



Railway Safety Performance 2012

November 2013

Foreword

Foreword

It is my privilege as the Head of Supervision & Enforcement to present the RSC Annual Safety Performance Review for 2012.

2012 was again a challenging year for the rail industry in Ireland, owing to economic pressures. However, 2012 was quite a good year for railways here in Ireland with the majority of safety performance indicators trending in the right direction. There were no passenger fatalities on the Irish rail network and the number of collisions at level crossings remained low.

Sadly, there was one fatality on the Luas tramway when an intending passenger was struck by a tram, travelling towards the city centre, as she tried to cross the lines to catch an outbound service. Remedial measures have since been taken and the RSC will continue to encourage Transdev (the Luas operator) to continuously improve to minimise the risk of similar occurrences.

The RSC supervision activity, in 2012, comprised a total of 9 audits of Iarnród Éireann's and Transdev's (formally Veolia) management systems (SMS) and in excess of 50 inspections. A number of findings were identified and action is being taken or has been taken to address these.

In conclusion, the RSC will continue to focus on its mission "To advance the safety of railways in Ireland through diligent supervision and enforcement". I trust that you will find this report informative and interesting.



Anthony Byrne
Principal Inspector – Supervision & Enforcement

Executive Summary

This is the fourth separately published annual safety statistical report of the Railway Safety Commission (RSC). It has been prepared for the general public in line with section 9(A) of the Railway Safety Act 2005 (the Act), which requires that the RSC operates in an open, non-discriminatory and transparent manner. This report provides background statistics to a number of safety performance indicators with discussion when appropriate.

The RSC is the independent railway safety regulator in the Republic of Ireland and is responsible for overseeing the safety of all railway companies, including Iarnród Éireann, Transdev (Luas Operator), Bord Na Móna where their railway interfaces with public roads, a number of heritage railways and the approval of projects undertaken by the Railway Procurement Agency (RPA).

The safety performance of both Iarnród Éireann and Transdev is, in the main, positive and broadly in line with previous years. However, concerns remain for both the rail and tram networks, with the operational environment continuing to remain demanding. Imported risk, i.e., from third parties interfacing with the railway, continues to be an issue. Bridge strikes, although decreased from recent years, continues to adversely affect railway operations seriously when they do occur.

There were no passenger fatalities or serious injuries in 2012. However, 5 trespassers lost their lives. There were no reports of level crossing deaths this year. There were two collisions between a train and a motor vehicle at a user-worked road level crossing, both of which resulted in minor injury to the road vehicle driver.

There was one broken rail on a passenger line and one on a freight line for the year 2012, reflecting a continuing low incidence rate. The number of fractured rail-joint fishplates and track misalignments and buckles increased in 2012, which runs counter to the prevailing trend.

In terms of train operations, Signals Passed at Danger (SPAD) remained largely consistent at 8, up 1 from 2011 but down considerably from a peak of 36 in 2005/06. Similarly, the number of train collisions (typically with obstacles such as branches) and derailments remained steady. A continued reduction in the number of rolling stock incidents was also apparent. Four incidents of fire/smoke were reported for the year.

LUAS safety performance in 2012 was largely similar to previous years. There was one fatality in 2012, as a result of a pedestrian coming into contact with the tram at Blackhorse Stop. The number of road traffic accidents in total declined to 24. Analysis contained in this report indicates a greater number of these accidents occur in winter. Noteworthy also were 7 tram contacts with members of the public during normal running. An accident precursor event, Emergency Brake Applications, continued on a similar trend to previous years.

Further thought is given to Ireland's Rail Safety performance within a European Context. It is demonstrated in the report that Ireland continues its satisfactory trend of recent times relative to other European Railways.

In 2012 the RAIU published three reports into accidents and incidents that were formally investigated. These produced a total of 13 recommendations, which are shown in Chapter 5.

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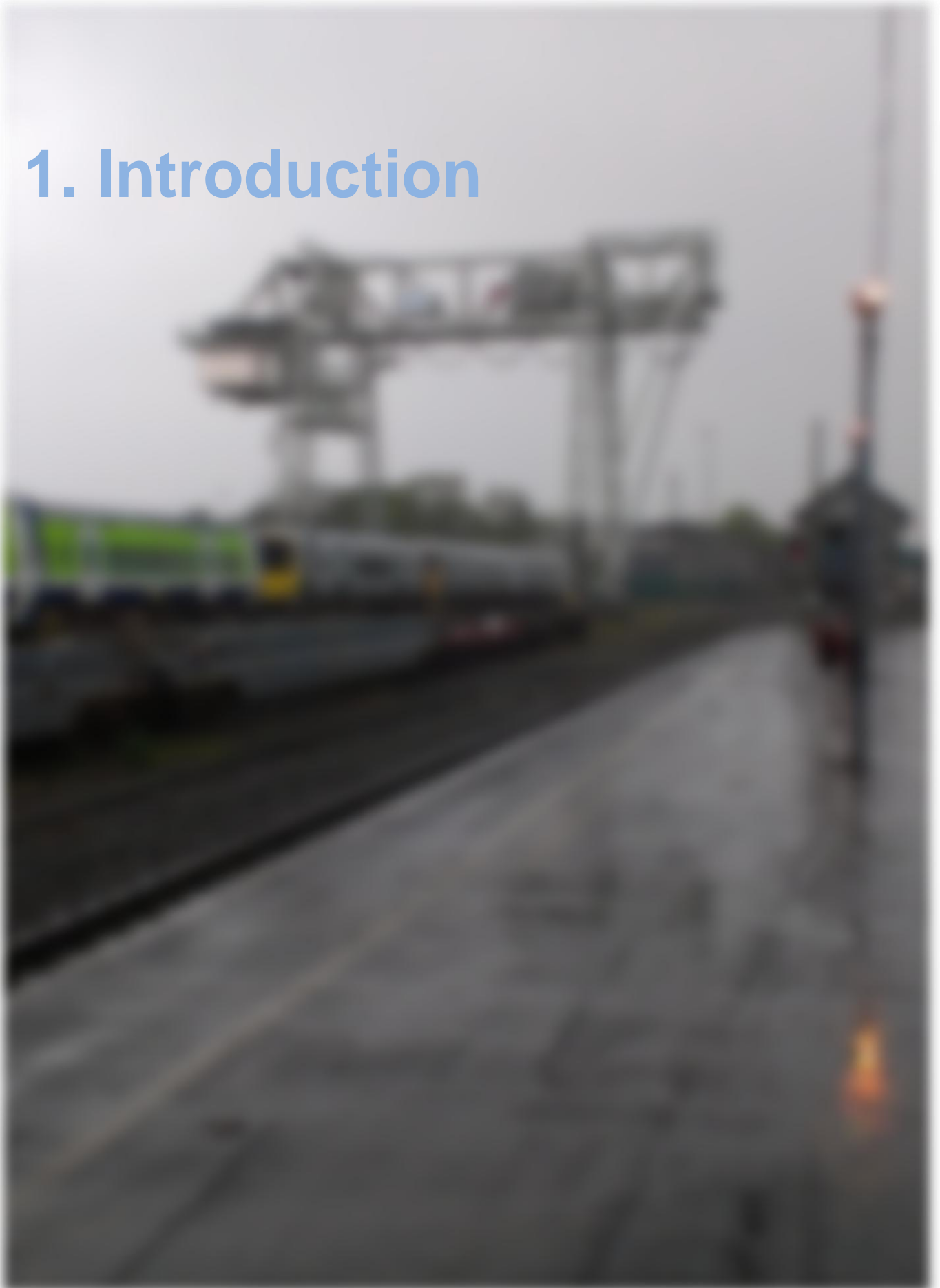
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1. Introduction



This is the fourth annual safety statistical report of the Railway Safety Commission (RSC) prepared for the general public in line with Section 9(A) of the Railway Safety Act 2005 which requires that the RSC operates in an open, non-discriminatory and transparent manner. This report provides background statistics to a number of safety performance indicators with discussion when appropriate. Key performance indicators are guided by the Common Safety Indicators (CSI), as specified in Directive 2004/49/EC and amended by Directive 149/2009/EC.

1.1 Overview of Report

In Chapter 2, a brief overview of the public representations received by the RSC is presented. Safety trends in Ireland are presented and discussed in Chapter 3. All types of train accidents are included. In Chapter 4, a high level comparison with other European railways shows where Iarnród Éireann (IE) are positioned in terms of railway safety. This includes a brief overview of significant accidents that have occurred in Europe in 2012. Chapter 5 concerns the Railway Accident Investigation Unit (RAIU) recommendations made as a result of their investigations. The status of each recommendation is explained together with details of actions taken to date.

1.2 The Railway Safety Commission

The RSC was established on 1st January 2006 under provision of the Railway Safety Act 2005, with responsibility for railway safety regulation and investigation. It is a small, professional organisation with a flat reporting structure. Its mission is to “advance the safety of railways in Ireland through diligent supervision and enforcement”. This regulatory responsibility is without prejudice to the fact that the national railway operator, Iarnród Éireann, and the operator of the Dublin Light Railway, Transdev, each has the primary duty of care regarding the safety of operations and infrastructure.

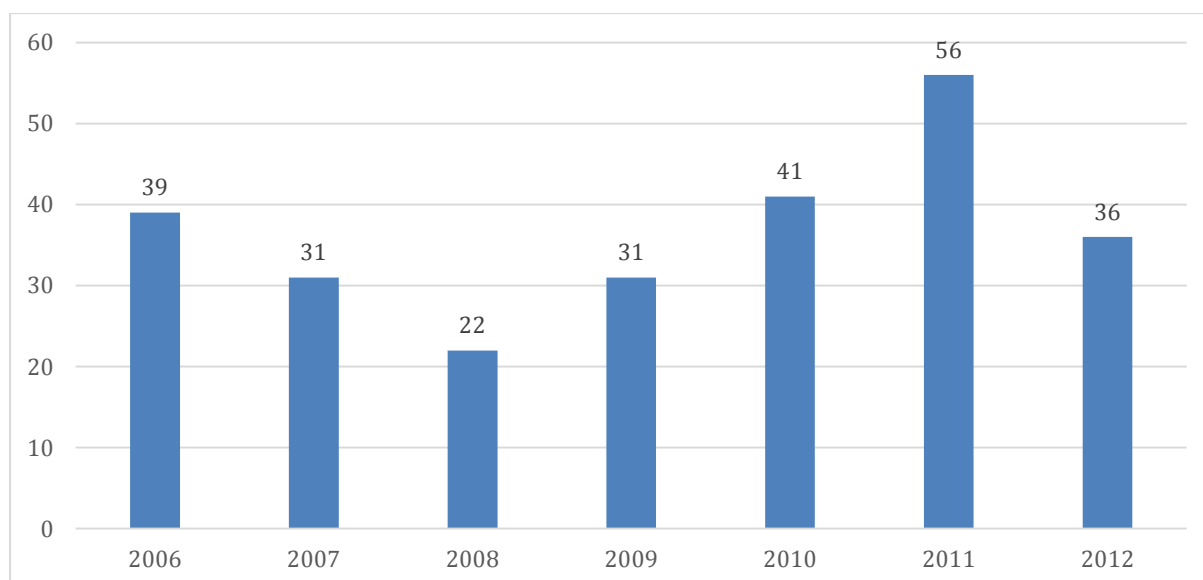
S.I. No. 61 of 2008 defined the RSC as the National Safety Authority (NSA) in the context of the European Railway Safety Directive 2004/49/EC. It also amended some provisions of the 2005 Act to transpose the Railway Safety Directive. The RSC as the NSA has responsibility for approving safety management systems, new rolling stock and infrastructure, and monitoring the industry to ensure it is able to manage its own risk effectively. The RSC also co-ordinates and encourages railway safety initiatives between the industry and external stakeholders. Further details may be found on the RSC website. www.rsc.ie.

2. Public Representations



The RSC encourages the public, passengers and others to bring any railway safety concern to our attention. The input of all stakeholders in the railway, such as employees, passengers and the general public is valuable when we work to improve railway safety. Where these issues relate to service rather than safety, the RSC directs the representation to the appropriate entity. Where the matter involves railway safety, the RSC endeavours, wherever possible, to deal with the matter directly. If necessary the RSC will seek information from the appropriate railway company for further clarification.

In 2012, the RSC received 36 direct or indirect representations relating to a range of heavy and light rail infrastructural and operational matters, a significant decrease on the number received in 2011 (56). Of these, 30 representations related to Iarnród Éireann operations or infrastructure with the remaining 5 pertaining to the LUAS (Dublin Light Rail) system, and some heritage railways. A small number of these did give cause for concern and the RSC acted immediately to ensure that corrective action was taken by the relevant Duty Holder. Some prompted immediate action to control risks while the majority gave no specific cause for safety concern. However, it is RSC policy that all safety related concerns are investigated further. The RSC continues to track representations to identify any recurrence or trends that might indicate a need for intervention in the future.

