Transport Accident Investigation Commission

Final Report
Tuhinga whakamutunga

Rail inquiry RO-2025-103
Mainline shunt, Train 170S
Signal passed at danger and near miss with passenger train
Westfield, Auckland
1 February 2025

June 2026

The Transport Accident Investigation Commission
Te Kōmihana Tirotiro Aituā Waka

No repeat accidents – ever!

"The principal purpose of the Commission shall be to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future, rather than to ascribe blame to any person."

Transport Accident Investigation Commission Act 1990, s4 Purpose

The Transport Accident Investigation Commission is an independent Crown entity and standing commission of inquiry. We investigate selected maritime, aviation and rail accidents and incidents that occur in New Zealand or involve New Zealand-registered aircraft or vessels.

Our investigations are for the purpose of avoiding similar accidents and incidents in the future. We determine and analyse contributing factors, explain circumstances and causes, identify safety issues, and make recommendations to improve safety. Our findings cannot be used to pursue criminal, civil, or regulatory action.

At the end of every inquiry, we share all relevant knowledge in a final report. We use our information and insight to influence others in the transport sector to improve safety, nationally and internationally.

Commissioners

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Deputy Chief Commissioner	Stephen Davies Howard
Commissioner	Paula Rose, QSO
Commissioner	Bernadette Roka Arapere (until 6 November 2025)

Key Commission personnel

Chief Executive	Martin Sawyers
Chief Investigator of Accidents	Louise Cook
Lead Investigator for this inquiry	Hans Boon
Commission General Counsel	Sid Wellik

Notes about Commission reports
Kōrero tāpiri ki ngā pūrongo o te Kōmihana

Citations and referencing

The citations section of this report lists public documents. Documents unavailable to the public (that is, not discoverable under the Official Information Act 1982) are referenced in footnotes. Information derived from interviews during the Commission's inquiry into the occurrence is used without attribution.

Photographs, diagrams, pictures

The Commission owns the photographs, diagrams and pictures in this report unless otherwise specified.

Verbal probability expressions

For clarity, the Commission uses standardised terminology where possible.

One example of this standardisation is the terminology used to describe the degree of probability (or likelihood) that an event happened, or a condition existed in support of a hypothesis. The Commission has adopted this terminology from the Intergovernmental Panel on Climate Change and Australian Transport Safety Bureau models. The Commission chose these models because of their simplicity, usability, and international use. The Commission considers these models reflect its functions. These functions include making findings and issuing recommendations based on a wide range of evidence, whether or not that evidence would be admissible in a court of law.

Terminology	Likelihood	Equivalent terms
Virtually certain	> 99% probability of occurrence	Almost certain
Very likely	> 90% probability	Highly likely, very probable
Likely	> 66% probability	Probable
About as likely as not	33% to 66% probability	More or less likely
Unlikely	< 33% probability	Improbable
Very unlikely	< 10% probability	Highly unlikely
Exceptionally unlikely	< 1% probability	

Figure 1: Freight train, Train 170S
(Credit: KiwiRail Holdings Limited)

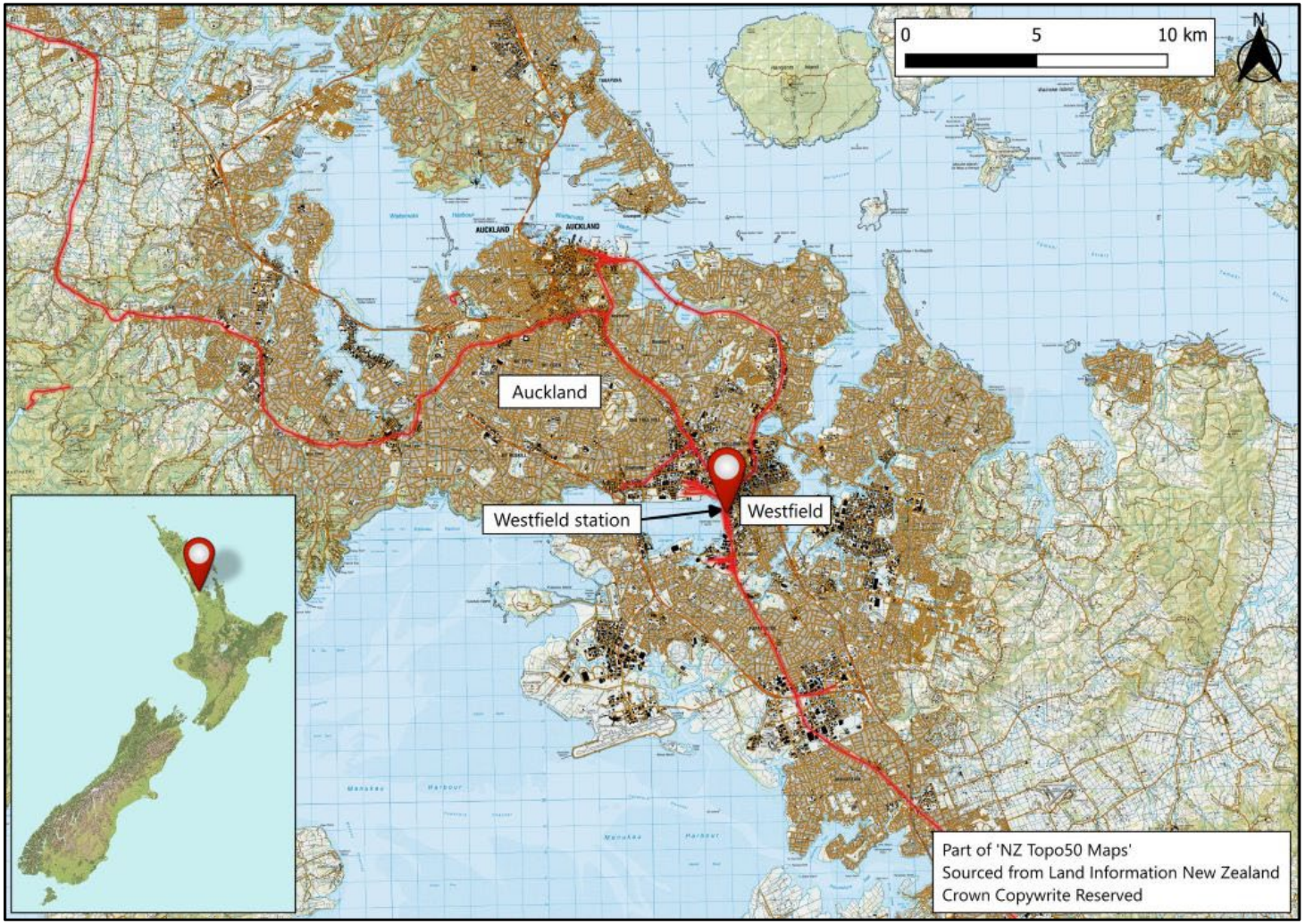

Figure 2: Location of incident at Westfield, Auckland,
(Credit: Land Information New Zealand Toitū Te Whenua,)

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1 Executive summary
Tuhinga whakarāpopoto

What happened

1.1. On 1 February 2025, Train 170S was operating as a regular shunt service loaded with containerised freight, travelling between Wiri and the Port of Auckland.

1.2. At about 1207,[1] Train 170S was travelling on the North Island Main Trunk when it passed a signal at stop without authority.[2] The locomotive engineer applied the emergency brake prior to the signal at stop, but the train stopped about 50 metres beyond the signal.

1.3. The signal was set to stop to allow a passenger train to cross over onto the same track ahead of the shunting movement. The passenger train cleared the track about 250 metres ahead of the shunt service and continued without incident. There were no injuries to train crew or passengers and no damage to the infrastructure.

Why it happened

1.4. The locomotive engineer and the rail operator were not familiar with the route.

1.5. The locomotive engineer had become distracted from the task of stopping the train. By the time they drew their attention back to that task, they were already too close to the signal to avoid passing the signal at stop.

1.6. The risk-triggered commentary driving practices were not sufficiently embedded or communicated to staff, resulting in a lack of awareness and understanding of the process. This affected their ability to mitigate the risks associated with approaching a signal at stop.

1.7. There were no route cues indicating the train's proximity to the signal, which would have facilitated a stabilised approach to the signal.

What we can learn

1.8. In the rail industry, non-technical skills[3] are critical safety measures that help to build resilience by improving communication, situational awareness and decision-making among personnel. They enable teams to identify, manage and recover from errors collaboratively, and serve as vital human barriers supporting safety outcomes in environments where technical safeguards are minimal or absent.

Who may benefit

1.9. Rail personnel, rail operators and all users of safety-critical equipment may benefit from the findings in this report.

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[1] Times in this report are in New Zealand Daylight Time (Universal Coordinated Time +13 hours) expressed in a 24-hour format

[2] A signal passed at stop without authority is referred to as a signal passed at danger (SPAD).

[3] Skills that refer to the cognitive, social and personal skills that complement technical competencies and are essential for safe and effective performance in safety-critical roles, including but not limited to, situational awareness, decision making, communication and teamwork.

2 Factual information
Pārongo pono

Background

2.1. In the period 27 January to 2 February 2025, multiple worksites were in operation between the 658.57 kilometre (km)[4] at Wiri and the 664.089 km at Westfield on the North Island Main Trunk (NIMT). These worksites closed the UP Main[5] and WEST Main, making those lines impassable[6] (*see* Figure 3).

2.2. The closure of the lines meant that a change to normal direction running was required, and UP trains needed to run in an opposing direction[7] on the DOWN Main.

2.3. The tracks were bi-directional, so were available for travel in either direction, with the necessary infrastructure and a safe working system using coloured light signals controlled by train control.

Narrative

2.4. At 0400 on 1 February 2025, the locomotive engineer (LE) and the rail operator[8] (RO) commenced their shifts at Westfield. They completed their prestart procedures, including reading the daily information bulletin[9] (DIB) and train running documentation, before departing for North Wiri yard in a light locomotive.[10]

2.5. At Wiri yard, they connected the locomotive to a rake[11] of wagons and completed their first shunt to the Port of Auckland. They then returned to Wiri with the empty rake that needed to be loaded.

2.6. They waited for the rake to be loaded and for the work order required to move the train, scheduled as Train 170S. There was a delay in their departure, and they left about an hour later than scheduled.

2.7. At 1145, Train 170S (the train) departed Wiri yard and was routed onto the DOWN Main. The direction of travel was in an UP direction towards the Port of Auckland, meaning the train was travelling in an opposing direction on the DOWN Main.

2.8. At 1148, the train stopped at the limits of a worksite, awaiting clearance from the worksite rail protection officer.

2.9. At 1152, on receiving clearance, the train travelled through the worksite and continued towards the port, passing Puhinui, Papatoetoe and Middlemore stations

[4] The kilometre (km) meterage is the location defined from a fixed reference point. On the NIMT that fixed point is Wellington Station.
[5] Trains running towards Otiria in the North Island are travelling in the UP direction, and away from Otiria in a DOWN direction. The tracks are defined in the same convention.
[6] Planned work that requires the closing of the track to normal train movements to allow for maintenance work to be carried out.
[7] A train running on the track designated for the opposite direction.
[8] A qualified person who assists the locomotive engineer with the movement and general working of the train.
[9] Information on general daily instructions, running of extra trains and maintenance work.
[10] A locomotive running singly, or in multiple without any other rail vehicles attached.
[11] Rail terminology for a series of wagons that are connected.

towards Ōtāhuhu. The train reached a maximum speed of 72 kilometres per hour (km/h) in locations along the route (*see* Figure 3).

Figure 3: Route on the North Island Main Trunk from Wiri to Westfield showing the stations and signal locations

2.10. At signal 1606, which is the signal that controls entry to Westfield station limits,[12] the recorded speed of the train was 62 km/h, reducing to a speed of 56 km/h as it passed signal 1650.

[12] Includes all lines within the outermost signals, station entry boards or points on each line controlled by the signaller for the station.

2.11. At 1200, the train was brought to a stop at Ōtāhuhu for signal 1646, which was displaying a red aspect[13] over red aspect. The LE stopped short of the signal by approximately 100 metres (m). The signal was subsequently set to proceed for the departure from Ōtāhuhu Station (*see* Figure 4).

