



**Railway Accident
Investigation Unit
Ireland**



INVESTIGATION REPORT

Self-detrainment of passengers between Shankill & Bray,

24th July 2022

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Report Description

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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.

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Preface

The RAIU is an independent investigation unit within the Department of Transport (DoT) which conducts investigations into accidents and incidents on the national railway network including 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 (EU) 2016/798 enshrined in the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020; and, where relevant, by the application of the Railway Safety (Reporting and Investigation of Serious Accidents, Accidents and Incidents Involving Certain Railways) Act 2020.

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 RAIU investigation shall analyse the established facts and findings (i.e. performance of operators, rolling stock and/or technical installations) which caused the occurrence. The analyses shall then lead to the identification of the safety critical factors that caused or otherwise contributed to the occurrence, including facts identified as precursors. An accident or incident may be caused by *causal*, *contributing* and *systemic factors* which are equally important and should be considered during the RAIU investigation. From this, the RAIU may make safety recommendations 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.

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Summary

- 1 On Sunday 24th July 2022, the weather conditions were sunny and hot. It was the day of the 2022 Bray Air Display and the 2022 All-Ireland Senior Football Championship Final in Croke Park, with both events drawing thousands of people. The Iarnród Éireann (IÉ) DART network was operating at capacity with all available DART trains in service, with the exception of one on standby.
- 2 A door fault on a DART train during the morning resulted in delays to services and increased *dwell times*. This resulted in large numbers of passengers accumulating on the station platforms, many travelling with small children and buggies. When boarding, passengers were reluctant to move down into the carriages, away from the entrance doors, due to the heat onboard the trains.
- 3 IÉ staff and crowd control plans were in place at major stations on the DART line, including Bray. However, passengers accumulating at unmanned stations were left frustrated due to a lack of information at stations; and the fact that trains arriving at stations were already close to capacity. With no station staff present, and given that DART trains are driver only operated, IÉ had no way of implementing processes and procedures to manage the overcrowding on these trains.
- 4 With services getting busier, the standby DART train was brought into service; it was the 13:45 hours (hrs) Connolly to Bray service (Train E268), which departed Connolly Station late. It was followed by the 13:05 hrs Howth to Greystones service (Train E103) which also departed Connolly Station late. Train E103 was followed by the 13:25 hrs Malahide to Bray service (Train E208) which also departed Connolly Station late.
- 5 All trains were arriving at Bray Station were stopping on Platform 2. It was taking approximately eight minutes for passengers to disembark and clear the train from Platform 2 to allow the next train to stop on Platform 2.
- 6 At 14:47 hrs, the 12:46 hrs service from Malahide to Bray (Train E206) arrived at Platform 2 at Bray, and passengers began alighting from the train. The next train scheduled to stop on Platform 2 was Train E268.
- 7 At 14:49:37 hrs, as Train E268 approached Bray Station, Signal BR28 (located approximately 548 metres (m) from Bray Station) was red as Train E206 was still stopped at Platform 2.
- 8 The air conditioning was off on Train E268 (unknown to the driver (Driver E268)), and as the windows were sealed (by design) there was no *forced* or *passive ventilation* on the

train, leading to increasingly uncomfortable conditions for passengers, with reports of some passengers suffering from symptoms of *heat exhaustion*.

- 9 Driver E268 did not make any passenger announcements using the public address system when the train came to a stop. After being stopped for five minutes and thirty-two seconds, one of the passengers (Pax 1) who was travelling with young children and an older person, opened a passenger door by means of the emergency opening device, and passengers began self-detraining.
- 10 Within a minute of the door being opened, Driver E268 saw passengers on the line and made an emergency call to the Controlling Signaller.
- 11 At this stage, the 14:43 hrs Bray to Malahide (Train E804) had departed Bray Station and the Controlling Signaller instructed the driver of Train E804 (Driver E804) to stop as a result of passengers on the railway line and placed the relevant signals at danger (as a result, passengers who self-detrained were not at risk of being struck by a train).
- 12 As Train E268 was stopped, this resulted in Trains E103 and E208 also being stopped at Signals BR26 and BR26 (between Shankill and Bray), respectively. These trains did not have air conditioning but had openable windows. As these trains were stationary there was no forced ventilation and insufficient passive ventilation through the opened windows due to crowding, resulting in increasingly uncomfortable conditions for the passengers on these trains.
- 13 Passengers on delayed Trains E103 and E208 became aware that passengers had begun self-detraining from Train E268 through messaging, calls and social media (including IE's Twitter account). The drivers of the two trains (Driver E103 and Driver E208) did make announcements, however, passengers on these trains also began self-detraining.
- 14 At this stage, the drivers of all trains made announcements for passengers to remain on the trains, however, passengers continued to self-detrain.
- 15 IE staff were dispatched to the locations of the *stranded trains* and made the decision to carry out *controlled evacuations* of Trains E268, E103 and E208. Passengers on Train E804, travelling away from Bray, remained onboard, and were subject to a controlled evacuation.
- 16 It was also reported that passengers alighted from the platforms at Dalkey, Killiney and Shankill Stations and started walking on the railway line, towards Bray.
- 17 It is estimated that up to 2,000 passengers self-detrained onto the railway line.

18 The self-detrainment of Trains E268, the first train to self-detrain, was as a result of the following *causal factors* (CaF):

- CaF-01 – The weather at the time of the incident was hot and sunny and Train E268 was crowded. The air conditioning was not switched on; and there was no *remote diagnostics system* fitted to the train to alert relevant staff members that the air-conditioning was off. In addition, the windows were unopenable and exposed to the sunlight. These combined factors, coupled with the hot weather, resulted in increasingly uncomfortable conditions on Train E268 with some passengers exhibiting signs of heat exhaustion;
- CaF-02 – Passengers were on Train E268 for a prolonged length of time due to delays, prior to being stopped at Signal BR28 awaiting platform clearance;
- CaF-03 – Driver E268 did not communicate with the passengers in terms of what was happening as set out in the Professional Driving Handbook and Ontrain Customer Communications Booklet; incorrectly assuming he was not required to do so. Driver E268 had not received any information, from Centralised Traffic Control (CTC), to communicate to passengers, which in part, may be a reason for not making any announcements;
- CaF-04 – Ultimately, Pax 1's desire to get off the train, with his family, onto a live railway, outweighed the need to stay on Train E268; citing that the conditions on Train E268 were "unbearable", therefore Pax 1 opened the train doors;
- CaF-05 – Once the doors were opened, fellow passengers began self-detraining.

19 As with Train E268, passengers on Trains E103 and E208 were on the trains for a prolonged length of time prior stopping. The following causal factors are related to the self-detrainments of Trains E103 and E208:

- CaF-06 – The passive ventilation, through the opened windows, was insufficient in the crowded conditions and there was no forced ventilation as the trains were stationary resulting in increasingly uncomfortable conditions for passengers;
- CaF-07 – Drivers E103 and E208, although making some announcements, these were insufficient at deterring the passengers from self-detraining. There were also reports from passengers that the driver announcements were difficult to decipher due to poor sound quality of the public address system which led to further passenger frustration.

20 It was reported, by drivers and Garda Control (Bray) that passengers alighted from the platforms at three stations and started walking on the track towards Bray. A mother also reported that her child partially fell between the platform and the train (uninjured) as a result of issues surrounding the boarding of the trains. The RAIU have identified the following causal factor:

- CaF-08 – There was no staff on busy outlying station platforms to implement adequate station crowd control plans, including the evacuation of stations in a safe manner once the incident was underway.

21 *Contributing factors* (CoF) related to the passenger self-detraining from Trains E268, E103 and E208 are as follows:

- CoF-01 – The number of passengers self-detraining was likely as a result of the demographic of those travelling, a large number of families with babies and young children were on the trains. This may have resulted in passengers considering that risk of self-detraining was worth taking, to ensure the welfare of their children;
- CoF-02 – The trains were stopped in relatively close proximity to Bray Station (especially Train E268), the likely destination for a most passengers, meaning that passengers knew they would be able to walk to Bray Air Display after self-detraining;
- CoF-03 – It is likely that passengers on Train E103 and E208, were aware of the self-detrainment of Train E268 as a result of phone calls, messaging and social media, which may have influenced passengers in their decision to detrain;
- CoF-04 – IÉ's Twitter account continuously referred to the self-detrained passengers as "*trespassing*", which greatly annoyed some passengers on the stranded trains and may have influenced their decision to self-detrain;
- CoF-05 – When IÉ's Twitter account then tried to communicate the need for passengers to remain on the trains, the passengers did not accede;
- CoF-06 – The passengers who phoned IÉ's Emergency Line, seeking assistance, were not provided with any reassurances or useful information; which in turn would not have dissuaded them from self-detraining.

22 *Systemic factors* (SF) in relation to the self-detraining have been identified as follows:

- SF-01 – There is no Traction Manual for the 8520 Class DART fleet for drivers to refer to when setting up the air conditioning on a train resulting in Driver E268 not having a full understanding of the Heating, Ventilation & Air Conditioning (HVAC) system;

- SF-02 – There is no Safety Management System (SMS) documentation in relation to the management of crowding on trains for large spectator events;
- SF-03 – The drivers involved had not undergone the customer communications module introduced in 2018;
- SF-04 – IÉ standards and training refer to “customer-friendly” communications; however, this “customer-friendly” approach to dealing with passengers, in particular, passengers in distress (where it is of utmost importance) was not evident on the day.

23 In terms of the IÉ response to the incident, it appears that CTC thought that they could recover the situation at an early stage in terms of the management of Train E268, however, the situation continued to escalate, whereby it became unrecoverable in that Trains E103 and E208 also began self-detraining; and passengers were reported to have alighted from platforms onto the railway line, with up to 2,000 passengers on the railway line. The RAIU found the following to be causal factors:

- CaF-09 – The suite of documents related to customer disruptions and self-detrainments were ineffective on the day of the incident, with most documents not adequately addressing the risks associated with self-detrainment, (as they were reliant on reactive rather than proactive actions), leading to IÉ being completely ill prepared to manage the incident;
- CaF-10 – IÉ-Railway Undertaking's (IÉ-RU) response, by the CTC Duty Manager not declaring an *Major Customer Disruption* (MCD), meant that sufficient resources were not deployed to CTC. Although noting that the incident was an escalating situation rather than an immediate major incident, there was no shared awareness of the circumstances in order to recognise that a minor operational occurrence had the potential to develop into a major incident.

24 There were no contributory factors identified in terms of the response to the incident.

25 There is a dearth of documentation associated with the risk of self-detrainments and as such, adequate control mechanisms could not be adopted; despite the risk of self-detrainments being a reasonably foreseeable risk as a result of a self-detrainment at Dun Laoghaire in 2017. The RAIU have identified the following systemic factors in terms of the response to the incident:

- SF-05 – The RAIU issued safety recommendation 2018001-003 on the 15th August 2018, which reads “IÉ-RU should review their suite of documents which reference major customer disruptions and emergencies and address any deficiencies in relation

to the management of passengers on trains and uncontrolled impromptu evacuations. These documents should then be briefed to staff who have roles in relation to customer disruptions and emergencies to ensure they are aware of their responsibilities”; had this safety recommendation been addressed with the vigour that was warranted, the incident may not have escalated;

- SF-06 – In addition, had IÉ addressed, in full, the recommendations set out in their internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, published on the 27th September 2017, which included: a requirement to update the MCD Response Handbook and the formation of a rigorous customer disruptions training exercise to ensure appropriateness, preparedness and compliance in the event of any future disruptions, the incident may not have escalated;
- SF-07 – There is no requirement for more senior members of IÉ staff to be present in CTC during major events;
- SF-08 – Many IÉ-RU documents, which should reference self-detrainment, do not adequately address the risks associated with self-detrainments, including: Local Emergency Plan for Bray Station; Passenger Comfort Risk Register; Emergency Scenario Response Risk Register; MCD Response Handbook;

26 Although not causal, contributing, or systemic to the incident, the RAIU make the following additional observations (AO):

- AO-01 – From the advertising, the passengers are likely to have had an expectation that their train journeys would be managed appropriately, with staffed stations and platforms, etc, leading to passenger frustrations. However, the events of the day, described in this report, do not reflect this, and the frustrations of the passengers increased significantly throughout the incident;
- AO-02 – IÉ-RU verified that the public address systems were operating in accordance with their own standards. However, a number of complaints were made to IÉ Customer Care Department in relation to the public announcements system on the trains in terms of volume;
- AO-03 – Manager CTC & Train Performance was not included in the planning in terms of platform allocation for incoming trains into Bray Station which may have minimised shunting of trains and passenger detraining times;
- AO-04 – There are no instructions for drivers, in the IÉ Rule Book in relation to self-detrainments or stranded trains;

- AO-05 – Passengers experienced difficulties during the evacuation process, when walking over the trespass guards; this issue is not addressed in the existing Train Evacuation Briefing Notes or any emergency documentation;
- AO-06 – Although, it is noted that IÉ were acting in what they considered the best interests of passengers, IÉ failed to comply with directions given by members of An Garda Síochána; this is likely as a result of no formal established procedures;
- AO-07 – IÉ's internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, made eight recommendations; the status of which could not be verified, in a timely manner, by IÉ;
- AO-08 – Only half the stations enroute to Bray were staffed, with reports of crowding at stations and issues boarding trains; with no Persons In Charge of Platform (PICs) present to manage the passenger flow.

27 The RAIU have made the following safety recommendations as a result of the incident and additional observations:

- Safety Recommendation 2023005-01 – IÉ-RU Head of Health & Safety, in conjunction with the Chief Mechanical Engineer's Department (CME), should develop Traction Manual for the entire 8500 Class DART fleet; this should include guidance on the air conditioning. Once complete, this should be briefed to drivers to ensure drivers fully understand how the air conditioning operates;
- Safety Recommendation 2023005-02 – IÉ-RU Head of Health & Safety should include a check that the heating, ventilation and air conditioning systems are operational in the train preparation instructions;
- Safety Recommendation 2023005-03 – IÉ-RU should update its Passenger Comfort Risk Register to adequately address the issues related to crowding on trains (with special consideration given to crowding during adverse weather conditions). Based on this, IÉ-RU should develop an operational SMS document for the management of crowding on trains;
- Safety Recommendation 2023005-04 – IÉ-RU should conduct a full review of how crowding at outlying stations is managed during major events, including reviews to local crowd control plans, PTI and train dispatch documentation; to ensure that the relevant stations are staffed appropriately to adequately manage the passenger flows;

- Safety Recommendation 2023005-05 – IÉ-RU should review its planning and management processes for large events, considerations should be given to:
 - How and what information is provided to passengers prior to the event (such as information in relation to predicted scale of passengers using the trains and likely conditions for their journey in order to manage passengers' expectations);
 - How passengers' expectations are managed for the duration of the event (such as using real time information and making this freely available through passenger announcements at stations and on the IÉ App and social media accounts);
- Safety Recommendation 2023005-06 – IÉ-RU should review its Ontrain Customer Communications Booklet and Professional Driving Handbook, and provide drivers with additional training, to enhance driver communications with passengers. The documentation and training should consider best practice and, at a minimum, the following requirements:
 - An initial announcement to be made within a specified short period of time, even if the reason for the delay is not known at that point;
 - A further announcement to be made as soon as further information is available about the cause and likely consequences of the delay;
 - Further announcements, at specified intervals, should be made whenever new facts suitable for informing and/or reassuring passengers become available;
 - In critical conditions, announcements should be made to dissuade passengers from detraining, these should include making announcements highlighting the risks involved with detraining and their safest option is to remain on the train.
- Safety Recommendation 2023005-07 – IÉ-Infrastructure Manager (IÉ-IM) should carry out a review to determine the suitability of direct messaging (visually and/or verbally) from CTC directly onto trains, consideration should be given as to whether it would improve onboard passenger communications;
- Safety Recommendation 2023005-08 – IÉ-RU should consider developing processes, in the case of emergency situations, to provide information through social media channels; these communications must be customer-friendly in order to encourage passengers to follow any directions given.
- Safety Recommendation 2023005-09 – IÉ-IM should develop suitable instructions and guidance for operational staff at CTC to help them determine when a train should be considered as stranded (consideration should be given to the proximity of the stranded

train to a station); the timeframe within which this needs to be declared and the actions that then need to be taken must be set out. Where appropriate, these instructions and guidance should be included in the IÉ Rule Book and relevant associated documentation;

- Safety Recommendation 2023005-10 – IÉ-RU should review their suite of documents which reference major customer disruptions and emergencies (in particular, in terms of stranded trains) and address the management of passengers on these trains. Considerations should be given to, but not limited to, the effective development of the following:
 - A common understanding and shared awareness of the circumstances in order to recognise when minor operational occurrences have the potential to develop into major incidents unless decisions are taken in a timely and decisive manner;
 - Effective communication and information sharing arrangements between the controlling signalman/ traffic regulators to the driver/s;
 - Assist driver/s in managing, informing and reassuring passengers in order to encourage passengers to stay onboard the train/s;
 - Anticipate and understand the needs of passengers in a train stranding situation (information, air conditioning, etc.) and to focus action plans accordingly;
 - Anticipate the need to provide on-site support to drivers of such trains in managing passengers' needs;
- Safety Recommendation 2023005-11 – IÉ-IM, and IÉ-RU, should review and formalise its processes for the attendance and allocation of staff requirements at CTC for major events, to determine what members of staff need to be present;
- Safety Recommendation 2023005-12 – IÉ-RU and IÉ-IM should carry out an incident simulation in terms of a scenario involving an incident with the potential for self-detrainment. As part of this simulation, the relevant stakeholders (An Garda Síochána, Dublin Fire Brigade, etc.) should be invited to participate. Any lessons learnt such be adopted into the relevant guidance documents;
- Safety Recommendation 2023005-13 – IÉ-RU should review its high level emergency preparedness, crowd control plans, risk assessments, train evacuation briefing notes and all other relevant document to include guidance on self-detrainments. Once complete, they should be circulated to the relevant departments and stations, for briefing;

- Safety Recommendation 2023005-14 – IÉ-RU CME should carry out an assessment on the quality of the public address systems on EMUs against good practice standards and address any deficits;
- Safety Recommendation 2023005-15 – IÉ-RU Health & Safety should ensure that train preparation instructions should include a check that public address systems are working prior to trains entering service;
- Safety Recommendation 2023005-16 – IÉ-IM & IÉ-RU should review the suite of documents in relation to the planning of large events to ensure that all key personnel are involved in the planning of events;
- Safety Recommendation 2023005-17 – IÉ-IM should update the IÉ Rule Book to include instructions for drivers in the event of self-detrainment and/ or stranded trains; these requirements should then be incorporated into the relevant associated documents;
- Safety Recommendation 2023005-18 – IÉ-IM should develop procedures for the evacuation of passengers over trespass guards, these should then be included in the Train Evacuation Briefing Notes and other relevant documents which reference evacuations;
- Safety Recommendation 2023005-19 – IÉ should engage with the relevant parties of An Garda Síochána to ensure that there is a shared understanding at CTC of when and how instructions from An Garda Síochána should be complied with. This can be practiced through IÉ-RU incident simulations where An Garda Síochána are in attendance;
- Safety Recommendation 2023005-20 – IÉ-IM and IÉ-RU should develop a system whereby internal recommendations as a result of safety related incidents are logged with an allocated timeframe, and the actions taken verified, and the status recorded.

28 As a result of measures taken since the incident, some safety recommendations are not warranted (this information is outlined in paragraphs 360 to 403 and 406 to 414, respectively).

RAIU Investigation

Decision & motivation to investigate this occurrence

- 29 On the 24th July 2022, the RAIU on-call investigator received a notification that self-detrainments were occurring, near Bray.
- 30 The incident is identified as the first self-detrainment of Train E268, after which Driver E268 made an emergency call to the Controlling Signaller, who then stopped Train E804, travelling in the opposite direction and provided signal protection to stop all traffic meaning that self-detrained passengers from Trains E268, E103 and E208 were not at risk of being struck by a train. However, the RAIU as part of the investigation considered the *thermal comfort* of passengers on all stranded trains and consider that the incident only ended after the controlled evacuation of Train E804.
- 31 The RAIU conducted a preliminary examination and the RAIU's Chief Investigator made the decision to conduct a full investigation into the incident, given the seriousness of the incident and its impact on railway safety (*Article 20 (2)(c))* of Directive (EU) 2016/798 of the European Parliament, Article 20, Obligation to Investigate), as under slightly different circumstances, the evacuated passengers from Train E268 may have been struck by other passing trains; which may have led to a serious accident with the potential for fatalities or serious injuries.

Scope & limits of investigation

32 The RAIU have established the scope and limits of the investigation as follows:

- Establish the sequence of events before, during and after the incident;
- Identify any other precursors which led to the incident;
- Establish, where applicable, causal, contributing and systemic factors;
- Examine the relevant Safety Management System (SMS) documents, and other relevant documents, in terms of operation, standards and manuals in place which could have prevented the occurrence;
- Examine the performance of the trains involved in the incident;
- Examine the human factors aspects of the actions of the passengers.

Technical capabilities & investigation methods

33 The RAIU's Chief Investigator allocated RAIU Senior Investigators, trained in accident investigation, to conduct this investigation, as appropriate. In this instance, no external parties were engaged by the RAIU to assist with the investigation.

34 During the investigation, the RAIU collate evidence through the submission of Requests for Information (RFIs). Related to this investigation, the RAIU collated and logged the following evidence for analysis:

- Voice communications involving IÉ-RU and IÉ-IM staff, including drivers, the Controlling Signaller, Traffic Regulators, staff members on scene, Station Managers, etc.;
- Voice communications between IÉ-IM staff (CTC) and passengers on board the stranded trains and emergency services who called the IÉ Emergency Line;
- 155 customer complaints, which were reported into IÉ Customer Care Department, in relation to the incident. The RAIU were able to use the information in these complaints in relation to the events which happened on the train carriages and platforms;
- Documentation in relation to emergency preparedness, emergency response, crowd control, evacuations, etc;
- Documentation in relation to event planning;
- IÉ Rule Book;

- Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, published internally by IÉ on the 13th September 2017;
- Major Customer Disruption Response Handbook, Version 1, published in 2014;
- IÉ-RU's Professional Driving Handbook, Issue 4, published in October 2014;
- Ontrain Customer Communication Booklet, the date of issue is not available but was in place at the time of the occurrence;
- IÉ-RU SMS document, Crowd Control, Issue 1, operative since 7th November 2017;
- Risk Register, Passenger Comfort, Version 8.0, which, at time of the occurrence, was last reviewed on the 15th February 2022;
- Local Emergency Plan for Bray Station, Issue 1, operative since the 13th July 2022;
- Bray Station Crowd Control Plan, Version 6.0, issued in May 2016;
- Emergency Preparedness, Ops-SMS-2.2, Issue 1, operative since the 18th June 2018;
- SMS document, Policy and Principles for Emergency Response, RU-SMS-012, Issue 1, operative since the 16th October 2017;
- Emergency Scenario Response Risk Register, Version No. 8, 23rd February 2022;
- Train Evacuation Briefing Notes, Issue 1, operative since the 1st April 2019;
- Professional Train Dispatchers Handbook, issued 2020;
- Ops SMS 1.5 Policy and Principles for the Management of Train Dispatch and Platform Interface Risk, Issue 1, operative since the 30th October 2017;
- Appendix C, Ops SMS 1.5, Platform Train Interface Risk, High Risk Platforms, effective 30th October 2017;
- RAIU investigation report, Derailment of DART passenger service, at Points DL115, Dun Laoghaire, 13th September 2017, RAIU Report No: R2018 – 001, published on the 15th August 2018;
- CRR RAIU Safety Recommendation Tracking excel spreadsheet.

35 In addition, research and guidance, from the United Kingdom (UK), was reviewed to assess factors which influence and contribute to passengers' actions on stranded trains, in relation to weather conditions, the documents considered are as follows:

- Research into the management of passengers on trains stranded in high ambient temperatures, which was published in 2006 following a 2005 self-detrainment in the UK by the Rail Safety and Standards Board's (RSSB)¹ operations research programme (to be referred to as RSSB Research document);
- RDG² and Network Rail³ Guidance Note: Meeting the Needs of Passengers Stranded on Trains, RDG-OPS-GN-049, Issue 5⁴, published in November 2020 by the Rail Delivery Group (National Rail) & Network Rail.

¹ Rail Safety and Standards Board is a not-for-profit company owned by major railway industry stakeholders. Their core purpose is to actively help the industry work together to drive improvements in Great Britain's rail system.

² The RDG is a membership organisation that works on behalf of the rail industry to create a simpler, better railway; their members are the train operating companies that make up the rail industry across Great Britain. The RDG produces Guidance Notes for the information of its members. RDG is not a regulatory body and compliance with RDG Guidance Notes and Approved Codes of Practice is not mandatory; they reflect good practice and are advisory only.

³ Network Rail Limited is the owner and infrastructure manager of most of the railway network in Great Britain.

⁴ It should be noted that this is the fifth version of the document, the document was first issued in December 2011. The document is reviewed on a regular three year cycle or earlier, if required.

Communications, consultation & co-operation

- 36 Communications were conducted through established processes (such as RFIs).
- 37 Relevant stakeholders were issued the draft investigation report for comment, comments were reviewed and responses on their comments returned. In this instance the stakeholders were: IÉ-RU, IÉ-IM and the CRR⁵.
- 38 All relevant parties co-operated with the RAIU investigation, however, despite the best efforts of the IÉ-RU and IÉ-IM Safety Teams, the responses to RFIs were late or incomplete, as a result of the requested information not being returned to them in a timely manner from staff outside the relevant safety departments. In addition, the internal IÉ-RU report was issued to the RAIU over two months late⁶.

Other stakeholder inputs

- 39 An Garda Síochána, stationed at Bray, were present during the day and responded to the incident.
- 40 Wicklow County Fire Service had a fire engine crew on duty at Level Crossing XR011, adjacent to Bray Station (see paragraph 92) due to the Bray Air Display. During the incident, the fire crew responded, on foot, to the railway line to assist passengers. Two fire engines and crews from Dublin Fire Brigade also attended the site.
- 41 Three emergency ambulances, from the National Ambulance Service, responded to the incident, supported by a number of rapid response units (see paragraph 51 in terms of numbers of patients treated).
- 42 The Irish Coast Guard were also on duty at Bray, and also responded to the incident.

⁵ The CRR is the National Safety Authority for Ireland.

⁶ Under the “Investigations by railway undertaking” section of the Railway Safety Act 2005, it states that a railway undertaking shall, in an expeditious manner, carry out an investigation and shall, as soon as practicable but in any event not later than six months after the date of the incident, prepare a report on its findings. Where the railway undertaking is of the opinion that the report cannot be completed in six months, the railway undertaking shall notify the CRR together with its reasons for reaching such opinion and shall provide an indication of the revised period for the completion of the report.”

Description of the occurrence & background information

Occurrence type

43 In terms of occurrence type, the EU Agency for Railways categorisation for this occurrence, the impromptu self-detrainment of passengers onto an operational railway line, would be considered an: Incident – Traffic Operations & Management.