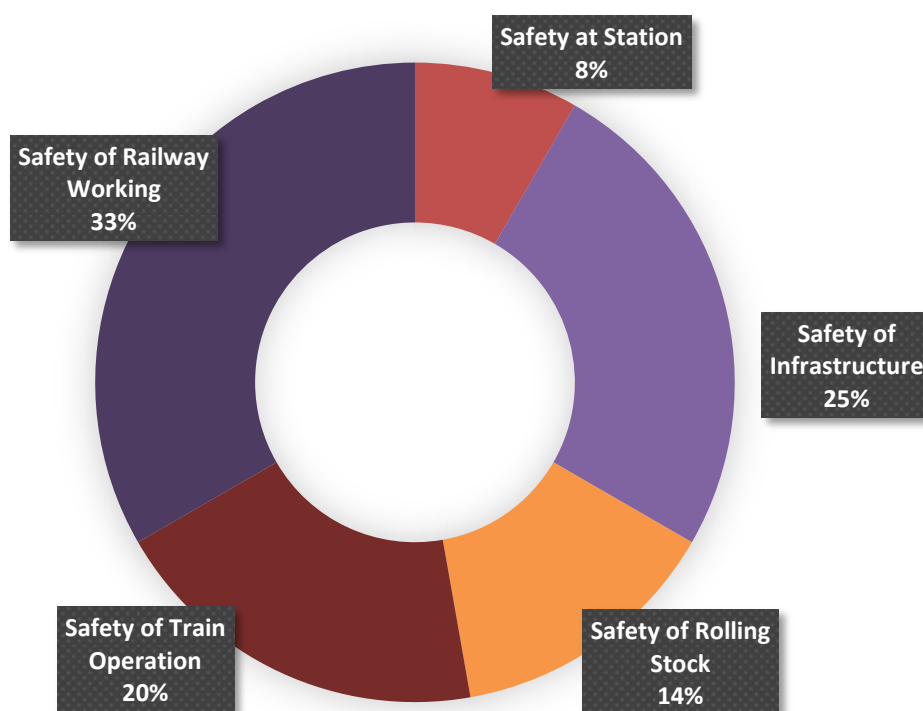


Graph 2-1 Public Representations to the RSC by year

Representations from 2012 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, level crossings or fencing
- Safety of Rolling Stock: Queries relating to Vehicles such as grab rail security or door operation
- Safety of Train Operation: Queries relating to operations such as excess train speed or shared running of trams
- Safety of Railway Working: Queries relating to operational and engineering activities on the railway such as network regulation or management control.

The distribution of the categories is shown in Graph 2-2. Distribution is quite even and similar to previous years, although it should be noted the sample size (36) is relatively small.



Graph 2-2 RSC Public Representation by category, 2012

3. Railway Safety Trends in Ireland

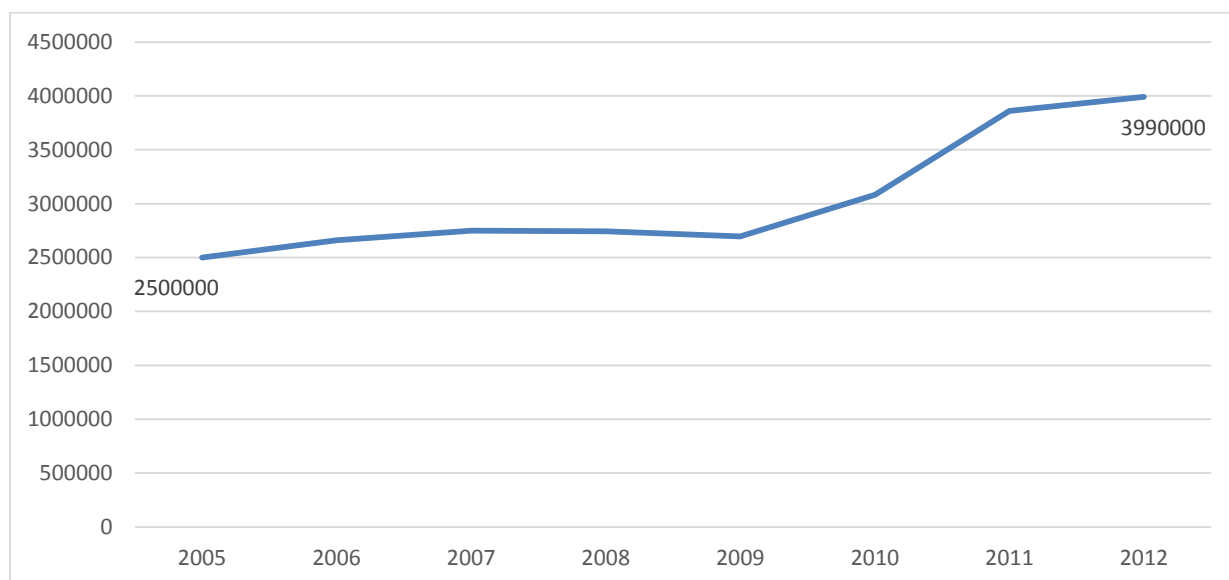


The safety performance of the duty holders in the Republic of Ireland is considered for the four principal railway sectors that the RSC regulates, namely heavy rail, light rail, industrial rail systems which interface with the public highway, and heritage railways. Each railway operator and infrastructure manager is obliged to notify railway incidents and accidents to the RSC. This data is used for assessing duty holder safety performance among other things.

3.1 Iarnród Éireann

At year end, the IÉ network in service was 1683 route-kilometres, the same as in 2011. There were no significant changes to the network or to the operation of trains. Passenger Train-km increased by 1.95% to 17,339,870.

The number of recorded passenger journeys dropped by 1.2 % to 36,919,000 million in the year end to 2012. Train km travelled increased by 3.4% to 3990000, as seen in graph 3-1.



Graph 3-1 Iarnród Éireann Train km 2005 – 2012

3.1.1 Iarnród Éireann Fatality and Injury Statistics

Table 3-1 illustrates the fatalities and lost-time injuries reported for employees and fatalities and injuries to third parties on the national railway network for the years 2006 to 2012.

	Railway operations and track maintenance								
	Category	2006	2007	2008	2009	2010	2011	2012	Trend
Fatal Injuries	Fatal injury to person due to a train accident, not at level crossing	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	
	Fatal injury to passenger attempting to board or alight from train	0	0	0	0	0	0	0	
	Fatal injury to customer, no train involved	0	1	0	0	0	0	0	
	Fatal injury due to railway accident at a level crossing	0	1	1	0	2	0	0	
	Fatal injury to employee at a level crossing due to train in motion	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	
	Other fatal injury to employee on the railway	0	0	0	0	0	0	0	
	Fatal injury on railway or level crossing where trespass or suspicious death was indicated	7	5	8	3	7	7	5	
Injuries	Injury to passenger due to a train accident not at level crossing	0	0	0	2	0	0	0	
	Injury to passenger travelling on train, other than in a train accident	41	35	22	40	28	10	27	
	Injury to passenger attempting to board or alight from train	55	50	43	17	64	46	41	
	Injury to passenger in station or visitor to premises	69	84	74	88	27	0	0	
	Employee injury involving train movement or train accident	15	8	9	13	12	9	9	
	Employee injury while working on railway	69	78	79	65	57	45	45	
	Employee injury at level crossing	2	4	0	0	0	0	0	
	Person injured in railway accident at level crossing	0	1	0	0	0	2	2	
	Passenger injury in railway accident at level crossing	0	0	0	0	0	1	1	
	Level crossing user injured	0	1	1	1	0	3	3	
	Injury to other person	5	1	2	0	1	0	0	

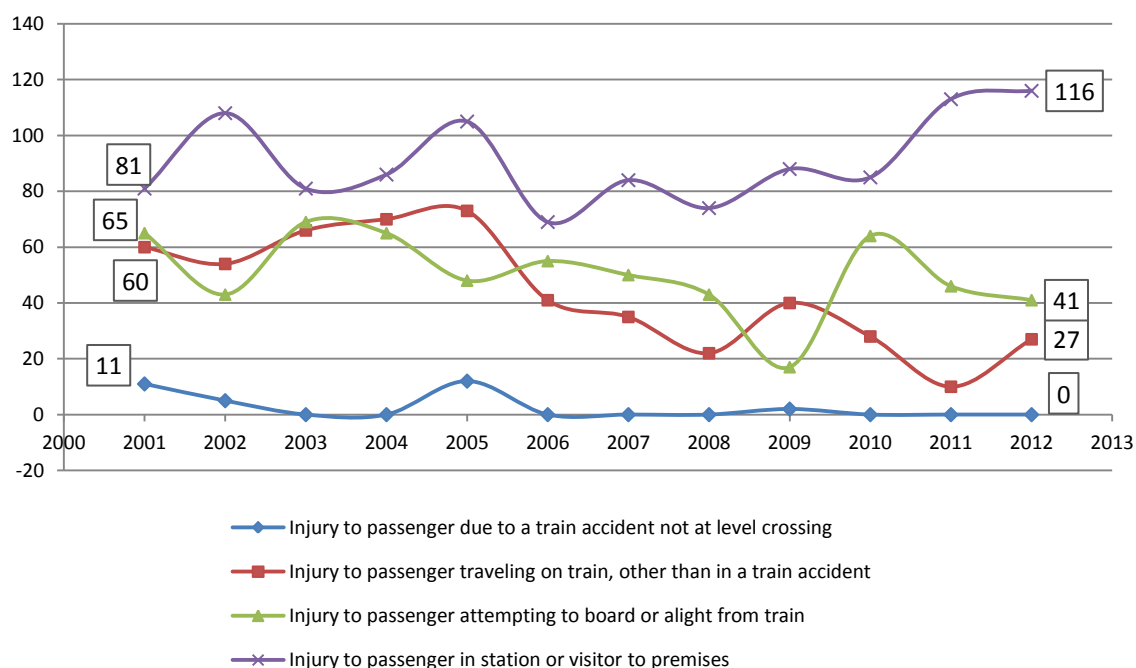
Table 3-1: IÉ Operational fatality and Injury Statistics by year

3.1.1.1 Fatal Injuries

There were five fatal injuries on the railway where trespass or suspicious death was indicated. These incidents occurred at various locations around the railway network. The RSC uses a coroner's verdict, when available, to assist in classifying the circumstances surrounding a fatality.

3.1.1.2 Passenger Injuries

The data indicates the largest proportion of incidences occur to passengers during time spent at stations as opposed to time spent on trains. This is common across many modern railways due to the sedentary nature of passengers when on board a train.



Graph 3-2: Passenger Injury statistics by year

Injuries to passengers or visitors to stations remain at a high level with slips, trips and falls being the dominant cause of these injuries. However, it is believed that a significant number of these injuries are as a result of people falling over left luggage and such as opposed to being as a result of an infrastructure failing.

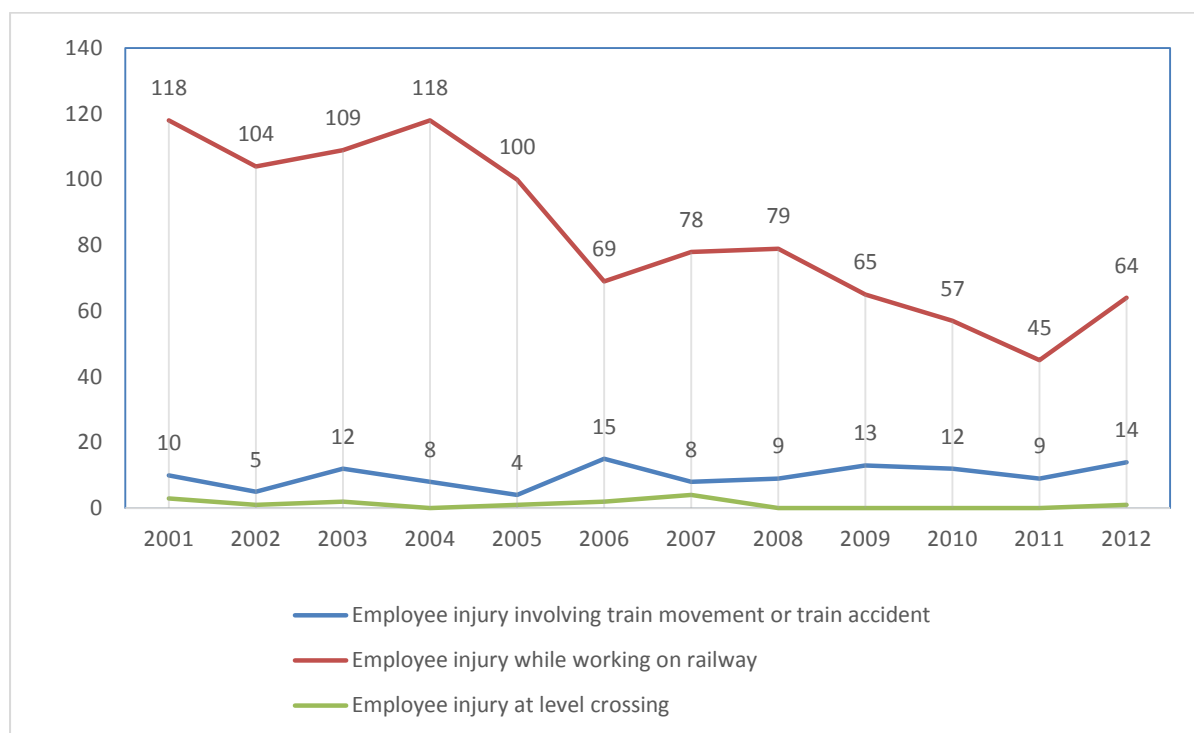
Injuries to passengers attempting to board or alight from trains has seen a small reduction but remains a cause for concern owing to the high risk of significant injury from this type of occurrence.

potentially fatal ing and When one examines this closer, it can be seen that there is a trend present since 2006, which the 2012 figure is broadly in line with. The figure is down from the highs seen in 2004 and 2005. This is despite the fact that passenger journeys has increased in this time.

