RSC
Railway Safety Commission

Railway Safety Performance 2014

21st October 2015

Report Notice

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Foreword

The safety performance of our principal railway operators in 2014 was, on the whole, encouraging with many key performance indicators seeing improvements on 2013.

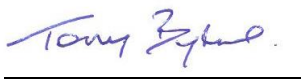
As in previous years there were no passenger fatalities, however, sadly there were 6 fatalities on our railways, 4 being as a result of apparent self-harm, 1 being the accidental death of an intending passenger at Killester Station and 1 the accidental death of person who tried to retrieve some personal items that had fallen onto the track at Sallins station.

Level crossing (LC) accidents remain a cause for concern with 2 serious accidents occurring in 2014, both in Co. Mayo, Corraun LC and Knockaphunta LC. Fortunately neither resulted in a fatality. Both these level crossings are user worked, i.e., where the road user is expected to open and close the gates themselves. There were many similarities in both accidents in that the road vehicles approached the level crossings, did not stop as they should have done, and drove onto the Level Crossing into the path of a train. Also worthy of note is that in both cases the same contributory factor was identified, i.e., the gates at the level crossings were left open by the previous user, which is a road traffic offence.

The number of signals passed at danger (SPAD) occurrences, an indicator of particular interest to the Railway Safety Commission (RSC) given their potential for a serious accident, fell in 2014 having previously doubled in 2013. The reduction in this precursor indicator is welcomed.

Statistical data for Iarnród Éireann (IÉ), Balfour Beatty Rail Ireland (BBRI) who are a track maintainer for IÉ and Transdev, the operator of the LUAS network, is, in the main, positive and broadly in line with previous years. However, given there are still many constraints, placed upon the Railway System, most notably on its finances, continued vigilance and diligence is needed to ensure we all continuously improve,

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 hope that you will find this report informative and interesting.



Anthony Byrne

Principal Inspector – Supervision & Enforcement

Executive Summary

This is the sixth separately published annual safety statistical report of the Railway Safety Commission (RSC). It has been prepared for the general public in line with Section 10 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 organisations, including Iarnród Éireann, Transdev (Luas Operator), Balfour Beatty Rail Ireland (BBRI), Bord Na Móna where their railway interfaces with public roads, the Railway Preservation Society of Ireland and a number of smaller heritage railways and the authorisation of projects undertaken by the Railway Procurement Agency (RPA).

The safety performance of Iarnród Éireann, BBRI 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, from third parties interfacing with the railway continues to be an issue.

There were no passenger fatalities or serious injuries in 2014. However, 6 people lost their lives due to unauthorised entry onto the railway. There were no reports of level crossing deaths this year, but one serious was reported at crossing in Mayo, where a commercial road vehicle collided with a train.

Passenger injuries showed a small increase in 2014, with no discernible trend detected. Employee injuries increased also, with a significant rise noted in relation to psychological trauma experienced after following incidents. ‘Other Obstacle’ collisions, which excludes infrastructure and animal collisions, are at 29 for 2014, which is a large increase from 7 in 2013. Analysis from the railway operator indicates this is attributable to adverse effects from storms experienced in certain locations during the early part of 2014.

A significant increase in Signals Passed At Danger (SPAD) was detected in 2013, with reports more than doubling in 2013 to 18. This has improved in 2014 with a total of 10 SPADs reported to the RSC. It is still down considerably from a peak of 36 in 2005/06. Of the mainline SPADs reported for 2014, 5 were categorised as Low Risk and 3 as medium risk. The trend is being monitored as part of specific supervision activities by the RSC and at time of writing, is the subject of a trend Investigation by the Railway Accident Investigation Unit. Iarnród Éireann is also developing a unique hybrid train protection system that seeks to overlay, and eventually replace, the current train control system and enhance safety through increased supervision of train movement.

Under Regulation (EU) No.1158/2010 Parts A and B, Safety Certificates covering the operation of on track machines (OTMs) over the Iarnród Éireann network were issued to Balfour Beatty Rail Ireland Limited (BBRI) on 24th February 2014, and they are classified as a Railway Undertaking (RU) under this system. BBRI operate and maintain OTMs for Iarnród Éireann Infrastructure Management. They reported one derailment and one SPAD in 2014.

LUAS safety performance in 2014 was broadly consistent with previous years, apart from a notable increase Road Traffic Accidents (RTAs). The number of road traffic accidents has stayed at a relatively high level first seen in 2013; 37 incidents occurred during 2014, vs. 38 in the previous calendar year. Reasons for this increase are varied. Queen Street continues to be the site of the largest number RTAs with 6 in 2014. Two other junctions are noted to have 3 RTAs (Church Street and Belgard) each, with two others noted as having 2 RTAs each. A long running project to install digital imaging equipment to capture evidence of automobile drivers failing to stop at traffic signals is expected to be operational in early 2015. It is hoped this will have a similar effect to that of speed camera's used by Gardaí.

Further insight 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. Additional analysis is presented showing the installation of train protection systems in Europe, where it was noted Ireland's network has had no increase in percentage of track covered by ATP. Notable international railway incidents are also discussed.

In 2014 the RAIU published six reports into accidents and incidents that were formally investigated. These produced a total of 26 safety recommendations, which are detailed in Chapter 5.

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1. Introduction

1.1 Introduction

This is the sixth Annual Safety Performance report of the Railway Safety Commission (RSC), prepared for the general public in line with Section 10 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 and comment to a number of important safety performance indicators. Performance indicators are guided by the Common Safety Indicators (CSI), as specified in Directive 2004/49/EC and amended by Directive 149/2009/EC. Further indicators are included in this report to reflect unique aspects and risks particular to Irish Railways.

1.2 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 categories of train incidents are included. In Chapter 4, a high level comparison with other European railways shows where Iarnród Éireann (IÉ) are positioned in terms of railway safety. This includes a brief overview of significant accidents that have occurred in other countries in 2014. 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 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. 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"

The Railway Safety Act (as amended) 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 authorising safety management systems, new rolling stock and infrastructure, and monitoring the industry to ensure it is able to manage its safety 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.

1.4 Statistical Qualification

The RSC produces this report to enhance public access to information about safety performance of the various Irish railway organisations. The RSC's goal is to keep this information timely

and accurate. If errors are brought to the RSC's attention, every effort will be made to correct them.

This information is:

- of a general nature only
- not professional or legal advice

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.

It is the RSC goal to minimise any inconvenience caused by technical errors. However, some data or information in this report may have been created or structured in files or formats that are not error-free. The RSC accepts no responsibility with regard to such problems incurred as a result of using data from this report

2. Public Representations

2.1 Introduction

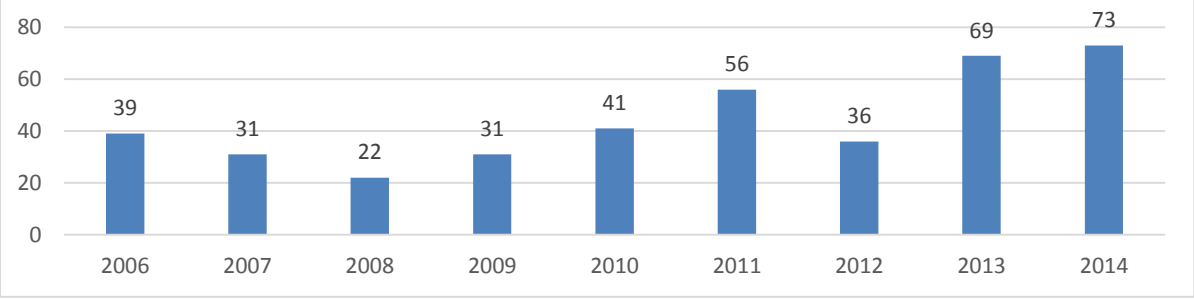
The RSC encourages the public, passengers, railway staff and others to bring any railway safety concerns to its attention. Facilities are available to communicate with the RSC by phone, post or via the RSC website (www.rsc.ie). The RSC also monitors media coverage of incidents related to railway safety. The input of all stakeholders in the railway, such as employees, passengers and the general public is valuable in the RSC's 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.

2.2 2014 Data and Commentary

In 2014, the RSC received 73 direct or indirect representations relating to a range of heavy and light rail infrastructural and operational matters, a small increase on the number received in 2013 (69). Of these, 69 representations related to Iarnród Éireann operations or infrastructure (60 in 2013), 3 pertained to the LUAS (Dublin Light Rail) system (8 in 2013) and 1 Balfour Beatty Rail Ireland (who are a railway undertaking carrying out movements on Iarnród Éireann infrastructure for the purpose of executing track maintenance tasks).

A number of the representations did give cause for concern and the RSC acted promptly to ensure that corrective action was taken by the relevant Railway Organisation. In some instances the Railway Organisation was required to take immediate action. It is RSC policy that all safety related concerns are investigated. Representations are continually tracked for re-occurrence and detection of trends. If either are observed, monitoring activities are increased to determine and address underlying causes.

The increase in public representations from 2013 to 2014 is slight in comparison to previous years (4 this year vs. 33 last year). The increase in 2013 was attributed to passenger safety concerns of overcrowding of services on the Iarnród Éireann network. Passengers continued to contact the RSC on this concern, but it is reduced by about 50% from 2013. Graph 2-2 contains further data describing a more detailed breakdown.

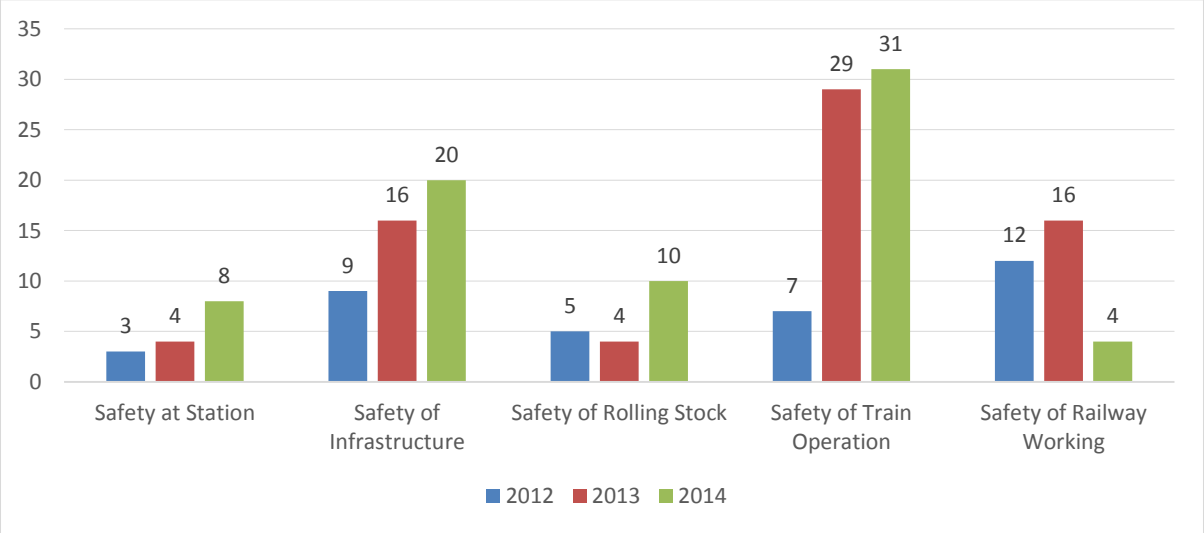


Graph 2-1 Public Representations to the RSC by year

Representations from 2014 were further analysed and broken down in to 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 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.

The distribution of the categories is shown in Graph 2-2. The number of representations remained similar to 2013, but their distribution has changed somewhat. Safety of railway working reports decreased significantly. It is not possible to ascribe changes in reporting to one particular reason, but railway organisations within the RSC's remit have been observed to enhance safety management by the introduction of 'Just Culture' initiatives and continued application and improvement of Safety Management Systems which combine to improve reporting. Safety of Infrastructure reports were noted to rise, where there was a notable increase in representations from railway employees. In such cases the RSC liaised with both the employee and employer to investigate the concern and resolve as appropriate.



Graph 2-2 RSC Public Representation by category, 2014

3. Railway Safety Trends in Ireland

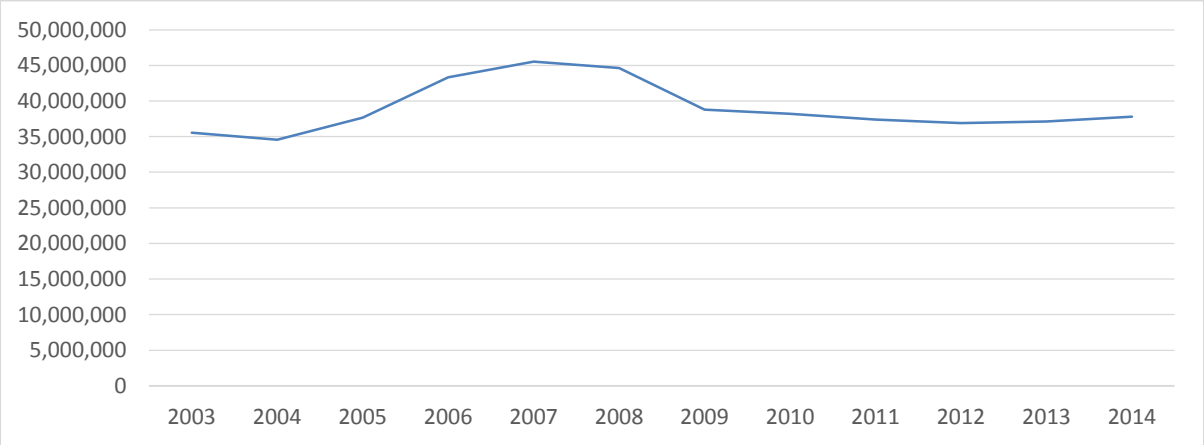
3.1 Introduction

The safety performance of the Railway Organisations in the Republic of Ireland is considered for the four principal railway sub-sectors that the RSC regulates, namely heavy rail, light rail, industrial rail systems which interface with the public highway, and heritage railways. Each railway organisation is obliged to report statistical data on railway operations and incidents to the RSC. This data is then used for assessing Railway Organisation safety performance and risk.

3.2 Iarnród Éireann

3.2.1 Operational Statistics

At year end, the IÉ network in service was 1683 route-kilometres, the same as in 2013. There were no significant changes to the network or to the operation of trains.

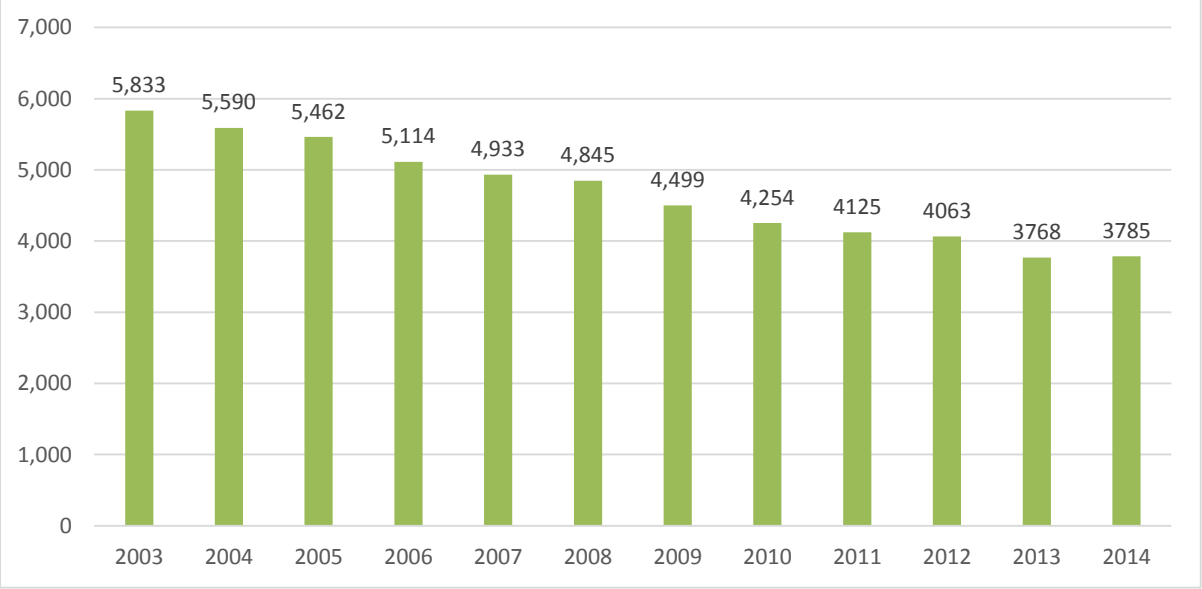


Graph 3-1Iarnród Éireann Passenger Journeys 2003 – 2014

Passenger Journeys are slightly up on the 2013 figure of 37,131,000, to 37,804,593 and have yet to return to the peaks experienced in 2006-2007 of ~ 45,000,000. It is notable, however, that a trend has now been established which demonstrates an increase in passenger journeys for the last three years. There is scope for this pattern to continue with several public transport projects such as Cork Kent Station Development, Phoenix Park Tunnel Passenger Services, the Iarnród Éireann hybrid train protection system and Luas Cross City in various stages of progress.