Date, time & location

44 On the 24th July 2022, between 14:55 hrs to 17:13 hrs, passengers from four DART services detrained (one of which was a controlled evacuation by IÉ staff), between Shankill (County Dublin) and Bray (County Wicklow) Stations. In addition, it was reported⁷ that there were three stations where passengers alighted from the platforms onto the railway line at Killiney Shankill and Dalkey (all Dublin) and walked towards Bray (Figure 1).

45 It is estimated that approximately 2,000 to 2,500 passengers were onboard Trains E268, E103 and E208, many of which self-detrained. Train E804, travelling out of Bray, had approximately fifty passengers onboard. Combined with the passengers that alighted the station platforms, it is estimated that up to 2,000 passengers were on the line.

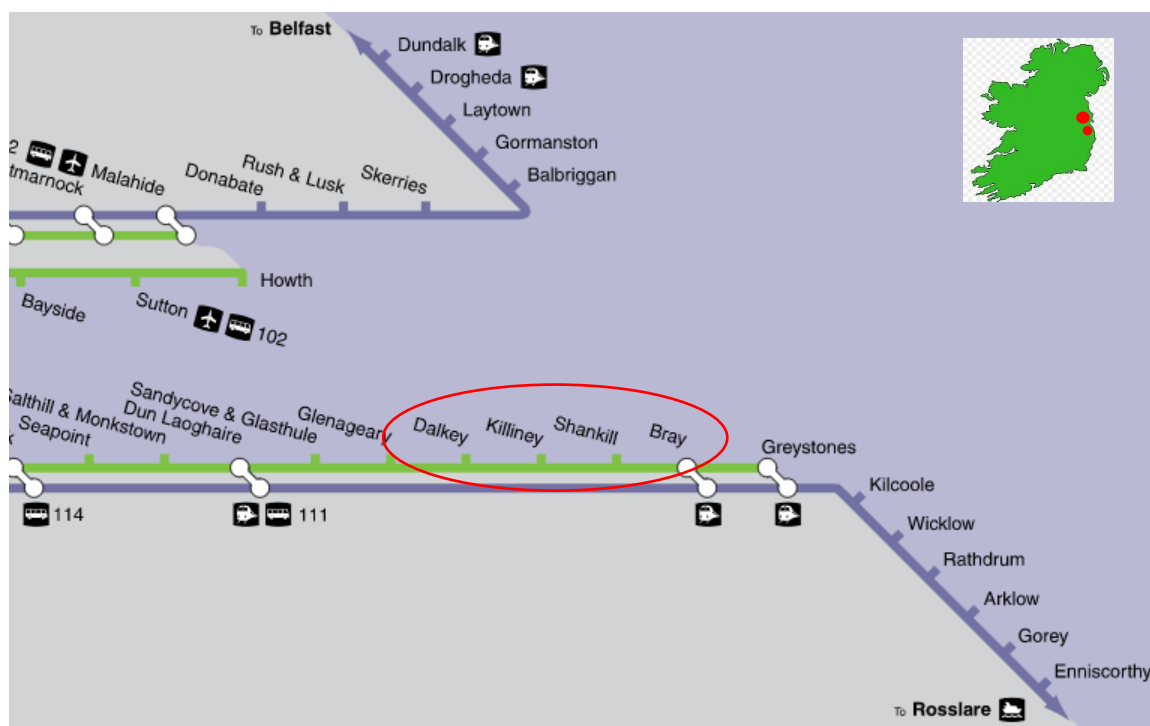


Figure 1 – Location of the incident (circled)

⁷ Reported by drivers at Dalkey and Killiney and Garda Control (Bray) in relation to Killiney.

Description of the background activities

Activities in the vicinity of the occurrence site

- 46 The Bray Air Display, also sometimes known as the Bray Air Show, is an air show which takes place in Bray, during a weekend in July. Typically a two-day events, however, in the case of the incident it was planned as a one day event on Sunday 24th July 2022, after being cancelled due to COVID-19 the previous two years. The event is held on the seafront, with planes flying over the Irish Sea, flanked by Bray Head to the south. The show is part of the town's Summerfest, with amusements and food and drink stands on the seafront.
- 47 Previous attendance figures, in recent years, for the two day event were 140,000 (2017), 30,000 (2018) and 80,000 (2019), with the numbers predicted in 2022 to be 45,000⁸. Also, of note was that the Red Arrows, one of the world's premier aerobatic display teams, were performing a display as part of the 100th anniversary of the Irish Air Corps. celebrations. The Red Arrows normally generates further spectators.
- 48 Also taking place on the 24th July 2022, was the men's All-Ireland Senior Football Championship Final in Croke Park, a stadium with a capacity of over 80,000.
- 49 To note, COVID-19 restrictions had been in place in Ireland from 2020 to 2020, with the majority of restrictions, including mandatory mask wearing and social distancing, eased in January and February 2022, five months before the incident.

Weather

- 50 The weather at the time and location of the occurrence was hot and sunny with temperatures approximately 24°C, which was one of the hottest days in July 2022. The weather had a significant impact on the events of the day.

⁸ These numbers are predicted by the stakeholders using factors such as car parking sales organised through the Bray Air Display event management, etc.

Deaths, injuries & material damage

- 51 There were seventeen passengers treated by responders from the National Ambulance Service as a result of the incident, for symptoms of heat exhaustion and minor injuries sustained during the self-detrainments.
- 52 In a call to the IÉ Emergency Line, after the occurrence, the passenger (Pax 1) who forced open the door on Train E268 (the first train to detrain) reported that he injured his hand.
- 53 There was no material damage to trains or infrastructure as a result of the occurrence.

Description of other consequences

- 54 There were thirty-one trains delayed on the day as a result of the occurrence. There was a total of 347 primary and 1,065 secondary delayed minutes as a result of the incident.

Parties, roles & duties associated with the occurrence

Parties & roles directly involved in the occurrence

IE-RU

55 IE-RU is the railway undertaking who owns, maintains 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 (valid at the time of incident). The main department directly relevant to the investigation is IE-RU Operations (Ops), who are responsible for the operation of trains on the network; this includes the supervision and competency assessment of train drivers.

IE-IM

56 IE-IM is the infrastructure manager who owns, maintains and operates the railway infrastructure in Ireland and operates under a Safety Authorisation certificate issued by the CRR. The IM Safety Authorisation is issued in conformity with Directive (EU) 2016/798, S.I. No. 476 of 2020 and Commission Regulation (EU) 2018/762; the authorisation was renewed on the 24th March 2022 for a period of five years. The main IE-IM department involved in the incident is Infrastructure Manager Operations – Responsible for the operations, performance and control of signalling and level crossing staff; and the control of train movements through CTC and regional controlling signal cabins.

Passengers

57 The day of the incident was a Sunday was a warm sunny, and as the Bray Air Display was on, there were a lot of families and other vulnerable passengers travelling on the DART train services. IE-RU identify vulnerable passengers as: elderly passengers; passengers with disabilities or sensory/ cognitive impairment; passengers travelling with infants/ young children; pregnant passengers; passengers whose judgement may be impaired as a result of medication, drug or alcohol consumption and crowds pre and post event (match or concert).

58 On the lead up to the Bray Air Display both the event organisers (on brayairdisplay.com/getting-here/) and IÉ-RU (through advertising)⁹ encouraged passengers to travel by train to the event. Advertising, prior to the Bray Air Display promoted the use of DART trains as a means of travel. This may have prompted passengers to think that their train journeys would be managed appropriately, with staffed stations and platforms. However, the events of the day and the evidence reviewed, shows that passengers were frustrated, and this frustration increased significantly throughout the day.

External Parties

59 An Garda Síochána, Irish Coast Guard and Dublin Fire Brigade responded to the incident.

60 Garda Control (Bray) and Dublin Fire and Ambulance Centre contacted the IÉ Emergency Line.

⁹ As a result, the RAIU consider this a safety recommendation, AO-01 (paragraph 359), which warrants a safety recommendation, Safety Recommendation 2023005-05 (paragraph 418).

Roles involved in the occurrence

61 There were four DART drivers involved in the occurrence, all employed by IÉ-RU in the DART District; and all of which were issued with a valid certificate of competency and Train Driving Licences. There were no issues arising from the competence assessments for any of the drivers. The dates for the last competencies are as follows:

- Driver E268 – Competent to perform driving duties and was issued with a certificate of competence on the 11th December 2020 which is valid for two years.
- Driver E103 – Certified as competent to perform driving duties and was issued with a certificate of competence on the 13th May 2021 which is valid for two years.
- Driver E208 – certified as competent to perform driving duties and was issued with a certificate of competence on the 23rd June 2022 which is valid for two years.
- Driver E804 – Certified as competent to perform driving duties and was issued with a certificate of competence on the 25th November /2020 which is valid for two years. Driver E804 was also the driver of Train E206.

62 At Bray Station, there were thirty-five IÉ-RU Operations staff rostered throughout the day (an increase on normal rostered staff as a result of the Bray Air Display), including: Acting Station Manager Bray¹⁰; Acting District Manager (ADM) DART; Station Controller. There were additional staff from IÉ Revenue Protection Unit present at the ticket validators to assist with the movement of passengers to and from the station platforms. In terms of security there were ten staff contracted by IÉ; and for crowd control, there were an additional twelve contracted by IÉ¹¹.

63 The staff involved in CTC included the:

- Controlling Signalman – Responsible for setting of signals on the DART route;
- Mainline Traffic Regulator – Responsible for delivering a punctual DART train service in accordance with the timetable and to deal with any service recovery situations. Mainline Traffic Regulators are also responsible for manning the IÉ Emergency Line (a number used by customers/ passengers and emergency services to contact CTC in the event of an emergency);
- CTC Duty Manager – Overall control over CTC.

¹⁰ On-site from 07:00 hrs on the 24th July 2022 and remained on-site until approximately 22:00 hrs.

¹¹ The staff were rostered; therefore they were allocated work and breaks at appropriate times.

64 Persons involved at the incident sites:

- District Traction Executive (DTE) – Travelling on Train E804, when the DTE became aware of the situation, he attempted to recover the situation on the ground in relation to the self-detraining of Train E268;
- Acting Station Manager Bray – Was onsite after the detrainments and notified the Suburban Traffic Regulator that decisions had been made to carry out controlled evacuations;
- IÉ staff that were rostered at Bray Station and surrounds assisted with the response;
- Emergency services.

65 During the response phase the Director IÉ-RU and Manager CTC & Train Performance were present in CTC.

Parties indirectly associated with the occurrence

66 The CRR is the national safety authority (NSA) for Ireland and is responsible for the regulatory oversight of the application and effectiveness of railway organisation's SMS and enforcement of railway safety in the Republic of Ireland in accordance with the Railway Safety Act 2005 and the European Railway Safety Directive.

Rolling Stock

General description of trains involved in the occurrence

- 67 The trains involved in the occurrences were Electrical Multiple Units (EMUs) that operate the DART service from Malahide/Howth to Greystones.
- 68 The 8100 EMU fleet are two car sets with both bogies of the motor car providing traction and the second car in the set comprising of two non-powered bogies. The two cars set can be coupled to additional units to give a maximum eight cars in service. Six cars give an approximate length of 123 metres and a weight of 207 tonnes.
- 69 The 8500 EMU fleet is subdivided into 8500, 8510 and 8520 types. The fleet are four car sets, two sets can be coupled to give a maximum eight cars in service which is approximately 163 metres in length and weighs 400 tonnes.
- 70 The five trains referenced, in direct relation to the incident, were operated by the following rolling stock:
- Train E206 – Six car 8100 consist (8302 (leading), 8102, 8305, 8105, 8312 & 8112);
 - Train E268 – Eight car 8520 consist (8621 (leading), 8521, 8526, 8626, 8625, 8525, 8522 & 8622);
 - Train E103 – Six car 8100 consist (8115 (leading), 8315, 8138, 8338, 8117 & 8317);
 - Train E208 – Eight car 8500 consist (8602 (leading), 8502, 8501, 8601, 8611, 8511, 8512 & 8612);
 - Train E804 – Eight car 8510 consist (8615 (leading), 8515, 8516, 8616, 8604, 8504, 8503 & 8603).
- 71 The maximum permitted speed for DART trains is 100 kilometres per hour (km/h).

Passenger capacity

- 72 The passenger capacity for a single 8500, 8510 and 8520 carriage is forty passengers seated and between 175 and 198 standing¹², totalling between 215 and 238¹³.
- 73 The passenger capacity for a single 8100 carriage is sixty-four passengers seated and 137 passengers standing, totalling 201 passengers.

¹² Dependent on the car type.

¹³ With a passenger's average mass at 71.5 kg; and a passenger density of six passengers per square metre.

Remote diagnostics system

- 74 There is no remote diagnostics system fitted to the EMU fleet. A remote diagnostics system collects on-train data from key systems and then reports this information live through a web browser based system to key personnel. The diagnostics platform is rules based and can report alerts for certain occurrences or events.
- 75 For information, a remote diagnostics system, supplied by Nexala, is fitted to the 22000 InterCity Railcar (275 vehicles), 29000 Diesel Multiple Unit (116 vehicles), MKIV Carriages (67 vehicles) and 201 Locomotive (24 vehicles) fleets. The Class 22000, 29000 and MKIV fleets have their HVAC status monitored and the MKIV and 22000 fleets are monitored for excessive heat¹⁴.

Heating, Ventilation & Air Conditioning (HVAC) Systems

General description

- 76 Air conditioning is available on the 8520 EMU fleet only, with sealed windows which cannot be opened to ensure air conditioning efficacy, see Figure 2 for example of windows on 8520 EMU. Of the five trains involved in the occurrence only one train, Train E268, was fitted with air conditioning.



Figure 2 – Sealed windows

¹⁴ Note: The new DART fleet will have a remote diagnostics system fitted (paragraph 409).

- 77 All other EMU trains have conventional heating and openable windows (hopper windows) in the saloon. Not all windows are openable.



Figure 3 – 8100 hopper windows

Post-incident inspection of the HVAC System on Train E268

- 78 When CME maintenance personnel arrived at Train E268 to help they checked the function of the air conditioning system and found that it was switched off and no faults were detected on the fault indicator panel onboard the train. Further testing at Fairview Maintenance Depot later on the 24th July 2022 indicated that there were no faults with the air conditioning system, and it was most probably off¹⁵.
- 79 It was identified that the air conditioning fans were operating on the morning of the 24th July in Fairview Depot after the train was prepared for service (verified by CCTV). After the train was prepared, Driver E268 boarded the train at the Dublin end and observed the green light air conditioning light illuminated on the driver's console, indicating that the air conditioning was on. Train E268 was then driven into Fairview Depot towards Connolly Station and stopped. Driver E268 changed ends (Belfast end) and moved Train E268 northwards towards Belfast; Train E268 was now taking commands from the Belfast end. It is likely that the emergency stop button for the air conditioning was depressed to turn off the air conditioning (at the Belfast end) at the end of a previous service (this is done so the air conditioning doesn't drain the battery when stabled); and as the train's commands had moved to the Belfast end of the train, the air conditioning was turned off.

¹⁵ There is no remote diagnostics system (Nexala or other) fitted to the EMU fleet (paragraph 74).

- 80 On returning to the Dublin end of the cab to bring the train into service, Driver E268 would have had to turn on the air conditioning again, but did not, as he thought it was already on. As a result, Driver E268 did not check that the lamp, which illuminates green if the air conditioning is commanded to turn on, was lit.
- 81 There is no appropriate documentation, such as a Traction Manual for the 8520 Class DART fleet, for drivers to reference when setting up the air conditioning on a train¹⁶.

Post-incident inspection of the other DART trains

- 82 Post incident inspection of the other trains identified no issues with the operation of the rolling stock in terms of ventilation, all windows openable.

Doors

- 83 Each individual EMU vehicle is fitted with four electro-pneumatically operated double-leaf outside doors. Traction power cannot be taken once the doors are open.
- 84 There is a blue *door interlock light* on the driver's console, when illuminated, this indicates to the driver that the passenger doors are closed, and the train can take traction. When extinguished, this indicates that a single door or multiple doors are open.
- 85 In terms of the emergency door release on the DART doors, a handle must be pulled to open the doors, or the doors can be forced open.

¹⁶ IÉ-RU noted that Traction Manuals were also absent for the 8500 and 8510 Class DART fleet.

Public Address System

86 There is a public address system on board the DART trains to allow drivers make “manual announcements” to passengers.

87 IÉ-RU verified that the public address systems were operating on the trains in accordance with their own standards. However, a number of complaints were made to IÉ Customer Care Department in relation to the public announcements system on the trains with passengers stating that: “we couldn’t hear the driver as the speakers weren’t working properly;” “no announcements were audible on the train I was on, so no information was received”; “the volume of the announcements SHOCKINGLY low”¹⁷.

¹⁷ Although nothing, that the public address systems were verified to be operational, passengers did complain. The RAIU considers communications with passengers during disruptions to be vital and as such identify this to be an additional observations, AO-02 (paragraph 359), which warrants safety recommendations, Safety Recommendation 2023005-14 and Safety Recommendation 2023005-15 (paragraph 430).

Infrastructure

Track and associated equipment

- 88 The route between Pearse Station 0 milepost (MP) and Rosslare Europort (114 MP) is double line from Pearse Station to Bray Station where the line then converges into a single bi-directional line with passing loops to Rosslare Europort.
- 89 The line is fitted with *Overhead Line Equipment* (OHLE) for the supply of electric power to EMU trains that operate the DART services from Malahide and Howth Stations (County Dublin) to Bray and Greystones Stations (County Wicklow).

Bray Station and other infrastructure

- 90 Bray Station is located on the Dublin South Eastern line at the 12 MP that is measured from Harcourt Street via Shanganagh Junction (10¾ MP). The line from Harcourt Street to Shanganagh Junction was closed in 1958. The distance from Pearse Station to Bray Station via Dun Laoghaire is 14 ¾ miles with the mileposts change at the location of the former Shanganagh Junction.
- 91 Bray Station has two main platforms, Platform 1 (*Down direction*) is 273.05 m and Platform 2 (*Up direction*, closest to the seafront) is 183 m in length. There is also the Bay Platform (adjacent to Platform 1), which is normally used for stabling trains (Figure 4).

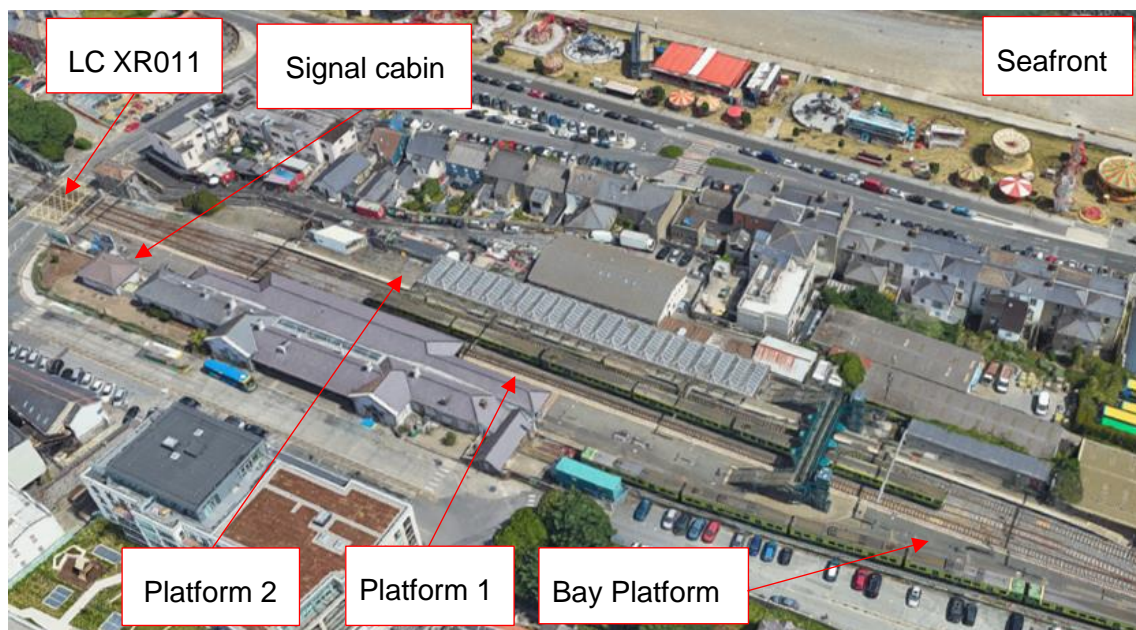


Figure 4 – Bray Station

Image courtesy of Google Earth

92 Level Crossing XR011 is a CCTV type crossing located at the north end of Bray Station (see Figure 4), on Quinnsborough Road. Level Crossing XR011 is normally controlled from CTC. A local control panel is provided in the former signal cabin adjacent to the level crossing (see Figure 4), the level crossing was in local control on the day of the incident (paragraph 101). Level Crossing XR011 has trespass guards, on the edges of the road to deter people from walking onto the railway line (see inset in Figure 5).

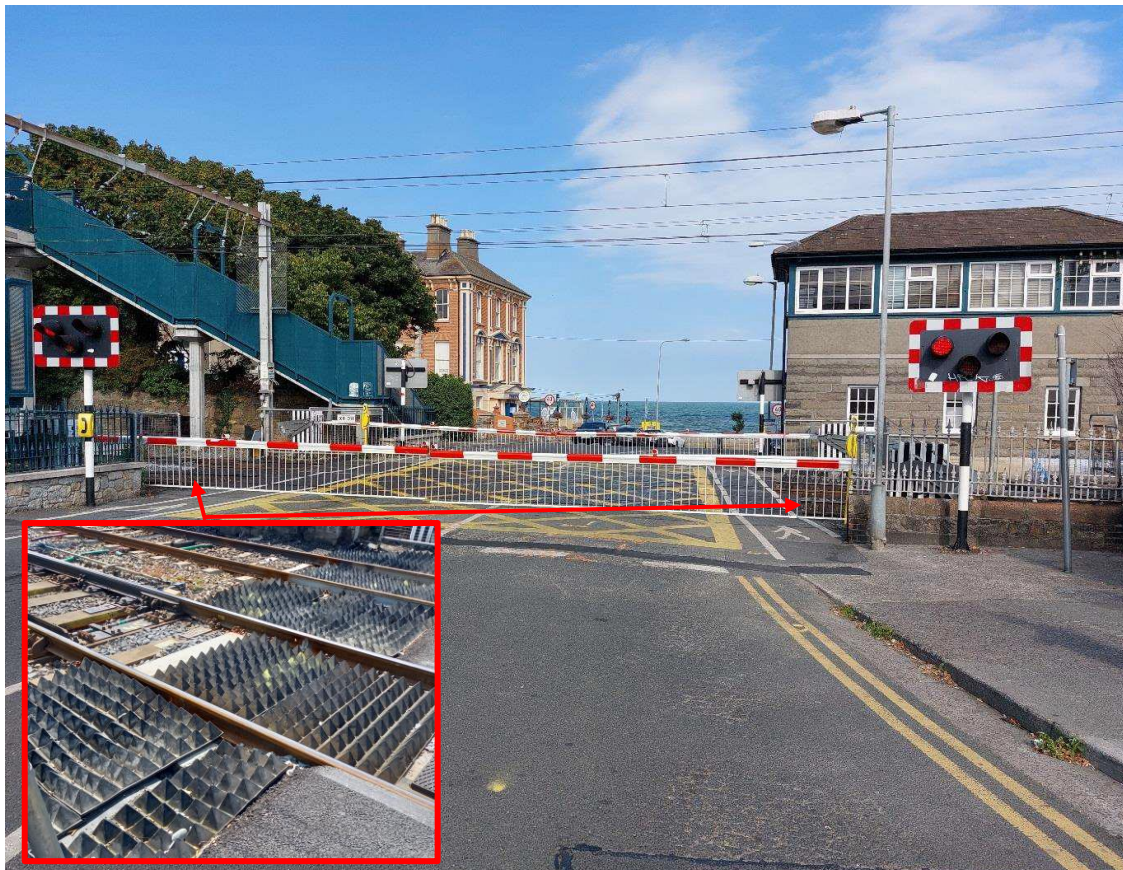


Figure 5 – Trespass guard locations at Level Crossing XR011

Signalling and communications

- 93 The route is fitted with two, three, and four aspect colour light signals. Trains are signalled under *Track Circuit Block* regulations and train detection is achieved by a combination of track circuits and axle counters. Train detection is exclusively by track circuit south of Sandymount Station.
- 94 Train protection is provided over the route by Continuous Automatic Warning System and Automatic Train Protection on DART trains.
- 95 Train radio coverage with the Controlling Signaller is also provided over the entire route.

- 96 The signalling system on Platforms 1 & 2 at Bray Station permits the operation of trains bi-directionally, allowing arrivals and departures to and from Dublin and Greystones. The Bay Platform, adjacent to the end of Platform 1, is used normally for stabling trains. On the day of the occurrence the Bay Platform was being used to provide a shuttle service from Bray to Greystones.

Operations

General description

- 97 Trains travelling to Dublin Connolly are travelling in the Up direction and trains travelling from Dublin Connolly are travelling in the Down direction.
- 98 The DART services are driver only operated and is controlled by IÉ-RU.
- 99 The maximum permissible line speed was 60 miles per hour (mph) (100 km/h). The maximum speed through Bray Station is 25 mph (40 km/h).
- 100 The line from Shankill (11 miles measured from Pearse Station) to Greystones Stations is controlled from the CTC North East signalling workstation located at CTC in Connolly Station, Dublin.
- 101 Road traffic over Level Crossing XR011 was suspended from 10:00 hrs to 20:00 hrs on the day to facilitate the large number of pedestrians making their way across the level crossing to the sea front. Level Crossing XR011 was under local control during this period.

Station operations in terms of the movement of passengers

Crowd Control

- 102 IÉ-RU SMS document, Crowd Control, (to be referred to as Ops-SMS-2.3 for the remainder of this report), sets out the arrangements for the safe control of crowds on IÉ stations and premises, stating that crowd control will be managed through production of risk based crowd control plans; planning for events and scenarios likely to generate crowds and implementing effective contingency plans and control measures; and ensuring that staff are competent in crowd control techniques.
- 103 Ops-SMS-2.3 outlines areas such as: crowd control plans; controls to manage crowd congestion; major/ rare events; congestion due to train service changes; incident management; and evacuation exercises; and requires that each station likely to be at risk of over-crowding must have a risk based crowd control plan.
- 104 In terms of major / rare events, Ops-SMS-2.3 requires that the station's crowd control plan should capture a number of areas, including:
- Possible measures to regulate the rate at which passengers arrive at the station;
 - Identification of the necessary station resources and supervisory arrangements to manage passenger throughput and any required crowd control measures;
 - Liaison arrangements with platform planning/allocation of staff to optimise passenger flows, connections, access/egress to/from platforms;
 - Passenger information/signage that is frequent, consistent, accurate, relevant and accessible taking account of the need for methods that are effective during crowded and potential stressful conditions;
 - The arrangements for the dispatch of trains to ensure these remain safe;
 - An emergency plan.
- 105 In relation to incident management, Ops-SMS-2.3 includes arrangements for:
- Providing additional staff to provide information and to control increased numbers of passengers at stations;
 - Evacuation from trains or stations with details of how this will be carried out in an orderly manner to avoid overcrowding during the evacuation;
 - Preventing overcrowding in the area to which people are evacuated;
 - Preventing people from entering the evacuated areas until it is safe to do so.

