



Australian Government
Australian Transport Safety Bureau

Level crossing collision between passenger train and semi-trailer

near Lake Charm, Victoria | 12 February 2013



Investigation

ATSB Transport Safety Report
Rail Occurrence Investigation
RO-2013-008
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Addendum

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Safety summary

What happened

At about 1320¹ on 12 February 2013, the 1250 Swan Hill to Melbourne passenger train collided with the rear corner of a semi-trailer on the B. McCann Road level crossing near Lake Charm, in northern Victoria. The semi-trailer was travelling towards the Murray Valley Highway having taken on a load of gypsum at a nearby mine.

As a result of the collision there were minor injuries to one train passenger and to the drivers of the train and truck. The truck's trailer was destroyed and there was minor damage to the front of the locomotive.

What the ATSB found

The ATSB found that the truck driver's view of the track was restricted due to the acute road-to-rail interface angle and the resulting limited opportunity to observe the train through the truck cabin's passenger-side window. When the truck driver stopped to look for trains, his view along the track to the north was probably no more than 220 m and insufficient to observe the approaching train.

An embankment in the crossing's northwest quadrant also affected sighting and vegetation either side of the road approach meant that the installed give-way protection was inconsistent with the available sighting distances.

Sighting deficiencies at the crossing had been raised at a meeting between V/Line and the Gannawarra Shire in 2009; however, no subsequent action was taken.

In the three years prior to the incident, the risk profile of the crossing had changed significantly due to a large increase in truck movements associated with a greater demand for gypsum from the mine. The safety interface management of the crossing by V/Line and the Gannawarra Shire did not identify this changing risk profile and did not involve consultation with a key stakeholder, the mine owner.

What's been done as a result

The operator of the gypsum mine has undertaken to re-align the road approaches to the crossing to address the acute road-to-rail interface angle, and to reduce the incline of the road on the approaches.

V/Line conducted a review of the level crossing that included an examination of site constraints and the identification of opportunities to improve safety.

Safety message

This incident highlights the need for rail and road authorities to be proactive in addressing identified sighting deficiencies at level crossings and to monitor the risk profile of crossings.

The occurrence also highlights the need to involve all key stakeholders in road-rail interface safety management processes.

¹ Australian Eastern Daylight Time.

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The occurrence

At about 0830 on 12 February 2013, a farmer driving his own semi-trailer departed his property in southern New South Wales. He intended to travel to a mine located south of the township of Lake Charm, in northern Victoria, obtain a load of gypsum and return home the same day. He had done the same trip the previous day.

Figure 1: Location of incident



Source: Melway Publishing 2013 (copyright) annotated by Chief Investigator, Transport Safety (Vic)

The farmer arrived at the mine at about 1045. There was a queue of trucks and a delay to be loaded. After his trailer was loaded with about 26 t of gypsum, he departed the mine at about 1315 and headed back along B. McCann Road towards the Murray Valley Highway.

B. McCann Road intersected the Melbourne to Swan Hill railway at a level crossing protected by give-way signs. The road approach to the level crossing was wide and without road markings which meant that drivers negotiated the crossing from a range of angles. The farmer approached the level crossing along the left-hand side of the road. The truck driver's side window was fully open and the passenger-side window closed.

The farmer stopped his truck around 15 m short of the crossing as a precaution and looked for trains, leaning forward from his normal driving position to view the track to the north. The driver's position was probably no more than 20 m back from the track. His view of the track to the north was restricted by the obstructions of the truck cab and possibly affected by an earth embankment in the crossing's northwest quadrant. It is probable he could not see further than about 220 m along the track. At this point in time, the train is estimated to have been at least 500 m from the crossing and the farmer did not observe the train.

The driver then returned to his normal driving posture, selected first gear, and proceeded slowly towards and across the level crossing at a speed of around five km/h. The approach to the crossing was on an incline (Figure 2), that resulted in reduced acceleration from the stopped position and added to the time taken to traverse the crossing.

Figure 2: A semi-trailer negotiating the level crossing, looking southeast



Source: Chief Investigator, Transport Safety (Vic)

With the truck in motion and the driver in his normal driving posture, there was no further opportunity to view the track to the north beyond a short distance due to the truck's angle of approach and the sighting angle limitations through the truck's left-side cab window. The train did not come into the truck driver's view at any point during this transit.

The Swan Hill to Melbourne passenger service 8042 had departed Swan Hill about one minute behind schedule at 1251. The train approached the crossing at about 98 km/h, eight km/h above line speed. The locomotive driver observed the semi-trailer stationary and back from the level crossing and also observed it commence moving towards the crossing.

The locomotive event recorder indicated that the train driver sounded the air horn about 440 m from the crossing, consistent with the requirement to sound the horn at the whistle board. The horn was then sounded for three seconds, commencing when the train was about 337 m from collision. When the train was about 239 m from collision, the driver made an emergency brake application and the horn was sounded again and held for about eight seconds.

The truck driver heard the train's horn when the prime-mover was on the track. He attempted to increase the speed of the truck to clear the crossing, but because the truck was in first gear, its speed did not increase appreciably.

The trailer had almost cleared the crossing when it was struck in the rear left-hand corner resulting in the loss of load and the destruction of the trailer. The speed of the train at the time of the collision was 84 km/h and it came to a stand under the emergency brake application about 248 m beyond B. McCann Road. The collision occurred at about 1320.