Graph 3-2 Train-km on the Iarnród Éireann Network 2003-2004

The long term trend for reduced freight movements is quite evident in Graph 3-2. A peak of about 5,000,000 train-km was reached in 2005 but this declined rapidly afterwards following strategic operational decisions which reduced freight traffic. At about this time, passenger-km soared and peaked in 2008. Iarnród Éireann is currently endeavouring to expand freight services following several years of decline in the previous decade, with some evidence from data indicating small growth.



Graph 3-3 Personnel Engaged in full time employment with Iarnród Éireann

Since 2008, in common with many Irish indigenous commercial organisations, Iarnród Éireann has decreased employee numbers significantly. Over a ten year period, numbers have declined by almost 2000, although 2014 figures indicate a small increase.

3.2.2 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 2014.

Category	2006	2007	2008	2009	2010	2011	2012	2013	2014	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	
Fatal injury to passenger due to a train accident at level crossing	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	
Fatal injury to passenger attempting to board or alight from train	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	0	1	1	0	2	0	0	0	0	
Fatal injury to third party at a level crossing not involving a train	0	0	0	0	0	0	0	0	0	
Railway operations: 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	
Fatal injury to employee due to train in motion (other than at a level crossing)	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	
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	
Fatal injury to employee due to train in motion (other than at a level crossing)	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	
Railway operations: fatal injuries to other persons										
Fatal injury due to train in motion not at level crossing	0	1	0	0	0	0	0	0	0	
Fatal injury to customer or visitor, no train involved	0	1	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	7	5	8	3	8	7	5	4	6	
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	2	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	
Injury to passenger attempting to board or alight from train	55	50	43	17	64	46	41	39	45	
Injury to passenger travelling on train, other than due to a railway accident	41	35	22	40	28	10	27	43	18	
Railway infrastructure: third party non fatal injuries										
Third party at level crossing injury involving a train	0	1	0	0	0	1	2	0	0	
Level crossing user injury not involving a train	0	1	1	1	0	2	5	1	0	
Railway infrastructure: non fatal injuries to other persons										
Injury to customer or visitor to premises	72	70	54	56	85	113	116	193	205	
Injuries to other persons including unauthorised persons	0	1	0	0	0	0	5	3	0	
Railway operations: non fatal employee injuries										
Employee lost time injury involving train movement or train accident	15	7	8	13	11	7	13	5	21	
Employee lost time injury while working on railway not due to train in motion	38	36	37	31	27	22	32	39	43	
Railway infrastructure: non fatal employee injuries										
Employee lost time injury involving train movement or train accident	0	1	1	0	1	2	1	0	0	
Employee lost time injury while working on railway not due to train in motion	31	42	42	34	30	23	32	41	25	
Employee lost time injury while working at level crossing not due to train in motion	2	4	0	0	0	0	1	1	2	
Entity in charge of maintenance and maintenance workshops: non fatal employee injuries										
Employee lost time injury involving train movement or train accident	0	0	0	1	0	0	0	0	0	
Employee lost time injury while working on railway not due to train in motion	30	36	27	21	10	18	10	14	18	

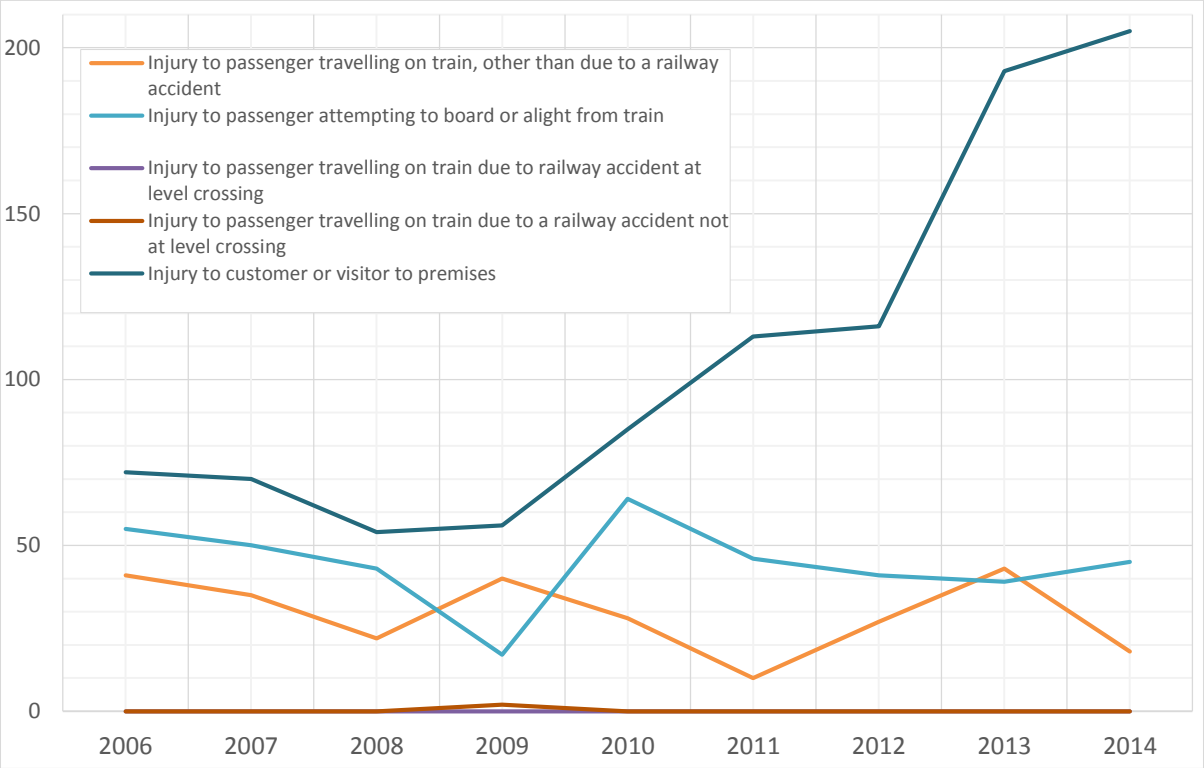
Table 3-1: IÉ Operational fatality and Injury Statistics by year

3.2.2.1 Fatal Injuries

In 2014 there were 6 fatal injuries on the railway, which is an increase on 2013 where 4 fatalities were reported. These incidents occurred at various locations around the railway network. The cause of 6 of these incidents emanated from trespass on the line. A further fatality occurred at a station due to natural causes, and is not considered for these statistics. The RSC uses a coroner's verdict, when available, to assist in classifying the circumstances surrounding a fatality.

3.2.2.2 Passenger Injuries

The data indicates that 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 3-4: Passenger Injury statistics by year

Similar to other years, injuries to customers or visitors to stations remain at a high level with slips, trips and falls being the dominant cause of these injuries. These incidents tend to be of a minor nature and are usually treated by first aid at the station. IÉ report usage of mobile phones

has been a factor in many incidents, where customer/visitor's attention is divided and therefore more prone to injury at stations.

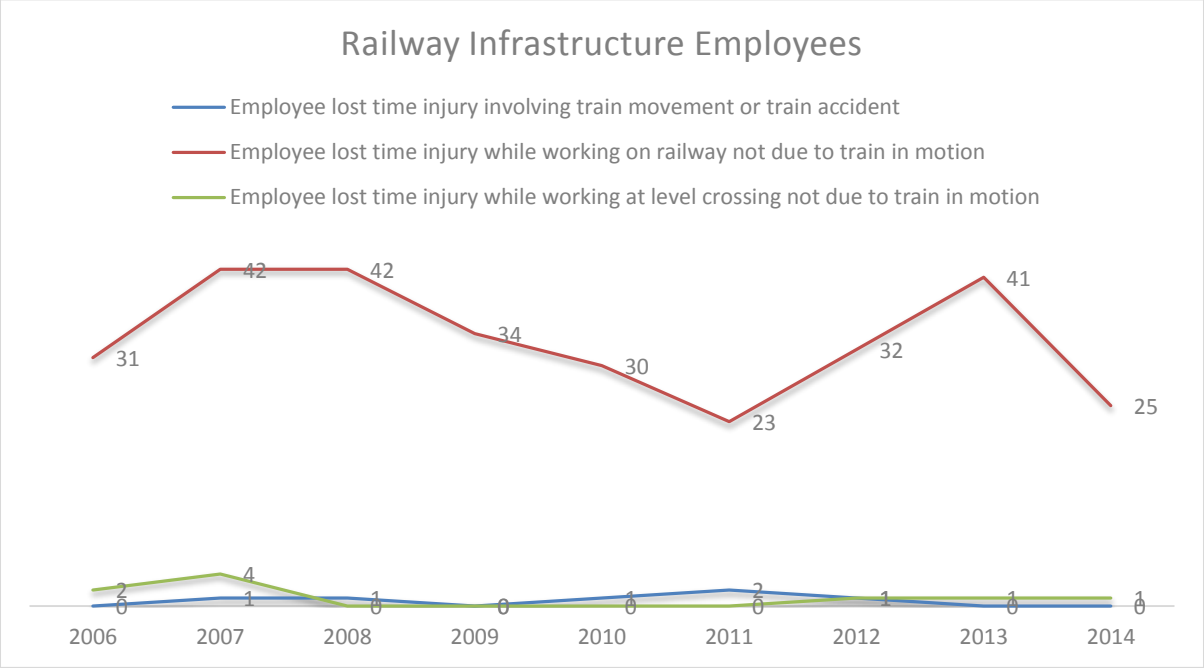
Injuries to passengers attempting to board or alight from trains has seen a small increase but remains a cause for concern owing to the high risk of significant injury from this type of incident. IÉ has undertaken much activity in this area in the form of an assessment of systems that prevent accidents. In addition, the RSC is undertaking a long term study on this type of incident.

3.2.2.3 Employee Injuries

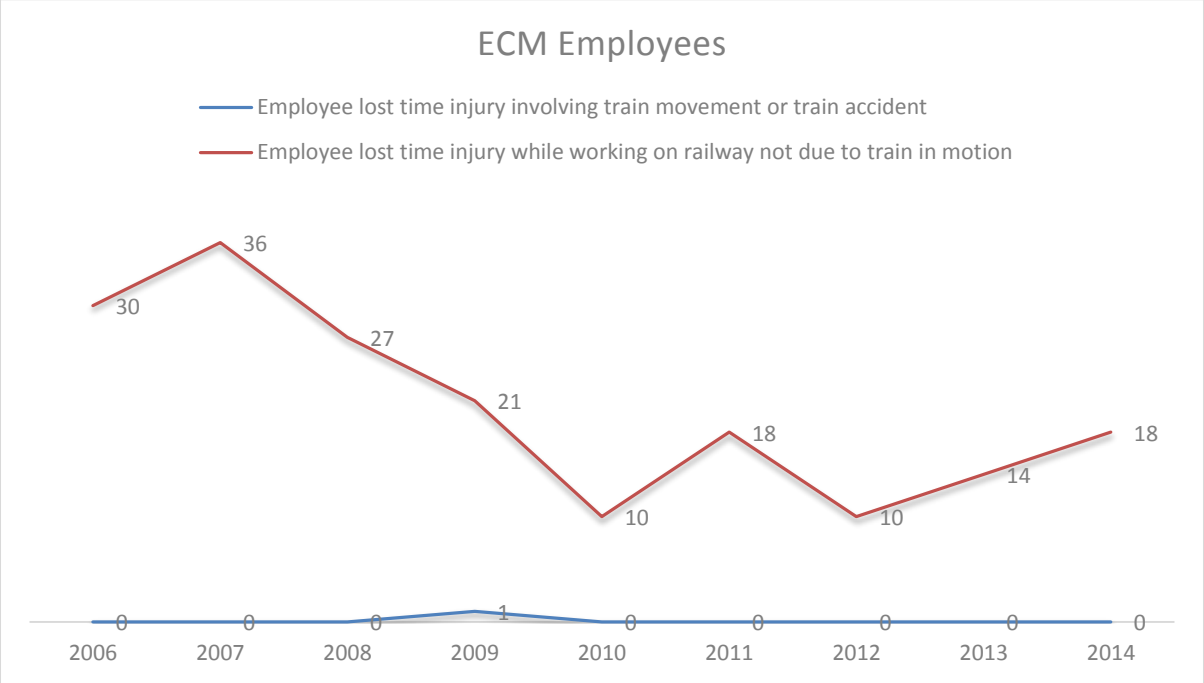
As in last year's report, employee injuries are categorised in the first instance by the sector of the railway system in which they work; Infrastructure, Railway Operations and Entity in Charge of Maintenance (ECM). During 2013, Iarnród Éireann achieved certification as an ECM. The ECM certificate is evidence that the ECM has established a maintenance system, as set out in European Regulation 445/2011, which ensures that the freight wagons for which it owns are safe to operate. Once issued, an ECM certificate is valid throughout the European Union. For more information, please see RSC Guideline RSC-G-027-A (www.rsc.ie). It is likely in the coming years that similar certification will be required for those who maintain passenger fleets.

Graph 3-5: Employee Injury statistics by year (Railway Operations)

The significant rise in Lost Time Incidents involving train movements is due to more staff reporting psychological trauma after serious accidents and fatalities. Increases to non-train movement incidents has been traced to improved reporting arrangements arising from further improvement of the Railway Organisation's Safety Management System.



Graph 3-6 Employee Injury statistics by year (Railway Infrastructure)



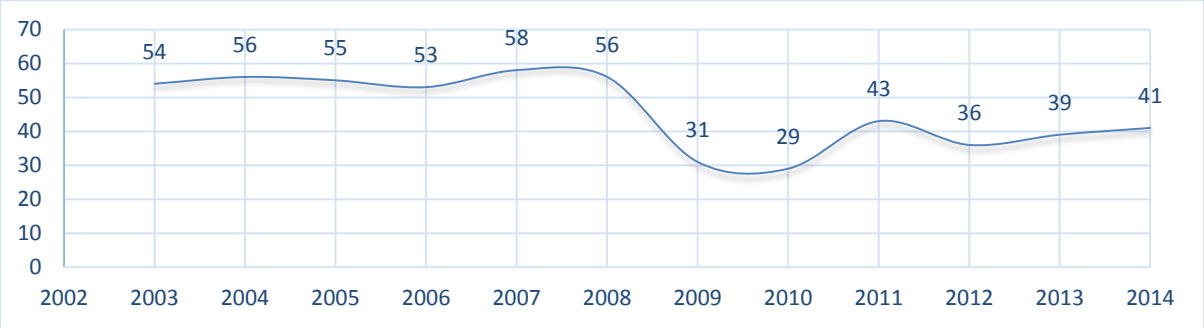
Graph 3-7 Employee Injury statistics by year (Railway ECM)

In response to an increasing trend for the ECM, an Accident Reduction Strategy has been established that has sought to reduce accidents by enhanced analysis of accident causes and review of safety management procedures.

