



Australian Government

Australian Transport Safety Bureau

Derailment of freight train 4PM9

Inverleigh, Victoria, on 14 November 2022



ATSB Transport Safety Report

Rail Occurrence Investigation (Systemic)

RO-2022-013

Preliminary - 24 February 2023

Cover photo: Country Fire Authority, Victoria

This investigation was conducted under the *Transport Safety Investigation Act 2003* (Cth) by the **Chief Investigator, Transport Safety (Victoria)** on behalf of the Australian Transport Safety Bureau in accordance with the Collaboration Agreement.

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

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Addendum

Page	Change	Date

Preliminary report

This preliminary report details factual information established in the investigation's early evidence collection phase, and has been prepared to provide timely information to the industry and public. Preliminary reports contain no analysis or findings, which will be detailed in the investigation's final report. The information contained in this preliminary report is released in accordance with section 25 of the *Transport Safety Investigation Act 2003*.

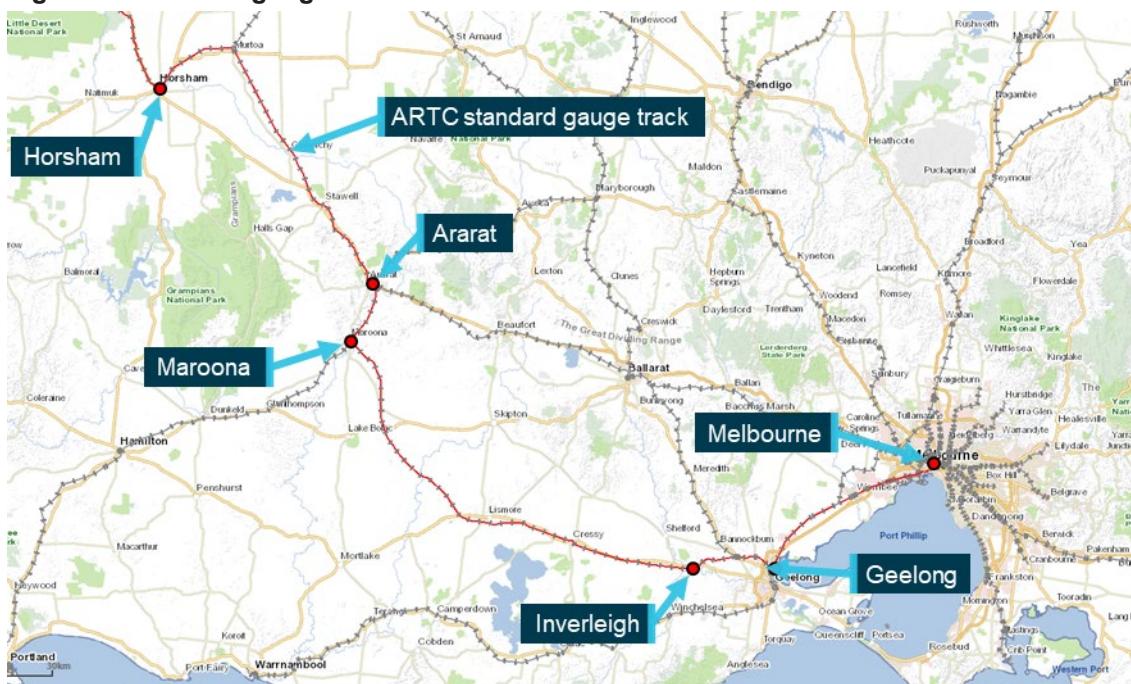
The occurrence

Passage of freight train 4PM9

On 10 November 2022, SCT Logistics freight train 4PM9 departed Perth, Western Australia for Melbourne, Victoria. The train left Adelaide, South Australia on 13 November and consisted of 5 locomotives hauling 55 wagons¹ and was about 1800 m in length. The train was operating on the Australian Rail Track Corporation (ARTC) standard gauge network.

