

This resulted in 18 new safety recommendations, 8 directed to Iarnród Éireann – Infrastructure Manager, 8 directed to Transdev the Dublin Light Railway operator and 2 directed to Transport Infrastructure Ireland (TII), as the owner of the Dublin Light Railway network and its rolling stock. The RAIU also commenced 9 investigations in 2020. These were:

- Collision between an IÉ passenger train and rail-mounted maintenance equipment, Rosslare, Wexford, 11th January 2020
- Collision between a car and a train at Kilnageer Level Crossing (XM240), Mayo on the 29th April 2020
- Person entrapped in lowered CCTV level crossing, Ashfield, Offaly on the 24th May 2020
- Near miss with an Iarnród Éireann Patrol Ganger near Woodlawn, Galway, on the 4th June 2019[1]
- Trend investigation into SPADs on the Luas network, (various dates but notified to the CRR on the 9th June 2020)
- Collision between a Bord na Móna Flat Wagon and Kilcolgan Level Crossing Gates, Offaly on the 8th June 2020
- Chassis Plate Fracture on General Motors Class 201, Locomotive 224 on the 7th July 2020
- The failure of overhead line equipment at Pearse Station, Dublin on the 1st October 2020
- An overhead line failure at Stillorgan tram stop on the 2nd of November 2020.

1. The RAIU only became aware of this incident when they received IÉ-IM's internal report on the 13th February 2020.

1. INTRODUCTION

1.1 Introduction

This is the twelfth Annual Safety Performance report produced by the Commission for Railway Regulation (CRR). In this report, the CRR uses the quantitative and qualitative data collected by Railway Organisations in Ireland to inform citizens and the sector in general on safety performance. All Railway Organisations in Ireland are required in law to demonstrate that they have assessed the safety risks they are responsible for, and then also to demonstrate that these risks are controlled and acceptable as per their defined risk acceptance criteria. Collection of safety data is an essential element of good risk management practice, and safety indicators collected and presented in this report provide some insight into the effectiveness of risk management practice for Ireland's railways. For further information on how the CRR assess that practice in Ireland, readers are invited to review the CRR's annual reports as they contain an overview of the CRR's supervisory activities in this area.

1.2 Overview of report

Safety trends in Ireland for all railway systems are presented and discussed in Chapter 2. For conventional rail systems, such as the one owned and operated by Iarnród Éireann, performance indicators are guided by the European Union's Common Safety Indicators (CSI) framework. Indicators presented for the Dublin Light Rail System (Luas) were developed by Transdev Dublin Light Rail (TDLR) and Transport Infrastructure Ireland (TII). Indicators for Heritage Railways are guided by their reporting of incidents and accidents to the CRR, the specification for reporting such information being contained within the CRR's guideline for 'Operators of Heritage and Minor Railways – RSC-G-022'.

In Chapter 3, a brief overview of the public representations received by the CRR in 2020 is presented. In Chapter 4, the safety performance of the conventional system in Ireland is placed into context of similar systems in other EU Member States. This includes a brief overview of significant accidents that occurred in the EU and beyond in 2020. Chapter 5 concerns the Railway Accident Investigation Unit (RAIU) and recommendations made arising out of their investigations. The status of each recommendation is explained together with details of actions taken to date.

1.3 The Commission for Railway Regulation

The Commission for Railway Regulation was established on the 1st of January 2006 under the Railway Safety Act 2005. It is the independent railway safety and market regulator for the conventional railway system in Ireland, a role largely defined in the European Union Regulatory framework for the Single European Railway Area. Under the Railway Safety Directive (EU Directive 2016/798/EC), as transposed in S.I. No.476 of 2020[2], the CRR is the National Safety Authority for the conventional railway in Ireland. The CRR is also the railway safety regulator for the light rail systems, heritage systems and the public highway interfaces with industrial rail systems. These systems are regulated under the provisions of the Railway Safety Act and are not within scope of the European Union Regulatory framework.

2. In October 2020, the recast Railway Safety Directive EU 2016/798 came into effect through SI 476 2020.

As stated in the current Statement of Strategy, the CRR is committed to advancing railway safety, the maintenance and further development of high performing and sustainable railway systems and ensuring fair access to the Irish conventional railway network in Ireland through regulation, monitoring, encouragement and promotion. Full detail of the role and functions vested in the CRR can be found in our annual report.

Further details on the role and function of the Commission may be found on the CRR website www.crr.ie.

1.4 Statistical qualification

The CRR produces this report to provide stakeholders and the public with information about safety performance of the various Irish railway organisations. The CRR intends for this information to be timely and accurate. Any errors should be brought to the CRR's attention, whereupon every effort will be made to correct them.

It is important to note that the figures used in this report are intended to illustrate broad trends and are not meant to be read as exact calculations. Rounding has been used and this could affect the overall data. The data used to compile this report is provided to the CRR periodically throughout the year by the various railway organisations. This report presents aggregated data and compares year on year performance together with commentary on several safety performance indicators.

While the CRR has made every effort to ensure the accuracy of the data, it takes no responsibility for third party data presented in this report.

1.4.1 2020 safety performance and COVID-19

As will be illustrated throughout the report, a large decline in passenger volumes and usage was reported for railway systems in Ireland in 2020. The Irish government required that railway organisations in Ireland significantly reduce their service capacity in order to reduce spread of COVID-19. The movement of people in Ireland was also restricted, where for several months people were required to stay within 2 to 5 kilometres of their residence. These restrictions on movement, combined with other restrictions (e.g., social distancing, home working), means that 2020 shows a significantly lower number of passengers compared to previous years. Whilst this report does not explicitly review the risk present on the system, a large fall in usage will inevitably impact the safety risk the system poses to people and the environment. In the short-term risk will likely be lower, but different usage patterns and changed societal behaviours may impact on risk as the pandemic and its consequences continues through 2021 and beyond.

2.
RAILWAY SAFETY TRENDS IN IRELAND

2.1 Introduction

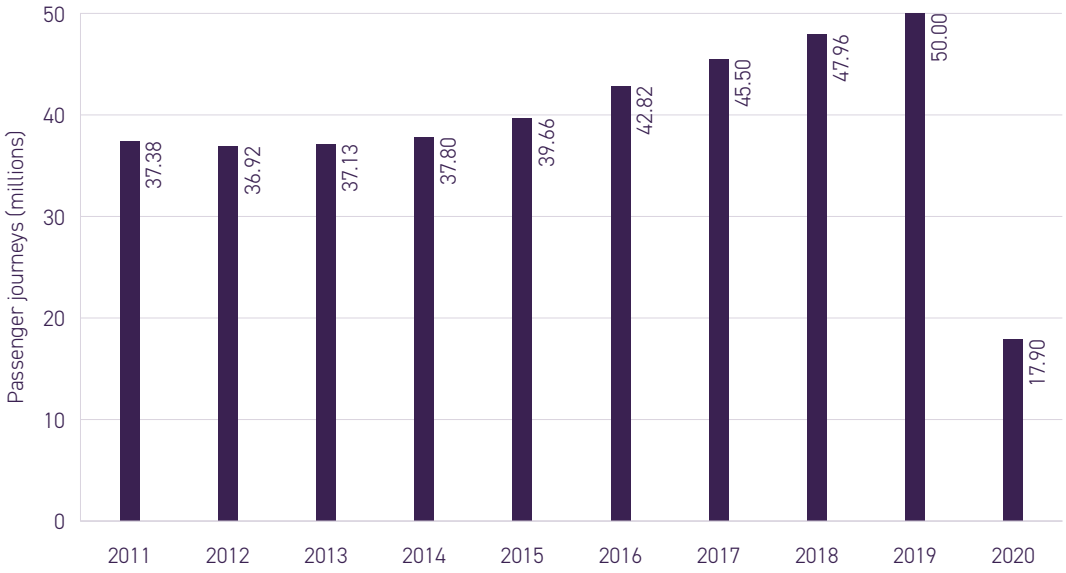
The safety performance of the Railway Organisations in the Republic of Ireland is considered for the four principal railway sub-sectors that the CRR regulates: conventional railways, light railways, public highway interfaces with industrial railway systems, and heritage railways.

2.2 Iarnród Éireann Railway (Ireland's conventional system)

2.2.1 Operational statistics

At the end of 2020, the Iarnród Éireann – Infrastructure Manager (IÉ-IM) reported to the CRR that its operational network was 1680 route-kilometres, or 2400 km of operational track based upon the Iarnród Éireann Network Statement for 2020. There were no significant changes to the network. Operational patterns changed substantially in March 2020 as railway services were heavily affected by the COVID-19 pandemic.

Figure 1
IÉ passenger journeys 2011 – 2020



Passenger journeys decreased by about 64% on the 2019 figure to 17.9 million (figure 1). Eurostat reported that for the second and fourth quarters in 2020, Ireland had the largest rail passenger transport decrease in Europe. Figure 2 from Eurostat gives some good perspective on this, they show Ireland to have the largest sustained 2020 decrease in Europe. The UK has reported reductions, which are likely to be similar in proportion to Ireland's reduction. It is anticipated that a recovery to levels experienced in 2019 is unlikely to be evident for some time, and predicting future levels will continue to be challenging given the uncertainty that prevails.

Figure 2
Rail passenger transport in Q1, Q2, Q3 and Q4 2019 – 2020

	Passengers in '000s		% change	Passengers in '000s		% change
	Q1 2019	Q1 2020		Q2 2019	Q2 2020	
Bulgaria	4,958	4,590	-7	5,584	3,533	-37
Czechia	47,197	38,988	-17	50,051	25,934	-48
Denmark	50,616	42,110	-17	51,452	23,303	-55
Germany	720,915	620,036	-14	725,410	295,000	-59
Estonia	1,957	1,800	-8	2,163	978	-55
Ireland	11,854	9,796	-17	12,428	1,196	-90
Greece	5,078	3,957	-22	5,118	1,512	-70
Spain	161,458	131,495	-19	160,348	35,048	-78
France	336,982	250,201	-26	340,258	74,041	-78
Croatia	5,156	4,793	-7	5,076	1,698	-67
Italy	218,201	161,063	-26	225,385	51,941	-77
Latvia	4,075	3,755	-8	4,871	2,343	-52
Lithuania	1,201	988	-18	1,330	573	-57
Luxembourg	6,461	5,560	-14	6,239	1,346	-78
Hungary	36,472	34,272	-6	37,328	15,346	-59
Netherlands	97,203	79,355	-18	97,469	20,772	-79
Poland	79,251	71,357	-10	81,605	29,562	-64
Purtugal	37,148	39,523	6	43,038	12,683	-71
Romania	16,487	14,898	-10	17,010	9,067	-47
Slovenia	3,277	2,779	-15	3,197	1,377	-57
Slovakia	19,842	16,322	-18	20,456	7,937	-61
Finland	22,553	18,742	-17	22,426	10,777	-52
Sweden	65,885	60,111	-9	66,840	29,318	-56
Norway	20,887	17,425	-17	20,586	6,989	-66
Switzerland	123,978	112,214	-9	126,102	53,871	-57
Montenegro	192	154	-20	256	57	-78
North Macedonia	130	93	-28	147	28	-81

	Passengers in '000s		% change	Passengers in '000s		% change
	Q3 2019	Q3 2020		Q4 2019	Q4 2020	
Bulgaria	5,686	4,663	-18	5,101	3,998	-22
Czechia	49,221	39,053	-21	47,740	25,167	-47
Denmark	50,992	36,830	-28	53,537	31,493	-41
Germany	731,455	36,991	-95	743,856	406,081	-45
Estonia	2,105	1,673	-21	2,147	1,534	-29
Ireland	12,870	3,539	-73	12,908	3,399	-74
Greece	5,049	2,979	-41	5,558	1,771	-68
Spain	139,321	77,545	-44	165,980	85,390	-49
France	303,618	204,448	-33	285,396	187,826	-34
Croatia	4,139	3,111	-25	5,455	3,526	-35
Italy	203,153	106,540	-48	236,562	91,642	-61
Latvia	5,256	4,117	-22	4,421	2,648	-40
Lithuania	1,287	1,020	-21	1,173	656	-44
Luxembourg	5,690	3,309	-42	6,625	4,313	-35
Hungary	35,884	29,171	-19	37,202	22,067	-41
Netherlands	92,242	41,324	-55	102,070	40,090	-61
Poland	84,315	58,774	-30	87,787	42,995	-51
Portugal	46,132	27,556	-40	49,015	28,277	-42
Romania	17,364	13,597	-22	17,049	11,526	-32
Slovenia	3,257	2,126	-35	3,529	1,642	-53
Slovakia	21,152	15,345	-27	20,628	9,455	-54
Finland	22,681	14,838	-35	25,142	15,193	-40
Sweden	62,979	36,517	-42	68,898	35,842	-48
Norway	18,235	9,425	-48	21,592	8,655	-60
Switzerland	127,831	96,025	-25	131,313	83,057	-37
Montenegro	327	164	-50	211	98	-54
North Macedonia	124	68	-45	148	64	-57

Notes:
Belgium, Austria: data not available due to confidentiality.
Cyprus, Malta: do not have railways.

Figure 3
Passenger train-km on the IÉ-IM network

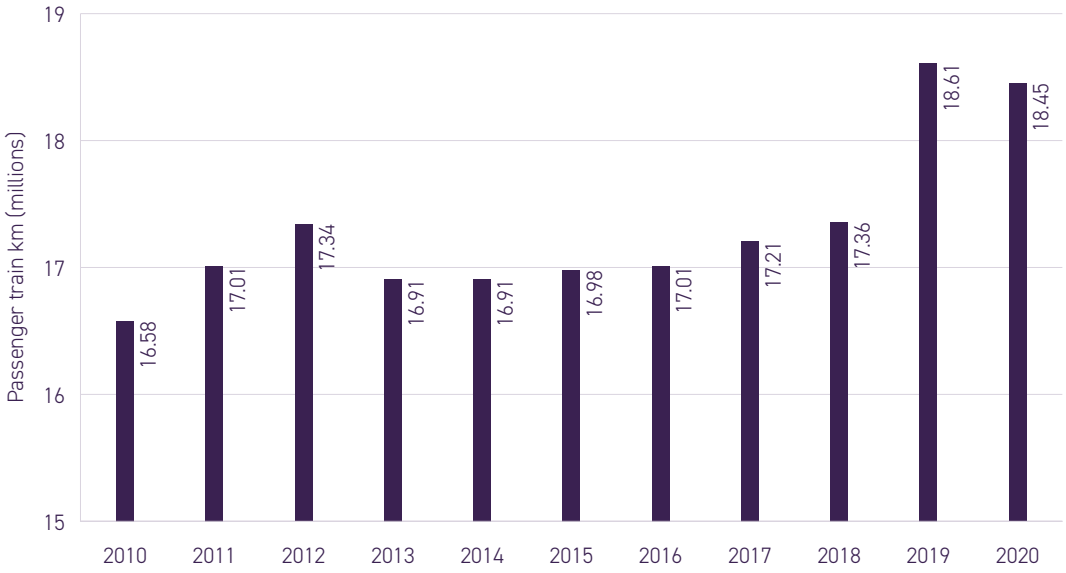


Figure 4
Freight train-km on the IÉ-IM network

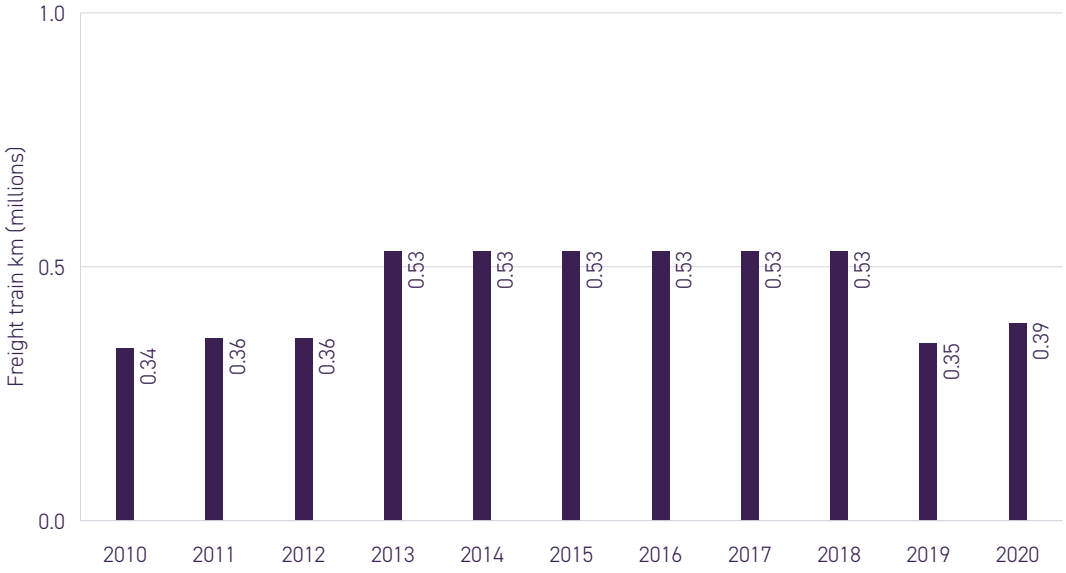
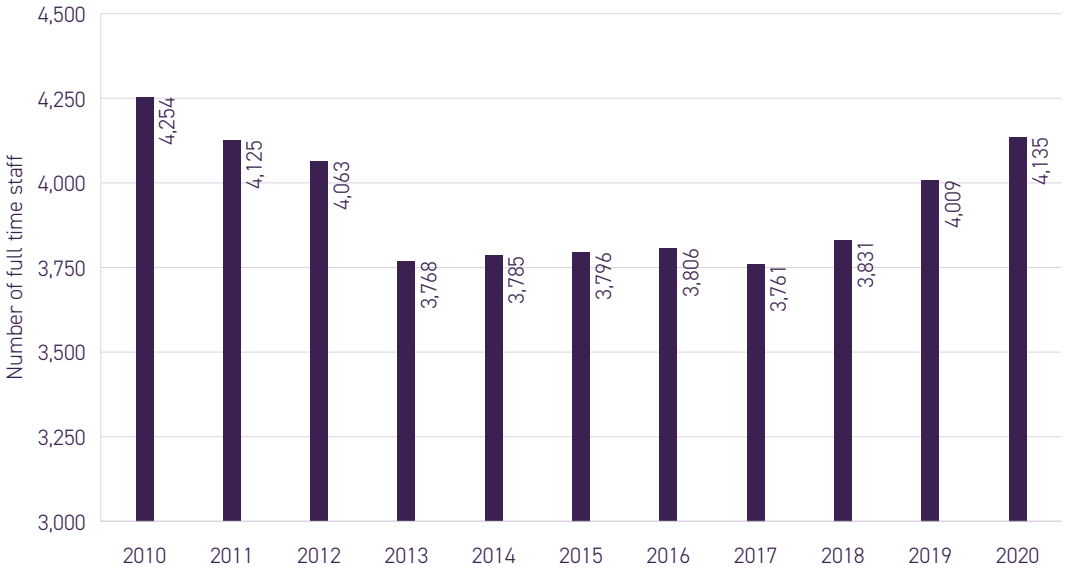


Figure 3 shows that IÉ-RU passenger train kilometres decreased by about 1%. The comparison to the reduction reported for passenger journeys is interesting, 64% vs. 1%. The difference in scale of impact is most probably a function of public health measures and the large decline in the mobility of people in Ireland.

