

Final Report

Rail inquiry RO-2020-103 Collision between bus and locomotive Clevely Line level crossing Bunnythorpe 16 September 2020

December 2021



About the Transport Accident Investigation Commission

The Transport Accident Investigation Commission (Commission) is a standing commission of inquiry and an independent Crown entity responsible for inquiring into maritime, aviation and rail accidents and incidents for New Zealand, and co-ordinating and co-operating with other accident investigation organisations overseas.

The principal purpose of its inquiries is to determine the circumstances and causes of occurrences with a view to avoiding similar occurrences in the future. It is not the Commission's purpose to ascribe blame to any person or agency or to pursue (or to assist an agency to pursue) criminal, civil or regulatory action against a person or agency. However, the Commission will not refrain from fully reporting on the circumstances and factors contributing to an accident because fault or liability may be inferred from the findings.

Notes about Commission reports

Commissioners

Chief Commissioner	Jane Meares
Deputy Chief Commissioner	Stephen Davies Howard
Commissioner	Richard Marchant
Commissioner	Paula Rose, QSO

Key Commission personnel

Chief Executive	Martin Sawyers
Chief Investigator of Accidents	Harald Hendel
Investigator in Charge	David Manuel
General Counsel	Cathryn Bridge

Citations and referencing

This draft report does not cite information derived from interviews during the Commission's inquiry into the occurrence. Documents normally accessible to industry participants only and not discoverable under the Official Information Act 1982 are referenced as footnotes only. Publicly available documents referred to during the Commission's inquiry are cited.

Photographs, diagrams, pictures

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

Verbal probability expressions

Where possible, the Commission uses standardised terminology in its reports. This is for the benefit of investigation participants, readers of its reports, and recipients of its recommendations. 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.

This terminology, set out in the table below, has been adopted by the Commission based on the Intergovernmental Panel on Climate Change and Australian Transport Safety Bureau models. The Commission chose these models due their simplicity, usability and international use. The Commission considers the suitability of these models as being reflective of the Commission's functions, which include the making of findings and recommendations based on a wide range of evidence received, 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

Terminology	Likelihood	Equivalent terms
Unlikely	< 33% probability	Improbable
Very unlikely	< 10% probability	Highly unlikely
Exceptionally unlikely	< 1% probability	



Figure 1: Uzabus KEW458 (Credit: New Zealand Police)



Figure 2: Location of accident (Credit: Land Information New Zealand, modified by the Transport Accident Investigation Commission)

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1 Executive summary

What happened

- 1.1 At about 0803 on Wednesday 16 September 2020, a bus carrying 31 passengers was on its usual route between Palmerston North and Feilding.
- 1.2 Although the service was not a designated school bus, most of the passengers were school children on their way to either one of two local schools.
- 1.3 The bus was running a few minutes behind its service schedule as it travelled north along Railway Road, between Palmerston North and Bunnythorpe. It stopped on Railway Road while the driver waited to make a right-hand turn onto Clevely Line.
- 1.4 At the same time, locomotive DL9469 was travelling north on the North Island Main Trunk line towards Marton, approaching the Clevely Line level crossing.
- 1.5 The locomotive was running 15 minutes ahead of its usual schedule.
- 1.6 The Clevely Line level crossing was positioned approximately 15 metres to the east of Railway Road. The level crossing was protected by flashing lights, bells and signage, in accordance with Waka Kotahi NZ Transport Agency requirements.
- 1.7 The approach of locomotive DL9469 towards the Clevely Line level crossing activated the flashing lights and bells.
- 1.8 The bus driver waited for a break in road traffic, travelling south, and once there was a gap in the traffic commenced the right-hand turn onto Clevely Line.
- 1.9 The bus completed its right-hand turn onto Clevely Line and, for reasons unable to be determined, did not stop before the level crossing.
- 1.10 The bus drove onto the level crossing at the same time as the locomotive was passing over it. The front of the bus connected with the rear left-hand quarter of the locomotive, causing the windscreen of the bus to be torn off along with most of the front fairing structure.
- 1.11 The bus driver, who was not restrained, was ejected through the front of the bus. The momentum of the bus caused it to continue rolling forward at a low speed.
- 1.12 The bus driver received fatal injuries.