The train arrived in Horsham, Victoria at about 2320² on 13 November. A crew change occurred in Horsham and the train resumed its trip to Melbourne that would take it through Ararat, Maroona and then Inverleigh (Figure 1).

Figure 1: Standard gauge route from Horsham to Melbourne



Source: e-way Electronic Street Directory Version 2.2 (c) Copyright Melway Publishing Pty. Ltd. annotated by Chief Investigator, Transport Safety

At about 0450 on 14 November, train 4PM9 travelling at about 80 km/h passed over a culvert located to the east of the township of Inverleigh. Soon after, there was a loss of brake pipe pressure³ and the leading end of the train came to a stop across the Hamilton Highway level crossing. Ten of the original 55 wagons were still attached to the leading 5 locomotives. The next 16 wagons were derailed including 7, 5-pack articulated wagons (Figure 2).

¹ Of the 55 wagons, 10 were '5-pack' articulated skeletal container flat wagons.

² Australian Eastern Daylight Time (AEDT).

³ A loss of brake pipe pressure is often associated with a loss of brake pipe integrity and is an indication of a train parting.

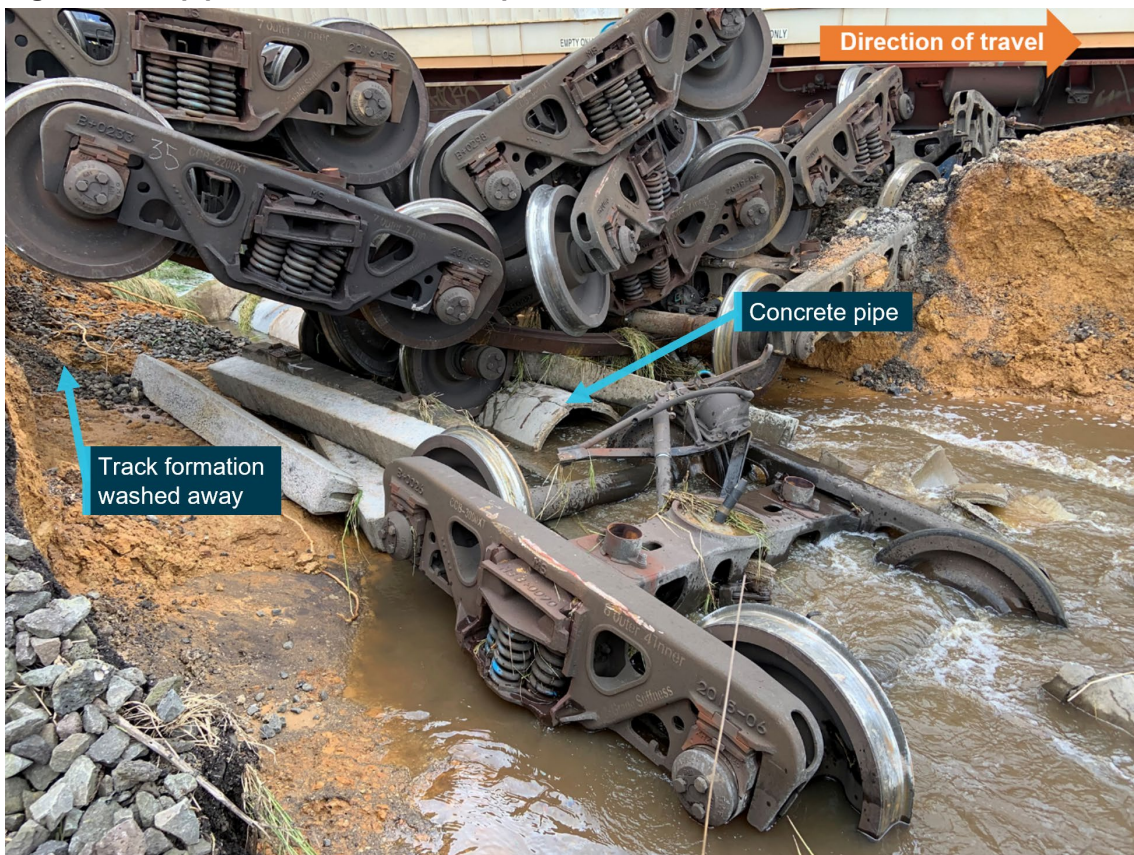
Figure 2: Aerial view of derailed train 4PM9



