SH 67 Kerrs Road Granity LCSIA

Bathurst Resources Limited

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Executive Summary

Bathurst Resources Limited ("Bathurst") are planning to progress their development and mining of coal resources across the Buller Plateaux which will increase the number of heavy commercial vehicle (HCV) movements on SH67 by approximately 180 heavy vehicle movements per day on SH67 to haul coal from Denniston to Stockton for processing, before being placed on the coal train. This constitutes as a change in use. The increased HCV movements will operate for a period of 18-24 months, whilst a new haul road is constructed connecting Denniston and Stockton mining sites. When complete, the HCV movements will cease to use SH67 and travel via the haul road.

This Level Crossing Safety Impact Assessment (LCSIA) has been prepared to assess the safety impact the change in use has to the level crossing. The Level Crossing Safety Score (LCSS) procedure consists of four categories and scores the risk of each crossing point at four different assessment stages of the project. The tables below detail the progression of the scoring for the level crossing through the stages of the LCSS.

The Future Score assessment in this LCSIA shows the level crossing after the HCV traffic movements have diverted to the new haul road between the two mines.

Summary of LCSS changes at SH67 Kerrs Road Granity [1394] level crossing

	Updated Existing	Change in Use	Proposed Design	Future Score
LCSS	**18**	**21**	**18**	**16**
LCSS Band	**Low**	**Medium Low**	**Low**	**Low**
Criterion Met	C1	C1	C1	C1 & C2
Form of Control	FLBs	FLBs	FLBs	FLBs
ALCAM risk band	Medium Low	Medium Low	Medium Low	Medium Low
ALCAM % change	N/A	27%	23%	-4%
Fatal return period	12,259 years	9,578 years	9,902 years	12,673 years

The Updated Existing LCSS risk band is Low, and the Change in Use LCSS risk band increases to Medium Low. The Proposed Design achieves Criterion 1, and Future Score achieves both Criterion 1 and Criterion 2. Therefore, the level crossing can remain with FLBs for the duration of time the HCV traffic uses SH67 and still meet Criterion 1.

The following recommendations were made by the LCSIA Assessor to reduce the LCSS at the road level crossing to achieve Criterion 1.

Summary of recommendations

No.	Recommendation	Level of Necessity
1.	Replace existing advanced warning signs, steam engine, level crossing alignment signs. Assess whether these need to be larger sized signs to better delineate the level crossing and reverse curves in road alignment.	Maintenance
2.	Review whether the advisory speed of 25km/h on the reverse curves is appropriate for the horizontal alignment	Maintenance
3.	Move horizontal alignment (PW20) advanced warning signs further away from the level crossing to provide more warning/reaction time for motorists to slow down before reverse curves	Maintenance
4.	Renew chevron arrow advisory sign exiting the southern approach	Maintenance
5.	Remove old GIVE WAY triangle road marking on both approaches	Maintenance

There were no Red Flag issues raised at this road crossing for any of the assessment stages.

1 Introduction

1.1 Level Crossing Safety Impact Assessment (LCSIA)

There are approximately 1355 road, 740 pedestrian and many private level crossings in New Zealand. While there are relatively few vehicle and pedestrian crashes at level crossings (compared with the rest of the road network), the consequence of a crash at a level crossing is often severe (serious injury or fatality). Given the high consequences of level crossing crashes, it is important that any changes around level crossings go through a thorough risk assessment process.

The level crossing safety impact assessment (LCSIA) process was developed to assess the level of crash risk of existing and new / upgraded level crossings designs. The risk of pedestrian and motor vehicle crashes is assessed using the level crossing safety score (LCSS). This is a score out of 60 and consists of:

- ALCAM[1] score (30 points),
- crash and incident history score (10 points),
- site specific safety score (10 points), and;
- engineer risk score (10 points).

The assessment is undertaken separately for vehicle and pedestrian crossings. Based on these scores, the level crossing is placed into the following risk bands in Figure 1-1.

Figure 1-1: Level crossing safety score risk bands

1.2 LCSIA Criteria

There are two criteria applicable to level crossings, which differ depending on whether the level crossing is a new crossing facility or an upgrade to an existing level crossing facility.

