



**Railway Accident
Investigation Unit
Ireland**



INVESTIGATION REPORT

Near miss with an Iarnród Éireann Patrol Ganger near Woodlawn, Galway, 4th June 2019

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1	08/07/2020	Correction in the glossary in terms related to the Down direction and Down line.

Reader guide

All dimensions and speeds in this report are given using the International System of Units (SI Units). Where the normal railway practice, in some railway organisations, is to use imperial dimensions; imperial dimensions are used, and the SI Unit is also given.

All abbreviations and technical terms (which appear in italics the first time they appear in the report) are explained in the glossary.

Descriptions and figures may be simplified in order to illustrate concepts to non-technical readers.

Preface

The RAIU is an independent investigation unit within the Department of Transport, Tourism and Sport (DTTAS) which conducts investigations into accidents and incidents on the national railway network, the Dublin Area Rapid Transit (DART) network, the LUAS light rail system, heritage and industrial railways in Ireland. Investigations are carried out in accordance with the Railway Safety Directive 2004/49/EC enshrined in the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2014.

The RAIU investigate all serious accidents. A serious accident means any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway or tramline safety regulation or the management of safety. During an investigation, if the RAIU make some early findings on safety issues that require immediate action, the RAIU will issue an Urgent Safety Advice Notice outlining the associated safety recommendation(s); other issues may require a Safety Advice Notice.

The RAIU may investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident.

The RAIU may also carry out trend investigations where the occurrence is part of a group of related occurrences that may or may not have warranted an investigation as individual occurrences, but the apparent trend warrants investigation.

The purpose of RAIU investigations is to make safety recommendations, based on the findings of investigations, in order to prevent accidents and incidents in the future and improve railway safety. It is not the purpose of an RAIU investigation to attribute blame or liability.

Report Summary

At approximately 10:04 hours (hrs) on the 4th June 2019, the 09:30 hrs passenger service from Galway to Heuston train departed Woodlawn Station. On route to Ballinasloe Station, on a curved section of track, the driver saw a person in high visibility clothing walking on the line in the *five foot* with his back to the oncoming train. The driver placed the train brake in the emergency position and sounded the train horn to warn of the train's approach. The person identified was an Iarnród Éireann Infrastructure Manager (IÉ-IM) *Patrol Ganger* who then stepped off the track into the *cess*, approximately four seconds before the train passed. The driver brought the train to a stop and reported the incident.

The weather at the time of the incident was raining with high gusts.

The immediate cause of the incident was that Patrol Ganger was in a position of danger as the requirements of the IÉ Rule Book could not be met in full for his patrol length. Contributory factors to the incident were:

- CF-01 – The location of the incident did not have the required sighting distances available for a patrol ganger to conduct the inspection within the parameters set out in the IÉ Rule Book;
- CF-02 – The Patrol Ganger was walking in the same direction as the oncoming train;
- CF-03 – There was adverse weather conditions at the time of the incident, which may have affected the Patrol Ganger's ability to hear the train.

Underlying causes to the incident were:

- UC-01 – The IÉ-IM CCE Department Risk Assessment and Section B, Part Two of the IÉ Rule Book are not practical in the provision of protection to patrol gangers at locations with inadequate sighting distances;
- UC-02 – There appears that IÉ-IM have, over a long period of time, accepted a certain element of risk in relation to track patrolling given that known dangers are not being adequately mitigated by patrol gangers or their managers.

A root cause associated with the incident is:

- RC-01 – The mitigation measures set out in CCE-SMS-006, Hazards and Risk Assessments, is not robust in the protection of patrol gangers, given that the mitigation measures are not practical for the routine patrolling task.

As a result of this incident, the RAIU made two safety recommendations:

- Safety Recommendation 202002-01 – IÉ-IM should review its track inspection methods to see if technological/ mechanised systems and/ or other safety measures could be implemented to eliminate/ minimise track worker exposure to railway hazards whilst undertaking the task of track patrolling.
- Safety Recommendation 202002-02 – IÉ-IM should, through their risk assessment process, conduct a review of the patrol lengths, with the objective of identifying all patrol lengths with associated risks, and introducing adequate mitigation measures to eliminate these risks. Consideration should be given to the introduction of technologies (such as anti-collision devices) for use by patrol gangers, with the objective of warning patrol gangers of oncoming trains.

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RAIU Investigation

RAIU decision to investigate

- 1 In accordance with the Railway Safety Act 2005 and Statutory Instrument No. 258 of 2014 European Union (Railway Safety) (Reporting and investigation of Serious Accidents, Accidents and Incidents) Regulations 2014, the RAIU investigate all serious accidents, the RAIU may also investigate and report on accidents and incidents which under slightly different conditions might have led to a serious accident.
- 2 On the 13th February 2020, the RAIU were made aware that on the 4th June 2019 that there was a near miss with a Patrol Ganger on the Galway line. This had not been reported to the RAIU, immediately or through monthly reports. The RAIU only became aware of the incident when IÉ-IM's internal report of investigation, "Cat 1 Near Miss with a member of staff at the 95 ¼ MP Galway line on the 4th of June 2019" (Report No: R1205-2019-62), to be referred to as IÉ's Report of Investigation for the remainder of this report, was issued to the RAIU on the 13th February, despite being completed on the 22nd November 2019. Under the RAIU's guidance document, Notification of occurrences to the RAIU for Railway Undertakings (RUs), Infrastructure Managers (IMs) & other Railway Organisations (ROs)" (Version 2 published on the 5th April 2017 was live at the time of the incident) requires that "occurrences that under slightly different conditions may have led to a fatality, serious injury or extensive damage" be reported immediately.
- 3 At the time of notification, the RAIU were conducting an investigation into another near miss with an IÉ-IM staff member at Rush and Lusk Station which occurred on the 20th June 2019, which was immediately notified to the RAIU; this incident occurred sixteen days after the unreported incident.
- 4 After conducting a Preliminary Examination Report, the RAIU made the decision to conduct a full investigation into the near miss with an IÉ Patrol Ganger near Woodlawn, given that under slightly different circumstances this incident may have led to serious accident with the potential for fatality or serious injuries due to the IÉ-IM Patrol Ganger almost being struck by the train.