3.2.3 Iarnród Éireann Operational Incident Statistics

3.2.3.1 Train Collisions

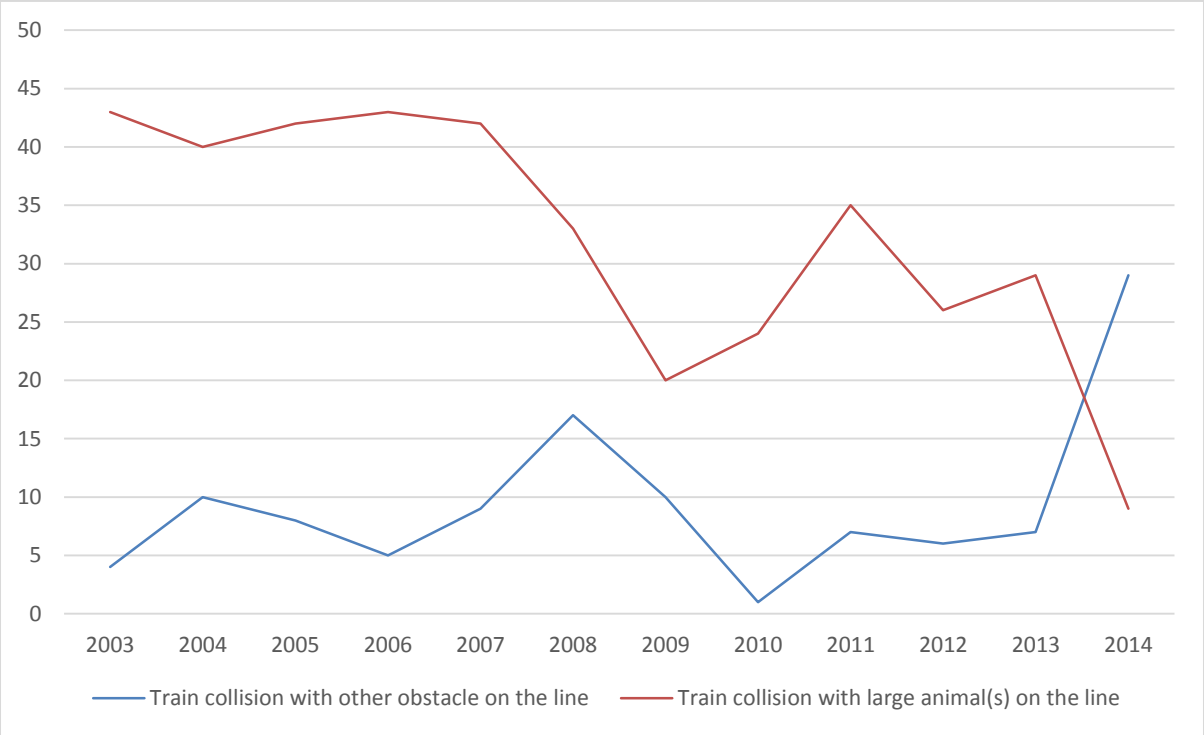
Train collisions can pose a significant risk to passengers, train crew and third parties. They have the potential to cause significant human and environmental harm. Graph 3-8 illustrates the trend for collisions since 2003. Graph 3-8 has been further split into parts, seen in Graphs 3-9 and 3-10, to aid understanding of the data. Two categories, 'Total Collisions with Obstacles on the line' and 'Train Collisions with animals (large)', have been separated to enhance visibility of the data.



Graph 3-8 Total Collisions by year

Category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Trend
Train collision with passenger or goods train on running line	0	0	0	1	0	0	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	1	1	
Train collision with a motor vehicle at a level crossing	1	2	2	1	4	4	0	2	1	2	1	2	
Train collision with pedestrian at a level crossing	0	0	0	0	1	0	0	1	0	0	0	0	
Train collision with attended gates at a level crossing	2	4	2	2	2	1	0	1	0	0	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	1	0	
Train collision with other obstacle on the line	4	10	8	5	9	17	10	1	7	6	7	29	
Train collision with large animal(s) on the line	43	40	42	43	42	33	20	24	35	26	29	9	

Graph 3-9: Train Collision Statistics detail by year, Part 1



Graph 3-10: Train Collision Statistics detail by year, Part 2

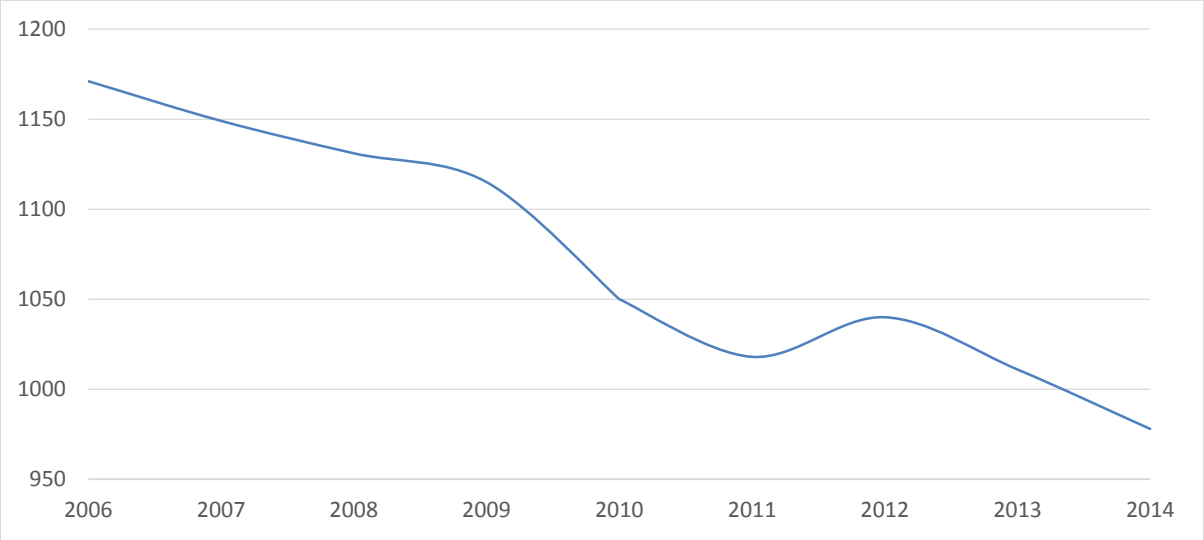
Total collisions have risen slightly again in 2014 to 41, up 2 from 2013. As discussed in previous reports, animals are a major contributor to collision statistics in Ireland. Iarnród Éireann continues to improve those systems protecting incursions to its railway. Analysis can be difficult on the factors that draw animals to the path of oncoming trains as the events tend to be random. It is considered that actions by Iarnród Éireann in enhancing boundary defence systems are a notable contributor.

'Other Obstacle' collisions are at 29 for 2014, which is a large increase from 7 in 2013. Analysis from the railway operator indicates this is attributable to adverse effects from storms experienced in certain locations during the early part of 2014.

Of the collisions in 2014, an incident at Knockaphunta level crossing, County Mayo, where a Westport Bound train collided with an automobile was notable as this level crossing is known to have poor safety performance. The driver of the automobile was taken to hospital, where minor injuries were treated and the driver was later released. Misuse by road users is repeatedly reported by train drivers and track inspectors at this level crossing. There have been a number of high profile, near fatal, accidents at this level crossing in recent years and it remains a cause for concern. As the responsible entities for operation and enforcement, Mayo County Council, An Garda Síochána and Iarnród Éireann have stated they are working together to ensure the crossing is used properly.

3.2.3.2 Level Crossings

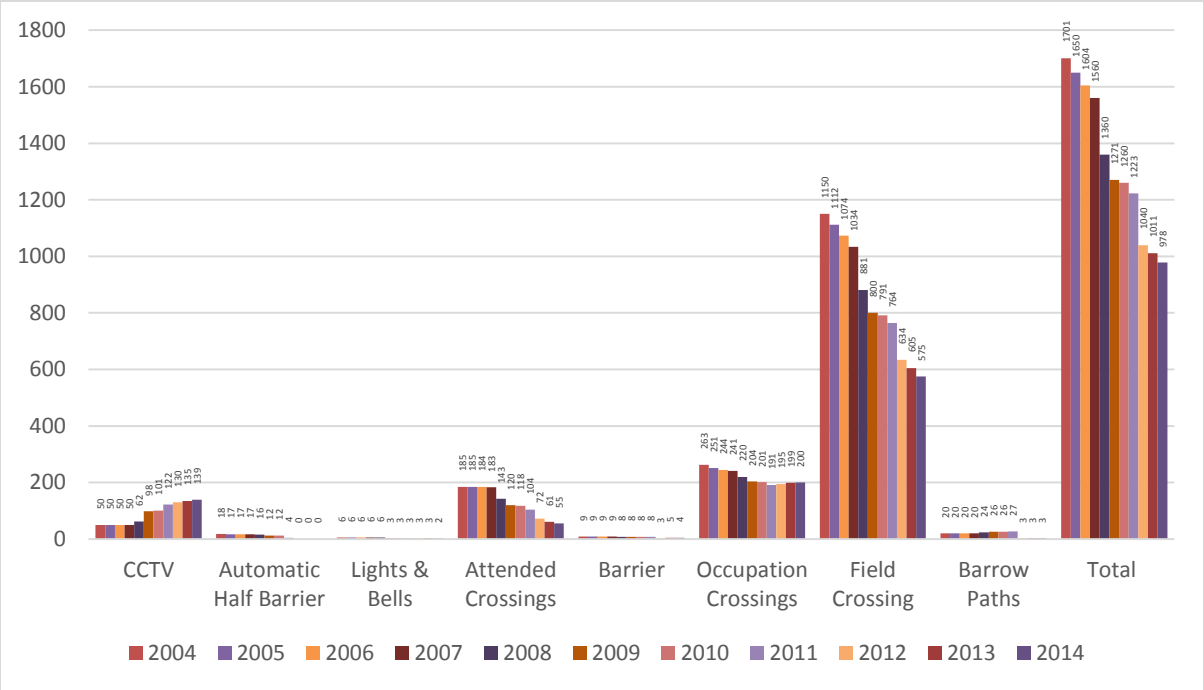
Level crossings are a significant risk to the railway and to any third parties who use them. The RSC has changed its approach slightly for this report with regards to counting their number. Previously, total numbers of level crossings were counted rather than those which were active, that is to say the number reported in previous years would have included level crossings which were present on closed or dormant lines. For this 2013 report only those level crossings which are present on active lines are included, since these are the crossings which present risk to users.



Graph 3-11: Number of level crossings by year

The reader may 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.

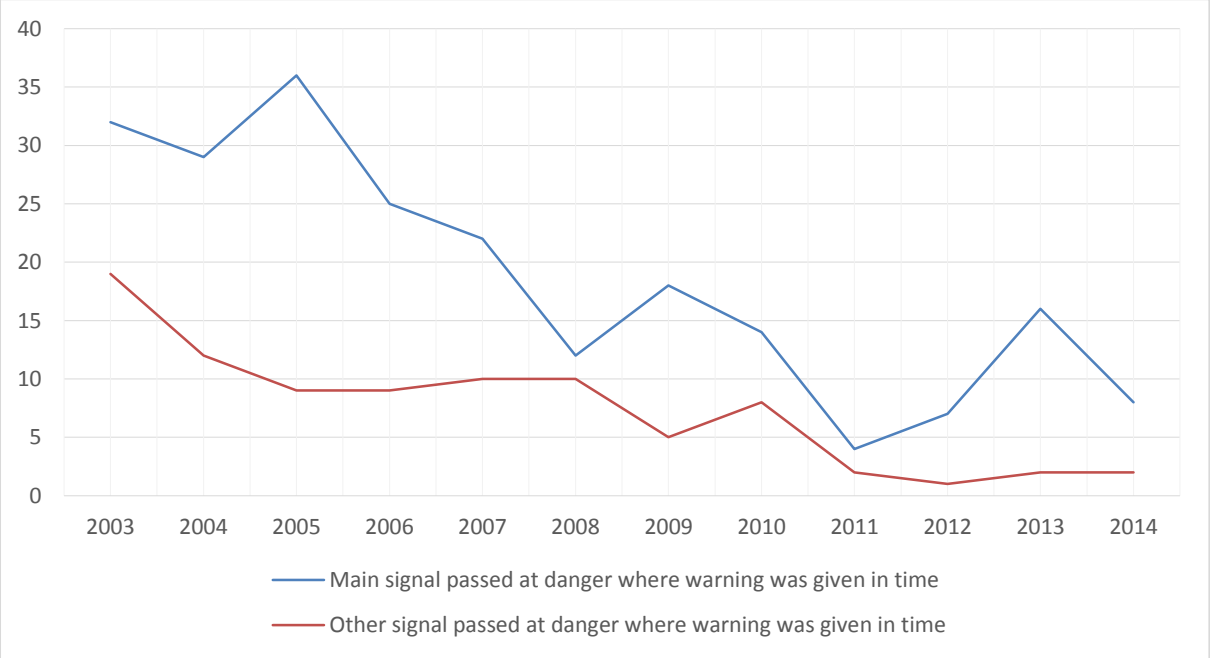
The breakdown of level crossings by type and year in Ireland is shown in Graph 3-12. Level crossings on public roads that require the road user to manually open and close gates remain the highest risk type of level crossing, closely followed by 'Field type' level crossings. Recent years have seen decline in investment for the removal or upgrade of level crossings. Iarnród Éireann are currently reviewing novel technological designs to enhance safety and operation at user-worked level crossings whilst operating within constrained budgets.



Graph 3-12 Level Crossings by type in Ireland, 2004 - 2014

3.2.3.3 Signals Passed at Danger (SPAD)

A SPAD is defined as having occurred when a train passes a stop (red) signal without authority. SPADs are a particular precursor event that the RSC monitors regularly during its supervisory meetings with IÉ. The trend in recent years has been a steady decline, and after poor performance in 2013, 2014 saw a decrease once more.



Graph 3-13: Main (running) and Other lines signal passed at danger where warning was given in time, by year

As may be seen on graph 3-13, in 2014, there were a total of 8 SPAD's on running lines and 2 on other lines (minor lines etc.). IÉ use a ranking tool developed in Great Britain by an industry body 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 categorised by type and are grouped into one of 3 severity bands:

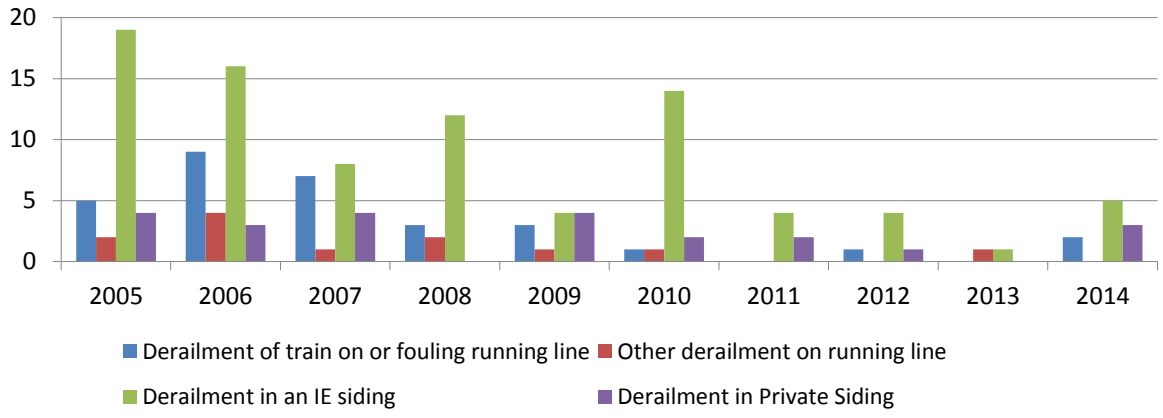
- those classified as Low Risk
- those classified as Medium Risk; and
- those classified as High Risk.

Of the mainline SPADs reported for 2014, 5 were categorised as Low Risk and 3 as medium risk. The trend is a welcome reversal of the previous year's performance, and is considerably below numbers from 10 years ago. Nonetheless, the trend is being monitored as part of specific supervision activities by the RSC and at time of writing, is the subject of a trend Investigation by the Railway Accident Investigation Unit. Iarnród Éireann is also developing a hybrid train protection system that seeks to overlay and eventually replace the current train control system and enhance safety through increased supervision of train movement. A Driver's Reminder Appliance has also been installed on much of the fleet. This system has been in use for several years on the British Network. When used correctly, the appliance prevents drivers from taking power when the signal is showing a red aspect.

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 internal surveillance.

3.2.3.4 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 3-14: Train Derailments by year

IÉ Siding Derailments are observed to have an increase that is relatively large but quantitatively small. For 2015, IÉ has committed to auditing safety systems for train operations on sidings. It is expected this will identify several improvements to current procedures.