- **Criterion 1:** requires the ***Proposed Design*** and ***Future Score*** of a level crossing to achieve a '***Low'*** or '***Medium-Low'*** level of risk as determined by the LCSS.
- **Criterion 2:** requires the ***Proposed Design*** and ***Future Score*** of a level crossing to achieve an LCSS number (out of 60) lower than, or equal to, the ***Updated Existing*** LCSS number.

New proposed facility:

Where a new facility is proposed, the new level crossing must meet ***Criterion 1***. This ensures any new infrastructure constructed over/within the railway corridor is safe for all users and the risk of death or serious injury is low. Where user exposure is high, then it may not be possible to achieve a "Low" or "Medium-Low" risk without grade separation.

Existing facility upgrade:

Where changes to an existing facility are proposed the revised level crossing must meet ***Criterion 1***. Where the modifications required to meet Criterion 1 are not ***reasonably practicable***[2]***,*** then a documented risk assessment discussion between KiwiRail and the client shall be undertaken to agree on the required crossing treatment. In this case the level of treatment applied must meet or exceed ***Criterion 2***.

[1] Australian Level Crossing Assessment Model (ALCAM) is a tool used to identify key potential risks at level crossings and to assist in the prioritisation of crossings for upgrades. The risk model is used to support a decision making process for both road and pedestrian level crossings and to help determine the most effective treatments.
[2] Refer to section 1.3.1 of the Level Crossing Risk Assessment Guidance v5 (April 2022).

1.3 Signals and Telecommunication Standard: Active Level Crossings (S-ST-LC-2103)

Section 5 of KiwiRail's Signals and Telecommunication Standard: Active Level Crossings (S-ST-LC-2103) takes precedence for at grade recommendations, irrespective if the LCSIA process determines a lower form of control is required than the minimum required. The standard states the minimum protection provided for pedestrians is automatic gates when metro trains and/or multiple tracks are present, due to the second train risk and higher train volumes. Half-arm barriers are required for all road new level crossings or upgrades to existing level crossings. Refer to Figure 1-2 for an excerpt from the Standard that outlines where automatic gates are the default installation.

5. Minimum Protection Provided

Not-withstanding all preceding risk assessments the following minimum protections will be pr ovided at active level crossings by Signals and Telecommunications Engineering for new or upgraded level crossings.

Railway Type	Multi Track*		Single Track	
	Road	Ped/cycle	Road	Ped/cycle
Metro	Barriers	Gates	Barriers	Gates
Non-metro	Barriers	Gates	Barriers	FLB

FLB = Flashing Lights and Bells *** Second Train Risk**

Figure 1-2: Section 5 of the Signals and Telecommunication Standard: Active Level Crossings (S-ST-LC-2103)

1.4 Structure of the Report

This report outlines the site observations and subsequent analysis undertaken to the level crossings being upgraded. The elements of the report consist of:

1. The change in use at the level crossing or rail corridor.
2. Site visit observations by the LCSIA Assessor.
3. The existing and future issues that need to be addressed at the crossings.
4. Recommendations to improve safety at the level crossing to achieve, or attempt to achieve, Criterion 1.
5. The LCSS assessment is then conducted, consisting of; ALCAM, Crash and Incident History, Site Specific Safety Score and Engineer risk. The LCSS is assessed for the following four stages.
   a. **UPDATED EXISTING:** an LCSS of the existing level crossings conditions as found on site.
   b. **CHANGE IN USE:** an LCSS of the forecast ten-year user volumes over the crossing in its Updated Existing state. This permits KiwiRail to understand the 'raw' effect the change in use would have on the crossing with no treatments in place, and hence better understand the scale of safety improvement the Proposed Design sets out to achieve.
   c. **PROPOSED DESIGN:** An LCSS of the change in use that aims to achieve Criterion 1. Allows for an initial increase of heavy commercial vehicles (HCV) to the level crossing.
   d. **FUTURE SCORE:** An LCSS that aims to achieve Criterion 1 when the HCV are using the newly constructed haul route between the two mines.