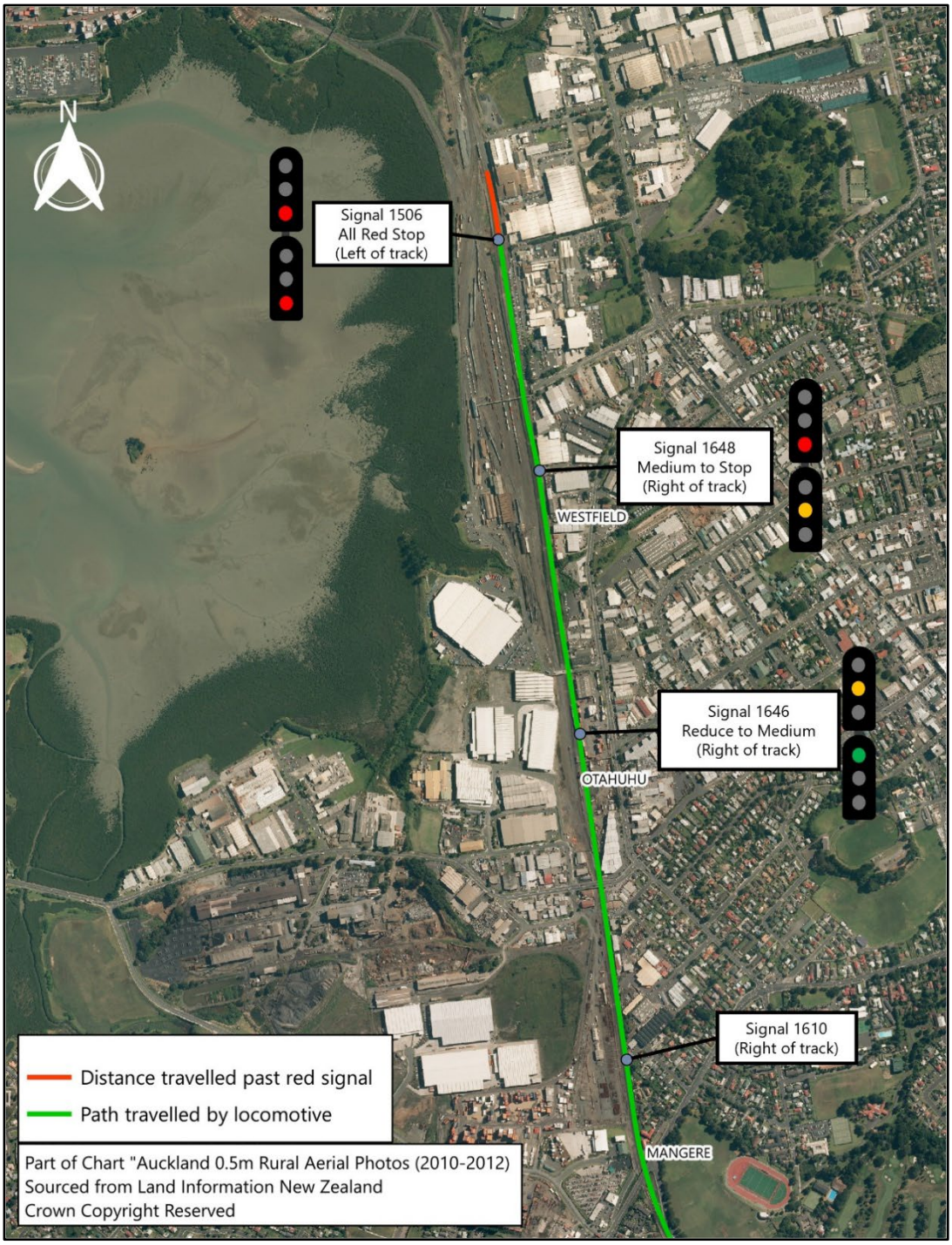

Figure 4: Location of signals and their aspects on departure from Ōtāhuhu Station

[13] A visual indication of the status of a signal that is given to the train driver, locomotive engineer or other operator of a rail vehicle.

2.12. At 1203 the train departed from Ōtāhuhu Station. Signal 1646 authorising the departure from Ōtāhuhu showed a yellow over green aspect, meaning 'reduce speed, being prepared to pass the next signal at medium speed[14](*see* Figure 5).

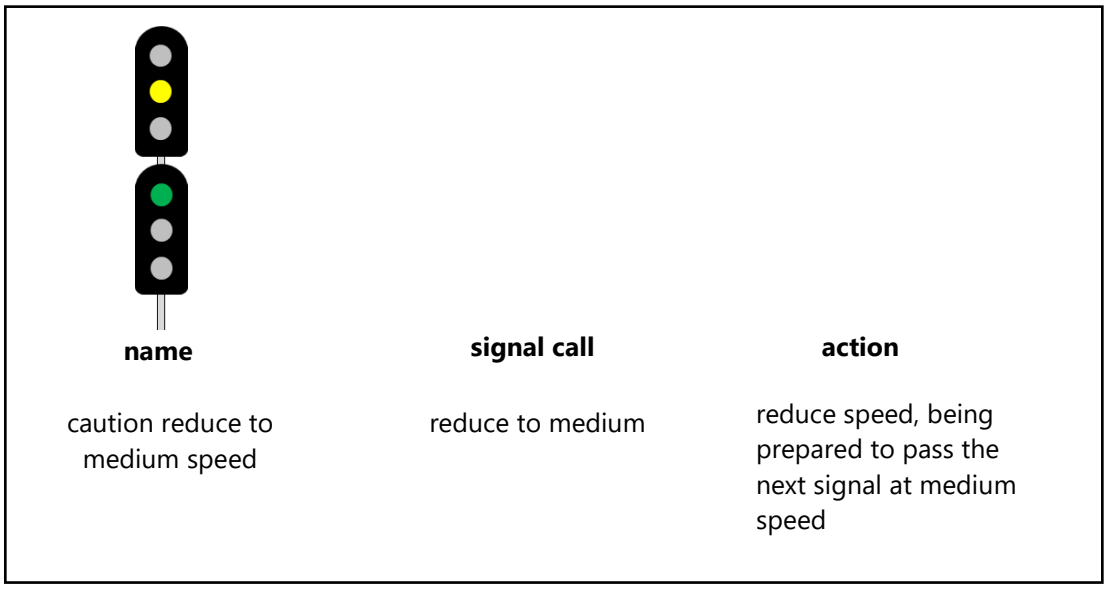

Figure 5: Signal 1646 aspect – reduce to medium

2.13. The purpose of the signalling sequence that followed was to ensure the train was travelling at the correct speed at signal 1648. This was the next signal to be passed and authorised the movement through the crossover from the DOWN Main to the CENTRE Main.

2.14. At about the same time that the train was departing Ōtāhuhu Station, Train T400, an Auckland One Rail (AOR) metro passenger train, was departing the station on the UP Main line.

2.15. The train increased speed to 15 km/h, passing signal 1646 at 1204. The train continued towards signal 1648 with the LE increasing the throttle notch position,[15] which applied power to the locomotive.

2.16. Signal 1648 was showing a red over yellow aspect, meaning 'proceed cautiously at medium speed, being prepared to stop at the next signal' (*see* Figure 6).

[14] Must not exceed 25 km/h unless a speed board, dynamic speed indicator (DSI) or European Train Control System (ETCS) authorises a higher speed.

[15] In a diesel-electric locomotive, the throttle-notch position refers to the setting of the throttle control lever that regulates the engine speed (revolutions per minute (RPM)) with positions ranging from Idle (0) to Notch 8. Each position corresponds to a specific engine RPM and power level and, indirectly, the power output delivered to the traction motors.

name	signal call	action
caution medium speed to stop	medium to stop	proceed cautiously at medium speed, being prepared to stop at the next signal

Figure 6: Signal 1648 aspect – medium to stop

2.17. The train passed this signal at 12:06:08, at a speed of 40 km/h in compliance with the rules and procedures. Although the signal indication required a speed of 25 km/h, this was overridden by a speed board at the signal that authorised a higher speed of 40 km/h through the crossover (*see* Figure 7).

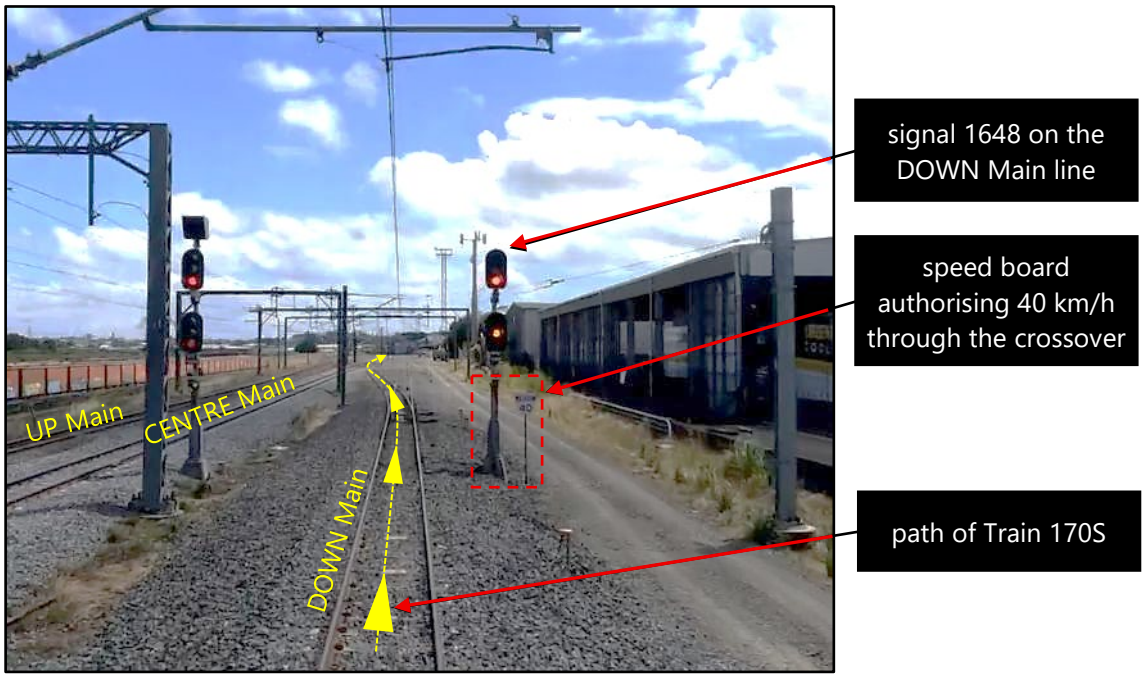

Figure 7: Approach to signal 1648 and the path taken by Train 170S
(Credit: KiwiRail annotated by TAIC)

2.18. As the train went through the crossover, the LE observed the train's speed and progress using the train's speedometer and head end monitor[16] to ensure it did not exceed the permitted speed of 40 km/h (*see* Figure 8).

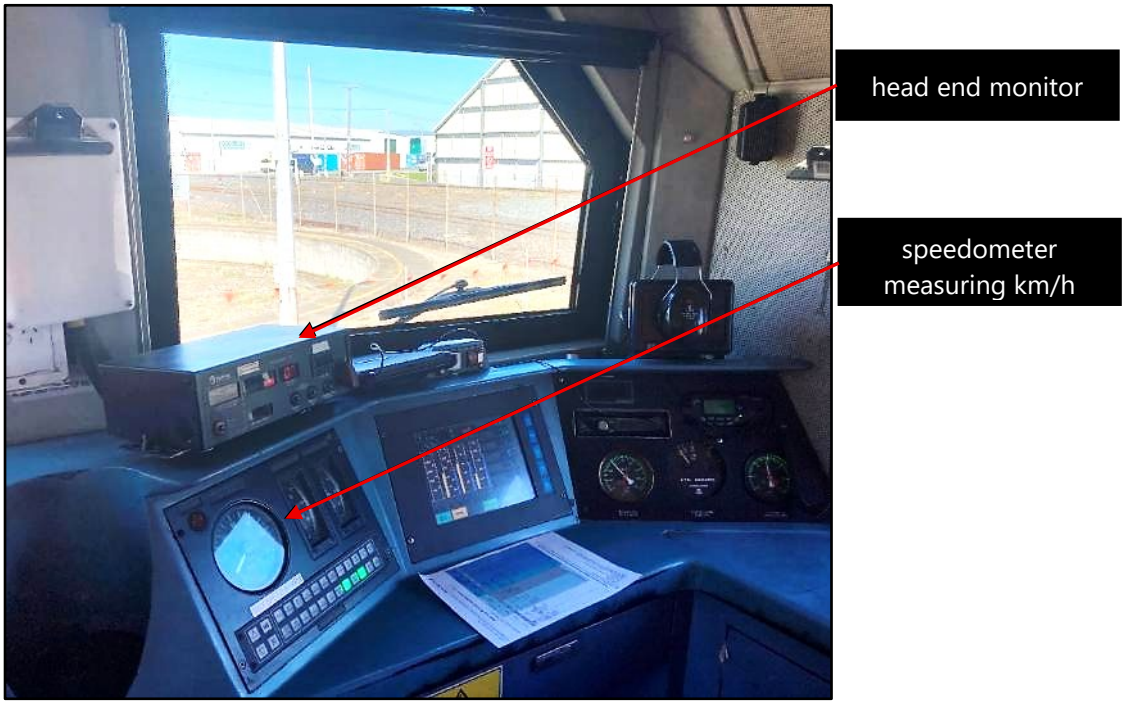

Figure 8: Cab view of a DL class locomotive
(Credit: KiwiRail annotated by TAIC)

2.19. At 12:06:48, the train had cleared the crossover and was travelling at 39 km/h when the LE observed signal 1506.

[16] A visual display unit which displays information transmitted from the train end monitor. The information includes brake pipe pressure, last vehicle movement, battery condition, taillight on or off, and has the provision to use a distance counter.

2.20. The train was about 226 m from signal 1506 that was showing a red over red aspect, which meant 'stop, only pass if authorised by the prescribed verbal or written instruction' (*see* Figure 9).

name	signal call	action
stop absolute signal	all red stop	stop, only pass if authorised by the prescribed verbal or written instruction

Figure 9: Signal 1506 aspect – stop

2.21. The LE made a minimum brake application, followed almost immediately by an emergency brake application.

2.22. At 12:07:05 the train was travelling at 24 km/h when it passed signal 1506 at stop. It continued for about 50 m before coming to a stand (*see* Figure 10). The train stopped about 250 m from the potential point of conflict with Train T400.

Figure 10: The position of Train 170S after passing signal 1506
(Credit: KiwiRail)

2.23. Signal 1506 was set to stop to enable Train T400 to leave Ōtāhuhu Station and cross onto the CENTRE Main ahead of Train 170S.

2.24. The train crew of Train T400 recalled hearing the emergency call transmitted from Train 170S in response to the emergency brake application. They recalled being clear of the crossover by that time.

2.25. There were no injuries or damage as a result of this occurrence.

Personnel information

Locomotive engineer

2.26. The LE had been employed by KiwiRail Holdings Limited (KiwiRail) since 2018 and commenced locomotive driving in 2019. They were certified to operate freight trains within the Auckland Metro rail network. Their safety observations[17] were current at the time of the incident.

[17] In-field assessment of rail personnel carrying out the application of practical skills for the activities specified on their Licence to Operate.

2.27. They had been assessed as fit for duty in accordance with the National Standard for Health Assessment of Rail Safety Workers.[18]

2.28. Following the incident, the LE was tested for the effects of drugs and alcohol; the results were negative (clear).

Rail operator

2.29. The RO had been employed in the position since 2023 and qualified as a mainline RO (second person duties) since July 2024. Their safety observations were current at the time of the incident.

2.30. They had been assessed as fit for duty in accordance with the National Standard for Health Assessment of Rail Safety Workers.