Why it happened

- 1.13 While the reason for the bus driver not stopping could not be determined with certainty, it is **likely** that they had rarely encountered a train at the level crossing based on the timetables and schedules of the bus and rail operations.
- 1.14 This **likely** led to the bus driver not having any expectation that they would have to stop at the level crossing, and as a result taking some time to acknowledge and then react to the level crossing alarms.
- 1.15 The Transport Accident Investigation Commission recommended that Waka Kotahi NZ Transport Agency review clause 9.5(c) of the Land Transport (Road User) Rule 2004 in consultation with the rail industry to assess its adequacy regarding the risks posed by level crossings in close proximity to road intersections.

What we can learn

1.16 Railway level crossings provide a heightened risk to road users. All road users should check for approaching rail traffic and be prepared to stop regardless of the state of the level crossing protection equipment.

Who may benefit

1.17 Transport operators, rail corridor users and road users may all benefit from the findings in this report.

2 Factual information

Narrative

- 2.1 At about 0620 on 16 September 2020, a bus driver (the driver) commenced their shift in Palmerston North.
- 2.2 At about 0740 the bus departed Palmerston North on its scheduled route to Feilding.
- 2.3 At about 0755 locomotive DL9469 departed Palmerston North 15 minutes ahead of schedule, due to its not being required to run with its usual train of empty log wagons.
- 2.4 At 0803:30 the train driver, approaching the Clevely Line level crossing, sounded the locomotive's horn three times.
- 2.5 The locomotive was travelling at 78.9 kilometres per hour, within the limit of 80 kilometres per hour for the line.
- 2.6 The level crossing warning devices, consisting of bells and alternately flashing red lights, were already activated when the bus entered Clevely Line at 0803:41 and struck the rear left corner of locomotive DL9469.
- 2.7 At 0803:45 the train driver applied the locomotive's brakes.
- 2.8 At 0804:12 the locomotive stopped 411.7 metres from the point of collision. The train driver contacted train control. Members of the public contacted emergency services and assisted passengers to disembark the bus.

Personnel information

- 2.9 The driver held full class 1 and 2 driver licences. A class 2 licence is required for driving a bus of the type involved in the accident.
- 2.10 The train driver was fully certified and had been driving trains for 11 years.

Train/Vehicle information

- 2.11 The single locomotive was a DL class weighing 108 tonnes.
- 2.12 The bus was a MAN 14.240 model large passenger service vehicle. An independent inspection found no defects that may have contributed to the accident.

Meteorological information

2.13 It was a clear morning. At the time of the accident the sun was in the east and low on the horizon at approximately 19 degrees. Witness accounts stated that the level crossing alarm lights had been visible at road level. The Transport Accident Investigation Commission (Commission) found no evidence to suggest that sunstrike contributed to the accident.

Recorded data

2.14 The bus had been fitted with a closed-circuit television system when it was imported to New Zealand from the United Kingdom. The system was not utilised by the operator and had stopped recording several months before the accident occurred.

2.15 The locomotive was fitted with a data-recording system known as Tranzlog. Where exact timings have been used in this report, they are based on data obtained from the Tranzlog system.

Site and wreckage information

2.16 The bus was removed to a secure location by New Zealand Police. An independent mechanical examination was conducted. No mechanical faults were found.

Medical and pathological information

- 2.17 Toxicology reports on the driver indicated a negative/clear result for the presence of alcohol or illicit drugs.
- 2.18 Further pathological information was supplied to the Commission. There was no indication that the driver had suffered a medical event prior to the accident.
- 2.19 The driver was required to wear corrective lenses while driving. The driver's glasses were recovered from the accident scene, and it is **likely** they were being worn by the driver at the time the accident occurred.