Conversely, freight kilometres (figure 4) increased slightly but broadly have remained stable since 2013. 2020 saw a slight increase from 2019, continuing the recent trend.

Figure 5
Personnel engaged in full time employment with IÉ (2010 – 2020)



Iarnród Éireann is composed of two railway organisations, Iarnród Éireann Infrastructure Manager (IÉ-IM) and Iarnród Éireann Railway Undertaking (IÉ-RU). Between these two organisations a 3% increase in staff was reported for 2020 (figure 5). This increase is related to planned expansion of services in the coming years. 2020 levels of staff are approaching levels last seen in 2010.

2.2.2 Iarnród Éireann fatality and injury statistics

Table 1 illustrates the fatalities and lost-time injuries reported for employees and fatalities and injuries to third parties on the Iarnród Éireann railway network for the last ten years. Most of the reported values are quite small hence it is difficult to extract meaning from their annual changes. One exception is those values concerned with passenger occurrences, where it is evident that a reduction in total passenger volume has had a lowering effect.

Table 1
Iarnród Éireann operational fatality and injury statistics by year (2010 – 2020)

Category	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	Trend
Railway operations: passenger fatal injuries												
Fatal injury to passenger due to a train accident, not at level crossing	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to passenger due to a train accident at level crossing	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to passenger travelling on a train, other than in train accident	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to passenger attempting to board or alight from train	0	0	0	0	0	0	0	0	0	0	0	
Railway infrastructure: third party fatal injuries												
Fatal injury to third party at a level crossing involving a train	2	0	0	0	0	0	0	0	0	0	1	
Fatal injury to third party at a level crossing not involving a train	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to employee at a level crossing due to train in motion	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to employee due to train in motion (other than at a level crossing)	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to employee not due to train in motion	0	0	0	0	0	0	0	0	0	0	0	
Railway infrastructure: employee fatal injuries												
Fatal injury to employee at a level crossing due to train in motion	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to employee due to train in motion (other than at a level crossing)	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to employee not due to train in motion	0	0	0	0	0	0	0	0	0	0	0	

Table 1
Iarnród Éireann operational fatality and injury statistics by year (2010 – 2020)

Category	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	Trend
Railway operations: fatal injuries to other persons												
Fatal injury due to train in motion not at level crossing	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury to customer or visitor, no train involved	0	0	0	0	0	0	0	0	0	0	0	
Fatal injury involving train in motion on railway or level crossing where trespass or suspicious death was indicated	8	7	5	4	6	2	5	12	9	4	7	
Railway operations: non fatal injuries to passengers												
Injury to passenger travelling on train due to a railway accident not at level crossing	0	0	0	0	0	0	0	0	0	0	0	
Injury to passenger travelling on train due to railway accident at level crossing	0	0	0	0	0	0	0	0	0	0	0	
Injury to passenger attempting to board or alight from train	64	46	41	39	45	48	79	57	74	76	42	
Injury to passenger travelling on train, other than due to a railway accident	28	10	27	43	18	15	31	33	46	38	9	
Railway infrastructure: third party non fatal injuries												
Third party at level crossing injury involving a train	0	1	2	0	0	0	0	0	1	1	0	
Level crossing user injury not involving a train	0	2	5	1	0	0	0	0	1	1	2	
Railway infrastructure: non fatal injuries to other persons												
Injury to customer or visitor to premises	85	113	116	193	205	146	192	321	199	288	122	
Injuries to other persons including unauthorised persons	0	0	5	3	0	1	2	6	0	2	0	

Table 1
Iarnród Éireann operational fatality and injury statistics by year (2010 – 2020)

Category	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	Trend
Railway operations: non fatal employee injuries												
Employee lost time accident involving train movement or train accident	11	7	13	5	21	3	1	15	13	7	8	
Employee lost time accident while working on railway not due to train in motion	27	22	32	39	43	32	30	30	13	35	16	
Railway infrastructure: non fatal employee injuries												
Employee lost time accident involving train movement or train accident	1	2	1	0	0	0	0	0	0	0	0	
Employee lost time accident while working on railway not due to train in motion	30	23	32	41	25	6	23	22	26	24	20	
Employee lost time accident while working at level crossing not due to train in motion	0	0	1	1	2	0	3	1	1	0	3	
Entity in charge of maintenance and maintenance workshops: non fatal employee injuries												
Employee lost time accident involving train movement or train accident	0	0	0	0	0	0	0	0	0	0	0	
Employee lost time accident while working on railway not due to train in motion	10	18	10	14	18	13	11	10	12	15	4	

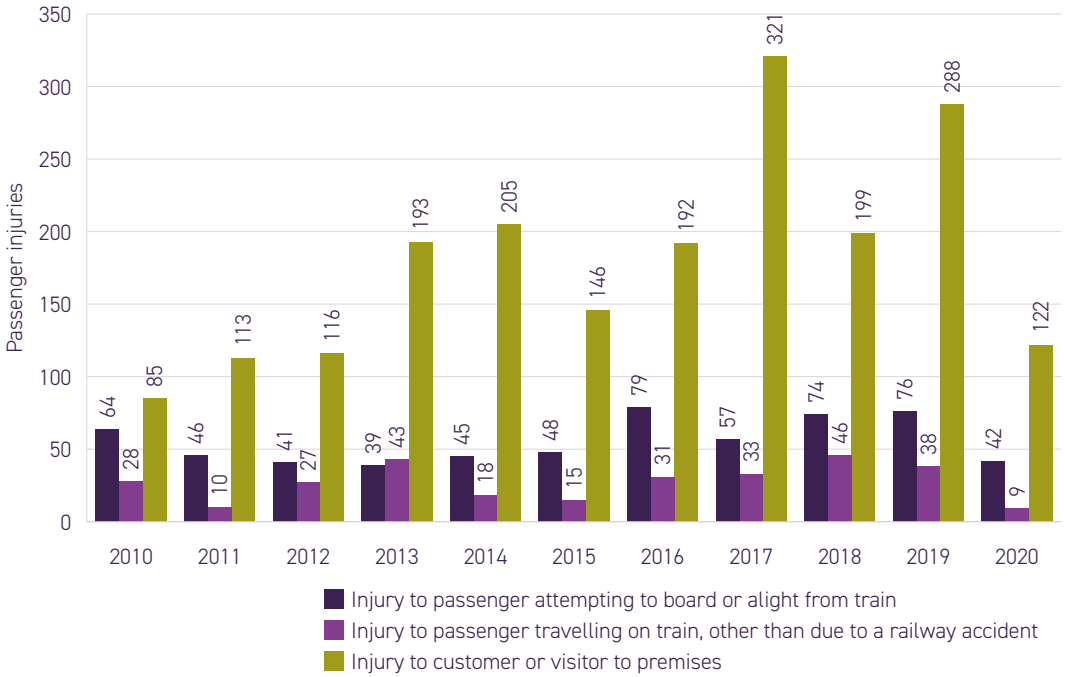
2.2.2.1 Fatal injuries

There were no passenger fatalities or serious injuries reported to the CRR in 2020. Tragically, there were 7 fatalities involving railway infrastructure and operation where trespass or suspected self-harm was indicated. While the numbers are low, any increase will be subject to detailed analysis by all stakeholders. IÉ-RU and IÉ-IM have taken several steps in recent years to reduce suspected suicides, with many staff receiving coaching on how to counsel those who may be considering such decisions.

2.2.2.2 Passenger injuries (customer and visitor injuries)

As reported since 2013, the data indicates that the largest proportion of incidents occur to persons during time spent at stations as opposed to time spent on trains and in 2020 this was no different. No injuries were reported on board a train that were due to a railway accident. Similar trends are discernible across many railways in Europe.

Figure 6
Passenger injury statistics by year



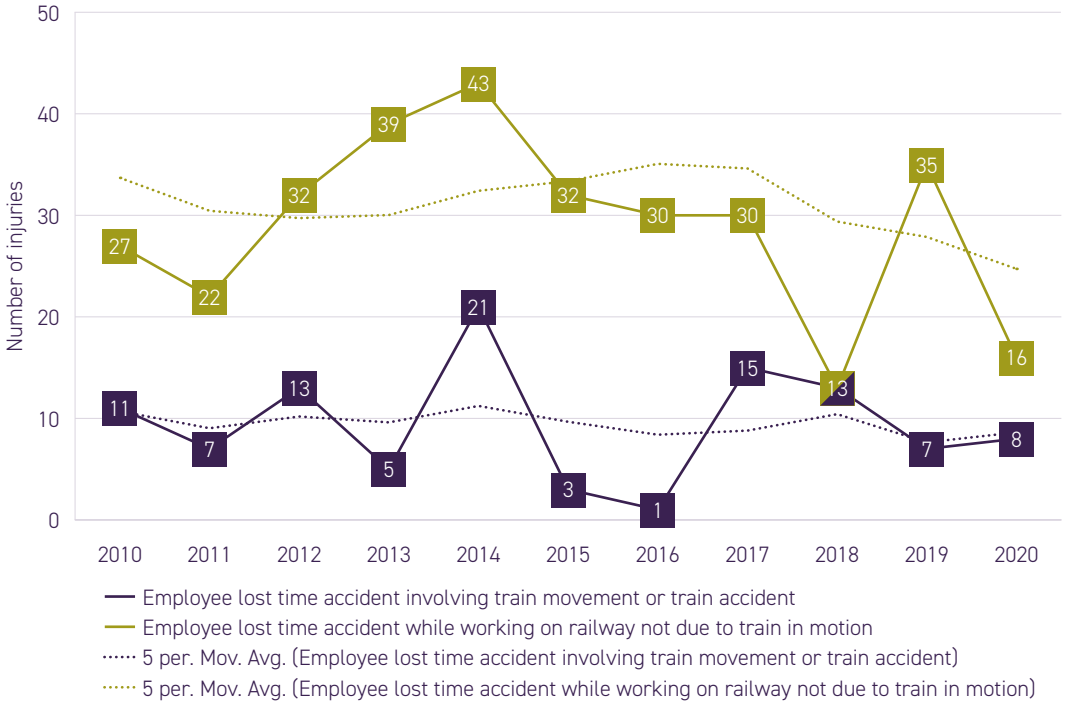
Injuries to persons (customers or visitors) on railway premises remain the largest single group with slips, trips and falls of various sorts being the dominant cause of these injuries. As with other indicators, the reduction observed for 2020 is likely associated with reduced patronage on the system (figure 6). The fall however is not commensurate with the decrease in passenger numbers, indicating that the relationship between safety risk and passengers carried is not entirely proportionate. Injuries reported for when passengers board and alight the train is relatively low given high passengers volumes carried, where it is comparable with 2011 – 2015 figures. The interface between the station platform and the train is the most dangerous area for passengers on the Iarnród Éireann railway network, where for example in 2019 it was reported to the CRR that there were 79 incidents at this interface requiring medical attention.

2.2.2.3 Employee injuries

Employee injuries are categorised in the first instance by the sector of the railway system in which they work:

- Railway operations
- Infrastructure management
- Entity in Charge of Maintenance for railway vehicles (ECM)[3].

Figure 7 Employee injury statistics by year (railway operations)



Railway operations data indicates an approximate halving of incidents in 2020. Given that 2020 train kilometres travelled is only slightly lower than 2019, it suggests a good performance. Infrastructure data continues the good trend from recent years, and it is unlikely the pandemic would have had much impact on performance as maintenance was generally continued as normal. A significantly improved performance is noted from the IÉ-RU Entity in Change of Maintenance, where seemingly a good reaction was noted in response to a 5 year high in 2019. In general, the numbers are quite small relative to the size of the operation, hence determining meaningful conclusions is difficult.

3. ECMs are railway organisations that are certified to undertake maintenance of rolling stock.

Figure 8
Employee injury statistics by year (railway infrastructure)

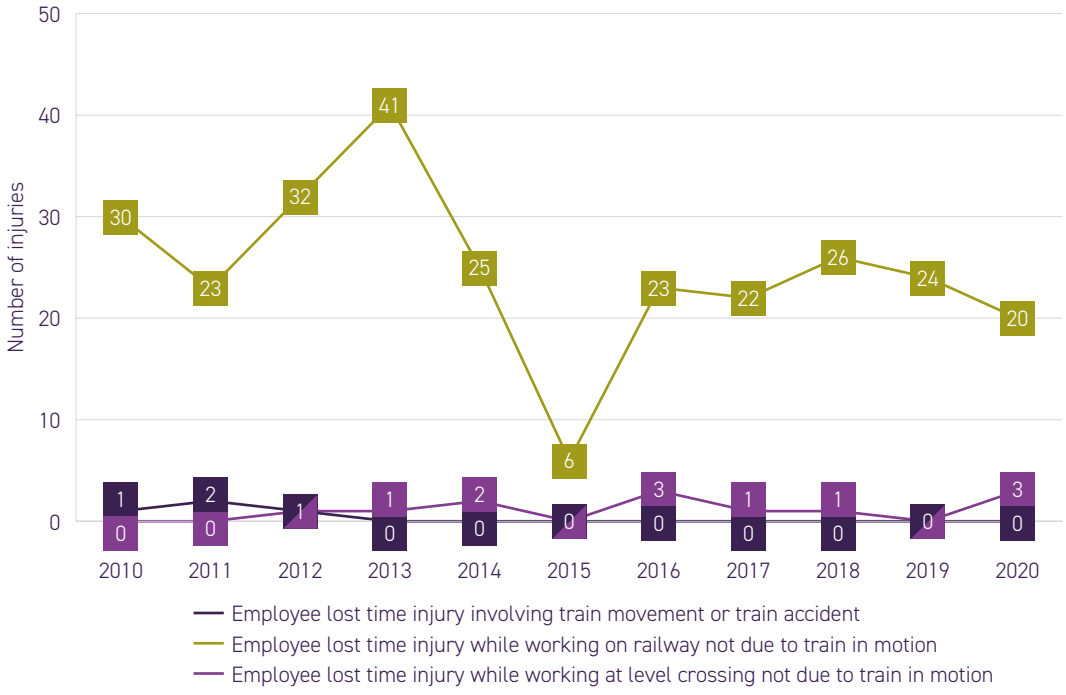


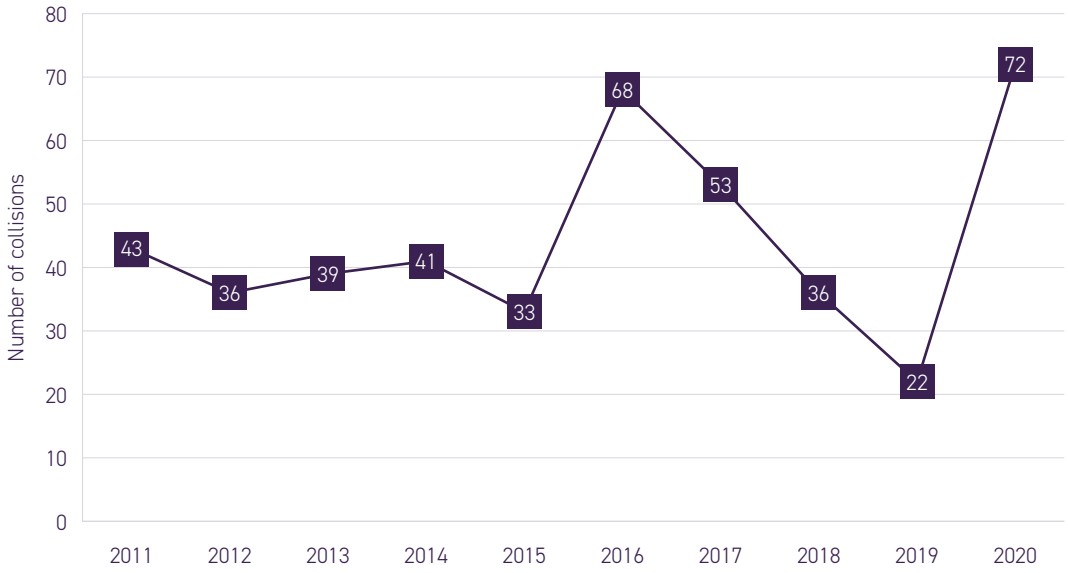
Figure 9
Employee injury statistics by year (IÉ-RU ECM)

2.2.3 Iarnród Éireann operational incident statistics

2.2.3.1 Train collisions

Train collisions can pose a significant risk to passengers, train crew, third parties, and the environment. There are several categories of train collision, e.g., collision with road vehicles, with animals, with obstacle etc. Figure 9 illustrates the overall trend for collisions over the last 10 years. Figure 10 is supported by table 2 and figure 11 to aid understanding of the data. In figure 10, two categories, 'Total Collisions with Obstacles on the line' and 'Train Collisions with large animals', have been separated to enhance understanding of the data. The overall data shows a significant increase in collisions in 2020.