2.31. Following the incident, the RO was tested for the effects of drugs and alcohol; the results were negative (clear).

Train information

Train 170S shunt operation

2.32. Train 170S was operating as a mainline shunt. It was comprised of a DL class diesel-electric locomotive hauling 25 wagons loaded with containerised freight. The weight of the train was 1101 tonnes, and it was 460 m in length.

2.33. The train was not fitted with any form of electronic train protection[19] (ETP) capable of stopping the train in the event of a signal being passed at stop.

Train T400 Auckland One Rail commuter service

2.34. The Train T400 was an AM class[20] Electric Multiple Unit (EMU) operated by AOR (*see* Figure 11).

[18] The Australian National Transport Commission Standard for Health Assessment of Rail Safety Workers provides a framework for rail operators to manage the risks to safety posed by the ill health of rail safety workers on the National Rail System.

[19] A system designed to reduce the consequences of a signal passed at danger (stop) occurrences. ETP is an onboard system as part of train control, or a protection system capable of stopping the train.

[20] A designated class of train for the Auckland Metro system, manufactured by Construcciones y Auxiliar de Ferrocarriles known as CAF.

Figure 11: Auckland One Rail AM class Electric Multiple Unit passenger train

2.35. This class of rail vehicle had been introduced to the Auckland electrified network in 2014 and is fitted with the European Train Control System[21] (ETCS) Level 1.

Recorded data

Testing

2.36. Between 3 and 4 February 2025, Commission investigators tested the train's brake functionality to ascertain the integrity and effectiveness of the air brake and emergency brake systems. The systems were found to comply with KiwiRail's rules and procedures.

2.37. On 4 February 2025, Commission investigators completed test runs using a test train, Train TT12, between Wiri and Westfield on the NIMT. The signals were observed from the cab to identify signal sighting distances and potential obstructions to sight lines. These observations determined that the signal sight lines approaching signals 1648 and signal 1506 were in compliance with the sighting distances required by KiwiRail's Signal Sighting Standard (S-ST-SG-2124).

Train data recorders

2.38. The train was fitted with a Tranzlog data recorder. Information from the recorder is used in this report, where appropriate.

2.39. The Tranzlog recorded the train's position along the route, including the LE's brake and throttle inputs (*see* Figure 12).

[21] A signalling, control and train protection system using trackside and onboard components to relay information about a permitted movement authority, ie, speed, distance and signal/track status ahead.

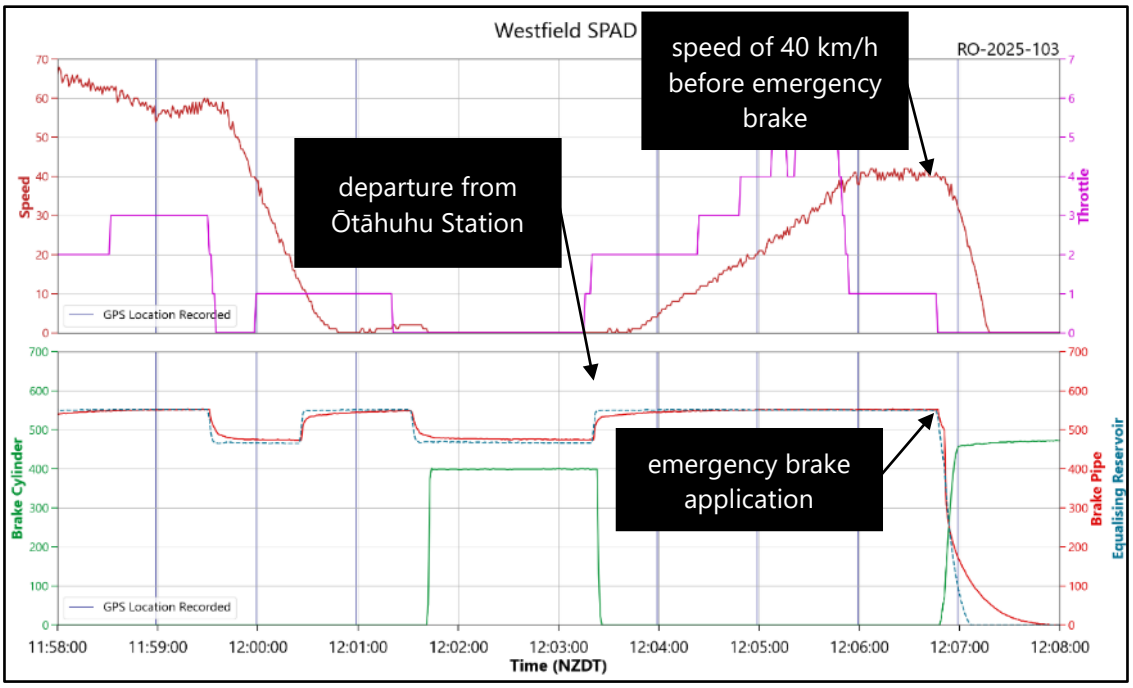

Figure 12: Tranzlog data analysis by TAIC

Other data sources

2.40. The Commission obtained forward-facing video from AOR EMU trains operating at the locality of the incident. This video recorded train movements, including Train 170S as it passed through Ōtāhuhu Station, and the signal aspects relevant to these movements.

Previous occurrences

2.41. The Commission obtained KiwiRail's signal passed at danger (SPAD) occurrence data for the period 2016 to 2025. The data captured freight and passenger operations, including metro passenger operations in Auckland and Wellington (*see* Figure 13).

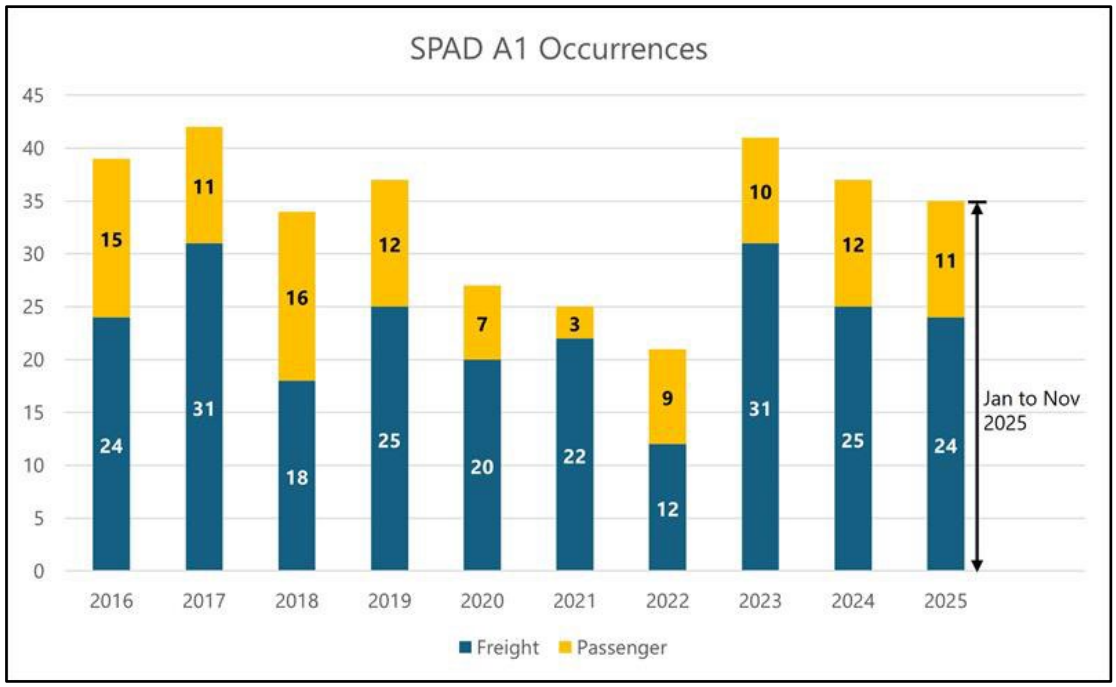

Figure 13: Frequency of freight and passenger train SPADs

2.42. For the year 2025, the recorded SPADs occurred between 1 January and 20 November.

Rail Inquiry RO-2024-104

2.43. In 2024, a SPAD event occurred involving a freight train passing two consecutive signals at stop on the East Coast Main Trunk Line at Kereone. The Commission opened an inquiry into this occurrence.

Rail Inquiry RO-2023-104

2.44. In 2023, a SPAD event occurred involving a passenger train (Te Huia) passing a signal at stop in Auckland. The Commission found that the LE mistook the signal on an adjacent line as their signal to proceed. The applicable signal for their line was at stop but was not within view.

2.45. The analysis of the events determined that one of the contributing factors to the incident was the adequacy of route knowledge possessed by the LE.

2.46. The Commission recommended that KiwiRail review route knowledge training for locomotive engineers. Infrequent driving of the route and prolonged absences should be identified so that locomotive engineers have the route knowledge to travel safely (Recommendation 018/24). KiwiRail accepted the recommendation. A project integrating route knowledge into the KiwiRail Learning Exchange (KLE) was commenced, with implementation planned for the second half of 2025.

Rail Inquiry RO-2022-102

2.47. In 2022, a shunt locomotive derailed and overturned in Tamaki, Auckland. The Commission found that the non-technical skills training did not provide the crew with adequate techniques for how to work together to manage safety threats.

2.48. The Commission recommended that KiwiRail undertake a review of its non-technical skills training to ensure it provides adequate training on how to work together to manage threats (Recommendation 034/23).

2.49. KiwiRail accepted and implemented this recommendation. Non-technical skills training is now delivered through the 'Future You' programmes for new infrastructure and protection staff, as well as trainee rail operators and locomotive engineers. The programmes include safe work conversations, detailed modules on non-technical skills, and interactive sessions applying these skills. An eLearn module is also available and forms part of the onboarding for new starters. Assessment of trainee locomotive engineers covers the required non-technical skills outcomes.

2.50. The Commission also found that training for second person duties was inconsistent with training requirements for other safety-critical roles, particularly how competency was assessed and recorded.

2.51. The Commission recommended in part that KiwiRail reviews its second person training approach to ensure document management of the training material is robust, and that training material is fit for purpose and consistent with training provided to other safety-critical roles (Recommendation 035/23).

2.52. KiwiRail had taken the matter under consideration, and a working group was reviewing this as of early 2024, to align with new operational realities that the practice of long hood leading[22] is no longer used.

Rail Inquiry RO-2019-107

2.53. In 2019, a SPAD event occurred involving a passenger train passing a signal at stop in the Wellington station limits and entering a track section that was already occupied. The Commission found there were no additional mitigations in place to prevent a train passing the red stop signal and colliding with another train.

2.54. The Commission referred to previous recommendations made for a similar incident. These recommended in part that KiwiRail conduct a review of current arrangements, and take any opportunities it could to further reduce risks for train operations in the area until a more suitable longer-term solution could be made (Recommendation 034/17).

2.55. KiwiRail and Greater Wellington Regional Council were working on long-term solutions, but no new or specific interim engineering controls for the key signals had been implemented.

Rail Investigation RO-2018-002 Australian Transport Safety Bureau (ATSB)

2.56. On 10 January 2018, a Queensland Rail Citytrain suburban passenger train was travelling to Brisbane Domestic Airport, Queensland, with a scheduled crew change at Bowen Hills. While the train was stopped at Bowen Hills, the departure signal at the northern end of No. 2 platform was displaying a yellow aspect, which meant that at that time the next signal (ME45) was displaying a red aspect (stop indication).

2.57. After departing the platform, the train exceeded its limit of authority by passing signal ME45, which was still displaying a red aspect (stop indication). After receiving a SPAD alarm, the network control officer broadcast an emergency stop command to

[22] Refers to operating a hood-unit diesel locomotive with its long hood facing the direction of travel, with the cab to the rear.

the driver. The train was stopped 220 m past signal ME45, and 126 m before a conflict point. At the time the train came to a stop, another suburban passenger train had just cleared the conflict point.

2.58. The ATSB identified several safety issues, including the following issue involving risk-triggered commentary driving (RTCD).

> Safety Issue RO-2018-002-SI-04: After mandating the use of risk triggered commentary driving (in 2011) to mitigate the risk of signals passed at danger, Queensland Rail Citytrain did not provide the necessary support to its trainers, assessors and drivers to effectively maximise the potential benefits of the technique and minimise the potential limitations or risks associated with the technique.

Organisational information

2.59. KiwiRail is a New Zealand state-owned enterprise. It operates trains and rail vehicles, controls rail movements on the national rail network and maintains the railway infrastructure as the access provider. KiwiRail was the rail operator, infrastructure owner and access provider for the network on which Train 170S was operated.

2.60. The commuter train service was operated by AOR, a licensed passenger service operator. AOR provides services on behalf of Auckland Transport. These include employing drivers and other train staff, developing timetables, undertaking station operations and maintenance, security and customer-facing activities, and managing the Auckland Network Access Agreement and KiwiRail interface.

3 Analysis
Tātaritanga

Introduction

3.1. The movement of a train into a section of track for which a route has been set for another train is a serious incident. A collision of two trains, even at relatively low speeds, has the potential to result in serious injury to people and significant damage to property.

3.2. The following section is an analysis of the circumstances surrounding the events. It identifies those factors that increased the likelihood of the event occurring or increased the severity of its outcome. It also examines any safety issues that have the potential to adversely affect future operations.

3.3. Signals are used to control train movements along various sections of track. The time it takes for a train to respond to brake and throttle inputs from LEs means that signal indications need to be progressive; that is, the preceding signal indicates what the next signal will potentially display. In this manner, signal indications convey speed instructions for the section of the track into which the train is entering, as well as advance information for the section beyond.

3.4. Safe rail movements rely on train crew responding appropriately to information conveyed via trackside signals. For this to occur, LEs must correctly identify and interpret the signals in time to react, using a three-step process: signal detection, signal interpretation and deciding on the correct course of action.

Route knowledge training and resource material

Safety issue 1: The route knowledge training provided to the train crew was insufficient for the complexity of the area in which they were operating, increasing the likelihood of errors.

3.5. Route knowledge is the information needed to predict, identify and interpret route-specific cues to safely and effectively complete railway tasks. The knowledge must be available when needed, either from long-term memory (knowledge and experience) or through some other means, such as documentation or verbal advice.