Source: Aerial footage provided by ABC News, annotated by CITS

The embankment supporting the track at the location of the culvert had collapsed (Figure 3).

Figure 3: The pipe culvert and the collapsed track formation



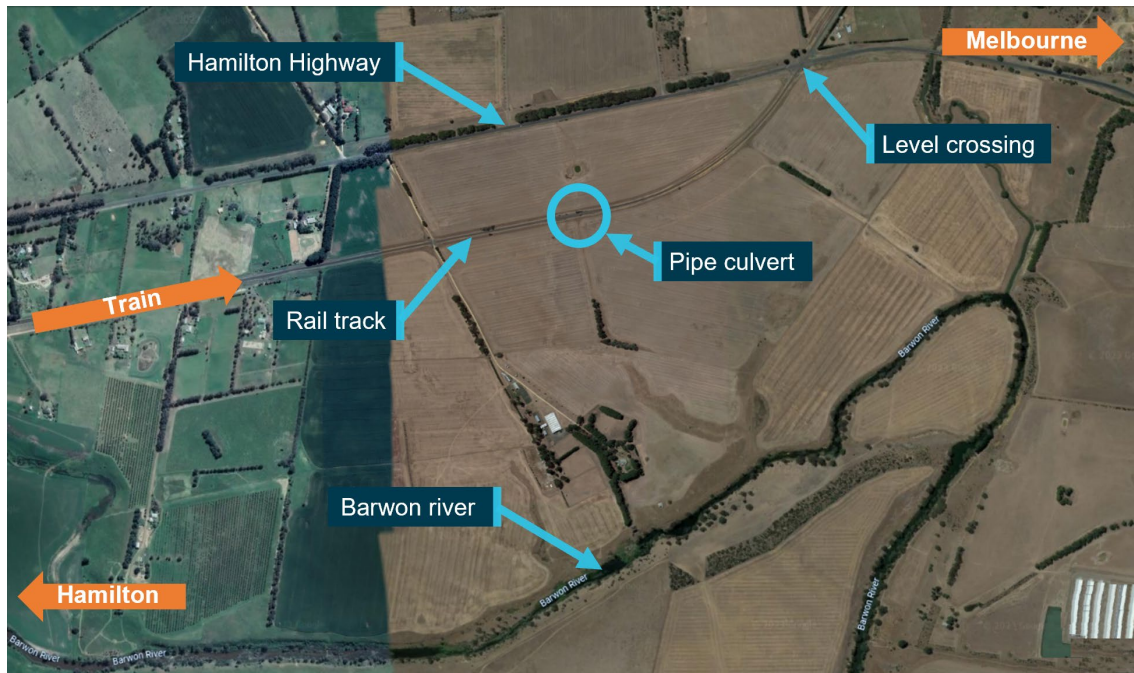
Source: Chief Investigator, Transport Safety

Context

Location

The derailment occurred about 3 km east of the township of Inverleigh on a section of track located between the Hamilton Highway and the Barwon River (Figure 4). Travelling in an easterly direction, the track ran parallel to the Hamilton Highway before curving towards and across the highway. The derailment occurred within the Mid Barwon catchment area that made up part of the Barwon drainage basin. The agricultural land on either side of the rail reserve generally sloped from the highway down towards the Barwon River. Therefore, run-off from rainfall flowed from the north side of the track through culverts (below the track) towards the Barwon River.