Passenger communications at stations

- 106 Information on the train departures was provided to passengers, at the DART stations, on the passenger information systems and through public address announcements.

Train Dispatch

Management of Train Dispatch & Platform Interface Risk

- 107 Policy and Principles for the Management of Train Dispatch and Platform Interface Risk, Ops SMS 1.5 (2017), acknowledges that *platform-train interface* (PTI) presents a number of hazards for station users including high frequency but low consequence events such as slips, trips and falls, and low frequency but high consequence events such as *dragging*; falling from the platform and being struck by the train; and being struck by the train when standing on the platform.
- 108 High risk platforms are identified and reviewed at five-yearly intervals and set out in Appendix C, High Risk Platform (Ops SMS 1.5, Platform Train Interface Risk (2017)) with risk assessment subject to annual checks to ensure risks remain at a “tolerable” level. These risk assessments consider infrastructure, platforms, trains (including DOO), services (including special services), human factors and platform users. The identified risk are: curved or narrow platforms, stepping distances, passenger flows (boarding incorrect train, more than two trains on the one platform), platform users (vulnerable). Of the twenty-three high risk platforms identified, twelve were on the DART network¹⁸ this are mainly as a result of the physical layout of the platform.
- 109 High risks associated with passenger flows were identified at Bray, Lansdowne Road and Pearse Stations; no issues were identified with Shankill, Killiney or Dalkey.
- 110 Although, Ops SMS 1.5 provides guidance on how to perform risk assessment, and identified “degraded operations and alterations which affect risk,” there is no specific information on PTI risks for major events (and not scored in the risk assessment above), only stating that crowd control plans, can be implemented, public address announcements, signage, etc.

¹⁸ Blackrock (narrow), Booterstown (narrow), Bray (passenger flows, platform users, Connolly (curved, stepping distances), Grand Canal Dock (narrow curved), Howth Junction (curved), Lansdowne Road (narrow, passenger flows, platform users), Pearse (curved, passenger flows, platform users), Raheny (narrow), Sandycove (narrow), Sydney Parade (narrow), Tara Street (curved, narrow, stepping distances).

111 There is no requirement to position train dispatchers¹⁹ on station platforms, which appears to be managed at a local level. Although Ops SMS 1.5 does note that “the visible presence of the announcer on the platform is likely to provide the greatest compliance because people on the platform will know that someone is watching whether they comply or not and is able to take further action if they do not”.

Professional Train Dispatcher Handbook

112 The Professional Train Dispatchers Handbook (2020) identifies key principles. Guidance and competency requirements. The document recognises that crowds pre and post event are vulnerable, identifying these as “high risk users” which require Person In Charge of the Platform (PICP) to effectively manage and actively help.

DART station operations on the day of the occurrence

113 On the day of the incident six of the nine DART stations from Howth to Clontarf Rd were staffed and seven of the sixteen DART stations from Tara Street to Shankill were staffed; these staff were carrying out office duties, selling tickets and dealing with customer issues.

114 Tara Street and Pearse stations were the only stations, included above, which had staff working on the platform e.g. train dispatching. Connolly Station was also staffed.

115 There were no staff on the platforms at Dalkey, Killiney or Shankill which is relevant as passengers are reported to have alighted from the platforms onto the railway line at these stations (this will be discussed in paragraphs 260 to 263).

116 There were reports from passengers of crowding at stations on the DART line on the day of the occurrence, with several passengers reporting having to wait on platforms for over an hour to board trains.

¹⁹ In terms of train dispatch, a train dispatcher and a Person In Charge of the Platform (PICP) are the same.

Bray Station

117 Bray Station had a suite of documents available for the management of crowd control and emergencies, which were adopted on the day of the Bray Air Display (only information relevant to the occurrence is included):

- Bray Station Crowd Control Plan (2016) – which requires that a PIC be provided on each platform;
- Local Emergency Plan for Bray Station (2022) – which includes details of a controlled evacuation but nothing relevant to self-detrainments, despite, “train evacuations” being an identified risk;
- Bray Air Display Checklist 2022 – which was briefed to staff on the day of the occurrence and includes information on checks to be carried out, such as checks that the points of access and egress are clear (with crowd control barriers erected), temporary signage erected, public address systems are operational and emergency equipment are checked. Of note is that, under “Are prevailing weather conditions a hazard” the response was “no”, with a note stating, “possible rain at 2-3 pm”.

118 Bray Station was staffed with thirty-five IÉ-RU Operations staff rostered throughout the day, including: Acting Station Manager Bray; ADM DART; Station Controller There were additional staff from IÉ Revenue Protection Unit present at the ticket validators to assist with the movement of passengers to and from the station platforms. In terms of security there were ten staff contracted by IÉ; and for crowd control, there were an additional twelve contracted by IÉ.

Train operations

Planning train operations for Bray Air Display

- 119 In previous years, the planning for the Bray Air Display would commence around mid-March with all stakeholders, including IÉ. The external Event Co-ordinator contacted a member of the IÉ management team in early June 2022 to discuss the event, with the first meeting that a member of IÉ attended was on 5th July 2022.
- 120 At this stage, all external plans had been finalised by other stakeholders prior to IÉ being invited to this event organisation meeting, including that pedestrian movements would be allowed over Level Crossing XR011 to allow access to the seafront²⁰.
- 121 IÉ have acknowledged that the late involvement did not impact IÉ's arrangements in terms of train operations (timetabling) and the provision of trains (IÉ-IM Operations Department, IÉ-IM Planning Office, CME Department DART District).
- 122 Passenger movements, external to IÉ property, had been decided by other stakeholders prior to IÉ being invited into the consultation process. This, in part, was the reason Platform 2 (closest to the seaside) was used for the majority of incoming trains into Bray, as it meant that fewer passengers were crossing over Level Crossing XR011. For this reason, the Manager CTC & Train Performance was not invited to review the allocation of platforms at the planning stage to determine, for example, if Platform 1 had been used more for incoming trains into Bray Station, would the delays have been minimised²¹.

Crowd control on trains

- 123 IÉ-RU have a Risk Register, entitled, Passenger Comfort, which includes eighty-one identified hazards; of these twenty-five were related to crowd management on trains. The consequences for crowd management on trains is assessed as mainly between insignificant and minor, with only four hazards identified as major, none related to hot weather and the impact on passengers on trains.

²⁰ The significance of Level Crossing XR011 being closed to pedestrians is highlighted by the improvements to train movements during the 2023 Bray Air Display where the level crossing was closed to pedestrian movements (bullet 5, paragraph 395).

²¹ The RAIU consider that the key personnel should be included in the early stages of planning for major events, and as a result consider this to be an additional observation, AO-03 (paragraph 359) which warrants Safety Recommendation 2023005-16 (paragraph 431).

124 Hazards associated with the impromptu evacuation of passengers as a result of crowding has also not been identified in the risk register.

125 There appears to be no crowd control SMS document for crowding on trains, similar to the Crowd Control document (Ops-SMS-2.3) for the safe control of crowds on IÉ stations and premises (paragraph 102)²².

Train operations on the day of the occurrence

126 On the morning of Sunday 24th July 2022, the IÉ DART network was operating at capacity with all available DART trains in service, with the exception of one on standby. At 13:48 hrs, the standby DART was utilised and commenced service. Therefore, at the time of the incident, all available DART trains were operating i.e. no more trains could have operated²³.

127 In addition, to assist in the movement of passengers, some non-DART services, timetabled to terminate in Connolly Station, were extended to Bray; and, a DART Bray/Greystones shuttle, operating from the Bay Platform, commenced at an earlier time than originally planned.

128 The timetabled frequency was between eight and thirteen minutes, however, due to delays, the frequency was impacted (in the morning there was a door fault on a southbound DART service at Grand Canal Dock Station which caused a delay of twenty minutes, there were also delays due to passengers who sought medical assistance and there was a report of people on the line earlier in the day (prior to the self-detrainments)).

²² IÉ-RU state that Ops-SMS-2.3 addresses crowding on trains, despite, the document stating that it is related to “stations and premise”. The RAIU reviewed the document and there is no reference to crowding on trains with the exception of: train service disruptions and service changes (in reference to stations); dispatch of trains (in relation to platform sightlines when platforms are crowded); and the evacuation of trains. There is no useful information in relation to management of crowding on trains.

²³ In addition, the signalling infrastructure could not accommodate any further trains.

129 In addition, the excess dwell times²⁴ caused further delays. The excess dwell times was likely as a result of the: numbers of passengers at stations; profile of the passengers e.g. families with buggies; full trains arriving at stations making them difficult to board; and passengers were standing at the doors and not moving into the carriages²⁵ which slowed other passengers boarding.

130 In terms of passenger services around the time of the occurrence, the following trains are relevant:

- Train E206 – The 12:46 hrs regular service from Malahide to Bray. Train E206 arrived at Bray at 14:47 hrs (fifty-three minutes late) and all passengers alighted safely onto the platform. The driver of Train E206 went on to operate Train E804 (outlined below);
- Train E268 – An additional auxiliary service from Connolly Station to Bray which departed Connolly Station at 13:48 hrs (departed Connolly three minutes late and Shankill seven minutes late);
- Train E103 – The 13:05 hrs regular service from Howth to Greystones deferred to 13:10 hrs as per temporary Working Timetable and was due at Bray at 14:27 hrs (but departed Connolly seventeen minutes late and Shankill forty minutes late);
- Train E208 – The 13:25 hrs regular service from Malahide to Bray which was due at Bray at 14:33 hrs (departed Connolly seven minutes late and Shankill thirty-two minutes late);
- Train E804 – The 14:43 hrs regular service from Bray to Malahide (departed Bray ten minutes late).

²⁴ The dwell times were now longer than the planned dwell times.

²⁵ This was reported from some passengers to be as a result of the hot conditions on board the trains, and the respite from the heat when the fresh air entered the carriage when the doors opened at stations (*buoyant ventilation*).

On train communications with passengers

Professional Driving Handbook

- 131 Section 4.16 of IÉ-RU's Professional Driving Handbook (2014) includes guidance in relation to "Communicating with customers", which states that "In the event of delays and disruptions, it is critical to ensure customers are kept fully informed of the situation and any developments".
- 132 All communications begin with "Good morning / afternoon / evening. This is your driver speaking. I apologise for the delay to this service". Further to this, is dependent on the cause of delay is, namely:
- Unknown – "At this time I do not have any information regarding the cause of the delay but will update you as soon as possible";
 - Known (information received) – "This is due to (reason given). I'll update you as soon as I receive further information";
 - Known (by observation) – "This is due to e.g.: congestion, conflicting movement etc. I understand we should be on the move within (xx) minutes".
- 133 The guidance continues "If information is received make an announcement updating passengers". There are no timescales in relation to when the first announcement should be made and at what intervals.
- 134 The document refers to the Ontrain Customer Communication Booklet for further guidance.

Ontrain Customer Communication Booklet

135 The Ontrain Customer Communication Booklet outlines instructions on how to make announcements: during normal working; disruptions; and, when the public information system is not working. In terms of “Instructions on Passenger Communication Procedures During Disruption” the booklet includes timelines in terms of when the announcements are made, see Figure 6. In the first instance, an “ice-breaker announcement” must be made in the first two minutes, with updates every five minutes.

Step 1	• Make “Ice-Breaker Announcement”.	2 Minutes
Step 2	<div> <div>As appropriate</div> <div> Walk through each carriage quickly making verbal announcements in case the PA system is not working and for passengers with hearing difficulties. Record an accurate passenger count. </div> </div> <ul style="list-style-type: none"> • Update passengers every 5 minutes for short delays, every 10 minutes for delays expected to be more than 40 minutes. • If requested by CTC, confirm that announcements have been made. 	5 Minutes
Step 3	• Advise onboard catering staff to provide complimentary tea, coffee and bottled water. One beverage per customer. No free alcohol.	30 Minutes
Step 4	• Advise onboard catering staff to provide complimentary minerals, snacks and sandwiches. One beverage and one food item per customer. No free alcohol.	45 Minutes
Step 5	• Make “After Disruption Announcement”.	When train is moving again
Step 6	<ul style="list-style-type: none"> • Make “End of Journey Announcement”. • Sign the onboard catering Free Issue Book. 	On arriving at terminating station

Figure 6 – Communication Procedures During Disruption timelines

136 The instructions outline what the “ice-breaker” and “detailed” announcements should include, see Figure 7.

Ice-Breaker Announcement	
May I have your attention please. This is your (title) speaking. I apologise for this delay.	
Reason known	This is because of (insert reason) at (give location)
Reason unknown	I am awaiting details of our delay and I will update you as soon as I have more information.
Thank you.	

Detailed Disruption Announcement	
May I have your attention please. This is your (title) speaking. I am sorry that we are still waiting. This is because of (insert reason) at (give location) .	
Major delay	I have been advised that this will result in a significant delay to our service.
Time known	We expect to be waiting here for approximately (X) minutes.
Time unknown	I am still awaiting details of the expected delay. I will update you as soon as I have more information.
Thank you.	
Update customers as further information becomes available	

Figure 7 – Announcement details

Communications training for drivers

137 From the end of 2018, the driver training programme, for new drivers, has included a customer communications module. At the time of the incident, approximately 167 out of 600 drivers had undertaken the training, which is a little over a quarter of all drivers. Competence assessments of drivers includes observations of drivers making announcements (in real-time or simulated).

138 None of the drivers (Drivers E268, E103, E208, E804) had undertaken training in the customer communications module.

Disruption & Emergency Control Mechanisms

IÉ Rule Book, Section M

139 Section M of the IÉ Rule Book, Trains stopped by accident, failure, obstruction or other exceptional incident, includes instructions for drivers and train guards in relation to train accidents (collisions, derailment, obstructions, major fires and train divisions) and failed trains. It is noted that in terms of fire, that this might cause passengers to detrain onto an adjacent running line, however, there are no instructions for drivers in relation to self-detrainments or stranded trains²⁶.

Emergency Preparedness

140 Emergency Preparedness (2018), document number Ops-SMS-2.2, sets out how IÉ-RU effectively manage their response to emergencies. Its objective is to facilitate a co-ordinated and effective response to emergencies by ensuring there is appropriate planning for emergency situations. This is done by preparing operations staff for emergencies by informing them of requirements utilising: training; the IÉ Rule Book; risk based local emergency plans for every managed location; Crowd Control Plans; Train Evacuation Briefing Notes; Railway *Incident Officer* Training; *emergency evacuation drills*; and exposure to scenario planned emergency exercises/*tabletop exercises*.

141 Ops-SMS-2.2 identified one of the key elements, in terms of scenario planning, is updating plans based on lessons learnt from accidents/incidents and emergency exercises.

142 Policy and Principles for Emergency Response (2017), document number RU-SMS-012, states that IÉ-RU's policy is "to have in place emergency plans to ensure the effective response and management of emergencies. This will include all types of foreseeable situations such as major rail accidents, office fires, network computer failures, terrorist attacks, industrial accidents or outbreaks of disease epidemics". To achieve this, appropriate planning for emergency situations and preparing staff for emergencies is carried out.

²⁶ Although noted that a number of the requirements set out in Section M were applied (e.g. emergency signal protection, the drivers made emergency calls to the Signaller, etc.); the RAIU consider that the absence of instructions for drivers in terms of self-detrainments in the IÉ Rule Book to be an additional observation, AO-04 (paragraph 359), which warrants a safety recommendation, Safety Recommendation 2023005-17 (paragraph 432).

- 143 One of the key elements is in relation to the “Documentation and identification all types of emergency, including degraded operations, and ensure there are procedures in place to identify new ones”, this can be done through annual workshops²⁷.
- 144 IE have never carried out workshops scenarios involving self-detrainments up until the time of the incident in Bray in 2022, despite the self-detrainment of sixty to seventy passengers of a derailed DART at Dun Laoghaire on the 13th September 2017 (paragraphs 279 to 285), this will be further discussed in paragraphs 293 to 294.

Emergency Scenario Response

- 145 The Emergency Scenario Response Risk Register (February 2022) identified nineteen hazards, with details on the consequences (insignificant, minor, major, critical and catastrophic), existing controls, likelihood (improbable, remote, occasional, probable, frequent), severity, additional controls and control (e.g. Station Manager) and risk owners (e.g. District Manager). Examples of the hazards identified include fires, assaults on staff, incidents in tunnels, bombs threats and disease outbreak.
- 146 A hazard related to this occurrence is entitled “Severe weather conditions” which was first identified on the 16th October 2017. The consequence is identified as critical (single fatality or multiple major injuries), its likelihood as improbable (unlikely to occur over a fifty year period). The controls include references to a number of documents, the only ones relevant to this incident are Ops-SMS-2.2 (paragraph 140) and RU-SMS-012 (paragraph 142) and in terms of annual scenario planning exercises undertaken and “lessons learnt recorded and reviewed to facilitate continuous improvement”, however, there is nothing related to how to manage the impact of weather related condition on trains and the potential for self-detrainment.

²⁷ Note, these would have to be had to be desktop exercises as a result of COVID-19 restrictions through 2020 to 2022.

Major Customer Disruption Response Handbook

Introduction

147 The MCD Response Handbook introduces the document by stating “Customers who are seriously delayed require more information, assistance and reassurance... This policy and the processes and responsibilities outlined are designed to ensure we all work together to make the best decisions for our customers and communicate with them effectively.... Specifically, it establishes a process to ensure consistent, customer-friendly information is available throughout the organisation to assist colleagues in giving the best possible information and advice to customers”.

148 An MCD can be declared and initiated by the CTC Duty Manager, based on their disruption timescales and the severity of the event. When declared, an Information Incident Room (IIR) can be activated in the CTC Duty Manager’s Office in Connolly. When the decision to open the IIR is made, Directors IM and RU will instruct their nominated Site Liaison Experts to report to the IIR. The MCD Response Handbook clearly outlines the communications that are required between internal staff and external agencies, with the CTC Duty Manager being the focal point for co-ordinating the response and the dissemination of information. See Figure 8 for the parties involved in the initiation, these are further discussed in paragraph 150.

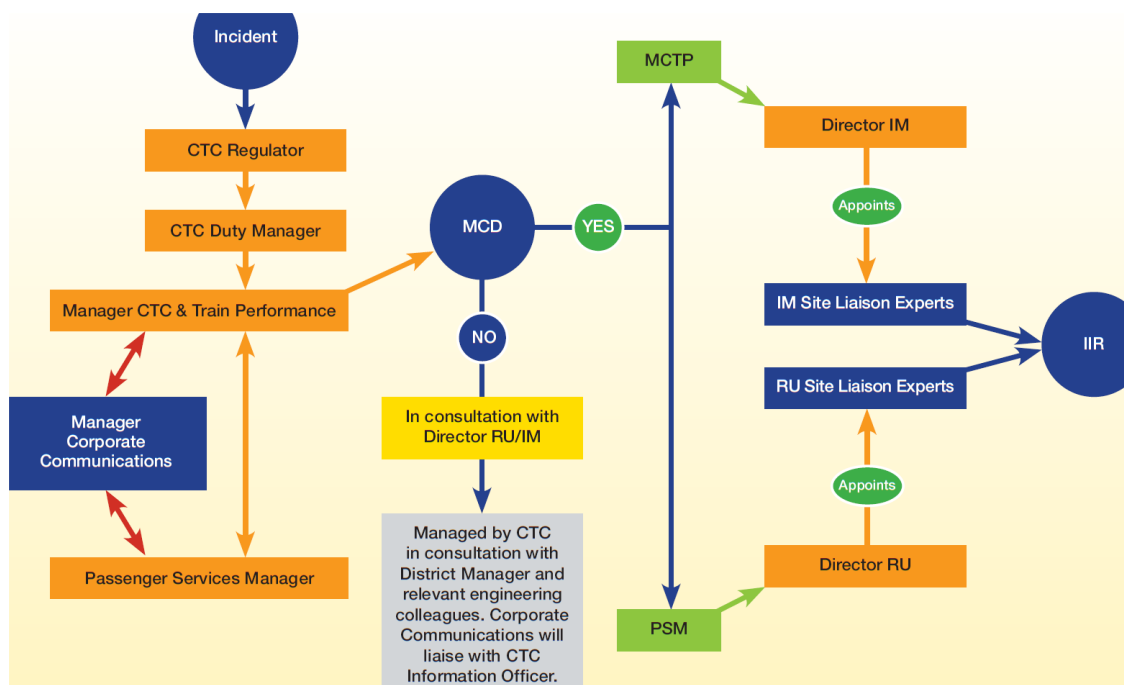


Figure 8 – Initiation of the MCD Response Process

149 In terms of triggering an MCD, for Zone 1 which includes Bray, the guideline delay estimates are between 60 minutes and 180 minutes, it is noted that self-detrainment is not included. The IIR should be established where the disruption duration was estimated to be in excess of one hour (in this instance, as it was during peak times).

150 The MCD Response Handbook includes very detailed roles and duties for those involved in an MCD Response, of note as some of the following:

- CTC Traffic Regulator – Assesses the exact circumstances, effects and scale of disruption, advises the CTC Duty Manager and manages the incident until they arrive, taking the necessary steps to minimise the effect of disruption and facilitate prompt service recovery. Makes a general call to all drivers advising of the disruption and asks them to make regular customer friendly announcements for the duration of the disruption. In all cases ensure delayed services are held on platforms, preventing customers being stranded ‘mid-section’ for prolonged periods of time. Liaises with station staff to prevent overcrowding. Decides on mitigating actions, such as: service cancellation, amalgamation etc; options for recovery or detraining;
- CTC Duty Manager – Designates events as MCDs. Seeks confirmation that: all services affected are held on platforms, where possible. PA announcements are made regularly from CTC;
- CTC Information Officer – Ensures customer “friendly” PA announcements are made every ten minutes from CTC to inform all passengers of the disruption and the initial estimated timescale and ensures regular update announcements are made;
- Manager Corporate Communications – Leads customer communications, ensuring all media channel are updated regularly with customer friendly text and monitors social media for customer’s concerns;
- Passenger Service Managers – Deploys staff to assist front line colleagues and ensuring adequate crowd control measures are implemented, at stations;
- Station Managers – Implements local RU contingency plan and briefs all front line staff/volunteers on the specific duties. Ensures outlying stations are receiving customer information updates. Ensures PA announcements are made every ten minutes using customer “friendly” message/text with reference to the Ontrain Customer Communications Booklet. Ensures train departure checks are conducted, where practicable, including passenger information systems, PA and HVAC.
- Drivers – Make PA announcements every ten minutes as set out in Ontrain Customer Communications Booklet incorporating CTC customer friendly message/text.

Train Evacuation Briefing Notes

- 151 Train Evacuation Briefing Notes (2019) is a thirty-six-page guide for staff who could be involved in a train evacuation which covers key subjects such as: situations that might prompt a train evacuation; equipment available; using others to assist; carrying out the evacuation. The document headings include: Fire; Fire on Trains; Types of Train Evacuation; Special Considerations; Emergency Equipment (ladder, first aid kit, fire extinguisher, break glass hammer); Customer Safety Signs (e.g. evacuation route and equipment locations); How to make an *Emergency Call*.
- 152 IÉ-RU identifies three types of train evacuation: *Controlled* (no immediate danger); *Emergency* (immediate danger); and Impromptu Evacuations²⁸, defined as “Situations can arise where trains may be stopped for a period of time. Passengers sometimes decide to disembark themselves from the train. Such behaviour should be discouraged. However, if passengers ignore requests to remain on the train, then train protection should be immediately requested. This can be requested from the Controlling Signaller via the driver/train crew.”
- 153 In terms of leading the emergency process, the Train Evacuation Briefing Notes provides five steps in terms of: contacting CTC/ Controlling Signaller; reassuring passengers (using the public address system as much as possible to communicate with passengers); detraining passengers (placement of ladder, etc); following instructions given by CTC/Controlling Signaller; placing passengers in a place of safety.
- 154 The document outlines certain special considerations, such as geographical location (tunnels, viaducts, OHLE, track, weather, time of day and local hazards). However, it does not address how to assist passengers over trespass guards / cattle grids²⁹.
- 155 The weather section identifies “extremely sunny conditions” however there is no further guidance as to timings for evacuations.
- 156 The Train Evacuation Briefing Notes are relevant in terms of a previous safety recommendation made by the RAIU in 2018 and will be further discussed in paragraphs 286 and 287.

²⁸ Note, the RAIU have used the term self-detrainment in this report as it better reflects the events of the day.

²⁹ It is noted, that of the emergency documents reviewed by the RAIU, this issue has not been addressed in any documentation.

Existing Research & Guidance

RSSB Research

Introduction

157 As part of the RSSB's "Research into the management of passengers on trains stranded in high ambient temperatures," an on-train condition assessment (using software modelling) was carried out to assess the extent and timing of the issues. An evaluation of the risk associated with staying on board (for example, harm caused by exposure to heat such as dehydration, respiration, heat stroke) compared with a controlled evacuation (for example, passengers being struck by another train, electrocution, passengers being crushed and slip, trip and falls) and a review of passenger behaviour under these circumstances. The overall aim was to determine at which point it would become intolerable for passengers to remain inside the train and the risks to passengers of detraining. In terms of the RAIU investigation, this research gives insight into considerations that could have been taken on the day of the incident at Bray, although noting, potentially, the outcomes could have been the same.

On-train condition assessment

158 In terms of on-train conditions assessments, the research found that the *dew point temperature*, for passengers to exceed thermal comfort is above 26° C, with people starting to feel slightly uncomfortable; above 29° C people feel uncomfortable, 32° C people feel very uncomfortable, and 33° C conditions are intolerable. The research notes that the human body can tolerate (dry) air at elevated temperatures for significant periods of time but increasing the humidity has a strong effect on the body's tolerability of the conditions (as it decreased the body's ability to lose heat through production and evaporation of sweat); finding that that the very old, very young or who have an existing medical condition may be more susceptible to a major injury or fatality.

159 The thermal assessment analysis found that "within a carriage with very limited passive ventilation capability and full seated load, conditions inside are expected to deteriorate to intolerable levels within ½-1 hour of a carriage becoming stationary in full sun and the ventilation fans stopping". Times can be reduced to fifteen minutes in crush loaded conditions (note, this is assuming there were favourable conditions in the fifteen minutes beforehand).

160 The research found that “conditions within the carriages are predicted to remain tolerable (although potentially uncomfortable) if the doors to the carriage are opened on one side and the internal doors (where present) are held open. Due to the safety implications, opening of the doors may only be possible as a precursor to evacuation of the train” (i.e. controlled evacuation). This however has safety implications to ensure that any additional risks in their use are minimised.

Risk evaluation & passenger behaviours

161 To prevent long term health effects following prolonged heat exposure, the evacuation needs to be planned and to have taken place well before the vehicle interior conditions have reached the point of intolerability; and actions should also be considered to improve vehicle conditions until the arrangements for evacuation are in place. The results from the analysis indicate that the risks of staying on board a failed train beyond one hour with no HVAC or ventilation would be in the order of a least eighty times higher than that in a controlled evacuation. Concluding that when the interior vehicle conditions in terms of temperature and humidity become intolerable, then the risk of carrying out a controlled evacuation is significantly lower compared to the risk of staying on board.