Scope of investigation

5 The RAIU must establish the scope of the investigation to ensure that only pertinent information is recovered and reviewed. Therefore, for this investigation, the RAIU have defined the following scope:

- Establish the sequence of events leading up to the incident;
- Establish, where applicable, the immediate cause, contributory factors, underlying factors and root causes;
- Examine the relevant elements of the IÉ Rule Book;
- Examine the relevant risk assessments and registers;
- Review the Safety Management System (SMS) documentation in relation to risk and hazard identification;
- Review any previous occurrences where IÉ staff were almost struck by trains.

Investigation and evidence

6 During this investigation, the RAIU collated and logged the following evidence:

- Footage from forward-facing closed-circuit television (CCTV) from the train;
- On train data recorder information;
- Working timetable;
- Witness evidence from parties involved in the incident;
- Documentary evidence from IÉ-IM standards, procedures and other documentation;
- IÉ-IM reports of investigations into similar occurrences.

The incident

Summary of the incident

- 7 The 09:30 hrs passenger service from Galway to Heuston train departed Woodlawn Station at approximately 10:04 hrs. On its way to Ballinasloe Station, on a curved section of track, the driver saw a person in high visibility clothing walking on the line in the *five foot* with his back to the oncoming train. The driver placed the train brake in the emergency position and sounded the train horn to warn of the train's approach.
- 8 The person identified was a Patrol Ganger then stepped off the track into the cess on the Down side, into a position of safety (see Figure 1, image taken from the forward facing closed circuit television (CCTV) of the train), approximately four seconds before the train passed. The Driver brought the train to a stop and reported a Category 1 Near Miss with the member of staff to the controlling Signaller located in the Local Control Centre in Athlone.
- 9 The weather at the time of the incident was raining with high gusts.



Figure 1 – Patrol Ganger stepping into the cess, into a position of safety

Parties & roles associated with the incident

Parties involved in the incident

10 IÉ–IM is the infrastructure manager who owns and operates the railway infrastructure in Ireland and operates under a Safety Authorisation certificate issued by the Commission for Railway Regulation (CRR). The IM Safety Authorisation is issued in conformity with Commission Regulation (EU) 1169/2010; the authorisation was renewed in 24th March 2018 for a period of four years. The IÉ-IM department involved in the incident and relevant to this investigation is:

- IÉ-IM Chief Civil Engineer's (CCE) Department - Directs the Technical Support, Business Support and Safety Sections within the Civil Engineering Department of IÉ-IM. This Department carries out the inspections and maintenance of track and structures.

11 IÉ is also the railway undertaking (RU) who owns and operates mainline and suburban railway services in Ireland and operates under a safety certificate issued by the CRR. The RU Safety Certificate is issued in conformity with European Directive 2004/49/EC and S.I. 249 of 2015; the Safety Certificate was renewed on 23rd March 2018 for a period of five years. The IÉ-RU department involved in the incident and relevant to this in investigation is:

- IÉ-RU Operations – responsible for the operation of trains on the network. This includes the supervision of train drivers.

Roles involved in the incident

12 The roles involved in the incident were the:

- *Patrol Ganger* – The Patrol Ganger has been employed by IÉ for approximately twenty years and has over ten years of service as a Patrol Ganger. He attended Patrol Ganger refresher training on the 5th March 2019; and his competence records showed that he was assessed and deemed competent in the role of Patrol Ganger and had the relevant Track Safety Co-ordinator (TSC)¹ certification. The Patrol Ganger was wearing a high visibility jacket and a railway approved hat at the time of the incident.
- *Driver* – The Driver was competent to drive trains. On the day of the incident, he booked on duty at Athlone, and his rostered shift included the 09:30 hrs passenger service form Galway to Dublin (Heuston), the train involved in the incident.

¹ According to the IÉ Rule Book, no-one other than a TSC is allowed to work alone on or near the line.

General description of the railway

Infrastructure

- 13 The incident occurred on a bi-directional single line section of track between Woodlawn and Ballinasloe at approximately the 95 ¼ Mile Post on the Dublin (Heuston) to Galway Line.
- 14 The track is plain line with flat bottom *continuously welded rail (CWR)* mounted on concrete sleepers in ballast.
- 15 The incident occurred on a curved section of track (see yellow line depicting the railway line and the location of the incident in Figure 2), where the maximum permitted line speed is 90 mph (145 km/h).
- 16 No factors in relation to the condition of the track were found to have contributed to the incident.