1.5 LCSIA Assessor Independence

The LCSIA Assessor has had no prior involvement with the change in use project at the SH67 Kerrs Road Granity level crossing location. This LCSIA has been conducted prior to the consent application phase.

1.6 Site Visit

On Tuesday 5th November 2024 the site visit was conducted by the LCSIA Assessor ([redacted]). Those present at the site visit were:

- Stantec: [redacted]r (Observer)

On Friday 29th November 2024, an online meeting was held to assess the Engineer Risk scores and meet with KiwiRail/NZTA and Buller District Council (BDC) representatives to discuss the change in use and the history of the level crossing. Those present on the online meeting were:

- Stantec: [redacted]
- KiwiRail: [redacted]
- NZTA: [redacted]
- BDC: [redacted]

1.7 Disclaimer

This report is based on the best available factual and estimated knowledge at the time of writing. Estimates of future scenarios are based on Stantec's educated expectations of what may be likely to occur.

Please note an LCSIA report is not a substitute for a design safety audit, which should occur for any proposed designs that are generated or modified after this report was finalised.

2 The Change in Use and Top down, Hierarchy of Controls Assessment

2.1 The Change in Use

Bathurst Resources Limited ("Bathurst") is seeking to progress the development and mining of coal resources across the Buller Plateau. The aim is to retain the existing infrastructure and mining operations on SH67 as well as to provide access to additional mining areas across the Buller Coal Plateau via Denniston Road.

For an 18 to 24 month period of time there will be an increase of approximately 180 heavy vehicle movements per day on SH67 to haul coal from Denniston to Stockton for processing, before being placed on the coal train. This will occur while a new haul road is constructed connecting Denniston and Stockton mining sites. When complete, the HCV movements will cease to use SH67 and travel via the haul road.

Therefore, this LCSIA is being completed for the existing level crossing to assess the existing situation of the level crossing and its safety. Buller District Council also asked for an assessment of whether the existing situation should be improved with safety interventions, other than increasing the form of control. This report provides an assessment of the impacts on the level crossing that will be impacted by this work.

2.2 Top down, Hierarchy of Controls Assessment

The closure of Kerrs Road Granity level crossing is unlikely as it is on an NZTA state highway route, which the purpose of is to connect townships together. There is no alternative route to Granity from the north.

Grade separation would be unlikely due to the significant cost for a relatively low volume of traffic and that it would be out of context with the surrounding road environment. There would likely be other level crossings in the South Island that would be grade separated before this one ever was.

Based on the above reasoning, grade separation and closure of the level crossing would not appear to be viable.

3 SH67 Kerrs Road Granity LCSIA

3.1 Level Crossing Details

The SH67 Kerrs Road Granity level crossing is located approximately 25 km northeast from Westport as seen in Figure 3-1 and crosses over the Stillwater – Ngakawau Line. It is currently controlled by single flashing lights and bells (FLBs) on each approach. Figure 3-2 shows the aerial view of the level crossing layout and how it interacts with other aspects of the transport network. The surrounding area consists of rural land.

Figure 3-1: SH 67 Kerrs Road Granity level crossing location (Source: Google Maps)

Figure 3-2: SH67 Kerrs Road Granity level crossing aerial (Source: Google Maps)

3.2 Existing and Future User Volumes

Over the last 10 years, the growth rate within the region has been decreasing by 5% annually. Therefore, a 0% growth rate is assumed.

In the short term, traffic volumes are expected to increase by approximately 180 heavy vehicles per day for the next 18 months. After this period, traffic volumes are anticipated to return to existing levels or potentially decrease further, as the haul road will be used to transport coal.

All user data is presented in Table 3-1.