It is noted that in the ‘injuries to passengers in a station or visitors to premises’ category, figures have remained broadly in line with 2011. This has previously been attributed to the introduction of new Safety Management Systems which encompass the reporting of such incidents.

3.1.1.3 Employee Injuries

Employee Injuries are broken down into three different categories, as shown in the graph below. In terms of injuries sustained while working on the railway, 2012 saw an increase on what had been a year-on-year reduction since 2008. While the overall trend is decreasing an increase of approximately 40% is concerning. Systems for managing safety have improved significantly in recent years, however, employers and employees must remain vigilant of the hazards that exist in railway environment.



Graph 3-3: Employee Injury statistics by year

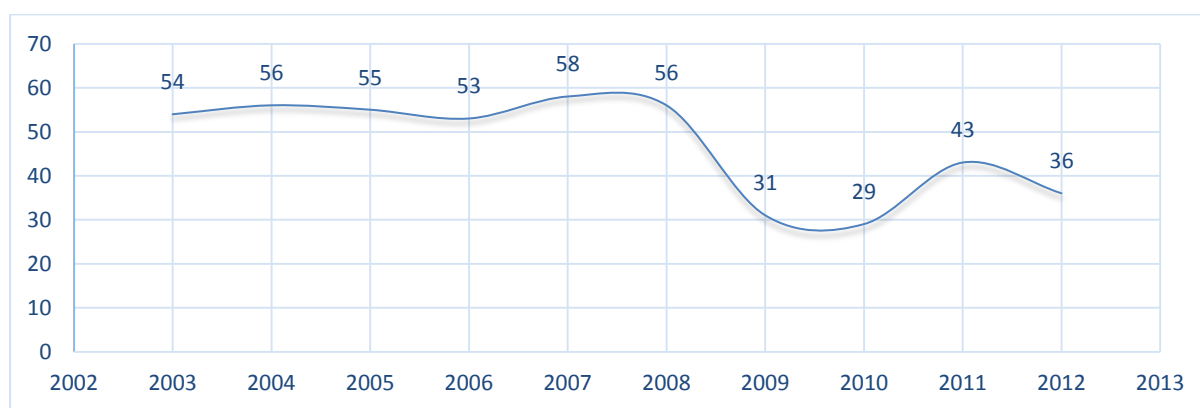
The trend of recent years for decline in Employee Injuries reversed in 2012. Total numbers were more in line with the trend emanating since 2006. Analysis of the individual items which make up the data indicate no trend in the accidents that occurred. An incident of note occurred in March 2012, when a fog signal detonated in the driving cab of a DART. The

RAIU is currently conducting a full investigation into this occurrence and their report is due to be published by September 2013.

3.1.2 Iarnród Éireann Incident Statistics

3.1.2.1 Train Collisions

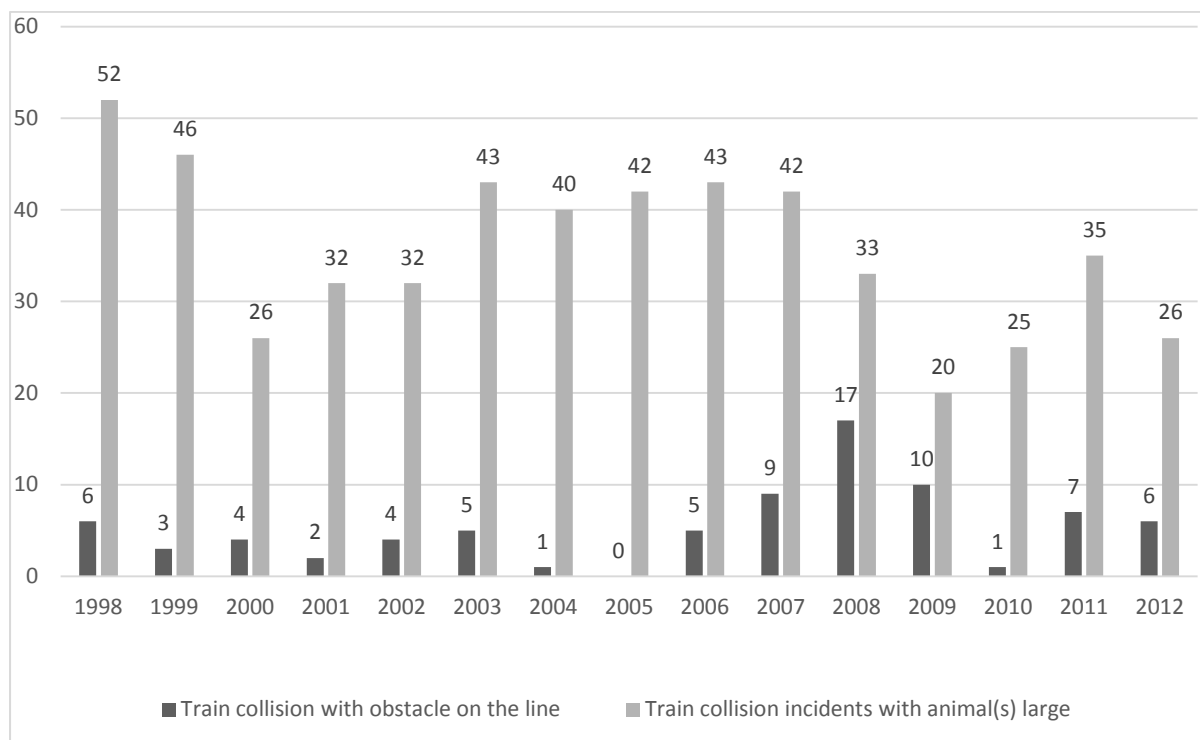
Train collisions can pose a significant risk to passengers, train crew and third parties. They have the potential to cause considerable damage to rolling stock. Graph 3-4 illustrates the trend for collisions since 1998. Graph 3-4 has been further split into parts, seen in Graphs 3-5 and 3-6, to aid understanding of the data. Two categories, ‘Total Collisions with Obstacles on the line’ and ‘Train Collisions with animals (large)’, have been separated out due to their frequency of occurrence.



Graph 3-4 Total Collisions by year

Category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Trend
Train collision with passenger or goods train on running line	0	0	0	1	0	0	0	0	0	0	
Train/railway vehicle collision in station or possession movement	2	0	1	1	0	1	1	0	0	1	
Train collision with a motor vehicle at a level crossing	1	2	2	1	4	4	0	2	1	2	
Train collision with pedestrian at a level crossing	0	0	0	0	1	0	0	1	0	0	
Train collision with attended gates at a level crossing	2	4	2	2	2	1	0	1	0	0	
Train collision with road vehicle obstructing the line (not at a level crossing)	2	0	0	0	0	0	0	0	0	1	

Graph 3-5: Train Collision Statistics detail by year, Part 1



Graph 3-6: Train Collision Statistics detail by year, Part 2

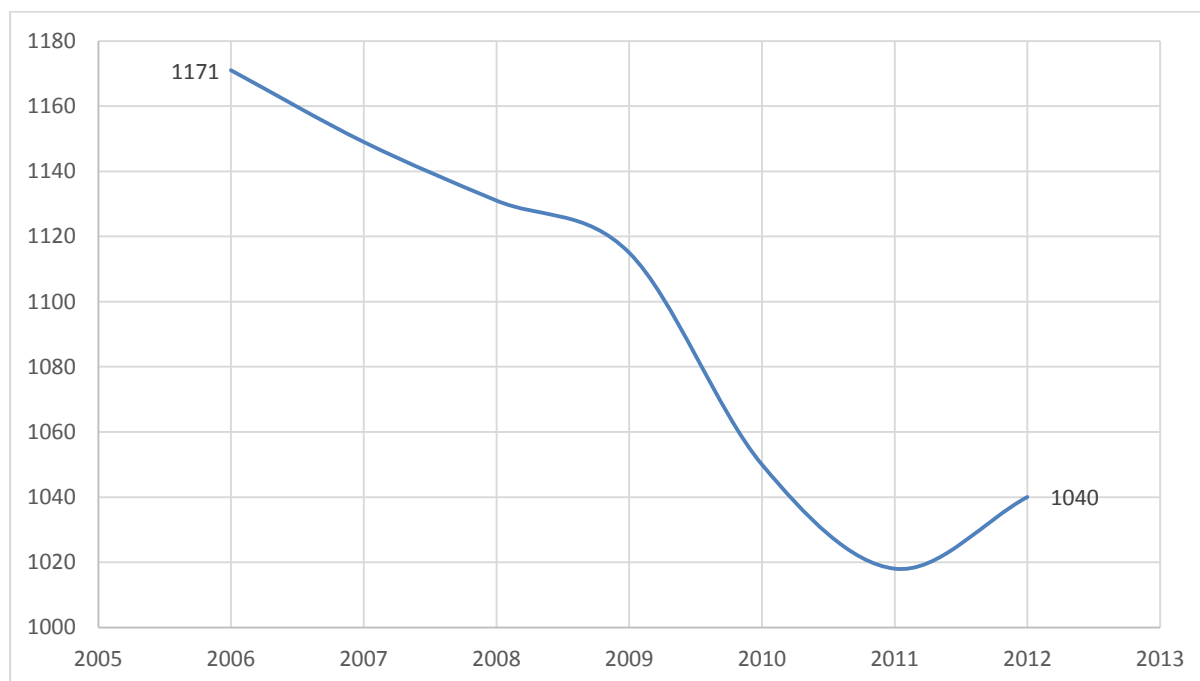
Total collisions were down in 2012, returning to similar levels seen in 2010. Such decline can be mainly attributed to the decline in collisions with animals. Iarnród Éireann continues to improve those systems protecting incursions to its railway, but there are many other factors out of its control which can cause animals to come into contact with rolling stock. The overall trend for animal collisions continues to be downward.

Obstacle collisions are down to 6 in 2012. This number is returning to a more normal trend from the low of 1 in 2010. Incidences include hitting trees and metal debris on the line.

There were two instances of Rolling Stock and motor vehicles colliding. Level crossings continue to be a major risk area for Ireland's Railway Network, and it is where such collision instances mainly occur. One incident occurred in Co. Clare where a tractor came into contact with a train bound for Galway. Damage was sustained to both vehicles and it has been investigated by the Railway Accident Investigation Unit. The other incident occurred at Cappadine crossing on the Ballybrophy – Limerick line. The collision caused the motor vehicle to overturn on impact. The driver of the motor vehicle sustained injury. IÉ conducted an investigation, which was monitored by the RSC.

3.1.2.2 Level Crossings

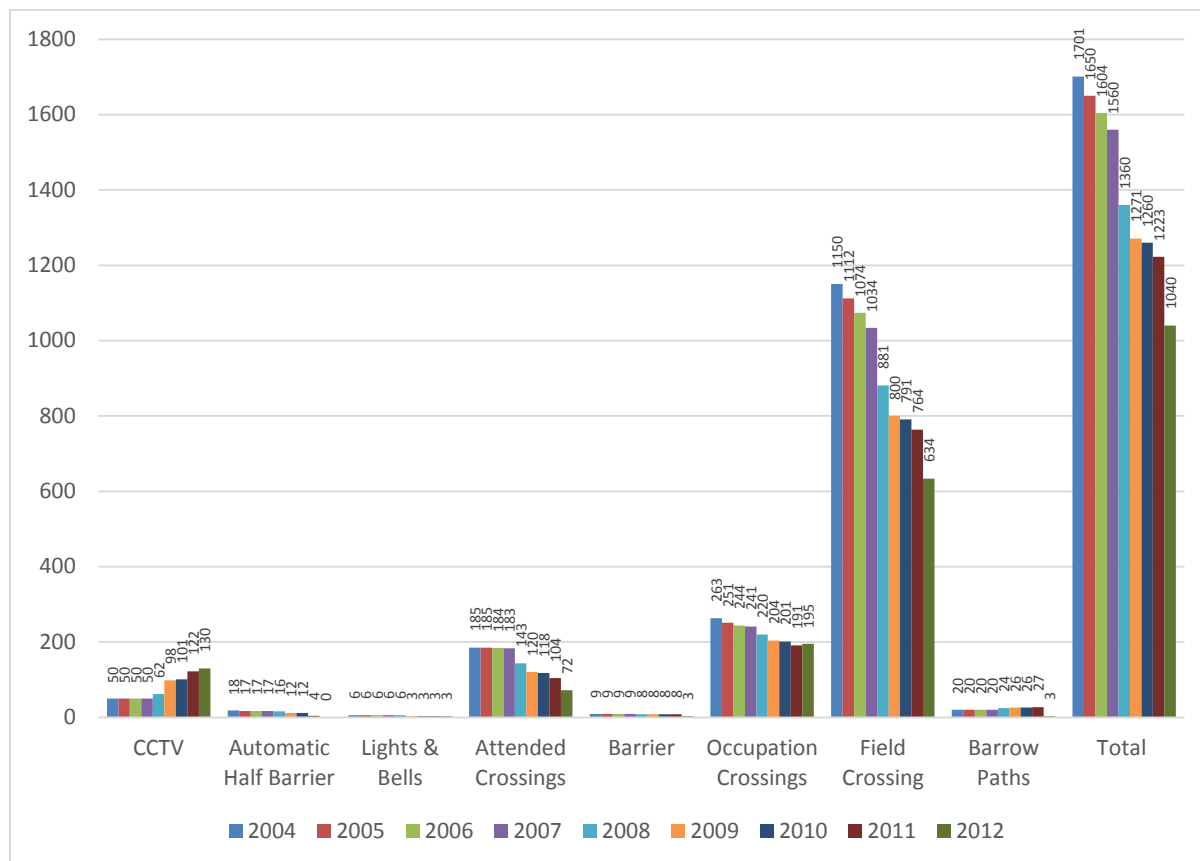
Level crossings are a significant risk to the railway and to any third parties who use them. The RSC has changed its approach slightly for the 2012 Statistics Report when counting their number in Ireland. Previously, total numbers of level crossings were counted rather than those which were active, that is to say the number would have included level crossings which were present on closed or dormant lines. This year it has been decided to count level crossings which are present on active lines only, as these are the crossings which present risk to users.