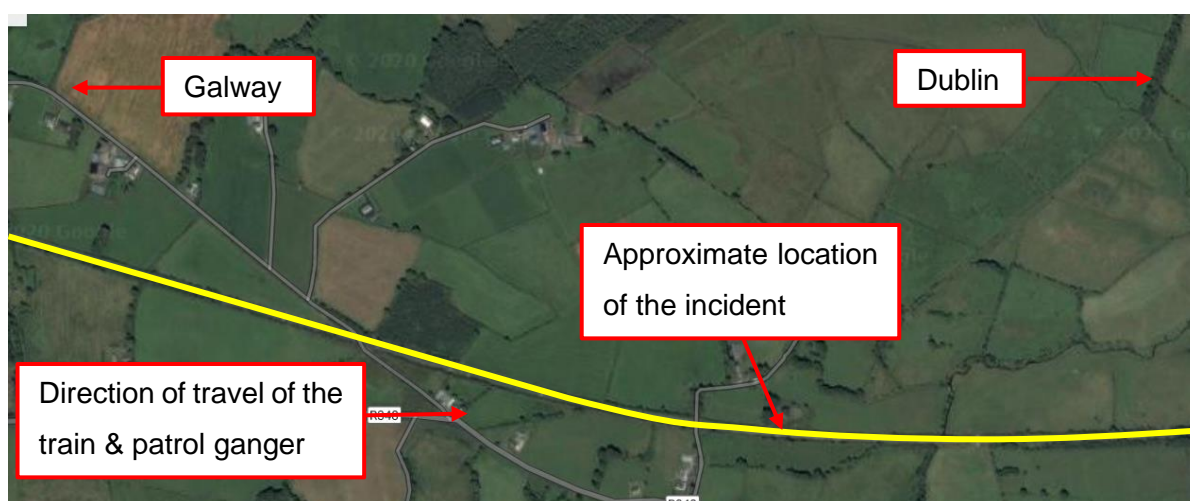


Figure 2 – Curved section of track between Woodlawn and Ballinasloe

Rolling Stock

- 17 The train involved in the incident was the 09:30 hrs passenger service from Galway to Heuston, Dublin, train ID A709. This service was operated by a four-piece 22000 class DMU Intercity Rail Car (ICR); with the train consist being 22343 (leading unit), 22443, 22543, 22243.
- 18 The total length of the train is approximately ninety-four meters with a mass of 196 tonnes. The maximum permitted speed of this train is 100 mph (160 km/h).
- 19 The speed of the train was 86.5 mph (139.6 km/h) on the approach to the curve.

- 20 The on-train data recorder indicated that the lights of the train were illuminated, and the horn was sounded: at the beginning of the curve (as there was a *whistle board* located at the curve); again at the time of applying the emergency brake; and again after the emergency brake was applied.
- 21 No factors in relation to the train were found to have contributed to the incident.

Signalling and communications

- 22 The line between Ballinasloe and Galway is signalled using two and three aspect colour light signals, controlled by the Galway Line Signaller, located in Athlone Local Control Centre. Track Circuit Block regulations apply to this route and train detection is achieved by a combination of track circuits and axle counters.
- 23 The means of communication between the train drivers and the signaller on this route is through train radio.
- 24 No factors in relation to the condition of the signalling and communications systems were found to have contributed to the incident.

Operations

- 25 Trains travelling towards Dublin, are travelling in the Up Direction. Trains travelling towards Galway are travelling in the Down Direction.
- 26 The maximum permitted line speed for this section of line is 90 mph (145 km/h) as set out in the current Working Timetable. The maximum permitted speed was increased from 70 mph (112 km/h) to 90 mph (145 km/h) in 2012. The change in speed was assessed for potential risks and all relevant staff (including patrol gangers) were briefed on the change.
- 27 No factors in relation to the operation of the trains were found to have contributed to the incident.

Fatalities, injuries & material damage

- 28 The Patrol Ganger was uninjured as a result of the incident.
- 29 There was no material damage as a result of the incident.

External circumstances

- 30 The weather at the time of the incident was raining with high wind gusts; weather data taken from the nearest Met Éireann Weather Station, which was Athenry Weather Station, 40 km from the site, recorded that there was 14.1 mm of rainfall for the day. The maximum temperature was recorded at 11.1°C. The wind speed was recorded at 6.5 knots, blowing in from the west.
- 31 Weather conditions may have impacted on the Patrol Ganger's ability to hear the train; although it should be noted that the Patrol Ganger was accustomed to working in adverse weather conditions.

Evidence

SMS Documents

CCE-SMS-001, Safety Management System

32 CCE-SMS-001, CCE Safety Management System, Version 6.0, operative since the 12th March 2018 (to be referred to as CCE-SMS-001 for the remainder of this report).

33 CCE-SMS-001 is a high-level document which sets out the: Policy, Scope & Principles; CCE Locations; Track, Structure and Building & Facilities Assets; Accountabilities and Responsibilities, Occupational Safety and Plant & Machinery Safety; Track Safety and Structures Safety; Safety Performance; and, Organisation Structure and Obligations.

34 CCE-SMS-001 also sets out the CCE Departments definitions for the following:

- Hazard – A condition, event or practice with the potential to cause an injury, damage or loss;
- Risk – The chance that harm will result from a Hazard; the combination of the severity of the Hazard with the likelihood of its happening, the probable consequence of potential harm or damage resulting from an unmanaged Hazard;
- Risk assessment – A structured assessment to identify the likelihood of a Risk event, the severity of the adverse consequences should the event come about, and the mitigating Risk control actions.

CCE-SMS-006, Hazards and Risk Assessments

General information

35 CCE-SMS-006, CCE Hazards and Risk Assessments, Version 4.0, operative since the 12th March 2017 (to be referred to as CCE-SMS-006 for the remainder of this report).

36 CCE-SMS-006 sets out the: Policy, Scope and Principles, Definition, Accountabilities and Responsibilities; and Implementation procedures associated with hazard and risk assessment.