3.6. Integral to this safe operation is the need for an accurate recall of signal locations, and knowledge of track geometry, track gradients and track speed. This is collectively known as 'route knowledge'.

3.7. Route knowledge is obtained through training and familiarisation with the routes, which can be practised in both live rail operations, such as 'driver training' trains or revenue services, or in simulators.

3.8. Route knowledge is also important in the context of the train type operated. For example, the track gradient will have a significant influence on a short, heavy freight train approaching a signal at stop. The external cues on where to commence braking and when to reduce speed are critical on a freight train if the desired outcome of stopping before the signal is to be achieved.

3.9. In this incident, Train 170S was diverted from the DOWN Main track to the CENTRE Main, a movement unfamiliar to the train crew.

3.10. The LE had been employed by KiwiRail since 2019 in their current position and was qualified in the role. However, the LE was unfamiliar with the route cues necessary to safely traverse the route; it was only their second time on this route, and the first time they had to stop at signal 1506.

3.11. Train driving involves periods of high cognitive workload because of the need to constantly monitor signals, speed and track conditions. Essential to the task is a thorough understanding and knowledge of the route being driven.

3.12. In this instance, the approach to Ōtāhuhu Station and Westfield had multiple signals for bi-directional movement on the same line, with each direction presenting different circumstances.

3.13. The signal and interlocking diagrams[23] (*see* Appendix 1) highlight the complexity of the routes with varying lengths of track sections between signals.

3.14. The section of track between signal 1610 and signal 1646 approaching Ōtāhuhu was 870 m in length. The next section of track between signal 1646 and signal 1648 was 703 m in length, and the section of track between signal 1648 and signal 1506 (the signal passed at stop) was 618 m.

3.15. The varying lengths of track sections needed to be known and understood by the LE in order to safely negotiate the route. In the first stopping sequence at signal 1646, they stopped approximately 100 m before the signal. Conversely, while attempting to stop at signal 1506, they stopped about 49 m beyond the signal, resulting in passing the signal at stop.

3.16. Multiline tracks in bi-directional running created six routes to learn within a complex signalling system. While these routes may be contained within the same locality, each route represents its own challenges and requires training and practice.

3.17. In this instance, the route set for the train had not been rehearsed and practised by the LE during their on-the-job training. The CENTRE Main had only become operational[24] since they had completed their training and become qualified.

3.18. Following their training they had exposure to normal main line running but limited exposure to running an opposing movement on the bi-directional track. They had not previously stopped at signal 1506 in these circumstances.

3.19. Except for the signal and interlocking diagrams, and access to the curve and gradient diagrams, the LE had not been provided with any additional training material about the route.

3.20. Signal and interlocking diagrams, while providing technical information such as the positions of signals, switches and track circuits, do not provide detailed geographical or topographical information that a train driver needs to navigate the route.

3.21. Other international jurisdictions have developed route maps that are used extensively for the purposes of training, identifying knowledge gaps and for train drivers to use as reference material. These are in both electronic and paper-based formats.

[23] Diagram issued by the access provider detailing signalling and interlocking arrangements for each station, and/or segment of the controlled network. Also shows interface with non-interlocked (operator-controlled territory) areas.

[24] The CENTRE main at Ōtāhuhu Station in Auckland became operational in December 2020. This upgrade was part of the City Rail Link works, which included the addition of a new southbound platform, 1.3 km of track and four crossovers.

3.22. Route maps provide clear and practical visual cues that enhance navigation and operational efficiency (*see* Figure 14).

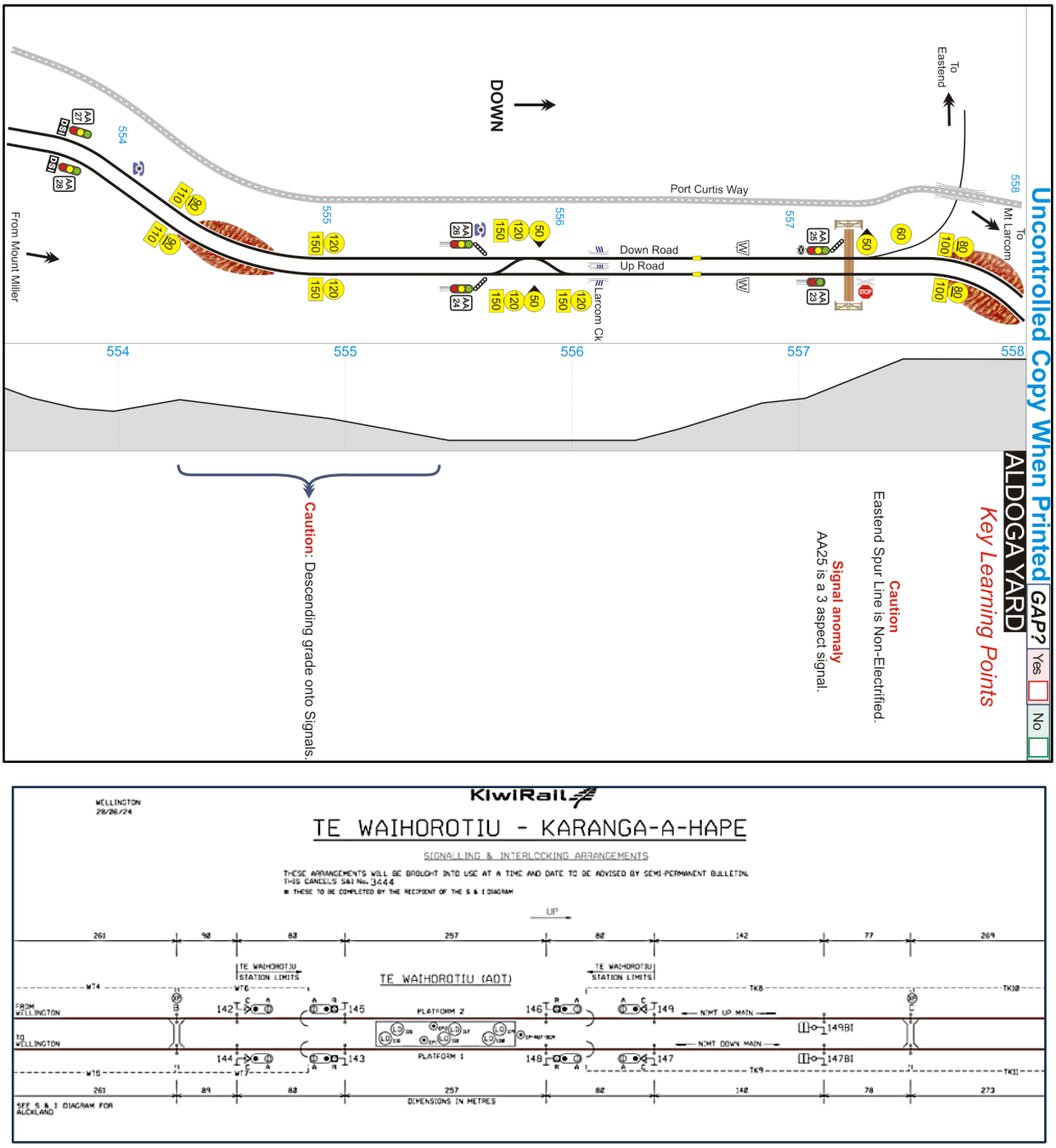

Figure 14: Examples comparing route map from Australia (top image) and signal and interlocking diagram used in New Zealand (bottom image)

(Credit: Aurizon Holdings Ltd (Australia) and KiwiRail Holdings Ltd (New Zealand))

3.23. Route maps offer several key benefits, including:

- comprehensive information about the track layout, including gradients, curves and speed limits
- key landmarks that aid drivers in anticipating and responding to changes in the track
- a simplified representation of complex track sections

- critical points such as junctions, signals and stations
- provisions of visual references that complement theoretical knowledge, making it easier for drivers to learn and retain important information.

3.24. Australia has developed a standard[25] for the management of route competence. The standard provides the requirements for the development, training and assessment of route competence for rail traffic crew (RTC) and additional guidance for rolling stock operators during the development and management of route competence.

3.25. Key points within the standard about the training and competency include:

- the need to conduct risk assessments that provide information about route complexity
- definition of the learning objectives and development of route learning plans, including minimum route learning time for RTC learning the route for the first time
- the frequency that RTC should work over each route to retain route competency, and of refresher training
- the material and information needed to be developed and made accessible
- appropriate assessment methods to identify the competence of RTC.

3.26. The standard specifies that assessments on route competency should include the following:

- direct observations
- written or verbal testing
- simulation, where available
- data recorder evidence, where available
- verbalising by the RTC being assessed, including their ability to identify and articulate specific hazards.

3.27. These methods may be adapted to address the specific risk of a given route, and to observe the rail traffic handling methodologies applied at specific locations.

3.28. Had the LE been provided with appropriate route knowledge training, and understood the risk profile of the route, in particular:

- the proximity of signal 1506 to the preceding signal 1648
- the appropriate speed for the signal indication of medium speed (25 km/h) as opposed to the 40 km/h speed board
- the importance of the location of signal 1648 to the stabilised approach gate (discussed in the next section of the analysis)

it is **likely** they would have altered their driving methodology as they approached signal 1506.

[25] Rail Industry and Safety Standards Board (RISSB), Australia Standard AS 7454:2017 Management of Network Competence.

Stabilised approach

Safety issue 2: Trackside infrastructure lacked visual cues to support the train crew to effectively perform the stabilised approach method for passing caution signals and approaching signals at stop.

3.29. Engineering controls to capture or mitigate human error have not extended to all aspects of rail operations. Locomotive engineers in rail operations remain central to operational safety.

3.30. Human error is both predictable and unavoidable, necessitating systems that are resilient to mistakes. Designing procedures that anticipate and accommodate human limitations is essential for reducing risk.

Research project into signals passed at danger

3.31. During 2015 and 2016, in response to the increasing incidence of SPADs, KiwiRail undertook a project to identify SPAD reduction strategies (O'Connell, Lawton, Mills & Klockner, 2017).

3.32. The research identified that traditional rail driving took a rule-based rather than risk-based approach. Driver practices had not incorporated strategies that enhanced driver action response and recovery to avoid a signal being passed at stop.

3.33. To develop a more error-tolerant system, the researchers designed a four-layered prevention strategy, known as a stabilised approach.[26] This approach included the need to anticipate, detect, correct and decide at key locations, known as decision points. These were then staged into approach gates, requiring actions to be conducted to maintain situational awareness[27] and focus on bringing the train to a stop before a red signal (*see* Figure 15).

3.34. As part of the project, training material was developed. This included computer animations on the stabilised approach method, and the necessary actions to be taken by an LE at various approach gates (*see* Appendix 2).

[26] Adapted aviation-based safety principles to train driver non-technical skills under the OUDA (Observe–Understand–Decide–Act) model. It recommends maintaining a steady, safe and controlled speed and braking profile when approaching a stop such as a station or restrictive signal.

[27] Involves the perception of environmental elements, such as signals, track conditions and train status, that provide comprehension of their meaning, and on which a projection of their future status can be made for effective decision-making and hazard avoidance.

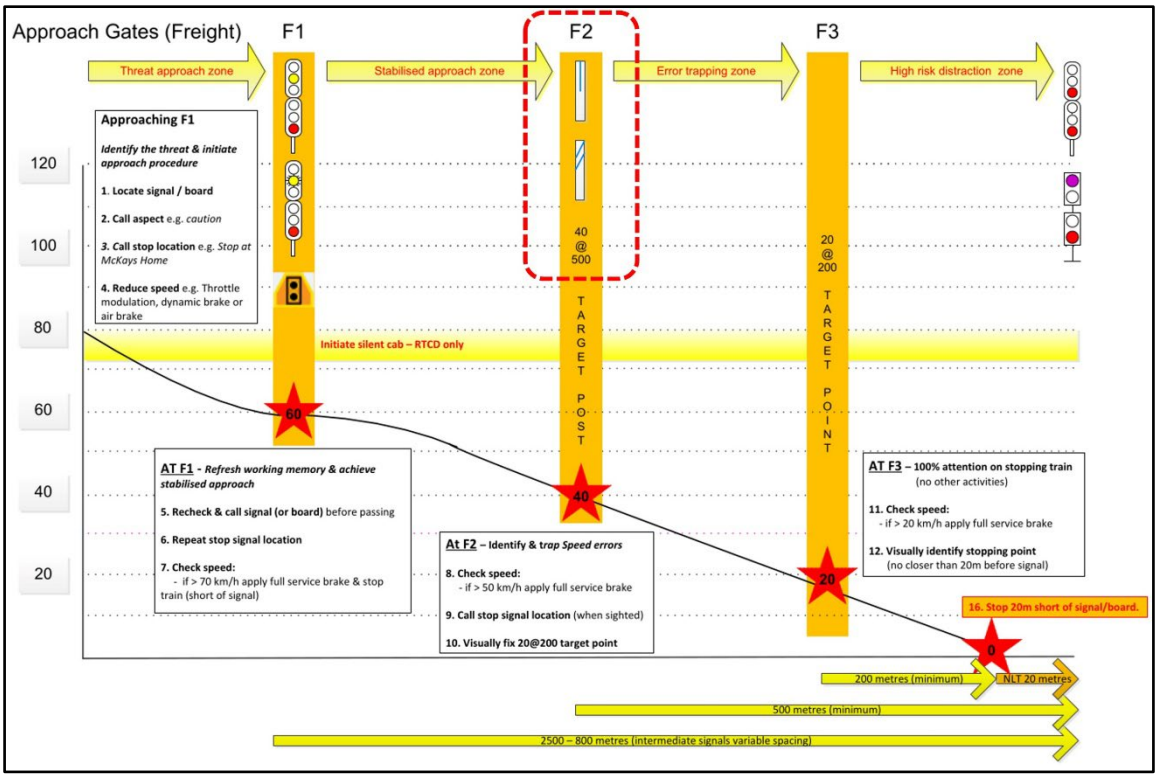

Figure 15: Stabilised approach annotated by TAIC

3.35. The research showed that in 69% of SPAD occurrences involving freight trains, the caution signal (Approach Gate F1, *see* Figure 15), was passed at or below the proposed stabilised approach speed of 60 km/h.