Graph 3-7: Number of level crossings by type by year

The reader might note an upward trend from 2011 to 2012. The number of registered level crossings increased due to the separate classification of pedestrian-only crossing points at certain manned level crossings and the regularisation of a small number of unofficial crossing points on well-established rights of way. The graph also demonstrates the long term trend of level crossing elimination. Sustained efforts by Iarnród Éireann and other parties have contributed greatly to reducing the risk presented by level crossings.

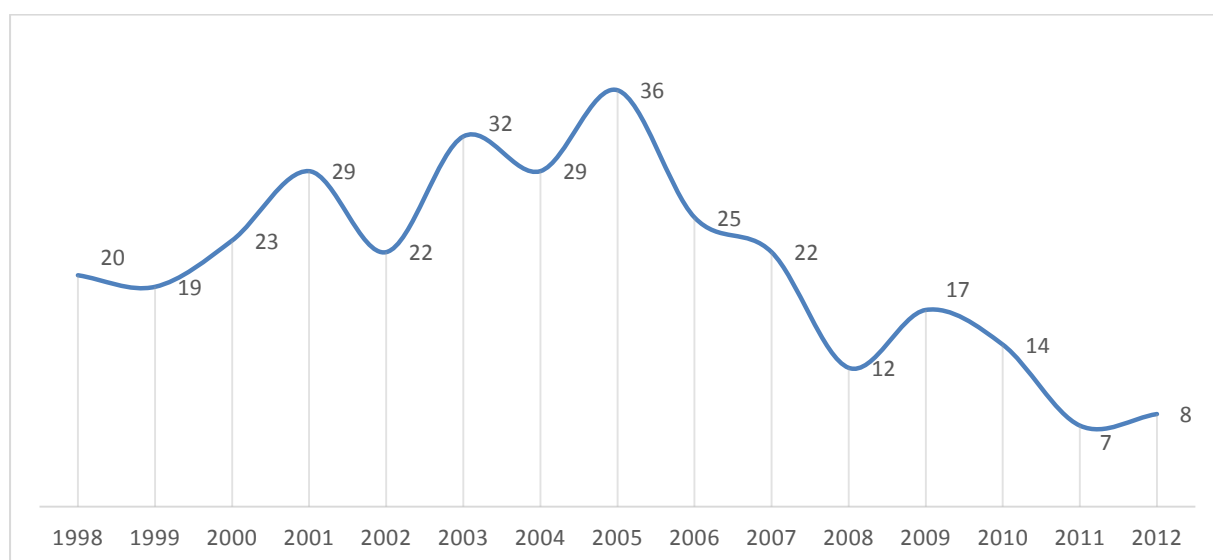
The breakdown of level crossings by type and year, in Ireland, is shown in Graph 3-8. Level crossing, on public roads, that require the road user to manually open and close gates remain the highest risk type of level crossing closely followed by 'Field type' level crossings. Further investment in this area will see a continued fall in the number of these types of crossing with a positive safety benefit.



Graph 3-8 Level Crossings by type in Ireland, 2004 - 2012

3.1.2.3 Signals Passed at Danger (SPAD)

A SPAD is defined as having occurred when a train passes a stop (red) signal. SPADs are particular precursor events that the RSC monitors regularly during its supervisory meetings with IÉ. The trend in recent years shows a steady decline.



Graph 3-9: Main (running) signal passed at danger where warning was given in time, by year

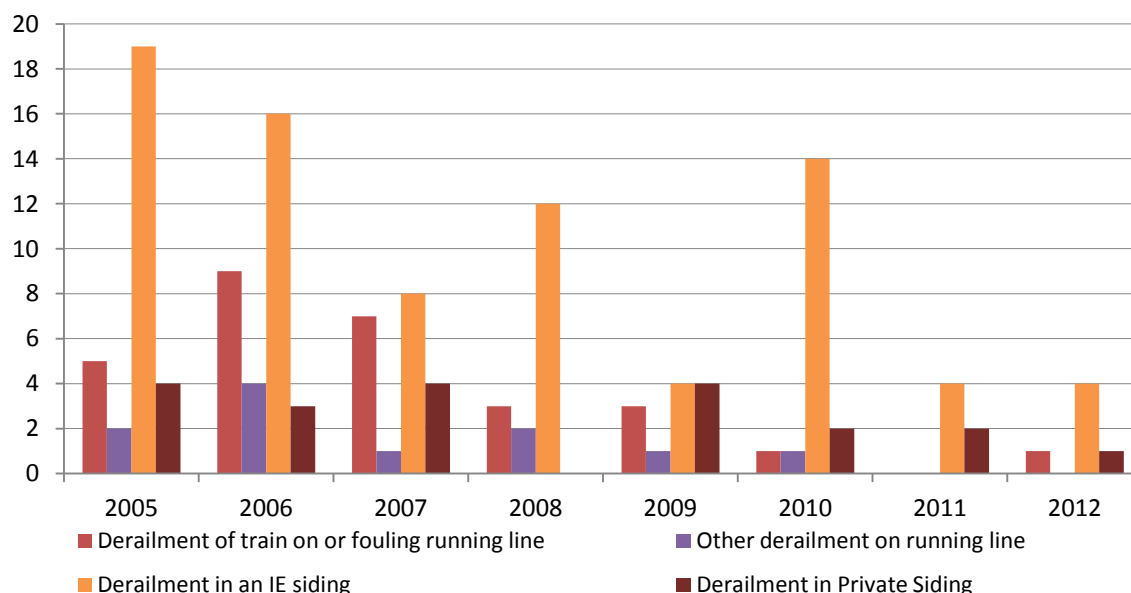
In 2012, there were a total of 8 SPADs on running lines, i.e., not including those that occurred in sidings or depots. IÉ use a ranking tool to determine whether each SPAD had the potential to cause an accident. A significant amount of information relating to each SPAD is collated. Using this information, IÉ determine a weighted numeric score for each occurrence and the score dictates the level of internal investigation. SPADs are grouped into one of 3 severity bands, i.e.,

- ⇒ those classified as not a significant risk
- ⇒ those classified as potentially significant; and
- ⇒ those classified as potentially severe.

Of the 8 SPADs in 2012, none were categorised as high risk. Regardless of severity, all SPADs are investigated by IÉ to determine if there are lessons to be learnt and in such cases where a SPAD occurs where there is sufficient warning, train drivers are placed under additional surveillance.

3.1.2.4 Train Derailment

Train derailments remain at low levels. Continued track and rolling stock maintenance, in conjunction with targeted renewals of track, should ensure that this type of incident rarely occurs.



Graph 3-10: Train Derailments by year

One derailment on the running line occurred in 2012 in Bray, Co. Wicklow. An empty (no passengers on board) commuter train at Bray was travelling towards a siding when a set of hand points¹ failed to operate correctly. The points were originally set for a siding, but as the train passed over, the points malfunctioned and sent half of the train consist towards a different siding, resulting in derailment. There were no injuries but damage was observed to infrastructure and to the rolling stock.

3.1.3 Iarnród Éireann Rolling Stock Incidents

Iarnród Éireann operates several different fleets in provision of rail services. These include:

- Intercity Diesel Multiple Unit (22000 class)
- Diesel Multiple Unit (29000, 2800, 2700, 2600 classes)
- Electrical Multiple Unit (8100, 8200, 8500 classes)
- Locomotives (201, 071 classes)
- Passenger Carriages (Mark IV)
- Freight wagons
- Yellow Plant (Track Maintenance Fleet)

There are a number of key safety statistics pertaining to rolling stock and they are:

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

¹ 'Points' or 'switches' are a rail mechanism for diverting a train from one track to another and can be operated remotely by the train signalling system or by hand.



Graph 3-11: Rolling Stock Incidents by year

The number of rolling stock incidents declined in 2012. Iarnród Éireann, with support from the Irish government, made significant investments in its fleet since 2000. It is normal when introducing new fleets to experience some reliability issues, and then as the fleet ages to see the reliability improve. Performance of the various fleets for 2012 is following a somewhat expected trend, following various problems associated with various fleet introductions in 2007.

One notable incident in 2012 involved an out of service train dividing in running whilst travelling on the north side of Dublin. The incident was investigated by the RSC. A root cause was determined and steps were taken by Iarnród Éireann to minimise the risk of such an incident reoccurring.

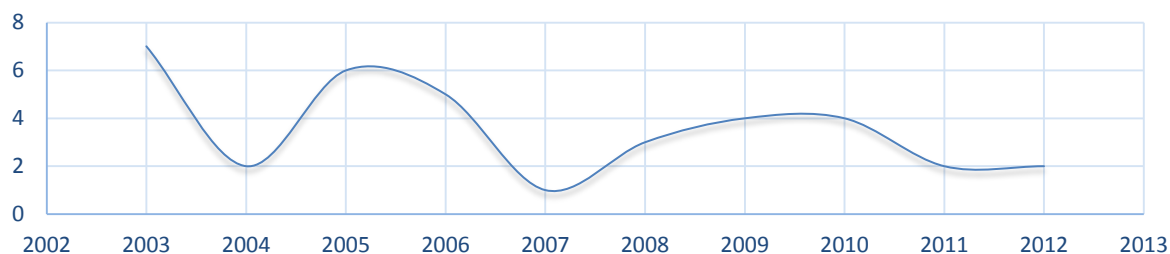
3.1.4 Iarnród Éireann Infrastructure Incidents

IE have many thousands of infrastructure assets including track, stations, bridges, culverts, tunnels, level crossings, buildings, cuttings and embankments, points and crossings, signals etc. all of which must be inspected and maintained at varying prescribed frequencies. Invariably assets will fail from time to time and data relating to some of these is now presented in the Sections 3.1.4.1 and 3.1.4.2.

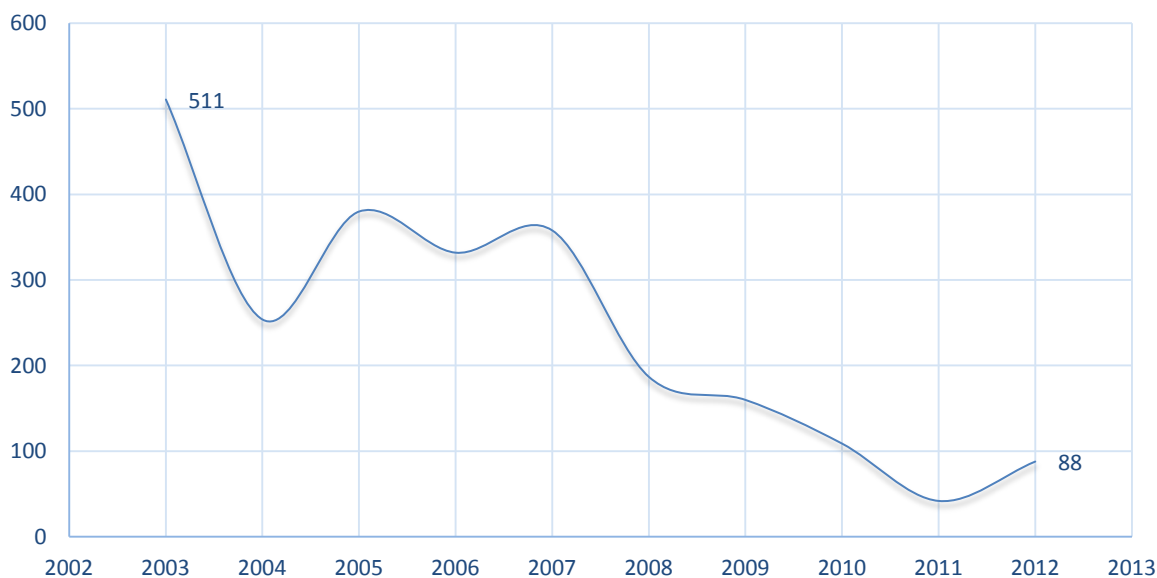
3.1.4.1 Broken Rails and Fishplates

The network extent is 1683 route-km or 2165 track-km, 27% of which is multiple track (double, triple or quadruple).