37 Guidance is provided on how to do an occupational safety risk assessment (Section 4.5 – How to do an Occupational Safety Risk Assessment; Appendix 2 – Risk Assessment Form; and, Appendix 3 – Risk Matrix); whereby the Risk Assessment Panel, with no fewer than three people (Section 4.3 Risk Assessment Panel) conduct the risk assessment and the manager completes the mitigations and close out actions (Section 4.2.7).

CCE Department Risk Assessment

38 In line with CCE-SMS-006, IÉ-IM produced a risk assessment, entitled CCE Department Risk Assessment RA:25, V 2.0, operative from the 14th September 2017, to be referred to as CCE Risk Assessment for remainder of this RAIU report. The CCE Risk Assessment was issued for the task of track patrolling for the Athlone location; it identifies twenty-eight hazards² associated with track patrolling, see Figure 3 for an example of how the hazards are presented (S – Severity; L – Likelihood; RR – Risk Rating; T – Tolerable).

Hazard: 7	Risk:	S	L	RR	Risk Controls:	S	L	RR	T?
Inspecting during poor Weather	Slip, trip, fall. Inability to hear or see approaching trains.	2	4	8	Local knowledge essential, see Occupational Safety Features Forms for limited clearance areas and track curves. Staff to request a Lookout if they deem it necessary. Staff must take extra care during poor weather conditions. Task and weather appropriate PPE to be worn.	2	3	6	Y

Figure 3 – An example of how the hazards are presented in RA:25

39 The RAIU found that IÉ had three hazards relevant to this incident included in the CCE Risk Assessment (please note the terminology used is the IÉ-IM terminology), namely:

- Hazard 1, Train movements – The risk associated with the hazard is fatality/serious injury and the risk controls associated with this hazard include: provision of documentation to the patrol ganger, local knowledge, equipment, training and competency; and, of particular note to this incident “walk in direction facing oncoming trains, where possible” and “on single track, look up frequently”;
- Hazard 7, Inspecting during poor weather – One of the risks associated with this hazard is “inability to hear or see approaching trains”; with the risk controls including: local knowledge; lookout protection; extra care;
- Hazard 19, Track Patrolling in areas with double lines, track curves and single lines... – With the risk being fatality/serious injury. The risk controls include: provision of documentation to the patrol ganger; local knowledge; and, lookout protection.

40 Two of these risk controls refer to Lookout protection, as a result, the RAIU requested information on the number of patrol gangers accessing the track on a weekly basis and their protection arrangements.

41 The number of weekly patrols undertaken by IÉ-IM is approximately 200. Some patrol lengths are patrolled once a week, some are patrolled three times a week depending on the track infrastructure. In terms of their protection arrangements, in terms of Lookouts;

² Note, the terminology used is the terminology used in the IÉ-IM documentation

two patrol lengths at Heuston Yard and Phoenix Park are routinely walked by two patrol gangers where one is acting as Lookout.

- 42 The RAIU requested information for a three-month period (December 2019 – February 2020) in relation to track patrol requests for Lookouts; there were no requests for lookout protection from patrol gangers.
- 43 In addition, IÉ-IM's Report of Investigation into this incident states that, in terms of lookout protection, "historically this control measure has not been used frequently by Patrol Gangers while carrying out the task".

IÉ Rule Book

Introduction

- 44 The relevant sections of the IÉ Rule Book in this investigation are Subsection 2.0, Personal Safety of Section B, Part One which are outlined in paragraphs 48 and 49; and, Subsection 6.0 Instructions to Track Safety Co-ordinators of Section B, Part Two which are outlined in paragraphs 46 and 50.
- 45 These instructions set out when it is safe to work alone and what the IÉ staff member must do during the work.

When is it safe for you to work alone

- 46 The Patrol Ganger was alone while patrolling which is permissible where the Patrol Ganger is able to remain sufficiently alert for the approach of trains and be able to reach a position of safety at least 10 seconds before a train arrives (Paragraph 6.12.2, When it is safe for you to work alone of Section B, Part Two).

What you must do during the work

- 47 Paragraph 6.12.3, What you must do during the work, of the IÉ Rule Book, states that the TSC must:
- Be alert constantly;
 - Look up frequently;
 - Avoid allowing the work you are doing, or anything else, to affect your seeing or hearing approaching trains.
- 48 These should be adhered to, along with some Personal Safety requirements (2.0 Personal Safety, Section B, Part Two), such as Subsection 2.3, What you must do when walking³ on or near the line:
- You must know the permissible speed of trains and the direction(s) they normally approach (2.3.2);
 - You must be: alert constantly; look up frequently; not be distracted by anyone nearby; not reliant on anyone giving warning of approaching trains; not reliant on signals at Danger or level crossings open to road traffic as an indication that no train is approaching; able to hear by not wearing anything to affect your hearing (2.3.3).

³ Although patrolling is working, this section of the IÉ Rule Book is also applicable to Patrol Gangers.

49 Subsection 2.3.4 states that when a train approaches you must:

- Immediately move clear of all lines unless you are clearly in a position of safety and in no danger from another train approaching unnoticed;
- Raise your arm above your head to acknowledge the warning horn;
- Put any equipment you are carrying in a safe place on the ground before the train passes;
- Stay in a position of safety until the train has passed and you are sure no other train is approaching.

Sighting distance

50 In order to be able to reach a position of safety 10 seconds before the arrival of a train, Patrol Gangers must have local knowledge of the areas and know the sighting distances required. Sighting distance charts are provided in Subsection 6.11, on the Instructions to Track Safety Co-ordinators (see Figure 4, taken from IÉ Rule Book). These include the: speed (maximum speed of approaching train); distance (of which an approaching train can be seen); time (warning time).