Figure 3: Damage to the truck's trailer



Source: Victoria Police

As a consequence of the collision, one train passenger was transported to hospital for observation and released the same day. The truck driver sustained a minor injury and the locomotive driver was shaken and suffered shock. Damage to the train was minor and confined to the front left-hand side of the locomotive. The service was terminated and passengers completed their journeys by road coach.

Context

Cumco Gypsum Pty Ltd

The Gypsum mine was located at Duck Lake, south of Lake Charm and about 16 km northwest of the regional centre of Kerang. Common access to the mine was by way of B. McCann Road that intersected with the Murray Valley Highway.

Figure 4: Location of the Gypsum mine, and the access route using B. McCann Road



Source: Google Maps (copyright) annotated by Chief Investigator, Transport Safety (Vic)

The mine was in the Shire of Gannawarra and had planning permission for its operation, including a permit issued in 2006 allowing expansion of the gypsum mine. This permit stated that the road reserve was not recognised on the Gannawarra Road Register in accordance with the Road Management Act 2004.

Demand for gypsum is seasonal and production and sales peak in the months of December through April. Prior to 2010, annual sales were around 20-30,000 tonnes. Sales then began to increase, to 43,000 tonnes in 2010-11, 84,000 tonnes in 2011-12 and to about 100,000 tonnes in 2012-13. This increase in production led to a significant increase in traffic on B. McCann Road.

On the day of the incident, the number of trucks visiting the mine was the highest it had been for the 2012-13 season. That day 75 heavy trucks—a mix of semi-trailers and B-doubles—accessed the mine, equating to 150 heavy vehicle movements over the level crossing. In addition, there were several smaller vehicle movements. Collision with a truck, particularly if loaded, presents as a significant hazard to train services with the potential for train derailment.

B. McCann Road

B. McCann Road had complex ownership and leasing arrangements. The crossing was within the rail reserve leased to V/Line as part of the intrastate rail network lease. Under this agreement, V/Line had responsibility for the maintenance of the crossing and for signage at the crossing. Advance warning signage was the responsibility of the applicable road authority.

The portion of B. McCann Road between the Murray Valley Highway and the east boundary of the railway reserve was within Gannawarra Shire jurisdiction. In 2004, as part of the implementation of Council's Road Management Plan, B. McCann Road was deemed not required for public use and was classified as 'not maintained' as it served only one property. B. McCann Road was therefore not included in the Council's Register of Public Roads. B. McCann Road's classification had not changed since 2004.

The road reserve to the west of the railway reserve boundary is Crown land. In 1994, the responsible government department² granted the abutting land owner (also associated with the ownership of the gypsum mine) with a grazing licence for the road reserve. The issuing of such a licence was not unusual and did not prohibit the use of the land for road access.

The road did not have sign-posted speed limits on either side of the level crossing.

Level crossing

Layout

The B. McCann Road level crossing was situated on the V/Line Broad-Gauge network 303.095 rail kilometres from Melbourne, between Kerang and Swan Hill. When approaching from the mine, vegetation on the left-hand side prevented road users from viewing the railway line towards Swan Hill until they were within about 35 m of the crossing. Once clear of the vegetation, the view to the north was affected by an earth embankment created by a shallow railway cutting.

Figure 5: Aerial view of B. McCann Road level crossing.



Source: Google Maps (copyright) annotated by Chief Investigator, Transport Safety (Vic)

² At the time of the incident these licensing functions resided with the Department of Sustainability and Environment.

The rail approach to the B. McCann Road level crossing from the north was tangent (straight) and on a slight downhill gradient with the crossing itself level. Sighting to the level crossing from a locomotive cab was clear for about a kilometre. A whistle board was provided about 400 m from the crossing.

Signage

All signage installed at the crossing was in good condition and clearly visible. Give-way signage was provided as the control treatment for road users and included the Railway crossing give-way assembly (RX-1) and the Railway crossing width marker assembly (RX-9) as detailed in AS1742.7 Manual of uniform traffic control devices, Part 7: Railway crossings.

Figure 6: Crossing signage, approaching from the gypsum mine



Source: Chief Investigator, Transport Safety (Vic)

Advance warning signage had been erected by the Gannawarra Shire on both road approaches consistent with the signage standard for a road vehicle approach speed of 75-90 km/h.

Australian Level Crossing Assessment Model (ALCAM) survey

In 2003, the Australian Transport Council (ATC) agreed to adopt ALCAM as the national model for assessing safety risk at level crossings. In Victoria, ALCAM crossing assessment and data collection is managed by VicTrack³ on behalf of Public Transport Victoria. At the time of the incident, field assessments were being conducted on a five year rolling program and results were made available via web portal to the applicable rail and road authorities. In the case of B. McCann Road, V/Line and the Gannawarra Shire Council had access to the ALCAM data.

AS1742.7 was used as the basis for the assessment of sighting distances and conformance to standard signage indication and placement. This standard was not a legislated requirement but accepted as the industry standard for the design of new level crossings and as a benchmark when assessing existing crossings and their risk profile.