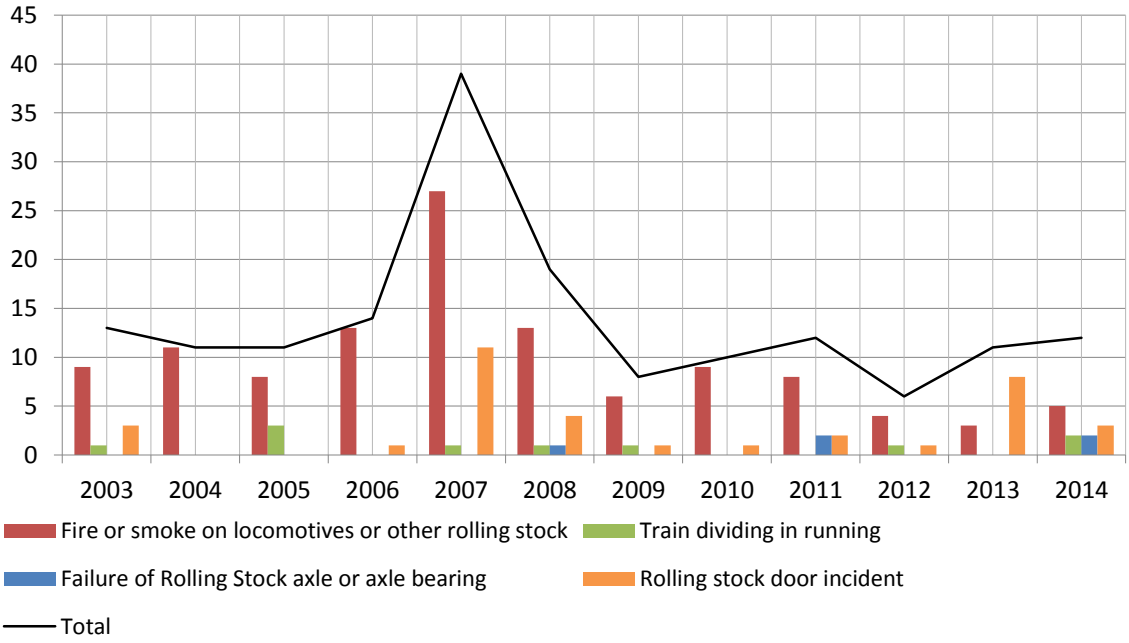
3.2.4 Iarnród Éireann Rolling Stock Incidents

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

- Intercity Diesel Multiple Unit (22000 class)
- Diesel Multiple Unit (29000, 2800, 2600 classes)
- Electrical Multiple Unit (8100, 8200, 8500 classes)
- Locomotives (201, 071 classes)
- Passenger Carriages (Mark IV and DeDietrich Enterprise)
- Freight wagons

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

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



Graph 3-15: Rolling Stock Incidents by year

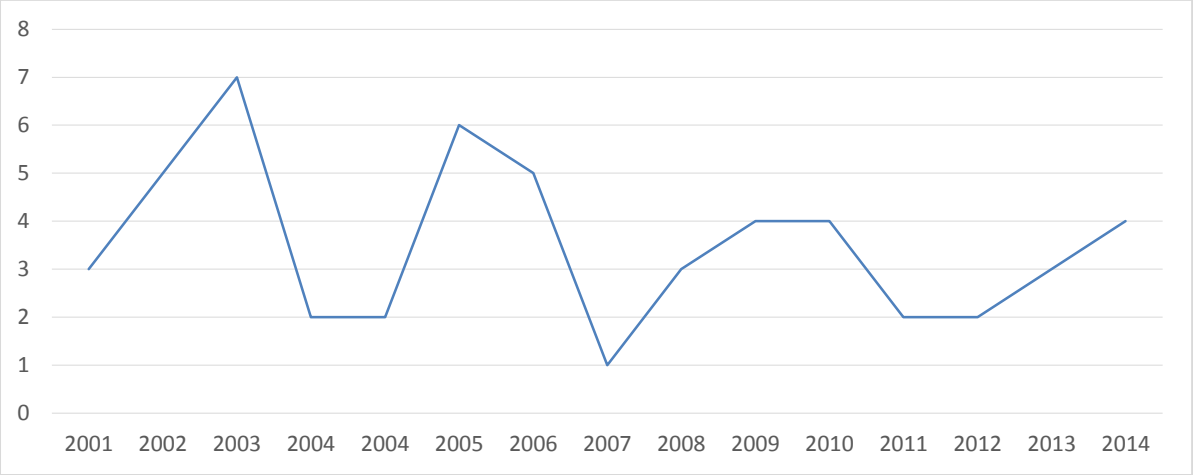
The number of reportable rolling stock incidents increased slightly in 2014. The broad trend, over a ten year period is in the main positive. Rolling Stock safety performance of the various fleets for 2014 is following a somewhat expected trend, following various problems associated with several fleet introductions from 2003 onwards.

3.2.5 Iarnród Éireann Infrastructure Incidents

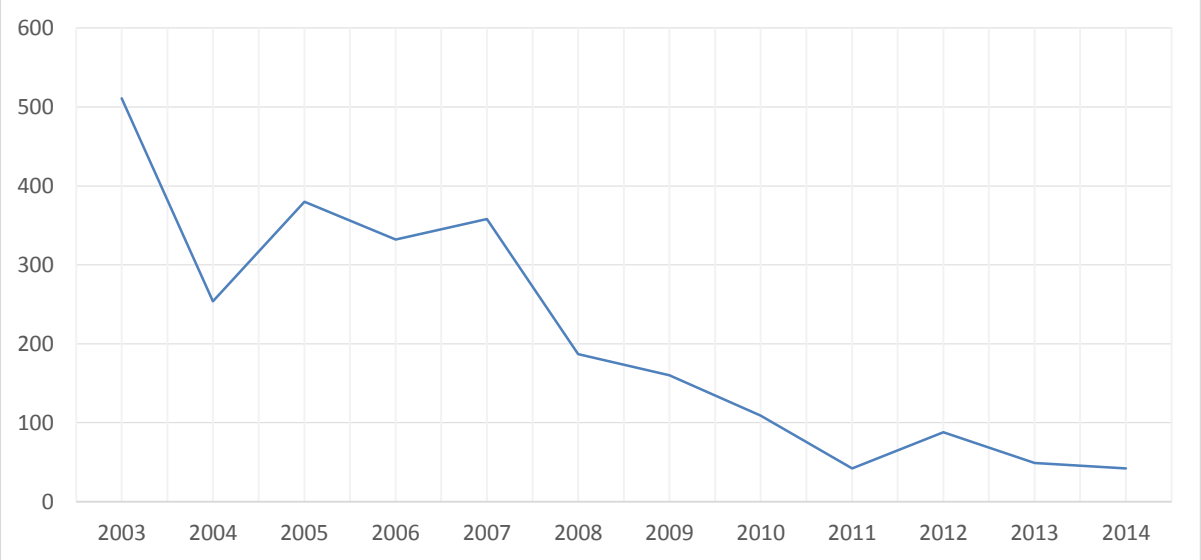
IÉ have thousands of infrastructure assets including track, stations, bridges, culverts, tunnels, level crossings, buildings, cuttings and embankments, points and crossings, signals etc. all of which must be inspected and maintained at varying prescribed frequencies. Invariably assets will fail from time to time and data relating to some of these is now presented in the Sections 3.2.5.1 and 3.2.5.2.

3.2.5.1 Broken Rails and Fishplates

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 tested annually. The number of broken rails on passenger lines in 2014 increased to 4. Whilst none resulted in a train accident, it is an area where IÉ remains vigilant. The RSC closely monitors Iarnród Éireann's management of its assets through regular supervision meetings.



Graph 3-16 Broken Rails, by year

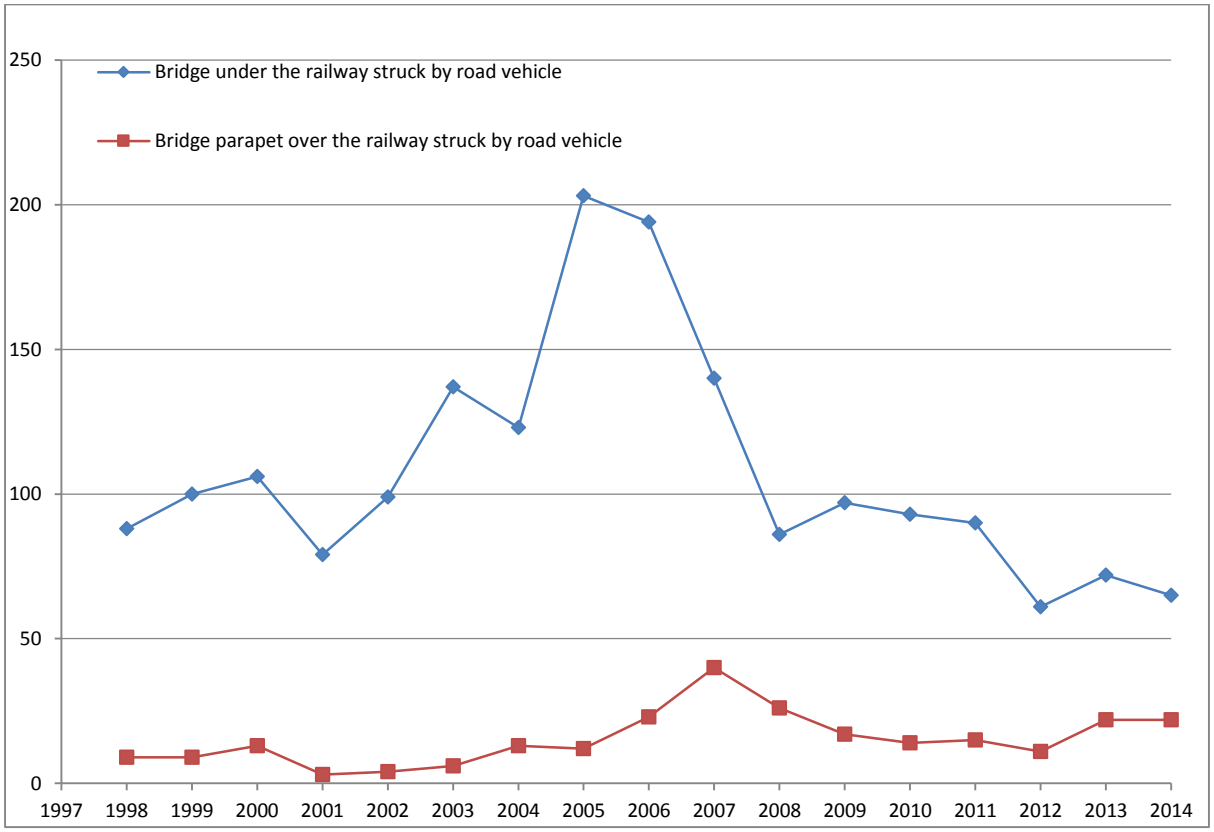


Graph 3-17 Cracked or Broken Fishplates on the IÉ network, by year

A fishplate is a special bolted connection that can join two rails together. The trend for 'Cracked' or 'Broken Fishplates' continues on the overall downward direction seen over the last ten years. Following a rise in 2012, a significant decrease was noted for 2013, with this trend continuing in 2014.

3.2.5.2 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 3-18: Railway Bridges struck by road vehicles

The total number of bridge strikes, i.e., under-bridge and over-bridge, in 2014 were down to 87 (from 94 in 2013) but less than the 2005 high of 215. IÉ report the worst acting bridges over the 2013-2015 period to be the following:

- UBL154: N24 Carrick-on-Shannon with 12 reported strikes
- UBC145: N80 Portlaoise with 7 reported strikes
- UBR54: Erne Street, Dublin, with 7 reported strikes
- UBC146: R445 Grattan Street, Portlaoise, with 6 reported strikes

A cross party organisation has been formed to tackle this issue. The Road Rail Safety Working Group (RRSWG) met 3 times in 2014, and continues to meet in 2015. The group is an advisory one consisting of high ranking members from the following organisations:

- City and County Councils
- Iarnród Éireann
- Transdev
- Railway Procurement Authority
- An Garda Síochána
- Road Safety Authority
- Irish Road Haulage Association
- County and City Managers Association
- Department of Transport, Tourism & Sport
- National Roads Authority

The RRSWG targets area where the railway and the road intersect, such as at level crossings and bridges over and under railways or tramways. The group aims to facilitate exchange of information, provide advice and support to stakeholders, and discuss mitigation measures which may be enacted.

3.3 Balfour Beatty Rail Ireland

Under Regulation (EU) No.1158/2010 Parts A and B, Safety Certificates covering the operation of on track machines (OTMs) over the Iarnród Éireann network were issued to Balfour Beatty Rail Ireland Limited (BBRI) on 24th February 2014, and they are classified as a Railway Undertaking (RU) under this system. They operate and maintain On Track Machines (OTM) for Iarnród Éireann Infrastructure Management. This requires they are compliant with the same relevant law as other RUs as they conduct movements on the IE network. A significant number of their activities are safety critical and have potential for significant harm if not properly controlled.

BBRI are a relatively small organisation, and have notified a staff level of 45 employees to the RSC. BRRI do not operate any passenger services, and provide many of their services outside peak and daytime periods. The total train kilometres for 2014 was 94701. One derailment was reported, which occurred in a private siding at Kildare Depot. A single SPAD was reported, which was investigated jointly by BBRI and the Infrastructure Manager in Irish Rail.

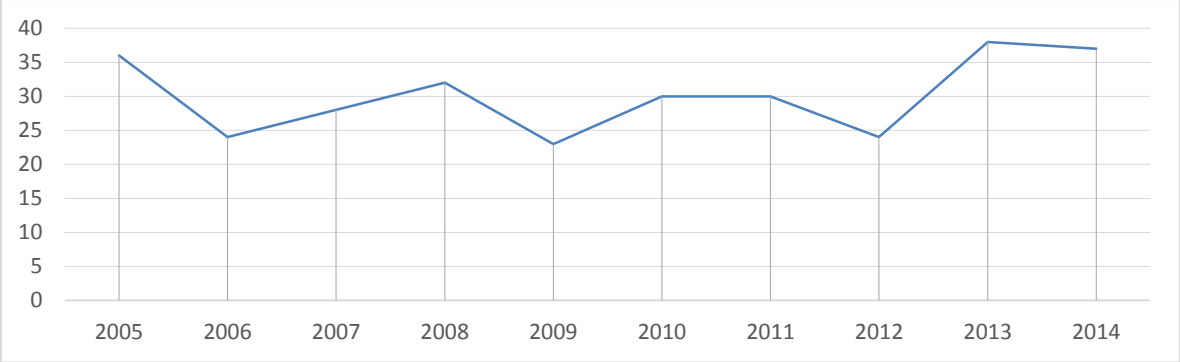
3.4 Transdev (Luas) Statistics

Transdev have been operating the Luas since it commenced operation in June 2004. The total tram-kilometres (km) run in 2014 was c. 3.88 million, similar to previous year. Passenger journeys increased again in 2014 by 6% to 32.4 million journeys. There were no new extensions or services offered in 2014.

3.4.1 Road Traffic Accidents

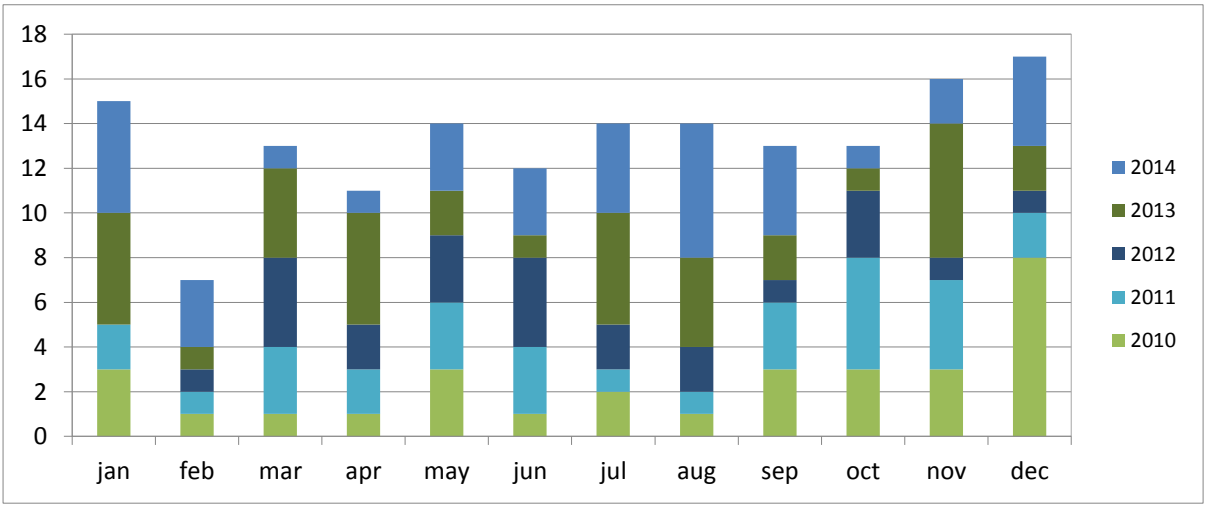
The Luas by design interfaces with the public and road traffic along significant sections of its alignment, most notably in the city centre. The Luas operates mainly by 'line of sight' and is no different in its operation to the majority of light rail systems around the world. However, given that the Luas shares sections of the carriageway with road vehicles, road traffic accidents (RTA) can and do occur. The number of road traffic accidents has stayed at a relatively high level first seen in 2013. A total of 37 incidents occurred during 2014, vs. 38 in the previous calendar year.