Survival aspects

2.20 The bus was not fitted with seatbelts for passengers or the driver. Passenger service vehicles over five tonnes are not required to be fitted with seatbelts under current New Zealand legislation. Bus drivers are not required to wear seatbelts even if fitted under current New Zealand legislation.

Previous occurrences

- 2.21 This incident had similarities to two previous Commission investigations: RO-1993-105 and RO-1993-112. Each investigation involved a road vehicle turning from a main road onto a side road that contained a level crossing (see section 3.36).
- 2.22 A further Commission investigation, RO-2017-105, involved a heavy motor vehicle colliding with a freight train. This investigation addressed the issue of the importance of wearing seatbelts where fitted.

3 Analysis

Introduction

- 3.1 The following section analyses the circumstances surrounding the event to identify 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.
- 3.2 The reason for the driver not stopping before the level crossing could not be determined with certainty. The following analysis provides expert opinion on the human factors that **likely** contributed to the driver's actions.
- 3.3 The Commission engaged an organisational psychologist¹ to assist the Commission in gaining a better understanding of the potential human factors involved in the accident. The analysis of the driver's behaviour is summarised in paragraphs 3.9 to 3.28.
- 3.4 The Commission found that the Clevely Line level crossing protections were in accordance with Waka Kotahi NZ Transport Agency's Traffic Control Devices Manual, Part 9 Level Crossings, and that witness accounts indicated that the warning devices were operating correctly immediately prior to the accident.
- 3.5 The Commission found no evidence that other factors, such as sunstrike or the driver being distracted by passengers on the bus, contributed to the accident.

Factors likely influencing the bus driver's behaviour

- 3.6 The driver had been employed by Uzabus for five years, and by another bus operator for seven years prior to that. Their usual route was the Palmerston North to Feilding trip.
- 3.7 The Commission obtained the driver's roster from Uzabus. It identified that the driver had been on the same daily route since 7 September, nine days prior to the accident, and had been regularly rostered on the route for at least the previous six months. During a normal day the driver crossed over the crossing 10 times, completing five return trips per day. This amounted to 50 times over the crossing per normal working week.
- 3.8 The Australian Transport Safety Bureau released a report on 29 July 2016 RO-2015-016: Collision involving a road-train truck and train 8834N – that had similarities to the Clevely Line collision. The report stated in part:

Studies undertaken into motorist behaviour have found that drivers who are familiar with a railway crossing are more likely to be involved in a crossing incident than drivers unfamiliar with the crossing.² Where train frequency is relatively low (trains rarely seen), motorists familiar with the crossing are even less likely to expect a train.

3.9 The physical defences in place to mitigate the risk of collision at the crossing included warning signs and alternately flashing red lights and bells (see Figures 3 and 4).

¹ Organisational psychology is a branch of psychology that applies psychological theories and principles to organisations.

² Yeh, M. & Multzer, J. (2008). Driver Behaviour at Highway-Railroad Grade Crossings: A literature review from 1990–2006. Human Factors in Railroad Operations. United States Department of Transportation, Federal Railroad Administration: Washington D.C.



Figure 3: Clevely Line level crossing from Railway Road (Credit: Google Earth, modified by Transport Accident Investigation Commission)



Figure 4: Level crossing warning device damaged in collision (Source: Transport Accident Investigation Commission)

3.10 The defences in place at the crossing were reliant on a driver observing a threat and, through a series of processes, reacting appropriately to it.