Table 3-1: Existing and Future Level Crossing User volumes

Level Crossing Characteristics		Updated Existing	Proposed Design	Change in Use / Future Score
Vehicle AADT		1,000	1,180	1,000
HCV (%)		15%	28%	15%
Posted Speed Limit		100 km/h	100 km/h	100 km/h
FREIGHT	No. per day	8	8	8
	Line Speed	50 km/h	50 km/h	50 km/h
	Operating Speed UP	50 km/h	50 km/h	50 km/h
	Operating Speed DOWN	50 km/h	50 km/h	50 km/h
Operational Tracks		1	1	1

3.3 Existing Conditions at Site Visit

The level crossing is controlled by single FLBs on both approaches to the level crossing as shown in Figure 3-3 and Figure 3-4. There are 'no parking' lines painted in all four quadrants of the level crossing. The carriageway through the level crossing is quite narrow with no sealed shoulders on either side. Additionally, there is no lighting at, or near, the level crossing. Road markings on both approaches to the level crossing were in a fair condition. The FLBs have crossbucks on top and are in good condition facing the oncoming traffic.

Figure 3-3: Southern approach to level crossing from Birchfield Road

Figure 3-4: Northern approach to the level crossing from Birchfield Road

The sightlines from the southern approach both up and down track have good visibility as shown in Figure 3-4 and Figure 3-5. The vegetation along the sides do not obstruct view of sightlines at the level crossing.

Figure 3-5: UP track sightline on southern approach

Figure 3-6: DOWN track sightline on southern approach

Note that trains have not been operating since June 2024, due to the closure of the railway between Reefton and Ikamatua for tunnel repairs. KiwiRail has informed the Buller District Council it is set to start up again in January 2025.

The sightlines from the northern approach both up and down track have good visibility with no vegetation obstruction as shown in Figure 3-7 and Figure 3-8. However, it is possible to envisage the vegetation in the down track view could grow higher and become a sight distance restriction in the future.

Figure 3-7: DOWN track sightline on northern approach

Figure 3-8: UP track sightline on northern approach

Figure 3-9 shows the condition of the crossing panel to be in an average condition and may require maintenance interventions in the coming years.

Figure 3-9: Crossing panel in moderate condition

There are old ‘GIVE WAY triangle” road markings on both approaches to the level crossing as shown in Figure 3-10 and Figure 3-11. The presence of these road markings may mislead motorists of the type of control this level crossing is operating with. These have not been removed since the controls were upgraded to FLBs in 2014/15.

Figure 3-10: Southern approach with old give way sign still marked

Figure 3-11: Northern approach with old give way sign still marked

Advanced warning signs on the northern approach are seen in Figure 3-12 and Figure 3-13. The advanced warning signs on the southern approach were not able to be closely examined at the time of the site visit due to safety concerns accessing the signs. However, the gated WX1L and WX1R steam train signs and level crossing reverse curves alignment advanced warning signs were present on the southern approach, along with the ‘Rail X’ road marking.

Figure 3-12: Steam train signs on northern approach

Figure 3-13: Advanced warning signs on northern approach

The ‘Rail X’ road marking on the northern approach is in good condition as seen in Figure 3-14. The WX1R sign on the northern approach was in poor condition, as shown in Figure 3-15. It was installed in October 1999. Because of the age of the sign, it was damaged, likely had no night-time retro-reflectivity, was growing lichen on the sign and pole, and finally was leaning to one side.

Figure 3-14: Rail X markings on northern approach

Figure 3-15: WX1R sign on northern approach is damaged.

Figure 3-16 shows the level crossing reverse curves alignment advanced warning sign on the left-hand side is in a poor condition with damage, likely no retro-reflectivity, and lichen growing on the sign and pole. This sign was installed in July 2010. The same sign on the right-hand side is in a good condition with no damage and a small amount of lichen growing on it, seen in Figure 3-17. The sign was installed in November 2014.

Figure 3-16: Advanced warning sign on left side of northern approach

Figure 3-17: Advanced warning sign on right side of northern approach

The WX1L sign on the northern approach, as seen in Figure 3-18, was damaged with likely no retro-reflectivity. The single chevron advisory sign closest to the WX1L sign on the northern approach was damaged as seen in Figure 3-19.

Figure 3-18: Damaged WX1L sign on northern approach

Figure 3-19: Damaged single chevron sign

3.4 Existing Safety Issues

There are existing safety issues which need to be addressed by the upgrade of these level crossing and its interaction with the rail corridor. The following list is in order of most significant to least.