Figure 4: Derailment site of train 4PM9



Source: Google maps, annotated by the Chief Investigator, Transport Safety

Track infrastructure

The standard gauge track at Inverleigh was a single, bi-directional line, and consisted of 60 kg/m rail fastened to concrete sleepers. The track through the location was carried on an embankment that was at a height of about 3 m at the location of the wash-away (at the culvert). This culvert was located at the 96.805 track km mark⁴ and comprised of a 750 mm diameter concrete pipe embedded at the base of the embankment carrying the track.

Rainfall

Heavy rain fell in Inverleigh from the late evening of 13 November and through the early hours of the morning of 14 November. A weather monitoring station at Gnarwarre⁵, located about 12 km from Inverleigh recorded about 42 mm of rain in the 12-hour period⁶ before the derailment, and local weather stations in Inverleigh recorded rainfall of around 70 mm.

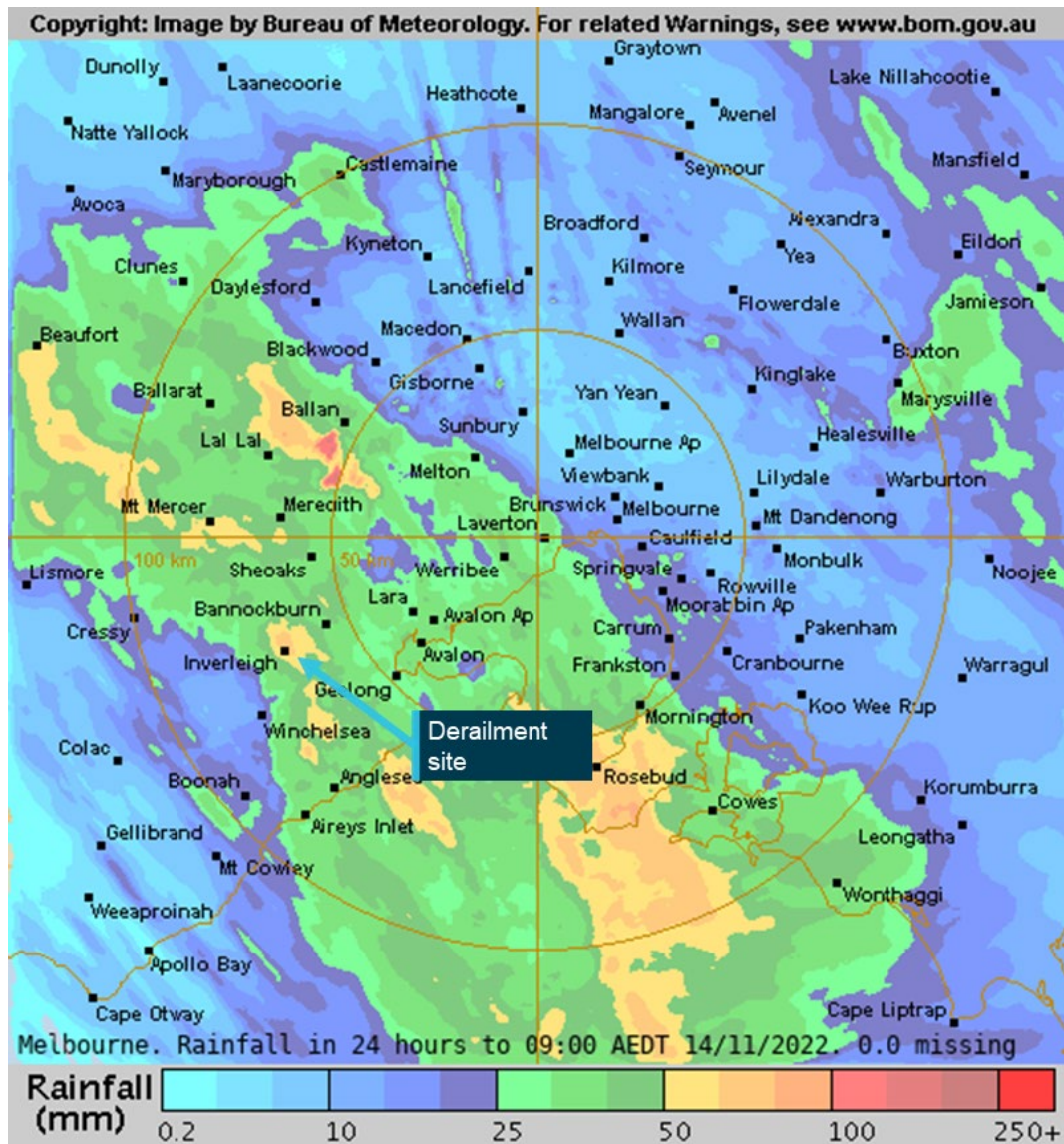
⁴ Rail km from Melbourne.