- 3.11 These processes include but are not limited to: situational expectation (what always happens?), established habits (what I always do), threat detection (what is that?), threat perception (is that a problem?), analysis of options (what should I do?), decision-making (I will do this), and control responses (taking action).^{3 4}
- 3.12 All such processes are subject to neurological and physical limitations dependent on factors such as age, fitness and health.
- 3.13 Researchers have identified that when a driver is faced with an unexpected event, two information-processing modes are activated: automatic and attentive.⁵
- 3.14 An immediate threat, such as a car ahead suddenly braking, generates an automatic reaction, one that happens quickly and without conscious thought.
- 3.15 Alternatively, observing a person standing on the side of the road gesturing to slow down requires thought (an attentive response) as the driver tries to evaluate the situation and work out what to do.
- 3.16 The attentive response is usually slower and has a greater likelihood of error than the automatic response. As the bus approached the Clevely Line along Railway Road, an attentional focus on oncoming road traffic may have contributed to the driver not seeing or registering level crossing warning devices on Clevely Line.
- 3.17 It is **likely** that the driver's attention was on the road ahead (Railway Road), judging a gap in the traffic to turn in through, rather than on looking to see if the lights were flashing.
- 3.18 The Palmerston North to Feilding bus service had been a daily routine for the driver for several years. Through this repetition it is **likely** that sections of the route had become habits.
- 3.19 Habit formation is a complex neural process that allows the brain to conserve energy. When learning a new task there is a high level of neural activity. Once the task has become a habit, neural activity is limited to the start and finish of the task, with relatively little activity during the task itself. Drivers who follow the same route from home to work and back every day often report doing so 'on autopilot' as they think about other topics. However, when a habit is disrupted, for example by roadworks that block a normal route, there is an increase in neural activity as the driver assesses the situation and identifies an alternative course of action. Both processes take extra time.⁶
- 3.20 The driver's behaviour at the level crossing would **likely** have followed a habitual pattern. Based on the bus and train schedules, it is **likely** that the driver did not expect to encounter a train on the crossing. It is also **unlikely** that they had previously encountered a train on the crossing.

³ Rudin-Brown, C. M., French-St. George, M., Stuart, J. J. (2014) Human Factors Issues of Accidents at Passively Controlled Rural Level Crossings. *Transportation Research Record: Journal of the Transportation Research Board, No. 2458,* Transportation Research Board of the National Academies, Washington, D.C., 96–103.

⁴ Berg, W. D., Knoblauch, K., Hucke, W. (1982) Causal Factors in Railroad-Highway Grade Crossing Accidents. *Transportation Research Record*, Issue 847, 47–54.

⁵ Green, M. (2000). 'How Long Does It Take to Stop?' Methodological Analysis of Driver Perception-Brake Times, *Transportation Human Factors*, *2*(*3*), 195–216.

⁶ Martiros et al., (2018). Inversely Active Striatal Projection Neurons and Interneurons Selectively Delimit Useful Behavioural Sequences, *Current Biology 28*, 560–573.

- 3.21 On ascertaining that it was safe to turn, the driver would **likely** have concentrated on completing the manoeuvre to cross the tracks. Had they had past experience of randomly encountering a train at that crossing, they would **likely** have been actively monitoring to see if the lights were active and would have been prepared to stop.
- 3.22 It is **likely** that the driver first became aware of the flashing lights as they were completing the turn.
- 3.23 As observing the flashing lights was an unexpected event, there was **likely** a brief period in which the driver attempted to process the information and evaluate the situation.
- 3.24 If the driver realised the lights were flashing, a natural instinct would have been to look to see how far away the train was and the direction from which it was coming.
- 3.25 Rather than being an automatic response, e.g. immediately activating the brake, the driver's response would have been attentive as they evaluated the threat.
- 3.26 Based on the speed of the approaching locomotive, witness reports of the bus speed, and the average normal reaction time⁷, the driver would have been **unlikely** to have had sufficient time to both evaluate the situation and bring the bus to a safe stop before the level crossing, had they in fact seen the warning devices.
- 3.27 Consequently, the bus entered the level crossing as the locomotive was passing over it, resulting in the bus colliding with the rear of the locomotive.
- 3.28 Had the driver been in the habit of stopping at the crossing, it is **likely** that the risk of a collision with a train would have been reduced.