Reasons for this increase are varied. Queen Street continues to be the site of the largest number RTA's with 6 in 2014. Two other junctions are noted to have 3 RTAs (Church Street and Belgard) each with 2 others noted to as 2 RTAs each. In early 2015 a new system for capturing digital images of cars that do not obey traffic signals was installed. It is hoped this will have a similar effect to that of speed cameras used by Gardaí.



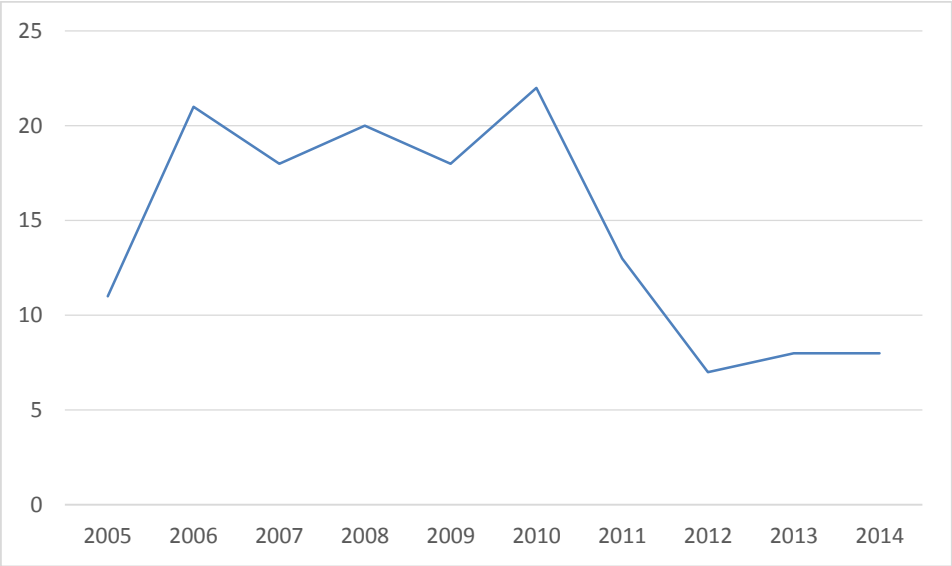
Graph 3-19: Number of Road Traffic Accidents involving a tram, by year

Graph 3-20 shows the breakdown of RTAs by month. December and January are noted to be worst months. There are many causes of these events, but the overriding issue is non-compliance with road traffic signals by automobile drivers.



Graph 3-20: 2013 RTA Occurrence by Month

3.4.2 Tram / Pedestrian Contact



Graph 3-21: Tram/Pedestrian coming into contact

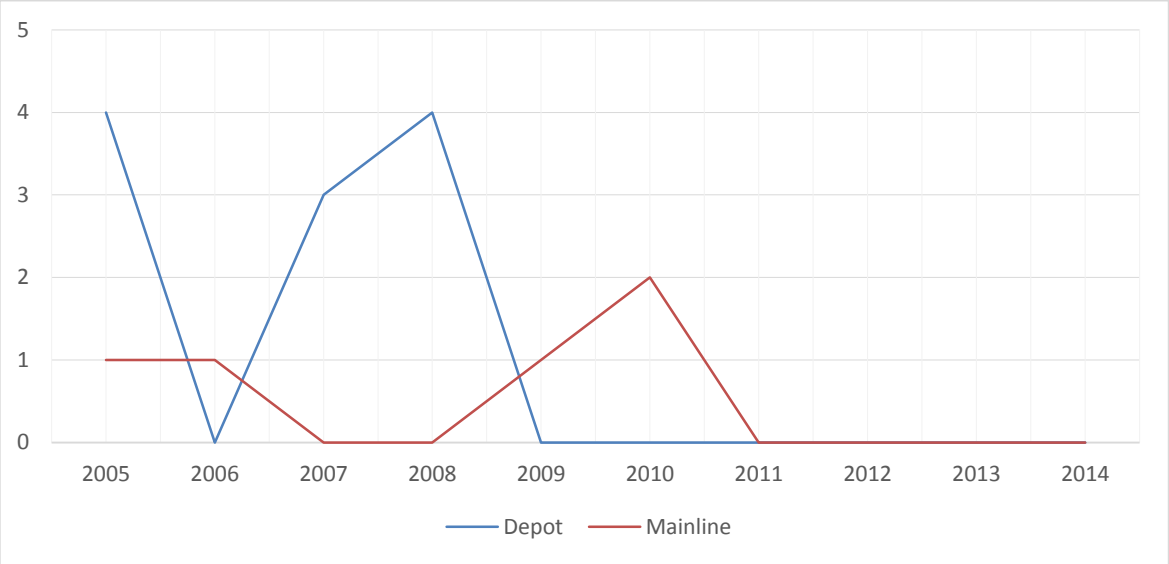
As with RTAs, a significant majority of incidents where contact is made between trams and pedestrians occur in and around Dublin city centre. The Luas Red Line in particular operates through 41 signalled junctions which are at grade. Such junctions carry a higher risk of the tram coming into contact with pedestrians. A total of 8 such incidents occurred in 2014, compared to 7 in 2012. No serious injuries were reported.

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
2013	8	0	0	0
2014	8	1	0	0

Table 3-2: Tram contact with person

3.4.3 Tram Derailments

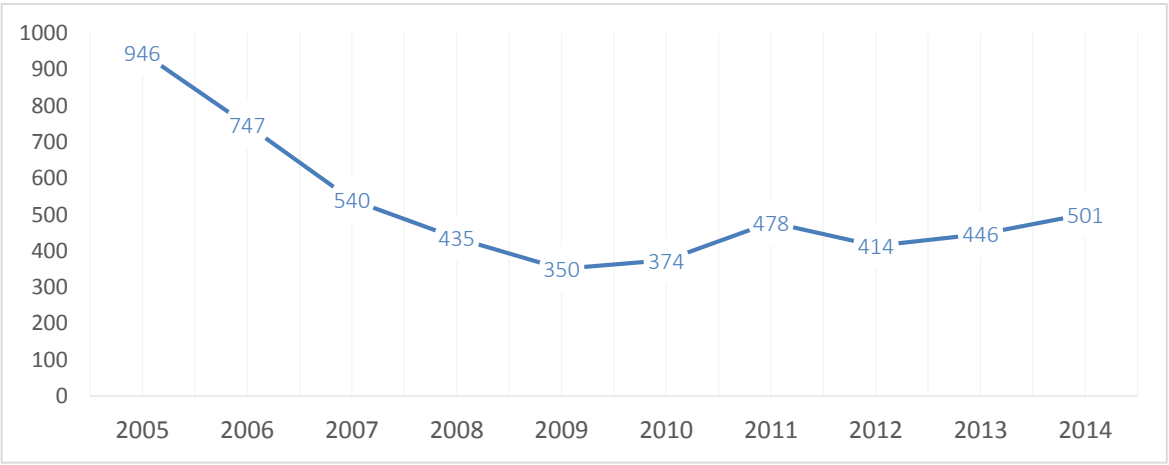
No derailments were reported in 2014.



Graph 3-22: Tram Derailments

3.4.4 Tram Emergency Brake Applications

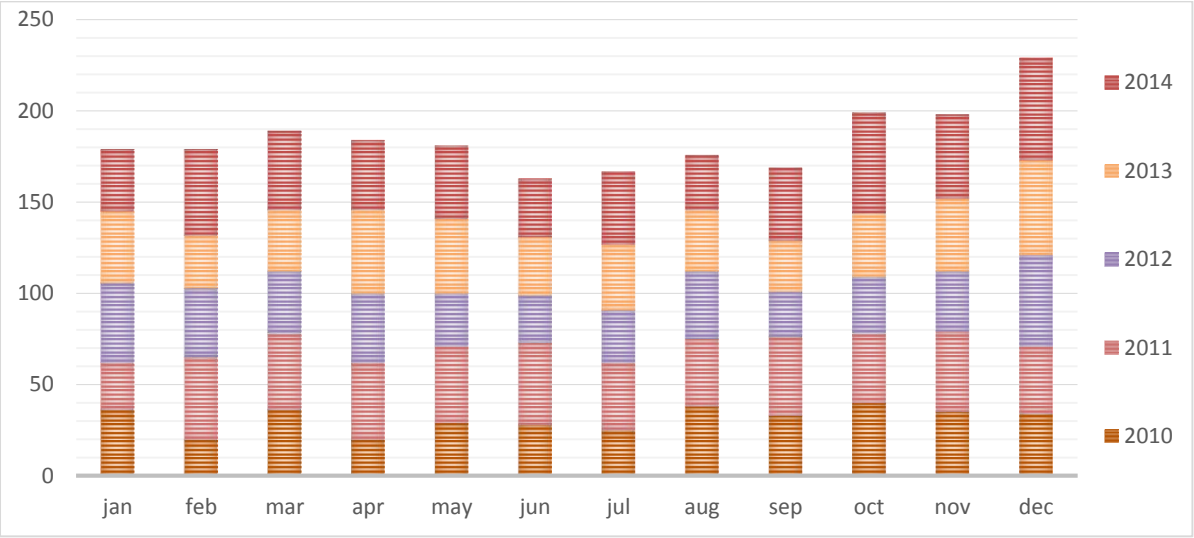
A useful indicator is the number of Emergency Brake (EB) applications which tram drivers make. In addition to its standard brakes, a tram is fitted with an electromagnetic track brake. Tram drivers are trained in defensive driving techniques and are constantly vigilant of pedestrians, cyclists and road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



Graph 3-23: Emergency Brake Applications

There were 501 EB applications made in 2014 representing about a 9% increase on 2012 figures. Operator analysis of this long term increase indicates EB applications are linked to new or changed items on the system such as new drivers, new infrastructure, or modifications to tram signalling systems.

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 January, March, November and December which would have some correlation with increased pedestrian activity in the city centre on the run up to Christmas and during the New Year's sales period.



Graph 3-24 Number of EB per 100,000 kilometre travelled per month

3.5 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 incidents reported by Bord Na Móna in 2014.

3.6 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 RSC monitor the operations of 8 self-contained heritage railways. They are:

- Cavan and Leitrim Railway[1]
- Difflin Lake railway, Oakfield, Raphoe
- Finntown & Glenties Railway
- Listowel Lartigue Monorail
- Tralee & Dingle Railway[1]
- Waterford & Suir Valley Railway (W&SVR)
- West Clare Railway[1]
- Irish Steam Preservation Society Stradbally

The RSC mandated all heritage railways to document a Safety Management System (SMS) and have it approved by the RSC as of the 1st of January 2014, in line with European standards. RSC guideline 'RSC-G-022' (Issue 2), published 21st of January 2013, outlines the elements a heritage railway must include in its Safety Management System. Compliance with this guideline forms part of the RSC Supervision Plan for 2014.

No incidents were reported by a heritage railway in 2014 maintaining a satisfactory safety performance. The RSC undertakes inspections and audits on the heritage railways commensurate to the risk but at a minimum visits each operational railway biennially. The RSC continues to work with a number of heritage railway operators to improve their safety standards and processes.

In 2014 the RSC undertook a safety management audit of W&SVR's management of risk. A small number of findings and outcomes were identified and made. W&SVR accepted these and submitted its corrective action plan to the RSC and has implemented a number of changes to its processes. The RSC continues to monitor implementation of corrective and remedial actions.

[1] These railways have not yet received a Safety Management Certificate from the RSC and were reported as being non-operational in 2014

In addition to the above operations the Railway Preservation Society of Ireland (RPSI) operate steam and diesel hauled heritage trains on the Iarnród Éireann rail network. Because of the nature of its activities, which can import risk to the mainline 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 was just one reported incident in 2014 which was categorised as an operational irregularity as the planned out of normal operation gave rise to:

- The train consist being too long for the platform infrastructure at Midleton station, resulting in a number of coaches being off the platform
- The train consist being too long for the signalling system in Midleton, resulting in the Mill Road level crossing barriers being continuously closed across the road for c.25 minutes.
- Trains being authorised to pass signals at danger, and points being manually operated.
- The unnecessary exposure of persons to danger.

The RSC undertook a Preliminary Post Incident Inspection (PPII) into this occurrence and findings and actions have been directed to both the RPSI and Iarnród Éireann Infrastructure Manager in its capacity as Traffic Control Manager.

4. Railway Safety Trends in Europe

4.1 Introduction

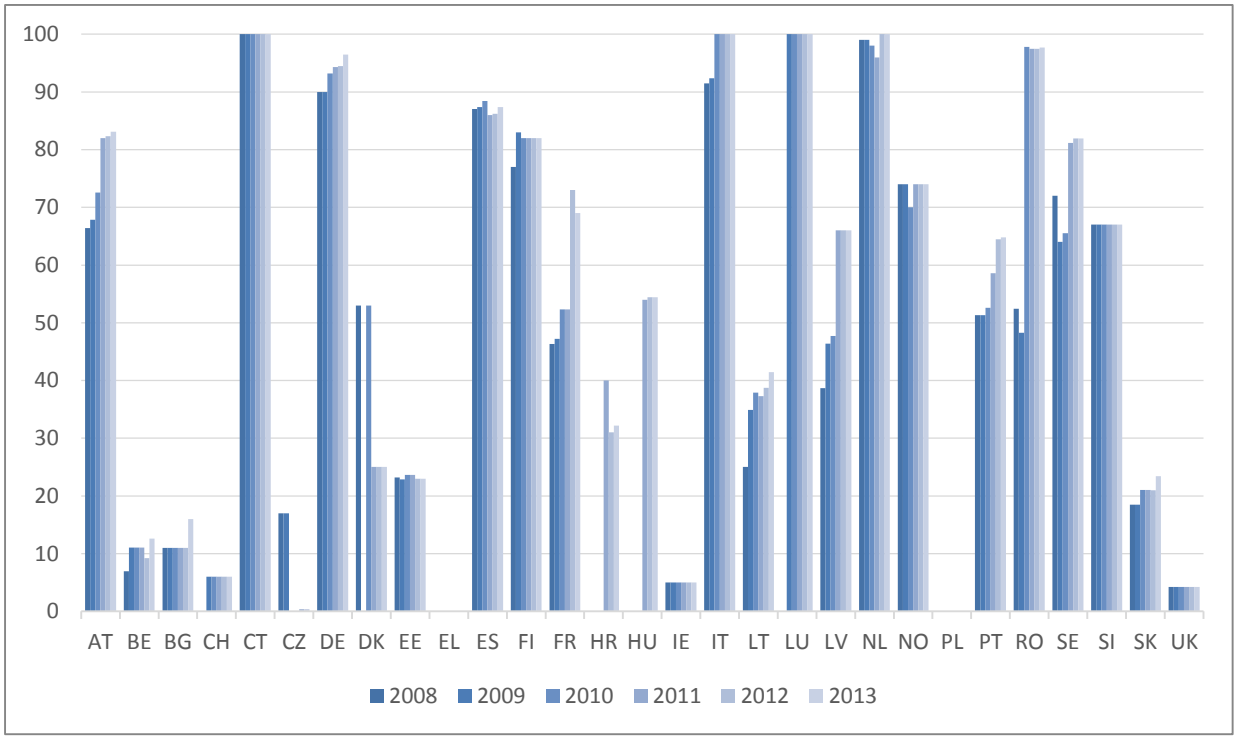
In European terms, the RSC is defined as the National Safety Authority (NSA) for the European railway network in Ireland. Each European member state has an NSA which, in accordance with the Railway Safety Directive (2004/49/EC), must send its annual report on railway safety to the European Railway Agency (ERA). 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, or self-contained heritage railway systems.

ERA produces a biennial report, the most recent being published in 2014, which includes data up to and including 2012. A report is not available for 2015 for comparison purposes. In a change from previous reports, data will be extracted from the publically available E-Rail Database that ERA maintain. This is a repository for European railway safety data, as inputted by National Safety Authorities. Some noteworthy statistics are presented from this database. 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 http://www.era.europa.eu/.