Figure 10
Total collisions by year



The data provided shows that a high number of collisions occurred in 2020, 2016 being the only figure in recent times that is comparable. Animals and obstacles on the line are the categories that are primarily responsible for the increase in total collisions observed in figure 10.
When considering the management of safety risk, the following items are of note:

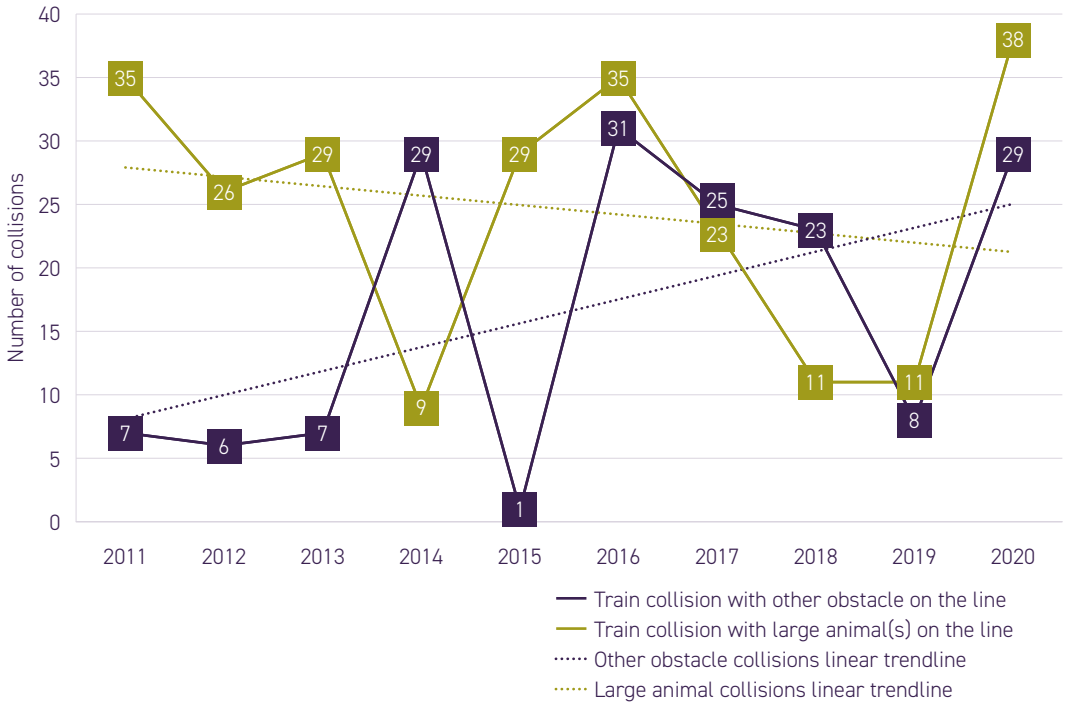
- IÉ-IM has primary responsibility for infrastructure related risk management
- Not all causal factors are within the control of IÉ-IM. It is difficult for IÉ-IM to influence factors such as placement of objects on the line such as bikes on the line or the inadequate fencing of farm animals
- Causal factors such as inadequate line fencing or control of vegetation are within the control of IÉ-IM.

Of the 38 collisions with large animals, 15 were reported to have occurred on the Mallow – Tralee line. This is similar in proportion to previous years and reflects well known features of the design and location of this line. For collisions with obstacles on the line the data shows 15 of these incidents involved collisions with trees or branches, which indicates some uncontrolled vegetation has arisen from weather events and growth patterns.

Table 2
Train collision statistics detail by year, part 1

Category	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	Trend
Train collision with passenger or goods train on running line	0	0	0	0	0	0	0	0	0	0	
Train/railway vehicle collision in station or possession movement	0	1	1	1	1	1	2	1	1	4	
Train collision with a motor vehicle at a level crossing	1	2	1	2	0	0	3	1	2	1	
Train collision with pedestrian at a level crossing	0	0	0	0	0	0	0	0	0	0	
Train collision with attended gates at a level crossing	0	0	0	0	1	0	0	0	0	0	
Train collision with road vehicle obstructing the line (not at a level crossing)	0	1	1	0	1	1	0	0	0	0	
Train collision with other obstacle on the line	7	6	7	29	1	31	25	23	8	29	
Train collision with large animal(s) on the line	35	26	29	9	29	35	23	11	11	38	
Total	**43**	**36**	**39**	**41**	**33**	**68**	**53**	**36**	**22**	**72**	

Figure 11
Train collision statistics detail by year, part 2

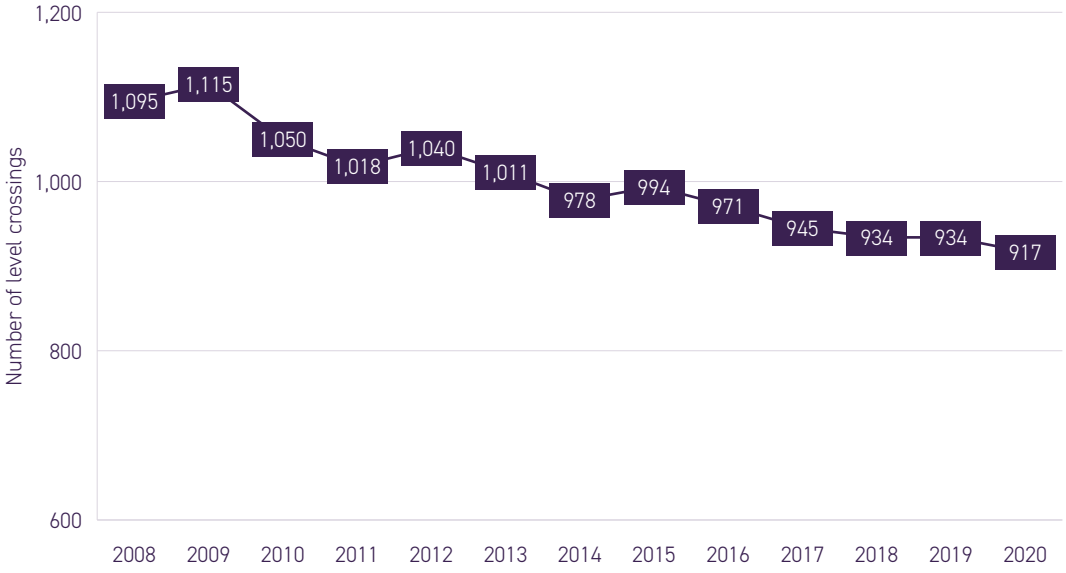


2.2.3.2 Level crossings

Level crossings remain a significant risk to the railway system and to level crossing users of all types. However, there were no fatal accidents at a level crossing in 2020. A fatal incident did occur involving a car colliding with elements of a level crossing but due to the absence of a railway vehicle or any other railway operational activity it is not considered a railway accident.

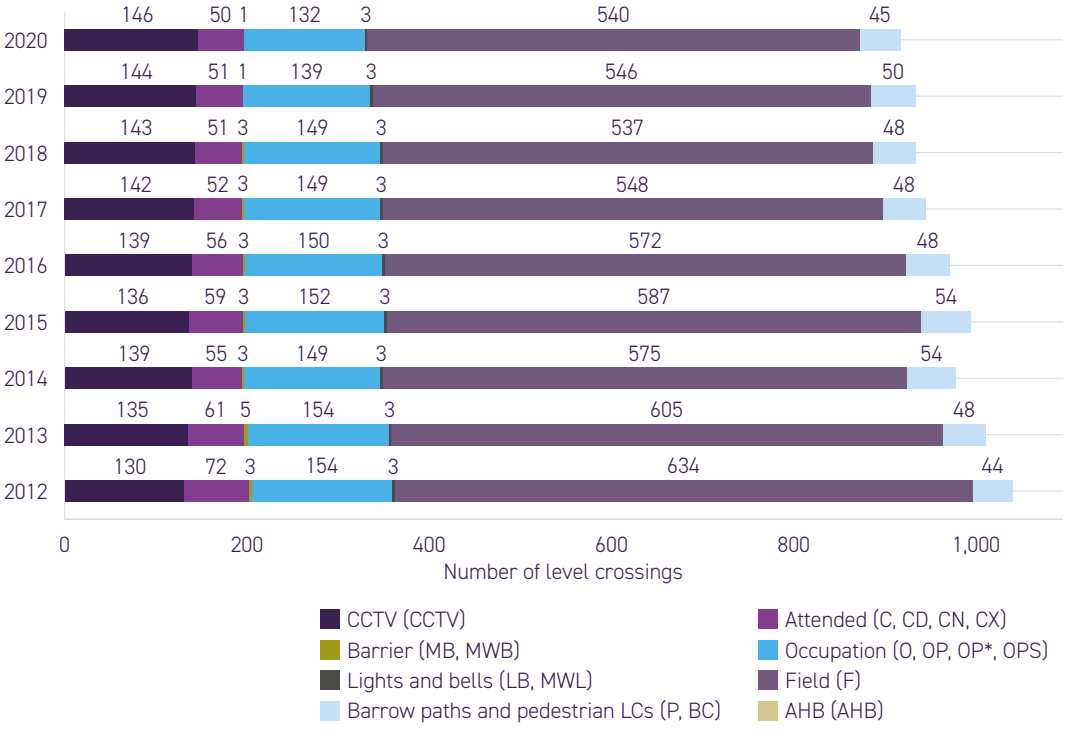
The long established trend, as shown in figure 12 and figure 13, is a decrease in the number of level crossings; there were 1701 level crossings in 2004 vs. 917 recorded for 2020. Figure 11 illustrates the number of level crossings on active lines. Sustained efforts by Iarnród Éireann have contributed greatly to reducing the risk presented by level crossings through closure or upgrade.

Figure 12 Number of level crossings by year



The breakdown of level crossings by type and year in Ireland is shown in figure 13. Occupation level crossings on public roads, that is those that require the road user to manually open and close gates remain the highest risk type of level crossing, closely followed by passive 'Field type' level crossings which are those a farmer might use if they have land on both sides of a railway. During 2020, IÉ-IM installed a new 'decision support system' at 8 user worked level crossings. The Decision Support System (DSS) at User Worked Level Crossings is composed of a set of indicator lights which are connected to train detectors placed on the track that detect a train approaching a level crossing. The indicator lights will inform the crossing user of an approaching train. The user may then take this information into account when deciding if it is safe to use the crossing. It will be some years before the effectiveness of the DSS at reducing the risk at level crossings can be determined. The design is understood to be unique to Ireland and is an innovative low-cost solution in comparison to other measures (e.g., closure, CCTV). The 8 crossings have been approved for the interim operation stage.

Figure 13
Level crossing by type in Ireland



2.2.3.3 Train derailment

The number of train derailments in 2020 was the same as that in 2019 (figure 14) and maintains a positive trend that began in 2014. Both derailments in 2020 was low speed in sidings managed by the IÉ-RU and were considered low risk.

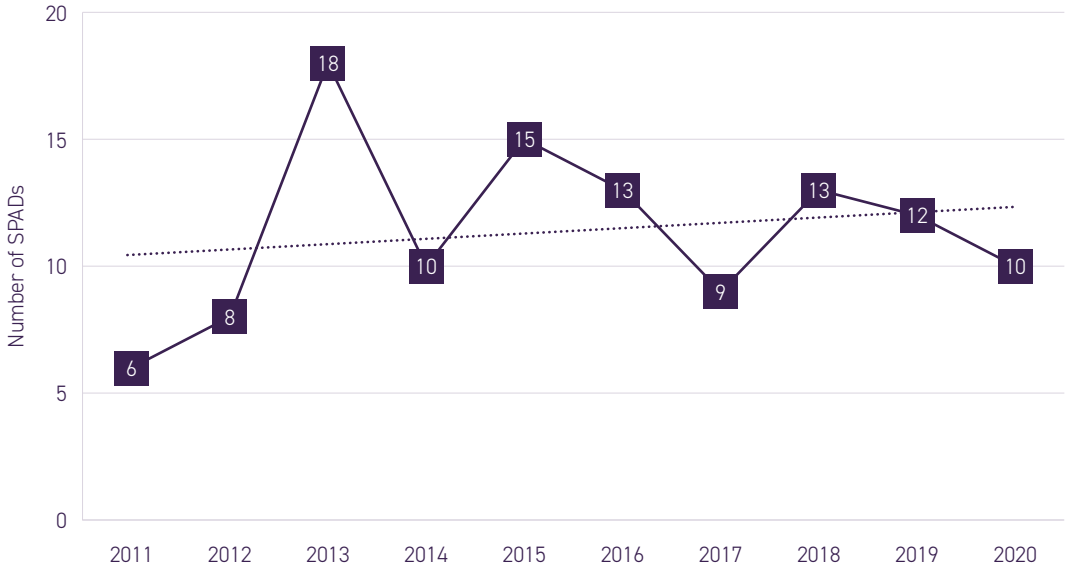
Figure 14
Train derailments by year

2.2.3.4 Signals Passed at Danger (SPAD)

IÉ-IM have defined a SPAD as an event where a part of a train proceeds beyond its authorised movement. SPADs are a particular precursor event that the CRR monitors during its supervisory meetings with IÉ-IM, IÉ-RU and railway undertakings. The overall trend in recent years has been a steady decline, which has been continued in 2020 (figure 15).

SPAD occurrences are investigated by the infrastructure manager and the railway undertaking involved. IÉ-IM have developed a qualitative method to evaluate the safety risk associated with each SPAD on their network, and in 2020 all were classed as medium, where medium denotes the level of risk determined after a risk analysis of the event is applied. IÉ-RU had 9 SPADs and Rhomberg Sersa Ireland Limited (RSIE) had 1. RSIE are a railway undertaking that operates and maintains on track machines as per a contract they have agreed with IÉ-IM.

Figure 15
IÉ SPADs by year



2.2.4 Iarnród Éireann rolling stock incidents

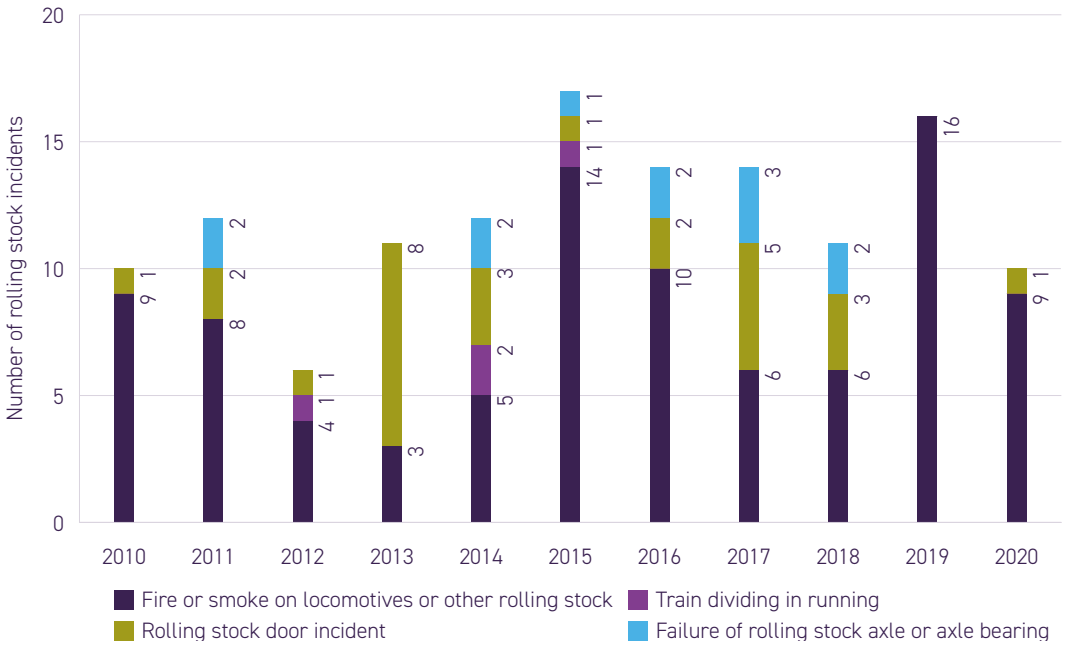
Iarnród Éireann operates several different fleets in provision of rail services and there were no changes to these in 2020. The IÉ-RU fleet include:

- Diesel Multiple Units (29000, 22000, 2800, 2600 classes), maintained in Portlaoise, Drogheda and Limerick
- Electrical Multiple Units (8100, 8200, 8500 classes), maintained in Fairview, Dublin
- Locomotives (201, 071 classes), maintained in Inchicore, Dublin
- Passenger Carriages (Mark IV and DeDietrich), maintained in Inchicore, Dublin and York Road, Belfast
- Freight wagons (of various types), maintained in Limerick.

There are a number of key safety performance indicators pertaining to rolling stock (figure 16), specifically:

- Fire or smoke incidents
- Failure of Rolling Stock Axle Bearing
- A train dividing (parting) while in service
- Door issues.

Figure 16 Rolling stock incidents by year



All but 1 of the reported occurrences for rolling stock were in the fire/smoke category (figure 15). IÉ-RU report that 2 of these events displayed evidence of fire. The importance of this distinction in rolling stock can depend on the medium within the vehicle that is generating heat and its location. Most passenger services in Ireland are operated using diesel multiple units, and whilst these are safe, inherent properties of their design can lead to more reports of fire and smoke in comparison to electric traction. On board systems for electrical and traction energy combined with complex bogie arrangements can result in several heated components in compact spaces creating environments where smoke or fire may occur. Such events are rare, and harm arising rarer still.

In July 2020, two longitudinal members of a 201 locomotive vehicle structure were observed to have failed, rendering the vehicle unsafe for service. The vehicle was due to be transferred to a depot for maintenance as the vehicle was identified as defective due to related faults reported during the previous days service. This safety performance report does not have a specified category for such events as it is unprecedented and highly unusual. A vehicle failure of this type is most unusual as it is expected that vehicle structures are designed for long life, and then are subject to maintenance of suitable quality. The Railway Accident Investigation Unit are investigating the occurrence for its cause. The CRR are conducting a related inspection concerning IÉ-RU management of safety risk for hazards connected to the causes.

2.2.5 Iarnród Éireann infrastructure incidents

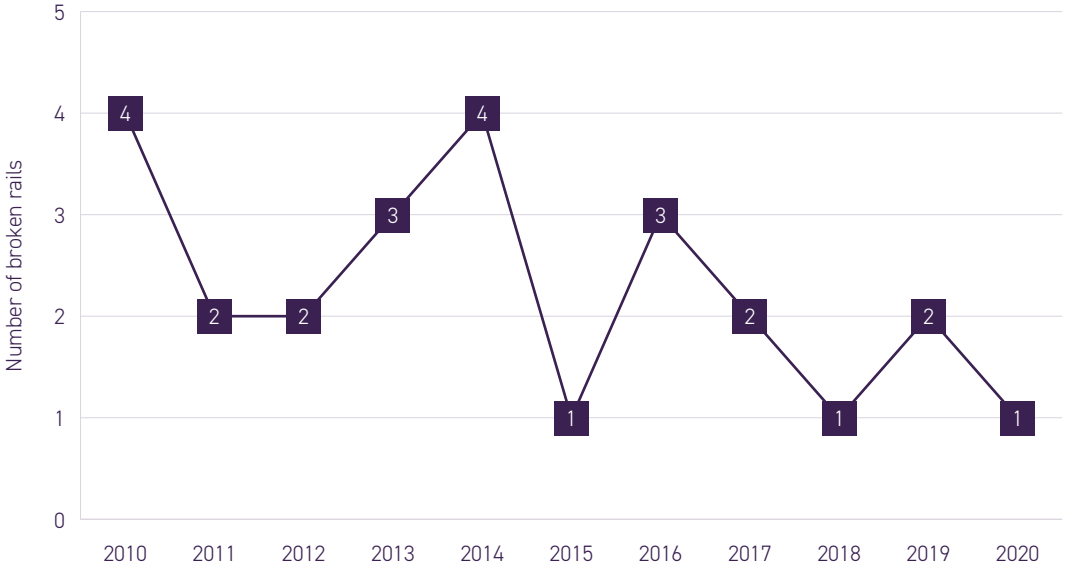
The IÉ-IM network currently extends to approximately 1680 route kilometres (km) or 2,400 km of operational track and includes c. 4,440 bridges, c. 1,100 point-ends, 917 level crossings, 144 stations, 3,300+ cuttings and embankments, 372 platforms and 13 tunnels. The network is used for passenger and freight services. It has infrastructure designed for long intercity services, commuter services, urban high frequency services, and freight transport.