Iarnród Éireann visually inspects the track at least once per week and rails are ultrasonically tested at least every 2 years, with the vast majority including the main lines being tested annually. The number of broken rails on passenger lines in 2012 stayed steady at 2. Whilst neither resulted in a train accident, it is an area where IÉ will need to be vigilant. The RSC closely monitors Iarnród Éireann's management of its assets through regular supervision meetings. The trend for 'Cracked' or 'Broken Fishplates' is broadly similar to recent years.



Graph 3-12 Broken Rails, by year

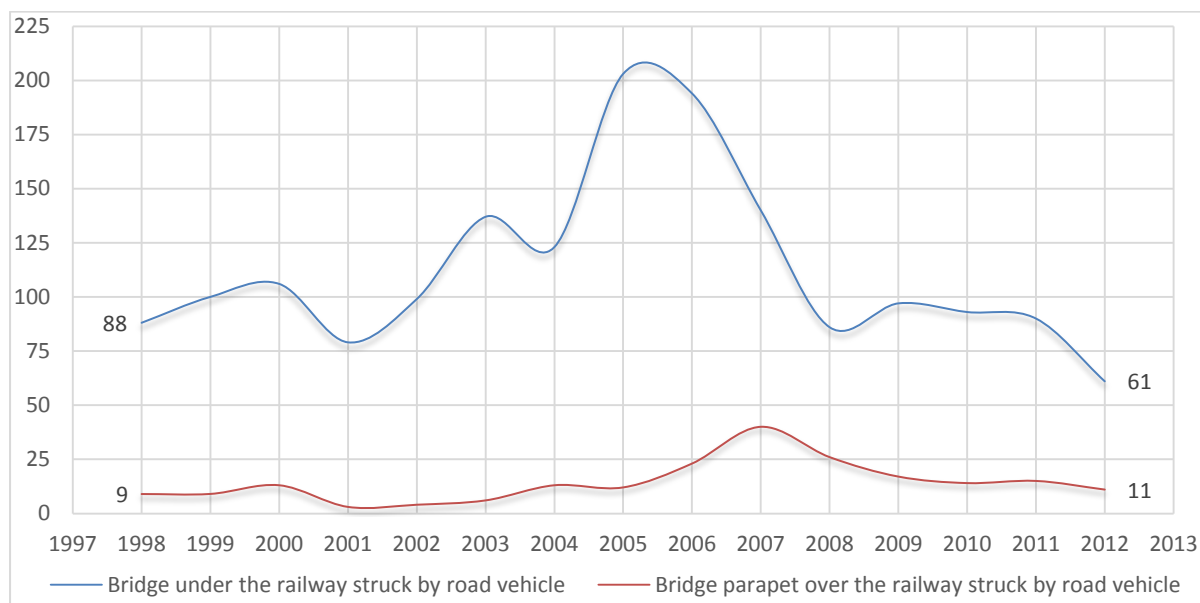


Graph 3-13 Cracked or Broken Fishplates on the IÉ network, by year

3.1.4.2 Bridge Strikes

A railway bridge may be a road over the railway or it may carry the railway over a road. A bridge strike is therefore where a road vehicle strikes the parapet or roadside containment of a bridge over the railway or where a road vehicle strikes the underside of a railway bridge. Both types can, in certain circumstances, result in very severe consequences and road users

should be mindful of their driving in the vicinity of the railway and, if driving an oversized vehicle, road vehicle drivers should know their vehicle height.



Graph 3-14: Railway Bridges struck by road vehicles

The total number of bridge strikes, i.e., under-bridge and over-bridge, in 2012 were down to 72 compared to 107 in 2011. This is the lowest number since 2001. Focusing on the 61 under-line bridge strikes in 2012, the following headline figures are worthy of note;

- 10 bridges were hit by road vehicles more than once
- The 10 bridges accounted for almost 50% of the total number bridge strikes in 2012
- 5 of these bridges are located in Dublin City Centre
- 15 bridge strikes resulted in disruption to DART services

These 10 ‘bad-actor’ bridges are:

- UBC218, Loughmore Bridge, Templemore – 3 Strikes
- UBE120, Georges St, Gort – 2 Strikes
- UBL154, Carrick on Suir – 5 Strikes
- UBLL44A, Liffey Viaduct / Custom's House Quay, Dublin – 4 Strikes
- UBLL38, Amiens Street, Dublin – 4 Strikes
- UBR54, Upper Erne Street, Dublin – 3 Strikes
- UBR56, Macken Street, Dublin – 2 Strikes
- UBR59, Barrow Street, Dublin – 2 Strikes
- UBW68, Pollerton Road, Carlow – 2 Strikes
- UBR280, Gorey at Old N11 – 2 Strikes

IE have introduced new procedures which includes the issuance of remits to investigate any type of technical issue, such as a bridge strike, that happens on the railway. The objective of such an investigation is to try and ascertain root causes, and identify where lessons can be learnt. Such investigations can contribute to devising new methods to prevent future bridge strikes.

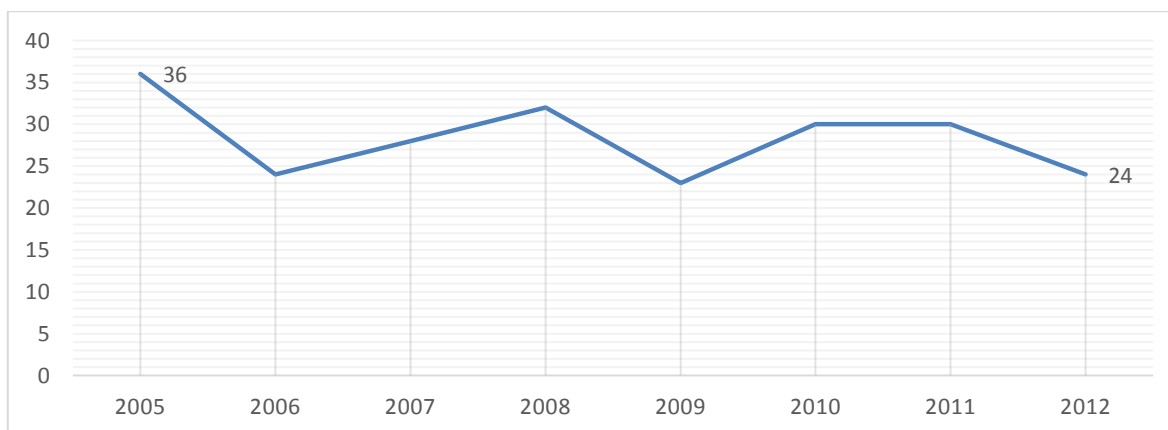
3.2 Transdev (Luas) Statistics

Transdev have been operating the Luas since it commenced operation in June 2004. The total tram-kilometres (km) run in 2012 was 3.99 million, a 3% increase on 2011 tram-kilometres. Passenger journeys for 2012 increased by 0.98% to 29.32 million journeys. There were no new extensions or services offered in 2012, explaining the relative stability in the numbers year on year.

3.2.1 Road Traffic Accidents

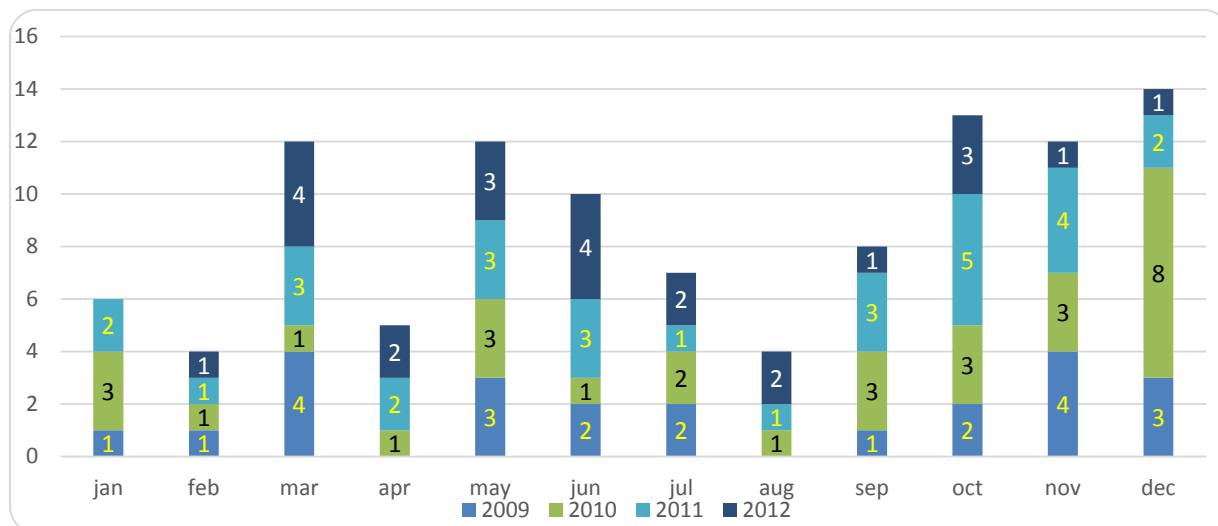
The Luas by its very design interfaces with the public and road traffic along significant sections of its alignment, most notably in the city centre. The Luas operates mainly by 'line of sight' and is no different in its operation to the majority of light rail systems around the world. However, given that the Luas shares sections of the carriageway with road vehicles, road traffic accidents (RTA) can and do occur. The number of road traffic accidents has reduced from 30 in 2011 to 24 in 2012.

Many of these have occurred at junctions where road vehicles and the tram meet; 6 occurrences happened in shared running sections, typically in the city centre. 3 accidents occurred at non signalled junctions whilst 15 occurred at traffic signalled junctions. There was no junction with more than one RTA in 2012.



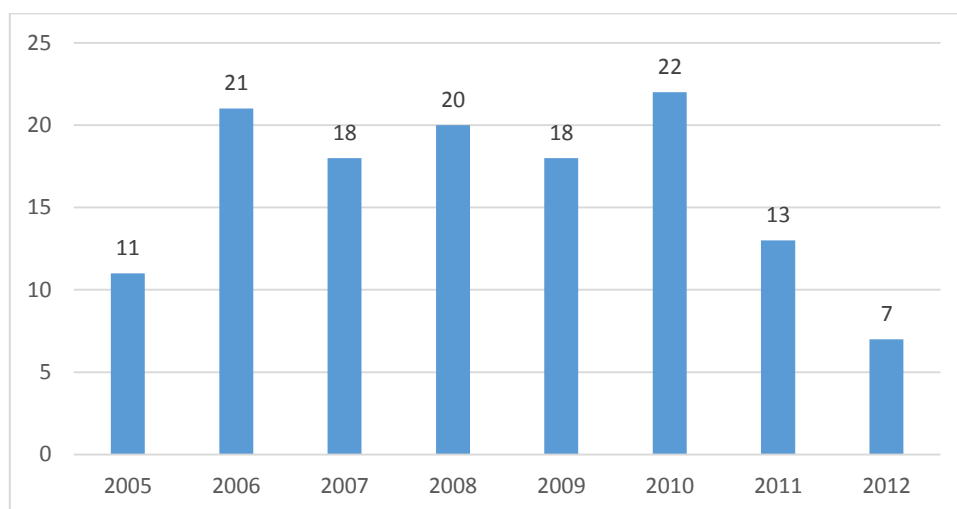
Graph 3-15: Number of Road Traffic Accidents involving a tram, by year

Bow Street Junction, which was the location of 3 RTA's in 2011 and 1 in 2012 is cause for some concern as a clear trend is evident. The Tram Operator is working with various state agencies to monitor traffic at the junction and improve its management.



Graph 3-16: 2012 RTA Occurrence by Month

3.2.2 Tram / Pedestrian Contact



Graph 3-17: Tram/Pedestrian coming into contact

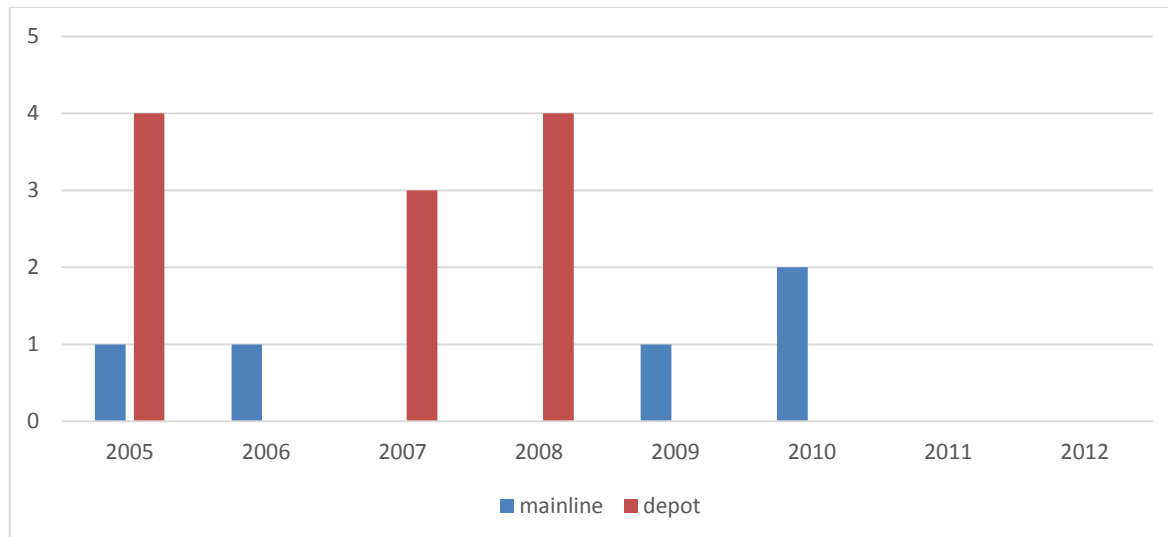
As with RTAs, a significant majority of contact incidents between trams and pedestrians occur in and around Dublin city centre. The Luas Red Line in particular operates through 41 signalled junctions which are at grade. Such junctions carry a higher risk of the tram coming into contact with pedestrians. 7 occurred in 2012, which is down from 13 in 2011. One of these resulted in the death of a pedestrian at the Blackhorse stop.