3.36. However, at Approach Gate F3, 91% of occurrences involved speeds that exceeded the proposed stabilised approach speed of 20 km/h.

3.37. By reducing the speed of freight trains to 40 km/h at Approach Gate F2, and to 20 km/h at Approach Gate F3, SPAD events could be reduced.

3.38. The incorporation of a speed threshold at each gate also provided a reference point for drivers to identify an over-speed situation and take action to trap the error and minimise its impact.

Trials of the stabilised approach system

3.39. Trials of the new system found that Approach Gate F1, the caution to stop signal, was clearly visible to train drivers. However, Approach Gates F2 and F3 were not as easily identifiable, and train drivers showed significant variation in their ability to judge distances accurately while the train was moving.

3.40. Without the location of Approach Gates F2 and F3 clearly marked in the field, LEs required a thorough knowledge of the route and its surroundings. An example of this expectation is provided in the training video screen captures (*see* Appendix 2). The training animation refers to a building as a means of identifying a relevant landmark to recall Approach Gate F3.

3.41. In applying this principle in the live rail environment, LEs were expected to recall the route-specific cues from memory, without reference material and without prompts about their location at points along the route.

3.42. Visual cues help to determine the location of the approach gates, but their importance is as visual reminders of the speed thresholds that should not be exceeded to bring the train to a stop before any signal displaying a stop aspect.

3.43. KiwiRail has incorporated the principles of the stabilised approach into their rules and procedures. However, it has not implemented the visual cues to help reference the Approach Gates F2 and F3.

3.44. Without these visual cues, the application of a stabilised approach is problematic as train drivers invariably find it difficult to estimate distances accurately in moving trains.

3.45. The figure in KiwiRail's rules and procedures differed from the figure developed during the research, with the removal of the marker posts at Approach Gate F2 (*see* Figure 16).

3.46. No marker posts or similar visual cues have been incorporated into the metro or signalled areas, and the rules and procedures expressly prohibit the use of marker posts in metro areas (*see* Appendix 3).

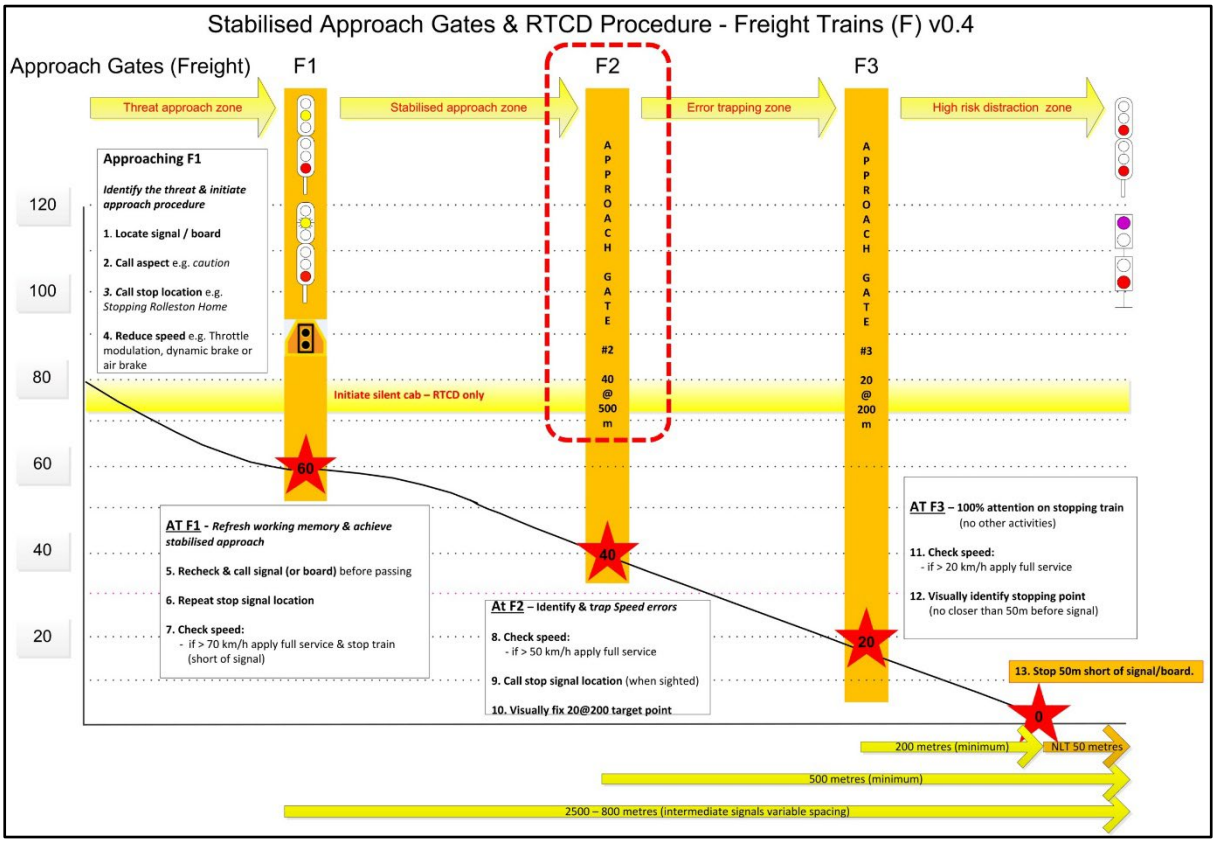

Figure 16: KiwiRail's stabilised approach gates and risk-triggered commentary driving procedure

(Source: KiwiRail annotated by TAIC)

3.47. While the task of stopping the train was recognised by the LE in this occurrence, they were distracted by monitoring the train's speed and progress through the crossover. It is **likely** that marker posts or visual cues in the field would have supported the LE to identify each approach gate and reduce the train's speed to a stop before signal 1506.

Risk-triggered commentary driving

Safety issue 3: The train crew were not sufficiently trained in risk-triggered commentary driving, nor was it a part of the driving strategy. Without it, the consequences of distraction were not well managed, increasing the likelihood of passing a signal at danger.

Memory and train driving

3.48. The term 'working memory' refers to how humans maintain and manipulate temporary information (Hartley, 2022) to facilitate cognitive operations (Spencer, 2020).[28] In the rail environment, working memory helps LEs to hold and process information in real time, allowing them to:

- monitor current speed and braking
- respond to signal aspects
- adjust to changing track conditions
- follow instructions from train control.

3.49. One of the characteristics of working memory is that new information is typically lost after a few seconds, unless actively maintained. As a result, it is vulnerable to distractions.

3.50. The term 'prospective memory' refers to the ability to remember to perform an intended action in the future (Rummel, 2023). It plays a role in many everyday contexts, such as scheduling an appointment, taking medication at a specific time or running an errand after work. It is crucial for safe train driving as it enables LEs to see a caution to stop signal and then remember to slow the train to a stop in the future.

3.51. Successful prospective remembering requires a person to:

1. encode the deferred action
2. maintain the intention to act
3. recognise the opportunity to execute the action
4. retrieve what needs to be done and execute it (Loft, 2014).

3.52. Given the number of complex steps involved, prospective memory is vulnerable to interruptions and relies on cues or triggers for the intended actions to be performed.

Risk-triggered commentary driving

3.53. Risk-triggered commentary driving is a common method to improve retention of safety-critical information in working memory. It also supports prospective memory by enabling drivers to check their intended actions against retained knowledge and long-term memory patterns.

3.54. The use of RTCD has been adopted by several international jurisdictions including Japan, Australia and the United Kingdom (UK). Japan's use includes finger pointing and vocalisation of signals to heighten focus on signals and speed. In the UK, the Rail

[28] For instance, working memory would play a key role if you were asked to type the first, fourth, and fifth digits of a personal identification number (PIN) into a banking app. In this case, you must 'load' information into an active, working memory state from long-term memory; hold that information in mind for a short duration; and then manipulate the information to achieve the goal (Spencer, 2020).

Safety and Standards Board (RSSB) has developed extensive training and guidance material on the subject.

3.55. When using RTCD, the person verbalises what they are seeing and the actions that they intend to perform. This reinforces key information in their mind and helps them remain focused on the critical task. The auditory cues of the upcoming tasks and rehearsal with verbal repetition of future actions serve to remind them of what they need to do in the future.

3.56. The Commission found that despite KiwiRail's own research (O'Connell et al,) indicating the safety benefits of RTCD, train crew are not routinely trained, assessed or monitored in applying it. KiwiRail's training did not include the application of RTCD during training runs on the train simulator, during training for the requisite hours for qualification as a LE, nor during the examination at the conclusion of the training. LEs were simply provided with information on RTCD in the form of a handout.

3.57. The training for second person duties did not include training on RTCD, despite the frequency of two-person operations. RTCD is a process that can be used in both driver-only and two-person operations. In situations where RTCD is used, all train crew need to be trained to facilitate its effective application.

3.58. Furthermore, the train crew were not aware of what RTCD was, nor how it could be used to support safe rail operation.

3.59. In this incident, the RO called the signal and the LE responded to the call acknowledging the caution signal. They then switched their attention to focus on ensuring the speed of the train remained within the prescribed limit until the train was clear of the crossover.

3.60. By the time the LE had refocused on the task of stopping the train, the speed and its proximity to the signal meant it could not be brought to a stop before the signal was passed at danger.

3.61. Despite seeing the caution to stop signal and intending to stop at signal 1506, the LE's focus on the crossover **likely** distracted them from taking the actions needed to stop the train.

3.62. The Commission found that it is **virtually certain** that neither the LE nor the RO used RTCD in the lead-up to the incident. As a result, they were vulnerable to the distraction created by the crossover, and they 'forgot to remember' to reduce the speed of the train to stop in time.

3.63. Had the crew been trained in RTCD and applied it, it is **likely** that they would have retained their focus on the task of stopping the train, monitored the train's speed on approach to the signal, and remembered to take the early preventative actions needed to stop the train before signal 1506.

4 Findings
Ngā kitenga

4.1. The route training provided to the LE was insufficient considering the complexity of the area in which they were operating. Had the LE been provided with appropriate route knowledge training and understood the risk profile of the route, it is **likely** they would have altered their driving methodology in order to stop before signal 1506.

4.2. The effective use of a stabilised approach to rail signals is dependent on the available visual cues in the operating environment. It is **likely** that marker posts or visual cues in the field would have supported the LE to identify each approach gate and reduced the train's speed to a stop before signal 1506.

4.3. Despite seeing the caution to stop signal and intending to stop at signal 1506, the LE's focus on the crossover **likely** distracted them from taking the actions needed to stop the train.

4.4. It is **virtually certain** that neither the LE nor the RO used risk-triggered commentary driving in the lead-up to the incident. This meant they were vulnerable to the distraction created by the crossover, and they 'forgot to remember' to reduce the speed of the train in anticipation of the intended stop at signal 1506.

4.5. Despite KiwiRail's own research indicating the safety benefits of RTCD and a stabilised approach, train crew were not routinely trained, assessed or monitored in applying it.

4.6. Had the crew been trained in RTCD and applied it, it is **likely** that they would have retained their focus on the task of stopping the train, monitored the train's speed on approach to the signal, and remembered to take the early preventative actions needed to stop the train before signal 1506.

5 Safety issues and remedial action
Ngā take haumaru me ngā mahi whakatika

General

5.1. Safety issues are an output from the Commission's analysis. They may not always relate to factors directly contributing to the accident or incident. They typically describe a system problem that could adversely affect future transport safety.

5.2. Safety issues may be addressed by safety actions taken by a participant, otherwise the Commission may issue a recommendation to address the issue.

Safety issue 1: The route knowledge training provided to the train crew was insufficient for the complexity of the area in which they were operating, increasing the likelihood of errors.

5.3. On 14 November 2025 KiwiRail supplied the Commission with the following information:

> A training tool has been created (the Arahina system) for route familiarity. The Auckland Metro Rail Network (AMRN) has been videoed, and the video has been converted into an on-line tool with competency questions relating to signal type, authorities to pass at stop, and roads that the signal can direct the train to.
>
> Spatial Media (Australia) have been engaged to create the tool in conjunction with AMRN subject matter experts (SMEs).
>
> The area of coverage so far is all routes from Pukekohe-Swanson and to the Strand via both North Auckland Line (NAL) and North Island Main Trunk Line (NIMT) in both directions on each main are now in Arahina.
>
> Auckland Rail Operations Centre (AROC) are currently using Arahina for training controls on route familiarisation. Arahina will also be used in the future by AOR and KiwiRail for the changes being made at Henderson and will be utilised as part of the introduction of the third/West main competency training.
>
> KiwiRail are also developing a Route Knowledge Standard, for which union consultation has now taken place.

5.4. In the Commission's view, the safety actions taken by KiwiRail Holdings Limited has addressed the safety issue. Therefore, the Commission has not made a recommendation.

Safety issue 2: Trackside infrastructure lacked visual cues to support the train crew to effectively perform the stabilised approach method for passing caution signals and approaching signals at stop.

5.5. KiwiRail has taken the following safety action to address this issue:

5.6. On 14 November 2025, KiwiRail supplied the Commission with the following information:

> KiwiRail has introduced the Signal Alert tool as a mandatory operation nationally which can be audited to provide evidence.
>
> A stabilised approach process has been introduced, although this is more relevant in areas outside of the complexity of the AMRN.

> The ETCS rollout on KiwiRail locomotives that run on the AMRN – this programme of works is progressing well and is due for completion by August 2026. This is a key mitigation to address the SPAD risk on the AMRN.

5.7. On 14 January 2026, KiwiRail advised the Commission that the recommendation was under consideration and supplied the following further information:

> … at this stage KiwiRail does not plan to implement trackside markers as part of the stabilised approach process. The current locomotive systems do not require such precise indications - unlike systems such as Interceptor, where markers are linked to penalty brake applications if speed limits are exceeded at specific points. Introducing markers in multi-line areas could create complexity and potential confusion about which marker applies to which signal. The stabilised approach locations are intended as guidance to support speed management rather than as compliance points requiring exact speeds at those locations. KiwiRail will consider how it can address this recommendation further.