Passenger service vehicles are not required to stop at level crossings fitted with active protection

Safety issue: There was no evidence that the rail industry had been consulted on legislative changes affecting the safety of the rail corridor.

- 3.29 Prior to 2009, school buses and vehicles being used for the carriage of passengers (passenger service vehicles) were required to stop before all level crossings unless 'exempt' signs or barrier arms were installed.
- 3.30 In 2009 a series of amendments was made to the Land Transport (Road User) Rule 2004 (the Rule), which included an exemption from the requirement to stop if "a traffic signal producing a steady red signal in the form of a disc or 2 alternately flashing red signals is installed at the level crossing".
- 3.31 This amendment effectively removed the requirement for a passenger service vehicle to stop at a level crossing unless the crossing was protected by a compulsory stop sign or the level crossing protection was activated.
- 3.32 Waka Kotahi NZ Transport Agency was asked to provide details of the reasoning and incentive for amending the Rule. It replied in part:

Before 2009, incidents were regularly reported of motorists taking unsafe, evasive action to avoid a bus that had stopped, or was about to stop, in compliance with existing

⁷ Research varies on an average normal reaction time. Studies range from 0.7 seconds to 3 seconds. Based on age, it is likely the driver was at the higher end of the normal reaction time.

requirements. As a result, many bus drivers were reluctant to stop in advance of level crossings, particularly those crossings equipped with flashing signals. The level of compliance, particularly in open-road areas, was reported as poor.

3.33 Waka Kotahi NZ Transport Agency was also asked for evidence of any risk assessment or analysis undertaken prior to the amendment. It replied in part:

... For the remaining sections, the benefit to society was improved road safety and traffic flow efficiency, and the benefit to industry was improved safety and efficiency of services due to the relaxing of regulation.

3.34 Waka Kotahi NZ Transport Agency also provided documentation pertaining to the decision-making process used by the drafters of the amendments. It stated in part:

This requirement [stopping at level crossings] also delays the flow of traffic. This requirement, specifically for heavy passenger service vehicles, was imposed prior to 1950. The perceived risk of multiple fatalities/injuries from a collision between a bus and a train was considered sufficient to require bus drivers to stop and ensure the way is clear before proceeding across the railway track. At that time there was also a speed limit of 15 mph [15 miles per hour, or 24 kilometres per hour] across the tracks for all other vehicles so the potential conflict between them and a stopped vehicle was not as great.

The documentation provided by Waka Kotahi NZ Transport Agency did not detail how the perceived risk of multiple fatalities/injuries from a collision between a bus and a train had changed between 1950 and 2009 when the Rule was amended. Nor did it detail what, if any, consideration was given to the danger to rail traffic of a collision with a heavy passenger service vehicle.

3.35 Neither KiwiRail nor Waka Kotahi NZ Transport Agency could find records of consultation on this matter. The Commission was unable to establish if any such consultation between Waka Kotahi NZ Transport Agency and the rail industry had taken place.

Safety issue: The amendments to the Rule did not consider the risks to road and rail users at level crossings in close proximity to road intersections.

- 3.36 In 1993 the Commission investigated two accidents similar to the Clevely Line collision: see reports RO-1993-105: Collision with motor vehicle near Levin and RO-1993-112: Passenger train collision with a concrete mixer truck near Rolleston, in which a total of three people were killed and seven seriously injured.
- 3.37 Both of these accidents involved level crossings in close proximity to road intersections.
- 3.38 Several recommendations were made to address the safety issues identified in RO-1993-105; of most relevance is recommendation 056/93:

That Transit New Zealand develop a code of practice for the design of intersections with closely adjacent railway crossings, taking into account the combined risk of accident that the two hazards present

Also recommendation 057/93:

That a programme be developed to review the adequacy of all warnings to motorists at intersections on State Highways which have railway crossings in close proximity.