The railway network in Ireland is abundant in legacy structures such as bridges, tunnels and station buildings, many of which are in excess of 100 years old. Given their long history and operational environment, these assets may be vulnerable to failure if not maintained to the required standard. Maintenance associated with these assets is challenging both technically and occupationally, and it requires IÉ-IM to maintain the highest levels of competence and organisational maturity. However, safety risk cannot be eliminated, and it is inevitable that some undesired events will occur. Minimising these and their effects is critical to ensuring a reliable and safe railway service; data relating to some of these is now presented.

2.2.5.1 Broken rails and fishplates

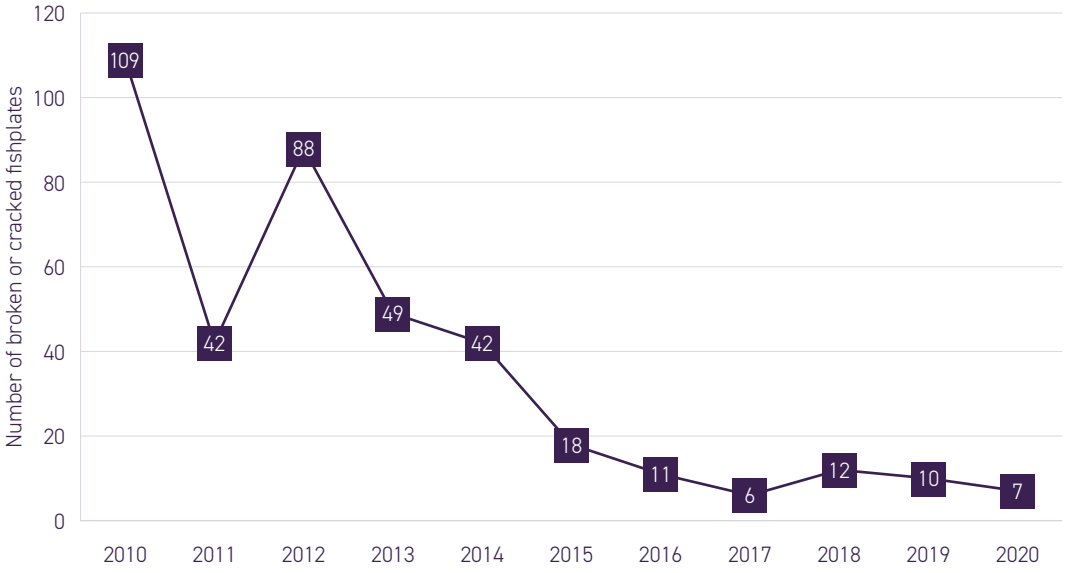
IÉ-IM personnel visually inspect the track and associated assets at least once per week. Engineers and the Infrastructure Manager also inspect the track several times each year using a dedicated Inspection Car. The rails themselves are ultrasonically tested at least every 2 years, with the vast majority tested annually. In 2020, there was 1 broken rail in a tunnel between Bray and Greystones which was discovered during a maintenance inspection. The surrounding section of the rail was replaced and there was minimal effect of service provision (figure 16).

Figure 17
Broken rails by year



A fishplate is a special bolted connection that joins two rails together. Should one break then the rail is not continuous and could, in certain circumstances, lead to a derailment. The trend for 'cracked or broken fishplates' has once more decreased in 2020 (figure 18). Numbers are at a level that further reductions will be more difficult to achieve, rather continued vigilance by track inspection staff is needed to ensure they are identified proactively and repaired accordingly.

Figure 18
Cracked or broken fishplates on the IÉ network, by year



As has been noted in previous reports, the large decrease over the 10-year period may be attributed to the installation of continuous welded rail (CWR) initiated under the Railway Safety Investment Programme (1998-2013) which has continued since, albeit in smaller quantities.

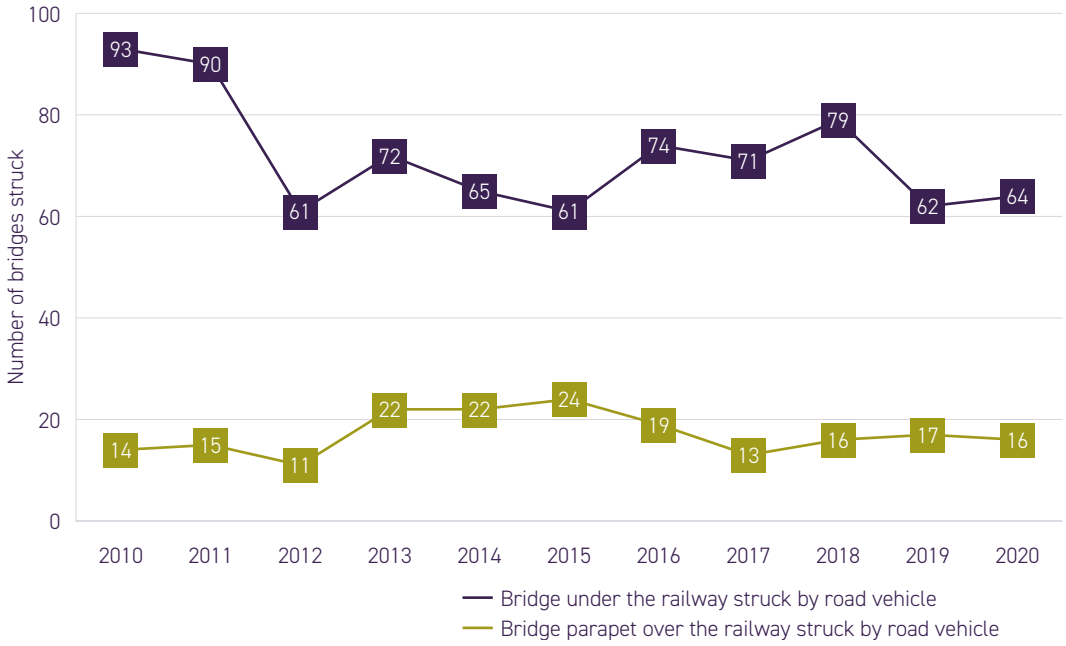
2.2.5.2 Bridge strikes

There are in excess of 4,400 bridges of varying structure types on the Iarnród Éireann railway network. All must be inspected and maintained by IÉ-IM at various periodicities depending on numerous factors such as their age, type, location and risk profile.

In terms of simple categorisation there are two categories of railway bridge to be inspected. The first is a where a road is over the railway (over bridge) and the second is where the railway is over a road (under bridge). A bridge strike is where a road vehicle strikes the parapet or roadside containment of an over bridge or where a road vehicle strikes the underside of a railway bridge over a road (under bridge).

Both types of occurrence can, in certain circumstances, result in very severe consequences such as causing a track misalignment or structural weakness or failure either of which could result in a train derailment.

Figure 19
Railway bridges struck by road vehicles



Performance in 2019 and 2020 is quite similar, with a slight degradation noted due to a slight increase in under-line bridges being struck (figure 19). Overall, the trend for under-line bridges has been falling since 2010 while it has largely remained level for over-line bridge strikes.

2.3 Rhomberg Sersa Ireland

Iarnród Éireann – Infrastructure Manager (IÉ-IM) have, since 2014, contracted external railway organisations to operate and maintain their fleet of On-Track Machines (OTMs). Rhomberg Sersa Ireland (RSIE) is currently contracted to provide this service. RSIE underwent a process of conformity assessment for their Safety Management System, which concluded with the issue of the necessary safety certificate issued by the CRR.

In 2020, RSIE report that they have 56 staff employed, 39 of which perform what they define as 'safety critical tasks'. RSIE does not operate any passenger services and completes most of its operational activity at night, outside peak and daytime periods. RSIE state that their fleet operated 100716 train kilometres for the OTM fleet in 2020. This represented an 8% decrease on the 2019 figure.

Table 3 shows the reported occurrences for RSIE in 2020. One SPAD occurrence was reported in 2020. A low risk and low speed SPAD occurred when an On-Track Machine Driver Operator (OTMDO) did not observe the signal aspect present due to a distraction and was unable to stop the vehicle in time.

RSIE report two derailments in 2020, both occurred at low speed and involved low speed movements over points. One was in an engineering possession of the railway and the other was in a depot. The amount of Railway Infrastructure Incidents increased in 2020, which RSIE advise is potentially due to improved occurrence reporting systems. It was reported that minor damage was observed in incidents concerning OTM component collisions with sleepers, platforms, rails, and axle counters. Occupational injuries were not reported to be high risk, and numbers are noted to be small in comparison to the type and extent of work maintenance work undertaken.

Table 3
OTM occurrences

Occurrence	2017	2018	2019	2020
SPAD	1	2	2	1
Derailments	2	0	0	2
Collisions	0	0	1	0
Minor occupational injuries	2	1	1	3
Rail infrastructure damage incidents	20	4	3	8

2.4 Transdev (Luas) statistics

The Dublin Light Railway System, or Luas (it's brand name), is owned by Transport Infrastructure Ireland (TII). This includes all trams and tramway infrastructure. Transdev Dublin Light Rail (TDLR) has been operating the Dublin light railway system, within different corporate structures, since it commenced operation in June 2004. In late 2019 TDLR were contracted to continue operation of the Luas service as well as to undertake infrastructure and rolling stock maintenance.

The Luas comprises of two lines, the Red Line which is 20km in length and has 32 Stops and the Green Line which is 24.5km in length and has 35 Stops. In line with other transport modes, public health measures for COVID 19 caused a large decrease in usage of the service. 19.2 million journeys were recorded, a 60% reduction on 2019's total of 48 million. Tram kilometres travelled however remained consistent, with 4.26 million reported in 2020 versus 4.27 million in 2019 (figure 20). The Central Statistics Office presented data (illustrated figure 21) that shows Passenger journeys by Luas per week. The illustration shows in good detail the effects of public health measures on the system, with numbers closely tracking the effects of the public health measures in place for each week shown.

Figure 20
Luas passenger journeys and tram-km travelled

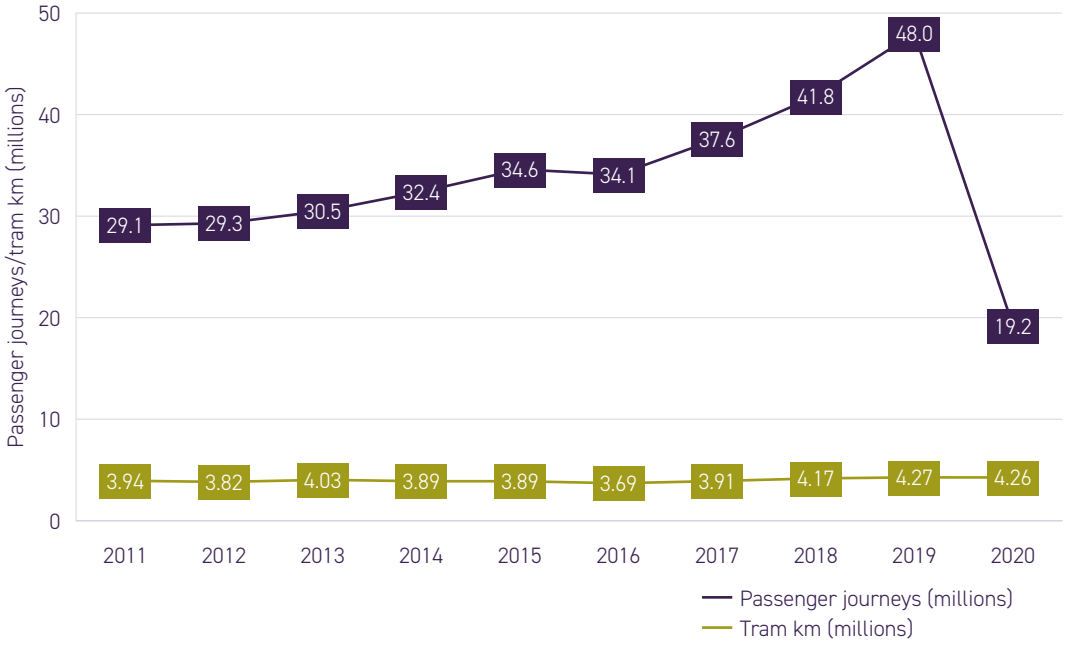
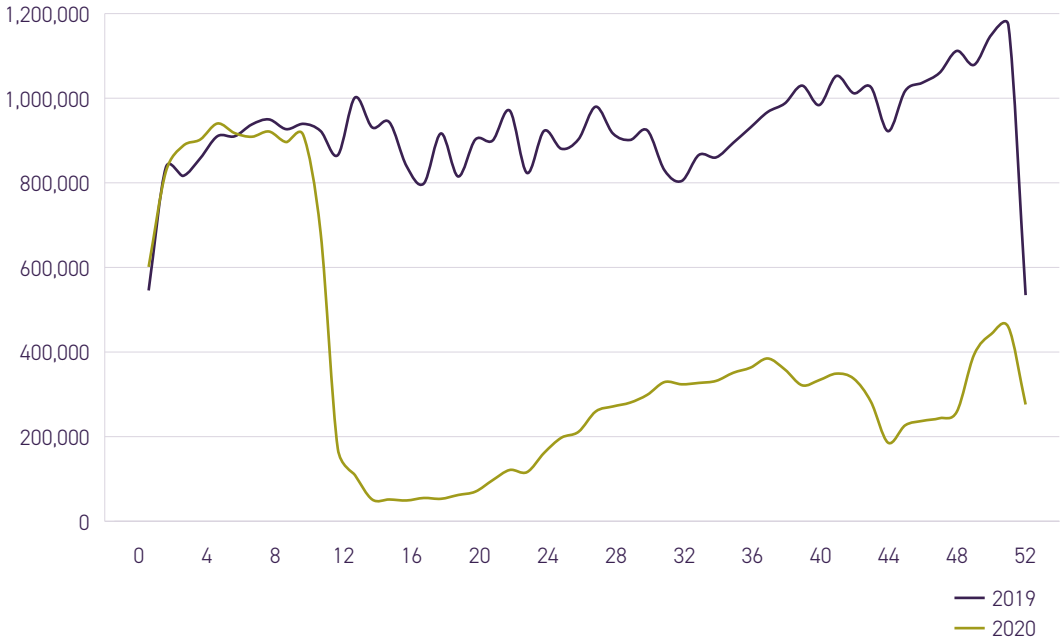


Figure 21
Passenger journeys by Luas per week



2.4.1 Road vehicle collisions

A significant proportion of Luas tracks interacts directly with road traffic and pedestrian movements, most notably in Dublin city centre. The Luas operates primarily by 'line of sight' which is a common operational approach in light railway systems and tramways around the world. This means that drivers are wholly responsible for controlling tram movements, and unlike conventional railway systems such as the one Iarnród Éireann owns, where systems are in place that assist drivers to make a safe decision or intervene if an unsafe condition is detected. The primary difference between the two systems is the distance required to bring the vehicle to a stop; a tram is able to stop in a much shorter distance due to lower speeds and the availability of multiple braking systems. Given that the Luas shares sections of the carriageway with road vehicles and other road users, there is the potential for collision with other road users. Return of experience has indicated that the consequences of these collisions are in the main minimal.

The number of road vehicle collisions has been on an increasing trend since 2015, and whilst 2019 saw a significant increase to 38, 2020 provided a significant decline to 18 (figure 22). It is likely the COVID pandemic played some role in this, but that is difficult to evaluate. All occurrences are reported to involve errors by road vehicle drivers, which is a signal that there may be systemic problems with regards to the operation of road vehicles on or near the tramway. TII and TDLR have a standing meeting where they review these occurrences on the infrastructure that TII own and that TDLR operates and maintains. Indicators such as Road Vehicle Collisions per million km run (figure 23) are a critical input for this when assessing if safety risk conforms with relevant risk acceptance criteria for the system. Figure 22 suggests performance has improved in 2020. However, one would need to develop a risk analysis to understand causality further. Figure 24 shows that most collisions occur on the red line, with the street running design of the Luas a probable causal factor.