SIGHTING DISTANCE CHART (IN METRES)

Permissible Speed (M.P.H.)	SIGHTING DISTANCES IN METRES TO PROVIDE MINIMUM WARNING TIME						
	15 sec	20 sec	25 sec	30 sec	35 sec	40 sec	45 sec
100	700	900	1200	1400	1600	1800	2100
90	700	900	1100	1300	1500	1700	1900
75	600	700	900	1100	1200	1400	1600
60	500	600	700	900	1000	1100	1300
40	300	400	500	600	700	800	900
20	200	200	300	300	400	400	400

Figure 4 – Sighting distance chart from IÉ Rule Book

51 With the maximum speed at the location of the incident being 90 mph (145 km/h); the minimum sighting distance provided for this speed is 700 m with a warning time of 15 seconds.

52 IÉ-IM took distance measurements post-incident and found that the sighting distance was 320 m (see Figure 5, taken from IÉ-IM's Report of Investigation into this incident) as opposed to the required sighting distance of 700 m.



Figure 5 – Sighting distance, as calculated by IÉ-IM

Blocked lines

53 Section B Part Two, 6.12.2, When it is safe to work alone, states that where staff cannot “reach a position of safety at least 10 seconds before a train arrives”, “you must arrange for the line(s) concerned to be blocked to all movements” (paragraph 46).

54 The RAIU requested information in relation to the weekly track patrols (approximately) and found that two patrol lengths (Loop Line Bridge and the Slab Track in Dun Laoghaire) are patrolled at night.

55 The RAIU requested information in relation to requests for line blockages in the three months from December 2019 to February 2020; there have been no requests for line blockages from patrol gangers.

56 In relation to line blockages, IÉ-IM’s Report of Investigation states that the arrangement for the line(s) concerned to be blocked to all movements “may not be practical in relation to the task of Track Patrolling due to the frequency of scheduled trains and the time required to patrol these areas”.

Track Patrolling Standard, CCE-TMS-361

57 The task of track patrolling and the responsibilities of patrol gangers are set out in the Chief Civil Engineer’s (CCE) Department, Technical Management Standard (TMS), CCE-TMS-361, Technical Standard for Track Patrolling, Version 1.8, published on the 10th January 2019 (to be referred to as Track Patrolling Standard for the remainder of this report).

58 IÉ-IM uses track patrolling⁴ and supplementary inspections by competent staff to ensure:

- Safe and reliable train operations;
- Safety of staff and members of the public;
- Safety of assets.

59 Patrol Gangers are responsible for:

- Following the Safe System of Work (SSOW)⁵, as set out in the IÉ Rule Book for track patrolling;
- Following the pattern of patrolling specified for the particular *patrol length*;
- *Inspecting* the track, related features and general *infrastructure*;
- Advising the *Permanent Way Inspector* (PWI) of any issues.

60 Patrol Gangers carry out continuous systemic examinations that include:

- Detecting and reporting unsafe conditions on or near the line;
- Taking immediate action as necessary to protect trains;
- Detecting and reporting conditions requiring remedial action;
- Carrying out minor repairs or adjustments during the inspection;
- Reporting defects dealt with during the patrol or requiring further action at the end of the patrol.

61 The Track Patrolling Standard provides information such as:

- Patrol length features (e.g. level crossing, cuttings and embankments, tunnels and stations, etc);
- Track patrolling schedules (i.e. frequency of inspections);
- Supplementary inspections (e.g. watercourse levels, inspections during adverse weather conditions, etc);
- Reporting and record keeping.

⁴ It should be noted that the task of track patrolling, under foot, is not unique to Ireland, and is not uncommon on other railways worldwide.

⁵ The Health & Safety Authority (HSA) define a SSOW as “A set of procedures according to which work must be carried out. Safe systems of work are required where hazards cannot be eliminated, and some risk still exists. When developing your safe systems of work, consider how the work is carried out and the difficulties that might arise and expose you or your workers to risk. Then develop a set of procedures detailing how the work must be carried out to minimise or reduce the risk of accident or injury”.

Events before, during & after the incident

Events before the incident

- 62 The Driver booked on duty at 06:00 hrs, his rostered shift for the day included the 09:30 hrs passenger service from Galway to Dublin (Heuston). This service departed Galway on time and serviced Athenry and Woodlawn; it departed Woodlawn, for Ballinasloe at approximately 10:04 hrs (the service is due to depart at 10:03 hrs). The weather at the time of the incident was raining with high gusts.
- 63 Track patrols are normally conducted on a Monday, except after bank holiday; the 3rd June 2019 was a bank holiday, as a result the track patrols were being conducted on the 4th June 2019.
- 64 On Tuesday 4th June, the Patrol Ganger started his patrol from Ballinasloe Station, to the 88 MP (distance from Broadstone (0 MP)), where he was collected by CCE staff and dropped at the 95 ¼ to complete his patrol back into Ballinasloe Station (his patrol length is 88 to 95 ¼ MP). Depending on the Patrol Ganger's arrival time at 95 ¼ MP, the 09:30 hrs Galway to Dublin (Heuston) train may or may not have already passed.

Events during the incident

- 65 On its way to Ballinasloe Station, the train approached a curve and the Driver sounded the train horn. While on the curved section of track, travelling at 86.5 mph (139.6 km/h), the Driver saw a person in high visibility clothing (the Patrol Ganger) walking on the line in the *five foot* with his back to the oncoming train. The Patrol Ganger was aware, through experience, that this was a dangerous curve due to the restricted views and line speed.
- 66 The Driver placed the train brake in the emergency position and sounded the train horn to warn of the train's approach. The Driver was unsure if the Patrol Ganger could hear the horn, so released and reapplied the train horn. The Patrol Ganger stepped off the track into the cess, into a position of safety (see Figure 6, images taken from forward facing CCTV on the train), approximately four seconds before the train passed (IE staff should be in a position of safety 10 seconds before the train arrives, paragraph 46).