Year	Total number of tram-pedestrian contact incidents	Taken to hospital	Confirmed serious injury	Fatality
2005	11	6	0	0
2006	21	5	0	0
2007	18	7	2	0
2008	20	3	2	1
2009	18	1	0	0
2010	22	5	3	0
2011	13	2	1	1
2012	7	0	0	1

Table 3-2: Number of Injuries following RTA/contact with person

3.2.3 Tram Derailments

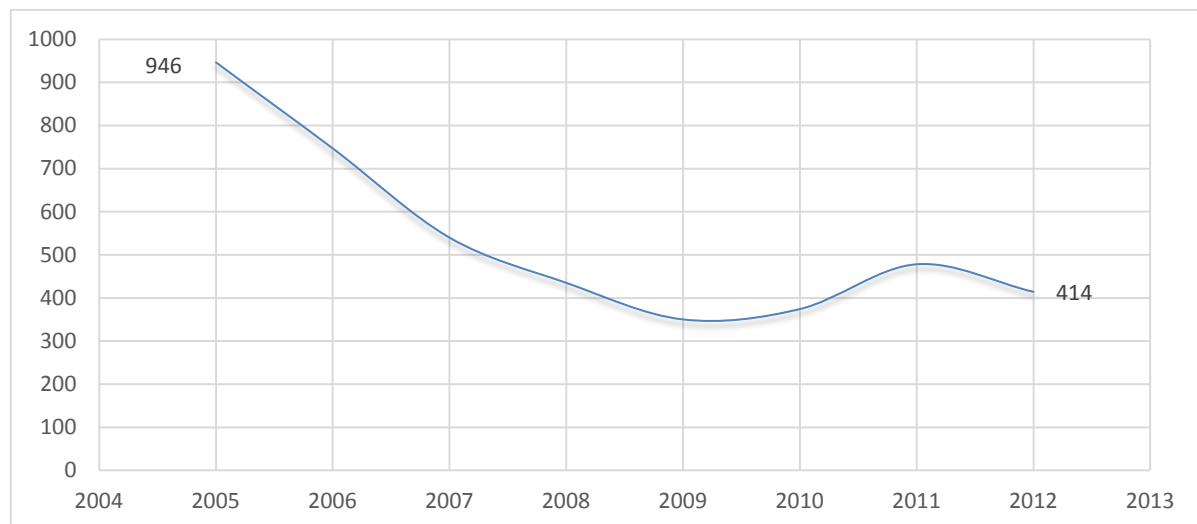
No derailments were reported in 2012.



Graph 3-18: Tram Derailments

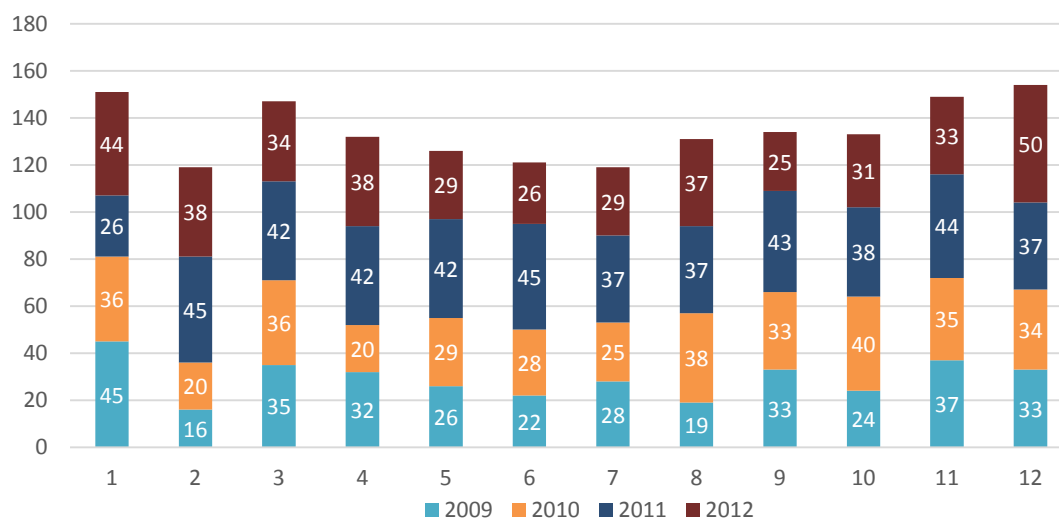
3.2.4 Tram Emergency Brake Applications

A useful precursor event indicator is the number of Emergency Brake (EB) applications which tram drivers make. In addition to its standard brakes, a tram is fitted with an electromagnetic track brake. Tram drivers are trained in defensive driving techniques and are constantly vigilant of pedestrians, cyclists and road vehicles. However, there are occasions when a driver may need to apply the EB to prevent a collision.



Graph 3-19: Emergency Brake Applications

There were 414 EB applications made in 2012 representing a 13.5% decrease on 2011 figures, but still represents an increase from 2009 and 2010. Operator analysis of this long term increase indicates EB's are linked to new or changed items on the system such as new drivers and new infrastructure. Graph 3-17 below shows that when EB applications are normalised per 100,000 km travelled, it can be seen that most applications occur in months 1, 3, 11 and 12 (January, March, November and December)



Graph 3-20 Number of EB per 100 000 kilometre travelled per month

3.3 Bord Na Móna Industrial Railway Statistics

The remit of the RSC in terms of its oversight of Bord Na Móna's (BNM) industrial railway is limited to where it interfaces with public roads. These interfaces are at level crossings and where there are bridges over the industrial railway. In terms of key infrastructure statistics there is 570 km of permanent track, 98 level crossings and 50 underpasses, of which 47 are under roads and 3 are under Iarnród Éireann rail lines.

There were no reported incidents of injury or infrastructure incidents in 2012.

3.4 Heritage Railways

A heritage railway is defined in legislation as *'a person who only operates train services or railway infrastructure of historical or touristic interest.'* The RSC monitor the operations of 8 self-contained heritage railways. They are;

- Cavan and Leitrim Railway
- Diffin Light railway, Oakfield, Raphoe
- Finntown & Glenties Railway
- Listowel Lartigue Monorail
- Irish Steam Preservation Society Stradbally
- Tralee & Dingle Railway
- Waterford & Suir Valley Railway
- West Clare Railway

There was one reported incident in 2012. A train de-railed as it was transporting passengers around its railway system. No major damage was sustained and no injuries were incurred.

3.4.1 Railway Preservation Society of Ireland (RPSI)

In addition to the above operations the RPSI operate steam and diesel hauled trains on the main Iarnród Éireann infrastructure. Because of the nature of its activities, which can import risk to the main railway network, the RPSI is classified as a Railway Undertaking (RU). As an RU it has received safety certification based on the acceptability of its Safety Management System, compliance with which is supervised by the RSC. There were no reported incidents of injury in 2012.

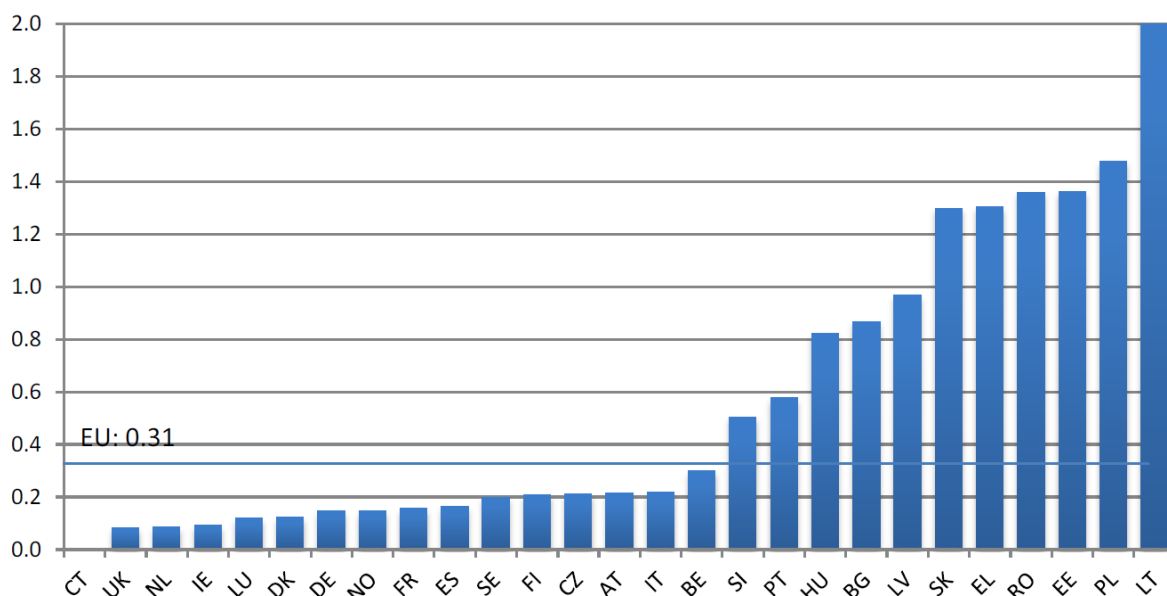
4. Railway Safety Trends in Europe



In European terms, the RSC is defined as the National Safety Authority (NSA) for rail in Ireland. Each European member state has an NSA which, in accordance with the Railway Safety Directive (2004/49/EC), must send its annual report on railway safety to the European Railway Agency (ERA). The ERA in turn analyses railway safety on a European scale and publishes its report. ERA reports do not take into account light rail (Luas) or metro systems. The ERA produces a biennial report, the most recent being published in 2013. Some noteworthy statistics from a European perspective are now presented from this analysis. 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 the ERA and is available at <http://www.era.europa.eu/>.

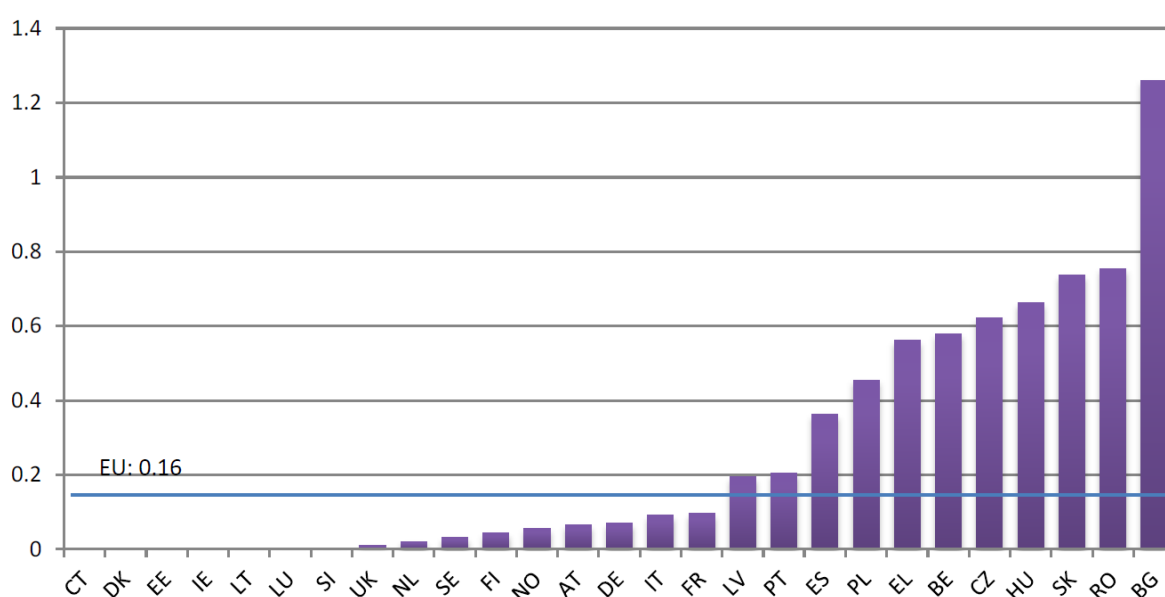
4.1 Key European Statistics

Ireland’s railway safety continues to compare favourably with other European states. Sustained investment in the 1990’s and 2000’s in all facets of the network improved the risk profile of the Irish Network. It can be seen in Graph 4-1 that Ireland ranks amongst the lowest when considering fatality risk, well below the EU average.