Figure 22
Number of road vehicle collisions involving a tram

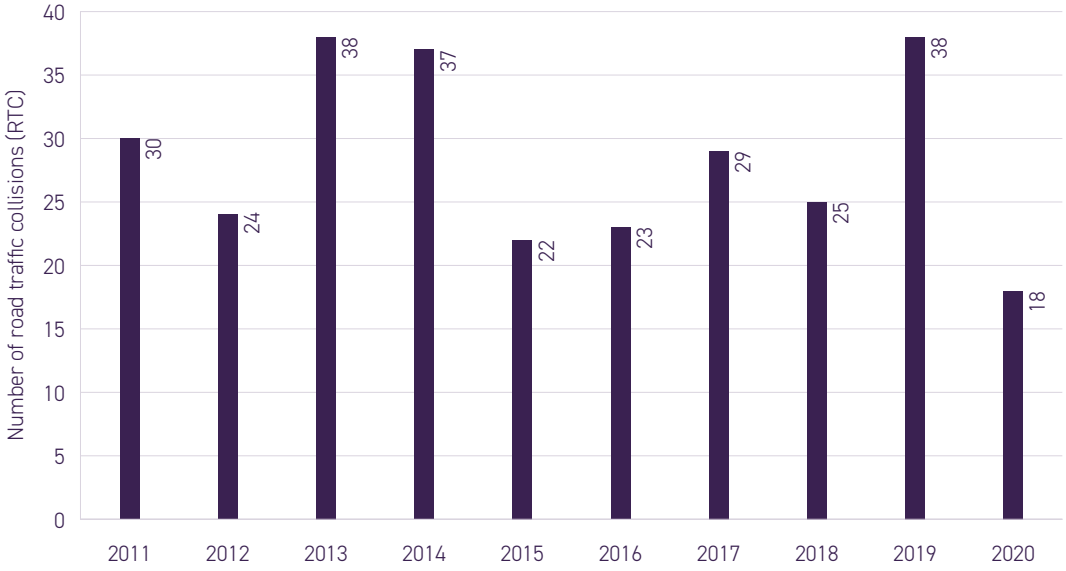


Figure 23
Road vehicle collisions per million km run

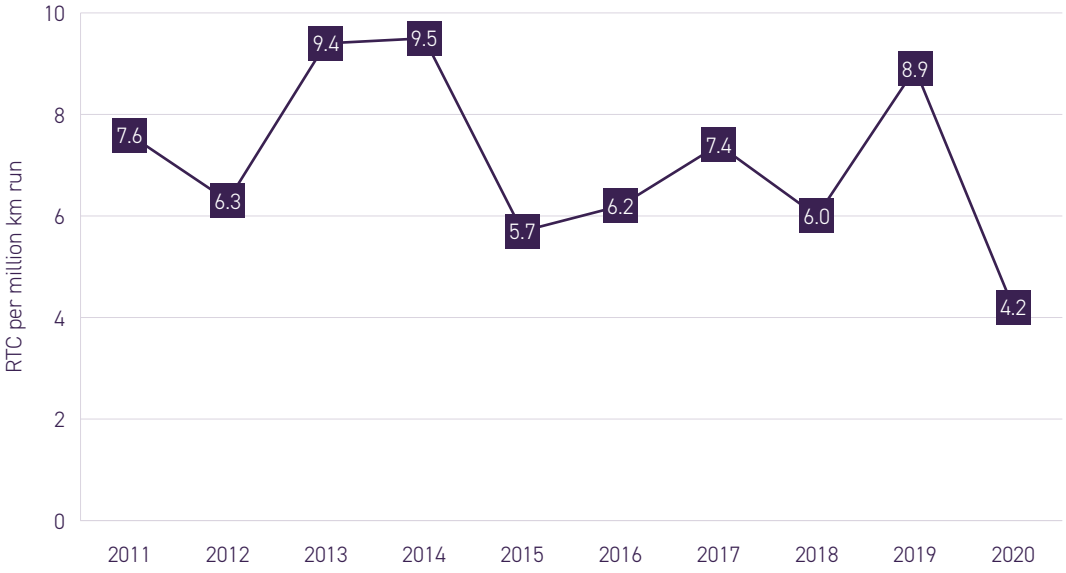
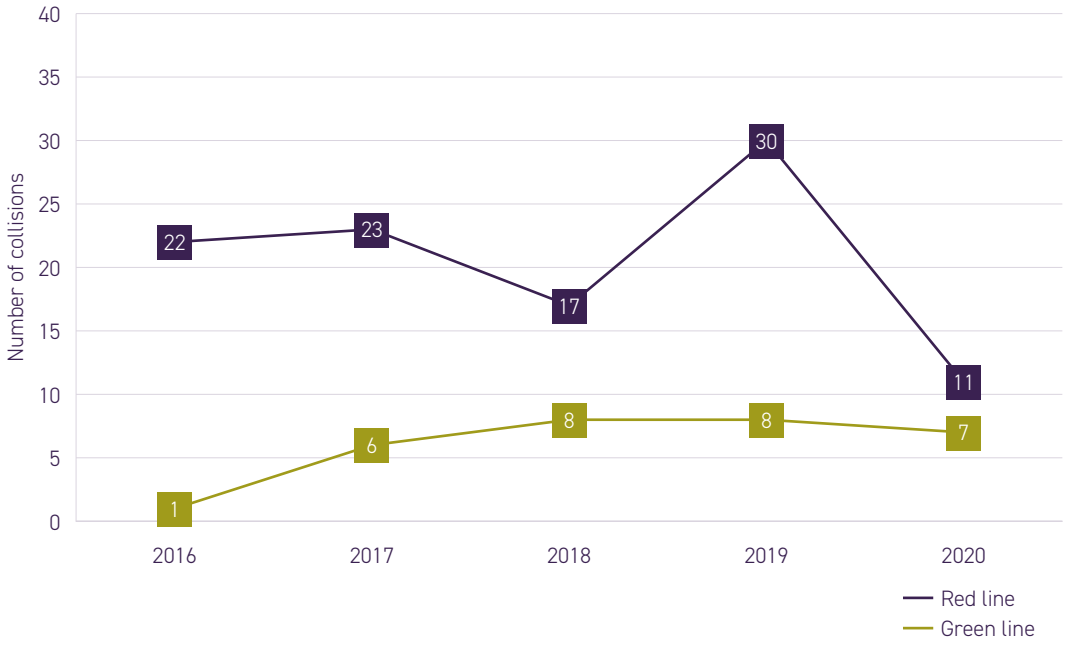


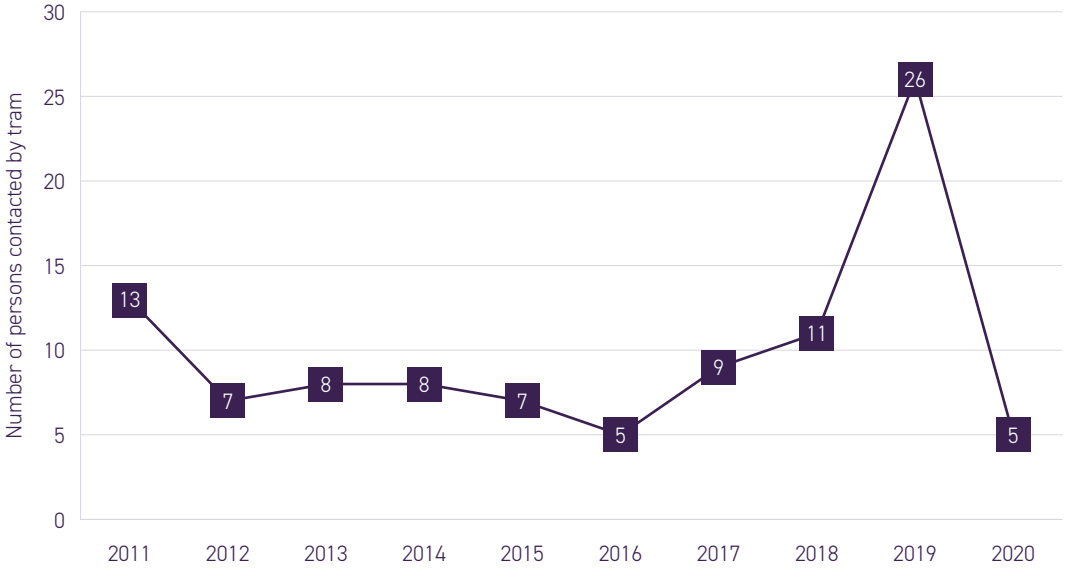
Figure 24
Collision by red and green line



2.4.2 Tram contacts with pedestrians and cyclists

5 occurrences of contacts between trams and cyclists and trams and pedestrians were reported in 2020. This is a substantial reduction from 2019 (26), with the reduction again likely a function of public health restrictions in 2020. Tragically, one of these occurrences led to a fatality near Ballyogan in South Dublin. A person accessed a segregated section of the tramway late at night and collided with a northbound tram. There were two other pedestrians contacts on the southern section of the green line, one contact in the north section of the green line, and a cyclist contact near Kilmainham.

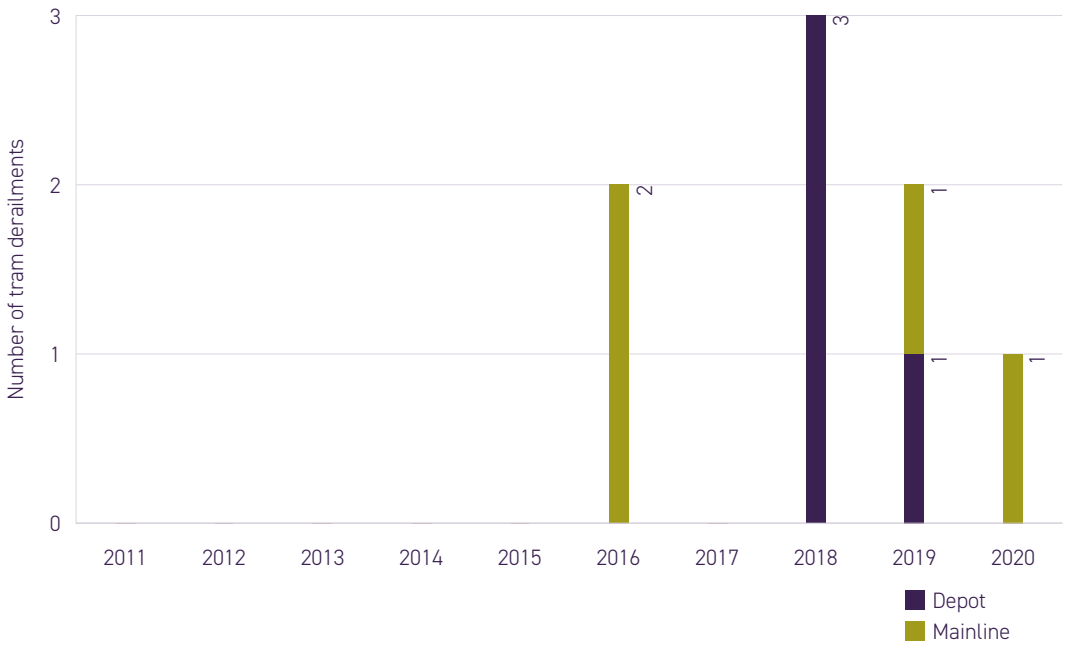
Figure 25
Persons coming into contact with tram



2.4.3 Tram derailments

There was 1 derailment in 2020 (figure 26), one less than in 2019. It was caused by a tram colliding with a truck that had breached a red light at the junction of Queen Street and Benburb Street.

Figure 26
Tram derailments



2.4.4 Signals Passed at Danger (SPAD)

A SPAD on the LUAS network is essentially the same as one on the Iarnród Éireann network, i.e., a tram has passed a stop signal without authority. SPADs are a particular precursor event that the CRR monitors regularly during its supervisory meetings with Transdev. The trend since 2012 has been uneven; 15 SPADs in 2020 being the same as that reported in 2019, which is still a good reduction on preceding years (figure 27). SPADs are recorded as having occurred at 4 locations:

a) Cookstown Junction (3)

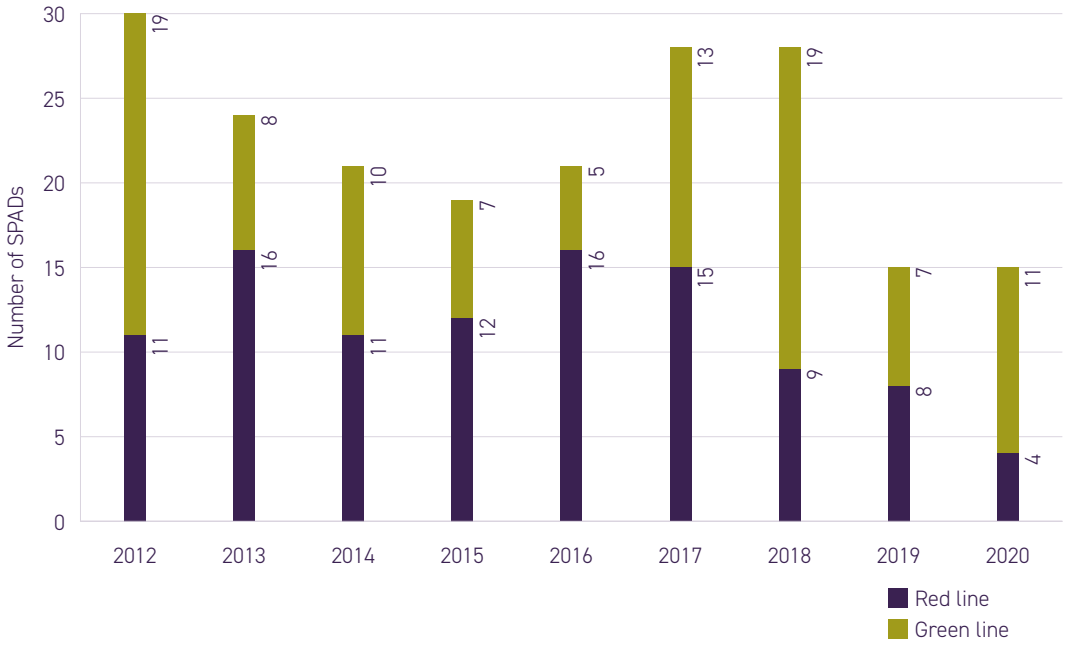
b) Sandyford Junction (10)

c) Broombridge Depot Junction (1)

d) Sylvan Road (1).

Item's 'a-c' have track based systems that automatically detect if a SPAD event occurred. Item 'd' requires a driver to self-report a SPAD event. In common with much of the Dublin Light Railway System there is no automatic detection of trams and crossing that use signals to communicate movement authority, hence there is no technological check of potential SPAD events for item 'd'. TDLR currently do not have a procedure for assessing the risk of SPAD events, but from occurrence reporting to the CRR many of the SPAD's detected were seemingly low risk. TII and TDLR are currently developing a method to measure safety risk within this occurrence category.

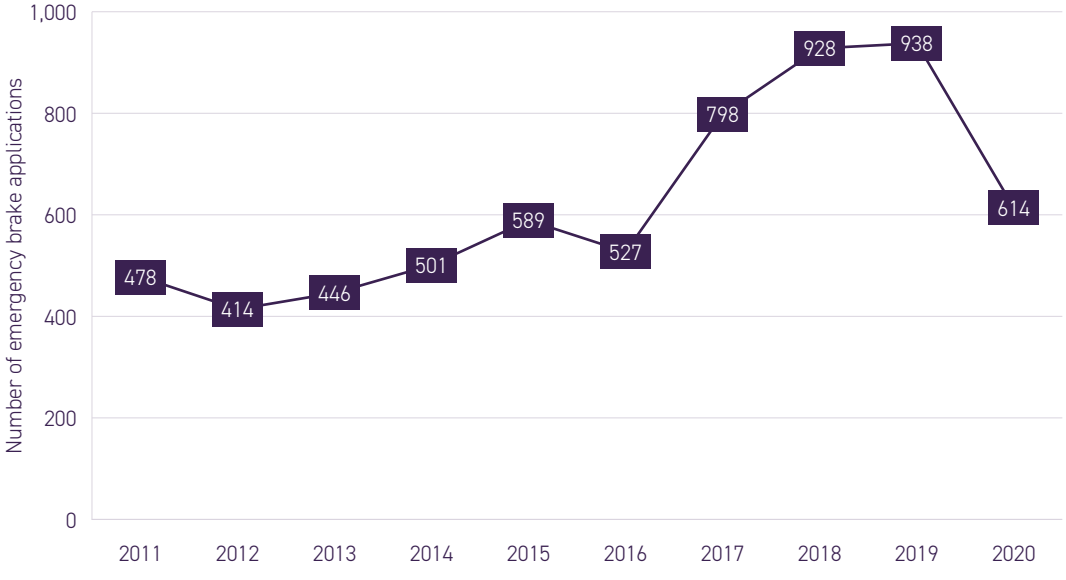
Figure 27
Tram SPADs



2.4.5 Tram emergency brake applications

An emergency brake application is where a driver commands the tram to apply friction brake (using a load sensing algorithm) on the discs, an electrodynamic brake on the motors and an electromagnetic track brake that applies to the rail head for adhesion. The number of Emergency Brake (EB) applications made by tram drivers can be a useful leading safety indicator as it can show there was potential for an unsafe condition to manifest. In 2020, there was a total of 614 EB applications, which is a substantial reduction from 938 in 2019 (figure 28). TDLR analysis indicates that 43% of these are due to technical issues with the tram or its operation, which can range from blockage of door leaves to faults with the tram control system. The analysis also indicates that 29% are attributable to road vehicles, 21% to pedestrians and 5.7% to cyclists.

Figure 28
Emergency brake applications

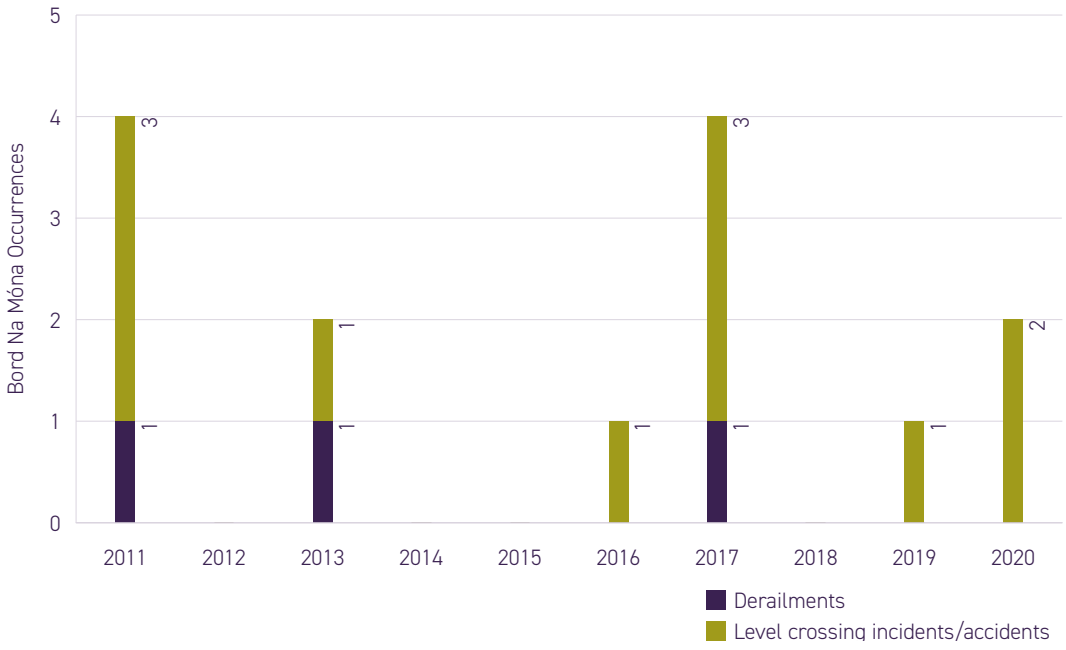


2.5 Bord Na Móna industrial railway statistics

The CRR's remit in terms of its oversight of Bord Na Móna's (BNM) industrial railway is limited to where it interfaces with public roads. While it has 570 km of permanent track it is only at its interfaces, i.e., level crossings and where there are road bridges over the industrial railway that the CRR has a function. In terms of key infrastructure statistics there are 99 level crossings of which 90 are operational and 52 underbridges. These figures represent no change from 2019.