Figure 6 – Patrol Ganger stepping into the cess & into a position of safety

Events after the incident

67 The Driver brought the train to a stop and reported a Category 1 Near Miss with the member of staff to the controlling Signalman located in the Local Control Centre in Athlone.

68 The relevant managers were informed of the incident and the Patrol Ganger was requested to attend Ballinasloe Station for post-incident drugs and alcohol testing, which returned negative from the presence of drugs and alcohol.

Similar Occurrences

69 There are no similar occurrences, whereby a patrol ganger was almost struck by a train on the IÉ network.

Analysis

SMS Documents

Summary of documents

70 CCE-SMS-001 and CCE-SMS-006 are high level documents; with CCE-SMS-006 setting out the requirements of how risk assessments should be conducted.

CCE Department Risk Assessment

71 The IÉ-IM CCE Risk Assessment identifies twenty-eight hazards associated with track patrolling; three of which are of relevance to this investigation, namely: train movements; inspecting during poor weather; and, track patrolling in areas with track curves (paragraphs 38 and 39).

72 Two of hazards include the provision of lookouts as risk controls (paragraph 40); the Patrol Ganger has never requested a lookout for track patrolling duties with the RAIU finding that lookout protection is not routinely requested by patrol gangers except in two locations (paragraph 41 and 42); IÉ-IM's Accident Investigation Unit acknowledge that "historically this control measure has not been used frequently by Patrol Gangers" (paragraph 43). In the case of this incident, the maximum permitted line speed increased from 70 mph (112 km/h) to 90 mph (145 km/h) in 2012 (paragraph 26); however, the Patrol Ganger requested no further protection measures.

73 In relation to the risk control for train movements "walk in direction facing oncoming trains, where possible"; the Patrol Ganger was familiar with the train timetable; and sometimes arrived before or after the 09:30 hrs Galway to Dublin (Heuston) train had passed. However, walking in the direction facing oncoming trains is not always practical for track patrolling in the selection of track, given that the line is bi-directional.

IÉ Rule Book

- 74 Subsection 2.0, Personal Safety of Section B, Part One of IÉ's Rule Book identifies responsibilities and requirements related to walking or working, alone, on or near the line; additional instructions for the role of TSC as set out in 6.0, Section B, Part One of the IÉ Rule Book (paragraph 44).
- 75 A key requirement for when it is safe to work alone is being able to reach a position of safety at least 10 seconds before a train arrives (paragraph 46). Also required are: being alert, looking up frequently; knowing permissible speeds of trains and directions (paragraphs 47 and 48).
- 76 The IÉ Rule Book also sets out clear sighting distances related to permissible speeds and warning times (paragraph 50). In relation to the location of the incident, for a permissible speed of 90 mph (145 km/h), the required sighting distances is 700 m; however, the actual sighting distances was 320 m (paragraphs 51 and 52). Therefore the Patrol Ganger would not be able to be in a position of safety at least 10 seconds before the arrival of a train; and the Patrol Ganger was aware that the location of the incident was dangerous due to the curve (paragraph 65).
- 77 In this case, the IÉ Rule Book allows for staff to arrange for lines to be blocked to all movements (paragraph 53). The Patrol Ganger had never requested that the line be blocked (paragraph 53); IÉ-IM's Accident Investigation Unit acknowledges that the blockage of lines is not practical in relation to track patrolling (paragraph 56); this is confirmed by the fact that the patrol gangers do not routinely request for lines to be blocked (paragraph 55).

Track Patrolling Standard

- 78 The track patrolling standard sets out the requirements for the task of track patrolling and refers back to the IÉ Rule Book for safety (paragraph 57 to 61).

Actions & inactions of the Patrol Ganger on the day of the accident

79 On the day of the incident the Patrol Ganger:

- Did wear the appropriate high visibility personal protective equipment;
- Was conducting his track patrolling duties effectively;
- Moved to a position of safety when he heard the train.

80 However, the Patrol Ganger:

- Did not request for lookout protection or the blocking of the line in order to conduct the track patrol, despite knowing that there was a dangerous curve on his patrol length;
- Did not walk in the direction facing oncoming trains.

81 Had the Patrol Ganger implemented the requirements of the IÉ Rule Book and the CCE Department's Risk Assessment, in full, on the day of the incident; he should have requested other protection measures i.e. blocking the line or lookout protection; despite not being practical (paragraph 77) or frequently used (paragraph 72), respectively.

Conclusion

IÉ-IM's suite of track patrolling documents

- 82 The IÉ CCE Risk Assessment allows for the use of lookout protection; however, the RAIU found that patrol gangers have not been using this risk control, even when there have been changes to conditions, such as changes to the permissible line speeds (paragraph 72). As a result, the mitigation measures in the risk assessment are not robust enough in the protection of patrol gangers.
- 83 The IÉ Rule Book appears to be robust in the protection of staff, if adhered to, in full; as it sets out the requirements in terms of actions on the line and sighting distances. In the case of this incident, given the poor sighting distances, the Patrol Ganger could have requested the line be blocked, however, this isn't practical in terms of operation of passenger services (paragraph 77).

Actions of the Patrol Ganger

- 84 The Patrol Ganger, was certified competent; and if had he adhered to the IÉ Rule Book, in full; he may have requested for the lines to be blocked or requested lookout protection; however, neither of these options are practical in terms of running passenger services.