⁵ Managed by the Department of Environment, Land Water and Planning and named Barwon River@Pollocksford

⁶ From about 1700 on 13 November 2023.

Bureau of Meteorology (BoM) radar-derived⁷ rainfall accumulations estimated that between 50 and 100 mm of rain fell at Inverleigh in the 24 hours to 0900 on 14 November 2022 (Figure 5).

Figure 5: Radar-derived rainfall accumulations



Source: Bureau of Meteorology, annotated by Chief Investigator, Transport Safety

⁷ The BoM rainfall accumulation images are made by blending measurements from rain gauges (accurate point data) and radar. Radar data is calibrated with rain gauge data and is used to fill in the "gaps" between rain gauges.

Further investigation

To date, CITS has:

- attended and completed derailment site inspections
- examined drainage in the waterway catchment area and commenced hydrology studies
- examined train consist and operational information
- interviewed the driver of train 4PM9
- commenced collection of other relevant information

The investigation is continuing and will include review and examination of:

- the train consist and operation of the train
- the waterway catchment area, including local catchment features
- the effect of prior rainfall on soil moisture and catchment flow
- culvert design including capacity
- track infrastructure including inspection and maintenance
- weather warnings

Should a critical safety issue be identified during the course of the investigation, the ATSB will immediately notify relevant parties so appropriate and timely safety action can be taken.

A final report will be released at the conclusion of the investigation.

General details

Occurrence details

Date and time:	14 November 2022 – 0450 EST	
Occurrence class:	Serious incident	
Occurrence categories:	Derailment	
Location:	3 km east of Inverleigh, Victoria	
	Latitude: 38°05' 53.3544 S	Longitude: 144°05' 29.8464 E

Train details

Track operator:	Australian Rail Track Corporation	
Train operator:	SCT Logistics	
Train number:	4PM9	
Type of operation:	Freight	
Departure:	Perth	
Destination:	Melbourne	
Persons on board:	Crew – 2	Passengers – 0
Injuries:	None	
Damage:	16 wagons destroyed. Substantial track damage.	

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, international agreements.

Rail safety investigations in Victoria

Most transport safety investigations into rail accidents and incidents in Victoria and New South Wales (NSW) are conducted in accordance with the Collaboration Agreement for Rail Safety Investigations and Other Matters between the Commonwealth Government of Australia, the State Government of Victoria, and the State Government of New South Wales. Under the Collaboration Agreement, rail safety investigations are conducted and resourced in Victoria by the Chief Investigator, Transport Safety (CITS) and in New South Wales by the Office of Transport Safety Investigations (OTSI), on behalf of the ATSB, under the provisions of the *Transport Safety Investigation Act 2003*.

The Chief Investigator, Transport Safety (CITS) is a statutory position established in 2006 to conduct independent, no-blame investigation of transport safety matters in Victoria. CITS has a broad safety remit that includes the investigation of rail (including tram), marine and bus incidents.

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.