162 The RSSB reviewed evidence from previous stranded trains, which indicates that passengers have an increasing tendency, as the incident progresses, to evacuate the train on their own initiative. It needs to be recognised, that in situations such as a stranded train, you need to rely upon the goodwill of the passengers to successfully control the situation. In terms of the risk of self-detrainments, the research states that “prompt action needs to be taken as the risks to passengers when detraining in an uncontrolled manner is in the region of four times higher than that of a controlled evacuation.”

163 In terms of effective passenger manager the findings were summarises as:

- Passenger behaviour as a whole is not perceived to be a sufficiently robust indicator for determining when to evacuate a train;
- Focus should be placed on looking after passengers by optimising the physical conditions and providing good, regular and justified information;
- It is considered essential to give staff the appropriate training and coaching to prepare for such eventualities;
- Passenger management and information are the best strategy to reduce the likelihood of inappropriate actions or behaviour (i.e. self-detrainment).

Communications with passengers

- 164 The RSSB Research identifies that “communication to the passengers is key to affecting a positive response from passengers, but this is dependent on a co-ordinated response across the Industry so that there is helpful information to be relayed. Announcements made by staff will be interpreted with varying trust depending on how well staff and passengers are interacting together. The information given will be weighed against external environmental cues and behaviours of others”.
- 165 Also stating that “delivery of information at the time it is required and relevant to passengers is important in encouraging optimal response of passengers. Instructions should be clear, relevant and precise and should not require passengers to retain or apply information. Effective and well timed communications are important to: stop people doing the wrong actions; and support people in doing the right/optimal actions,” although, also noting that “however good communication does not guarantee that all passengers will behave predictably”.

RDG & Network Rail Guidance

Introduction

166 This thirty-nine page document provides guidance on: identification of an event; understanding and assessing on board conditions; command and control; supporting passengers stranded on trains; evacuation; larger scale events; key roles and responsibilities; and assurance, training and competency of staff. The RAIU have not included all information from the guidance in the document, only information relevant to the RAIU investigation.

Understanding and accessing on board conditions (Section 5)

167 In terms of the initial risk assessment, the guidance recognises that “one of the key objectives is the need to reduce the risk of an uncontrolled evacuation. Determining the needs and expectations of passengers on board stranded trains is best met via a risk assessment based on the information available. The initial assessment will need to be refined and adjusted as further information becomes available and the situation develops”.

168 The guidance recognises that “the most fundamental decision is likely to be whether to seek to hold passengers on board the train until it can be moved or set in motion arrangements for them to be evacuated”, noting that “the safest option will usually be for passengers to remain on the train”. It continues that “immediately (if) it is judged to be likely that passengers will start to an uncontrolled evacuation... they should be advised to remain on board and that a safe resolution of the situation is being developed. A controlled evacuation will always be preferable to an uncontrolled evacuation”.

169 In terms of factors to be considered, to the extent that reliable information is available, risk assessments should take into account the following factors (these provide an overview of the issues, but it is unlikely that all these can be assessed fully in an unfolding event). Included are those relevant to the RAIU investigation:

- Reason for stranding and likely duration;
- Types of passengers involved and their attributes;
- Number/type of staff on board the train (recognising that driver operated only services present particular challenges);
- The ability to provide information to passengers on the stranded train;
- External media/peer group influences – passengers are more likely to be conscious of the option to self-evacuate – and do so – if they are aware of other self-evacuations.

Such awareness may originate from a number of sources – personal messages, social media and more general media reporting;

- Weather – external air temperatures and the degree of sunlight shining directly on the train can have a direct impact on conditions inside the train, particularly if on train HVAC systems are inoperative;
- Internal conditions – conditions on board the train should generally be the single most important factor influencing the decision on how best to respond. The temperature/quality/humidity of air on the train is a critical element. The speed at which the on-board environment can deteriorate during hot or even warm weather - especially on a heavily-loaded train - from one which is simply unpleasant to one which poses significant risks to health should not be underestimated. Conversely, the ventilation effect of opening external doors and normally sealed windows should not be over-estimated. It is therefore recommended that in all such cases, preparations for evacuation should begin immediately the situation becomes apparent;
- Scale of the incident – stranded train incidents can range from a small number of passengers being stranded on a single train with fully functioning HVAC and several members of traincrew /onboard staff to multiple crowded trains losing power during the middle of a heat wave. The response plans need to be flexible enough to address a full range of incidents. It is recommended that for all major and intermediate scale Stranded Train incidents a senior manager is assigned to “think passenger”;
- Multiple trains with passengers on board affected – where passengers are stranded on multiple trains then prioritisation of the resources based on the risk factors will be required.

Supporting Passengers Stranded on Trains (Section 7)

170 The guidance notes that “regular information is a very powerful means of providing reassurance to Passengers that ‘the railway’ remains in control and is actively attempting to resolve the problem, thus dissuading them from taking matters into their own hands. Accurate information must be provided irrespective of whether it is good or bad news... In addition to the factual content (which may be fairly minimal, at least in the early stages), reassurance is also needed”. It continues “where information is incomplete or imprecise it should still be passed on with suitable explanation of its limitations. This is to provide reassurance to passengers that efforts are continuing to rectify the situation and that ‘the railway’ cares”.

171 The guidance identifies some high-level factors (based on the RSSB Research behaviour model) most likely to resulted in self-detrainments, in terms of the following indicators:

- Individual – Misperception of hazards, perceived low likelihood of detection and immunity from consequences; able bodies; male passengers are more likely to initiate;
- Environmental – Unacceptable temperature; unable to provide basic needs; positive external conditions; destination in sight; evacuation route visible;
- Organisational – Low staff to passenger ratio; no established authority; poor information provision;
- Task scenario – Long delay; crowded; group pressure to evaluate; shortage of time (perceived or actual); complex procedures.

172 In terms of dissuading passengers from self-evacuating, where there is a risk of passengers self-evacuating, all reasonable efforts to prevent this should be made to prevent it; this should include making announcements highlighting the risks of such action – dangers from moving trains, power cables, weather and ground conditions, etc. as appropriate - and stressing to passengers that their safest option is to remain on the train. If there is suitable and sufficient relevant dialogue with passengers, this risk is lowered.

Training & Competency of Staff (Section 11)

173 In terms of training and competency management of staff the guidance recognises that “instances of significant numbers of passengers being stranded on trains are comparatively rare. Those leading to an actual evacuation are ever rarer. This makes it difficult for relevant staff to build up much experience of managing them. It is therefore imperative that training (initial and refresher), testing and exercising of operational scenarios involving stranded passengers become integral to developing and maintaining the competence of the key staff involved in: the processes (including communication) relating to the management of passengers stranded on trains; the assessment and decision-making processes for responding to passengers stranded on trains; and the actual train evacuation process”.

174 It continues “company competence processes should include all elements of managing passengers stranded on trains situations, both from a direct (at site) perspective and from the perspective of those managing events within Control³⁰, who have links to such as emergency responders and external agencies. The roles and responsibilities of all staff

³⁰ In the case of IÉ, this is CTC.

involved should be covered through initial and ongoing refresher training and monitored via company competence management systems, which must include responding to passengers stranded on trains and train evacuation as specific elements directly associated with the implementation of company response and/or emergency plans”.

175 It further continues, “Assessment or evidence of competence and demonstration of knowledge associated with managing passengers stranded on trains situations and evacuation should be attained through a variety of methods, which may include one or more of the following techniques: unannounced monitoring; observation; review of records, logs, voice tapes, etc.; direct questioning; and practice via participation in exercises (tabletop and live)”.

Events before, during and after the occurrence

Events before the occurrence

- 176 On the morning of Sunday 24th July 2022, the IÉ DART network was operating all available DART trains in service, with the exception of one on standby set. There were delays on the DART network in the morning which impacted other DART services (i.e. door faults, people on the line and medical assistance).
- 177 All trains arriving at Bray were taking approximately six minutes to detrain and another two minutes for the train to move off the platform to allow the next train to enter. Passengers exited the station through the ticket barriers which were left open to allow a speedier exit, however, passengers with Leap Cards were still required to validate their tickets, which slowed the exit somewhat, but IÉ staff were able to assist with passenger flows.
- 178 To improve with the movement of passengers, some non-DART services, timetabled to terminate in Connolly Station, were extended to Bray. A DART Bray/Greystones shuttle started earlier than originally planned.
- 179 At 13:48 hrs, the standby DART was brought into and commenced service, departing Connolly Station, three minutes late, serving all stations to Bray (this is Train E268).
- 180 At 13:52 hrs Train E103 departed Connolly seventeen minutes, thirty seconds late (this was the service directly after Train E268).
- 181 At 13:57 hrs, Train E208 departed Connolly seven minutes late (this was the service directly after Train E103).
- 182 At 14:43 hrs, Train E268 departed Shankill, seven minutes late.
- 183 At 14:47 hrs Train E206 arrived at Bray fifty-three minutes late and all passengers alighted safely onto the platform. The driver of Train E206 was also the driver for Train E804 (to be known as Driver E804 for ease of understanding). It took approximately six and a half minutes for passengers to clear the train to allow the doors to be closed. It was moved by the Chargehand Driver to the sidings on the Down Side of Bray Station.
- 184 It is estimated that, including the passengers from Train E206 above, that 18,000 passengers arrived at Bray Station before the incident.
- 185 At 14:49:37 hrs, Train E268 was stopped at Signal BR28, waiting for platform clearance into Bray Station (i.e. waiting for Train E206 to clear the platform), which was 600 yards (548 m) away.

- 186 At 14:53 hrs, Train E103 departed Shankill forty minutes and thirty seconds late. At the same time, Train E804 departed Bray Station, ten minutes late.
- 187 At 14:55 hrs the status of the trains in the vicinity of Shankill and Bray, was that Train E268 was stationary at Signal BR28; Train E103 was departing Shankill Station and Train E208 was approaching Shankill Station (Down Line), respectively; and Train E804 had departed Bray Station (Up Line). See Figure 9 for key events and status of the trains at 14:55 hrs.
- 188 Passengers reported that conditions, around this time, on DART trains were unbearably hot with people stripping off their clothes (toddlers were stripped to their nappies), with some passengers reporting symptoms of heat exhaustion (it should be noted that children are more prone to heat exhaustion as they do not sweat as much as adults and therefore it is more difficult for children to cool down).



	Train E268 [†]	Train E103	Train E208	Train E804
	13:45 hrs Connolly to Bray	13:05 hrs Howth to Greystones	13:25 hrs Malahide to Bray	14:43 hrs Bray to Malahide
13:48	Departed Connolly, 3 m late.			
13:52		Departed Connolly, 17 m 3 s late.		
13:57			Departed Connolly, 7 min late.	
14:43	Departed Shankill, 7 m late.			
14:49:37	Stopped at Signal BR28, waiting for clearance into Bray.			
14:53		Departed Shankill, 40 m 30 s late.		Departed Bray, 10 m late [‡] .
Status @ 14:55	Stopped outside Bray	Departed Shankill	Approaching Shankill	Departed Bray

Figure 9 – Key events from 13:48 to 14:55 hrs, with locations of trains @ 14:55 hrs

* Summarised to E268, E103, etc, in illustration for ease of understanding

† Red circles illustrate stopped trains (in next slides, dashed circles illustrate detrainment).

‡ This was Train E206 which arrived safely at Bray at 14:47 hrs

Events during the occurrence on Train E268

- 189 The air conditioning Train E268 was off and with windows sealed there was no forced or passive ventilation on the train. Train E268 was close to maximum capacity.
- 190 The majority of passengers had travelled from Connolly and were on the train for sixty-two minutes (the scheduled time for Connolly to Bray is forty-six minutes) when the train came to a stop at Signal BR28.
- 191 Driver E268 did not make any passenger announcements as he believed this was not a requirement if the delay was less than five minutes (an “ice-breaker announcement was required within two minutes and a more detailed announcement after five minutes).
- 192 The following events are what can be determined by the RAIU as to what likely happened in the carriage where the first doors were opened (see Figure 10 for still of saloon CCTV of carriage involved).



Figure 10 – Still from carriage where first door was opened
Image taken from IÉ internal CCTV

193 At this stage Train E268 was stopped at Signal BR28 (Figure 9) for approximately five minutes³¹. On the carriage, the heat was so great that condensation built up on the carriage ceiling and began to drip onto passengers³². A teenager, who was feeling faint with the heat, began to vomit (both symptoms of heat exhaustion), and due to the crowding was vomiting over other passengers, some of whom tried to disperse, and others tried to come to her assistance. In the commotion, a baby began screaming and turning red, and the baby's father, Pax 1³³, in a "distressed", "agitated" and "frustrated" state (irritability is a symptom of heat exhaustion), opened a passenger door by means of the emergency opening device, forcing open the door, and passengers began self-detraining.

194 Pax 1 opened a second door, exited the train and assisted passengers to detrain. He then re-boarded the train to assist his family in detraining and exited the train onto the railway line with his baby and family members³⁴.

195 At 14:55:09 hrs, after being stopped for five minutes and thirty-two seconds, Driver E268 saw that the door interlock light (paragraph 84) had illuminated³⁵, which in turn resulted in Driver E268 contacting the Controlling Signaller to report the perceived fault³⁶.

³¹ It was noted that a few passengers thought they were stopped for closer to twenty minutes, however, on review of the evidence, five minutes and thirty-two seconds was the correct time. It may be the case that the time felt longer as a result of the conditions onboard the train.

³² It is unknown what the temperatures were on the trains; however given that dew droplets were condensing on the carriage ceiling, there was a high dew point temperature (paragraph 158), where people were uncomfortable, very uncomfortable, or conditions were intolerable.

³³ Pax 1 was travelling with young children (including a baby) and a grandmother.

³⁴ Pax 1 contacted the IÉ Emergency Line late on the night of the incident, to report that he was the passenger that opened the doors and his reasons for doing so, which were that there was: no air conditioning; no openable windows; that the conditions were "unbearable" and that passengers were "slowly cooking" and collapsing. The response was that if Pax 1 had just waited for five minutes that train would have been moving, Pax 1 countered by saying that there was "no information relayed to us as to how long we were going to stay in that carriage".

³⁵ Train E268 cannot take traction when the door interlock light is illuminated.

³⁶ Driver E268, did not know that passengers had de-trained, hence the request.

- 196 At 14:55:11 hrs, Signal BR28 displayed a Yellow aspect, which would mean, in normal circumstances, that Train E268 could proceed into Bray Station, however, Train E268 was unable to take traction as a result of the extinguished door interlock light. Driver E268 requested signal protection, from the Controlling Signaller, to examine the train as a result of the perceived fault, so he could continue to Bray, but this could not be granted as Train E804 (Up line) was travelling towards Train E268 (Down line).
- 197 On the carriage, arguments broke out between the passengers with some wanting to get off the train and others wanting to stay on the train (realising the train would not be able to move with people on the line). Nonetheless, more passengers began to exit the train.
- 198 Within the same minute of the door opening, Driver E268 made an emergency call to the Controlling Signaller stating that passengers were getting off the train. The Controlling Signaller immediately contacted Train E804, which was travelling towards Train E268, to request that Driver E804 bring the train to a stop as there were passengers on the line. The Controlling Signaller also turned all signals, in the location, to red to stop the movement of all trains and prevent the passengers on the line being struck by the trains; effectively stranding all other trains in the vicinity.

Events after the incident³⁷

Events after the incident (Train E268)

199 At 14:57:23 hrs a DTE who was on Train E804 (now stopped outside Bray on the Up line) attempted to return passengers to Train E268, however, he was unsuccessful³⁸.

200 Driver E268 now made an announcement over the public address system for passengers to remain on the train. During the announcement passengers could hear a heated argument (with shouting and bad language) between some passengers and Driver E268 in relation to opening the doors³⁹. This probably led to increased anxiety among the passengers which resulted in a large number of passengers getting off the train and onto the railway line.

201 CTC notified IÉ staff at Bray Station of the self-detraining and were dispatched to the scene accompanied by security personnel, An Garda Síochána and the Irish Coast Guard. They arrived onsite at 15:03 hrs.

202 At 15:04:49 hrs, the Acting Station Manager Bray contacts the Suburban Traffic Regulator to say that there were passengers “all over the line”.

203 Based on the numbers who had detrained, it was decided to conduct a controlled evacuation of the remaining passengers on Train E268, the Acting Station Manager Bray contacts the Suburban Traffic Regulator of this at 15:15 hrs. The passengers who remained on board were those who had chosen not to detrain or required assistance and were supplied with bottled water and some were later treated by emergency medical technicians.

³⁷ As outlined in paragraph 30, the triggering event is related to the self-detrainment of Train E268, however, the thermal comfort of passengers on all trains is also considered as part of the incident, with the incident coming to an end when a decision was made to carry out a controlled evacuation of the last train, Train E804. For ease of reading, the information has been presented in this way.

³⁸ There were reports of abusive, aggressive and threatening behaviours. A number of calls were made by passengers and IÉ staff.

³⁹ This was reported by six other passengers, post incident, to IÉ Customer Care Departments, and there also was a call to CTC from Garda Control (Bray), whereby another passenger reported the same at 15:03 hrs.

- 204 When IÉ-RU CME maintenance personnel arrived at Train E268 to provide assistance they checked the function of the air conditioning system and found that it was switched off (paragraphs 76 to 79).
- 205 Once the evacuation was controlled the passengers from Train E268 were removed from the line through a gate to the Chief Civil Engineers (CCE) compound leading to the car park and through the level crossing at Bray Station. Some passengers struggled to cross over the trespass guards (Figure 5) at the level crossing and were seen balancing on the running rails, this was more difficult for passengers with buggies or mobility issues⁴⁰.
- 206 At 16:18:52 hrs ADM advised by Suburban Traffic Regulator of plan to sweep line back to Bray to ensure line is clear of all persons prior to moving trains; the line was confirmed as clear at 16:29 hrs.
- 207 At 16:28 hrs the ADM contacts the Suburban Traffic Regulator stating that Train E268 is ready to move (as is Train E103, paragraph 226).
- 208 At 16:52 hrs the Controlling Signaller issued authority to Train E268 to move to Bray Station. Driver E268 was instructed to move with extreme caution and exam the line enroute to Bray and report back when Train E268 has arrived at Bray.
- 209 At 16:57 hrs Driver E268 contacted the Controlling Signaller advising that Train E268 has arrived at Bray Station with a few remaining passengers and the line is clear and safe for traffic.
- 210 All passengers, emergency personnel and IÉ staff were clear of the line at 17:13 hrs and the line was re-opened for normal service at 17:25 hrs, approximately two hours after the first self-detrainment occurred.

⁴⁰ The RAIU consider this to be an additional observation, AO-05 (paragraph 359), which warrants a safety recommendation 2023005-18 (paragraph 433).

Events after the incident on Train E103

- 211 Passengers who travelled from Connolly were on the train for fifty-nine minutes by the time they departed Shankill at 14:53 hrs (opposed to the scheduled time of thirty-eight minutes, there were additional delays as a result of passengers requiring medical attention in Dalkey and Killiney Stations).
- 212 Train E103 was travelling close to maximum capacity with no air conditioning, but with open windows. CCTV footage indicates that they were fanning themselves and wiping their brows, most likely as a result of the crowding and the heat.
- 213 At the point of self-detrainment of Train E268 at 14:55 hrs, Train E103 was travelling from Shankill towards Bray.
- 214 At 14:57:08 hrs, as a result of Train E268 being stopped at Signal BR28, Train E103 was stopped at Signal BR26 (Figure 11). Driver E103 immediately made an announcement, followed by a number of other announcements in relation to the delay.
- 215 As a result of Train E103 being stationary, there is now no forced ventilation on the train, and insufficient passive ventilation through the windows resulting in the conditions onboard becoming increasingly uncomfortable.
- 216 Figure 11 illustrates the status of the trains at 14:57 hrs, whereby passengers are self-detraining Train E268 at Signal E268 (dashed circle), Train E103 is stopped at Signal BR26 (circled); Train E208 is departing Shankill Station and Train E804 is stopped on request of the Controlling Signalman (explained in paragraphs 248).



Figure 11 – Signal locations and status of trains at 14:57 hrs

217 At 15:06 hrs, IÉ’s Twitter account posted “13:45 Connolly/Bray stopped approaching Bray due to passengers forcing doors open and trespassing⁴¹⁴² on the line”. IÉ continued to refer the self-detrained passengers as “trespassing” on Twitter, throughout the incident (see Figure 15 for samples the tweets sent).

218 At 15:10:11 hrs Driver E103 contacted the Controlling Signaller requesting an update on the delays. While on the call, Driver E103 sees the blue door interlock light extinguishes (indicating that a door was open) and reports this to the Controlling Signaller, who confirms he has signal protection and traffic is stopped.

⁴¹ The person sending the tweets was using the information provided to them, through internal alerts, which included the trespassing terminology.

⁴² Firstly, were the passengers who self-detrained trespassing? The RSSB Research states that “Human error can be defined as follows: ‘A failure to perform a required action within the tolerance limits necessary for adequate and safe systems performance.’ If no instructions or communication, are provided escape through the open door would be classified as a mistake. It is possible that passengers would believe their actions to be appropriate based on misunderstanding. This would be wholly unacceptable on basis of keeping risks to passengers As Low as Reasonably Practicable”. Driver E268 failed to make any announcements in the five and a half minutes that Train E268 was stopped and as such the opening of the door would be classified as a mistake; this would be similar for Trains E103 and E804. As a result of the RAIU are in agreement that the passengers who self-detrained should not be classified as trespassers in this instance. (Note: See glossary for IÉ’s definition of trespassing).

- 219 Passengers on Train E103 were likely to be aware that passengers had begun self-detraining from Train E268, approximately eighteen minutes earlier, through messaging, calls and social media. It appears that passengers on carriages were making group decisions i.e. each carriage was deciding as to whether to stay onboard or self-detrain.
- 220 IÉ's Twitter account continuously referred to the self-detrained passengers as "trespassing" which greatly annoyed the passengers on Train E103 and appears to have been influential in some passengers' decision to self-detrain.
- 221 At 15:13:35 hrs, sixteen minutes after Train E103 came to a stop at Signal BR26, passengers did open the doors and start self-detraining.
- 222 On seeing passengers on the track, Driver E103 made an Emergency Call.
- 223 IÉ staff and other personnel, assisting with Train E268 were now tasked with assisting passengers on Train E103⁴³. Once on site they quickly decided, based on the numbers who had detrained to conduct a controlled evacuation of the remaining passengers. The passengers who remained on board were those who had chosen not to detrain or required assistance and were supplied with bottled water.
- 224 Once the evacuation was controlled the passengers from Train E103 were removed from the line through a gate to the CCE compound leading to the car park and through the level crossing at Bray Station.
- 225 At 16:18:52 hrs, the ADM advised of plan to sweep line back to Bray to ensure line is clear of all persons prior to moving trains.
- 226 At 16:28 hrs the ADM contacted the Suburban Traffic Regulator stating that Train E103 was ready to move (at the same time as Train E268, paragraph 207); at 16:31 hrs the ADM advised the Controlling Signaller of same.
- 227 At 17:03 hrs, the Controlling Signaller issued authority for Train E103 to move. Driver E103 was instructed to move with extreme caution and exam the line enroute to Bray.

⁴³ It was reported by An Garda Síochána that parents, in desperation, were trying to pass babies and young children out the windows of the trains to other passengers that were on the railway line, however, the windows were too small.

Events after the incident on Train E208

228 Train E208 departed Connolly Station seven minutes late. Passengers who travelled from Connolly Station were on the train for an hour (opposed to the scheduled time of thirty-eight minutes) by the time they departed Shankill at 14:57 hrs. Train E208 was travelling close to maximum capacity with no air conditioning, but with open windows (CCTV shows passengers fanning themselves).

229 At the time of Train E208's departure from Shankill, passengers from Train E268 were self-detraining (which commenced at 14:55 hrs) and Train E103 was stopped at Signal BR26 (see Figure 11).

230 At 15:00:45 hrs, Train E208 is stopped at Signal BR24. Driver E208 makes a number of announcements about the delay.

231 Figure 12 illustrates the signal and station locations and the status of the trains at 15:10 hrs, when Train E208 has been stopped for ten minutes with passengers on Train E268 and Train E103 self-detraining.

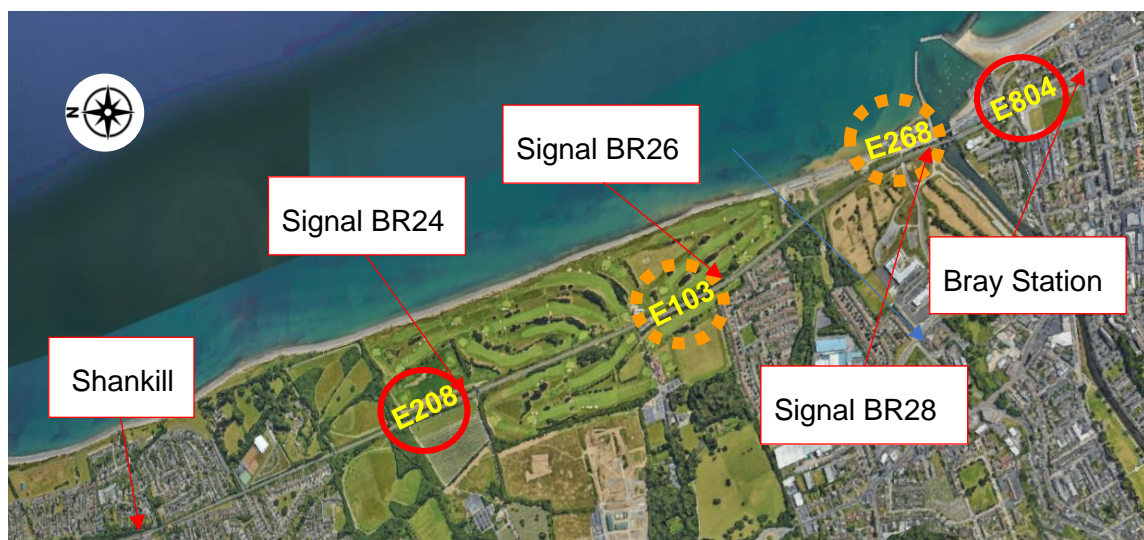


Figure 12 – Signal locations and status of trains at 15:00 hrs

232 At 15:25 hrs, Driver E208 contacted the Controlling Signalman advising people are pulling emergency handles on board the train. Driver E208 asks the Controlling Signalman if it possible to change ends and go back to Shankill Station, this request is declined as there is another train on the platform at Shankill.

233 As a result of Train E208 being stationary, there is now no forced ventilation and insufficient passive ventilation on the train and the conditions onboard become increasingly uncomfortable.

234 At 15:25 hrs, while Driver E208 is talking to the Controlling Signaller the door interlock light extinguishes and that the doors on the train were opened by passengers; however, people remained on the train at this stage. Driver E208 made a number of announcements to try keep people on the train.

235 It is likely that similar events occurred on the carriages of Train E208 as those on Train E103 (paragraphs 219), in terms of being aware of the detrainments, looking at social media (including Twitter) and making group decisions to self-detrain as with Train E103.