Bord Na Móna reported no derailments in 2020 but did report 2 level crossing occurrences (figure 29). The first of these incidents involved a car crashing through level crossing gates that had just been closed across the public road by a BNM employee who was then about to traverse the crossing with their train. In the second occurrence, a flatbed wagon that had been carrying stone became derailed while it was being unloaded using an excavator. In order to re-rail the wagon it was uncoupled from the BNM locomotive. Just after it was re-railed it started moving and travelled along the line unaided and ran through both level crossing gates at Kilcolgan. No harm was reported apart from minor damage to crossing infrastructure in both occurrences.

Figure 29
Bord na Móna derailments and level crossing incidents/accidents



2.6 Heritage railways

A heritage railway is defined in Irish Legislation as "a person who only operates train services or railway infrastructure of historical or touristic interest". The CRR monitor the operations of heritage railways. In 2020, the following heritage railways held railway safety certificates permitting operation:

- Difflin Lake railway, Oakfield, Raphoe, Co Donegal
- Fintown & Glenties Railway, Co Donegal
- Listowel Lartigue Monorail, Co Kerry
- Waterford & Suir Valley Railway (W&SVR)
- Irish Steam Preservation Society, Stradbally, Co Laois.

Due to the COVID-19 pandemic and government restrictions in place, only the Difflin Lake Railway and the Waterford & Suir Valley Railway operated passenger services in 2020. Both railways curtailed their passenger services, only operating for shorter than normal periods during the summer months and/or during the festive season. Neither railway reported any occurrences.

2.6.1 Railway Preservation Society of Ireland (RPSI)

The RPSI is a special case of heritage railway given they are not a self-contained heritage railway. They operate steam and diesel hauled heritage trains on the Iarnród Éireann rail network and therefore hold a Safety Certificate allowing them to operate as a Railway Undertaking (RU). As an RU under the European Railway Safety Directive they are subject to a supervision regime that is commensurate with the risks they manage and import onto the Iarnród Éireann network. As an RU the RPSI has received safety certification based on the acceptability of its Safety Management System, compliance with which is also supervised by the CRR.

The RPSI did not operate in 2020.

3. PUBLIC REPRESENTATIONS

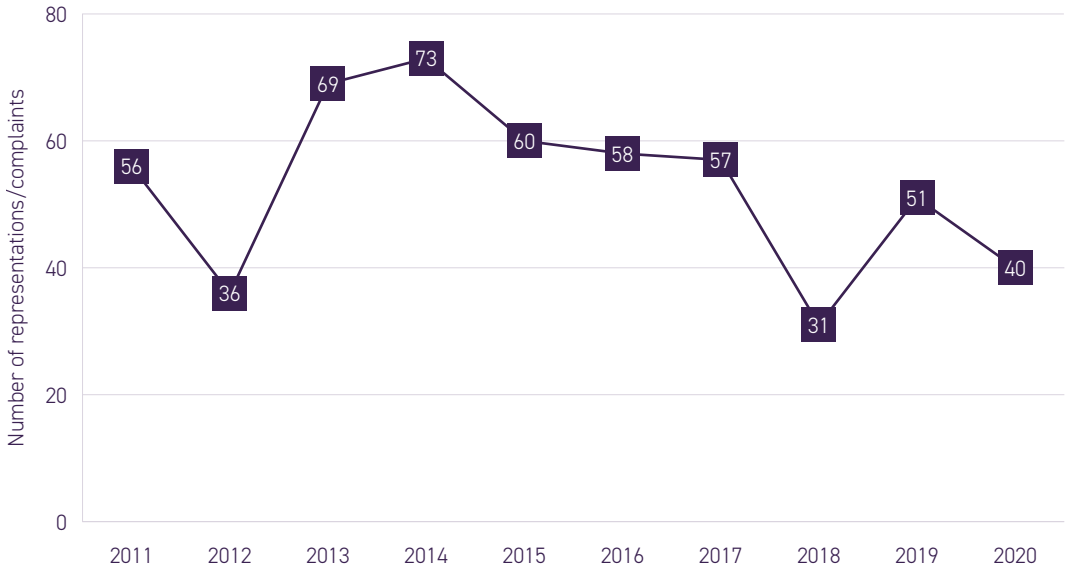
3.1 Introduction

The CRR uses many inputs to undertake risk-based supervision activity and one such source is that from representations the CRR receive from the public, be they passengers or otherwise, railway workers or other entities (both Irish and beyond). Representations can be made to the CRR, with details on how to make a representation being available on our website (www.crr.ie). The contribution from the various stakeholders, including railway workers, passengers, and the general public is a valuable source of information and all contact is screened and responded to in line with the CRR's charter. Where issues that relate primarily to occupational health and safety arise, the CRR liaises with colleagues in the Health & Safety Authority (HSA). Should issues raised relate to service efficiency or effectiveness, rather than safety, then the CRR directs the representation to the appropriate railway organisation or regulator (typically the National Transport Authority). If after the screening process the issues raised involves railway safety, the CRR endeavours, wherever possible, to deal with the matter directly. If necessary, the CRR will undertake inspections and/or seek information from the appropriate railway organisation(s) for further clarification seeking resolution before responding back to the person who made the representation.

3.2 2020 data and commentary

In 2020, the CRR received 40 representations relating to a range of heavy and light rail infrastructure and operational matters (figure 30). These ranged from safety concerns regarding the condition and safety of the IÉ-IM network to general tramway safety. The figure was down on that received in 2019, which reflects passenger number reductions due to COVID-19 and the associated travel restrictions in place during the year. (See the graph below for representation trend details). Of the 40 representations received in 2020, 20 related to IÉ-IM or IÉ-RU, 9 related to the LUAS system, 1 related to the heritage railway sector with the remaining 10 being mainly of either a general legislative or network nature. The CRR gives a high degree of attention to any representation concerning railway safety made by either railway staff, railway passengers, members of the public, or others.

Figure 30
Public representations to the CRR by year



Representations from 2020 were further analysed and broken down into the following categories:

- Safety at stations: queries relating to incidents or concerns at stations
- Safety of Infrastructure: queries relating to Railway Infrastructure such as bridges, track, level crossings or fencing
- Safety of rolling stock: queries relating to Vehicles such as train performance, grab rail security or door operation
- Safety of train operation: queries relating to operations such as train loading, excess train speed or shared running of trams
- Safety of railway working: queries relating to operational activities on the railway such as network regulation or management control
- Request for information: a request to the CRR for information not specifically related to railway safety (note these are distinct from formal Freedom of Information requests).

The numbers of representations/complaints by category is shown in figure 31. The distribution is not significantly different compared to 2020 in terms of category.

Figure 31 CRR public representation by category

4. RAILWAY SAFETY TRENDS IN EUROPE

4.1 Introduction

For the railway sector, European Union policy has the principle aim of establishing a Single European Railway Area; this is an EU-wide system of railway networks which would allow the expansion of the railway sector based on competition, technical harmonisation, and the joint development of cross-border connections. The main elements of this policy are:

- an open and restructured rail market
- increase competitiveness by creating a level playing field for companies
- develop infrastructure to ensure interoperability
- improve efficiency in infrastructure use and safety
- ensure fair prices for consumers.

The main EU legislation supporting the development of EU rail policy consists of four legislative packages adopted by the Council and the European Parliament between 2001 and 2016. These include common provisions on:

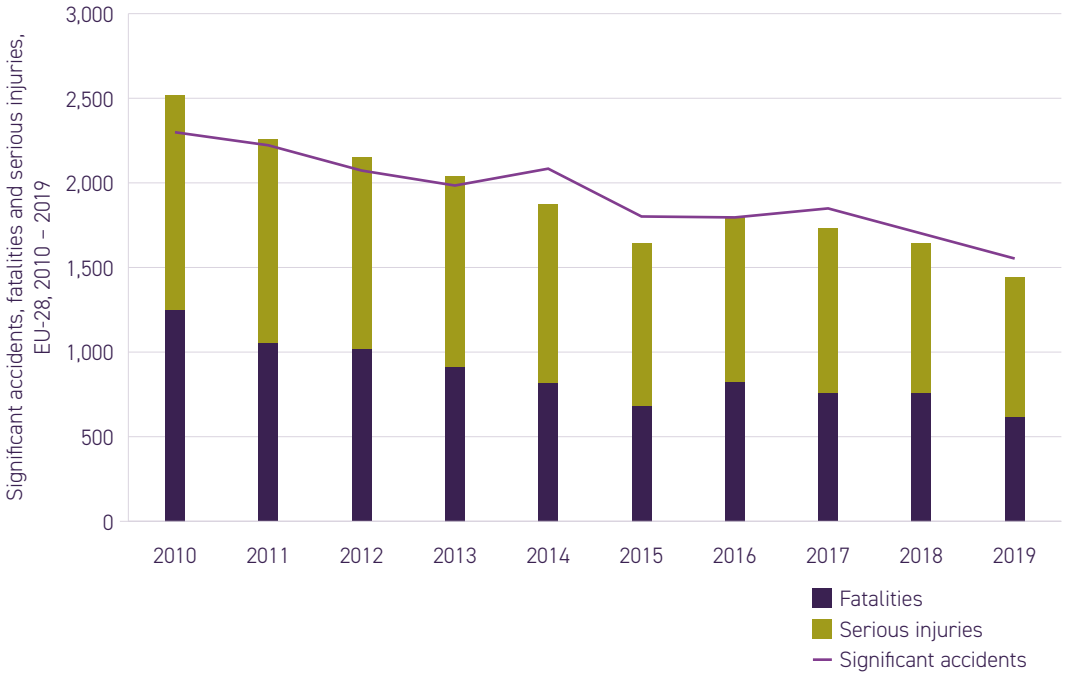
- liberalisation of the rail market
- licensing of railway undertakings and train driver certification
- safety requirements
- the creation of the European Union agency for railways and railway regulatory bodies in each Member State
- rail passenger rights.

In these legislative packages the CRR is defined as the National Safety Authority (NSA) for the railway network in Ireland. Each European member state has an NSA which, in accordance with the Railway Safety Directive (2016/798/EC), must submit its annual report on 'Common Safety Indicators' of railway safety to the European Union Agency for Railways (ERA). ERA uses this data to analyse railway safety at an EU level and publishes its report on its website. ERA reports do not take into account light rail (Luas) or metro systems, or self-contained heritage railway systems. Some noteworthy statistics are presented from a recent report on 2019 data from ERA. Definitions for data categories used, where not stated, can be found in the document 'Implementation Guidance for use of Common Safety Indicators', which is produced by ERA and is available at www.era.europa.eu.

4.1.1 Significant accidents and their outcomes

Significant accidents are defined as "any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic, excluding accidents in workshops, warehouses and depots." In 2019 (the most recently available dataset), there were 1552 significant accidents resulting in 824 fatalities and 618 serious injuries (figure 32), which are estimated to cost €3.5 billion (figure 33). Significant accidents decreased respectively by 10% in 2019 compared to 2018 (figure 34), confirming the steady decrease observed since 2010. ERA have distinguished significant accidents into external and internal, the distinction being dependant on the involvement in accidents of parties external to the railway system (e.g., cars, trespassers). When this distinction is applied it is reported that a reduction in external accidents (e.g., level crossings collisions) has driven the reduction in significant accidents (figures 34, 35).

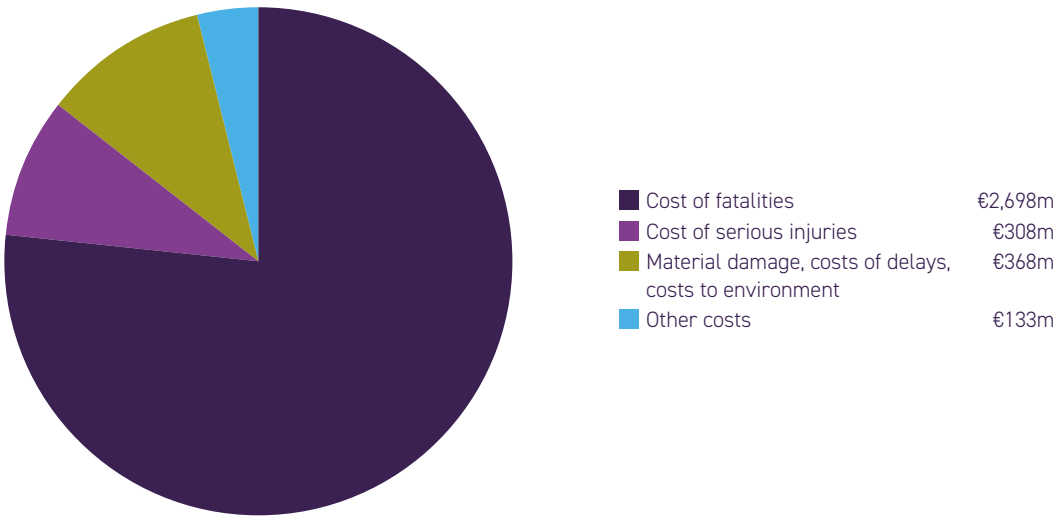
Figure 32
Safety outcomes of accidents in the EU



Source: Common Safety Indicators (CSIs) as reported by National Safety Authorities (NSAs) to the European Union Agency for Railways, published in ERAIL.

Figure 33
Cost of railway accidents in the EU

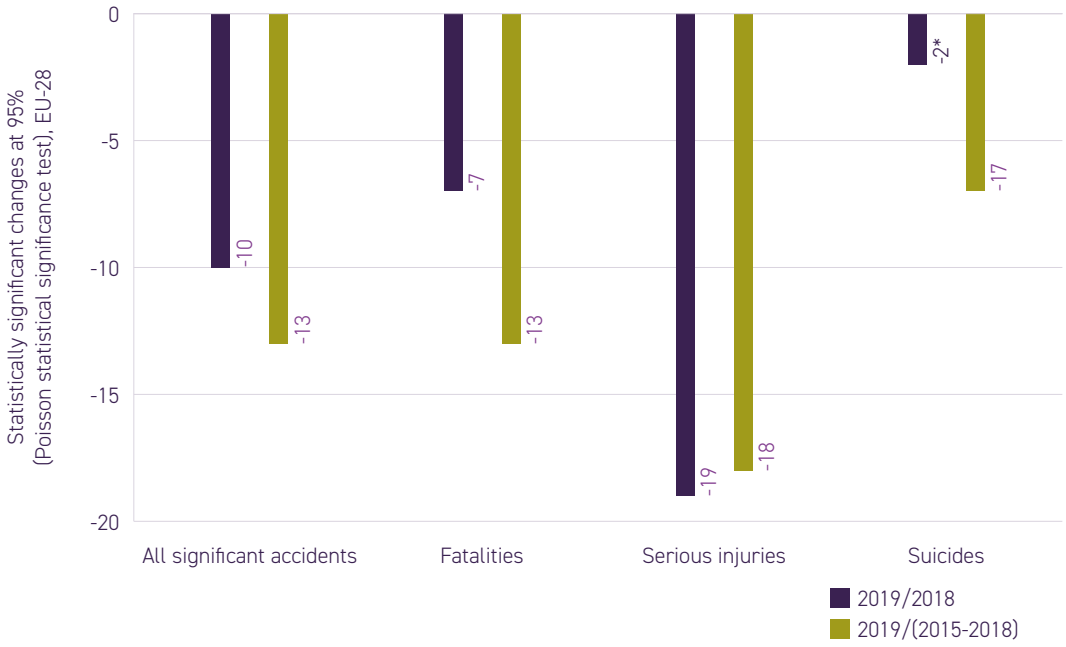
Estimated costs in million EUR, EU-28, 2019



Note: other costs (modal shift, air pollution, administrative, rerouting, reputational damage, productivity losses) estimated from unit costs developed by consultant for ERA.

Source: Common Safety Indicators (CSIs) as reported by National Safety Authorities (NSAs) to the European Union Agency for Railways, published in ERAIL.

Figure 34
Changes in outcomes

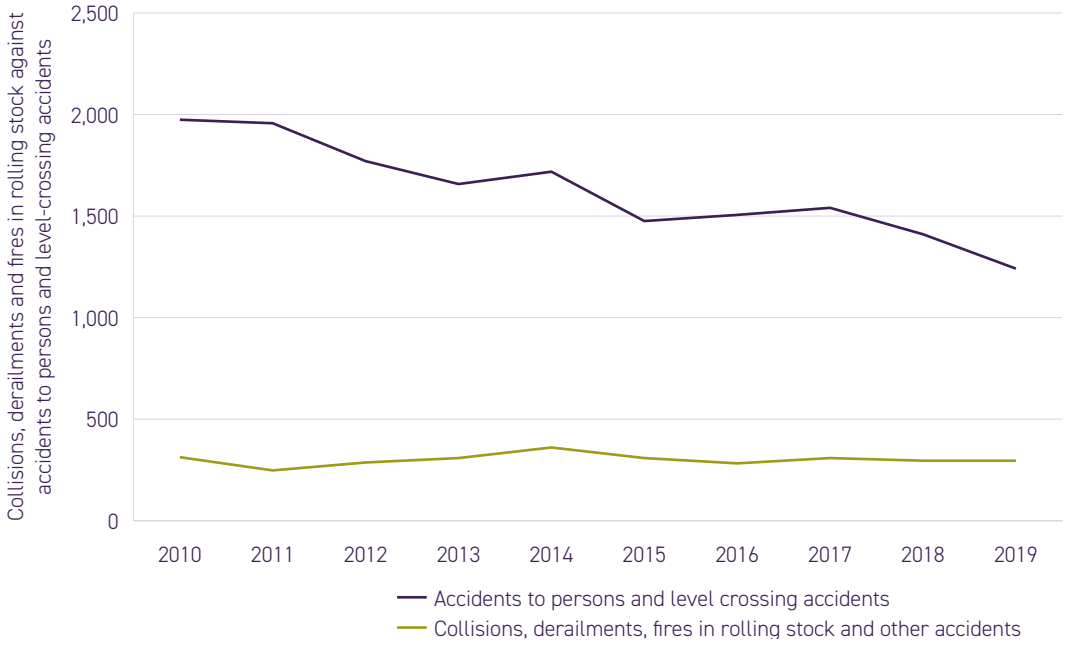


*Not statistically significant.

Note: Statistical significance at 95%.

Source: Common Safety Indicators (CSIs) as reported by National Safety Authorities (NSAs) to the European Union Agency for Railways, published in ERAIL.