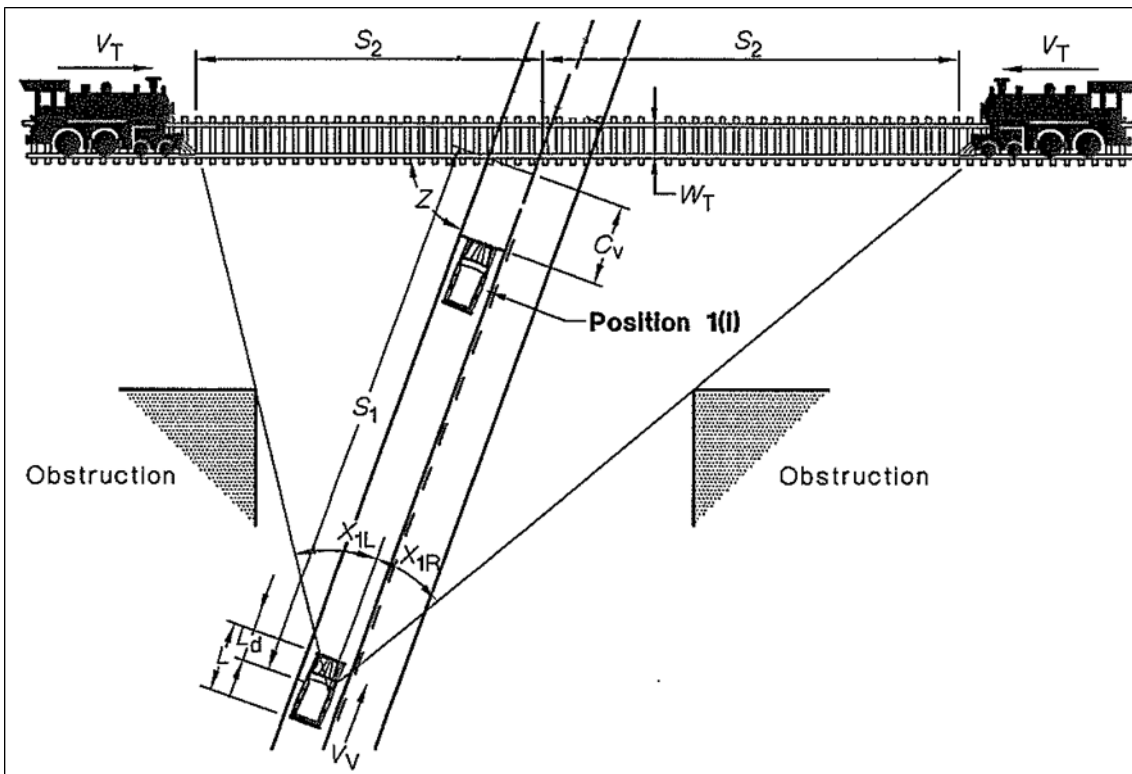
³ VicTrack was the owner of Victoria's railway land and infrastructure. VicTrack leased railway land used for public transport to Public Transport Victoria that then sub-leased railway land and infrastructure to accredited rail operators.

The most recent assessment of the B. McCann Road level crossing was conducted in September 2010. It resulted in an ALCAM likelihood factor of 265 (medium) and an ALCAM Risk Score of 148,400⁴, neither of which in themselves signalled a need for priority action.

For this ALCAM assessment, the average annual daily road traffic was assumed to be 20 with a medium proportion of heavy vehicles. These traffic values may have been valid at the time of inspection but were not reflective of the traffic profile in 2013.

The more critical finding of the assessment was the identified non-compliances with the S2 sighting requirement applicable to give-way protection (Figure 7). This measurement is an indicator of whether a motorist has sufficient time to observe and give way to an approaching train. The ALCAM assessment assumed a vehicle approach speed of 50 km/h and concluded that for eastbound road traffic, the S2 distances (looking both north and south) were less than 50 per cent of that required. The assessment also identified an S2 deficiency for westbound road traffic.

Figure 7: Definition of S2 distance for road vehicles approaching a give-way sign



Source: AS1742.7 Manual of uniform traffic control devices, Part 7: Railway crossings

The survey did not identify deficiencies with the available sighting when stopped, or issues with the road-rail crossing angle. The road bearings recorded in the ALCAM report indicated that the bearings were taken about 15 degrees more towards the centre of the road, when compared to a left-hand side approach. This equated to a net acute road-to-rail angle of about 80 degrees. There was no indication that the position of the left-edge of the road had altered between the 2010 survey and the incident.

⁴ The ALCAM Risk Score is strongly influenced by road and rail traffic volumes. As a result, crossings with high traffic volumes have significantly higher risk scores than low usage crossings. Excluding those crossings that were already fitted with boom barriers, this crossing was ranked 437 in the list used as input to the crossing upgrade program, and there was no recorded incidents at this crossing prior to the collision.

Post-incident site examination

An examination of the eastbound road approach to the crossing (travelling from the gypsum mine) found that sighting to the north was affected by a number of factors. On the approach to the crossing, there was no sighting to the track due to vegetation until about 35 m from the track. Once clear of the vegetation, the view to the north was affected by an embankment (Figure 8) formed by a shallow rail cutting. The embankment did not completely block an approaching train from view, although the view was diminished.