236 At 15:43 hrs, approximately forty-three minutes after coming to a stop at Signal BR24 (eighteen minutes after opening the doors), the passengers began self-detraining from Train E208. Driver E208 made an Emergency Call saying that passengers were walking towards Bray.

237 As with Train E103 they may have been influenced by the activity on social media (paragraph 219).

238 Figure 13 illustrates that three trains now have passengers self-detraining, and one train remained stopped.

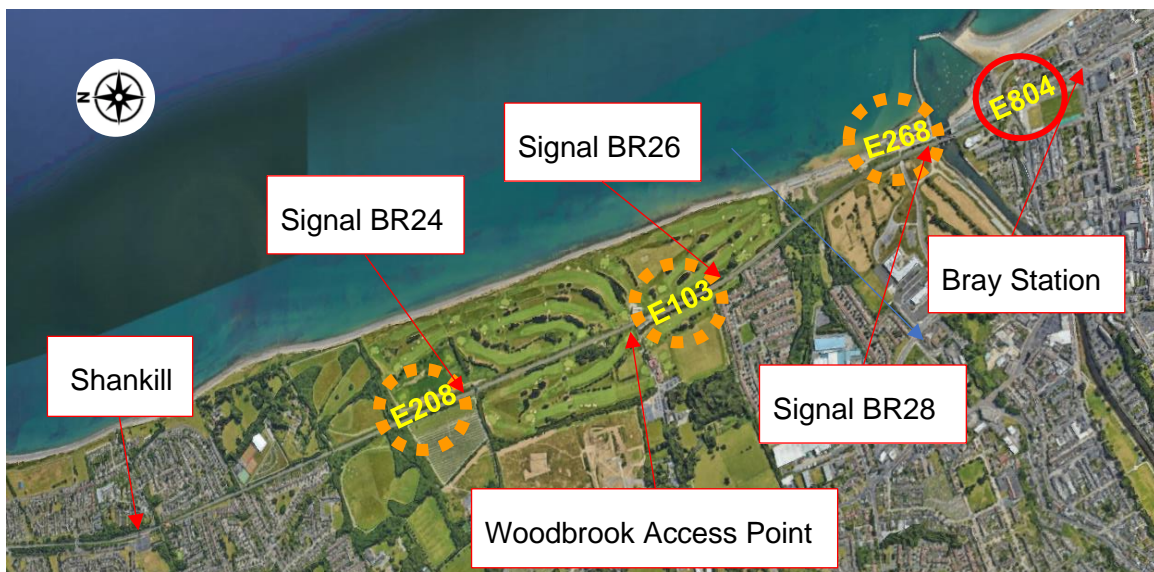


Figure 13 – Signal locations and status of trains at 15:00 hrs

239 At 15:45 hrs, the Acting Station Manager Bray contacts Suburban Regulator to advise that he is making his way up to Train E208 and intends to initiate a controlled evacuation and to divert people from the train via Woodbrook Access Point and through Woodbrook Golf Club (Figure 13) to get them off the line.

- 240 At 15:54:09 hrs Acting Station Manager Bray confirms that passengers are being routed via Woodbrook Golf Club. Some passengers also made their way through the back garden of a house adjacent to the railway line which was easily opened due to being in a degraded condition.
- 241 At 16:11 hrs Acting Station Manager Bray contacts the Suburban Traffic Regulator to advise some passengers from Train E208 were making their way back to Shankill on the line, the Suburban Traffic Regulator confirmed this with a driver stopped at Shankill Station (Train A602 to Rosslare) at 16:17:25 hrs.
- 242 At 16:33 hrs, approximately forty people remained on the line around Shankill Station.
- 243 At 16:41 hrs, the Acting Station Manager Bray contacted the Controlling Signalman and advised that the line from Train E208 (Signal BR24) was clear as far as Shankill Station.
- 244 At 17:00 hrs, after resolving a door issue on Train E208, the Controlling Signalman issued authority to Train E208 to proceed towards Bray examining the line and obeying all signals.
- 245 At 17:08 hrs, Driver E208 contacted the Controlling Signalman and advises that the line is clear from Signal BR24 to Signal BR28.
- 246 At 17:17 hrs, Train E208 arrives at Bray Station with approximately eighty passengers who remained on the train.

Events after the incident on Train E804

- 247 At 14:53 hrs Train E804 departed Bray, ten minutes late. There were approximately fifty passengers on board, and conditions were described as comfortable.
- 248 At 14:55 hrs the Controlling Signaller requests that Driver E804 brings Train E804 to a stop as a result of passengers self-detraining Train E268; Driver E804 complies with the instruction.
- 249 Driver E804 makes numerous announcements in relation to the delay.
- 250 At 15:43 hrs (having been stopped for forty-six minutes), Driver E804 makes an emergency call advising that the door interlock light has extinguished; with the light restored one minute later⁴⁴.
- 251 At 15:51 hrs An Garda Síochána, arrive on-site with a member of IÉ staff and directs⁴⁵ that Driver E804 open the doors to allow in some fresh air. Driver E804 relayed this to the Controlling Signaller who advised that the doors could not be opened, and permission would be granted when IÉ staff arrive to assist.
- 252 At 15:52:56 hrs it was then agreed between the Controlling Signaller and the Suburban Traffic Regulator that the doors could be enabled and opened as it was unlikely the train would be moved for a period of time, Driver E804 is informed of this at 15:53 hrs, but must wait until IÉ staff arrive onsite to assist; staff were requested to assist at 15:56 hrs.

⁴⁴ This is likely due to a passenger forcing the door open, rather than applying the emergency door release (paragraph 85) as the door interlock light illuminated without the driver resetting the emergency door open switch.

⁴⁵ It should be noted that this was an unusual scenario for Driver E804 and the staff in CTC and the actions taken were perceived to be in the best interest of passengers onboard due to the safety implications of opening doors. Whilst acknowledging that members of An Garda Síochána may not be familiar with the IÉ Rule Book and the hazards associated with the railway, there needs to be a shared understanding, at CTC, of when instructions from An Garda Síochána should be complied with. The RAIU consider this to be an additional observation, AO-06 (paragraph 359), in terms of when and how IÉ follow directions from An Garda Síochána during an incident, which warrants a safety recommendation 2023005-19 (paragraph 434).

- 253 At 15:57 hrs, a more senior member of An Garda Síochána instructed that the door be opened; again the Controlling Signaller advises that the doors will be opened when assistance arrives; this is relayed by Driver E804.
- 254 When IE staff arrive and position themselves at the doors of Train E804, Driver E804 advised passengers that the doors were being enabled and if they wished they could open the doors and take instruction from the people on the ground. After the door were enabled, some were opened, and a controlled evacuation of some passengers was undertaken, and these passengers walked back to Bray Station. Medical assistance was provided to some passengers who remained on the train for minor ailments, no further medical attention was sought at the time.
- 255 At 16:16 hrs Driver E804 contacted the Controlling Signaller to advise that he had been told by the ADM to change ends with a view to moving the train back into Bray Station. The Controlling Signaller advises Driver E804 not to change ends and not to move his train until he spoke to him again.
- 256 At 16:21 hrs the Suburban Traffic Regulator contacted the Controlling Signaller and advises that Train E804 will go forward to Shankill; the Controlling Signaller then advises Driver E804.
- 257 At 16:31 hrs Driver E804 is requested to change ends to move back to Bray as Train E208 is having door issues and people are walking the line to Shankill.
- 258 At 16:47 hrs the Controlling Signaller gives authority to move Train E804 back to Bray.
- 259 At 16:50 hrs Driver E804 advises the Controlling Signaller that Train E804 is back in Bray and the line is clear.

Events after the incident at Dalkey, Killiney & Shankill Stations

260 Dalkey, Killiney and Shankill station platforms were not staffed and therefore no crowd control plan could be implemented in terms of managing passengers boarding trains.

261 At approximately 15:50 hrs, the driver of a train stopped at Platform 2 at Dalkey Station reported that passengers had left his train and began to get down onto the railway line and were walking towards Bray (see Figure 14).

262 At the same time, the driver of a train stopped at Platform 2 at Killiney Station reported that passengers had left his train and began to get down onto the railway line and were walking towards Bray (see Figure 14).

263 It was reported by Garda Control (Bray) that at approximately 16:30 hrs, about forty passengers on Shankill Station, got down from the platform, and started walking towards north and south of the station (see Figure 14).

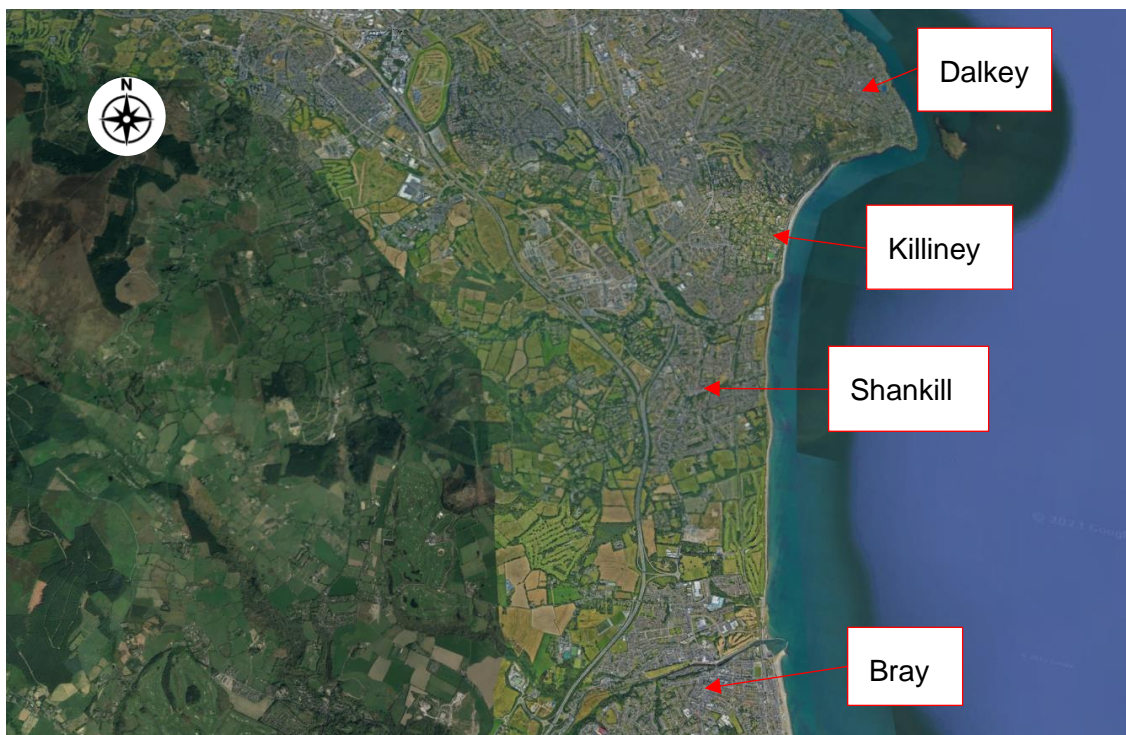


Figure 14 – Extent of the incident locations

264 A mother reported, through the IÉ Customer Care Department, that as a result of a “scrum” for passengers to get on the train at Dalkey, her three year old son fell between the platform and the train; but as she was holding his hand she was “able to pull him back up but only when three quarters of him disappeared.” She could not report the incident to anyone at the station as “there was nobody at the station to tell, to warn, to ask for help.”

Communications after the incident

IÉ Emergency Line

265 There were 129 recorded communications of note, through CTC during the course of the incident⁴⁶. This section of the report reviews the communications between members of IÉ staff and parties outside IÉ i.e. passengers and emergency services.

266 The Mainline Traffic Regulators man the IÉ Emergency Line, 24/7.

267 There were five calls made to the IÉ Emergency Line, during the incident, by passengers who were on the trains⁴⁷. In summary, these are the details of the calls made:

- 14:57:59 hrs – A passenger on Train E268 reported that as a result of no air conditioning, people were taking their clothes off and breaking out of the train. The Mainline Traffic Regulator was unaware of people on the line and the passenger explained the situation. The Mainline Traffic Regulator was unhelpful, and it resulted in the passenger sounding frustrated;
- 15:11:33 hrs – A passenger called advising people are beginning to faint on the train, they are stressed and panicked, people are banging the doors and there are no announcements on the train. The Mainline Traffic Regulator tells the passenger of the situation with Train E268. The passenger requests that someone go down to the train and tell passengers “It’s okay.” The Mainline Traffic Regulator tells her that he will get the driver to make an announcement, she requests that the driver make the announcement “slowly so everyone can hear,” the IÉ staff member simply says, “will do, okay” and ends the call;
- 15:15:42 hrs – A passenger calls to request that the doors be opened as there is “sweat dripping off people,” “people are soaking wet” and the train is “jam packed”. The Mainline Traffic Regulator says, “we’ll try and get some done, yeah, we’ll try and do it,” the passenger responds by saying “the windows are going to have to be smashed to get air;” the Mainline Traffic Regulator repeats “we’ll try and get something done” and ends the call;

⁴⁶ In terms of safety critical communications between IÉ members of staff (i.e. drivers, traffic regulators, etc), the communications complied with Section A of the IÉ Rule Book, “Employment and Rules concerning Safety, Security, Communications and Emergencies.”

⁴⁷ Other passengers also called the national emergency line on 999 or 112 requesting assistance from the emergency services.

- 15:18:41 hrs – A passenger calls and says, “I’m ringing because we really need some assistance here, we are trying to follow the rules, have people not open the doors and be safe, if you don’t do something now, I’m going to call RTÉ”. The response from the Mainline Traffic Regulator was “RTÉ are recording it from the level crossing, I’m not being smart-arse with you, but that’s a fact”. Her response was “you know what, you are not being very reassuring and I’m recording this call”. The Mainline Traffic Regulator says, “that’s fine, but we’ve a thousand people who’ve evacuated a train, if you listen to me” she interrupts, and the Mainline Traffic Regulator interjects “no I won’t”. The caller continues to request assistance as “it’s not good enough”, the Mainline Traffic Regulator then explains what has happened in terms of the self-detrainments and says trains will start moving in fifteen minutes. The Mainline Traffic Regulator ends the call by stating “blame the people who left the train in the first place”;
- 15:22:11 hrs – A passenger calls saying they’ve “been stuck for fifteen minutes and there is no air conditioning”, the Mainline Traffic Regulator explains the situation and that once the line is cleared the trains can move forward and tries to re-assure her.

268 The tone of the passengers was stressed. The tone of the Mainline Traffic Regulator, with the exception of the last call, were not “customer-friendly” and did not provide reassurance or empathy to the passengers seeking assistance.

269 Garda Control (Bray) made three calls to the IÉ Emergency Line to report that:

- Passengers were reporting that they were on a stopped train and there was an argument between a driver and a member of the public, which was broadcast over the public address system, this was identified as Train E268 (call received at 15:03:42 hrs);
- They were getting a number of 999 calls that people were going to smash windows to get off the trains;
- Approximately forty people were alighted from the platform at Shankill Station (paragraphs 263).

270 Dublin Fire and Ambulance Centre also called twice to state that they have a number of calls that people were “trapped” on trains and the second call the Dublin Fire and Ambulance Centre offered medical assistance, which was declined as IÉ had no reports that medical assistance being required.

271 The tone of the Mainline Traffic Regulator was dismissive and blamed the passengers on terms of talking to the emergency services.

IE's Twitter account

272 IE's Twitter⁴⁸ account was used throughout the incident. The first tweet in relation to the delay, at 15:06 hrs, states, "13:45 Connolly/Bray stopped approaching Bray due to passengers forcing doors open and trespassing on the line". Further tweets continue to refer to the passengers "trespassing" see Figure 15 for a sample of tweets.

273 An Garda Síochána are noted as "attending."

274 There are also responses to tweets in relation to the train not having any "technical issues" or are "not broken down".

275 It should be noted that the Twitter operator was feeding information and responding based on information that they were receiving through internal alerts e.g. the internal alerts were using the trespassing terminology.

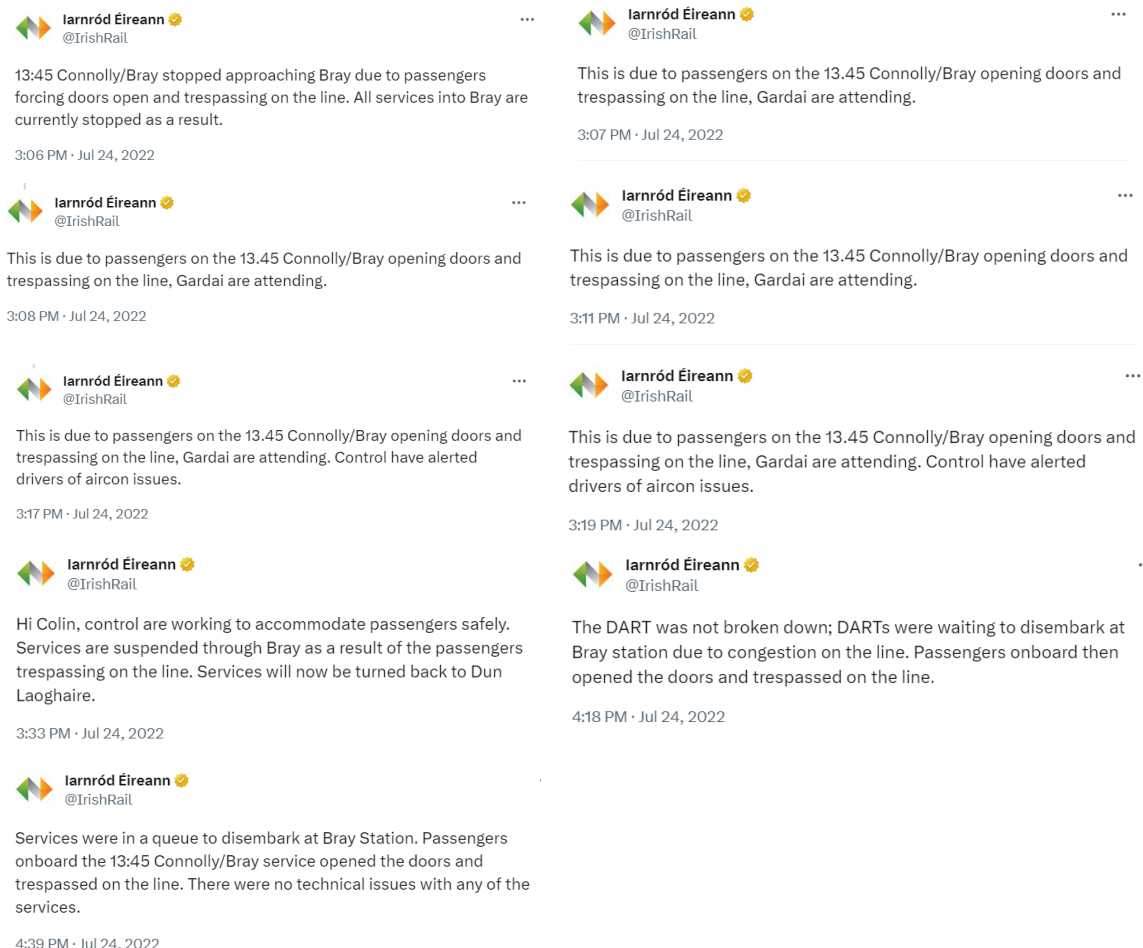


Figure 15 – IE "trespassing" tweets

⁴⁸ Known as "X" at the time of the publication of this report.

276 When IÉ were trying to recover the situation and trying and get passengers to remain on the trains, another tweet was sent at 15:23 hrs (seven minutes after the first tweet), stating “can passengers outside of Bray please stay onboard the train”, see Figure 16. Passengers did not accede to the request.

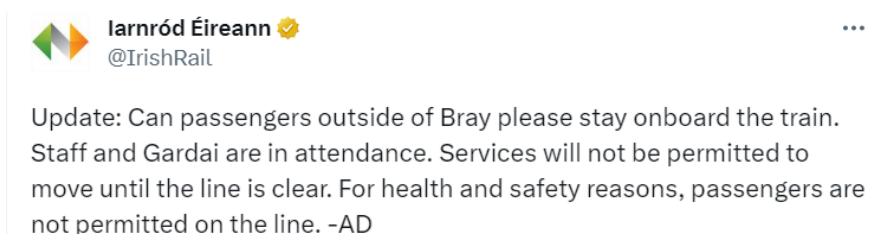


Figure 16 – IÉ “stay onboard” tweet

Customer complaints

277 After the incident, passengers made 155 complaints to the IÉ Customer Care Department. The complaints included:

- Concern for people's welfare, in particular for the young and vulnerable, with several reports of panic attacks, people passing out and suffocating; and some passengers urinating on themselves or into bottles;
- Hot temperatures on trains, being described as a "bloody sauna" with people "overheated", "floppy with the heat", "everyone sweating" with "no fresh air" making it "impossible to breathe" with several noting that there was no air conditioning and no openable windows. As well as poor conditions on the trains as a result of crowding, with trains being described as "rammed", "jammed", and "totally overcrowded";
- Absence of communications from drivers, with complaints including: "train stopped... delayed, no feedback as to why"; "stopped outside Bray with no announcements as to what was happening"; "You can't leave people on an overheated DART and not tell them that help is on the way"; "no communication from the officials about the status of the train or station"; and "I feel if there had been an announcement to let us know why the train had stalled people might not have panicked so much";
- Crowding at stations, and the absence of staff at stations, where platforms described as "full" and reports that it was taking an hour to board trains and passengers were "fighting to get on". Also that the IÉ App (mobile application), and station public information system, were not reporting the live delays;
- Poor quality driver announcements with passengers stating that the instructions were "unclear" and that passengers "couldn't hear the driver as the speakers weren't working correctly", "the volume of the announcements SHOCKINGLY low", and "no announcements were audible". There were several complaints related to the fighting between Driver E268 and the passengers being broadcast over the public address system;
- Issues related to "blaming" passengers and a report of the threat of arrest, on arrival to Bray Station, for self-detraining;
- The lack of consideration for passenger needs "There was zero empathy for the people who had to endure these dangerous conditions on board";
- Overall passengers felt the conditions were "intolerable", "tortuous", "terrible" and "unbearable" "it was more dangerous to stay on the DART than to leave".

Similar occurrences

Historical occurrences

278 There were some self-detrainments around Dublin City Centre station in the 1990s and early 2000s, however they predate formal incident recording systems, therefore exact details on the incidents are unknown. It should be noted that IÉ now have formal incident recording systems in place to record such events.

Previous occurrences

Self-detrainment of a derailed DART at Dun Laoghaire, 13/09/17

The incident

279 At 17:32 hrs on the 13th September 2017 a DART passenger service from Howth to Bray, Train E222, arrived at Salthill Station, one minute late. While Train E222 was detained on the platform at Salthill (due to an issue with Points DL115) the platform side passenger doors were in the opened position and updates on the delay were relayed by Driver E222 and over the station public address system. It should be noted that the temperature was approximately 15°C and not contributory to the events.

280 At 18:02 hrs Train E222 departed Salthill thirty-one minutes late, with approximately 500 passengers onboard. Train E222 travelled over Points DL115 and derailed (remaining upright).

281 Driver E222 advised the passengers, by the public address system, of a further delay, Driver E222 made two further announcements at approximately twenty-five minute intervals stating that there had been a derailment but not giving a clear time for a controlled evacuation of the train.

282 At approximately 18:24 hrs (Train E222 is now fifty-three minutes late; people travelling from Howth would have been on the train for one-hour thirty-nine minutes) one passenger in the leading carriage activated the emergency passenger door opening device and left the train. Driver E222 entered the saloon and closed the door. Approximately fifteen minutes later a passenger in the rear carriage opened a passenger door by means of the emergency opening device and exited the train, he was followed by approximately sixty to seventy passengers who made their way away from the train in many different directions on the up and down lines towards Dun Laoghaire Station and the sidings.

283 At approximately 18:39 hrs, a DTE arrived on site and declared himself IÉ Incident Officer (IÉIO). As the IÉIO made his way to Train E222 he saw the passengers making an uncontrolled evacuation and attempted to prevent the evacuation.

284 At 18:43 hrs the IÉIO was joined by the District Manager DART and they assessed how best to evacuate the remaining 500 passengers; the IÉIO was also informed that a pregnant woman and a woman having a panic attack were on the train and an ambulance was called.

285 At 18:49 hrs, following further confirmation that full protection was in place, IÉ staff arranged a controlled evacuation of the train which was completed by 19:15 hrs.

RAIU investigation

286 The RAIU carried out an investigation into the derailment and the impromptu evacuation of the train. In terms of the impromptu evacuation, the RAIU found that the existing IÉ-RU publications did not address the prevention of uncontrolled impromptu evacuations. This absence of controlled response, coupled with the frustration of the delayed passengers on board a train which was situated close to a platform, resulted in a significant number of passengers carrying out impromptu evacuations without the supervision of IÉ staff. As a result, the RAIU made the following safety recommendation (2018001-003) on the 15th August 2018: “IÉ-RU should review their suite of documents which reference major customer disruptions and emergencies and address any deficiencies in relation to the management of passengers on trains and uncontrolled impromptu evacuations. These documents should then be briefed to staff who have roles in relation to customer disruptions and emergencies to ensure they are aware of their responsibilities”.

287 The CRR closed this safety recommendation in November 2021, based on IÉ’s submission of the Train Evacuation Briefing Notes⁴⁹.

⁴⁹ It should be noted that the CRR have since published their procedure for “Managing RAIU Safety Recommendations”, effective since the 10th November 2023, which formalises the way RAIU safety recommendations are closed, see paragraphs 397 to 403.

IE Customer Response Assessment

IE internal recommendations

288 IE internally published their report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, on the 27th September 2017. This assessment identified that “the absence of information on precisely when detraining would occur resulted in an uncontrolled evacuation of the train whereby frustrated and concerned passengers opened the door and jumped from a height onto the ballast below”. The assessment made eight recommendations. The recommendations relevant to this incident are as follows:

- Recommendation 1 – Protocol and procedure as defined within the MCD Response Handbook requires clinical execution following the designation of an incident as an MCD. The MCD Response Handbook should be subject to a detailed review and updated accordingly. The updated MCD Response Handbook should then be subject to a rigorous customer disruptions training exercise to ensure appropriateness, preparedness and compliance in the event of any future disruptions;
- Recommendation 2 – The Emergency Services should be advised by CTC once a derailment is declared. Other trigger events in the MCD should be identified and considered as to which require Emergency Services to be advised;
- Recommendation 3 – A review of the optimal option for train evacuation needs to be considered i.e. single door, multiple door, train to train. Also, CTC needs to consider how to effect early evacuation of impacted services;
- Recommendation 4 – In the event of disruption, CTC nominate the terminal station;
- Recommendation 5 – Prioritise the provision in CTC of accurate customer information displays. It is clear that a separation is required for the management of making station announcements and managing the Customer Information System (CIS) displays. Dedicated resources need to be allocated to these tasks, one to make announcements and one person to manage CIS display information;
- Recommendation 6 – The quality and frequency of driver announcements can vary at times of disruption. The feasibility of train configuration to align with Global System for Mobile Communications – Railway (GSMR) train radio capability supporting centralised CTC train public address announcements needs to be assessed;
- Recommendation 7 – Deploying staff to stations should be prioritised to the designated turn-back station. Review required of how this is best affected taking into consideration

availability of station staff and time of incident. Wider resource availability needs to be also considered;

- Recommendation 8 – Consideration needs to be given to the level of communication for onward connections for passengers.