5.8. The Commission welcomes the safety action to date. However, it believes more action needs to be taken to ensure the safety of future operations. Therefore, the Commission has made a recommendation in Section 6 to address this issue.

Safety issue 3: The train crew were not sufficiently trained in risk-triggered commentary driving, nor was it a part of the driving strategy. Without it, the consequences of distraction were not well managed, increasing the likelihood of passing a signal at danger.

5.9. KiwiRail has taken the following safety action to address this issue:

5.10. On 14 November 2025 KiwiRail supplied the Commission with the following information:

> KiwiRail has developed non-technical skills training, as evidence of progression in this area. This will initially be rolled out to Westfield and Te Rapa drivers, then rolled out nationally.
>
> As part of the Stabilised Approach process, KiwiRail has included risk triggered commentary which will assist in driving to standardise and codify requirements. Once feedback has been received, the changes to the rules will go through KiwiRail's usual Joint Technical Committee (JTC) process for inclusion into the code, at this point we can provide this change as evidence.

5.11. On 14 January 2026 KiwiRail provided confirmation that KiwiRail was continuing with the actions to address this issue and would provide the Commission with an update on the progress.

5.12. The Commission welcomes the safety action to date. However, it believes more action needs to be taken to ensure the safety of future operations. Therefore, the Commission has made a recommendation in Section 6 to address this issue.

6 Recommendations
Ngā tūtohutanga

General

6.1. The Commission issues recommendations to address safety issues found in its investigations. Recommendations may be addressed to organisations or people and can relate to safety issues found within an organisation or within the wider transport system that could contribute to future transport accidents and incidents.

6.2. In the interests of transport safety, it is important that recommendations are implemented without delay to help prevent similar accidents or incidents occurring in the future.

New recommendations

6.3. On 24 March 2026, the Commission recommended that the chief executive of KiwiRail takes action to put in place trackside information to assist train crews to respond appropriately to signals, monitoring the train's speed and progress. **[013/26]**

6.4. On 13 April 2026, KiwiRail replied:

> This recommendation is under consideration.
>
> KiwiRail does not plan to implement trackside markers as part of the stabilised approach process.
>
> The stabilised approach locations are intended as guidance to support speed management rather than as compliance points requiring exact speeds at those locations. KiwiRail will consider how it can address this recommendation further.

6.5. On 24 March 2026, the Commission recommended that the chief executive of KiwiRail includes in KiwiRail's train crew training risk-triggered commentary driving, and then ensures it is implemented in practice. **[014/26]**

6.6. On 13 April 2026, KiwiRail replied:

> This recommendation is accepted.
>
> We are working through the non-technical skills training requirements. Shield will be updated on 20 April 2026 with changes to the stabilised approach graphics to clarify the process and with required wording for risk-triggered commentary.

7 Other safety lessons
Ngā akoranga matua

7.1. In the absence of engineering controls, when the safety of a system is contingent on human performance, individuals should be trained to operate in a manner that anticipates and reduces human error.

8 Data summary
Whakarāpopoto raraunga

Vehicle particulars

Train type and number:	mainline shunt Train 170S – DL 9331
Classification:	diesel-electric locomotive
Year of manufacture:	2013
Operator:	KiwiRail Holdings Limited

Date and time	01 February 2025, 1207
Location	Westfield Auckland – North Island Main Trunk
Operating crew	One locomotive engineer, one rail operator
Injuries	no injuries
Damage	no damage

9 Conduct of the inquiry
Te whakahaere i te pakirehua

9.1. On 1 February 2025, the New Zealand Transport Agency Waka Kotahi notified the Commission of the occurrence. The Commission subsequently opened an inquiry under section 13(1) of the Transport Accident Investigation Commission Act 1990 and appointed an investigator in charge.

9.2. The Commission obtained documentation and records including:

- Tranzlog data of the locomotive, signal logs, mobile phone records, maintenance records, track and infrastructure records, and train control voice recordings
- train manifest and loadings
- train safety tests
- training documentation
- risk assessments
- shift rosters
- standards rules and procedures.

9.3. The Commission conducted interviews with the affected train crew and train crew from AOR.

9.4. The Commission conducted train safety tests which included:

- static, running and emergency brake tests
- brake pipe pressure readings and leakage tests
- wagon inspections
- observations with locomotive cab rides on the NIMT with the cooperation of KiwiRail.

9.5. On 19 November 2025, the Commission approved a draft report for circulation to five interested parties for their comment and one party to ensure accuracy of the report.

9.6. One interested party provided a detailed submission. The party to ensure accuracy and the remaining four interested parties replied that they had no comment. Any changes as a result of the submission has been included in the final report.

9.7. On 24 March 2026, the Commission approved the final report for publication.

Abbreviations
Whakapotonga

AOR	Auckland One Rail
DIB	daily information bulletin
DSI	dynamic speed indicator
EMU	electric multiple unit
ETCS	European Train Control System
ETP	electronic train protection
LE	locomotive engineer
NIMT	North Island Main Trunk
NZDT	New Zealand Daylight Time
OUDA	Observe–Understand–Decide–Act
RISSB	Rail Industry and Safety Standards Board (Australia)
RO	rail operator
RSSB	Rail Safety and Standards Board (UK)
RTC	rail traffic crew
RTCD	risk-triggered commentary driving
SPAD	signal passed at danger

Glossary
Kuputaka

aspect	a visual indication of the status of a signal that is given to the train driver, locomotive engineer, or other operator of a rail vehicle
crossover	the track arrangement that allows trains to switch from one track to another. These arrangements typically consist of two turnouts (or switches) connected by a short section of track, forming an X shape when viewed from above
daily information bulletin	information on general daily instructions, running of extra trains and maintenance work
DOWN direction	trains running away from Otiria are travelling in a DOWN direction and the tracks are defined in the same convention
European Train Control System	a signalling, control and train protection system using trackside and onboard components to relay information about a permitted movement authority ie, speed, distance and signal/track status ahead
head end monitor	a visual display unit which displays information transmitted from the train end monitor, such as brake pipe pressure, last vehicle movement and battery condition
heat restrictions	the use of temporary speed restrictions when heat thresholds are exceeded on track, and identified as a risk of track buckling causing derailments
lines impassable	planned work that requires the closing of the track to normal train movements for a period to allow for maintenance work
locomotive engineer	rail personnel qualified by examination and certified to drive and be in charge of a locomotive
medium speed	a location where the speed must not exceed 25 km/h unless a speed board, dynamic speed indicator or European Train Control System (ETCS) authorises a higher speed

National Standard for Health Assessment of Rail Safety Workers	the Australian National Transport Commission standard that provides a framework for rail operators to manage the risks to safety posed by the ill health of rail safety workers on the National Rail System
New Zealand Daylight Time	NZDT is UTC+13. It begins at 0200 on the last Sunday in September, when clocks are moved forward one hour from New Zealand Standard Time (NZST). It ends at 0300 on the first Sunday in April, when clocks are moved back one hour to NZST (UTC+12)
non-technical skills	skills that refer to the cognitive, social and personal skills that complement technical competencies and are essential for safe and effective performance in safety-critical roles, including but not limited to situational awareness, decision-making, communication and teamwork
opposing direction running	a train running in a direction opposite to the track's designated direction. For example, trains running in an UP direction on a designated DOWN track
rake	rail terminology for a series of wagons that are connected
rail operator	a qualified person who assists the locomotive engineer with the movement and general working of the train
risk-triggered commentary driving	a safety technique used primarily in the rail industry to help drivers maintain focus and reduce the likelihood of errors. Drivers verbalise observations and intended actions aloud to enhance situational awareness, reduce distraction and prevent errors
safety observations	in-field assessment of rail personnel carrying out the application of practical skills for the activities specified on their Licence to Operate
signal and interlocking diagrams	a diagram issued by the access provider detailing signalling and interlocking arrangements for each station, and/or segment of the controlled network. Also shows interface with non-interlocked (operator-controlled territory) areas

signal passed at danger	a signal passed at stop without the correct authority, or where the safe working authority has been exceeded
situational awareness	the perception of environmental elements, such as signals, track conditions and train status, which provides comprehension of their meaning, and on which a projection of their future status can be made for effective decision-making and hazard avoidance
stabilised approach	aviation-based safety principles adapted to train driver non-technical skills under the OUDA (Observe–Understand–Decide–Act) model. It refers to maintaining a steady, safe, and controlled speed and braking profile when approaching a stop such as a station or restrictive signal
station limits	includes all lines within the outermost signals, station entry boards or points on each line controlled by the signaller for the station
throttle notch position	in a diesel-electric locomotive, the throttle-notch position refers to the setting of the throttle control lever that regulates the engine speed (RPM) with positions ranging from Idle (0) to Notch 8. Each position corresponds to a specific engine RPM and power level, and indirectly, the power output delivered to the traction motors
UP direction	trains running towards Otiria in the North Island are travelling in the UP direction, and the tracks are defined in the same convention

Citations
Ngā tohutoru

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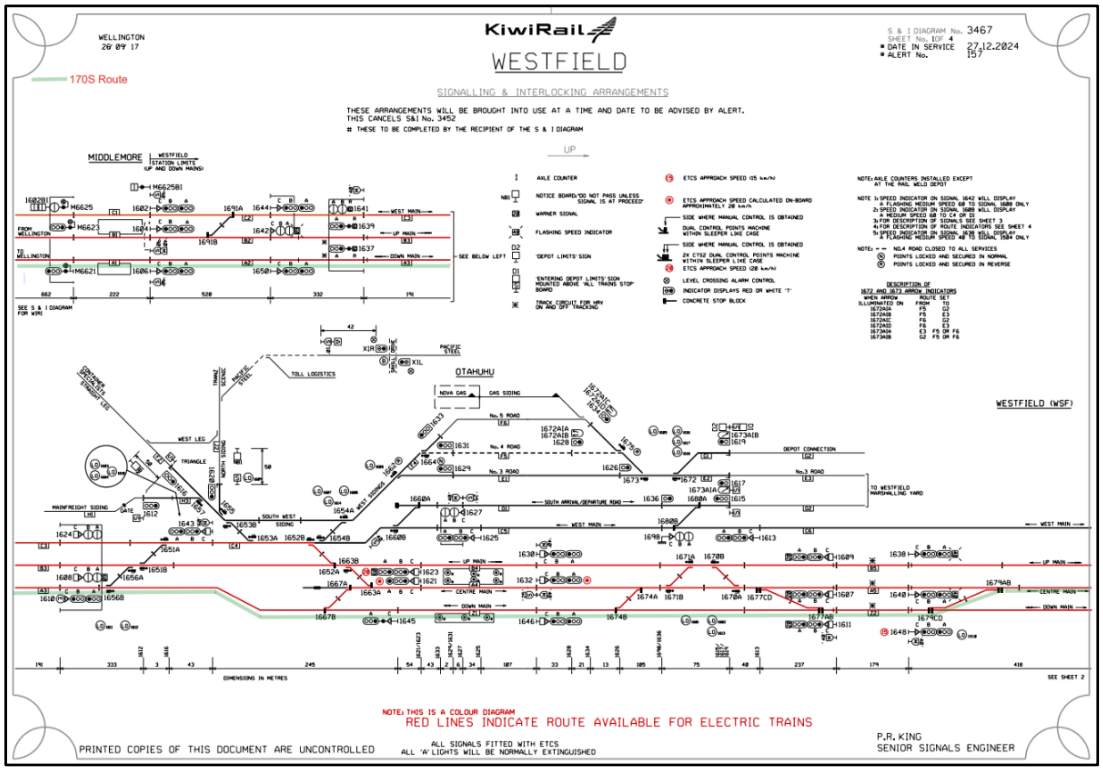
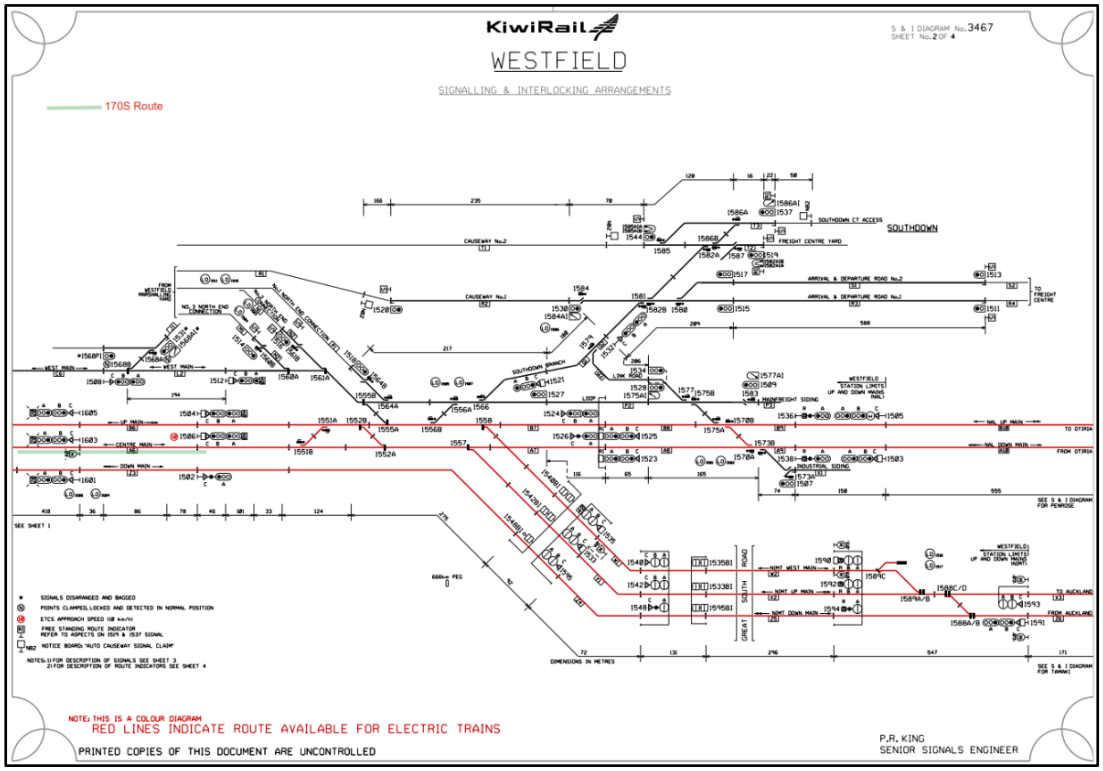
Appendix 1 Signal and interlocking diagrams for Westfield