- 3.39 These recommendations formed the basis for safety improvements later made to the warning signage and road markings for motorists approaching level crossings within New Zealand.
- 3.40 The safety improvements were implemented and a code of practice was developed. The Commission was satisfied with the actions taken and both recommendations were closed in 2003.
- 3.41 On 1 November 2009, the Rule was amended with the addition of clauses 9.5(b) and 9.5(c). These clauses provided an exemption for large passenger service vehicles having to stop at level crossings fitted with barriers or alternately flashing red lights (active protection).
- 3.42 The amendments to the Rule appear to have been developed with a singular focus on road safety, as they did not consider the effects that the amendment to exempt passenger service vehicles stopping at level crossings would have on the safety of rail corridor users, or consider previous recommendations made by the Commission.
- 3.43 The removal of the requirement for passenger service vehicles to stop before level crossings fitted with active protection was intended to lower the risk to road users. Not considering the added dangers posed by level crossings in close proximity to intersections could have increased the risks to both road and rail users.
- 3.44 The Commission has made a recommendation to address this safety issue in Section 6.

4 Findings

- 4.1 The level crossing warning devices were working correctly at the time of the accident.
- 4.2 The driver was **likely** focused on manoeuvring the bus through a right-hand turn and did not register the active warning devices in time to react and stop the bus before the level crossing.
- 4.3 The driver traversed the same level crossing up to 50 times per week and was **unlikely** to have encountered rail traffic previously.
- 4.4 Road legislation was amended in 2009 to remove the requirement for passenger service vehicles to stop before traversing a level crossing where active protection was present.

5 Safety issues and remedial action

General

- 5.1 Safety issues are an output from the Commission's analysis. They typically describe a system problem that has the potential to adversely affect future operations on a wide scale.
- 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.
- 5.3 Two new safety issues were identified in this investigation.

There was no evidence that the rail industry had been consulted on legislation changes affecting the safety of the rail corridor.

5.4 The amendments made to the Rule in 2009, which provided exemptions for passenger service vehicles stopping at level crossings, appear to have been developed without input from the rail sector. KiwiRail has no record of being consulted or making submissions on the proposed change. Waka Kotahi NZ Transport Agency was unable to provide evidence of any submissions having been made by the rail industry.

The amendments to the Land Transport (Road User) Rule did not consider the risks to road and rail users at level crossings in close proximity to road intersections.

- 5.5 The removal of a requirement for passenger service vehicles to stop before level crossings fitted with active protection was intended to lower the risk to road users. Not considering the added dangers posed by level crossings in close proximity to road intersections could have increased the risk to road and rail users at these crossings.
- 5.6 No action has been taken by Waka Kotahi NZ Transport Agency to address these safety issues. Therefore the Commission has made a recommendation in Section 6 to address these issues.

6 Recommendations

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 have the potential to 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.
- 6.3 The amendment to the Rule in relation to passenger service vehicles was made without consultation with the rail industry, and without regard to the recommendations made by the Commission in 1993 following serious incidents at level crossings.
- 6.4 Level crossing safety for pedestrians and vehicles is on the Commission's watchlist of serious transport safety concerns.

New recommendation

6.5 On 24 November 2021 the Commission recommended that Waka Kotahi NZ Transport Agency review clause 9.5(c) of the Land Transport (Road User) Rule 2004 in consultation with the rail industry to assess its adequacy regarding the risks posed by level crossings in close proximity to road intersections. (008/21)

Notice given to the Ministry of Transport

6.6 **On 24 November 2021 the Commission recommended that Waka Kotahi NZ Transport Agency** review clause 9.5(c) of the Land Transport (Road User) Rule 2004 in consultation with the rail industry to assess its adequacy regarding the risks posed by level crossings in close proximity to road intersections.

7 Key lessons

- 7.1 Railway level crossings provide a heightened risk to road users. All road users should check for approaching rail traffic and be prepared to stop regardless of the state of the level crossing protection equipment.
- 7.2 Wearing seatbelts will increase the chances of people surviving accidents.