Graph 4-1 Fatality risk on EU railways: Fatalities per million train-km (2009-2011)

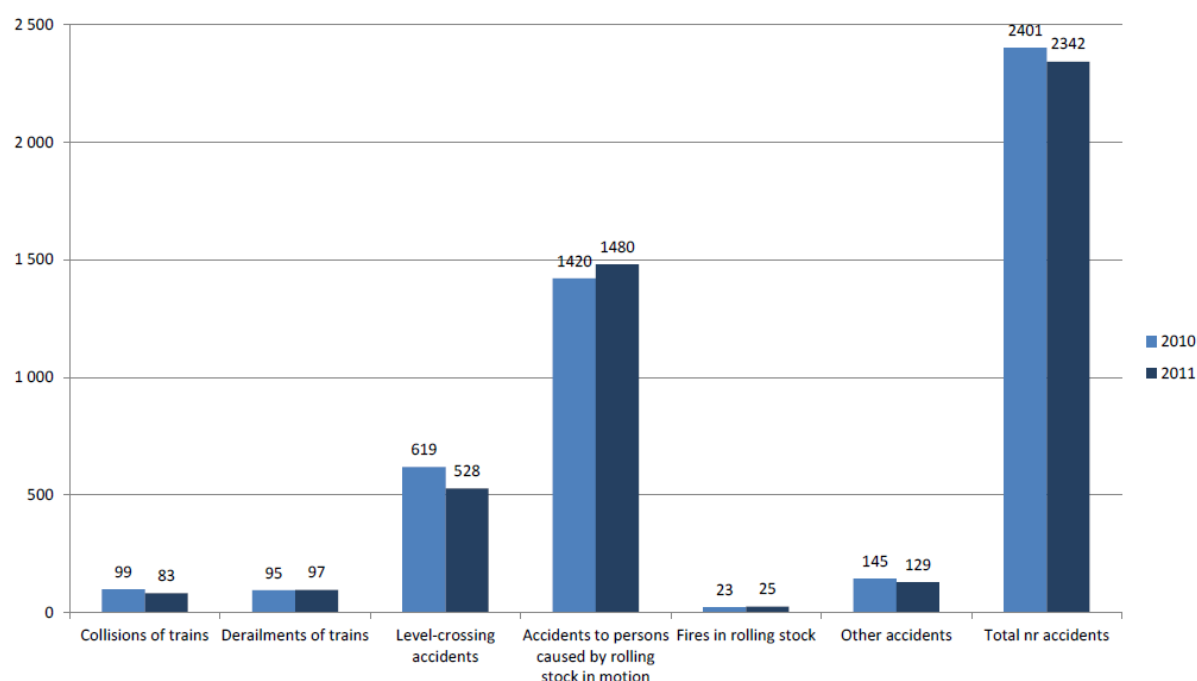
Another benchmark of the level of risk of national railway systems is to look at the fatality risk of passengers expressed in terms of passenger fatalities per passenger kilometres. Ireland has not recorded a passenger fatality in the period 2006-2011, thus the passenger fatality risk is zero.



Graph 4-2 Passenger fatality risk: Passenger fatalities per billion passenger kilometres (2006-2011)

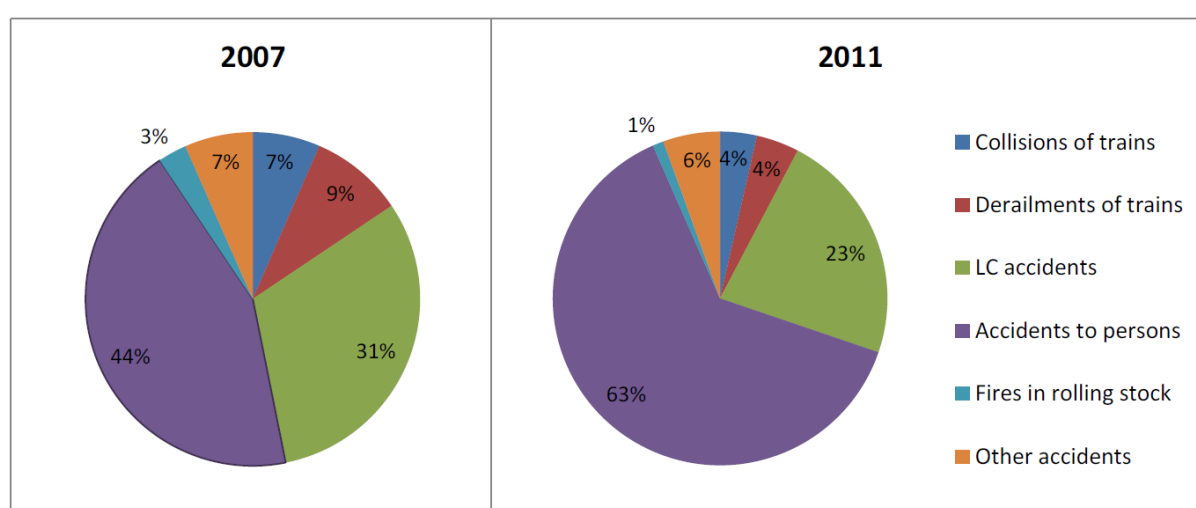
Around 2,400 significant accidents occur each year on the railways of the EU Member States. Accidents to persons caused by rolling stock in motion and level-crossing accidents constitute more than three quarters of the total number of accidents, excluding suicides. The number of significant accidents per accident type in the period 2010–2011 is shown in Graph 4-3.

A wide range of accidents, not included within the specific types of accidents, are included in the category of other accidents. The 129 cases reported in 2011 include collisions and derailments of shunting rolling stock/maintenance machines, dangerous goods released during transport, objects projected by the running train, and electrocution in connection with the rolling stock in motion; the category other accidents is the third largest group of accidents.



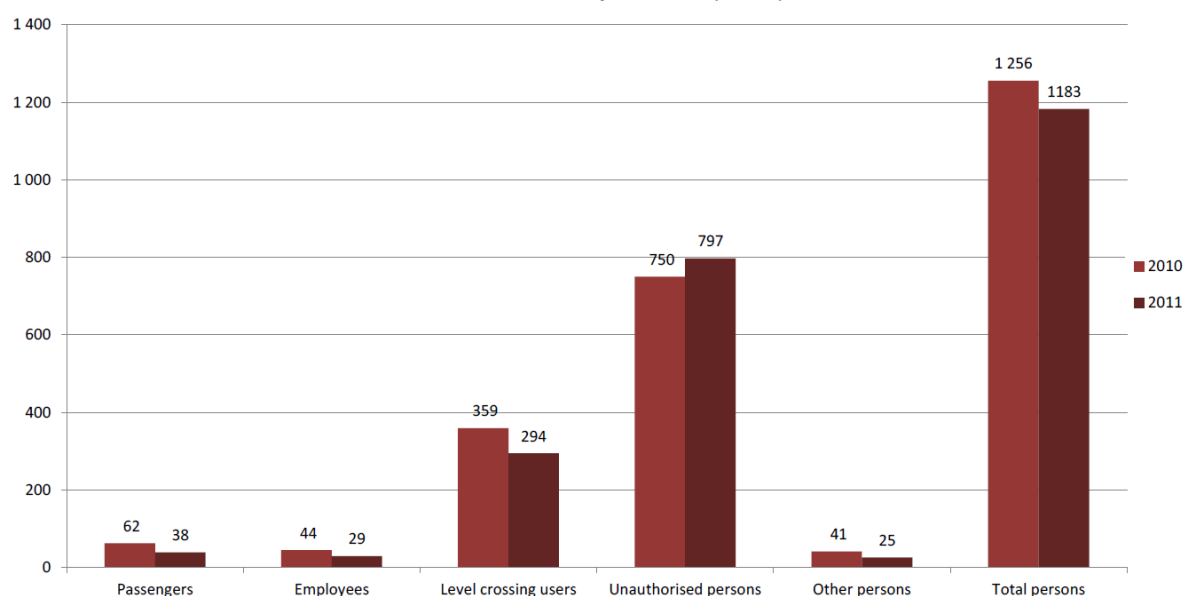
Graph 4-3 Reported number of significant accidents per accident category (2010–2011)

In 2012, the number of collisions and relevant outcomes was reported by type for the first time to the ERA on a voluntary basis. Among 83 collisions reported in 2011, only 11 were train collisions with other trains, the remaining 72 collisions involved a train hitting an obstacle in its path. The number of casualties per collision type follows a similar pattern, with on average 1 person killed and 6 seriously injured in train collisions with other trains and 50 people killed and seriously injured in collisions with an obstacle.

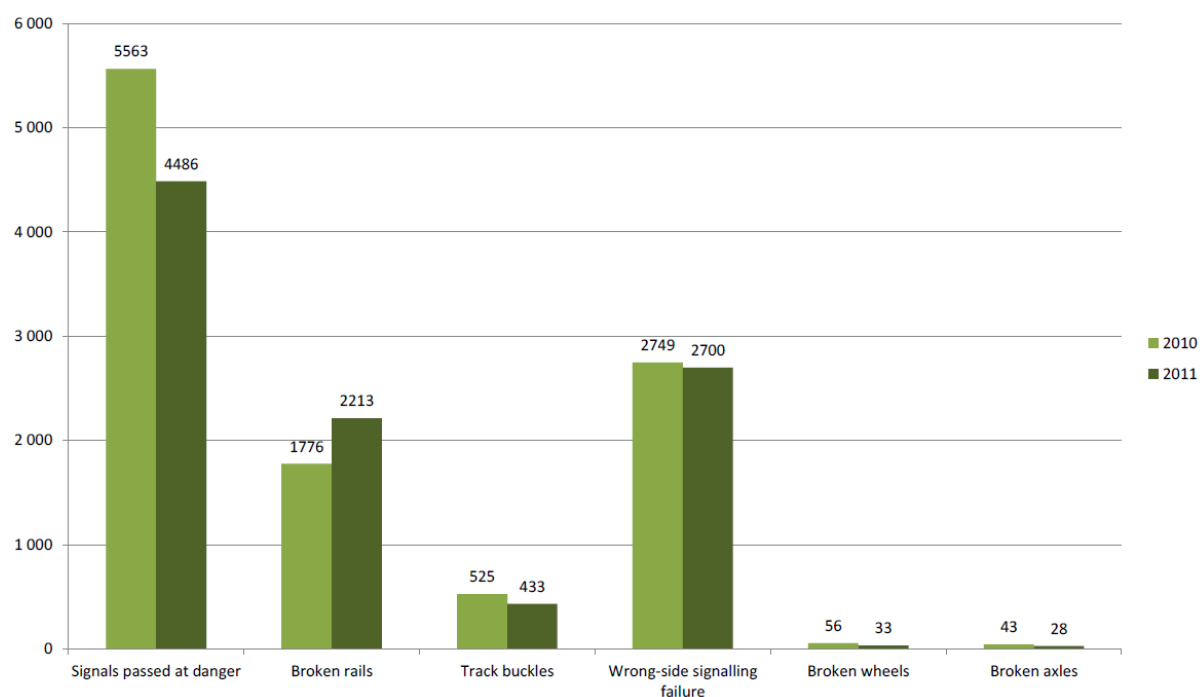


Graph 4-4 Reported number of significant accidents per accident category (2007 and 2011)

Level Crossings are a major risk area for European Railways with significant impacts on victims and railway operation. 25 % of railway fatalities are attributed to having occurred at such locations. In the road sector this equates to 1.1 % of road-user fatalities occurring at these intersections. Level crossing safety might therefore be perceived as a marginal problem by the road sector, but imperative to railways.



Graph 4-5 Number of fatalities per victim category (2010–2011)

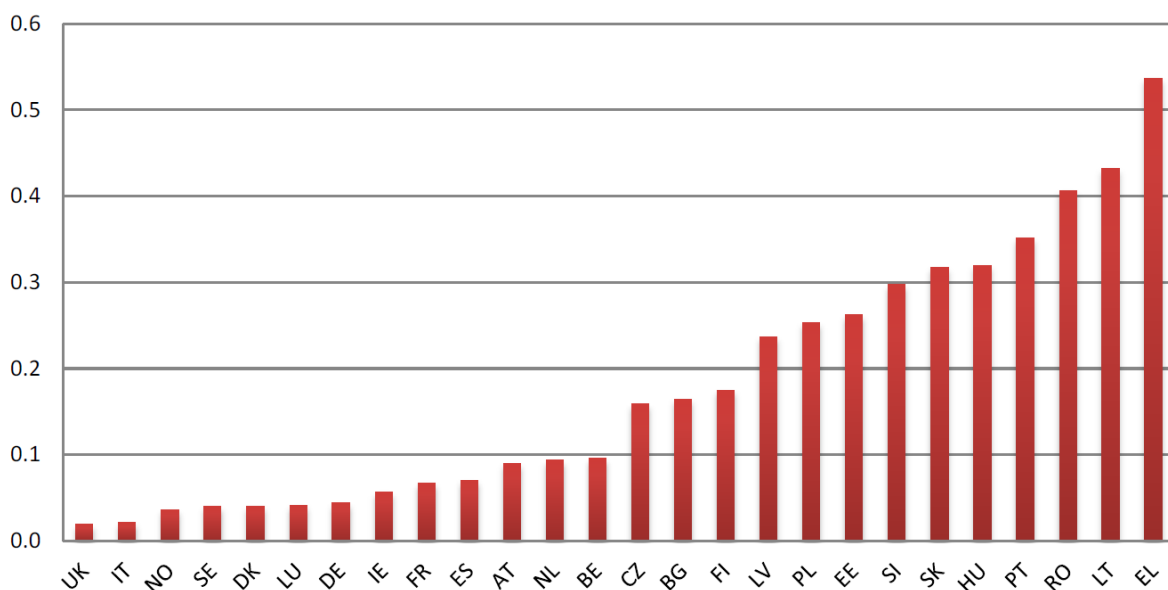


Graph 4-6 Reported number of precursors in 2010-2011 (EU-27 countries and Norway)

As accidents on railways are a relatively rare occurrence, the monitoring of less serious events occurring on railways is an essential tool of a proactive Safety Management System. ‘Precursors to accidents’ are indicators of incidents that under other circumstances could have led to an accident. Over the period 2010–11, EU countries reported as many as 20,650 precursors to accidents; this is a ratio of more than four precursors to one significant accident. See Graph 4-6 above, for further detail.