Status of the IÉ internal recommendations

289 The actions were due to be closed out in late 2017, the RAIU requested the status of the recommendations during this investigation. The status of the recommendations could not be immediately verified by IÉ-IM as there was no log in place (similar to IÉ's Accident Incident Management System (AIMS) for safety recommendation) for the above recommendations, with some of this recommendation only being allocated for action in August 2023, after the RAIU status request⁵⁰.

290 At the time of publication of this RAIU Report, seven of the eight safety recommendations have now been closed (see paragraphs 380 to 384).

Open IÉ internal recommendation (Recommendation 1)

291 Recommendation 1, related to the updating of the MCD Response Handbook and rigorous customer disruptions training exercise to ensure appropriateness, preparedness and compliance in the event of any future disruptions.

292 In terms of the MCD Response Handbook, this has not been updated, however, the RAIU have addressed this through Safety Recommendation 2023005-10 (paragraph 423).

293 In terms of the "rigorous customer disruptions training exercise" the RAIU requested the notes from the next workshop after the incident. This workshop was on the 5th December 2018, entitled "Briefing on Emergency Response Handbook / Scenario Workshop Post Exercise Report", whereby thirty-three members of staff attended a full briefing of the "Emergency Response Handbook" and the scenario was where there was a "loss of CTC due to a terrorist incident", which the chances of occurrence were "not high".

⁵⁰ The RAIU consider that the fact that the status of the recommendations could not be collated in a timely manner and the fact that the eventual findings found that some of the recommendations were not completed to be an additional observation, AO-07 (paragraph 359), which warrants a safety recommendation, Safety Recommendation 2023005-20 (paragraph 435).

294 This is despite Recommendation 1 being made and the likelihood of a self-detrainment being greater than “not high” as it had occurred the year previous. In fact, IÉ have never carried out workshops scenarios involving self-detrainments up until the time of the incident in Bray in 2022 (paragraph 144).

Self-detrainment at Malahide Station on the 20th June 2022

295 At approximately 23:44 hrs on Sunday 19th June 2022, Train E700 departed from the Up platform at Malahide Station. Two minutes later, there was a power outage in the OHLE between Malahide and Portmarnock Stations (the OHLE did not take the reset). Train E700 stopped approximately 180 m south of Malahide Station as there was no power available.

296 At approximately 00:00 hrs on the 20th June 2022 the driver of Train E700 contacted the Signaller to report that a door had been opened and he could see two men walking back along the track towards Malahide Station (at the time, there were no trains moving in the area due to the OHLE power outage).

297 Staff made their way to the train from Malahide Station and commenced a controlled evacuation of passengers from the failed train and walked them back to Malahide Station.

Occurrence after the incident

Self-detrainment at Ballysadare on the 14th June 2023

298 At approximately 15:12 hrs, the 15:05 hrs passenger service from Sligo to Dublin Connolly (Train A911), struck two people, fatally injuring one and seriously injuring the second. The accident occurred close to the 129 MP between Sligo and Collooney.

299 Train A911 was stopped at the scene of the accident for approximately fifty-five minutes when one of the passengers opened a passenger door by means of the emergency opening device and exited the train onto the railway. It appears, that the person had arranged for a car to collect them. The person may have sustained an injury to the hand, on the boundary fencing, on exiting the railway line.

300 Air conditioning was working on the train, customers were updated frequently on events (by the customer service operative, the customer service supervisor (who travelled to the site) and other members of staff). Passengers were also supplied with bottled water. No other passenger self-detrained.

Analysis

Rolling stock

HVAC Systems

301 Three of the trains (Trains E103, E208 and E804) had hopper windows that could be opened while Train E268 was the only train with an air conditioning option (paragraph 76); however, it was not turned on, unbeknown to Driver E268, and relevant IÉ-RU personnel through a remote diagnostics system as there is none fitted on the EMU fleet (paragraph 74).

302 Driver E268 was aware of the air conditioning being on at Fairview, however, Driver E268 did not fully understanding that changing ends on the train required the air conditioning to be turned on again (paragraph 79), which may have been as a result of insufficient training and there being no Traction Manual for the 8520 Class DART fleet (paragraph 81).

Public Address Systems

303 There were reports of the public address systems on the trains being of poor quality although verified to be operation by IÉ-RU (paragraphs 87 and 277).

Station Operations – Crowd Control

304 The procedures for crowd control are managed through Ops-SMS-2.3 which outlines plans in relation to regulating passengers' arrival, throughput and dispatching of trains (paragraph 104). While the management and staffing arrangements at Bray were adequate in terms of passenger flows (paragraph 118) with PICs positioned on each platform as per the Bray Station Crowd Control Plan (paragraph 117) only half of the stations enroute to Bray were staffed (paragraph 113) which resulted in excess dwell times due to passengers travelling with buggies and passengers not moving down the carriages (paragraph 129). This meant that, while crowd control plans may have been implemented in terms of signage, etc. with no staff present, a full adoption of a sufficiently robust crowd control plan could not be adopted.

305 PTI is a known risk identified in Ops SMS 1.5 (2017) (paragraph 107). The Professional Train Dispatcher Handbook (2020) acknowledges that those travelling pre or post event are "high risk users" (paragraph 112), however, the risk assessments associated with high risk platforms does not recognise this as a risk; therefore mitigations for major events,

which may require the presence of PICs on platforms as a result of an increased risk is not considered⁵¹.

306 On the day, there was crowding at stations enroute to Bray, with some passengers reporting being at stations for an hour before boarding (paragraph 116); one report of a child falling between the train and the platform, at Dalkey Station (paragraph 264); and during the incident, there were reports of passengers alighting from unattended platforms onto the railway line at Dalkey, Killiney and Shankill (paragraphs 260 - 263).

Train Operations – Crowd Control

307 There appears to be no SMS document covering crowding on board trains, similar to Crowd Control document for stations (paragraph 125), despite IÉ-RU claiming that Ops-SMS-2.3 does address this, RAIU have not found this to be the case (footnote 22).

308 There is a Passenger Comfort Risk Register, but this was not updated to include the risks associated with self-detrainments (paragraph 123), despite a self-detrainment occurring in 2017 at Dun Laoghaire (paragraphs 279 - 285).

309 On the day of the occurrence, it appears that passengers were remaining in close proximity to the doors, as when the doors would open, the passenger would get some respite from the heat due to buoyant ventilation (paragraph 129, footnote 25), which meant passengers trying to board trains were finding it difficult, especially those travelling with buggies.

310 The crowding could have been managed by PICs on platforms, as it is acknowledged that the visible presence of the announcer is likely to provide the greatest compliance (paragraph 110), therefore meaning that driver announcements would not likely have made much difference in these instances as they are not clearly visible to passengers.

⁵¹ The RAIU consider the absence of staff at stations enroute to a major event to be an additional observation, AO-08 (paragraph 359). The absence of staff was also found to be a causal factor, CaF-08 (paragraph 353) in terms of passengers alighting from platforms (paragraphs 260 to 263) and therefore will be addressed through Safety Recommendation 2023005-04 (paragraph 417).

Factors influencing passenger behaviours & possible mitigations

Introduction

311 The main factors which influenced passenger behaviours on the day of the incident are: on-train interior conditions (as a result of external conditions i.e. hot weather), which are discussed in paragraphs 313 to 315; and, passenger communications, including communications from the drivers, IÉ Emergency Line and IÉ's Twitter account, which are discussed in paragraphs 316 to 328. This sections also highlights other factors which may have influenced passenger behaviour (paragraph 329).

312 This section also examines mitigating actions that could have been considered through existing research and guidance (paragraphs 157 to 175), which may have deterred passengers from self-detraining (after the first self-detrainment), discussed in paragraphs 322 to 340. Although it should be noted, the potential outcomes cannot be accurately determined, and passengers may still have self-detrained.

On-train interior conditions for Train E268, E103, E208 & E804

313 The on-train conditions on Train E268, were likely the catalyst, to the events on the day. The conditions on Train E268 are likely to have been the worst of the trains travelling on the day as the windows were sealed (no passive ventilation) and the air-conditioning was off (no forced ventilation (paragraph 189)), in addition passengers were exposed to the sunlight through the windows. There was reports of condensation dripping down from the carriage ceiling on Train E268 (paragraph 193), indicating high humidity and high dew point temperature which resulted in intolerable conditions (paragraph 158). Many passengers were onboard Train E268 for over an hour (paragraph 190) with passengers displaying symptoms of heat exhaustion. To give an indication as to how "at risk" the passengers were on Train E268, the RSSB Research indicates that the risks of staying on board a failed train⁵² beyond one hour with no HVAC or ventilation would be in the order of a least eighty times higher than that in a controlled evacuation (paragraph 161).

314 Passengers on Trains E103 and E208 who travelled from Connolly were on the trains for over an hour when they came to a stop (paragraphs 211 and 228). As a result of the trains being stationary, there was no forced ventilation and insufficient passive ventilation through the windows, in addition the passengers were exposed to sunlight through the windows; all these factors resulted in the conditions onboard becoming increasingly

⁵² Although Train E268 had not failed, the air-conditioning was off for over an hour.

uncomfortable as the dew point temperature likely increased once stationary (paragraphs 169, 215 and 233), with some passengers experienced symptoms of heat exhaustion.

315 It appears, that although the conditions on Train E804 were uncomfortable, they may have been more tolerable as the train was: exiting Bray (travelling in the opposite direction); was only travelling two minutes when stopped and was sparsely loaded (paragraph 247).

Passenger Communications

Driver announcements

316 In terms of driver announcements, experience would emphasise that the initial provision of information is key to affecting a positive response from passengers stranded on trains (paragraphs 164). Drivers should endeavour to make regular “manual announcements” within a specified time period at an unscheduled stop, and then at regular interval thereafter; with the Professional Driving Handbook reinforcing this in stating that “In the event of delays and disruptions, it is critical to ensure customers are kept fully informed of the situation and any developments” (paragraph 131).

317 Although noting Train E268 was not “stranded” when it came to a stop at Signal BR28, Driver E268 did not make any announcements for five and a half minutes. The Ontrain Customer Communications Booklet provides a detailed account of how the announcements should be made and requires an “ice-breaker announcement” to be made after two minutes and additional announcements every five minutes for short delays (paragraphs 135 and 136). Driver E268 or any of the other drivers involved in the incident had not undertaken the customer communications training module, which was introduced in 2018 for new drivers (paragraph 138), only approximately 25% had received the training at the time of the incident.

318 Driver E268 thought that if a train was stopped for five minutes or less an announcement was not required, but as the train was stopped for five and a half minutes, at least one announcement should have been made at two minutes as per the Ontrain Customer Communications Booklet (paragraph 131 - 134).

319 Driver E268, in part, may not have made any announcements as no information was received from CTC in relation to what was happening.

320 When Driver E268 did make an announcement for passengers to remain on the train, it was poor due to the projection of the argument over the public address system between Driver E268 and some passengers which increased passenger anxiety; which likely

resulted in a large number of passengers self-detraining onto the railway line (paragraph 200).

321 Trains E103 and E208 had left Connolly approximately an hour prior to being stopped. Drivers E103 and E208 made a number of announcements in relation to the delay, however, despite their best efforts, passengers on Train E103 opened the doors and began detraining almost immediately. Driver E208 continued to make announcements after the doors were opened by passengers and successfully managed to keep passengers on the train for another eighteen minutes before self-detrainment began.

322 While Train E804 was stopped for approximately forty-eight minutes before a passenger opened one of the doors, which was re-closed after a minute. Driver E804 was therefore successful at managing to dissuade passengers from self-detraining.

323 It was reported by some passengers that the quality of the sound of the public address systems of some train carriages was poor, meaning announcements could not be heard or were difficult to decipher (paragraph 87), further increasing frustrations of the passengers.

Communications through the IÉ Emergency Line

324 In terms of the communications with the passengers and the IÉ Emergency Line the passengers were calling seeking some form of assistance, reassurance or information. The Mainline Traffic Regulator, in some instances, was rude, dismissive, uninterested and was blaming the passengers on the other trains (paragraph 267 and 268).

325 The actions on the day, were contrary to those outlined in RSSB Research which identifies that passengers will respond positively if staff are helpful (paragraph 164); while the IÉ's MCD Response Handbook, RDG & Network Rail Guidance requires that staff must demonstrate reassurance (paragraphs 147 and 170).

Communications through the IÉ Twitter account

326 The tweets (paragraph 272) referring to the passengers as "trespassing on the line" with An Garda Síochána "attending" were loaded with blame and were unsympathetic to the conditions on the trains; and, they were not in line IÉ's own documentation which requires "consistent, customer-friendly information" (paragraph 147).

327 Furthermore, IÉ stated that "there were no technical issues with any of the services" and "the DART was not broken down", where in fact there was an operational issue with Train E268's air conditioning and although the DARTs were not broken down, they were in fact stranded.

328 The RSSB Research notes that staff will be interpreted with varying trust depending on how well staff and passengers are interacting together (paragraph 164). These interactions were poor, and therefore at this stage, the “goodwill” between staff and passengers is likely to have broken down (paragraph 162). When a tweet was sent to dissuade passengers from self-detraining, seventeen minutes after the first “trespassing” tweet to try (paragraph 276), the passengers did not accede.

Other factors influencing passenger behaviours

Trains E268, E103 & E208

329 The main influencers on the day were the on-train interior conditions and passenger communications, other factors were (paragraphs 169 and 171):

- Reason for the stranding (after the self-detrainment of Train E268) – Passengers on the stranded trains knew that passengers were on the line, so their trains could not move until these passengers were clear of the line, meaning they may have expected the expected duration, on their respective trains, to take longer;
- Type of passengers – Many families were travelling, which in turn leads to more vulnerable passengers (children); who are more susceptible to heat exhaustion, and were likely to have been exhibiting signs of heat exhaustion quicker than the adults (paragraph 158);
- Driver only operated train – There was no train crew present on the train as trains, which meant that there was no visible established authority (paragraph 171);
- Information – Although drivers were providing information to passengers, it was not enough to dissuade them from self-detraining;
- External media – Passengers on Trains E103 and E208 were likely to be aware that passengers had begun self-detraining from Train E268, through messaging, calls and social media (paragraphs 219 and 235);
- Peer group influences – There is some evidence that there were group decisions, on the trains, as to whether passenger self-detrained or remained on the train, with many making the decision to self-detrain (paragraphs 219 and 235);
- Scale of the incident with four trains stranded (outside platform locations) – Many people self-detrained, meaning there were a lot of passenger on the line, meaning passengers onboard may have considered that IÉ had lost “control” of the situation (paragraph 170). This may have also led to a misperception of hazards associated with self-detraining;

- Environmental conditions – The destination was in sight for some passengers (i.e. they could see the location of Bray Air Display (paragraph 185)), the route by which they could evacuate to the location and the external environmental conditions were likely to be more favourable i.e. fresh air.

Train E804

330 Passengers on Train E804 would see the self-detrained passengers walking towards Bray, which may have caused anxiety, however, passengers remained on Train E804; and, although a door was opened after forty-six minutes, passengers still remained on the train and the door was closed a minute later (paragraph 250).

331 Successful passenger communications, the on-site presence of members of An Garda Síochána and IÉ staff members (established authority (paragraph 171), is likely to have reassured passengers that there were actions being taken to resolve the situation, which ultimately led to the passengers not self-detraining and waiting for a controlled evacuation, over an hour after initially coming to a stop (paragraphs 247 to 254).

Possible mitigation actions based on existing research and guidance

Possible mitigation actions for Train E268

- 332 Although Train E268 was not “stranded” when it initially came to a stop at Signal BR28 (paragraph 185). When passengers did self-detrain from Train E268, Train E268 was now effectively stranded. While acknowledging that signal protection was immediately put in place to stop trains, to protect the passengers who did self-detrain on the line from being struck by a train (paragraph 198); passengers that remained onboard Train E268 were still at risk as a result of the adverse interior thermal conditions.
- 333 When the first self-detrainments occurred, the full extent of the interior conditions on Train E268 should have been determined as being at the point of intolerability, or, expected to become intolerable within minutes, especially for children (paragraphs 158 and 159).
- 334 Prompt actions needed to be taken to protect the remaining onboard passengers on Train E268, by possibly opening the external doors on one side of the carriages, where the positive effect of such action cannot be “over-estimated”⁵³. However, it is noted that due to the safety implications, opening of the doors may only be possible as a precursor to evacuation of the train (paragraphs 160 and 169). While the conditions for a controlled evacuation may be less than ideal, this option will always be preferable to an uncontrolled self-evacuation, where risks to passengers is estimated to be in the region of four times higher than that of a controlled evacuation (paragraphs 162 and 167).
- 335 There is now a reliance on the “goodwill” of the remaining passengers not to self-detrain. Here, communications of information, to the passengers is key to affecting a positive response from passengers, to help support people in doing the right actions (paragraphs 162, 163 and 165).
- 336 However, it is noted that the information would be weighed against the external environmental cues and behaviours of others (paragraph 164). In terms of the incident at Bray, the passengers, given the hot weather and onboard conditions, and the fact that other passengers had already self-detrained; this may have meant that passengers would have self-detrained, irrespective as to whether the communications were good.

⁵³ It is noted that passengers opened the doors on Train E208 and remained onboard for another eighteen minutes before self-detraining (paragraphs 234 and 236), likely as a result of positive driver communications.

Possible mitigation actions for Train E103 and E208

- 337 When the passengers from Train E268 self-detrained, this effectively meant that Trains E103 and E208 were now stranded.
- 338 Existing research and guidance would recognise that passengers on Trains E103 and E208 may have had an increased tendency to evacuate the train of their own initiative as the incident at Train E268 progressed (paragraph 162 and 169).
- 339 Again, the positive effects of opening the external doors on one side of the carriages cannot be over-estimated, as seen on Train E208 where passengers remained onboard for a further eighteen minutes after opening the doors (paragraphs 234 and 236).
- 340 As mentioned previously, there are risks associated with opening the doors for ventilation, as there is the possibility of other passengers self-detraining. However, the provision of factual information and reassurance; and well as the provision on information on the risk of self-detraining may dissuade passengers from remaining onboard (paragraphs 165 and 172); again noting that the opening of the doors is a pre-cursor to controlled evacuation (paragraph 160).

Emergency Preparedness

- 341 In terms of emergency preparedness IÉ-RU Emergency Preparedness (Ops-SMS-2.2) seeks a co-ordinated and effective response to emergencies through formalised documentation and exposure to scenario planned emergency exercises/ tabletop exercises, and updating the lessons learnt from these exercises (paragraph 140). In terms of what scenarios to carry out, Policy and Principles for Emergency Response (RU-SMS-012) requires that “foreseeable situations” are targeted, which can be decided through annual workshops (paragraph 142). However, no scenario planned emergency exercises/tabletop exercises were carried out prior to the incident at Bray, despite a self-detrainment at Dun Laoghaire in 2017 meaning that self-detrainments was now a reasonably foreseeable risk (paragraph 144). In addition, the RDG & Network Rail Guidance Note, while acknowledging that instances of self-detrainment are rare, states that training (initial and refresher) is “imperative”, with the testing and exercising of operational scenarios integral to developing and maintaining competence in the processes, including those in CTC with particular regard to the emergency services. It also provides information on maintaining the competencies of those involved (paragraphs 173 to 175).
- 342 As a result, documents were not updated to reflect any lessons learnt, such as the Emergency Scenario Response Risk Register, which was not updated to include the risk associated with self-detrainment, despite being updated regularly (paragraphs 145 - 146).
- 343 The RAIU and IÉ recommendations to the Dun Laoghaire self-detrainment both identified the need to address deficiencies in the response to major customer disruptions (paragraph 286 and 288, respectively), however, the MCD Response Handbook was not updated.
- 344 Safety documents, which should reference self-detrainments, don't include any guidance for the prevention of self-detrainments including: Local Emergency Plan for Bray Station (paragraph 117); Passenger Comfort Risk Register (paragraph 123); Emergency Scenario Response Risk Register (paragraph 146); MCD Response Handbook (paragraph 149).

Conclusions

Summary of analysis with regard to the causes of the occurrence

- 345 On the day of the incident passengers from three trains carried out self-detrainments from DART trains while enroute to the Bray Air Display (paragraphs 189 to 239), one train was subject to a controlled evacuation (paragraphs 247 to 254) and there were reports of passengers alighting onto the railway line from three separate station platforms (paragraphs 260 to 263). The casual, contributory and systemic factors for these events are outlined in paragraphs 351 to 355; in terms of the factors. The communications were significant and are therefore discussed in the following two paragraphs.
- 346 The absence of communications to passengers was a major factor to the incident on Train E268 (paragraphs 317 to 318). Had Driver E268 made an announcement, this may have delayed Pax 1 from opening the doors; as just two seconds after the door was opened Signal BR28 cleared, which meant that the train could have proceeded into Bray Station, followed by Trains E103 and E208. In this incident, it was a case of “seconds count”.
- 347 In terms of the communications through the IÉ Emergency Line and IÉ Twitter account these were unacceptable in terms of provided reassurance to passengers. IÉ set out standards in terms of effective customer-friendly communications (Professional Driving Handbook, MCD Response Handbook, enhanced customer communications training for drivers, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire on the 27th September 2017, (paragraphs 131, 147, 137 and 288, respectively). However, these were not implemented on the day; the importance of communications in these incidents is imperative, as set out in the RRB Research and RDG & Network Rail Guidance Note (paragraph 325).
- 348 In terms of the response to the incident, it appears that IÉ-RU were “blindsided” by the escalation of the events on the day and continued to assume that the situation could be recovered; and this is likely the reason for not triggering an MCD response (paragraph 343).
- 349 There is no standalone document relating to stranded trains (similar to the RDG and Network Rail Guidance Note which has been in place since 2011 (paragraph 166 to 175) or the management of passengers in hot weather conditions (taking guidance from the RSSB Research (paragraphs 157 to 165). This contributed to there being no shared awareness of the circumstances in order to recognise when a minor operational

occurrence (trains stopped at signals) had the potential to develop into a major incident (mass self-detrainment of passengers).

350 IÉ had experienced a self-detrainment at Dun Laoghaire in 2017 whereby sixty to seventy passengers self-detrained; and despite internal IÉ (paragraphs 288) and an external RAIU recommendation (paragraph 286) being made to address the issue, they were not carried out with the vigour that was warranted (paragraphs 287 and 289), despite self-detrainment being a reasonably foreseeable risk.

Causal, contributing, and systemic factors

351 The self-detrainment of Trains E268, the first train to self-detrain, was as a result of the following causal factors:

- CaF-01 – The weather at the time of the incident was hot and sunny and Train E268 was crowded. The air conditioning was not switched on (paragraph 301); and there was no remote diagnostics system fitted to the train to alert relevant staff members that the air-conditioning was off (paragraph 301). In addition, the windows were unopenable and exposed to the sunlight. These combined factors resulted in increasingly uncomfortable conditions on Train E268 with some passengers exhibiting signs of heat exhaustion (paragraph 189);
- CaF-02 – Passengers were on Train E268 for a prolonged length of time due to delays (paragraph 190), prior to being stopped at Signal BR28 awaiting platform clearance (paragraph 184);
- CaF-03 – Driver E268 did not communicate with the passengers in terms of what was happening as set out in the Professional Driving Handbook and Ontrain Customer Communications Booklet (paragraph 317); incorrectly assuming he was not required to do so (paragraph 318). Driver E268 had not received any information, from CTC, to communicate to passengers, which in part, may be a reason for not making any announcements (paragraph 319);
- CaF-04 – Ultimately, Pax 1's desire to get off the train, with his family, onto a live railway, outweighed the need to stay on Train E268, citing that the conditions on Train E268 were "unbearable" (footnote 16), therefore Pax 1 opened the train doors;
- CaF-05 – Once the doors were open, fellow passengers began self-detraining (paragraph 197).

352 As with Train E268, passengers on Trains E103 and E208 were on the trains for a prolonged length of time prior stopping. The following causal factors are related to the self-detrainments of Trains E103 and E208:

- CaF-06 – The passive ventilation, through the opened windows, was insufficient in the crowded conditions and there was no forced ventilation as the trains were stationary resulting in increasingly uncomfortable conditions for passengers (paragraphs 215 and 233);
- CaF-07 – Drivers E103 and E208, although making some announcements, these were insufficient at deterring the passengers from self-detraining. There were also reports from passengers that the driver announcements were difficult to decipher due to poor sound quality of the public address system which led to further passenger frustration (paragraph 303).

353 It was reported that passengers alighted from the platforms at three stations and a child fell between the platform and the train (uninjured) at Dalkey, as a result of issues surround the boarding of the trains, was as a result of the following causal factor:

- CaF-08 – There was no staff on busy outlying station platforms to implement adequate station crowd control plans, including the evacuation of stations in a safe manner once the incident was underway (paragraphs 113, 115 and 260).

354 Contributing factors related to the passenger self-detraining from Trains E268, E103 and E208 are as follows:

- CoF-01 – The number of passengers self-detraining was likely as a result of the demographic of those travelling, a large number of families with babies and young children were on the trains. This may have resulted in passengers considering that risk of self-detraining was worth taking, to ensure the welfare of their children;
- CoF-02 – The trains were stopped in relatively close proximity to Bray Station (especially Train E268), the likely destination for a most passengers, meaning that passengers knew they would be able to walk to Bray Air Display after self-detraining (paragraph 239);
- CoF-03 – It is likely that passengers on Train E103 and E208, were aware of the self-detrainment of Train E268 as a result of phone calls, messaging and social media, which may have influenced passengers in their decision to detrain;
- CoF-04 – IE’s Twitter account continuously referred to the self-detrained passengers as “trespassing”, which greatly annoyed some passengers on the stranded trains and may have influenced their decision to self-detrain (paragraph 326);
- CoF-05 – When IE’s Twitter account then tried to communicate the need for passengers to remain on the trains, the passengers did not accede (paragraph 328);
- CoF-06 – The passengers who phoned IE’s Emergency Line, seeking assistance, were not provided with any reassurances or useful information; which in turn would not have dissuaded them from self-detraining (paragraph 324).