4.2 Percentage of tracks with Automatic Train Protection (ATP) in operation

One critical measure of railway infrastructure is the percentage of railway fitted with Automatic Train Protection (ATP). The European Railway Agency, in common with most professional railway organisations, consider ATP to be the most effective railway safety measure that railway infrastructure managers can implement to reduce the risk of collisions and derailment on mainline railways. ATP enforces obedience to signals and speed restrictions by speed supervision, including automatic stopping at signals. 25 Member States reported the percentage of lines equipped with such a system. This data is shown in Graph 4-1. Of the 1683 route kilometre of Ireland's conventional rail network, 53 km are fitted with ATP. In Ireland (IE), ATP is only functional on DART EMU rolling stock that runs on the DART system. All other rolling stock does not have ATP technology fitted, but can still run on this section. The UK figure is slightly distorted in that the their network makes wide use of a Train Protection Warning System which does not meet the EU definition of Automatic Train Protection, but does provide the ability to stop trains in the event of Overspeed or after a signal has been passed at danger.

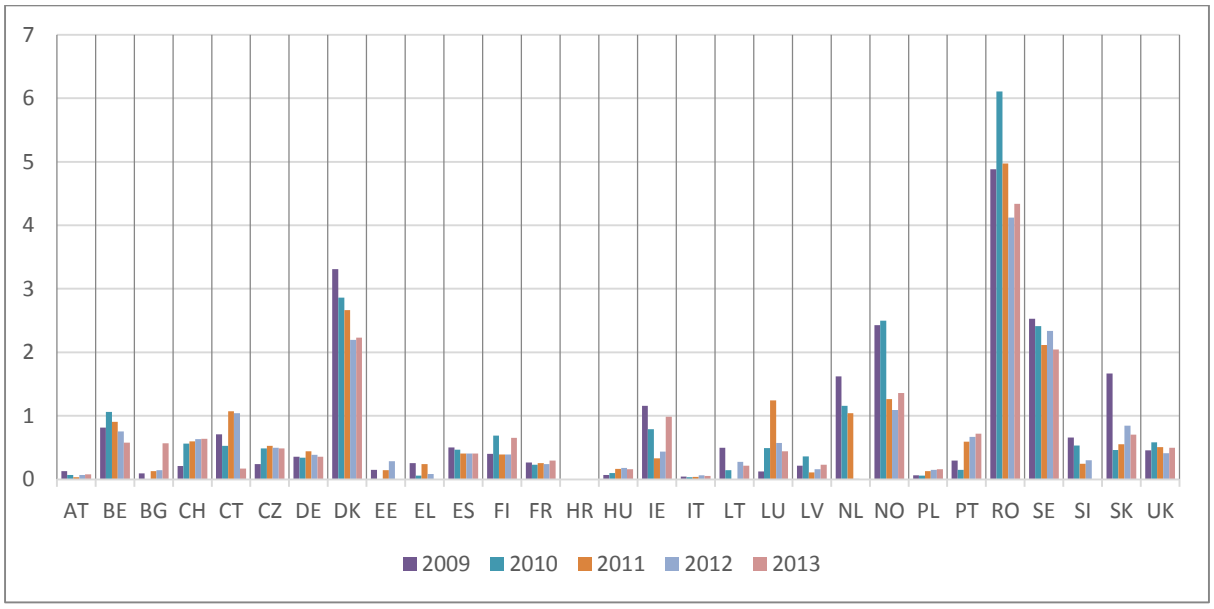
The notable element of the Irish data is a long term trend where ATP coverage has not increased. Most EU states tend to expand ATP over a long period on their rail systems. This is part of a worldwide trend where many developed nations have extensive use of ATP. The United States have mandated a form of ATP for use by year end 2015, although at time of writing this deadline will probably be extended.



Graph 4-1: Percentage of tracks with Automatic Train Protection (ATP) in operation, by country

4.3 Signals passed at danger relative to train km

Earlier in this report it noted that 2014 SPAD performance in Ireland (IE) was an improvement on 2013. Data presented in this chapter is for 2013, and shows relative performance using train kilometres travelled on the network.

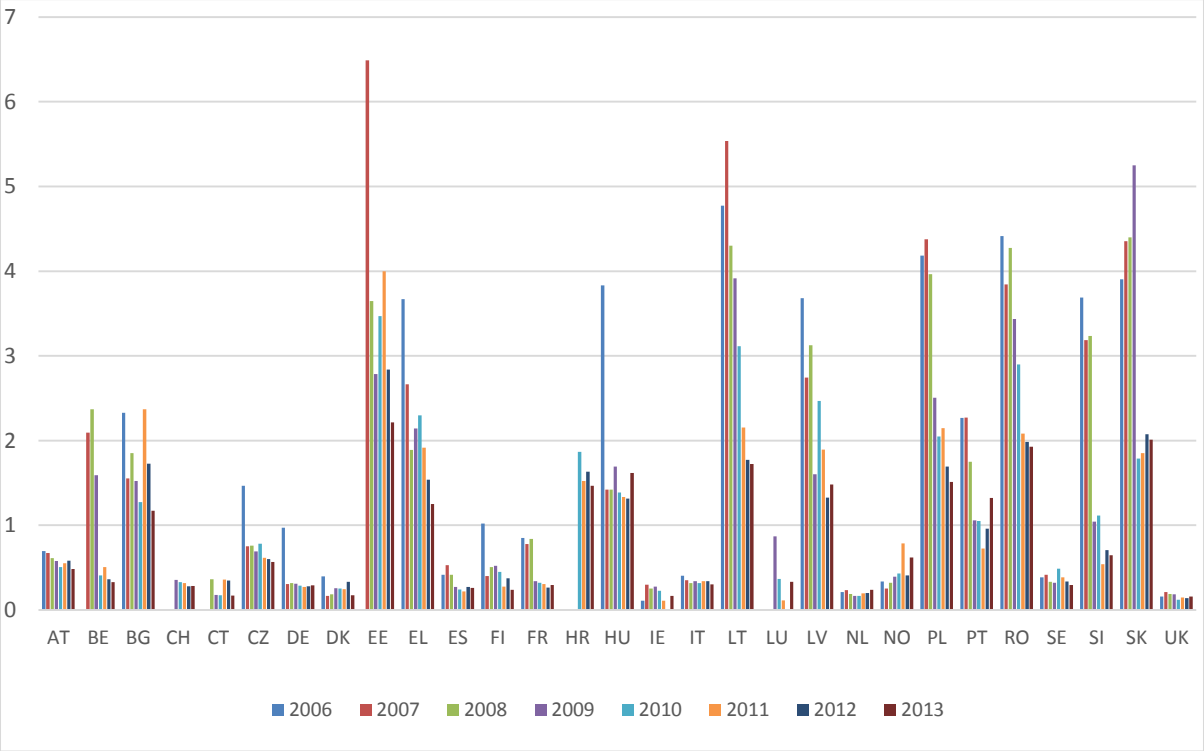


Graph 4-2: Signals passed at danger relative to train km

Irish performance for the years shown is below average for the EU. Denmark (DK), which can be seen to have poor performance, is in the process of installing the European Train Control System (ETCS), the standard European Train Protection System, which should address concerns in this area. As indicated earlier, Ireland is currently developing an alternative unique hybrid system which will incorporate ETCS components.

4.4 All accidents relative to train km

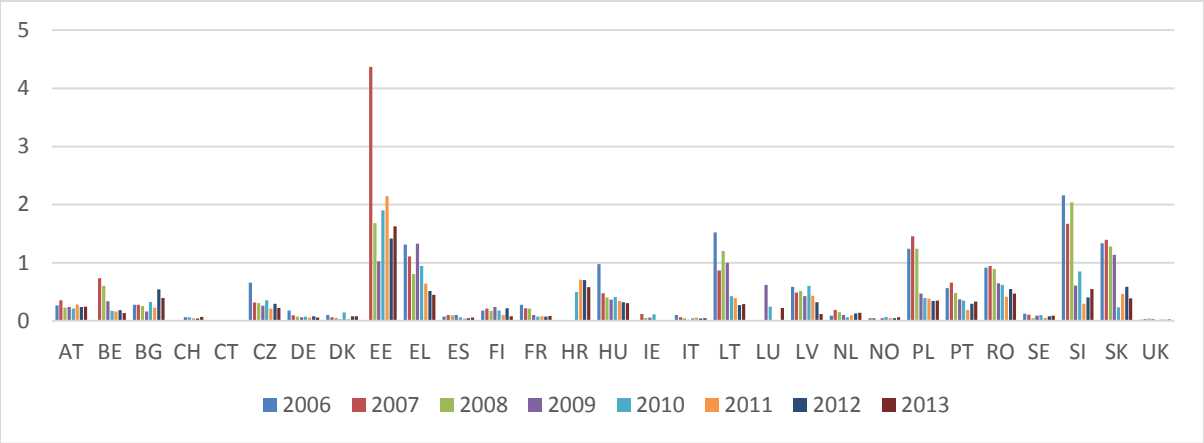
In European Terms the Irish Network is quite small, and has had very few passenger fatalities in the last 35 years. However, given the relatively small amount of passenger kilometres measured, a small number of fatalities could change relative performance, which makes it incumbent on all stakeholders to remain vigilant and continuously improve safety systems. All accidents in this instance are those which are reportable within the Common Safety Indicator framework as described in the European Union Railway Safety Directive 2004/49 (as amended).



Graph 4-3: All accidents relative to train km

4.5 Level-crossing accidents relative to train km

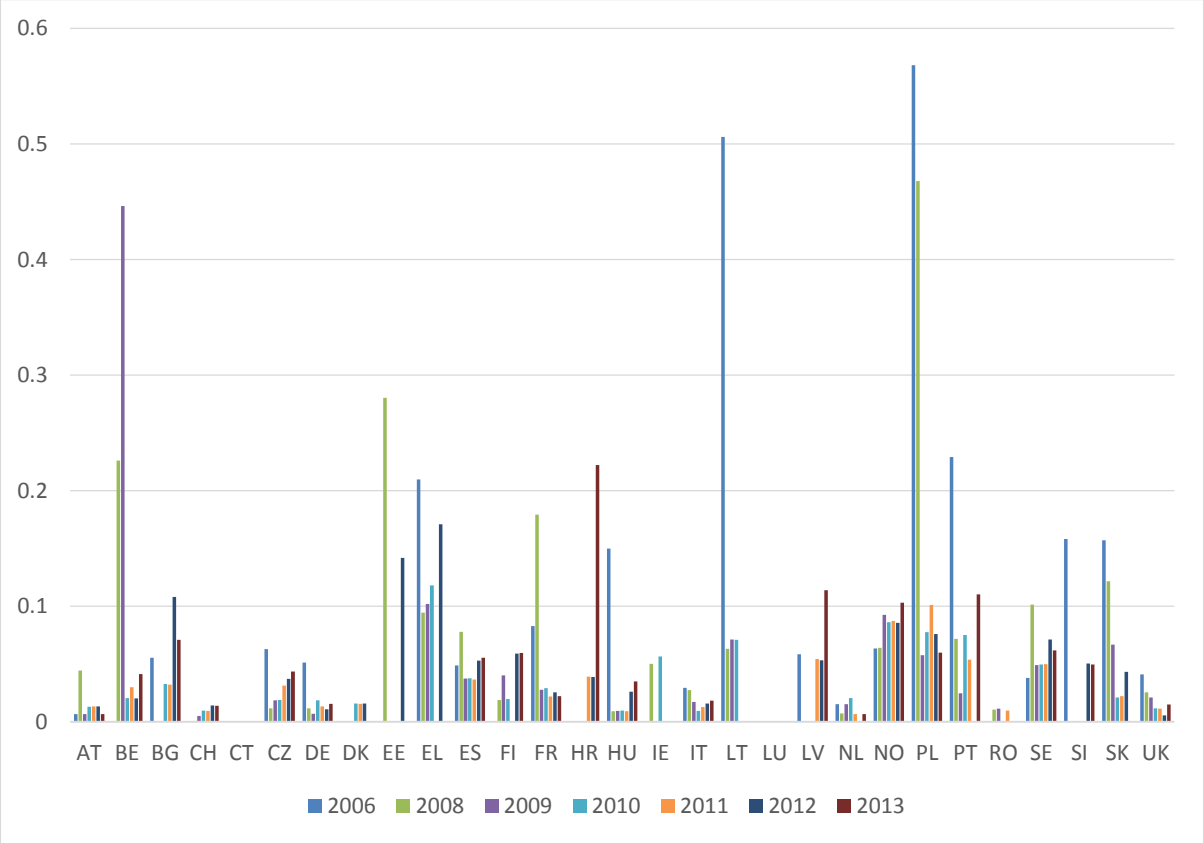
Level Crossings are a significant risk to railway safety. Graph 4-4 indicates Ireland is just below the EU average when it comes to accidents relative to train kilometres. Ireland, however, is above average for level crossing deployment, indicating good performance in this area.



Graph 4-4: All accidents relative to train km

4.6 Derailments of trains relative to train km

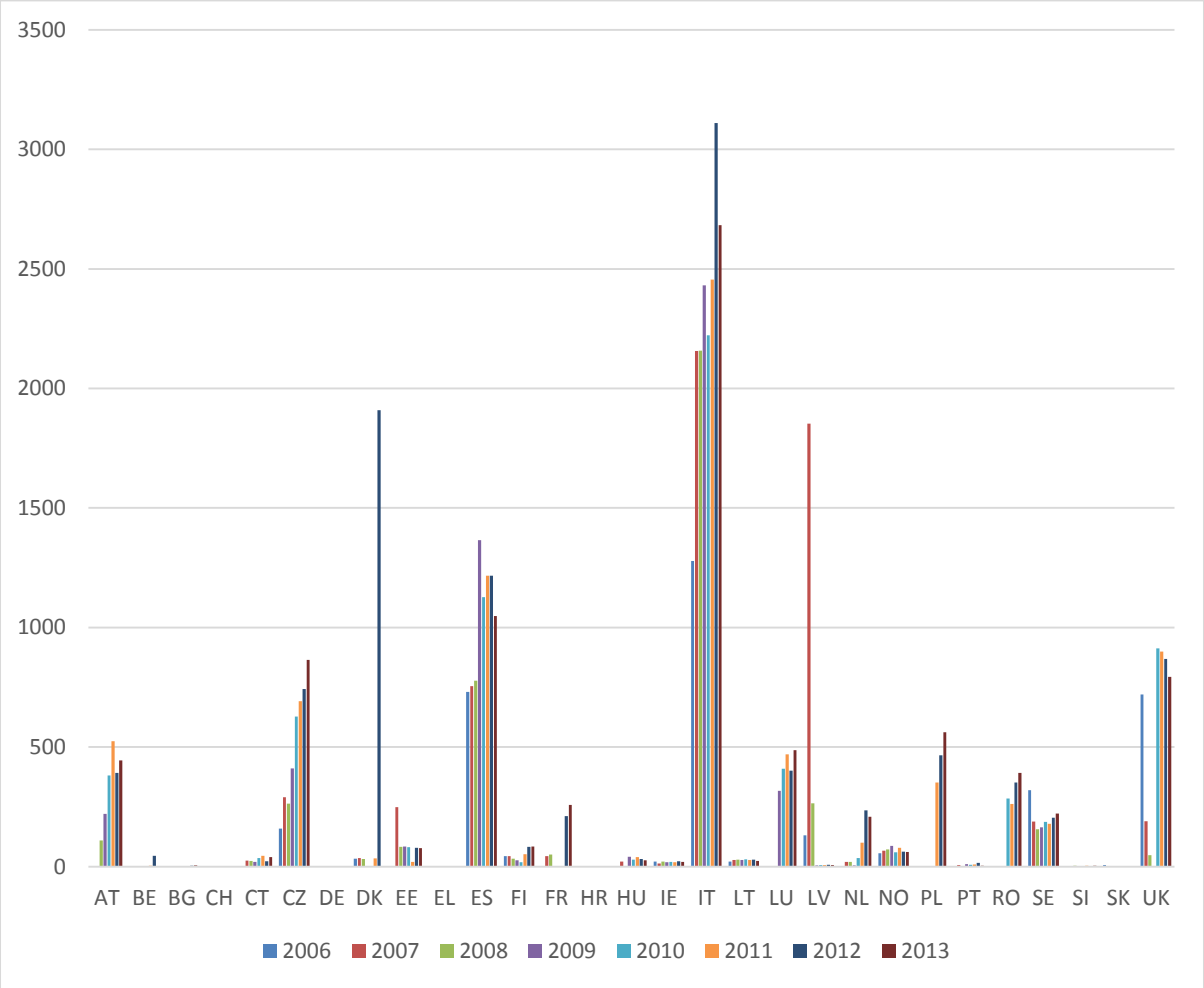
The indicators are largely positive for Ireland with regards to derailments. There are favourable comparisons evident with all other major railways in the EU. Whilst the Irish Network is relatively low speed and has low utilisation compared to some other member states, derailment risk still requires careful management in a challenging environment where resources have been reduced in the period under review.