Figure 35
Railway 'internal' and 'external' accidents

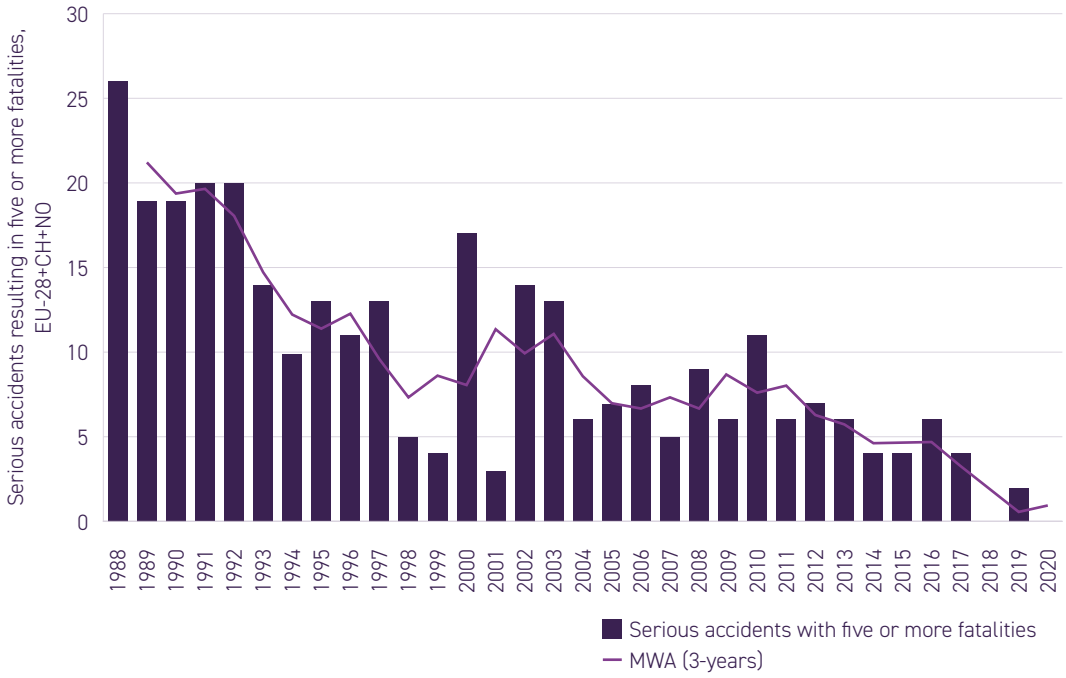


Source: Common Safety Indicators (CSIs) as reported by National Safety Authorities (NSAs) to the European Union Agency for Railways, published in ERAIL.

4.1.2 Irish railway safety in an EU context

The latest CSI data for the EU suggests Ireland has a good safety performance, which is positive, but one should understand the limitations of this data set to put that performance in context. Firstly, Ireland has a small network (1680 route km) and a serious accident with multiple fatalities has the potential to alter significantly Ireland's position in relation to most other Member States. The trend for major accidents is downward (see figure 36 with data from Imperial College in London) but one such occurrence in Ireland would likely have a disproportionate effect on Ireland's position. Secondly, ERA has advised that CSI's give a limited perspective on safety risk in each member state and the level of information provided is basic. Importantly, they give little visibility on the 'Low frequency high consequence risks' that may threaten a Member State's safety performance. This limitation has led the European Commission to undertake a far-reaching project to establish a common occurrence database that will allow for a better understanding of safety risk. First results from this new approach are expected in the next 2-3 years.

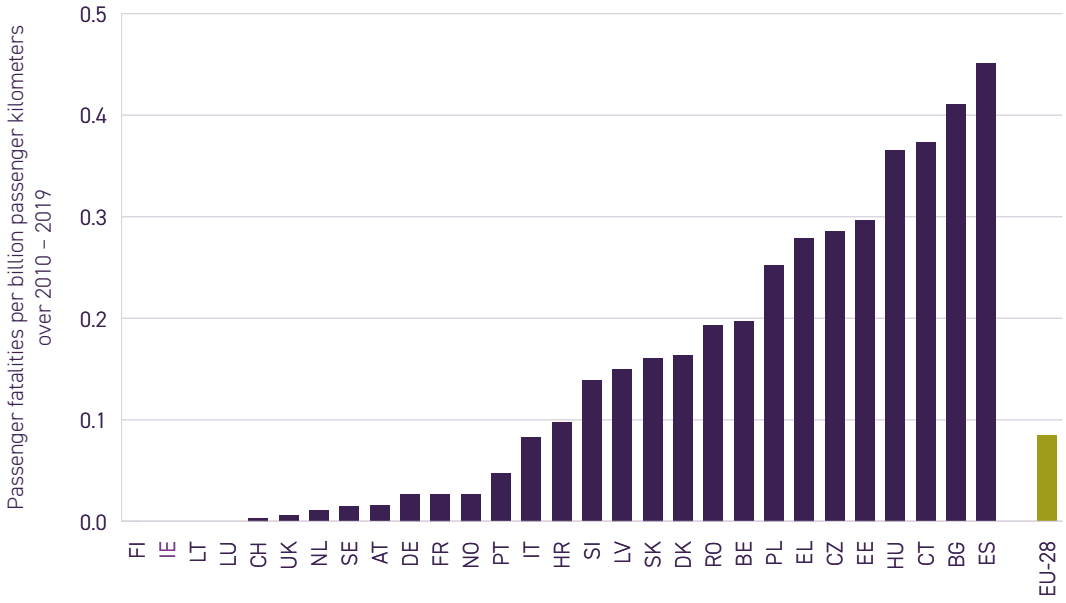
Figure 36 Major accidents in Europe



Source: ERAIL and database of historical accidents – courtesy of Andrew Evans, Imperial College London.

In terms of what is known for 2019, Ireland's performance is good in comparison to other Member States, with performance consistently well ahead of the EU level. Data for railway passenger fatality rates in figure 37 show that when fatalities are normalised using train kilometres travelled, Ireland jointly leads as it reported no passenger fatalities for that year.

Figure 37
Passenger fatalities per billion passenger kilometers

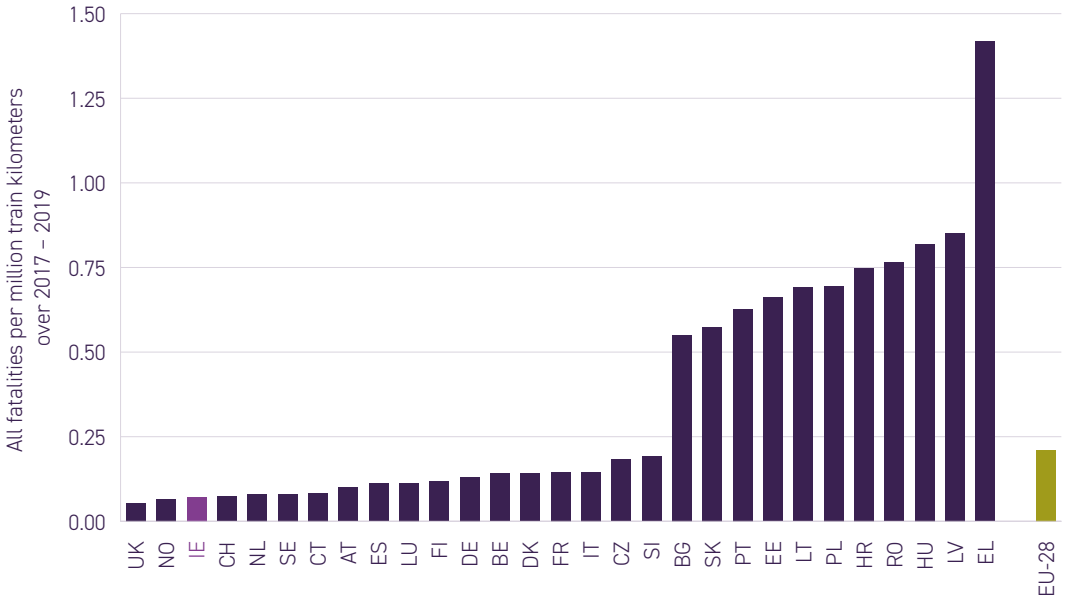


Note: EU = 28 member states as of 2019.

Source: Common Safety Indicators (CSIs) as reported by National Safety Authorities (NSAs) to the European Union Agency for Railways, published in ERAIL.

When all fatalities on the railway system are analysed (figure 38), Ireland has performed well in comparison to other member states. This figure includes fatalities that occur during the 'external' significant accident type discussed earlier. The illustration does point to a large disparity between best and worst performers, and it is a significant policy challenge at EU and Member State level to reduce this gap. A deeper understanding of the risk factors may be possible if the common occurrence database referenced earlier works as planned.

Figure 38
All EU fatalities per million train km



Note: EU = 28 member states as of 2019.

Source: Common Safety Indicators (CSIs) as reported by National Safety Authorities (NSAs) to the European Union Agency for Railways, published in ERAIL.

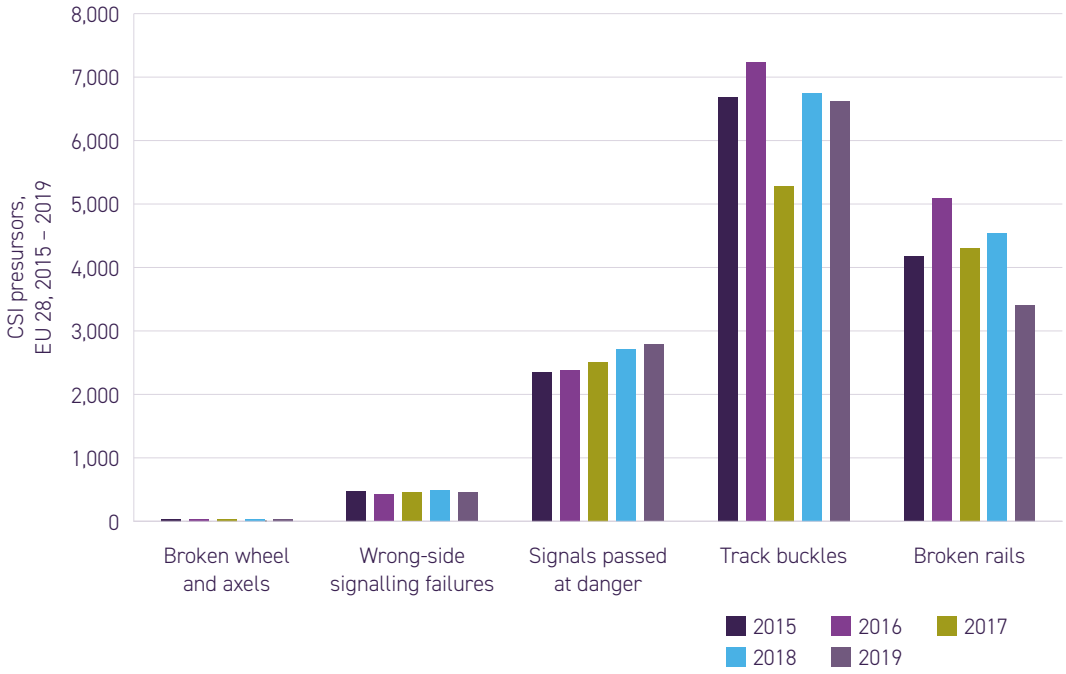
4.1.3 Precursor to accidents

Accidents on railways are rare events and to keep such occurrences as low as possible railway organisations and safety authorities monitor events (precursors) that have no harmful consequences but under slightly different circumstances, could have led to an accident. The following precursors are those reported to the ERA;

- Broken wheels and axles (on trains or wagons)
- Wrong-side signalling failures
- Signal passed at Danger (SPAD)
- Track Buckles (track is out of alignment)
- Broken rails.

Nationally the number of precursor events are low (28 in total) yet at an EU level there were more than 13,000 precursor events reported for the period 2015-2019. As seen in figure 39, the number of signals passed at danger has risen each year that is reported. This illustrates that monitoring precursor events as a protection against accidents can be effective, but a consistent and sustained negative trend over a sustained period is one that requires action at all levels that influence it. ERA report that they have concerns about data quality with regards to track buckles and broken rails, hence it is difficult to draw a meaningful conclusion from the data shown.

Figure 39
Total precursor events by category, 2015 – 2019



Source: Common Safety Indicators (CSIs) as reported by National Safety Authorities (NSAs) to the European Union Agency for Railways, published in ERAIL.

4.2 Major accidents worldwide

A number of accidents on railways in other countries during 2020 reminds us that despite many indicators showing improvement in overall safety performance, potential still exists for serious accidents with catastrophic outcomes. The CRR is an active participant in a small number of fora with other National Safety Authorities in Europe and similar agencies worldwide regarding such incidents and endeavour to share learning points derived from investigations. What follows is a brief overview of recent accidents in other jurisdictions which the CRR considered noteworthy for the Irish railway sector. They highlight the impact of major weather events on the railway, the effectiveness of automatic train protection, crash protection systems on modern trains, and the dangers of unauthorised access to the railway line.

Ingenheim, Republic of France

At 07:32 (local time) on 5 March 2020, the first five carriages of a Colmar-Paris Train à Grande Vitesse (TGV) service derailed between Ingenheim and Saessolsheim after striking debris from a landslip from an embankment at around 170 mph. There were 22 injured, including the driver. SNCF later described the landslip as 'very sudden and large'. French ecology minister Elisabeth Borne announced on Twitter that she had asked le Bureau d'Enquêtes sur les Accidents de Transports Terrestres (BEA-TT, French National Investigative Body) to open an inquiry. SNCF (French state railway operator) is also investigating. The train was reported to have dealt with the collision quite well as it did not overturn, and SNCF credits specific design of features of their TGV fleet (e.g., articulated bogies) in preventing this type of consequence. The line was opened for traffic in 2016, and SNCF report they had not observed any uncontrolled risk prior to the occurrence during maintenance and inspection.

Soure, Coimbra District, Portugal

A train crash at Soure occurred on 31st July 2020. A high-speed passenger train collided with an on-track machine railway vehicle (OTM) that resulted in 2 fatalities and 43 injuries. The maintenance vehicle is reported to have passed a signal at danger (red aspect) and occupied a track section to which the oncoming high-speed train that was travelling from Lisbon to Braga was due to pass through. The high-speed train attempted to brake but did not have sufficient stopping distance to avoid the collision. It was reported that the high-speed train had automatic train protection (ATP) fitted and operational, but the OTM did not. ATP would likely have mitigated the harm caused by the erroneous initial movement of the OTM as it would automatically have detected a movement to pass a signal at danger. ATP is fitted on the DART service in Dublin, and there are plans to extend this functionality to other parts of the IÉ network.

Carmont, Aberdeenshire, United Kingdom of Great Britain and Northern Ireland

At around 09:37 hrs on Wednesday 12 August 2020, a passenger train collided with debris washed onto the track near Carmont, Aberdeenshire, following heavy rainfall. The subsequent derailment resulted in the death of three people, injuries to the six other people in the train and catastrophic damage. The national investigative body published an interim report in April 2021 which indicated that key areas of investigation include emergency response to extreme weather, the role of climate change for this weather, infrastructure design, and derailment mitigation systems on the involved railway vehicles. The investigation will be monitored closely in Ireland given the shared history of the respective railway systems, and the influence UK operational practice has on the Irish system.

Gallery Place-Chinatown Station, Washington D.C., United States of America

A Metrorail customer was killed in a collision with a train at Gallery Place-Chinatown Station at 5:42 am, September 14th, 2020. The Washington Metrorail Safety Commission reported that a customer fell from the platform when standing near its edge, after which the person appeared to have lost consciousness. The person then regained consciousness, staggered to their feet, and while appearing to remain disoriented they started collecting their items from the railway. At around that time, a Green Line train toward Branch Ave. Station approached the Gallery Place Station platform at more than 38 mph. 111 feet before reaching the platform, the Train Operator put the train's master controller into emergency braking. As the train entered the station, now going more than 33 mph, the customer attempted to get out of the way of the train but could not and died because of the collision with the train. Trains require a larger distance to come to a stop due to steel wheels and steel rails, and they cannot change direction, hence they cannot react in the same way a road vehicle may do.

5. ACCIDENT INVESTIGATIONS

5.1 Introduction

The Railway Accident Investigation Unit (RAIU) is a functionally independent organisation within what is now the Department of Transport, (Previously the Department of Transport (DoT)). The RAIU undertakes 'for cause' investigations into accidents and incidents that either meet specific criteria in terms of severity or could have, in slightly different circumstances, resulted in a more serious accident or incident.

The purpose of an investigation by the RAIU is to identify improvements in railway safety by establishing, in so far as possible, the cause or causes of an accident or incident with a view to making recommendations for the avoidance of similar accidents in the future, or otherwise for the improvement of railway safety. It is not the purpose of an investigation to attribute blame or liability. The RAIU's investigations are carried out in accordance with the European Railway Safety Directive 2004/49/EC and recast Directive (EC) 2016/798 and the Railway Safety Act 2005 as amended by S.I. No.258 of 2014 and S.I. No. 430/2020.[4]

5.2 RAIU active investigations

The RAIU conducted 50 Preliminary Examination Reports (PER) and initiated nine full investigations into railway accidents and incidents in 2020 (table 4).

Table 4
RAIU investigations initiated in 2020

Date of incident	Details	Duty holder
4th June 2019[5]	Near miss with an IÉ Patrol Ganger near Woodlawn, Galway	IÉ-IM
Various	Trend investigation into Signals Passed at Stop (SPASs) on the Luas Network	Transdev
11th January 2020	Collision between an IÉ passenger train and rail-mounted maintenance equipment, Rosslare, Wexford	IÉ-IM
29th April 2020	Collision between a car and a train at Kilnageer Level Crossing (XM240), Mayo	IÉ-IM
24th May 2020	Person entrapped in lowered CCTV level crossing, Ashfield, Offaly	IÉ-IM
8th June 2020	Collision between a Bord na Móna Flat Wagon and Kilcolgan Level Crossing Gates, Offaly	BNM
7th July 2020	Chassis Plate Fracture on General Motors Class 201, Locomotive 224	IÉ-RU
1st October 2020	Overhead Line detachment, Pearse Station	IÉ-IM
2nd November 2020	Luas Overhead Line Failure, Stillorgan,	Transdev

4. Railway Safety Directive and the Railway Safety Act are supplemented by S.I. No. 430/2020 – European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020.
5. The RAIU only became aware of this incident in February 2020 and then commenced its investigation.

5.3 RAIU Investigation Reports 2020

In accordance with the Railway Safety Act 2005, the RAIU endeavours to publish an investigation report not later than 12 months after the date of the incident. In 2020, the RAIU published four investigation reports which are listed in table 5. As a result of their investigations the RAIU made a total of 18 safety recommendations which are discussed in section 5.4.