- 355 Systemic factors in relation to the self-detraining have been identified as follows:
- SF-01 – There is no Traction Manual for the 8520 Class DART fleet for drivers to refer to when setting up the air conditioning on a train resulting in Driver E268 not having a full understanding of the HVAC system (paragraph 301);
 - SF-02 – There is no SMS documentation in relation to the management of crowding on trains for large spectator events (paragraphs 307 and 309);
 - SF-03 – The drivers involved had not undergone the customer communications module introduced in 2018 (paragraph 317);
 - SF-04 – IÉ standards and training refer to “customer-friendly” communications (paragraph 347); however, this “customer-friendly” approach to dealing with passengers, in particular, passengers in distress (where it is of utmost importance) was not evident on the day.
- 356 In terms of the IÉ response to the incident, it appears that CTC thought that they could recover the situation at an early stage in terms of the management of Train E268, however, situation continued to escalate, whereby it became unrecoverable in that Trains E103 and E208 also began self-detraining, and passenger were reported to have alighted from platforms onto the railway line, with up to 2,000 passengers on the railway line. The RAIU found the following to be causal factors:
- CaF-09 – The suite of documents related to customer disruptions and self-detrainments were ineffective on the day of the incident, with most documents not adequately addressing the risks associated with self-detrainment (as they were reliant on reactive rather than proactive actions), leading to IÉ being completely ill prepared to manage the incident (paragraphs 341 to 343);
 - CaF-10 – IÉ-RU’s response, by the CTC Duty Manager not declaring an MCD, meant that sufficient resources were not deployed to CTC. Although noting that the incident was an escalating situation rather than an immediate major incident, there was no shared awareness of the circumstances in order to recognise that a minor operational occurrence had the potential to develop into a major incident (paragraph 348).
- 357 There were no contributory factors identified in terms of the response to the incident.

358 There is a dearth of documentation associated with the risk of self-detrainments, and as such adequate control mechanisms had not been adopted; despite the risk of self-detrainments being a reasonably foreseeable risk as a result of a self-detrainment at Dun Laoghaire in 2017. The RAIU have identified the following systemic factors in terms of the response to the incident:

- SF-05 – The RAIU issued safety recommendation 2018001-003 on the 15th August 2018, which reads “IÉ-RU should review their suite of documents which reference major customer disruptions and emergencies and address any deficiencies in relation to the management of passengers on trains and uncontrolled impromptu evacuations. These documents should then be briefed to staff who have roles in relation to customer disruptions and emergencies to ensure they are aware of their responsibilities”; had this safety recommendation been addressed with the vigour that was warranted, the incident may not have escalated (paragraph 343);
- SF-06 – In addition, had IÉ addressed, in full, the recommendations set out in their internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, published on the 27th September 2017, which included: a requirement to update the MCD Response Handbook and the formation of a rigorous customer disruptions training exercise to ensure appropriateness, preparedness and compliance in the event of any future disruptions, the incident may not have escalated (paragraph 343);
- SF-07 – A full complement of staff was not present in CTC for this incident as an MCD was not triggered (paragraph 348);
- SF-08 – Many IÉ-RU documents, which should reference self-detrainment, do not adequately address the risks associated with self-detrainments (paragraph 117); Passenger Comfort Risk Register (paragraph 123); Emergency Scenario Response Risk Register (paragraph 146); MCD Response Handbook (paragraph 344).

Additional observations

359 Although not causal, contributing, or systemic to the incident, the RAIU make the following additional observations:

- AO-01 – From the advertising, the passengers are likely to have had an expectation that their train journeys would be managed appropriately, with staffed stations and platforms, etc, leading to passenger frustrations. However, the events of the day, described in this report, do not reflect this, and the frustrations of the passengers increased significantly throughout the incident (paragraph 58);
- AO-02 – IÉ-RU verified that the public address systems were operating in accordance with their own standards. However, a number of complaints were made to IÉ Customer Care Department in relation to the public announcements system on the trains in terms of volume (paragraph 86);
- AO-03 – Manager CTC & Train Performance was not included in the planning in terms of platform allocation for incoming trains into Bray Station (paragraphs 122) which may have minimised shunting of trains and passenger detraining times (paragraph 177);
- AO-04 – There are no instructions for drivers, in the IÉ Rule Book in relation to self-detrainments or stranded trains (paragraph 139);
- AO-05 – Passengers experienced difficulties during the evacuation process, when walking over the trespass guards (Figure 5, paragraph 205); this issue is not addressed in the existing Train Evacuation Briefing Notes or any emergency documentation (paragraph 154);
- AO-06 – Although, it is noted that IÉ were acting in what they considered the best interests of passengers, IÉ failed to comply with directions given by members of An Garda Síochána (paragraph 251); this is likely as a result of no formal established procedures;
- AO-07 – IÉ's internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, made eight recommendations; the status of which could not be verified, in a timely manner, by IÉ (paragraph 289);
- AO-08 – Only half the stations enroute to Bray were staffed, with reports of crowding at stations and issues boarding trains; with no PICs present to manage the passenger flow (paragraph 305).

Measures taken since the incident

Measures taken by IÉ since the incident

Internal investigation report into the causation of the incident

360 IÉ-RU completed an internal investigation in relation to the incident, Self-detrainment of passengers from three DART trains onto the line that was still live for the operation of trains between Shankill and Bray Stations. The report noted four actions as having been carried out, namely:

- Driver E268 received corrective coaching on Safety Critical Communications and making announcements in compliance to Competence Management Drivers (Ops SMS 3.1). Additionally, Driver E268 was assessed on communicating safety related information by use of in cab and line side equipment and providing good customer service;
- The requirements of the Professional Driving Handbook 5.2, providing good customers service is being discussed and assessed with DART Drivers;
- A notice was posted in the DART driver depots on making public address announcements referring to the requirements of the Professional Driving Handbook;
- Fencing adjacent near Shankill Station was renewed (paragraph 239).

361 The report made eight safety recommendations, including:

- Development and issue a Traction Manuals for DART Fleet (paragraph 81);
- Improving the training material to provide additional guidance on the setting up of the air conditioning systems on DART trains;
- Provision of training in improved passenger communications to the train drivers;
- Provision of information to customers for special events;
- The updating of the Local Emergency Plan (LEP) Template to include reference that train evacuation scenarios can take place through self-evacuation;
- The development of a template for an Event Plan for use in the planning and execution of railway operations at stations for special events;
- The presence of a RU operations manager in the CTC control room during special events;
- The involvement of relevant managers from CTC in the train planning and control arrangements with IÉ-RU for large events.

362 The RAIU note, that despite having specialist human factors staff working in IÉ, they were not included in the investigation panel, despite the human factors being a major factor in the incident.

Driver training

363 There have been a number of actions taken in terms of driver training, as follows:

- All service delivery drivers have now been briefed on the importance of passenger communications especially in times of disruption;
- Communications prompt cards are now issued to drivers for large events e.g. Bray Air Display;
- All DART drivers were trained on the new passenger information system fitted on the 8500 Class DART fleet.

HVAC Systems on the DART

364 Prior to the occurrence in July 2022, the CME Department had begun a programme of overhauling the HVAC systems on the DART fleet to provide a reliable system on the trains. This work is now complete.

365 The air conditioning emergency stop button on the driver console is being replaced with a consistent type with improved light emission to better identify the status of the air conditioning. Additionally, a label is being applied around the button to provide information on the function of the button.

IÉ-RU Customer experience

Customer Experience Programme

366 In March 2023, the IÉ-RU Operations Department was reorganised. This reorganised structure included a new Departments of Service Delivery and Customer Experience. The Service Delivery section manages train drivers, shunters and the movement of trains on the network. The Customer Experience (CX) section is involved with the delivery of the customer experience at stations and on-board trains.

367 IÉ have launched a brand-new CX Strategy with a goal “to ensuring that every part of our customer’s journey is the very best it can be, which is why we are focusing on service and, ensuring that our customers have the best possible journey that they can, every time they travel”.

368 The CX Vision to make IÉ “the best railway in Europe for customer experience, delighting passengers by making travel frequent, flexible, fully accessible and friendly. This CX Vision is underpinned by the development of five strategic pillars across the areas of Employee Experience, Accessibility, Digital, Service, and Asset Development. To support this, our business has redesigned itself with dedicated teams now responsible for customer experience in stations and on trains, ensuring we are structured to ensure our customers remain very much at the heart of our business.”

369 In parallel, in May 2023, IÉ commenced “the roll out of a comprehensive CX training programme which targets every colleague within the organisation, giving them best in class training, highlighting that each and every one of us, irrespective of the role we perform has an impact on customer experience”.

370 IÉ continue to state “we consistently track and review our performance in the areas of safety and punctuality. With that in mind a transparent and straightforward balanced scorecard that will be discussed at all levels of the organisation is being developed with key metrics to be shared publicly with our customers. This scorecard will be used to create and update action plans and address areas that are causing customer dissatisfaction to drive continuous CX improvement”.

Report into customer experience following the 2022 incident

371 In addition, IÉ-RU published a “CX Recommendation Plan”⁵⁴, published in April 2023, to highlight findings and recommendation to improve the customer experience after the incident; and found that a number of key changes could be made across people, process and technology workstreams that would improve the customer experience. The emerging themes were found to be:

- Enhanced driver training on communication and knowledge of use of the air conditioning systems;
- Improved levels of staffing and on the day communication and queue management;
- Proactively managing customer expectations on the day and enhanced communication via multiple media platforms;
- Improved crisis command processes and levels of senior leadership visibility for such events;
- Improved proactive planning based on complexity and volume of event;
- The need for cross-organisational working, collaboration and the potential to try and cap volume in some capacity.

372 It is noted that the report makes a number of findings and recommendations; there is also a column associated with “note/actions”, in some case these are filled in e.g. “will be actioned via the procurement of new fleet” however, others remain blank and are not addressed to any party. This could result in a similar outcome to the Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire where the actions taken as a result of the recommendations cannot be verified (paragraph 289)⁵⁵.

⁵⁴ IÉ have a team of staff established for the purposes of improving customer experience (CX).

⁵⁵ The RAIU consider that this can be addressed through Safety Recommendation 2023005-20 (paragraph 435).

373 It is noted that in this report, the panel did not appear to look at the customer complaints in relation to the incident of which there were over 150, only noting that it was “customer complaint handling post event appears poorly organised”. The panel also did not review the calls to the IÉ Emergency Line.

Operating Procedures at CTC Operations Control Room

374 The IÉ-IM IMO Department updated Operating Procedure, the CTC Operations Control Room Manual, on the 31st July 2023 (to be referred to as IMO-SMS-052) to provide addition updates on CX services to colleagues in the Operations Control Room.

375 In relation to the section on Service Delivery, Regulation and Recovery, it is recognised as critical that “the stopping of trains, for whatever reason, can have serious safety implications away from the immediate scene of operations, such as:

- Overcrowding of stations and platforms;
- Heat exhaustion of customers on trains where HVAC may be lost on air conditioned trains;
- Customers affected in overcrowded conditions in delayed trains;
- Customer frustration leading to unlawful acts by delayed customers;
- Uncontrolled evacuation of customers onto the railway line.

376 The document continues “where an incident occurs that is likely to disrupt service, the Traffic Regulator and Duty Manager will assess the likely impact of the disruption based on available information, deciding the most appropriate options for recovery”.

377 IMO-SMS-052 requires that where information suggest that delays are likely to be considerable, the CTC Duty Manager will initiate an MCD event.

378 The document also requires that “where conditions suggest deteriorating levels of customer comfort on disabled or mid-section detained services, the CTC Duty Manager will instruct the relevant RU CX Manager to dispatch Customer Care resources to the relevant site”.

379 In terms of detraining, the detraining request will be made by the CTC Duty Manager to the IÉ-RU Head of Customer Experience following assessment of the situation by the Duty Manager and Traffic Regulator. Influencing factors include:

- A train suffers a serious mechanical defect requiring the on-site response of the Entity in Charge of Maintenance – Fleet;
- After fault-finding it is established, that train is disabled, and assistance is not readily available;
- Fault-finding or other recovery options have not resulted in a positive outcome after thirty minutes;
- The train is detained mid-section due to an infrastructure or signalling fault and cannot return to a platform in rear for any reason;
- The scenario suggests that recovery timescales may lead to heat exhaustion or on-board quality issues for customers, potentially leading to an uncontrolled evacuation.

Actions taken to close the IÉ internal recommendations

380 In terms of the actions taken as a result of the internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, on the 27th September 2017, it appears that the actions were only taken to finalise the recommendations, when prompted by the RAIU to provide the status of the recommendations (paragraphs 288 to 289), although noting that some actions may have been taken.

381 In terms of the actions taken to close Recommendations 2 to 8, documents have been updated, such as:

- Operating Procedure: CTC Operations Control Room Manual (included in the 2019 version) (IMO-SMS-052) (Recommendation 2) (paragraphs 374 to 379);
- RU OP 09: Train to Train Transfers using Wheelchair Ramp during major service disruption or in emergency situations (2023);
- RU Procedure for the Transfer of Passengers between Trains using a wheelchair ramp (2023) (Recommendation 3);
- CTC Service Recovery document (Recommendation 4).

- 382 In terms of addressing Recommendation 5, at CTC there has been an increase in the number of Public Announcer and Customer Information System (PACIS) operators from three to eleven, with the management of digital media brought into the control room. When operations move to the new National Train Control Centre (NTCC), this will increase to twenty PACIS operators.
- 383 IÉ-RU and the SET Department have advised that the current DART fleet's GSMR radio system is not configured to handle message traffic back to the train from CTC. The new DART+ fleet will have this capability and the NTCC will feature improved connectivity to the fleet. In terms of other fleets, the Class 22000 had some limited capability but would need modification and none of the other fleets have the capability. The new system will be deployed on the Class 29000. GSMR train radio will be rolled out on other fleets, starting in 2024 (Recommendation 6).
- 384 In terms of onward connections to other transport modes, IÉ are in the developing the IÉ Multi-Modal Interchange Project to improve the integration and accessibility of the public transport network for stations and communities across the network, through the provision of multi-modal interchanges. In terms of onward connections to other parts of the IÉ network, there is better interface with a number of physical signs and technological improvements (next train indication signage, wayfinding and journey planners, automatic board announcements and signage systems) with further improvements being rolled out (e.g. Landscape Route Maps), (Recommendation 8).

Bray Air Display 2023 Review

IÉ management of the activities surrounding Bray Air Display 2023

385 The planning of train services for the Bray Air Display 2023 (29th and 30th July 2023) began in March 2023 with engagement between the organisers, IÉ and, which resulted in the drafting of an Event Plan.

386 Internally in IÉ-IM and IÉ-RU, there were planning engagements across:

- Operations Planning – who arrange the train paths and Manager CTC & Train Performance – who control the movement of trains;
- Customer Experience – led by Head of Customer Experience with Regional Customer Experience Manager Northern, Regional Customer Experience Manager DART, Station Manager Bray; Service Delivery – led by Head of Service Delivery with Service Delivery Manager DART, Service Delivery Manager Northern (Acting); Director IÉ-RU; Head of Health & Safety IÉ-RU;
- The Media and Corporate Communications Department communicated the train arrangements and advice on travelling to the event such as busy trains, weather, hydration, travelling in good time.

387 IÉ devised an event plan for the day. This plan outlined the procedures for safely managing the flow of people through Bray DART Station both before and after the events. The purpose of this event plan was to identify and address the risks associated with event management and establish effective communication channels between IÉ staff and other agencies involved in the event.

388 With over 80,000 visitors visiting Bray over the 2023 weekend, IÉ-RU plans operated as anticipated. The decision to close the level crossing at Bray proved beneficial, allowing trains to arrive and depart from Bray without hindrance. The visibility of IÉ-RU staff at each Station was a positive aspect noted by passengers. This demonstrates that the plans developed for this major event can serve as a blueprint for managing other large-scale events in the future⁵⁶.

⁵⁶ Information taken for the CRR's "CRR Supervision Activity Number 111/23-I, Iarnród Éireann/Irish Rail Railway Undertaking – Review of passenger management during Bray Airshow 2023" issued 29th September 2023. Further details are outlined in paragraphs 390 to 396.

CX Review of Bray Air Show Operation 2023

389 The CX section undertook a review of IÉ-RU's performance on the weekend of the Bray Air Display 2023 (29th and 30th July 2023), a year after the self-detrainments. The key points/ actions that the CX section noted were as follows:

- New IÉ-RU Event Plan – Developed specifically for the event, it was an “all in one”, “robust” plan, including location maps and contacts lists;
- Internal Stakeholder Meetings – A “road map” was created from January 2023 of internal stakeholder meetings, all departments were represented and consulted in the lead up to the event, including CTC;
- External Stakeholder Meetings – With the event organisers, An Garda Síochána (Bray), Wicklow Fire Brigade, Bray Town Council and the National Transport Authority (NTA).
- Tabletop Exercise – IÉ-RU “pushed hard” for a tabletop exercise for all external stakeholders, which was carried out, where there were “some excellent learnings for all stakeholders”;
- An Garda Síochána (Bray) Communications – Increased communication and long-term relationships were established; which allowed for the additional allocations of An Garda Síochána resources on both days and allowed changes to the traffic plan for the better management of the crowds without vehicles being impacting;
- Event Control Centre – Established at Bray Civic Buildings, with event teams setup in Connolly, Pearse, Dun Laoghaire and Bray and Lansdowne Road Station. The NTA were present in the Event Control Centre for the first time;
- All DART Stations Staffed – Every station from Malahide/Howth to Greystones was staffed (this was the first time that this ever happened on the DART network for an event);
- Social Media – IÉ RU Operations worked closely with Corporate Communications to manage customers’ expectations when travelling to the event by DART via social media, i.e. high demand for services, travel two hours early, travel times may be longer, expect delays, bring water, etc;
- RU Operations Manager Based in CTC – Acting as a direct liaison between the management teams in CTC and the Event Management Team on the ground;
- Bray Level Crossing (XR011) Closed – From 10:00 am to 16:00 hrs both days to ensure an uninterrupted approach for DART trains from Shankill into Bray;

- Traction Executive Regulating Trains from Shankill to Bray – A Traction Executive was located on Shankill Down platform who had direct contact with the Assistant Event Manager Bray. The Traction Executive was then able to tell DART drivers if they had a clear run into Bray or whether they would be blocked outside Bray at Signal BR28, the DART driver could then adopt a speed between Shankill Station and Bray Station that would reduce the chance of being unnecessarily blocked at Signal BR28, therefore, reducing the risk of a customer self-evacuating the DART;
- Bray Station Passenger Flows - Ticket machines were removed from Platform 2 at Bray Station to clear the platform more effectively. In addition, a new queueing system was developed at the front of Bray Station for post event returning customers, it is a flexible queueing system that had an overflow system built into it;
- Internal Stakeholder Cover – There were more departments with extra cover throughout the weekend, with all contact details in the Event Plan.

Measures taken by the CRR since the incident

Bray Air Display 2023 Supervision Activity

Introduction

390 The CRR is required to supervise a Railway Undertakings continued application of their SMS once they have been granted a safety certification. IÉ-RU having received safety certification is therefore subject to CRR supervision (paragraph 55 and 66).

391 As part of the 2023 CRR supervision activities of IÉ-RU, the 2023 Bray Air Display (29th – 30th July 2023)⁵⁷ was identified as an area for which an inspection activity would be undertaken. This inspection reviewed IÉ-RU's application of their SMS during this significantly attended weekend event. The inspection activity was divided into three separate areas: document review; on-site inspection; and interviews.

392 The CRR can make a number of supervision outcomes, when required, such as *major non-compliance*, *minor non-compliance*, *action required*, *scope for improvement*, *good practice* or *audit trial*.

Pre-event preparation meeting

393 Prior to the event, the CRR Inspector met with the Head of Customer Experience (HCX), Manager of CX DART and Head of IÉ-RU Health & Safety. The HCX gave a headline overview of the plans for both days, including plans for:

- Station resources at each station from Connolly to Bray for both event days, which included the provision of IÉ-RU station staff at each station south of Pearse over the weekend (some of these stations are usually unmanned during weekend periods);
- Fleet availability (DARTs) to be utilised, (all 8520 Fleet with HVAC);
- Media and communications plan for week commencing 24th July 2023;
- Addition special service pre and post event on both days;
- A shuttle bus service operating between Greystones to Bray across the weekend;
- A spare eight-car DART train, held in Dun-Laoghaire Station, if required;

⁵⁷ It should be noted that two other major events were scheduled for the same weekend, namely, a match in the Aviva Stadium on Saturday 29th July 2023 and the All-Ireland Football Final Sunday on 30th July 2023. The normal match control plans were in place for the event.

- All IÉ-RU DART drivers were provided with a Toolbox Talk regarding communications to passengers during their journey and HVAC systems;
- CME checks on all HVACs on the Class 8520 DART trains train types before service;
- CME staff in Bray over the weekend to deal with any train failures;
- CTC involvement in planning for the event, IÉ-RU Ops Manager based in CTC for the weekend to liaise with staff on the ground in Bray and CTC.

Pre-event Bray Station site visit

394 The CRR Inspector visited Bray Station on Friday 27th July to observe the preparations for the weekend. The Bray Station Manager, who was the designated Event Controller for the weekend gave an overview of the following:

- Event plan for the weekend, access and egress for passengers pre and post-event;
- Removal of gates on Platform 2 and the use of temporary tags on/off poles to provide unobstructed access out of the station to remove the risk of build-up of passengers at the gates leaving the station;
- Manned exiting system for arriving passengers from Greystones;
- Plans for the corral system post-event at the front of Bray Station;
- Tabletop exercises were conducted with Bray Town Council and with An Garda Síochána;
- Operation and control of the level-crossing (which was closed for road traffic during the event);
- Discussion regarding the operation and control of the footbridge;
- First aid provision;
- Staff plan displaying the location and role of the PICP;
- Platform train interface.

Event site visits

395 CRR Inspectors carried out a number of station site inspections, train journeys and a visit to CTC during the 29th – 30th July 2023. Included are some of the observations made by CRR:

- On a train journey to Bray (departing Connolly at 12:05 hrs on Saturday), the CRR Inspector noted that the driver periodically made announcements to update passengers;
- Stations enroute to Bray had a visible staff presence on platforms; staff members were consistently present and visible on all platforms in Bray Station, ensuring smooth arrivals and departures for trains;
- During the entire weekend, all trains arriving at Bray were able to proceed directly into the station without any delays for platform allocation. The disembarkation process took about three minutes, after which the train was prepared for its return journey;
- After the event on both days, outside of the main entrance of Bray Station, a queuing system (corral) was noted to be in situ, the CRR noted that it “was sizable and was a good addition to previous years... This setup was put in place to facilitate the orderly management and control of passenger queues for boarding trains. IÉ effectively and systematically managed this process each day”;
- In terms of Level Crossing XR011 (paragraph 92), this was closed to pedestrian and road traffic from 10:00 hrs to 16:00 hrs on both days, with the CRR noting “The closure of the crossing yielded the advantage of preventing incoming trains from Dublin from being delayed outside of Bray Station. This was a significant improvement compared to the 2022 event, where such delays had prompted passengers to disembark, anticipating another train's departure”;
- At CTC, it was noted that a senior member of IÉ-RU management team was physically present throughout the weekend, to assist with potential operation issues specific to IÉ-RU and to offer guidance and advice the CTC team.

CRR conclusion

396 The CRR concluded “Following the events of 2022, the 2023 event was a well-planned and thought-out event that was executed as per the plan. This event has demonstrated IÉ-RUs ability to plan for and manage major events on the railway. IÉ-RU should utilise this event as a template for such events and how they are managed”.

Closing RAIU safety recommendations

397 As of the 10th November 2023, the CRR have adopted their internal document, CRR Procedure for: Managing RAIU Safety Recommendations (CRR-P-042.-R0.1), to guide its Inspectors on the management of RAIU Safety Recommendations addressed to the CRR by the RAIU, in order to promote consistency and transparency; and, to fulfil the CRR's mandate in respect of Part 2 Section 5 (17-21) of S.I. No. 430 of 2020 (European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020. The procedure outlines the processes associated with dealing with RAIU safety recommendation, which includes a flow-chart for ease of understanding.

398 On receipt of the final RAIU report (including the safety recommendations), the CRR (Principal Inspector Supervision) completes an Issuance Letter to the applicable railway organisation or other relevant body. Six weeks are afforded to provide an initial response, and the response should:

- Outline details of actions taken in respect of each recommendation (plan); or,
- Outline details of actions proposed to be taken; or,
- State that no action is considered necessary to be taken and the reason for same.

399 Upon receipt of a plan, the CRR should review the submission checking actions taken /or stated to be taken and planned completion dates; and consider whether the plan appears appropriate and reasonable and if undertaken would they likely prevent re-occurrence, and action further if required.

400 The railway organisation (or other body) shall report at least quarterly to the CRR on the progress of measures that are taken or planned as a consequence of the safety recommendation.

401 Once, the railway organisation (or other body) is satisfied, they have addressed the intent of the RAIU safety recommendation they must compile an evidence submission (this is done formally through a form (No. CRR-F-006)) which should be completed with sufficient detail and accompanied with adequate evidence and submitted to the CRR. This is then thoroughly reviewed to see that actions taken address the intent of the RAIU safety recommendation.

402 The CRR's process for reviewing submissions involves an internal peer review by two CRR Inspectors working independently in order to satisfy themselves that the safety recommendation has been suitably addressed. Only when both Inspectors are in agreement can a safety recommendation be closed.

403 The CRR's process for reviewing submissions is as follows:

- Evidence submission reviewed by “No. 1 Reviewer” (Principal Inspector Supervision or an assigned Inspector; if considered acceptable it is signed and passed to a “No. 2 Reviewer”. The CRR note that acceptability is subjective, but the reviewing Inspector should ask themselves whether the actions address the intent of the safety recommendation; and will the actions taken assist in preventing a reoccurrence;
- If considered acceptable by the “No. 2 Reviewer”, they sign the form and return it to the Principal Inspector Supervision;
- Principal Inspector Supervision files accordingly and issues a copy of the signed closed form to the relevant railway organisation (or other body);
- Principal Inspector Supervision updates the RAIU Safety Recommendation Tracker spreadsheet, adding the closed date;
- If evidence is not considered satisfactory by the “No. 1 Reviewer” then the Principal Inspector Supervision should email the railway organisation (or other body) advising that further information is required. Additional guidance may be offered;
- If evidence is not considered satisfactory by the “No. 2 Reviewer” then a discussion should take place between the two reviewers. This may result in further evidence being requested from the railway organisation (or other body), additional guidance may be provided, or the form being signed-off (closed) if both reviewers are now satisfied.

Safety Recommendations

Introduction to safety recommendation

404 In accordance with the European Union (Railway Safety) (Reporting and Investigation of Serious Accidents, Accidents and Incidents) Regulations 2020), recommendations are addressed to the national safety authority, the CRR. The recommendation is directed to the party identified in each recommendation.

405 The scale of the safety recommendations was also influenced by the DART+ Programme which will see the DART network grow from its current 50 km in length to over 150 km⁵⁸.

Absence of safety recommendations due to measures already taken

DART capacity on the day of the incident

406 DART trains were operating to capacity, therefore there was no further available trains to serve Bray Station on the day of the incident. It is also likely, due to the limited capacity at Bray Station (to the access and egress) that more trains may have led to even further delays (paragraph 126).

407 The DART+ Coastal South (which includes Shankill and Bray Station) will enable an increase in the frequency of DART services between Dublin City Centre and Bray from six trains per hour per direction up to twelve trains per hour per direction, and an increase in frequency of DART services between Bray and Greystones from two trains per hour per direction up to three trains per hour per direction. As a result, a safety recommendation in relation to increased capacity is not warranted.