Graph 4-5: Derailments of trains relative to train km

4.7 Total number of accomplished safety audits

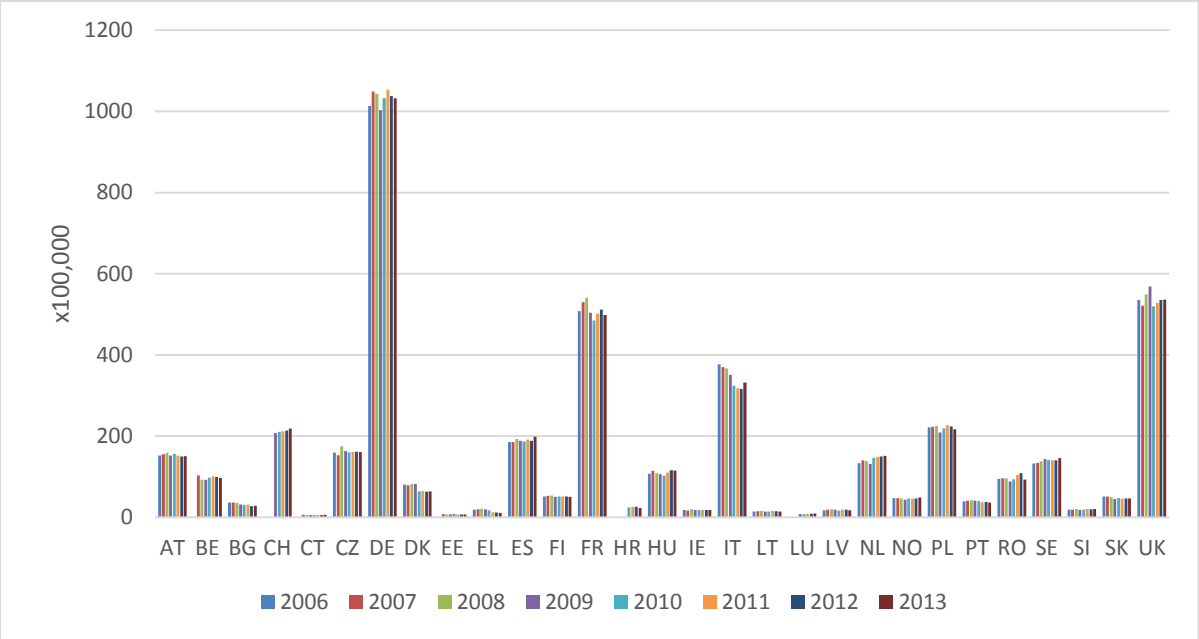
The European Union has developed specific regulations to ensure that all railway organisations monitor their safety performance. One key measure of this is safety audits accomplished. Railway Organisations are required to audit their compliance with European and National Law, and act on the results accordingly. The RSC closely monitors railway organisations to ensure they comply, and in addition the RSC also regularly audit railway organisations. It can be seen that there are relatively few audits performed by Irish Rail, however, this is to be expected given it is a small railway network which is operated and maintained by one organisation. The relevant European Law allows for some scope of how member states comply with audit requirements, with different interpretations of what constitutes a safety audit.



Graph 4-6 *Total number of accomplished audits*

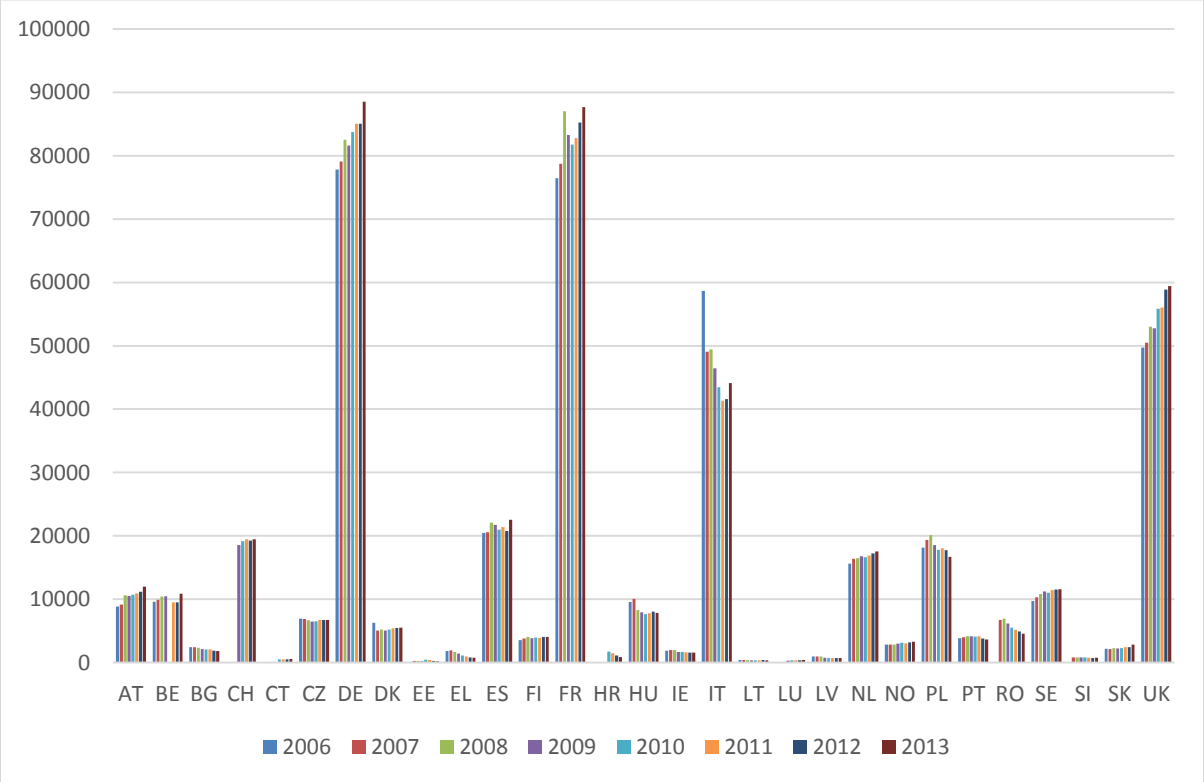
4.8 Network Comparisons

Comparisons are presented below to show the scale of traffic density on the Irish Network in Comparison to other EU Member States.



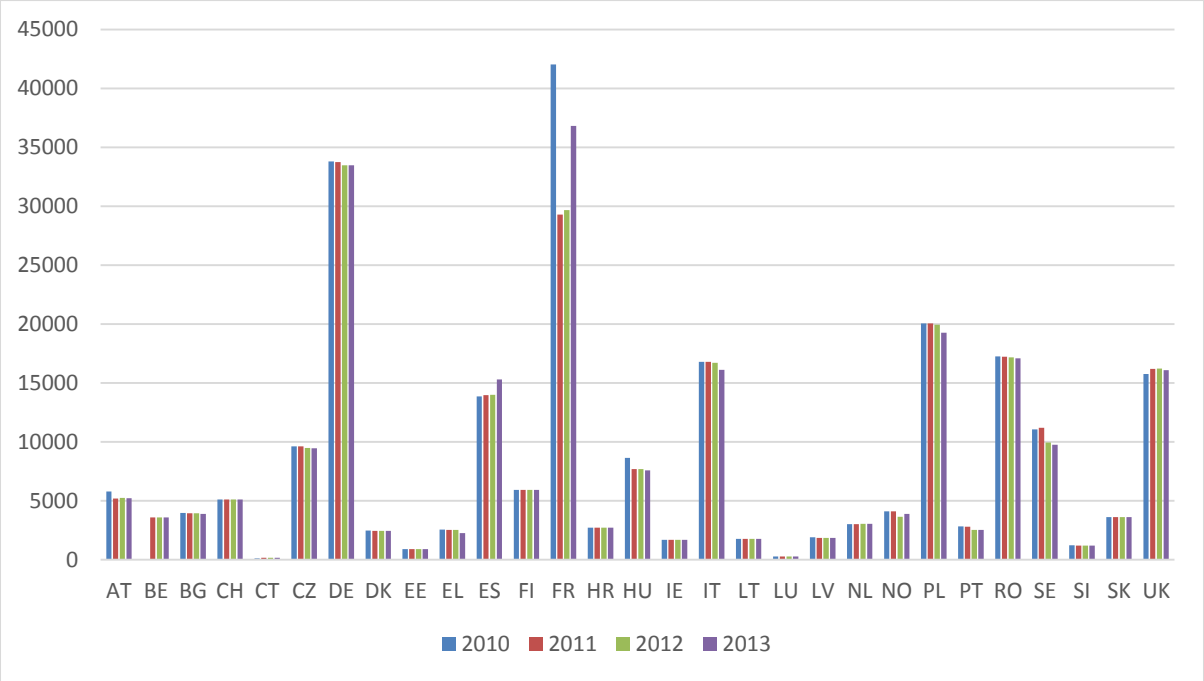
Graph 4-7 Total number of train km

It can be seen from Graph 4-7 that there is quite a small amount of train km measured. As Ireland and Northern Ireland networks are connected to each other, but not with other networks, train km is likely to be lower than the interconnected networks in mainland Europe.



Graph 4-8 Number of passenger km

Graph 4-8 follows a broadly similar trend to Graph 4-7. The Y-Axis is measured in millions. Many of the countries where there is high passenger numbers generally utilise extensive modal sharing whereby the train might be part of a journey along with bike, bus, tram and car. Ireland is making progress in this area with many projects under development by the National Transport Authority.



Graph 4-9 Number of line kilometres

Graph 4-9 shows the number of line kilometres, which is a measure of the amount a track in a countries network. It is observed that this indicator remains relatively steady for most member states.

4.9 Major Accidents Worldwide

A number of major incidents on railways in other countries during 2014 provided a stark reminder that despite many indicators showing improvement in overall safety performance, potential still exists for catastrophic accidents. The Railway Safety Commission is in networks with other National Safety Authorities in Europe and similar agencies worldwide regarding such incidents and endeavour to share learning points derived from investigations.

United States of America

A Burlington Northern Santa Fe (BNSF) train guard died at 12:30 on 8 October 2014 while a freight train was undergoing a controlled movement in a private siding in Colorado. On the day prior to accident, a driver and train guard had tried to place a train consist of four freight wagons in to a private siding. This was not possible as there was no capacity available. Wagons were

then placed in an adjacent siding and activities for the day were concluded. The crew planned to return to site the next morning to complete the movement.

On arrival the next day, the driver prepared the two locomotives with a guard and person in charge of coupling the wagons (shunter). Staff released the handbrakes on the four wagons left on the siding the day before and coupled the four loaded wagons to six other wagons and to two locomotives. Some of the wagons were separated out from the train-consist on another track (See Figure 4-1), where there were several attempts made to join them together to complete an additional movement. When the Guard indicated that all wagons and locomotives were coupled, she instructed the driver to pull the train out to another track. Soon after starting the movement, the driver heard an unusual noise on the radio and ceased operation. The guard was between the two tracks used to couple the train together. When the train pulled out of track 816, she became caught between two train consists. The shunter told the driver to stop the movement. On finding the guard, he instructed the driver to back up gently, in order to try to free his colleague. The shunter realised this was not working and halted the movement.

The National Transport Safety Board have stated the probable cause of the accident to be the guard leaving wagons on the track with insufficient clearance to the adjacent track and then instructing the driver to move the wagons before moving to a position of safety. The guard's focus on successfully coupling the wagons was a contributing factor.

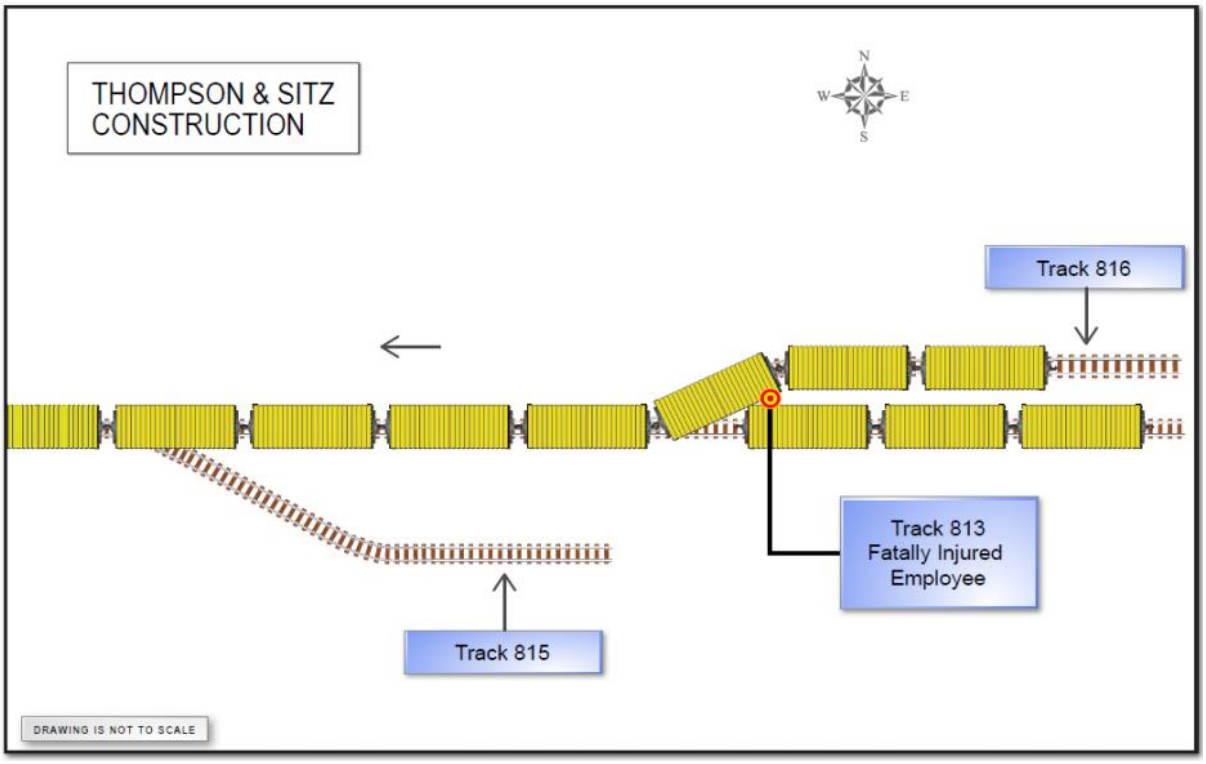


Figure 4-1 Track Diagram and Accident Site

Italy

A passenger fell between a train and a platform at Castelfranco Emillia near Modena, resulting in a fatality. At 21:53 (local time) on 7 April 2014 the passenger had forced the train doors open and attempted to board, but lost balance when the door trapped his ankle as the train proceeded to its next destination. The passenger was dragged around 200 metres before his death. A subsequent investigation by authorities found that on-board control systems did not stop the train when the doors were moved. It was further indicated that the doors were non-compliant with the relevant European Standards as they do not lock when closed.

Australia

A bulk iron ore train derailed on the Defined Interstate Rail Network (DIRN) between Stewart and Bonnie Vale, Western Australia on 14th May. There were no reported injuries but significant damage to track and rolling stock were observed. The Australian Transport Safety Bureau (ATSB) reported that the derailment was likely to have been initiated by lateral harmonic vehicle oscillation induced by a combination of minor cyclic track irregularities which were evident before the location of derailment. The accident report indicated that that the lateral roll of one of the wagons caused the left hand wheels to unload at a time when the leading left wheel came into contact with the left rail face – resulting in flange climb (where the flange of the wheel climbs over the rail-head) and derailment.

The rolling stock type and infrastructure were determined to be compliant with all build and maintenance requirements. The ATSB used computer modelling during the investigation to demonstrate that there was sufficient probability that derailment of this type could occur within this railway system design. It was also found that the systems in place between the train operator and track maintainer for the reporting of track abnormalities was ineffective. The ATSB had previously noted that this was a “known” area for poor ride quality. The rolling stock operator has since developed improved procedures for reporting track irregularities.