Immediate cause, contributory factors, underlying causes & root factors

- 85 The Patrol Ganger was almost struck by a train near Woodlawn; the immediate cause of the incident was that the Patrol Ganger did not have sufficient time to reach a position of safety within the timeframe defined in the IÉ Rule Book as the train approached.
- 86 Contributory factors to the incident were:
- CF-01 – The location of the incident did not have the required sighting distances available for a patrol ganger to conduct the inspection within the parameters set out in the IÉ Rule Book;
 - CF-02 – The Patrol Ganger was walking in the same direction as the oncoming train;
 - CF-03 – There was adverse weather conditions at the time of the incident, which may have affected the Patrol Ganger's ability to hear the train.

87 Underlying causes to the incident were:

- UC-01 – The IÉ-IM CCE Department Risk Assessment and Section B, Part Two of the IÉ Rule Book are not practical in the provision of protection to patrol gangers at locations with inadequate sighting distances;
- UC-02 – There appears that IÉ-IM have, over a long period of time, accepted a certain element of risk in relation to track patrolling given that known dangers are not being adequately mitigated by patrol gangers or their managers⁶.

88 A root cause associated with the incident is:

- RC-01 – The mitigation measures set out in CCE-SMS-006, Hazards and Risk Assessments, is not robust in the protection of patrol gangers, given that the mitigation measures are not practical for the routine patrolling task.

⁶ Again, it should be noted that the task of track patrolling, under foot, is not unique to Ireland, and is not uncommon on other railway systems worldwide.

Measures taken since the incident

Measures taken by IÉ since the incident

89 IÉ-IM's Report of Investigation identified the immediate cause as: "The Patrol Ganger only became aware of the approach of train A709 and stepped off the track approximately six seconds before the arrival of the train". Causal factors were identified as:

- The Patrol Ganger did not have adequate viewing distance to allow him to be in a position of safety for ten seconds prior to the approach of train A709;
- The location of the near miss was on a curve with limited viewing distance in the direction of the oncoming train A709;
- The risk control of the provision of Lookout protection was not applied as is outlined in Risk Assessment RA25 Hazard 19;
- The risk control of Lookout protection was not applied as it was not considered practical for the task of Track Patrolling in this area.

90 IÉ-IM made one safety recommendation as a result of this incident: "The Chief Civil Engineer in conjunction with the Head of Health & Safety IÉ-IM should conduct an immediate full review of the risk for the potential of a Patrol Ganger to be struck by a train in the course of Track Patrolling duties. This review should explore the use of technological aids that may be available to assist in reducing risks associated with the task of Track Patrolling".

91 As a result of the recommendation, IÉ-IM have established a "Track Patrolling Safety Improvement Working Group" consisting of relevant stakeholders with the purpose of:

- Identifying the full suite of safety measures within IÉ-IM's existing documented rules and procedures for the task of track patrolling;
- Assessing the practical application of those rules and procedures to track patrol lengths throughout the IÉ network, thereafter, implementing where found to be required, and as reasonably practicable, safer systems of work.

Measures taken by the RAIU since the incident

- 92 Under the RAIU's guidance document, Notification of occurrences to the RAIU for RUs, IMs & other ROs, in place at the time of the occurrence, IÉ-IM would have been required to notify the RAIU of this incident. The RAIU have reminded the relevant parties in IÉ-IM and IÉ-RU of the importance of notifications.
- 93 In addition, the RAIU have issued IÉ-IM and IÉ-RU with the updated (Version 3) of the Notification of occurrences to the RAIU for RUs, IMs & other ROs document, which was live from the 1st January 2020; this document requires that IÉ-IM and IÉ-RU issue the RAIU with all remits of investigation.

Safety Recommendations

Introduction to safety recommendation

94 In accordance with the Railway Safety Act 2005 (Government of Ireland, 2005a) and the European railway safety directive (European Union, 2004), recommendations are addressed to the national safety authority, the CRR. The recommendation is directed to the party identified in each recommendation.

Absence of safety recommendations due to measures already taken

95 As the RAIU have briefed the relevant parties within IÉ-IM and IÉ-RU in relation to the reporting of incidents and updated their notification guidance document (paragraphs 92 and 93), no further safety recommendation is warranted.

Safety recommendations as a result of this incident

96 In relation to the near miss with the patrol ganger, a certain element of risk seems to be acceptable in relation to track patrolling; given that known dangers are not being challenged or adequately mitigated by patrol gangers or their manager (paragraph 74 and 82). Also, given the numbers of patrol lengths being foot patrolled on a weekly basis (approximately 200) without any change in process over the years, despite improvements to the railway (CWR) and increased risks due improvements in rolling stock (e.g. quieter trains). The mechanisation of plain line inspection would remove patrol staff from a large proportion of their exposure to risk and should be considered. As a result, the RAIU make the following safety recommendation (CF-01, CF-02, UC-01, UC-02 & RC-01):

Safety Recommendation 202002-01

IÉ-IM should review its track inspection methods to see if technological/mechanised systems and/ or other safety measures could be implemented to eliminate/ minimise track worker exposure to railway hazards whilst undertaking the task of track patrolling.

97 Given the scale of the above safety recommendation, in the interim, to reduce the exposure to risks to the patrol gangers, the RAIU make the following safety recommendation (CF-01, CF-02, UC-01, UC-02 & RC-01):

Safety Recommendation 202002-02

IÉ-IM should, through their risk assessment process, conduct a review of the patrol lengths, with the objective of identifying all patrol lengths with associated risks, and introducing adequate mitigation measures to eliminate these risks. Consideration should be given to the introduction of technologies (such as anti-collision devices) for use by patrol gangers, with the objective of warning patrol gangers of oncoming trains.