1. **No half-arm barrier control:** The level crossing is only controlled by FLBs, so there is no barrier to help contain motorists who may risk crossing while the FLBs are active.
2. **Curve advisory signs too close to curve.** The reverse curve advisory signs (PW20) are potentially located too close to horizontal curves for crossing the level crossing. There is a large speed differential that motorists have to make from 100km/h to 25km/h to negotiate the first of the reverse curves in each direction. The curves are out of context with the rest of the SH67 alignment, which is a straight alignment for a few kilometres in either direction prior to the level crossing. The number of loss-of-control crashes occurring in either direction at night, is confirming that the existing signage is not helping motorists safely negotiate this piece of road alignment. Motorists either need more time to slow down, or better warning of the change in alignment.
3. **Advanced warning signs placed too close together.** The advanced warning signs are placed close to the level crossing and in close distance from one another providing only a short distance for drivers to slow down before reaching the level crossing.
4. **Speed advisory through the reverse curves and level crossing appears to be low:** The 25km/h speed advisory on the curves through the level crossing may not represent the actual speed that a vehicle can travel through the alignment whilst slowing down to from a 100km/h environment. During the site visit, vehicles were observed to be travelling through the level crossing at a speed greater than 25 km/h.
5. **Non-compliance with level crossing controls.** The KiwiRail incident reporting system has documented several instances where road users have ignored the level crossing FLBs and made risky crossings in front of oncoming trains.
6. **Damaged, non-reflective and old signage**. Majority of the signage installation for the level crossing dates to 1999, has lichen growing on both the sign and pole, have most likely lost their retro-reflectivity, as well as being damaged.

7. **Misleading road markings**. The old 'GIVE WAY triangle road' markings are still present even after upgrading the level crossing from 'GIVE WAY control to FLBs in 2014/15.
8. **Narrow width of road over the level crossing**. The road width is narrow on the approaches and over the level crossing. There are no sealed shoulders on either side of road.
9. **Average condition of crossing panel.** The crossing panel is starting to show signs of wear / deterioration. This needs to be monitored so that a renewal can be timely programmed when required.
10. **No lighting of level crossing**. There is no lighting provision at or near the level crossing as it is in a rural area.

3.5 Future Issues

Bathurst Resources plans to increase heavy vehicle volumes over the level crossing by approximately 180 movements per day for approximately 18-24 months until an alternative haul route is constructed.

Aside from the short-term increase in heavy vehicle volumes, there are no significant issues expected at this level crossing. Train volumes are expected to remain unchanged.

3.6 Safety Recommendations

The recommendations to improve safety at the road level crossing are outlined in Table 3-2, while Figure 3-20 and Figure 3-21 shows how these changes would look in an aerial view. The column on the right states the level of necessity of the recommendation from the following list:

- Meet the Signals and Telecommunication '**Standard: Active Level Crossings**' (S-ST-LC-2103),
- To achieve **'Criterion 1'** and/or **'Criterion 2'**,
- Meet **'TCD Pt. 9'** conditions, or,
- **'Maintenance'** issues.

Table 3-2: Safety recommendations for the road level crossing

Safety Recommendation	Necessity
1. Replace existing advanced warning signs, steam engine, level crossing alignment signs. Assess whether these need to be larger sized signs to better delineate the level crossing and reverse curves in road alignment.	Maintenance
Renew the advanced the WX1L and WX1R steam train signs as well as all the level crossing reverse curves alignment signs. These signs must meet current retro-reflectivity standards. Install large new advanced warning signs and road markings to increase road user awareness of the reverse curves alignment and approaching level crossing. This will likely reduce the number of loss-of-control crashes at this level crossing.	
2. Review whether the advisory speed of 25km/h on the reverse curves is appropriate for the horizontal alignment	
Test the current alignment to determine whether a change in the speed of the advisory sign on the reverse curves is warranted to allow road users to navigate the curve more comfortably and provide messaging that is consistent with the road alignment.	
3. Move horizontal alignment (PW20) advanced warning signs further away from the level crossing to provide more warning/reaction time for motorists to slow down before reverse curves	Maintenance
With a high number of loss of control crashes, user awareness of the reverse curves for the level crossing appears to be insufficient and the warning needs to start at a further distance, allowing drivers more time to slow down and safely negotiate the reverse curves. From the north the signs are only approx. 90m from the start of the curve and from the south approx. 110m. It could be that motorists are not getting enough warning time to slow down after travelling on long straight sections of SH67 in the lead up to the level crossing.	