Figure 8: View looking north, about 20 m from the crossing



Source: Chief Investigator, Transport Safety (Vic)

The road approaches from both sides of the crossing were wide and allowed for a range of approach angles to the track. For those eastbound (travelling from the mine) motorists who approached the crossing along the left-hand side of the road, the approach angle was about 65 degrees to the track (angle Z in Figure 7). The approach angle for westbound motorists travelling along the left side of the road was also acute at about 68 degrees.

Observations conducted on site identified that traffic in both directions typically moved towards the centre or onto the right-hand side of the road on the approach to the rail crossing in order to 'square up' to improve the sighting along the railway. The practice resulted in opposing traffic having to hold back to permit the first to arrive to have right-of-way, effectively reducing the crossing to one lane. This practice of 'squaring up' was known to regular users of the crossing but not to everyone.

V/Line review of B. McCann level crossing

Subsequent to the incident, V/Line undertook a review of the level crossing. The review included an examination of local site constraints and the identification of opportunities to improve the safety of the crossing. The review identified that for eastbound (from the mine) motorists, sighting of approaching trains was limited due to significant vegetation in the northwest and southwest quadrants and the embankment situated in the crossing's northwest quadrant. The clear sighting distance to trains approaching from the Swan Hill direction was measured as being approximately 291 m.

As a result of this review, the following improvement options were identified by V/Line:

- Option 1 – Retain the give-way signs, realign the roadway and level out the road approaches in close proximity to the level crossing, cut back the embankment and reduce the road speed to 20 km/h.
- Option 2 – Level out the road approaches in close proximity to the level crossing, change the protection type from give-way to stop signs and reduce the rail speed to 60 km/h.
- Option 3 – Retain the give-way signs, realign the roadway and level out the road approaches in close proximity to the level crossing, cut back the embankment, remove vegetation and reduce the road speed to 30 km/h.

Road vehicle

The prime-mover was a dual axle 1982 White International with sleeper cab (Figure 9). The trailer was a Freightmaster semi-tipping type with a capacity of 27 t. The total length of the semi-trailer was 14.9 m and its total mass was about 43 t after departing the gypsum mine on the day of the incident. The truck's mechanical condition did not have a bearing on the event.

Figure 9: The semi-trailer configuration, with the prime-mover and a similar trailer



Source: Chief Investigator, Transport Safety (Vic)

A driver's view to the left of the truck was restricted by the cab and sleeper configuration (Figure 10). Viewing left was limited to the small passenger-side window as there were no windows further to the rear.

Figure 10: View through truck cab side window from the driving position



Source: Chief Investigator, Transport Safety (Vic)

Rail-Road interface management

Strategic framework

The Victorian Railway Crossing Safety Steering Committee was established in 2005 under section 36 of the *Transport Act 1983* to advise and make recommendations to the Minister of Transport on the policy directions, management and standards for road and pedestrian crossings in Victoria. Four sub-groups work on behalf of the committee to manage the annual level crossing upgrade program, commission research into road user behaviours, trial new technologies and manage the state's awareness campaign.

All level crossings in Victoria have been assessed using ALCAM and given a risk ranking. Resource allocation for upgrade works is prioritised based on the ALCAM risk ranking, incident data and stakeholder feedback.

Safety interface agreement

The *Rail Safety Act 2006 (Vic)* required rail operators and road managers to identify and assess risks that arise from operations at level crossings, and seek to enter into safety interface agreements with other relevant parties to manage those risks. These requirements were introduced on 1 July 2010.

In March 2012, a safety interface agreement was finalised between V/Line, VicTrack and the Gannawarra Shire. The plan covered 51 sites, including the B. McCann Road level crossing. B. McCann Road was identified as a public road with the Gannawarra Shire recorded as having primary responsibility for it. Subsequent to the incident, the Shire advised that B. McCann Road should not have been included in the agreement, as it was not maintained by the Shire.

The licensee of the road reserve to the west of the crossing was not identified in the agreement nor included in the consultation process associated with B. McCann Road level crossing.

Train

Details

Train 8042 consisted of locomotive N466 and three passenger cars. It was about 87 m in length and had a mass of 254 t. Aboard were the driver, two conductors and about 40 passengers. No aspect of the mechanical condition of the train contributed to the incident. The train's headlights were examined after the incident and found to be functional.

Figure 11: Train 8042 following the collision



Source: Victoria Police

Data logger

The event logger on locomotive N466 captured amongst other parameters: time, distance, speed, driver vigilance control acknowledgement, and horn operation. Time is synchronised by way of GPS at each engine start up sequence.

An examination of the data established that the train exceeded the track speed by between six km/h and 10 km/h on three occasions in the seven kilometres before B. McCann Road. The last occasion was for a distance of 630 m commencing about 1070 m before the train came to a stand. During this phase, the train speed peaked at 98 km/h and was 97 km/h when the emergency brake application was made.

Operating procedure pertaining to speed exceedence

The V/Line Network and Access Train Operating Data document NA_NSP_02.15-R01-2013 stipulates a speed of 90 km/h for passenger trains hauled by N class locomotives between Kerang and Swan Hill. This was also the maximum permitted speed for any train on this section.

V/Line Procedure OPRR: 033 Locomotive Driver Point Demerit System provided guidance to performance reviewers and locomotive drivers in regard to compliance with permitted speeds on the network. This procedure allowed locomotive drivers to exercise discretion in applying certain train handling techniques to manage their train. In part, the procedure allowed for a speed adjustment by drivers between 0 and 10 km/h for up to one kilometre. Should the speed exceed the maximum permitted by between 11 and 15 km/h, the procedure called for a driver to be interviewed by a supervisor.