Additional Information

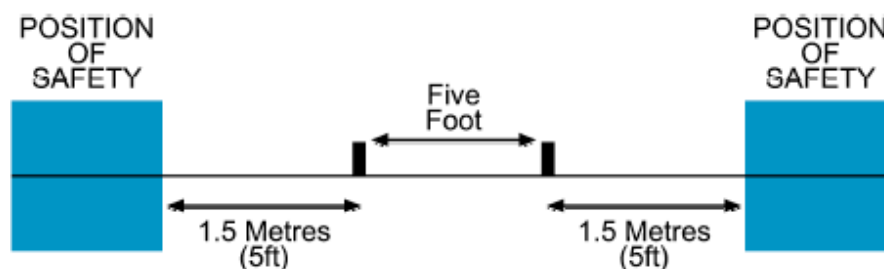
List of abbreviations

CCE	Chief Civil Engineer
CF	Contributory Factor
CRR	Commission for Railway Regulation
CTC	Centralised Traffic Control
CWR	Continuous Welded Rail
DMU	Diesel Multiple Unit
hr	hour
ICR	Intercity Railcar
IÉ-IM	Iarnród Éireann Infrastructure Manager
IÉ-RU	Iarnród Éireann Railway Undertaking
km	kilometre
m	metre
MP	Milepost
mph	Miles per hour
PWI	Permanent Way Inspector
RAIU	Railway Accident Investigation Unit
RC	Root Cause
SET	Signalling, Electrical and Telecommunications
SSOW	Safe System of Work
TCB	Track Circuit Block
UC	Underlying Cause

Glossary of terms

Accident	An unwanted or unintended sudden event or a specific chain of such events which have harmful consequences including collisions, derailments, level crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Ballast Shoulder	The ballast (crushed stones, nominally 48 mm in size and of a prescribed angularity) placed at the ends of the sleepers, timbers or bearers to give lateral stability to the track.
Cess	The part of the track bed outside the <i>ballast shoulder</i> .
Continuous Welded Rail	Sections of rail that are welded together.
Contributory Factor	Factors relating to actions taken by persons involved or the condition of rolling stock or technical installations.
Down Direction	Towards Galway.
Down Line	Line where trains are travelling towards Galway.
Extensive Damage	Damage that can be immediately assessed by the RAIU to cost at least €2,000,000 in total.
Five foot	The area between the two running rails (it is 5 feet 3 inches (1,600 millimetres ((mm)).
General Infrastructure	All features on or near the line as listed in CCE-TMS-361.
Green Zone	Is where work is arranged to take place without anyone/any group going on or near any line or siding, including in a possession, on which trains (or movements) may pass through: safeguarded, separated or fenced work sites.
Hazard	CCE-SMS-001 defines a hazard as “a condition, event or practice with the potential to cause an injury, damage or loss”.
Immediate Cause	Direct and immediate causes of the occurrence including contributory factors relating to actions taken by persons involved or the condition of rolling stock or technical installations.
Incident	Any incident, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation.

Investigation	A process conducted for the purpose of accident and incident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations
Limited clearance	Locations where there are no positions of safety. Extra care must be taken in areas of limited clearance. And you must not stand where there is limited clearance while a train passes.
Lineside	Anything within the boundary of the railway but not within 3 m (10 feet) of any track.
Lookout	A competent person whose duty is to watch for, and to give appropriate warning, of approaching trains.
Milepost	Marks distances.
On or near the line	Being within a specified distance of a defined part of track, generally 3 m (10 feet) of the outside edge.
Patrol Ganger	A person who is trained and competent to undertake patrolling duties on a specified length of track on behalf of IÉ in line with IÉ-IM standard, Track Patrolling, CCE-TMS-361.
Patrol Length	A stretch of railway to which a patrol ganger is appointed to check the day-to-day safe conditions of the track and general infrastructure.
Permanent Way Inspector	Responsible for programming and completing Permanent Way Maintenance and CCE renewal as required by standard in the area assigned.
Position of safety	A place allowing a clearance of at least 1.5 m (5 feet) between you (including anything you are wearing or carrying) and the nearest rail of any line on which a train is approaching.



Risk	CCE-SMS-001 defines risk as “the chance that harm will result from a Hazard; the combination of the severity of the Hazard with the likelihood of its happening, the probable consequence of potential harm or damage resulting from an unmanaged Hazard”.
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Risk Assessment	CCE-SMS-001 defines a risk assessment as “a structured assessment to identify the likelihood of a Risk event, the severity of the adverse consequences should the event come about, and the mitigating Risk control actions”.
Root Cause	Causes related to framework conditions and application of the SMS.
Safe System of Work	A set of procedures according to which work must be carried out. Safe systems of work are required where hazards cannot be eliminated, and some risk still exists. When developing your safe systems of work, consider how the work is carried out and the difficulties that might arise and expose you or your workers to risk. Then develop a set of procedures detailing how the work must be carried out to minimise or reduce the risk of accident or injury.
T3 Possession	A possession taken for an agreed period without the facility to run passenger trains in the area during that period until such time as the holder of the possession decides to relinquish it.
Underbridge	A bridge positioned under the railway.
Underlying Cause	Causes related to skills, procedures and maintenance.
Up Direction	Towards Dublin.
Up Line	Line where trains are travelling towards Dublin.
Whistle board	Trackside sign which indicates to a train driver that he/she must sound the horn.

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