Safety Recommendation	Necessity
4. Renew chevron arrow advisory sign exiting the southern approach	Maintenance
Replace the damaged chevron arrow closest to the advanced warning signs on the right side after crossing the level crossing from the southern approach.	
5. Remove old GIVE WAY triangle road marking on both approaches	Maintenance
Remove the old give-way road markings on both approaches which no longer comply with FLBs	

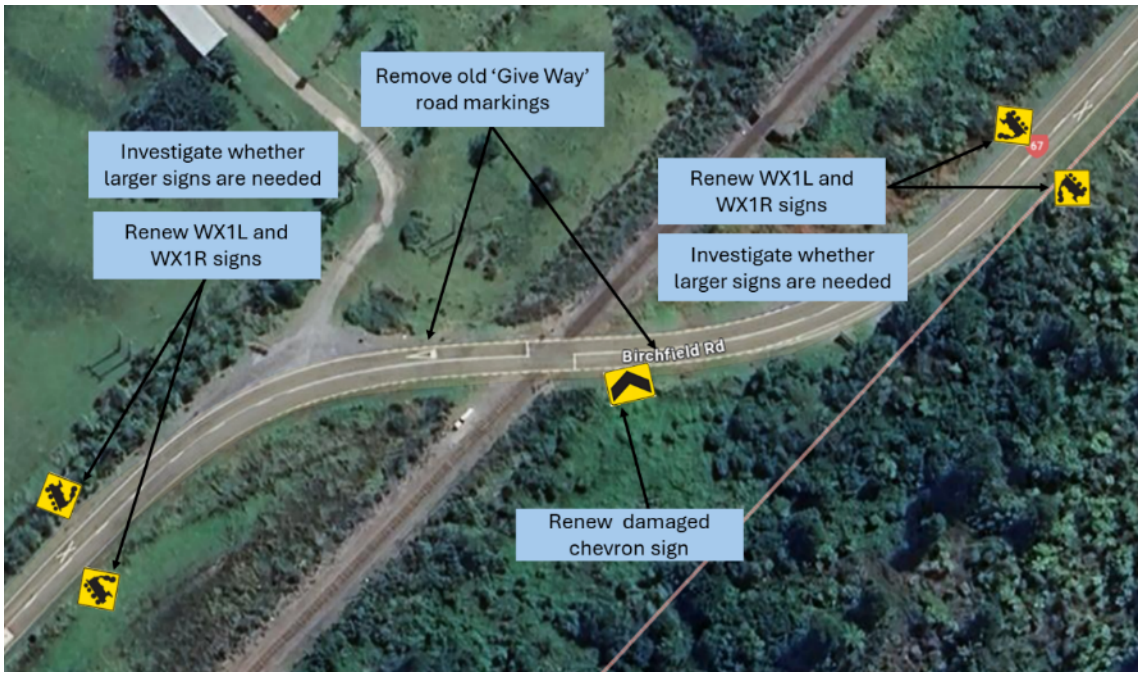

Figure 3-20: Recommendations for the SH67 Kerrs Road Granity level crossing

Figure 3-21: Further recommendations for the SH67 Kerrs Road Granity level crossing

3.7 Level Crossing Safety Score (LCSS)

The following four sections calculate the risk scores of the categories that make up the 60-point LCSS.

3.7.1 ALCAM Score

ALCAM scores are assessed in 'Proposals' mode in the LXM database[3] and forecast the possible risk scenario due to the change in use and for the future, ten years after the proposed change to the crossing.

Updates to the traffic count data were made, as these can have a large impact on the ALCAM score. The return period for fatalities is reported for the road score for each stage. The road ALCAM assessment is presented in Table 3-3.