The fatality risk at level crossings in EU countries was estimated for the period 2009-2011 and the countries were ranked in Graph 4-7. The difference in risk between the countries with the smallest fatality risk at level crossings (United Kingdom with 19 deaths per billion train km) and the country with the highest level of risk (Greece with 537 deaths per billion train km) is huge, there is a 28 fold difference in the estimated risk of fatality at level crossings. The variance in risk remains significant, even if we disregard the 10th percentiles of countries with highest and lowest risk levels.

Due to Ireland’s extensive use of Level Crossings, performance in this metric is not as strong as in others. The estimation of trends in accidents and other outcomes for EU countries reveals that while the number of significant accidents on level crossings has been decreasing at a steady pace since 2006 (by 15 per cent per year on average), the number of casualties (fatalities and serious injuries taken together) was almost constant. At the same time, casualties on railways have been decreasing by about 4 % per year, on average.



Graph 4-7 Fatality risk at level crossings: Level crossing fatalities per million train-km (2009-2011)

As a mode of transport, Railways continue to be an extremely safe way to travel. 2012 data shows little change from previous years.

Transport Mode by User	Fatalities per Billion Passenger km
Airline Passenger	0.101
Railway Passenger	0.156
Car Occupant	4.450
Bus/Coach Occupant	0.433
Powered Two-wheelers	52.593
Vessels Passenger	n/a

Table 4-1 Fatality risk of passenger using different mode of transport (EU-27 in 2008-2010)

4.2 Major Accidents in other EU Member States

A number of major incidents occurred in 2012 in other EU countries and below is a brief synopsis of two of these.

Poland

At approximately 20:57, 3 March 2012, two passenger trains collided head-on near the town of Szczekociny, Silesian Voivodeship, Poland. 16 people were killed in the incident and a further 58 injured. One train was travelling north from Przemyśl to Warsaw, the other was travelling south from Warsaw to Kraków. During this time, scheduled engineering works were underway on the track at Szczekociny railway station. The investigation, conducted by the Polish Ministry for Transport, revealed a number of causes which led to the collision. An immediate cause of the incident was the failure of traffic controllers near the affected track section to send the southbound train on the correct line. Further causes included different traffic controllers directing the northbound train onto the same track, when that section showed it was occupied. These Traffic Controllers assumed the system was malfunctioning. Furthermore, operational staff on board the train failed to heed conflicting signals.

Netherlands

On 21 April 2012 a train collision occurred in Amsterdam, where a Commuter and an Intercity Train collided head on. About 190 passengers sustained injury, 4 of which were deemed to be serious. One passenger died the following day as a result of injuries sustained. The Dutch Safety Board conducted an investigation in to the incident and reached some conclusions as to causes of the incident. The immediate cause was deemed to be the driver of

the commuter service misinterpreting a red signal due to a distraction occurring on the line. Other circumstances also contributed, including the presence of engineering works which changed operation for both services. Also, when the commuter service passed the signal at danger, traffic control and safety systems did not provide action or warning that an incident had occurred. Various other authorities have yet to report on their investigations.

United Kingdom

At 16:32 hrs on 2 May 2012, a cyclist who was using the footpath and bridleway level crossing at Kings Mill, near Mansfield in Nottinghamshire, was struck and fatally injured by a passenger train travelling at about 56 miles per hour (90 kilometres per hour). The cyclist rode over the crossing into the path of the train.

An investigation by the Rail Accident Investigation Branch concluded the cyclist was unaware of the train's approach, probably because he had not looked towards it after passing through the gate protecting the crossing and he was wearing earphones, which probably prevented him from hearing warnings sounded by the train's horn.



5. Accident Investigations

The Railway Accident Investigation Unit (RAIU) is a functionally independent organisation which shares some of the administrative resources of the RSC. 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 Railway Safety Act 2005 as amended by S.I. 61 of 2008 and European Railway Safety Directive 2004/49/EC.

5.1 RAIU Active Investigations

In 2012, the RAIU initiated 3 investigations. The investigations initiated in 2012 are listed in table 5-1. The RAIU have or will in due course, issue reports on these incidents and may make recommendations that the RSC will oversee the implementation of.

Date of Incident	Details	Duty Holder
27 th February 2012	Possession irregularities in Irish Rail - Trend Investigation	IE
6 th March 2012	Fog signal activation in DART driving cab	IE
20 th June 2012	Tractor struck train at level crossing XE020, County Clare	IE

Table 5-1: RAIU investigations initiated in 2012

5.2 RAIU Investigation Reports

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 2012, the RAIU published 3 investigation reports which are listed in table 5-2. As a result of their investigations the RAIU made a total of 13 safety recommendations which are discussed in section 5.3.

Date Report Published	Title of Report	No. of recommendations made	Duty Holder
08 th February (2012-R001)	Car Strike at Morrough Level Crossing, XG173, 14 th February 2011	4	IÉ
19 th Sept. (2012-R002)	Runaway locomotive at Portlaoise Loop on the 29 th September 2011	4	IÉ
28 th Sept. (2012-R003)	Investigation Report into a Bearing Failure on Loco 233, Connolly Station, 18th October 2011 13 th May 2010	5	IÉ

Table 5-2: RAIU Investigation Reports published in 2012

5.3 RAIU Safety Recommendations

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 recommendations and as previously stated, 13 were made in 2012. In accordance with the Railway Safety Directive the RAIU should address recommendations to the safety authority (the RSC) 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 shall 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 RSC categorise the status of recommendations as being either 'Open', 'Complete' or 'Closed'. These are defined as follows;

- | | |
|--------------------|--|
| Open (In progress) | - Feedback from implementer is awaited or actions have not yet been completed. |
| Complete | - Implementer has advised that it has taken measures to effect the recommendation and the RSC is considering whether to close the recommendation. |
| Closed | - Implementer has advised that it has taken measures to effect the recommendation and the RSC is satisfied that the work has been completed and has closed the recommendation. |

What follows is a summary of the actions taken in relation to the three RAIU Investigation Reports published in 2012 where recommendations were made, and the status of each recommendation.

2012-R001 - Car Strike at Morrough Level Crossing, XG173, County Galway, 14th February 2011
Summary:

At approximately 12:00 on Monday 14th February a waste collection vehicle crew, who regularly used the Morrough level crossing (XG173) to collect waste from the private residence, Morrough House, opened the gates of the level crossing and passed over the level crossing. The crew left the level crossing gates open while they collected waste, a task that usually took only a few minutes. At approximately 12:13 a Volkswagen Bora car approached the level crossing with the gates still open. The car slowly drove onto the level crossing. At approximately the same time, the 09:30 passenger service from Heuston to Galway approached the level crossing. On seeing the car, the train driver sounded the horn twice and applied the emergency brake. The train struck the car as the car's driver was attempting to reverse off the level crossing. Both occupants of the car were treated for their injuries at the local hospital and released later the same day.

Number of recommendations made

4

Recommendation 1

IÉ should review the suitability of the signage at user worked crossings on public and private roads, ensuring that human factors issues are identified and addressed.

 Action/s taken /
in progress

Human Factor issues currently being assessed by Iarnród Eireann

Status

Open

Recommendation 2

IÉ should liaise with local authorities where private road level crossings can be accessed from a public road to ensure there is advance warning to road users.

 Action/s taken /
in progress

N/A

Status

Open

Recommendation 3

IÉ should ensure that they adopt their own standards in relation to design changes to any PEIO that has the potential to affect safety.

Action/s taken / in

Briefing has been issued to Engineering Safety Review Group

progress	
Status	Complete
Recommendation 4	The RSC should ensure that they adopt a formal approach to submissions made by IÉ in relation to design changes to any PEIO that has the potential to affect safety.
Action/s taken / in progress	The RSC have considered this and are of the opinion that the existing processes in place are sufficient and propose taking no further action.
Status	Closed

2012-R002 - Runaway locomotive at Portlaoise Loop 29th September 2011**Summary:**

On the morning of the 29th September 2011 a Train Driver was rostered to drive a locomotive around Portlaoise Rail Depot to carry out preparatory works for a planned possession. He collected a locomotive from Limerick Junction and travelled to Portlaoise without incident. As part of his manoeuvre into Portlaoise Rail Depot he was required to change driving cab, disembark the locomotive and set the route, at a set of points, into Portlaoise Rail Depot. While setting the route the Train Driver saw the locomotive rolling away from him, down the gradient, towards Portlaoise Station. The locomotive travelled approximately 306 metres from its stationary position, passing a signal at danger, running over a set of points and striking the buffer stop in the former Bay Platform road at Portlaoise Station, before continuing to travel another 9 m approximately until finally coming to a stop. There were no passengers or other crew members on the locomotive and nobody was injured as a result of the occurrence. There was no damage to the locomotive or buffer stop as a result of the accident.

Number of recommendations made		4
Recommendation 1	IE should review their VMIs for locomotives to ensure that there are adequate braking tests at appropriate intervals.	
Action/s taken / in progress	Exams have been reviewed and the leakage test has been reinstated	
Status	Complete	
Recommendation 2	IE should adopt a quality control system for the introduction of new maintenance procedures for locomotives.	
Action/s taken / in progress	CME_TMS_316 "Engineering Change Request" has been introduced.	
Status	Complete	
Recommendation 3	IE should review their system for introducing new train drivers' manuals, to ensure that train drivers are fully trained and assessed in all aspects of these manuals.	
Action/s taken / in progress	N/A	
Status	Open	

Recommendation 4	IE should review their competency management system for train drivers to ensure that all driving tasks are routinely assessed.
Action/s taken / in progress	N/A
Status	Open

2012-R003 - Bearing failure on a train at Connolly Station, 18th October 2011**Summary:**

At 17:45 on the 18th October 2011, the 16:10 service from Belfast to Dublin passed a Hot Axlebox Detector near Drogheda triggering an alarm on the Sligo and Northern Signalman's panel in Centralised Traffic Control. The Sligo and Northern Signalman advised the Suburban Signalman of the alarm, who then contacted the Train Driver to request that the train be stopped and inspected. The Train Driver inspected all of the axle boxes on the train and found no issues. The train was then allowed to continue its journey to Connolly Station. When the train arrived at Connolly Station it was inspected by a member of maintenance staff, one of the axle boxes on the locomotive was found to be red hot and smoking. An axle journal bearing on the locomotive, which was positioned at the rear of the train, had failed.

Number of recommendations made

5

Recommendation 1

IE should put in place provisions to assist train drivers with the task of identifying if there is a fault present with an axlebox.

Action/s taken /
in progress

Exams have been reviewed and the leakage test has been reinstated.

Status

Open

Recommendation 2

IE should ensure the competency management system for signalmen includes the assessment of HABD related functions they perform.

Action/s taken /
in progress

N/A

Status

Open

Recommendation 3

IE should put in place formal procedures governing the role of FTS staff in relation to HABDs.

Action/s taken /
in progress

CME-TMS-001-002 FTS call out procedure drafted

Status

Open

Recommendation 4

IE should ensure that a robust system is put in place for the competency

	assessment of safety critical rolling stock maintenance staff.
Action/s taken / in progress	A system is in place for competency assessment of safety critical rolling stock maintenance staff. To address this deficiency in the application of the process in this instance the following actions have been taken; All supervisors in the bogie shop, wheel shop and FCR have been re-briefed on CME-SMS-004. The individual staff member was assessed against the task and is now deemed competent to fit cartridge journal bearings. A competence management plan has been implemented in the wheel shop and the bogie shop.
Status	Complete
Recommendation 5	IE should update its competency management system for train drivers to include assessment of their competency in relation to their tasks following a HABD alarm.
Action/s taken / in progress	N/A
Status	Open

5.3.1 RAIU Recommendations Summary

Table 7 below confirms the current status of all RAIU recommendations made by year up to and including 31st December 2012.

Year	No. of Reports	No. Of Recommendations			
		Open	Complete	Closed	Total
2006*	1	1	3	10	14
2007	0	0	0	0	0
2008	1	1	2	4	7
2009	5	2	2	9	13
2010	6	8	9	9	26
2011	6	9	8	0	17
2012	3	8	4	1	13
Totals	22	29	28	33	90
Total Recommendations made to date					90

Table 5-3: RAIU Recommendations Summary

*RSC Recommendations made prior to establishment of RAIU

6 References

6.1 Documents

RSC (2012), “Annual Report”, Railway Safety Commission, Dublin.

(ERA, 2012), “Intermediate report on the development of railway safety in the European Union”, European Railway Agency, Valenciennes