5. Accident Investigations

5.1 Introduction

The Railway Accident Investigation Unit (RAIU) was separated from the RSC on 1st July 2014 and is now a functionally independent organisation within the Department of Transport, Tourism & Sport (DTTAS). 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 the Railway Safety Act 2005 as amended by S.I. No.258 of 2014.9

5.2 RAIU Active Investigations

The RAIU initiated two formal investigations into railway accidents and incidents in 2014, see Table 5-1 for more detail. 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
12th February 2014	Vehicle struck by a train at Corraun level crossing, XX024, Co. Mayo	IÉ-IM
8th June 2014	Car strikes train at level crossing XM250, at Knockaphunta, Co Mayo	IÉ-IM
N/A	Trend Investigation into SPAD Occurrences on the Iarnród Éireann Network	IÉ-IM

Table 5-1: RAIU investigations initiated in 2014

5.3 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 2014, the RAIU published 6 investigation reports which are listed in table 5-2. As a result of their investigations the RAIU made a total of 27 safety recommendations which are discussed in section 5.4.

Date Report Published	Title of Report	No. of recommendations made	Duty Holder
27th February 2014	Trend Investigation into Track Possession related Incidents	5	IÉ-IM
28th April 2014	Operational Irregularity during Single Line Working between Dundalk & Newry	3	IÉ-IM
30th July 2014	DART wrong-side door failure, Salthill & Monkstown Station, 10th August 2013	4	IÉ-RU
28th August 2014	Tram fire on approach to Busáras Luas Stop on the 7th November 2013	6	Transdev
7th November 2014	Structural failure of a platform canopy at Kent Station, Cork 18th December 2013	5	IÉ-IM
18th December 2014	Rock fall at Plunkett Station, Waterford, 31st December 2013	3	IÉ

Table 5-2: RAIU Investigation Reports published in 2014

5.4 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, 27 were made in 2014. 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.

A summary is presented below of the actions taken (at the time of writing) in relation to the six RAIU Investigation Reports published in 2014 where safety recommendations were made, and the status of each recommendation.

R2014 – 001- Trend Investigation into Track Possession related Incidents *(Report Published 27-02-14)*	
Summary: In 2012 Iarnród Éireann (IÉ) had four possession related incidents within the space of one week. These incidents led to the RAIU to initiate a trend investigation on the 27th February 2012. The scope of the trend investigation included the four aforementioned incidents and all other relevant reported possession incidents that occurred between January 2009 and January 2013. Initial analysis of these incidents identified recurring issues with possession planning therefore this investigation has focused on the management and execution of possession planning. Due to the recurring nature of these issues the RAIU have also examined how IÉ manage internal post incident recommendations previously made in the area of possession management.	
Number of recommendations made	5
Recommendation 1 (1-2014)	IÉ (Infrastructure Manager) should develop a formal possession planning meeting framework that is consistent through the IÉ network.
Action/s taken / in progress	The Civil Engineering department wrote a number of new Work instructions and these are now being used in the possession management activity.
Status	Closed
Recommendation 2 (2-2014)	IÉ (Infrastructure Manager) should review the application of Back-to-Back possessions and implement actions to eliminate any informal practices that do not comply with IÉ Rule Book.
Action/s taken / in progress	The Safety, Training and Civil Engineering departments reviewed the practice of having back-to-back possession and amended its possession management training course.
Status	Closed
Recommendation 3 (3-2014)	IÉ (Infrastructure Manager) should establish a possession planning procedure that ensures protection arrangements are based on the work

	to be delivered and are verified by a suitable member of staff and formally communicated to all relevant personnel.
Action/s taken / in progress	The Civil Engineering department wrote a new Quality Management standard together with associated work instructions.
Status	Closed
Recommendation 4 (4-2014)	IÉ (Infrastructure Manager) should monitor and review entries into Section "Engineering works requiring absolute possessions – Section T Part III" of the Weekly Circular to ensure that the information published in this document is accurate and credible.
Action/s taken / in progress	No action advised to date
Status	Open / In Progress
Recommendation 5 (5-2014)	IÉ (Infrastructure Manager) should review the current process for late changes to possessions to ensure changes to possession arrangements are verified by a suitable member of staff and formally communicated to all relevant personnel.
Action/s taken / in progress	No action advised to date
Status	Open / In Progress
Recommendation 6 (6-2014)	IÉ (Infrastructure Manager) should undertake a review of possession incidents that have occurred over the last four years to ensure that reports are completed and recommendations are identified and addressed.
Action/s taken / in progress	No action advised to date
Status	Open / In Progress

R2014-002 - Operating irregularity during Single Line Working between Dundalk and Newry

(Report Published 28-04-14)

Summary:

On Friday, 22nd March weather conditions between Dundalk and Newry were such that there was a heavy downfall of snow and localised flooding in the area, causing landslips. This resulted in degraded conditions on the railway line running cross-border between the Republic of Ireland and Northern Ireland. Single Line Working (SLW) with a Pilotman was introduced over the *Down Line*, between Dundalk and Newry, to keep the rail services operational.
On the morning of Saturday 23rd March, an operating irregularity took place in that Pilotman did not follow correct Rule Book procedures and a second train was allowed to enter the section of line where SLW was in operation.

Number of recommendations made	3
Recommendation 1 (7-2014)	IÉ should review the signalling infrastructure cross -border with a view to commissioning the bi-directional signalling.

Action/s taken / in progress	IÉ-IM and NIR Translink convened a meeting to review the commissioning of the bi-directional signalling. It was deemed that the cost involved in the project would be disproportionate to the benefits. The RSC accepted IÉ-IM's assessment.
Status	Closed
Recommendation 2 (8-2014)	IÉ should review their training, assessment and competency of signalmen and pilotmen in relation to SLW with Pilotman to ensure they are confident in performing their respective duties during SLW and are familiar with the routes covered.
Action/s taken / in progress	No action advised to date.
Status	Open / In progress
Recommendation 3 (9-2014)	IÉ should review current communication procedures with regard to the updated communication equipment now available.
Action/s taken / in progress	No action advised to date.
Status	Open / In progress

R2014-003 - DART Wrongside Door Failure, Salthill & Monkstown Station, 10th August 2013

(Report Published 30-07-14)

Summary:

At approximately 08:50 hours (hrs) on Saturday 10th August 2013 the driver of the DART service from Howth to Greystones was stopped at Salthill & Monkstown Station, when he noticed that the blue Door Interlock Light, a light used by drivers for confirmation that the passenger doors are closed, was illuminated while the rear passenger doors of the train were open. After a number of checks, the driver found that the *coupler* was damaged and the rear units of the train were incorrectly *coupled*. He contacted the Chief Mechanical Engineer's Department (CME) and the train was taken out of service and sent to Fairview Depot for inspection.

Number of recommendations made	4
Recommendation 1 (10-2014)	The Chief Mechanical Engineer's department should review and modify their design for the DART autocouplers to ensure a more robust coupler circuit that will provide assurance that both coupler electrical heads have connected correctly and that coupler circuits are continuous throughout the train consist. Any modification made should be documented in Rolling Stock Design Standards.
Action/s taken / in progress	The CME advised that the DART coupler design circuits were revised and was documented through an 'engineering change request'.
Status	Closed

Recommendation 2 (11-2014)	The CME (IÉ RU) should introduce a visual indicator on the driving console (EMU Fleet) to indicate to the driver that coupling has been completed successfully (or a visual or audible indication that coupling has failed).
Action/s taken / in progress	The CME advised that the EMU coupler design circuits were revised and this included the addition of a visual indicator in the cab. Evidence submitted to demonstrate same.
Status	Complete
Recommendation 3 (12-2014)	DART Operations (IÉ RU) should update the applicable EMU Drivers' Manuals to include specific guidance on the requirement for the examination of couplers. The update should also include guidance on associated testing of coupler integrity and guidance on any indications in the driving cab that would assist the driver in detecting any coupler failure.
Action/s taken / in progress	No action advised to date.
Status	Open / In progress
Recommendation 4 (13-2014)	The CME (IÉ RU) should review and modify the processes set out in their SMS for closing recommendations to ensure recommendations from investigations are recorded, monitored and closed. When these processes have been established, they should be audited (by a party external to the CME) at predefined intervals to ensure compliance.
Action/s taken / in progress	CME reviewed its process with the Safety Compliance Manager and have agreed its process
Status	Complete

R2014 – 004- Tram fire on approach to Busáras Luas Stop, 7th November 2013

(Report Published 28-08-14)

Summary:

On Thursday 7th November 2013 at approximately 16:30 hours (hrs) a flash fire occurred on Luas Tram 3002 as it approached Busáras Stop in Dublin City. The tram was operating a Red Line Service, travelling from The Point to Tallaght. There were no injuries as result of the fire and the damage to the Tram was minor.

Number of recommendations made	6
Recommendation 1 (14-2014)	Transdev should ensure that Alstom, as the contracted VMC, review maintenance instructions to ensure separation is maintained between hydraulic circuit and the traction cables at installation and during operation
Action/s taken / in progress	Maintenance instruction has been updated and a trial solution has been implemented

Status	Closed
Recommendation 2 (15-2014)	Transdev should ensure that Alstom, as the contracted VMC, add the interaction between the braking hoses and traction cables and the potential event of a flash fire to the hazard log of the 401 Type Tram and implement all identified mitigation actions
Action/s taken / in progress	Alstom have advised, through Transdev that the Tram Hazard log has been updated
Status	Closed
Recommendation 3 (16-2014)	Transdev should ensure that Alstom, as the contracted VMC, review the requirements for traction cables in the MIC bogie and produce and implement a suitable specification for this component. Installation procedures should also be reviewed to ensure that the free length requirements of these components are fulfilled
Action/s taken / in progress	Transdev have advised that action is being taken to affect this safety recommendation but that work is not yet complete.
Status	Open / In Progress
Recommendation 4 (17-2014)	Transdev should ensure that Alstom, as the contracted VMC, review the performance requirements for the isolation protection system in the MIC bogie to ensure that it meets the requirements of the 401 hazard log or revise the 401 hazard log accordingly
Action/s taken / in progress	A design change with regards to the cable routing has been undertaken.
Status	Closed
Recommendation 5 (18-2014)	Transdev should ensure that Alstom, as the contracted VMC, review the defect priority matrix with regards to damage to traction cable insulation and fretting between these components and hydraulic hoses. In addition to this, maintenance procedures should be introduced to specify actions for the repair of traction cables
Action/s taken / in progress	A Work Instruction has been updated that specify the actions to be taken if damaged cables are identified.
Status	Closed
Recommendation 6 (19-2014)	Transdev should ensure that Alstom, as the contracted VMC, review their incident / accident investigation process to ensure that investigations are of sufficient depth and produce clear recommendations
Action/s taken / in progress	Alstom have a robust accident/incident investigation process in place and the RSC is satisfied it is appropriate and effective.
Status	Closed

R2014-005 - Structural failure of a platform canopy at Kent Station, Cork, 18th December 2013 *(Report Published 7-11-14)*	
Summary: At approximately 15:01 hours (hrs) on Thursday 18th December 2013 the canopy over Platforms 1 and 2 at Kent Station, Cork, was exposed to unusually high winds and collapsed. The canopy consisted of a mainly timber cantilevered roof supported by seventeen cast-iron columns which were braced longitudinally by lattice girders. The design of each column included a decorative feature at the base of the column at which fourteen of the seventeen columns fractured. This feature acted as a stress raiser and therefore an inherent weak point in the design. A structural dynamics and wind loading study was undertaken by Fluvio R&D Limited (Fluvio) to determine the collapse mechanism. This work concluded that the structure initially failed at the end furthest away from the station and then the columns fractured sequentially towards the station. This model was supported by witness statements and CCTV footage. The work also calculated that a peak wind speed of between 39 metres per second (m/s) and 50 m/s would be required to initiate the collapse and concluded that speeds of this magnitude would be associated with a rare event.	
Number of recommendations made	3
Recommendation 1 (20-2014)	IÉ IM should identify all cast-iron structures on the network. From this, a risk-based approach should be taken in relation to the inspection of these assets, during routine inspections, in terms of any risks associated with cast-iron.
Action/s taken / in progress	All similar structures to that at Cork Kent Station have been identified. The RSC have requested further information and await its submission.
Status	Complete
Recommendation 2 (21-2014)	IÉ IM should establish a formalised procedure for managing the risk associated with the adverse effects of high winds.
Action/s taken / in progress	The Civil Engineering department have revised and updated its standard relating to Structural Inspections. Additionally a technical bulletin was written and briefed to all relevant staff.
Status	Complete
Recommendation 3 (22-2014)	IÉ IM should review the structural and annual inspection regimes for Buildings & Facilities (B&F) to ensure all assets are inspected in accordance with the prescribed standards and any associated documentation is completed appropriately.
Action/s taken / in progress	A new B&F compliance section has been created with new standards and work practice developed. The RSC await submission of some further evidence before closing this safety recommendation.
Status	Complete

R2014 – 006- Rock fall at Plunkett Station, Waterford, 31st December 2013 *(Report Published 18-12-14)*	
Summary: At approximately 18:45 hours (hrs) on Tuesday 31st December 2013 the *Signalman* at Waterford Central Cabin (Signal Cabin) heard a loud rumble from outside. When the Signalman went out onto the steps of the Signal Cabin to investigate, he saw that a large portion of the *rock face* running adjacent to the station had collapsed onto the two tracks which run under the Signal Cabin and through Plunkett Station (Waterford).	
Number of recommendations made	5
Recommendation 1 (23-2014)	IÉ IM CCE should complete a thorough review of CCE-STR-STD-2100 in relation to the application of condition ratings on assets to ensure that condition ratings are a true reflection of the condition of the asset; and that the appropriate inspection frequency is applied.
Action/s taken / in progress	This standard has been reviewed and has been superseded.
Status	Complete
Recommendation 2 (24-2014)	IÉ IM CCE should complete a thorough review of the Cuttings, Embankments and Coastal/River Defences Inspection Card set out in CCE-STR-STD-2100 to ensure that Structures Inspectors have the correct means to complete the card without the requirement for alterations to templates or defined terms. The process of approval of these Inspection Cards should also be reviewed to ensure that they are reviewed and approved by the STSE.
Action/s taken / in progress	Structural asset inspection cards were reviewed and have been updated and incorporated in a updated standard
Status	Complete
Recommendation 3 (25-2014)	IÉ IM CCE should complete thorough reviews of CCE-STR-STD-2100 and CCE-STR-GDN-2802 in terms of maintenance requirements to ensure consistency throughout both documents.
Action/s taken / in progress	No action advised to date.
Status	Open / In Progress
Recommendation 4 (26-2014)	IÉ IM CCE should fully adopt the compliance verification process and ensure the process includes an effective means of reviewing the quality of documents completed by staff.
Action/s taken / in progress	The Civil Engineering department have advised that the compliance verification process is being implemented and have written a 'Process Document to explain this' the RSC are considering the submitted evidence.
Status	Complete

Recommendation 5 (27-2014)	IÉ IM CCE should review its Competence Management System in terms of both: its identification and tracking of mandated refresher training for Structures Inspectors competence; and its annual review of Structures Inspectors inspection work.
Action/s taken / in progress	The Civil Engineering department have revised and updated its standard relating to Structural Inspector Competence and are implementing it.
Status	Closed

5.4.1 RAIU Recommendations Summary

Table 7 below confirms the current status of all RAIU recommendations (at the time of writing) September 2015

Year	No. of Reports	No. Of Recommendations			
		Open	Complete	Closed	Total
2006*	1	0	1	13	14
2007	0	0	0	0	0
2008	1	0	2	5	7
2009	5	0	1	12	13
2010	6	2	7	17	26
2011	6	2	10	5	17
2012	3	2	5	6	13
2013	3	4	6	0	10
2014	6	8	8	11	27
2015	2	3	1	0	4
Totals	33	21	41	69	131
Total Recommendations made to date					131

Table 5-3: RAIU Recommendations Summary

*RSC Recommendations made prior to establishment of RAIU

6. References

6.1 Documents Used

RSC (2013), “Annual Report”, Railway Safety Commission, Dublin.

ERA (2014), “Railway Safety Performance in the European Union”

ERA (2015), Common Safety Indicator Data, https://erail.era.europa.eu/ retrieved 10.09.2015