8 Data summary

Vehicle particulars	
Train type and	single locomotive DL9469
number:	
Classification:	light locomotive
Operator:	KiwiRail
Date and time	16 September 2020, 0803
Location	Clevely Line, Bunnythorpe
Operating crew	one train driver, one bus driver
Injuries	one fatality, minor injuries to four bus passengers
Damage	extensive damage to front of bus

9 Conduct of the inquiry

- 9.1 On 16 September 2020, the Commission became aware of the occurrence through media reports. 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 Commission investigators conducted a scene examination and interviewed:
 - the train driver
 - two managers of the bus company
 - the spouse of the deceased.
- 9.3 The Commission obtained the following documents and records for analysis:
 - Tranzlog data from the locomotive
 - radio communications between the train driver and train control at the time of the incident
 - train control diagrams relevant to the incident
 - records from New Zealand Police, including photographs and witness statements
 - the New Zealand Police traffic crash report and Serious Crash Unit final report
 - the toxicology report
 - the pathology results
 - the warrant of fitness and registration details of the bus
 - a copy of an independent vehicle examination conducted on the bus
 - the driver licence details of the bus driver
 - copies of incident reports conducted by KiwiRail
 - various information from Waka Kotahi NZ Transport Agency relating to the legislation surrounding the operation of passenger service vehicles.
- 9.4 On 29 July 2021, the Commission approved a draft report for circulation to four interested persons for their comment.
- 9.5 The Commission received submissions from three interested persons. Any changes resulting from those submissions have been included in this final report.
- 9.6 On 24 November 2021 the Commission approved the final report for publication.

10 Report information

Abbreviations

Commission	Transport Accident Investigation Commission
the Rule	Land Transport (Road User) Rule 2004

TAIC Kōwhaiwhai - Māori scroll designs

TAIC commissioned its kōwhaiwhai, Māori scroll designs, from artist Sandy Rodgers (Ngati Raukawa, Tuwharetoa, MacDougal). Sandy began from thinking of the Commission as a vehicle or vessel for seeking knowledge to understand transport accident tragedies and how to prevent them. A 'waka whai mārama (i te ara haumaru) is 'a vessel/vehicle in pursuit of understanding'. Waka is 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 represent 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 aviation.

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

Marine: 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 'Marine'.

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

Rail: rerewhenua - flowing across the land

<u>NARRARS</u>

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.



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

- RO-2019-108 Level crossing collision, Piako Road, Morrinsville, 7 December 2019
- RO-2020-102 Express freight Train 932, strikes hi-rail vehicle, Limeworks Road, 24 April 2020
- RO-2019-105 Express freight Train 268, derailment, Wellington, 2 July 2019
- RO-2019-107 Passenger service SPAD and near collision, Wellington, 6 November 2019
- RO-2019-106 Passenger train 804, Irregular disembarkation of passengers, Rolleston, Canterbury, 3 September 2019
- RO-2019-104 Unsafe entry into worksite, Taimate, 5 June 2019
- RO-2019-103 Derailment of Train 626, Palmerston North, 4 April 2019
- RO-2019-101 Safe-working occurrence, Westfield yard, Ōtāhuhu, Auckland, 24 March 2019
- RO-2019-102 Clinton derailment, 29 March 2019
- RO-2018-102 Freight train SPAD and wrong-routing, Taimate, 1 October 2018
- RO-2018-101 Metropolitan passenger train, derailment, Britomart Transport Centre, Auckland, 9 May 2018
- RO-2017-106 Mainline locomotives, Wrong-routing and collision with work vehicle, Invercargill, 16 November 2017
- RO-2017-105 Collision between freight Train 353 and heavy motor vehicle, Lambert Road, level crossing, near Kawerau, 6 October 2017
- RO-2017-104 Unauthorised immobilisation of passenger train, at Baldwin Avenue Station, Avondale, 17 September 2017
- RO-2017-101 Signal Passed at Danger 'A' at compulsory stop boards protected worksite, Pongakawa, Bay of Plenty, 7 February 2017