DART fleet/ HVAC Systems

408 IE, supported by the NTA, and in partnership with railcar provider Alstom, have provision to commission up to 750 electric/battery electric powered vehicles over a ten-year timescale, which represents the purchase of the largest public transport fleet in Irish history. This fleet will have HVAC systems and as a result, a safety recommendation in relation to the provision of HVAC systems is not warranted to address, in part, CaF-06 (paragraph 352) in terms of trains not having HVAC systems.

⁵⁸ Information taken from the DART+ Programme website and was accurate at the time of this report.

409 In addition, IÉ have confirmed that the new DART fleet will have Alstom HealthHub, a remote diagnostics system, fitted and it will monitor and report the HVAC status and interior temperatures of the new DART trains. The RAIU safety recommendations related to the Traction Manuals (Safety Recommendation 2023005-01) and the checks that HVAC is operational before service begins (Safety Recommendation 2023005-02) (paragraph 415) should ensure operational HVAC, in service, in the interim; combined, they address causal factor, CaF-01 (paragraph 351).

Ontrain passenger information system/ communications from CTC

410 Driver E268 did not make any announcements for the duration the train was stopped at Signal BR38 until the time of self-detrainment. When an announcement was made, after passengers began self-detraining, passengers could hear that Driver E268 was stressed and was arguing with the passengers. The possibility of CTC being able to communicate directly with passengers on trains to allow for clearer and more consistent (in the case of multiple trains) information being provided to passengers was explored by IÉ-RU in 2017. Although, it was deemed not to be possible on the current DART fleet, it will be possible on the new DART+ fleet, with the new NTCC featuring improved connectivity to the fleets. The new system is to be rolled out on other fleets, starting in 2024 (paragraph 289). Although the systems will be in place, the implementation of the direct messaging (verbally and/or visually) has not been confirmed, this warrants a safety recommendation, Safety Recommendation 2023005-07 (paragraph 420).

Passenger communications

411 IÉ standards and training refer to “customer-friendly” communications (Professional Drivers’ Handbook, Ontrain Customer Communication Booklet, driver customer communications module); however, this “customer-friendly” approach to dealing with passengers, in particular, passengers in distress (where it is of utmost importance) was not evident on the day of the occurrence (driver announcements, IÉ Emergency Line, IÉ Twitter, IÉ staff on the ground).

412 The RAIU note the new Customer Experience Department, which is focused on customer experience at stations and on-board trains. A CX Strategy is in place, which includes a CX training programme for all IÉ staff members, which commenced in May 2023 (paragraphs 366 to 370).

413 As a result of these actions, a further safety recommendation in terms of improved communications culture between customers and IÉ staff is not warranted to address SF-04 (paragraph 355).

Previous Customer Response Recommendations

414 IÉ's internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, made eight recommendations, as of the time of the publication, seven of the recommendations have been closed, with the exception of Recommendation 1, related to the updating of the MCD Response Handbook, which remains open (paragraphs 288 and 289). The RAIU have made a safety recommendation in relation to major customer response documentation (Safety Recommendation 2023005-10 (paragraph 423)), and as such another recommendation is not warranted, in this instance.

Safety recommendations as a result of this incident

Rolling Stock – HVAC

415 There is no Traction Manual for the 8520 Class DART fleet for drivers to refer to when setting up the air conditioning on the train; and there may be insufficient training (paragraph 301). As a result, the RAIU make the following safety recommendations to address CaF-01 and SF-01 (paragraphs 351 and 355):

Safety Recommendation 2023005-01

IE-RU Head of Health & Safety, in conjunction with the CME Department, should develop Traction Manual for the entire 8500 Class DART fleet; this should include guidance on the air conditioning. Once complete, this should be briefed to drivers to ensure drivers fully understand how the air conditioning operates.

Safety Recommendation 2023005-02

IE-RU Head of Health & Safety should include a check that the heating, ventilation and air conditioning systems are operational in the train preparation instructions.

Train & Station Operations

416 In terms of the crowding on the trains, there is no sufficient SMS document or risk register to manage the crowding on trains, in particular in relation to crowding during hot weather; consideration should be given to the RSSB Research (paragraphs 157 to 165). As a result, make the following safety recommendation to address CaF-01, CaF-06 and SF-02 (paragraphs 351, 352 and 355):

Safety Recommendation 2023005-03

IE-RU should update its Passenger Comfort Risk Register to adequately address the issues related to crowding on trains (with special consideration given to crowding during adverse weather conditions). Based on this, IE-RU should develop an operational SMS document for the management of crowding on trains.

417 There was crowding at stations on the day of the occurrence, with no staff available at half the stations enroute to Bray, the mitigation may have been for CTC to have direct information from the IÉ Security Room to CTC, to allow for staff to be deployed to unmanned stations; but this was not done. As the incident escalated, it was reported that passengers alighted from the platforms at three stations onto the railway line, likely as a result of no staff being present. As a result, the RAIU make the following safety recommendation to address CaF-08 and AO-08 (paragraph 353 and 359):

Safety Recommendation 2023005-04

IÉ-RU should conduct a full review of how crowding at outlying stations is managed during major events, including reviews to local crowd control plans, PTI and train dispatch documentation; to ensure that the relevant stations are staffed appropriately to adequately manage the passenger flows.

Passenger communications

Passenger communications – Prior to and during large events

418 IÉ had promoted the use of the DART as a means to travel to the Bray Air Display resulting in large numbers using the DART service. During the event, the scale of travelling passengers, was not conveyed to those passenger at stations or through social media (paragraph 57), as a result the RAIU make the following safety recommendation to address CoF-01 (paragraph 354) and AO-01 (paragraph 359):

Safety Recommendation 2023005-05

IÉ-RU should review its planning and management processes for large events, considerations should be given to:

- **How and what information is provided to passengers prior to the event (such as information in relation to predicted scale of passengers using the trains and likely conditions for their journey in order to manage passengers' expectations).**
- **How passengers' expectations are managed for the duration of the event (such as using real time information and making this freely available through passenger announcements at stations and on the IÉ App and social media accounts).**

Passenger communications – On train announcements

419 The RAIU consider that “manual announcements” by drivers needs enhancement. It is acknowledged that the Ontrain Customer Communications Booklet addresses the need to communicate and at what intervals, however, it does not include information in relation to encouraging passengers to remain on trains in the case of major disruptions. As a result the RAIU make the following safety recommendation CaF-03, CaF-04, CaF-05, CaF-07, SF-03 (paragraphs 351, 352 and 355):

Safety Recommendation 2023005-06

IE-RU should review its Ontrain Customer Communications Booklet and Professional Driving Handbook, and provide drivers with additional training, to enhance driver communications with passengers. The documentation and training should consider best practice and, at a minimum, the following requirements:

- **An initial announcement to be made within a specified short period of time, even if the reason for the delay is not known at that point;**
- **A further announcement to be made as soon as further information is available about the cause and likely consequences of the delay;**
- **Further announcements, at specified intervals, should be made whenever new facts suitable for informing and/or reassuring passengers become available;**
- **In critical conditions, announcements should be made to dissuade passengers from detraining, these should include making announcements highlighting the risks involved with detraining and their safest option is to remain on the train.**

420 It is noted that systems will be in place, in the future, for the capability of CTC to communicate directly with trains (new DART+ fleet and other fleets), either visually and/or verbally. Although CME Project has stated that the implementation of the direct messaging has not been confirmed (paragraph 410). As a result the RAIU make the following safety recommendation, which should be considered once the capabilities have been completed:

Safety Recommendation 2023005-07

IE-IM should carry out a review to determine the suitability of direct messaging (visually and/or verbally) from CTC directly onto trains, consideration should be given as to whether it would improve onboard passenger communications.

Customer communications – emergency communications

421 It appears that the passengers may have been influenced by social networking channels. The social media communications on the day of the incident were loaded with blame and unsympathetic to the conditions on the trains. As a result the RAIU make the following safety recommendation to address CoF-03, CoF-04 and CoF-05 (paragraph 354):

Safety Recommendation 2023005-08

IE-RU should consider developing processes, in the case of emergency situations, to provide information through social media channels; these communications must be customer-friendly in order to encourage passengers to follow any directions given.

Customer disruption - CTC

Train operations – Stranded trains

422 It appears that CTC thought that they could recover the situation at an early stage, however, the situation continued to escalate. Therefore, the intent of this recommendation is to ensure that CTC and drivers respond in a timely manner to events that have the potential to result in a train being held at a signal, or other scenarios where a train is stranded (as a result of it being unable to move or make adequate progress) for an extended period of time. As part of the measures required to close this safety recommendation, IE-IM should give consideration to existing RDG & Network Rail Guidance Notes (as outlined in paragraphs 166 to 175). As a result the RAIU make the following safety recommendation to address CaF-09, CaF-10 and CoF-02 (paragraphs 354 and 356):

Safety Recommendation 2023005-09

IE-IM should develop suitable instructions and guidance for operational staff at CTC to help them determine when a train should be considered as stranded (consideration should be given to the proximity of the stranded train to a station); the timeframe within which this needs to be declared and the actions that then need to be taken must be set out. Where appropriate, these instructions and guidance should be included in the IE Rule Book and relevant associated documentation.

Major Customer Disruption

423 The RAIU made a safety recommendation (2018001-003) related to impromptu evacuations on the 15th August 2018 which was closed by the CRR in November 2021 based on actions taken by IÉ-RU (paragraphs 286 and 287). The RAIU considers that a more effective implementation of this safety recommendation could have helped address factors identified in this investigation. It is noted that the CTC Operations Control Room Manual was updated in 2023 (paragraphs 374 - 379), which does address some concerns; however, it does not address all concerns. The RAIU make the following safety recommendation to address CaF-02 and CaF-10 (paragraphs 351 and 356):

Safety Recommendation 2023005-10

IÉ-RU should review their suite of documents which reference major customer disruptions and emergencies (in particular, in terms of stranded trains) and address the management of passengers on these trains. Considerations should be given to, but not limited to, the effective development of the following:

- **A common understanding and shared awareness of the circumstances in order to recognise when minor operational occurrences have the potential to develop into major incidents unless decisions are taken in a timely and decisive manner;**
- **Effective communication and information sharing arrangements between the controlling signalman/ traffic regulators to the driver/s;**
- **Assist driver/s in managing, informing and reassuring passengers in order to encourage passengers to stay onboard the train/s;**
- **Anticipate and understand the needs of passengers in a train stranding situation (information, air conditioning, etc.) and to focus action plans accordingly;**
- **Anticipate the need to provide on-site support to drivers of such trains in managing passengers' needs.**

Management of major events at CTC

424 In terms of the communications through the IÉ Emergency Line this is addressed through IÉ's new Service Delivery and Customer Experience (paragraphs 366 to 370). However, consideration should be given as to whether Mainline Traffic Regulators should be the interface with passengers (IÉ Emergency Line) during major events or diverted to a more suitable party.

425 In addition, there is no requirement for more senior members of IÉ staff to be present in CTC during major events; had relevant staff members been present, decisions may have been made quicker and an MCD may have been triggered (paragraphs 147 to 150).

426 As a result, as a result the RAIU make the following safety recommendation to address CoF-06 (paragraph 354) and SF-07 (paragraph 358):

Safety Recommendation 2023005-11

IÉ-IM, and IÉ-RU, should review and formalise its processes for the attendance and allocation of staff requirements at CTC for major events, to determine what members of staff need to be present.

Self-detrainments

427 No scenario planned emergency exercises/tabletop exercises were carried out prior to the incident at Bray, despite a self-detrainment at Dun Laoghaire in 2017 as a result, IÉ- were ill prepared for the incident. In addition, as it exercises were not carried out, documents were not updated to reflect any lessons learnt, such as the Emergency Scenario Response Risk Register, which was not updated to include the risk associated with self-detrainment, despite being updated regularly. As a result the RAIU make the following safety recommendation to address SF-05 and SF-06 (paragraph 358):

Safety Recommendation 2023005-12

IÉ-RU and IÉ-IM should carry out an incident simulation in terms of a scenario involving an incident with the potential for self-detrainment. As part of this simulation, the relevant stakeholders (An Garda Síochána, Dublin Fire Brigade, etc.) should be invited to participate. Any lessons learnt such be adopted into the relevant guidance documents.

428 Many of the documents, which should reference self-detrainments, do not reference self-detrainment; and, as such has not been identified as a risk on risk registers. As a result the RAIU make the following safety recommendation to address SF-08 (paragraph 358):

Safety Recommendation 2023005-13

IÉ-RU should review its high level emergency preparedness, crowd control plans, risk assessments, train evacuation briefing notes and all other relevant document to include guidance on self-detrainments. Once complete, they should be circulated to the relevant departments and stations, for briefing.

Safety recommendations as a result of additional observations

General description

429 This section of the report addresses safety recommendations as a result of additional observations (paragraph 359), which have not been addressed by safety recommendations 2023005-01 to 2023005-13 (paragraphs 415 to 428).

Rolling stock – Public address system

430 IÉ-RU verified that the public address systems were operating in accordance with their own standards. However, a number of complaints were made to IÉ Customer Care Department in relation to the public announcements system on the trains in terms of volume (paragraph 86), as a result, the RAIU make the following safety recommendation to address AO-02 (paragraph 359):

Safety Recommendation 2023005-14

IÉ-RU CME should carry out an assessment on the quality of the public address systems on EMUs against good practice standards and address any deficits.

Safety Recommendation 2023005-15

IÉ-RU Health & Safety should ensure that train preparation instructions should include a check that public address systems are working prior to trains entering service.

Event Planning – Key personnel

431 The Manager CTC & Train Performance was not included in the planning in terms of platform allocation for incoming trains into Bray Station which may have minimised shunting of trains and passenger detraining times. As a result the RAIU make the following safety recommendation to address AO-03 (paragraph 359):

Safety Recommendation 2023005-16

IÉ-IM & IÉ-RU should review the suite of documents in relation to the planning of large events to ensure that all key personnel are involved in the planning of events.

IÉ Rule Book

432 There are no instructions for drivers in relation to self-detrainments or stranded trains in the IÉ Rule Book. As a result, the RAIU make the following safety recommendation to address AO-04 (paragraph 359):

Safety Recommendation 2023005-17

IÉ-IM should update the IÉ Rule Book to include instructions for drivers in the event of self-detrainment and/ or stranded trains; these requirements should then be incorporated into the relevant associated documents.

Infrastructure – Trespass Guards

433 Passengers experienced difficulties during the evacuation process, when walking over the trespass guards; this issue is not addressed in the existing Train Evacuation Briefing Notes (or other emergency documentation). As a result, the RAIU make the following safety recommendation to address AO-05 (paragraph 359):

Safety Recommendation 2023005-18

IÉ-IM should develop procedures for the evacuation of passengers over trespass guards, these should then be included in the Train Evacuation Briefing Notes and other relevant documents which reference evacuations.

Multi-agency response to incidents

434 Although, it is noted that IÉ were acting in what they considered the best interests of passengers; and members of An Garda Síochána may not be as familiar with the hazards associated with the railway. IÉ failed to comply with directions given by members of An Garda Síochána; this is likely as a result of no formal established procedures. As a result, the RAIU make the following safety recommendation, to ensure best practice moving forward, to address AO-06 (paragraph 359):

Safety Recommendation 2023005-19

IÉ should engage with the relevant parties of An Garda Síochána to ensure that there is a shared understanding at CTC of when and how instructions from An Garda Síochána should be complied with. This can be practiced through IÉ-RU incident simulations where An Garda Síochána are in attendance.

Previous Customer Response Recommendations

435 IÉ's internal report, Post Incident Assessment into the Customer Response of the DART Derailment at Dun Laoghaire, made eight recommendations, the status of which could not be verified by IÉ-IM in a timely manner and not logged in a similar manner to safety recommendations which are logged in AIMS (paragraphs 288 and 289); in addition, the implementors of the recommendations of the CX Recommendation Plan do not appear to be formalised (paragraphs 371 and 372). As a result the RAIU make the following safety recommendations to address AO-07 (paragraph 359):

Safety Recommendation 2023005-20

IÉ-IM and IÉ-RU should develop a system whereby internal recommendations as a result of safety related incidents are logged with an allocated timeframe, and the actions taken verified, and the status recorded.

Additional Information

List of abbreviations

ADM	Acting District Manager
AIMS	Accident Incident Management System
AO	Additional Observation
CaF	Causal Factor
CCTV	Close Circuit Television
CCE	Chief Civil Engineer
CI	Chief Investigator
CIS	Customer Information System
CME	Chief Mechanical Engineer's Department
CoF	Contributing Factor
CRR	Commission for Railway Regulation
CTC	Centralised Traffic Control
CX	Customer Experience
DART	Dublin Area Rapid Transport
DTE	District Traction Executive
EMU	Electrical Multiple Unit
EU	European Union
GSMR	Global System for Mobile Communications – Railway
hr	hour
HCX	Head of Customer Experience
HVAC	Heating, Ventilation and Aire Conditioning
IÉ-IM	Iarnród Éireann Infrastructure Manager
IÉIO	IÉ Incident Officer
IÉ-RU	Iarnród Éireann Railway Undertaking
IIR	Information Incident Room
km	kilometre
km/h	kilometres per hour
LEP	Local Emergency Plan
m	metre

MCD	Major Customer Disruption
MP	Milepost
mph	miles per hour
NSA	National Safety Authority
NTA	National Transport Authority
NTCC	National Train Control Centre
OHLE	Overhead Line Equipment
Ops	Operations
PA	Public Address
PACIS	Public Announcer and Customer Information System
PIC	Person In Charge of the Platform
PICP	Person In Charge of the Platform
PIDD	Passenger Information During Disruption
PTI	Platform Train Interface
RAIU	Railway Accident Investigation Unit
RDG	Rail Delivery Group
RFI	Request For Information
RSSB	Rail Safety & Standards Board
SF	Systemic Factor
SMS	Safety Management Systems

Glossary of terms

Accident	An unwanted or unintended sudden event or a specific chain of such events which have harmful consequences. For heavy rail, the EU Agency for Railways divides accidents into the following categories: collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Action Required	An area where the potential exists for non-compliance to occur unless remedial action is taken or improvement is made, an isolated error that requires correction, or some other issue where in the opinion of the auditor action is necessary.
Article 20 of Directive (EU) 2016/798, Obligation to investigation	<p>Article 20 (1) Member States shall ensure that an investigation is carried out by the investigating body referred to in Article 22 after any serious accident on the Union rail system. The objective of the investigation shall be to improve, where possible, railway safety and the prevention of accidents.</p> <p>Article 20 (2) The investigating body referred to in Article 22 may also investigate those accidents and incidents which under slightly different conditions might have led to serious accidents, including technical failures of the structural subsystems or of interoperability constituents of the Union rail system. The investigating body may decide whether or not an investigation of such an accident or incident is to be undertaken. In making its decision it shall take into account:</p> <ul style="list-style-type: none">(a) the seriousness of the accident or incident;(b) whether it forms part of a series of accidents or incidents relevant to the system as a whole;(c) its impact on railway safety; and(d) requests from infrastructure managers, railway undertakings, the national safety authority or the Member States.
Audit Trail	An area that the auditor feels should have further attention, either by inclusion in the program for future audits (but not necessarily an external audit item) or by some other means.
Buoyant ventilation	Resulting from density difference between interior and exterior air driving natural ventilation. In the case of the trains, cooler air entering the carriages when the doors are opened.

Causal Factor	Any action, omission, event or condition, or a combination thereof that if corrected, eliminated, or avoided would have prevented the occurrence, in all likelihood.
Contributing Factor	Any action, omission, event or condition that affects an occurrence by increasing its likelihood, accelerating the effect in time or increasing the severity of the consequences, but the elimination of which would not have prevented the occurrence.
Controlled Train Evacuation	This means evacuating customers from a train when there is no immediate danger. It is done so that passengers can complete their journey by another train or other transport. The driver/train crew will invariably lead the process.
Detraining	The actions of getting passengers off a train, normally away from a station during an emergency.
Dew point temperature	The temperature point at which the air can hold no more water. It is always lower or the same as the air temperature.
Door interlock light	A blue light, on the driver's console, used by drivers for confirmation that the passenger doors are closed, and the train can take power. When extinguished, this indicates that a single door or multiple doors are open.
Down Direction	In this incident, trains travelling from Connolly are travelling in the Down direction.
Dragging	A platform train interface issue where a passenger becomes trapped in the doors of the train and dragged along the platform.
Dwell time	Length of time trains spends at a scheduled stop without moving.
Emergency	IE-RU define an emergency as an unplanned event that poses serious and imminent danger to people, property or process, and requires an immediate emergency response (OPS-SMS-2.2).
Emergency Call	Section A, 3.8, IE Rule Book, outlines what requires to be communicated in an emergency call, namely, that you identify yourself, say what has happened, request emergency services, if necessary; provide your contact details; request the message be repeated; and stay in contact until nothing further is required.

Emergency Evacuation Drill	A method of practising how a location would be evacuated in the event of a fire or other emergency. The existing alarm system is activated. The evacuation takes place as if the emergency had occurred.
Emergency Train Evacuation	This means evacuating customers from a train when immediate danger makes it necessary. The driver/train crew will invariably lead the process. For non-driver/train crew employees required to take responsibility, guidance will be available via CTC.
Exercise Tabletop	An exercise for key personnel involving simulated scenarios. There are no people or agencies on the ground. They are used to assess Emergency Plans, Policies, and Procedures. They can be basic or advanced.
Forced ventilation	Passive ventilation makes use of natural forces, such as movement terms of trains, to circulate air to and from a space, bringing fresh air in and sending stale air out.
Good practice	An area highlighted which, in the opinion of the Auditor, is good practice within the industry.
Heat exhaustion (for adults)	The Health Service Executive (HSE) identify, on their website, the signs of heat exhaustion for adults, as: a headache; dizziness and confusion; loss of appetite and feeling sick; excessive sweating and pale, clammy skin; cramps in the arms, legs and stomach; fast breathing or pulse; a high temperature of 38°C or above; being very thirsty. The HSE continues "Heat exhaustion is not usually serious if you can cool down within 30 minutes. If it turns into heatstroke, it needs to be treated as an emergency." The HSE also note that "heat exhaustion can happen indoors as well as outdoors; any environment that is too warm can lead to these conditions, including in a car or near a window on a hot day."
Heat exhaustion (for children)	The HSE state "Children do not sweat as much as adults. So they find it harder to stay cool. When it's hot, you should make sure that babies and children drink enough fluids. Signs of heat exhaustion include: tired, irritable or bad-tempered; intense thirst; weakness or fainting cramps in the arms, legs or stomach; no appetite, feeling sick or vomiting; complaining of a headache; sweating a lot; pale clammy skin

	<p>temperature of more than 38°C (but less than 40°C). The HSE also note that “heat exhaustion can turn into heatstroke if the body cannot cool down within 30 minutes. Heatstroke is a life-threatening medical emergency.” The HSE also note that “heat exhaustion can happen indoors as well as outdoors; any environment that is too warm can lead to these conditions, including in a car or near a window on a hot day”.</p>
Heat stroke	<p>The HSE state that “Heatstroke is a life-threatening medical emergency”. A person can get heatstroke if they are not able to cool their body down. Their body can get hotter and hotter. This causes their temperature to rise. Heatstroke can happen indoors as well as outdoors; any environment that is too warm can lead to these conditions, including in a car or near a window on a hot day.</p>
Incident	<p>Any occurrence, other than an accident or serious accident, associated with the operation of trains and affecting the safety of operation. For heavy rail, the EU Agency for Railways divides incidents into the following categories: infrastructure; energy; control-command & signalling; rolling stock; traffic operations & management and others.</p>
Incident Officer	<p>IE-RU define an Incident Officer as a trained and competent person who is responsible for the safety of an accident site, including liaison with the emergency services, and to whom all those entitled to be on the site will respond (OPS-SMS-2.2).</p>
Investigation	<p>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.</p>
Live emergency exercises	<p>A full-scale exercise is multi-discipline exercise involving departments from IE-RU and IE-IM. It puts people in simulated emergency scenarios and tests the effective response of people and processes on the ground. It uses realistic real-time interaction and communications. It allows for utilisation and testing of seldom used resources. It often includes participation from the Principal Response Agencies.</p>
Major Customer Disruption	<p>An major customer disruption can be declared and initiated by the CTC Duty Manager, based on their disruption timescales and the severity of</p>

the event, for example, for Bray, during peak time, this would be where there was an incident expected to last over one hour.

Major compliance	non-	An area of non-compliance with an IÉ internal standard, an applicable external standard, or legislation that is evidence of a system failure.
Milepost		Marks distances.
Minor compliance	non-	An area of non-compliance with an IÉ internal standard, an applicable external standard, or legislation that is evidence of a sporadic lapse in implementation of a system or deviation from a system.
Overhead Line Equipment		An arrangement of wires suspended over each electrified track for the supply of electricity to electric trains.
Passive ventilation		Natural ventilation through openable windows.
Platform-train interface		IÉ-RU define platform-train interface relates to the full length of the train or the full length of the platform, whichever is the shortest distance and applies from the platform edge up to, and including, the area defined as the 'dispatch corridor.
Remote diagnostics system		A system that collects on-train data from key systems and then reports this information live through a web browser based system to key personnel. The diagnostics platform is rules based and can report alerts for certain occurrences or events.
Scope for improvement		An area highlighted where, in the opinion of the Auditor, system or business improvement can be achieved by the company. Typically, this is phrased as a recommendation, the merits and implementation of which should be decided by the audited organisation.
Self-detraining		The actions of passengers getting off a train, of their own volition. It can also be referred to as uncontrolled evacuation.
Serious Accident		Any train collision or derailment of trains, resulting in the death of at least one person or serious injuries to five or more persons or extensive damage to rolling stock, the infrastructure or the environment, and any other similar accident with an obvious impact on railway safety regulation or the management of safety. For heavy rail, the EU Agency for Railways divides serious accidents into the following categories:

	collisions, derailments, level-crossing accidents, accidents to persons caused by rolling stock in motion, fires and others.
Stranded train	Network Rail define a stranded train as follows: For a train to qualify as stranded the following criteria must be met: the train must be stationary (other than as scheduled); and, it is established that either there is no reasonable certainty that it will resume its journey within the next X minutes (as dined by railway organisation); or, there is reasonable certainty that it will resume its journey but only after a delay of at least Y minutes since coming to a stand (as defined by railway organisation).
Thermal comfort	The condition of mind that expresses satisfaction or dissatisfaction with the thermal environment.
Track Circuit Block	A method of signalling trains in a section of line where safety is ensured by the use of track circuits (electric devices installed in running rails which detects the presence of a train) or other means of automatic train absence detection and without the use of block instruments.
Trespasser	IE define trespassers are “anyone on railway premises where the public are not permitted must be considered as trespassing except for: employees in the course of their duties; employees using an authorised route to or from a place of work; persons in possession of written authority”. Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 define a trespassers as a “person present on railway premises where such presence is forbidden”. See footnote 42 as to why the RAIU do not consider the passengers who self-detrained in this incident to be trespassers.
Trespass guard	An arrangement of angled/pyramid shaped sections, placed on the edges of the road to deter people from walking onto the railway line.
Up Direction	In this accident, trains travelling towards Connolly are travelling in the Up direction.

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