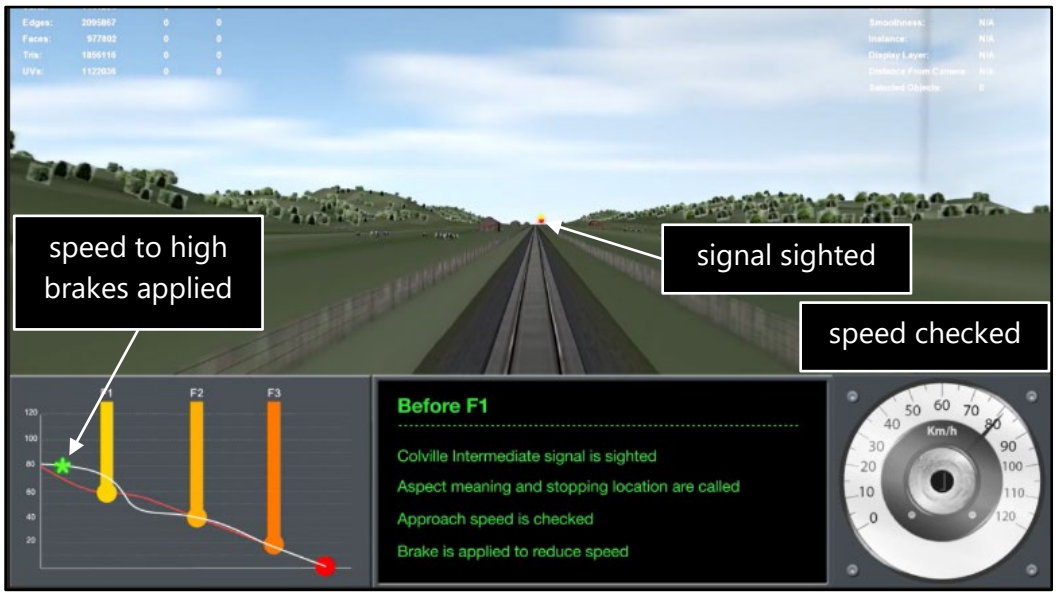




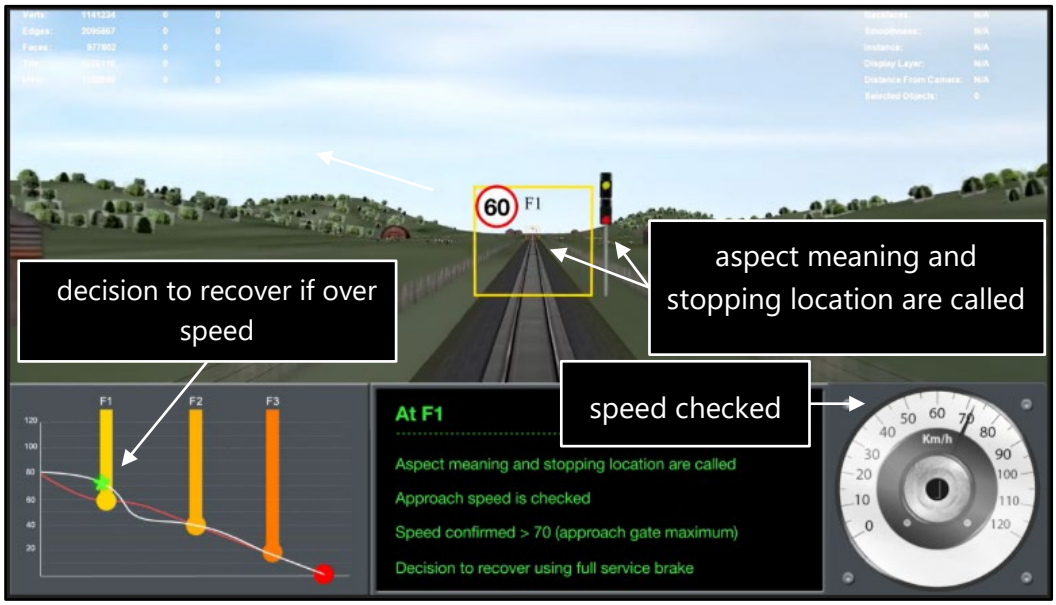
Signal and interlocking diagrams for Westfield (diagram 3467) dated 27/12/2024. Green line shows route taken by Train 170S

Credit KiwiRail Holdings Ltd

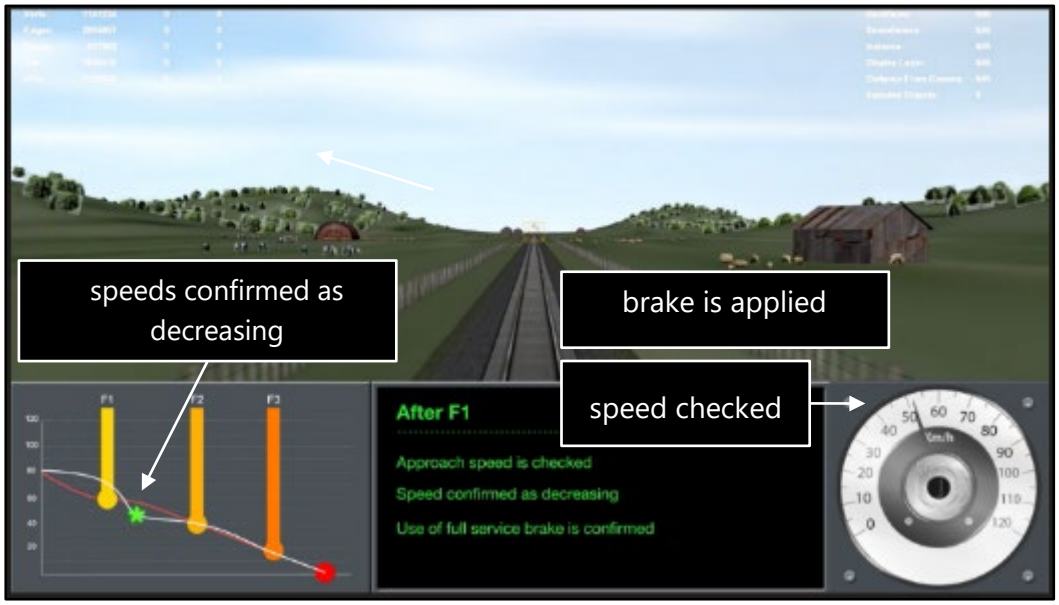
Appendix 2 Video animation of stabilised approach and risk-triggered commentary driving



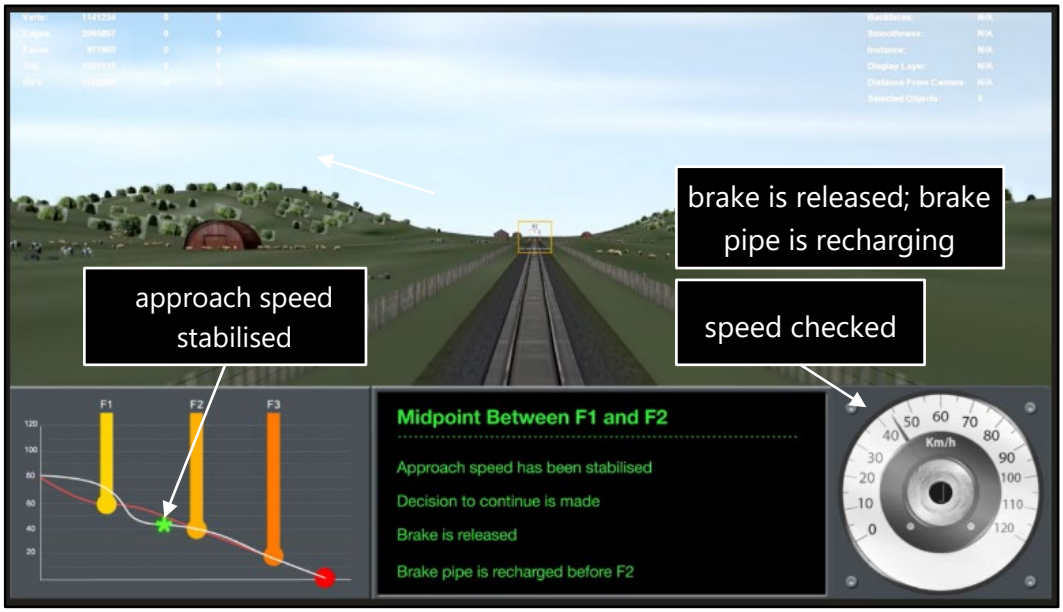
Training video: Approaching Stage Gate F1



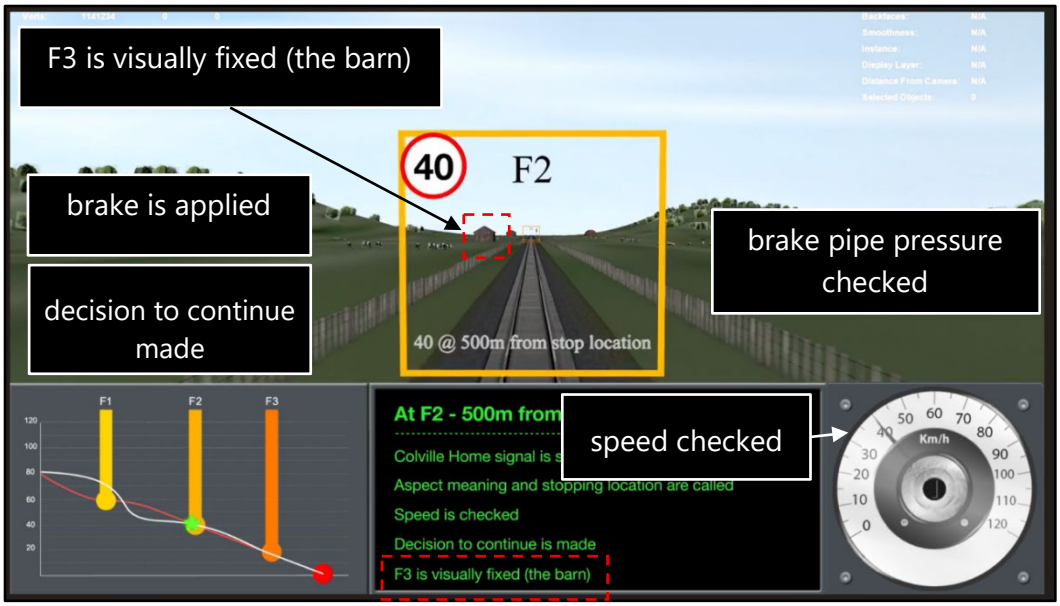
Training video: At Approach Gate F1



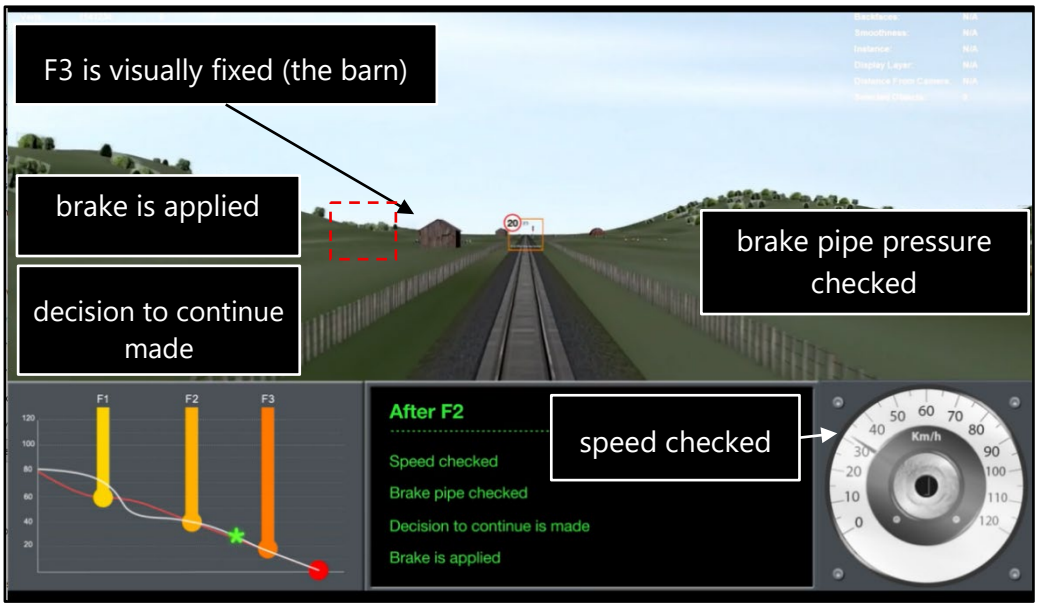
Training video: After Approach Gate F1



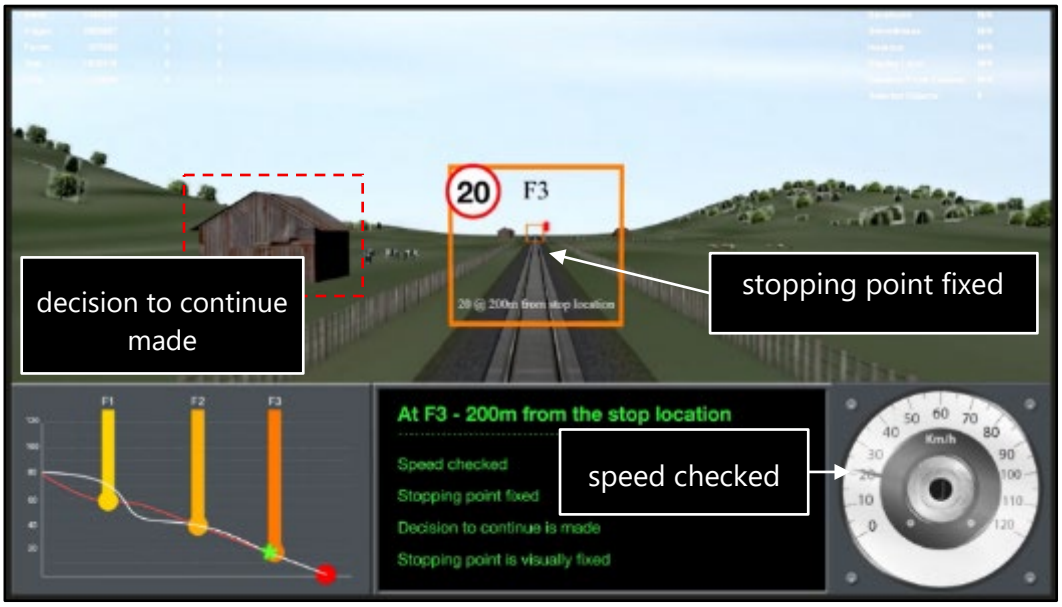
Training video: Midpoint Approach Gate F1 and F2