Safety analysis

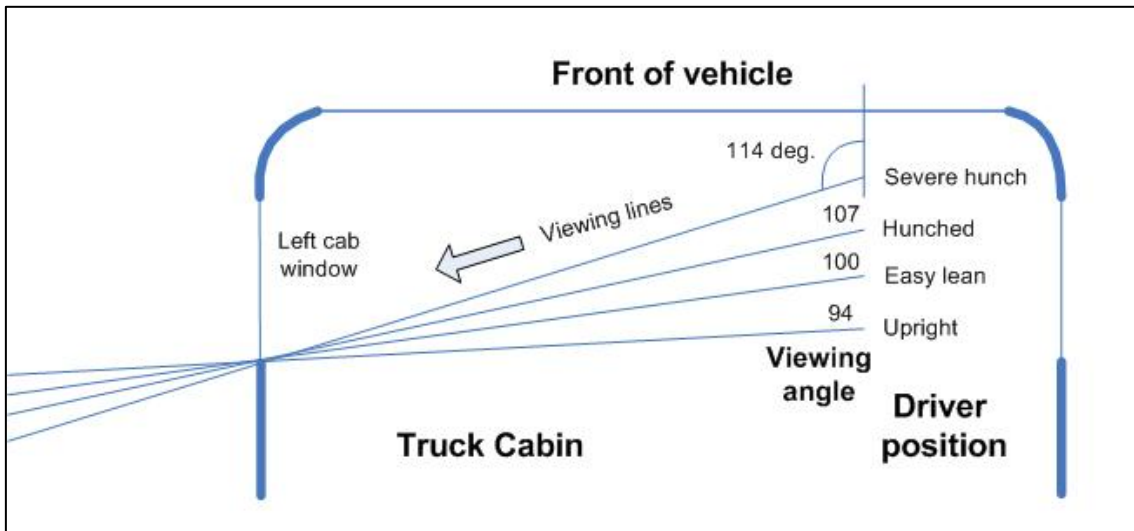
Level crossing viewing restrictions due to road-rail angle

Drivers approaching the B. McCann Road level crossing from the gypsum mine along the left-hand side of the road had a restricted view of the track to the north due to the acute road-rail angle. Acute road approach angles are problematic because they restrict the ability of a driver to view along the track and observe an approaching train. This is particularly difficult for drivers of trucks that often have a restricted view behind the perpendicular (90 degrees) to their direction of travel because of the obstructions of the cab.

AS1742.7 specifies maximum viewing angles from the driving position in order to ensure that a motor vehicle driver can see along the prescribed sight triangles without excessive head movement or sight obstruction by parts of the vehicle itself. Approaching a give-way sign, the specified maximum angle from the direction of travel to the left is 95 degrees (identified as angle X1L in Figure 7), or 5 degrees behind perpendicular. For a stop sign, the specified maximum view angle to the left is 110 degrees, or 20 degrees behind perpendicular.

Measurement of the truck involved in this incident confirmed the viewing limitations when attempting to view to the left behind the perpendicular to the direction of travel. With the driver in a typical upright position, the furthest rearward view was about 94 degrees from the direction of travel. With an easy lean forward, this angle could be increased to 100 degrees, with a more extreme hunch forward to 107 degrees and at the most extreme forward position over the steering wheel, to about 114 degrees (Figure 12).

Figure 12: Measured maximum driver viewing angle for a range of driver postures



Source: Chief Investigator, Transport Safety (Vic)

With the driver in a 'hunched' position (107 degree view angle), the truck approaching at an acute angle of 65 degrees to the track and the driver 20 m back from the crossing, the driver's view along the track would have been limited to about 140 m. With the driver hunched slightly more forward and achieving the Australian Standard specified maximum (at stop) view angle of 110 degrees, this distance could be increased to about 220 m. The precise extent to which the driver leant forward to look for trains is unknown. However, based on these estimates, it is likely that when stopped on the left-hand side of the road, the driver's view was limited to less than 220 m along the track as a result of the acute road-rail angle. The train is estimated to have been in excess of 500 m from the crossing when the observation was made and therefore out of the truck driver's view.

Inaction to address identified sighting issues

Concerns with available sighting at the B. McCann level crossing were known at least as early as 2009. The acute road-rail angle and sighting deficiencies associated with the crossing were raised at a coordination meeting between V/Line and the Gannawarra Shire in May that year. Recorded actions were to consider road closure or road re-alignment, and the owner of the actions identified as Gannawarra Shire. There are no records of follow-up on these actions by either Gannawarra Shire or V/Line. The minutes recorded that the road was not maintained [by the Shire], had gates and alternate access seemed to be available.

Sighting deficiencies were again flagged in the ALCAM survey undertaken in 2010. There is no evidence to indicate whether the survey results or identified issues were considered by either V/Line or Gannawarra Shire.

Any decisions that may have been made regarding the identified sighting deficiencies at the B. McCann Road level crossing were not documented. It is possible that individuals reviewing the deficiencies believed that the crossing traffic—a combination of rail and road traffic volumes—was sufficiently low that the overall risk of collision at the crossing was also low.