Table 3-3: ALCAM ID 1394 - SH67 Kerrs Road Granity level crossing ALCAM score

Stage	LCSS	Fatality return	Risk % change	Comments
Updated Existing	7	12,259 years	-	The following changes were made based on conditions found on site. • Road – Horizontal Rail Alignment: Slight Curve • Increased AADT from 967vpd to 1000vpd • Changed HV% from 6.7% to 6.6% • Changed Track Panel Surface Condition to 'Good' • Increased shortest and longest warning time from 0s to 22s due to FLBs • Increase minimum train speed from 10 km/h to 5 km/h • Changed Crossing Characteristic: Road traffic controls do not conform to TCD Pt 9, but understandable • Changed Crossing Characteristic: Visibility – Temporary visual impediments "no known" • Changed Crossing Characteristics: Road Geometry – Possible fatigue zone. **ALCAM risk score is** **0.82** **and the risk band is Medium Low.**
Change in Use (2027)	8	9,578 years	27%	The predicted changes to the road crossing volume are: • Increase AADT from 1,000vpd to 1,180vpd • Increase HV% from 6.6% to 20.8% **ALCAM risk score is** **1.04** **and the risk band is Medium Low.**
Proposed Design	7	9,902 years	23%	Changes to the road crossing are stated below: • Changed Crossing Characteristics – 'Controls (signs and road markings" conform to NZTA TCD Pt 9 **ALCAM risk score is** **1.01** **and the risk band is Medium Low.**
Future Score (2030)	7	12,673 years	-4%	The predicted changes to the road crossing are stated below: • Crossing returns to 1,000 vpd after haul route is complete • Decreased HV% back to 6.6% **ALCAM risk score is** **0.79** **and the risk band is Medium Low.**

[3] Note that the LCSIA Assessor is not ALCAM accredited, so uses best engineering judgement when scoring ALCAM.

3.7.2 Crash and Incident History Score

The ten-year ORA and CAS data for 2014 - 2023 was analysed (including any incidents from 2024) with the history presented in Table 3-4. Where the total score is greater than 10 points, only a maximum of 10 points can be adopted.

There have been eight recorded incidents reported in CAS. Of these crashes, two were serious injury crashes and six were non-injury crashes.

There were two other crashes were recorded on ORA within the search period.

Table 3-4: Crash and Incident History

Database	Incident Type	No.	Comments	Score
ROAD CROSSING				
ORA	NCLV – Near Collision Light Road Vehicle	1	Flashing lights and bells at level crossing. Utility vehicle went across the front of an empty coal train. Failure to comply to Give Way Sign.	1
ORA	NCHV – Near Collision Heavy Road Vehicle	1	Flashing lights and bells were working at the level crossing. Milk Truck failed to stop for bells and lights, passing by only 50m in front of the train.	1
CAS	Hit object	2	Vehicle hit a flashing light pole. Loss of control around the right-hand sweeping bend over the level crossing. One crash was southbound and the other was northbound.	2 x 1 = 2
			TOTAL	**4**

In addition to the crashes mention above there have been six other crashes recorded on the approaches to this level crossing in the CAS database. Of these incidents, half involved vehicles travelling southbound, while the other half involved vehicles travelling northbound. All of these crashes were due to a common issue of drivers failing to negotiate the sweeping right-hand curve from both approaches.

Although the horizontal alignment has been identified as a contributing factor in these crashes, its purpose is to ensure that road users approach the level crossing in a more perpendicular angle as possible. This design improves sightlines up and down the track from both directions, enhancing overall safety. This was particularly important when the level crossing used to be GIVE WAY controlled.

Table 3-5 summarises the change in the LCSS through the assessment stages, with commentary on how reductions or increases in score were forecast for the hypothetical scenarios.

Table 3-5: Summary of Crash and Incident History LCSS

Crossing	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
SH67 Kerrs Road Granity level crossing	**4**	**4**	**3**	**3**	Renewing the advanced warning signs will increase road user awareness of the level crossing which will reduce loss of control type crashes. This will be beneficial particularly for night-time. However, the reverse curves on the road will remain.