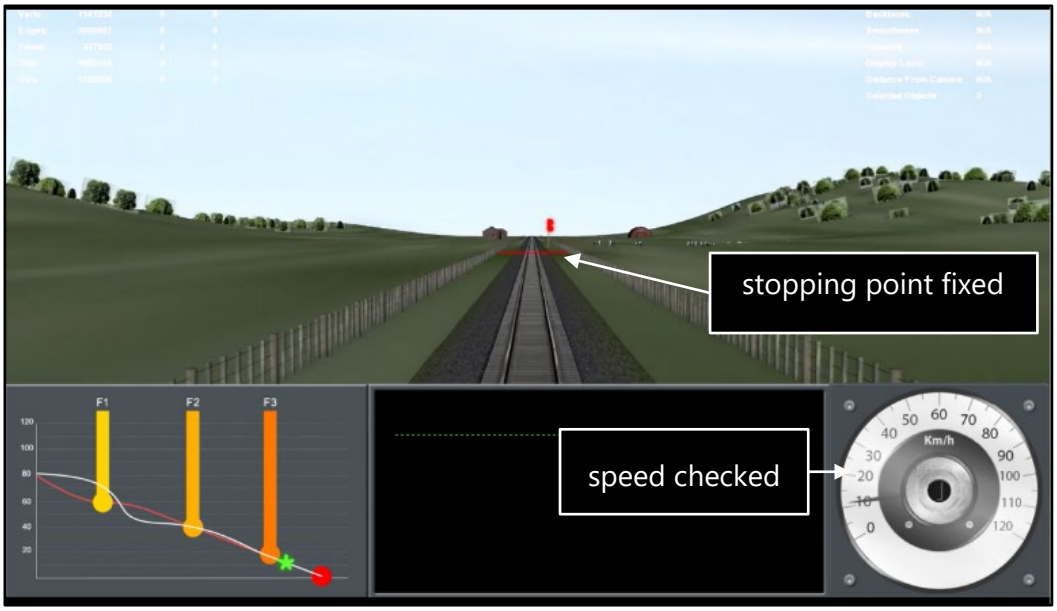
Training video: At Approach Gate F2



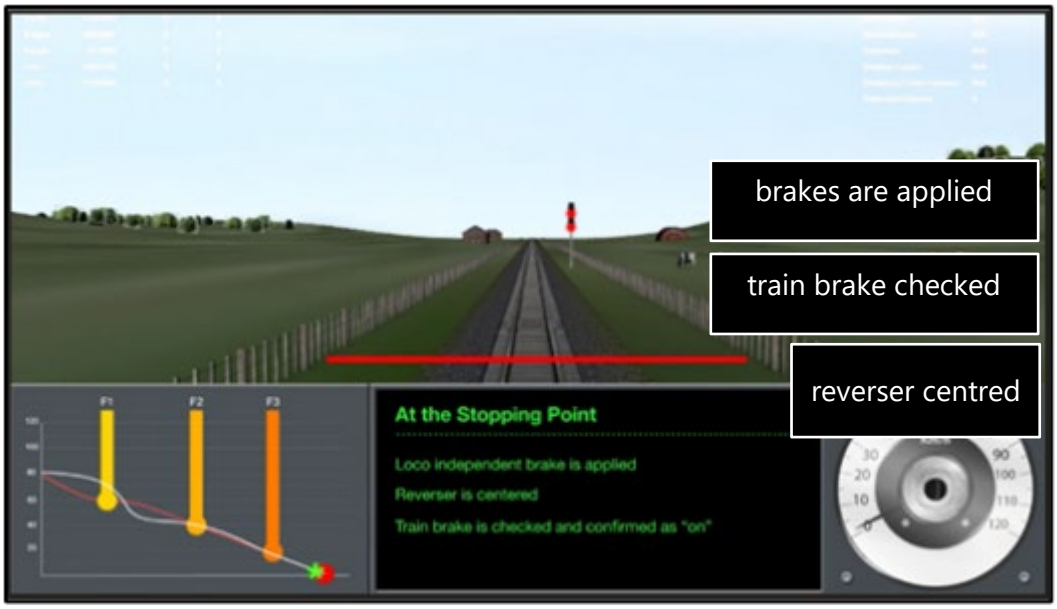
Training video: After Approach Gate F2, Approach Gate F3 is sighted



Training video: At Approach Gate F3 (200 m to signal)



Training video: Approaching stopping point



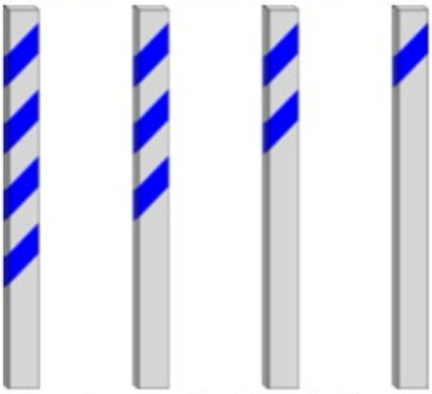
Training video: At stopping point

Appendix 3 KiwiRail rules and procedures

5.6.6 Advance Signal Warning Marker Posts

Advance Signal Warning marker posts provide advance warning of the distance to the next signal or board in some locations where visibility is limited or restricted.

They assist Locomotive Engineers to identify critical stopping distances remaining to the next signal or board.



400m marker post (four diagonal reflectorised blue strips)

300m marker post (three diagonal reflectorised blue strips)

200m marker post (two diagonal reflectorised blue strips)

100m marker post (one diagonal reflectorised blue strip)

The location of Advance Signal Warning marker posts in the network will be detailed in the relevant Local Network Instructions.

Important

Advance Signal Warning marker posts are not permitted in Metro areas.

3. Road Knowledge

Before operating trains over a section of track, Locomotive Engineers must undergo a period of on-the-job training and site / area familiarisation by road vehicle decided by the Linehaul Operations Manager to gain road knowledge.

The purpose of this is to ensure that Locomotive Engineers become familiar with:

- The geography of the area.
- Crew relief location access points.
- Station / junction unique features.
- Track geometry and authorised speed.
- Signal and / or track warrant locations.
- Special operating instructions.

Locomotive Engineers must not be rostered to operate a train over a section of track for which they do not have road knowledge.

3.1 Initial Road Experience

When commencing work at a depot, a Locomotive Engineer will be rostered with an experienced local Locomotive Engineer to operate trains to attain road knowledge for routes where the Locomotive Engineer has no previous or recent experience.

A safety assessment must be undertaken by authorised personnel before the Locomotive Engineer is considered to have road knowledge for each route.

The Locomotive Operations Manager / Team Leader must carry out further safety assessments over one route:

- Each month for three months, then
- Again, in months five, seven and nine following the certification date. These assessments must include a mandatory grade assessment.

4.0 Locomotive Engineer Training and Certification

COLLAPSE ALL

6. Second Person Duties

This course prepares personnel for Locomotive Engineer Assistants duties. There is some classroom study however, the course is mainly practical field-based exercises followed by full certification for the locations identified.

6.1. Area Familiarisation

Second Persons do not require the comprehensive road knowledge necessary for a Locomotive Engineer and must be familiar with signalling layouts at terminals / stations where they are required to work.

The familiarisation will be determined on a case-by-case basis by the training provider and recorded on an STF 23.

When Second Persons are transferred into a new terminal / depot, they must be given access to all S&I diagrams relating to the new areas. They will be taken to selected station yards by the Locomotive Operations Manager or suitably qualified nominee to cover the local Rail Operating Procedures and Rail Operating Code instructions in-depth.

After receiving initial Second Person training or if the running area is extended, the Second Person will be rostered for one shift as an additional crew member over the area where they will work as a Second Person.

12.10 Risk Triggered Commentary and Stabilised Approach

A stabilised approach process coupled with the Operator's non-technical skills training programme has been proven to reduce SPAD likelihood.

Active monitoring of the operational environment is critical to achieving and maintaining situational awareness.

To achieve situational awareness the Operator needs to:

- anticipate signal locations through accurate recall of route knowledge
- visually detect signals, noticeboards, Track Warrant limits etc., and
- make decisions on braking response to ensure the train is brought to a safe stop

Key braking principles:

- plan ahead to provide sufficient time for full BP recharge
- apply braking in stages
- increase braking in increments to stop 50 metres before the signal / board location
- use full service if approach gate speed is, or will be, exceeded
- use emergency if in doubt and when approach cannot be stabilised

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Kōwhaiwhai - Māori scroll designs

TAIC commissioned its four kōwhaiwhai, Māori scroll designs, from artist Sandy Rodgers (Ngāti Raukawa, Tūwharetoa, MacDougal). Sandy began from thinking of the Commission as a vehicle or vessel for seeking knowledge to understand transport accident tragedies and how to avoid them. A 'waka whai mārama' (i te ara haumaru) is 'a vessel/vehicle in pursuit of understanding'. Waka is a metaphor for the Commission. Mārama (from 'te ao mārama' – the world of light) is for the separation of Rangitāne (Sky Father) and Papatūānuku (Earth Mother) by their son Tāne Māhuta (god of man, forests and everything dwelling within), which brought light and thus awareness to the world. 'Te ara' is 'the path' and 'haumaru' is 'safe' or 'risk free'.

Corporate: Te Ara Haumaru - the safe and risk free path

The eye motif looks to the future, watching the path for obstructions. The encased double koru is the mother and child, symbolising protection, safety and guidance. The triple koru represents the three kete of knowledge that Tāne Māhuta collected from the highest of the heavens to pass their wisdom to humanity. The continual wave is the perpetual line of influence. The succession of humps represents the individual inquiries.

Sandy acknowledges Tāne Māhuta in the creation of this Kōwhaiwhai.

Aviation: Ngā hau e whā - the four winds

To Sandy, 'Ngā hau e whā' (the four winds), commonly used in Te Reo Māori to refer to people coming together from across Aotearoa, was also redolent of the aviation environment. The design represents the sky, cloud, and wind. There is a manu (bird) form representing the aircraft that move through Aotearoa's 'long white cloud'. The letter 'A' is present, standing for a 'Aviation'.

Sandy acknowledges Ranginui (Sky father) and Tāwhirimātea (God of wind) in the creation of this Kōwhaiwhai.

Maritime: Ara wai - waterways

The sections of waves flowing across the design represent the many different 'ara wai' (waterways) that ships sail across. The 'V' shape is a ship's prow and its wake. The letter 'M' is present, standing for 'Maritime.

Sandy acknowledges Tangaroa (God of the sea) in the creation of this Kōwhaiwhai.

Rail: rerewhenua - flowing across the land

The design represents the fluid movement of trains across Aotearoa. 'Rere' is to flow or fly. 'Whenua' is the land. The koru forms represent the earth, land and flora that trains pass over and through. The letter 'R' is present, standing for 'Rail'.

Sandy acknowledges Papatūānuku (Earth Mother) and Tāne Mahuta (God of man and forests and everything that dwells within) in the creation of this Kōwhaiwhai.

Transport Accident Investigation Commission

Recent Rail Occurrence reports published by the Transport Accident Investigation Commission (most recent at top of list)

RO-2025-102	Y20 shunt, runaway rail vehicle collision and near miss with rail crew, Port Chalmers, Dunedin, 23 January 2025
RO-2024-104	Freight train MR1, Signal passed at danger and near miss with HRV, Kereone Station, 2 August 2024
RO-2025-101	Train 931, safe working irregularity, 553.82 km Main South Line, Mataura, 12 January 2025
RO-2023-105	Derailment of Tamper 703, Purewa tunnel, Auckland, 9 October 2023
RO-2024-102	Freight Train 882, near miss with track workers, Main South Line, Hornby 27 km, 7 March 2024
RO-2023-106	Passenger train 804, TranzAlpine, train parting, Arthur's Pass, 17 December 2023
RO-2024-101	Loaded coal train 850, signal passed at danger, Cora Lynn, Midland line, 27 February 2024
RO-2023-104	Passenger train (Te Huia) signal passed at danger and potential conflict, Penrose, Auckland, 17 June 2023
RO-2021-104	Passenger train 6205, train derailment, Kāpiti, 17 August 2021
RO-2023-102	Freight train 360, derailment, Te Puke, 29 January 2023
RO-2023-101	Hi rail vehicle collision near Te Puna, 86.43 km East Coast Main Trunk Line, 10 January 2023
RO-2023-103	Safe working irregularity, 3.85km, Johnsonville line, tunnel 5, 4 May 2023
RO-2022-104	Shunt train L51 and heavy goods vehicle, level crossing collision and derailment, Whangārei, 7 December 2022
RO-2022-102	L71 Mainline Shunt, derailment and subsequent rollover, Tamaki, 1 June 2022
RO-2022-101	Passenger train, fire in auxiliary generator wagon, Palmerston North, 11 May 2022

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