Truck driver behaviour

This was the third time that the farmer had been to the mine that season and he had been there the day before. He had also been to the mine three times during the previous season. On none of these occasions did he see a train. However, the driver knew that this was an active line and his actions were not affected by his experience of not seeing a train at this crossing.

The driver's approach along the left side of the road was consistent with the Road Safety Road Rules 2009 (Vic) r129 requirement that a driver must drive as near as practicable to the far left side of the road. He was not aware of the practice of 'squaring up' to the crossing.

At his visit to the mine in the week prior, he was travelling with a companion who was able to provide assistance when looking for trains. This trip he was alone, and because of his concerns with the sighting difficulty at the crossing, he approached it with extreme caution. As a result, he stopped to look for trains, a factor that subsequently increased his transit time because of the need to accelerate the truck up an incline from the stopped position.

Road incline and surface

The near approach to the track was on an uphill grade that reduced truck acceleration from stop, particularly for loaded trucks coming from the mine. This increased transit time and heightened the risk of collision. A levelling of the road surface, particularly to the west of the crossing to cater for loaded trucks, would therefore reduce risk at the crossing.

B. McCann Road was surfaced with gypsum. While loose surfaces can affect drive-wheel traction, the surface condition was not considered a critical factor given the generally low acceleration of the trucks at the crossing.

Approach sighting deficiencies for give-way protection

In assessing the adequacy of passive controls, AS1742.7⁵ states that the application of passive control treatments to railway crossings by use of give-way or stop sign control shall be determined by sight distance available to a road vehicle driver to an approaching train. For give-way protection, the sight distance shall be sufficient for the driver approaching to see an approaching train in time to allow them to stop if necessary before reaching the crossing. In addition the sight distance shall be sufficient for a road vehicle stopped at the stop line to be able to start and clear the crossing before the arrival of a previously unseen train. Where the sight distances are not met, the standard specifies the restoration of sight distance by sight benching⁶ in cuttings, clearing, geometric alteration of the crossing or the installation of active control.

In this instance, sighting to the track on both the eastbound and westbound approaches did not satisfy the sighting criteria for give-way protection. Sighting was affected by vegetation to the west of the crossing, a rail cutting to the north and the curved road on both approaches.

Level crossing safety coordination and consultation

Level crossing safety is a shared responsibility between rail and road authorities. In order to encourage greater cooperation and dialogue between these authorities, legislation was introduced to require the development of safety interface agreements for level crossings. While such an agreement was reached for B. McCann Road, a key stakeholder, the gypsum mine owner, was not included in the consultation process. The mine owner had intimate knowledge of the changing traffic profile for the road and was associated with the licensee of the road reserve to the west of the crossing.

Both road and rail authorities play a role in assuring necessary stakeholder involvement in level crossing safety coordination. To manage its significant operational risks at level crossings, the accredited rail operator should include in its processes mechanisms to facilitate all necessary stakeholder consultation.

ALCAM crossing assessment processes

When the crossing was last surveyed under the ALCAM program, the road bearing was measured towards the centreline of the road rather than along the left-hand side approach. The result was an overestimate of the net road-to-rail acute interface angle. The measurement of road bearing should assume a road user approach along the left-hand side of the road.

Inconsistency between permitted and published line speed

V/Line systems for evaluating train driver behaviour permitted an exceedence of line speed by up to 10 km/h for short distances. This gave drivers latitude for train handling speed variances. However, this also created a potential differential of 10 km/h between the 'procedurally permitted' train speed and the published maximum line speed.

Passive level crossing protection is reliant on the road user having sufficient sighting distance and time available to stop before or clear a crossing prior to the arrival of a train. Evaluation of sighting requirements in the ALCAM process was based on the published maximum line speed and so was not consistent with the scenario of a train travelling at a greater speed as permitted by V/Line operational protocol.

⁵ The standard's sighting requirement is not mandated, but a critical reference when assessing level crossing risk.

⁶ This involves the cutting of an embankment to form a surface or 'bench' over which a driver can see an approaching train.

Findings

The following findings are made with respect to the collision between a semi-trailer and V/Line passenger train 8042 at the B. McCann Road level crossing near Lake Charm on 12 February 2013. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

Safety issues, or system problems, are highlighted in bold to emphasise their importance.

A safety issue is an event or condition that increases safety risk and (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

Contributing factors

- For eastbound road users approaching the B. McCann Road level crossing along the left-side of the road, the view to the track was restricted due to the acute road-to-rail interface. This was particularly problematic for trucks with the viewing opportunity to the left limited to the cab's passenger-side window. [Safety issue]
- V/Line did not adequately address level crossing sighting issues at B. McCann Road acknowledged by the rail operator in 2009. [Safety issue]
- Gannawarra Shire did not adequately address level crossing sighting issues at B. McCann Road acknowledged by the Shire in 2009. [Safety issue]