Table 5
RAIU investigation reports published in 2020

Date report published	Date of incident	Title of report	No. of safety recommendations made	Railway organisation
04th March 2020	26th March 2019	Passenger trap-and-drag occurrence on Luas tram at Heuston Stop	10	Transdev
27th May 2020	4th June 2019	Near miss with an IÉ Patrol Ganger near Woodlawn, Galway	2	IÉ-IM
27th May 2020	20th June 2019	Near miss collision between a train and an IÉ-IM staff member, at Rush and Lusk Station	2	IÉ-IM
16th December 2020	11th January 2020	Collision between an IÉ passenger train and rail-mounted maintenance equipment, Rosslare, Wexford	4	IÉ-IM

5.4 RAIU safety recommendations 2020

The RAIU, through their accident investigations, identify whenever possible the immediate cause, contributory factors and any underlying factors. Having established these, the RAIU may make safety recommendations and as previously stated, 18 were made in 2020. In accordance with the Railway Safety Directive the RAIU address recommendations to the national safety authority (the CRR) and where needed by reason of the character of the recommendation, to other bodies or authorities in the Member State or to other Member States. Member States and their safety authorities take the necessary measures to ensure that the safety recommendations issued by the investigating bodies are duly taken into consideration, and where appropriate acted upon.

The CRR categorise the status of recommendations as being either 'Open', 'Submitted', 'FER' or 'Closed'. These are defined as follows:

Open Feedback (Evidence) from Railway Organisation (or another party) is awaited or actions have not yet been completed.

Submitted A Railway Organisation (or other party) has made a submission to the CRR, advising that it has taken measures to effect the recommendation and the CRR is considering whether to close the recommendation.

FER Further Evidence Required. The CRR has reviewed a submission (or further submission) but considers that further evidence is necessary to close the safety recommendation.

Closed The CRR has reviewed a submission (or further submission) and is satisfied that the safety recommendation has been addressed.

A summary is presented below of the actions taken (at the time of writing) in relation to the four RAIU Investigation Reports published in 2020 where safety recommendations were made, and the status of each recommendation.

It should be noted that just because a safety recommendation is identified as being 'open' does not mean that no action has been taken, rather the railway organisation responsible has not yet reported that they have concluded the actions they propose to take to address the individual safety recommendation.

R2020 – 001
Passenger trap-and-drag occurrence on Luas tram at Heuston Stop, 26th March 2019 (Report published 4th March 2020)

Summary	On the 26th March 2019 at approximately 14:22 a male passenger attempted to board inbound Luas tram, Tram 3011, at Heuston Stop. The passenger placed his hand between the door leaf and the door pillar of the rear most entrance door as the door was closing. The passenger's hand became trapped in the door seals. The door obstacle detection system did not detect the presence of the hand as it was less than 10 millimetres (mm); the door operation mechanism allows 10 mm obstacle detection to facilitate door closing. The tram departed Heuston Stop nineteen seconds after the doors were closed with the passenger's hand trapped in the door. Two security staff from Special Task Team (STT), STT 1 and STT 2, came to the passenger's assistance, with one of the security staff communicating with the driver by radio. The tram began to move, with the passenger's hand still trapped and the passenger walked along the platform with his hand trapped in the door seal for five seconds before the security staff assisted in freeing the passenger's hand from the door. The tram came to a stop four seconds after the passenger had freed his hand.
Number of recommendations made	10

Recommendation 1 (2020001-01)	Transdev should update their suite of documents for driver training (SM 017 Driver Training Plan), operations (TSI Manual) and competence assessment (SM 018 & SM 019 Competence Assessment) to include a requirement for drivers to conduct a thorough final visual check (using CCTV and mirrors) after obtaining doors closed and locked indications and before moving the tram to confirm that nothing is trapped in the doors.
Action/s taken/in progress	200428 PCD and plan received from Transdev. Expected planned completion date 1st April 2021
Status	Open/In progress.

Recommendation 2 (2020001-02)	TII should conduct a risk-based review on whether CCTV platform monitors should be installed at high-use tram stops.
Action/s taken/ in progress	On the 20th April 2020 TII advised the CRR: That in relation to the Luas Driver CCTV Monitor TII do not think that any action is necessary to implement the recommendation and they have provided a report in support of this view. 2/6/2020 – CRR advise TII that their submittal form is not signed and also that a definitive statement is required as to TII's contention. 16/6/2020 – resubmitted signed form.
Status	Closed.

R2020 – 001
Passenger trap-and-drag occurrence on Luas tram at Heuston Stop, 26th March 2019
(Report published 4th March 2020)

Recommendation 3 (2020001-03)	TII should conduct a risk-based review on whether the tram fleet operating on the Red Line should be upgraded with coloured rear view monitors.
Action/s taken/in progress	On the 20th April 2020 TII advised the CRR: That a review has been undertaken and a variation order has been approved by TII for Transdev to install a higher specification surveillance system onto the 401 fleet of trams. There is a lead time for parts and work will be undertaken in a phased basis with a planned completion date of January 2021".
Status	Open/In progress.

Recommendation 4 (2020001-04)	Transdev and TII should develop new labels, for the application on tram doors, which warn passengers of the dangers of closing doors.
Action/s taken/in progress	200428 PCD and plan received from Transdev. 200831 Submission received from Transdev. 200902 Evidence reviewed and considered satisfactory.
Status	Closed.

Recommendation 5 (2020001-05)	Transdev, as part of the update to the SMS 018 Competence Assessment, should formally include the assessments that should be conducted every quarter.
Action/s taken/in progress	200428 PCD and plan received from Transdev. 200419 April submission reviewed and evidence exists to demonstrate that Procedure SM018 has been reviewed and superseded by a new procedure outlining a new competence assessment regime. Further clarifications sought.
Status	Further evidence requested.

Recommendation 6 (2020001-06)	Transdev should brief drivers on the operation of the door mechanism, and specifically explain the removal of obstacle detection for the final 10 mm of door travel; this briefing should then be incorporated into their suite of training and competence management documents.
Action/s taken/in progress	200428 Evidence received from Transdev but not considered sufficient for closure.
Status	Further evidence requested.

Recommendation 7 (2020001-07)	Transdev should develop and implement an induction training and competency assessment program for security staff, which should include training and assessment in the use of safety critical communications.
Action/s taken/in progress	200428 Evidence received from Transdev but not considered sufficient for closure.
Status	Further evidence requested.

R2020 – 001
Passenger trap-and-drag occurrence on Luas tram at Heuston Stop, 26th March 2019 (Report published 4th March 2020)

Recommendation 8 (2020001-08)	Transdev should update their WIs to ensure that appropriate testing is conducted for sensitivity of obstacle detection, door impact for closing forces and obstacle removal forces; the requirements set out in I.S. EN 14752 should be used, as appropriate.
Action/s taken/in progress	200428 Evidence received from Transdev but not considered sufficient for closure.
Status	Further evidence requested.

Recommendation 9 (2020001-09)	Transdev should update their drugs and alcohol policy to include explicit requirements that testing is conducted post incident/accident where the actions of a driver may have contributed to the incident/accident. Transdev should also develop a system whereby a decision not to test an individual is documented with clear justification for the decision provided.
Action/s taken/in progress	200428 PCD and plan received from Transdev. 200914 Evidence Submission received from Transdev. Revised D&A Policy together with a new form to be completed if a D&A Test is not undertaken post incident. 200915 Initial review undertaken but not yet considered sufficient for closure. Previous version of policy requested and evidence of briefing new policy and new form. 200916 – Further evidence received inc. earlier versions of D&A Policy. Also evidence of communicating to Authorised Persons' the updated policy and requirement in relation to recording reasons for non-testing of persons.
Status	Closed.

Recommendation 10 (2020001-10)	Transdev should update their Chain of Care Procedure mandating that drivers are subject to appropriate developmental supports (such as assessment, monitoring and supervision) post incident/accident. Depending on the type of incident/accident, and whether the actions of the driver contributed to the incident/accident, specified periods of time of continuing developmental supports should be set.
Action/s taken/in progress	No update received.
Status	Further evidence requested.

R2020 – 002
Near miss with an Iarnród Éireann Patrol Ganger near Woodlawn, Galway, 4th June 2019
(Report published 27th May 2020)

Summary	At approximately 10:04 hours (hrs) on the 4th June 2019, the 09:30 hrs passenger service from Galway to Heuston train departed Woodlawn Station. On route to Ballinasloe Station, on a curved section of track, the driver saw a person in high visibility clothing walking on the line in the five foot with his back to the oncoming train. The driver placed the train brake in the emergency position and sounded the train horn to warn of the train's approach. The person identified was an Iarnród Éireann Infrastructure Manager (IÉ-IM) Patrol Ganger who then stepped off the track into the cess, approximately four seconds before the train passed. The driver brought the train to a stop and reported the incident.
Number of recommendations made	2
Recommendation 1 (2020002-01)	IÉ-IM should review its track inspection methods to see if technological/ mechanised systems and/or other safety measures could be implemented to eliminate/minimise track worker exposure to railway hazards whilst undertaking the task of track patrolling.
Action/s taken/in progress	9th July 2020 Iarnród Éireann-IM advise the CRR: "É-IM will review its track inspection methods to minimise the risk to track workers, whilst undertaking the task of track patrolling. A program plan is being developed which lists the steps involved." CRR has requested copy of said program plan.
Status	Open/In progress.
Recommendation 2 (2020002-02)	IÉ-IM should, through their risk assessment process, conduct a review of the patrol lengths, with the objective of identifying all patrol lengths with associated risks, and introducing adequate mitigation measures to eliminate these risks. Consideration should be given to the introduction of technologies (such as anti-collision devices) for use by patrol gangers, with the objective of warning patrol gangers of oncoming trains.
Action/s taken/in progress	9th July 2020 Iarnród Éireann-IM advise the CRR: "IÉ-IM will conduct a review of the patrol lengths to minimise the risk to track workers, whilst undertaking the task of track patrolling. A program plan is being developed which lists the steps involved." CRR has requested copy of said program plan.
Status	Open/In progress.

R2020 – 003
Near miss with an Iarnród Éireann SET worker at Rush and Lusk station, 20th June 2019 (Report published 27th May 2020)

Summary	At approximately 09:50:31 hrs, on the 20th June 2019, a member of Iarnród Éireann Infrastructure Manager's (IÉ-IM) Signalling, Electrical and Telecommunications (SET) Department's staff (to be referred to as SET Worker) accessed the railway line at Rusk and Lusk Station and began walking on the railway line (Up Line). The SET Worker was accessing the railway line to inspect electrical equipment associated with a nearby SET location case. Seven seconds later the SET Worker sees the 08:00 hrs Belfast to Connolly passenger train approaching on the Up Line and starts to walk towards the other railway line (not occupied by the train, the Down Line). At 09:50:42 hrs, while standing in the middle of the Down Line, he raises his hand above his head to acknowledge the presence of the train, he is not in a position of safety. Two seconds later (09:50:44 hrs) the SET Worker walks across to the Down Platform and leans his elbow down on the platform and raises his other hand to acknowledge the train for a second time, he is not in a position of safety. As the SET Worker watches the Belfast to Connolly train pass (09:50:46 hrs), the SET Worker sees the 09:29 hrs Pearse to Drogheda empty train approaching on the Down Line. The SET Worker walks, at pace, towards the ramp of the Platform and begins to climb up on the ramp of the Down Line Platform, he stumbles during the climb. At 09:50:53 the SET Worker clears the track, although he is not in a position of safety. One second later, at 09:50:54, the train travels past the SET Worker. At 09:50:56, the SET Worker is more than 1.5 m from the track, in a position of safety; he does not suffer any injuries as a result of the incident.
Number of recommendations made	2
Recommendation 1 (2020003-01)	The IÉ-IM SET Department should develop a formalised process, through their SMS suite of documents, for IÉ-IM SET staff walking/working alone, which should be completed prior to any member of SET staff going on or near the line; at a minimum consideration should be given to: — Whether it is necessary to go on or near the line to conduct the walk/work — What local knowledge is required to walk/work safely — Whether all the requirements of the IÉ Rule Book/SSOW can be me; — What special protection arrangements are required either at night or during the day.
Action/s taken/in progress	9th July 2020 Iarnród Éireann-IM advise the CRR: "IÉ-IM SET have developed process through their SMS suite of documents as above. An evidence form for the closure of this recommendation will be sent to the CRR within the next month. 4th August 2020 Evidence submitted by IE-IM containing an updated standard and associated procedure and details of a new mobile application." CRR has requested evidence of briefing out the new standard/procedure and training material for the mobile application
Status	Further evidence requested.
Recommendation 2 (2020003-02)	IÉ-IM should brief all staff of their requirements, under the IÉ Rule Book, to wear their high visibility clothing correctly.
Action/s taken/in progress	9th July 2020 Iarnród Éireann-IM advise the CRR: IÉ-IM will brief all staff of their requirements, under the IÉ Rule Book, to wear their high visibility clothing correctly. 14/09/2020 IÉ-IM provide evidence of briefing staff through the Weekly Circular on the importance of correctly wearing PPE.
Status	Closed.

R2020 – 004
Collision between an Iarnród Éireann passenger train and rail-mounted maintenance equipment, Rosslare, Wexford, 11th January 2020
(Report published 16th December 2020)

Summary	On 11th January 2020, T3 Possessions were granted between the 112 Mile Post (MP) 880 yards and the 112 MP 1320 yards (Rosslare Strand to Rosslare Europort) for Iarnród Éireann's Infrastructure Manager's (IÉ-IM) Chief Civil Engineer's (CCE) Department in relation to the Rosslare Coastal Erosion Project. The work being undertaken in the T3 Possessions included the erection of viewing distance marker boards (sometimes referred to as V Boards) on the north and south sides of a newly re-opened level crossing, adjacent to Hayesland IÉ-IM compound. There were four members of CCE staff, working in pairs, erecting the V Boards on the north and south sides of the level crossing. The pair working on the south side included the Person In Charge Of Possession (PICOP)/Engineering Supervisor (PICOP/ES) and the other pair, working on the north side, included the Acting Permanent Way Inspector (APWI). The APWI decided to transport the V Boards using a piece of wheeled rail-mounted maintenance equipment (RMME) at the level crossing. On arrival at the V Board erection location, it was discovered that the poles to hold the V Boards were too short and needed to be extended; this could be done by a welder working in Hayesland compound. Therefore, the APWI made the decision to put the V Boards back on the RMME and return to the Hayesland compound where the welder could extend the poles to the correct length. On arrival at level crossing (adjacent to Hayesland compound), APWI and another permanent way worker carried one pole each to the welder, leaving the RMME on the track. As APWI was explaining the requirements to the welder his mobile phone rang and he took the call. On completion of the call, the PICOP/ES asked the APWI if the line was clear for the possession to be handed back; the APWI responded that it was clear; intending to remove the RMME. The APWI continued his conversation with the welder, forgetting to remove the RMME. The PICOP/ES phoned the Signalman, without physically checking the line, and handed back the possession, as safe, for the passage of trains. At approximately 10:52 hours (hrs), as the driver of the 08:05 hrs Connolly to Rosslare Europort passenger service (Train A602) approached the level crossing; he saw the RMME on the track and applied the emergency brakes. However, the train collided with the RMME. When the train stopped, the driver informed the relevant staff. The RMME was wedged between the two wheelsets on the leading bogie and required the intervention of permanent way staff to remove the RMME. On removal, the driver inspected the train for damage and after a conversation with the Chief Mechanical Engineer's (CME) maintenance staff, the train was cleared to continue its journey to Rosslare Europort, twenty-six minutes late.
Number of recommendations made	4

Recommendation 1 (2020004-01)	IÉ-IM should classify and define RMMEs, Trolleys, LMEs and other commonly used plant or equipment on the railway and ensure appropriate safety procedures are in place for their use. IÉ-IM should also assess the need for any associated training and competency related to these changes and if considered necessary prepare training and competency assessment material.
Action/s taken/in progress	27.01.2021 Iarnród Éireann-IM Advise the CRR: The IM Procedures Manager will set up a working group to review the range of equipment to be classified and defined. The group will also review the tasks involving these machines and recommend, where appropriate where current procedures need to be enhanced and where new procedures need to be put in place. Appropriate training and competency arrangements, as required, will be put in place, based on the outcome of this review.
Status	Open/In Progress.

R2020 – 004
Collision between an Iarnród Éireann passenger train and rail-mounted maintenance equipment, Rosslare, Wexford, 11th January 2020
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Recommendation 2 (2020004-02)	IÉ-IM CCE should ensure that, once defined and classified, change management systems are put in place to ensure RMMEs, Trolleys, LMEs, etc. are not altered for other uses, without first having been safety validated in line with company processes.
Action/s taken/in progress	27.01.2021 Iarnród Éireann-IM Advise the CRR... IÉ-IM have a change management process in place-IM-SMS-014 Safety Approval of Changes in Plant, Equipment, Infrastructure and Operations (PEIO). An instruction will be issued by the Chief Civil Engineer to reinforce that, when making changes to equipment, this process must be applied at the appropriate level.
Status	Open/In Progress.
Recommendation 3 (2020004-03)	IÉ-IM should update their Mobile Gang Work Instructions, I-PWY-1490, (Ganger's Handbook) to ensure that all routine light maintenance activities are included. Systems, e.g., training, should be put in place to ensure that relevant staff can undertake dynamic risk assessments should non-routine activities need to be undertaken that are not described in the Ganger's Handbook.
Action/s taken/in progress	27.01.2021 Iarnród Éireann-IM Advise the CRR... A working group is to be established to review the routine maintenance tasks detailed in the Mobile Gang Work Instructions and to amend accordingly. Dynamic risk assessment training is currently being rolled out in IÉ-IM. If a non routine maintenance task is to be carried out, a method statement must be devised. An instruction will be issued by the Chief Civil Engineer stating this.
Status	Open/In Progress.
Recommendation 4 (2020004-04)	IÉ-IM clearly define the role of the PWI/APWI and update the relevant documentation accordingly.
Action/s taken/in progress	27.01.2021 Iarnród Éireann-IM Advise the CRR: These supervisory roles have associated job descriptions which define these roles. This comment was made to the RAIU at the draft stage. 18.02.21 CRR Request IÉ-IM submit evidence to demonstrate that these roles are already defined.
Status	Closed.

5.5 RAIU recommendations summary

For further details on the status of RAIU Safety Recommendations please consult the CRR's Annual Report to the Minister for Transport, which is available on our website, www.crr.ie.

It should also be noted that many safety recommendations made by the RAIU may require strategic planning, engineering design, public consultation, planning permission and/or government funding and all of which can take many years to actually 'close' a safety recommendation.

6. REFERENCES

6.1 Documents used

— CRR (2020), Annual Report

— ERA (2020), Safety Overview

— RAIU (2020), Annual Report

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