Other factors that increased risk

- The truck driver stopped well short of the crossing and then proceeded slowly over the crossing, both factors lengthening the transit time to clear the crossing.
- The road incline on the west-side approach to the crossing increased the time required for loaded trucks to transit the crossing. [Safety issue]
- The give-way protection installed at the crossing was inconsistent with the available sighting distances on both approaches to the crossing. Sighting was affected by vegetation, embankments formed by a rail cutting and the curved road approaches. [Safety issue]
- The level crossing safety coordination processes did not involve a key stakeholder, the gypsum mine owner who had knowledge of the changing traffic profile. The mine owner was aware of the increasing numbers of heavy vehicles using B. McCann Road since 2010 and the associated changing risk profile of the level crossing. [Safety issue]
- When the crossing was last surveyed under the ALCAM program, the measurement of the road angle resulted in an overestimate of the acute road-to-rail interface angle. The implication of overestimating the acute interface angle is that sighting deficiencies may be underestimated or not identified. [Safety Issue]
- There existed an inconsistency between the track speed used for crossing assessment and permitted train speeds. The ALCAM process used a train speed equal to the track line speed, whereas V/Line systems for evaluating driver behaviour permitted an exceedence of line speed by up to 10 km/h for short distances. [Safety issue]

Other findings

- Truck drivers that were familiar with B. McCann Road typically compensated for the sighting deficiencies at the level crossing by 'squaring up' on the approach to the crossing. This practice was contrary to the requirement of the road rules to stay on the far left side of the road.

Safety issues and actions

The safety issues identified during this investigation are listed in the Findings and Safety issues and actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

Depending on the level of risk of the safety issue, the extent of corrective action taken by the relevant organisation, or the desirability of directing a broad safety message to rail industry, the ATSB may issue safety recommendations or safety advisory notices as part of the final report.

Sighting restrictions due to road-to-rail angle

Number:	RO-2013-008-SI-01
Issue owner:	Cumco Gypsum Pty Ltd
Operation affected:	Rail: Infrastructure
Who it affects:	Users of B. McCann Road level crossing

Safety issue description:

For eastbound road users approaching the B. McCann Road level crossing along the left-side of the road, the view to the track was restricted due to the acute road-to-rail interface. This was particularly problematic for trucks with the viewing opportunity to the left limited to the cab's passenger-side window.

Response to safety issue by Cumco Gypsum Pty Ltd

Action number: RO-2013-008-NSA-072

Cumco Gypsum Pty Ltd has undertaken to realign the road on both sides of the crossing to eliminate the acute road-to-rail interface, such that road users approaching the crossing will have a better view of trains approaching from either direction.

ATSB comment in response

The ATSB is satisfied that, when implemented, the actions advised by Cumco Pty Ltd to address the acute road-to-rail interface will reduce the risk of collision for vehicles approaching along the left side of the road.

Current status of the safety issue

Issue status: Safety action pending

Justification: At the date of issue of this report, the safety action advised by Cumco Pty Ltd had not yet been completed.

Rail operator inaction to address identified sighting issues

Number:	RO-2013-008-SI-02
Issue owner:	V/Line Pty Ltd
Operation affected:	Rail: Infrastructure
Who it affects:	Users of level crossings in Victoria

Safety issue description:

V/Line did not adequately address level crossing sighting issues at B. McCann Road acknowledged by the rail operator in 2009.

Response to safety issue by V/Line Pty Ltd

The V/Line response did not directly address this safety issue.

ATSB safety recommendation to V/Line Pty Ltd

The Australian Transport Safety Bureau recommends that V/Line reviews its processes and implements improvement in the follow-up of identified level crossing sighting deficiencies.

Action number: RO-2013-008-SR-067

Action status: Released

Shire inaction to address identified sighting issues

Number:	RO-2013-008-SI-03
Issue owner:	Gannawarra Shire
Operation affected:	Rail: Other
Who it affects:	Users of level crossings in Gannawarra Shire

Safety issue description:

Gannawarra Shire did not adequately address level crossing sighting issues at B. McCann Road acknowledged by the Shire in 2009.

Response to safety issue by Gannawarra Shire

The Gannawarra Shire response did not directly address this safety issue.

ATSB safety recommendation to Gannawarra Shire

The Australian Transport Safety Bureau recommends that Gannawarra Shire reviews its processes and implements improvements in the follow-up of identified level crossing sighting deficiencies.

Action number: RO-2013-008-SR-068

Action status: Released

Road incline on approach to level crossing

Number:	RO-2013-008-SI-04
Issue owner:	Cumco Gypsum Pty Ltd
Operation affected:	Rail: Other
Who it affects:	Users of B. McCann Road level crossing

Safety issue description:

The road incline on the west-side approach to the crossing increased the time required for loaded trucks to transit the crossing.

Response to safety issue by Cumco Gypsum Pty Ltd

Action number: RO-2013-008-NSA-073

Cumco Gypsum Pty Ltd has undertaken to reduce the road incline on both sides of the crossing in order to minimise the time required for vehicles to transit the crossing.

ATSB comment in response

The ATSB is satisfied that, when implemented, the actions advised by Cumco Pty Ltd will reduce the transit times of trucks and reduce the associated risk.

Current status of the safety issue

Issue status: Safety action pending

Justification: At the date of issue of this report, the safety action advised by Cumco Pty Ltd had not yet been completed.

Crossing protection inconsistent with available sighting

Number:	RO-2013-008-SI-05
Issue owner:	V/Line Pty Ltd
Operation affected:	Rail: Infrastructure
Who it affects:	Users of B. McCann Road level crossing

Safety issue description:

The give-way protection installed at the crossing was inconsistent with the available sighting distances on both approaches to the crossing. Sighting was affected by vegetation, embankments formed by a rail cutting and the curved road approaches.

Response to safety issue by V/Line Pty Ltd

V/Line advised that it has undertaken a significant program of sight distance improvements since 2009, with many passive crossings improved where reasonably practicable through vegetation removal and earthworks. V/Line also advised that as an interim control measure it has imposed speed restrictions to decrease train approach speeds and improve visibility.

ATSB comment in response

The V/Line response did not directly address this safety issue at the B. McCann level crossing.

ATSB safety recommendation to V/Line Pty Ltd

The Australian Transport Safety Bureau recommends that V/Line reviews the risks at the B. McCann level crossing associated with the inconsistency between the level of crossing protection provided and the sighting available, and takes appropriate action.

Action number: RO-2013-008-SR-069

Action status: Released

Level crossing stakeholder consultation

Number:	RO-2013-008-SI-06
Issue owner:	V/Line Pty Ltd
Operation affected:	Rail: Infrastructure
Who it affects:	Stakeholders associated with level crossings

Safety issue description:

The level crossing safety coordination processes did not involve a key stakeholder, the gypsum mine owner, who had knowledge of the changing traffic profile. The mine owner was aware of the increasing numbers of heavy vehicles using B. McCann Road since 2010 and the associated changing risk profile of the level crossing.

Response to safety issue by V/Line Pty Ltd

The V/Line response did not directly address this safety issue.

ATSB safety recommendation to V/Line Pty Ltd

The Australian Transport Safety Bureau recommends that V/Line reviews its processes of level crossing safety coordination to ensure that all necessary stakeholders are consulted.

Action number: RO-2013-008-SR-070

Action status: Released

ALCAM crossing assessment processes

Number:	RO-2013-008-SI-07
Issue owner:	VicTrack
Operation affected:	Rail: Infrastructure
Who it affects:	Stakeholders associated with risk assessment of level crossings

Safety issue description:

When the crossing was last surveyed under the ALCAM program, the measurement of the road angle resulted in an overestimation of the acute road-to-rail interface angle. The implication of overestimating the acute interface angle is that sighting deficiencies may be underestimated or not identified.

Response to safety issue by VicTrack

VicTrack did not provide a response to this safety issue.

ATSB safety recommendation to VicTrack

The Australian Transport Safety Bureau recommends that VicTrack reviews its instructions for the measurement of road angle to assure that worst case sighting scenarios are identified.

Action number: RO-2013-008-SR-071

Action status: Released

Inconsistency between permitted and published line speed

Number:	RO-2013-008-SI-08
Issue owner:	VicTrack
Operation affected:	Rail: Other
Who it affects:	Stakeholders associated with risk assessment of level crossings

Safety issue description:

There existed an inconsistency between the track speed used for crossing assessment and permitted train speeds. The ALCAM process used a train speed equal to the track line speed, whereas V/Line systems for evaluating driver behaviour permitted an exceedence of line speed by up to 10 km/h for short distances.

Response to safety issue by VicTrack

VicTrack did not provide a response to this safety issue.

ATSB safety recommendation to VicTrack

The Australian Transport Safety Bureau recommends that VicTrack takes action to address the inconsistency that exists between the crossing assessment that assumes a train travelling at line speed, and the sighting that would be required for a train travelling at the 10 km/h greater speed that is procedurally permitted by the rail operator.

Action number: RO-2013-008-SR-074

Action status: Released

General details

Occurrence details

Date and time:	12 February 2013	
Occurrence category:	Accident	
Primary occurrence type:	Level crossing collision	
Location:	B. McCann Road, near Lake Charm, Victoria	
	Latitude: 35° 38.53' S	Longitude: 143° 49.082' E

Train details

Train operator:	V/Line Pty Ltd	
Registration:	8042	
Type of operation:	Passenger	
Persons on board:	Driver – 1, Conductor – 2	Passengers – about 40
Injuries:	Driver – Minor	Passengers – 1 Minor
Damage:	Minor	

Truck details

Type of operation:	Semi-trailer, bulk gypsum haulage	
Persons on board:	Driver	Passengers – Nil
Injuries:	Driver – Minor	
Damage:	Major damage to trailer	

Sources and submissions

Sources of information

The sources of information during the investigation included:

- V/Line Pty Ltd
- VicTrack
- Gannawarra Shire
- Cumco Gypsum Pty Ltd
- Victoria Police
- The truck driver
- The train driver
- Department of Environment and Primary Industries (Department of Sustainability and Environment)

References

Australian Standard 1742.7 2009

Road Safety Road Rules 2009 (Vic)

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003* (the Act), the Australian Transport Safety Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to V/line Pty Ltd, VicTrack, Gannawarra Shire, Cumco Gypsum Pty Ltd, Victoria Police, Public Transport Victoria, Transport Safety Victoria, the Office of the National Rail Safety Regulator, the Department of Environment and Primary Industries and the drivers of the semi-trailer and train. Submissions received were reviewed and where considered appropriate, the text of the draft report amended.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

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

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

Australian Transport Safety Bureau

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Investigation

ATSB Transport Safety Report

Rail Occurrence Investigation

Level crossing collision between passenger train and semi-trailer
near Lake Charm, Victoria on 12 February 2013

RO-2013-008

Final – 7 October 2014