3.7.3 Site Specific Safety Score (SSSS)

This site-based score aims to analyse elements of the level crossing layout and is assessed in Table 3-6.

If the level crossing triggers a red flag scenario, the SSSS is automatically scored as 24/30 (or 8/10). If the LCSIA Assessor is not satisfied the calculated SSSS adequately portrays the risk of the level crossing (it has over or understated the risk), they are able to provide a 'Modified' SSSS total score.

Table 3-6: SH67 Kerrs Road Granity level crossing SSSS – ID 1394

Assessed Item	Updated Existing	Change in Use	Proposed Design	Future Score
Crossing Controls ($x_{/5}$)	3	3	3	3
Side road / intersection proximity ($x_{/5}$)	0	0	0	0
Horizontal and vertical alignment ($x_{/5}$)	2	2	2	2
Short stacking / grounding out ($x_{/10}$)	0	0	0	0
Road surface condition ($x_{/5}$)	2	2	2	2
TOTAL SCORE ($X_{/30}$)	**7**	**7**	**7**	**7**
SSSS	**2**	**2**	**2**	**2**
Red Flag Scenario	**N/A**	**N/A**	**N/A**	**N/A**
MODIFIED SSSS				

3.7.4 Engineer Risk Score

The Engineer risk score is a combination of the Locomotive Engineer and NZTA Engineer's opinions of the crash risk at the level crossing, with a weighting of 2:1 in favour of the Locomotive Engineer. Opinions for this level crossing site were provided by the following people:

Locomotive Engineer: Robert Armstrong
NZTA Engineer: Jodi Enright

The risk score for the level crossing is presented in Table 3-7. Any specific comments provided by either Engineer are recorded in the appropriate comments section.

Table 3-7: Engineer Risk Scores SH67 Kerrs Road Granity

Engineers Opinion	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Locomotive Engineer	5	7	7	5	**Change in Use** and **Proposed Design**: Increase HCV will increase the risk score **Future Score**: Decrease in HCV reduces the risk score.
Roading Engineer	3	3	3	3	Implementing larger signs may increase user awareness of the level crossing and therefore increasing the safety rating.
TOTAL SCORE	**8**	**10**	**10**	**8**	
LCSS	**5**	**7**	**7**	**5**	

The Signals Engineer believes the increase in HCV will increase the risk score and installing larger signs will reduce the risk score by increasing road user awareness of the level crossing.

4 LCSS Results

This section calculates the overall LCSS rating for the level crossing in Table 4-1.

Table 4-1: SH67 Kerrs Road Granity level crossing LCSS [1394]

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score
ALCAM score	7	8	7	7
Crash & incident history	4	4	3	3
Site specific safety score	2	2	2	2
Engineer risk score	5	7	7	5
LCSS	**18**	**21**	**19**	**17**
LCSS Risk Band	**Low**	**Medium Low**	**Low**	**Low**
Criterion Met	**C1**	**C1**	**C1**	**C1 & C2**
Form Of Control	**FLBs**	**FLBs**	**FLBs**	**FLBs**
ALCAM risk band	Medium Low	Medium Low	Medium Low	Medium Low
ALCAM risk % change	N/A	27%	23%	-4%
Fatal return period	12,259 years	9,578 years	9,902 years	12,673 years

The Updated Existing LCSS risk band is Low, and the Change in Use LCSS risk band increases to Medium Low. The Proposed Design achieves Criterion 1, and Future Score achieves both Criterion 1 and Criterion 2. Therefore, the level crossing can remain with FLBs for the duration of time the HCV traffic uses SH67 and still meet Criterion 1.

There were no Red Flag issues raised at this road crossing for any of the assessment stages.

5 ALCAM Improvements

5.1 Recommended ALCAM updates

To assist KiwiRail with improvements to the ALCAM database, the following data in Table 5-1 should be considered for update the existing level crossings in LXM.

Table 5-1: ALCAM updates for KiwiRail consideration

SH67 Kerrs Road crossing #1394
• Road – Horizontal Rail Alignment: Slight Curve • Increased AADT from 967vpd to 1000vpd • Changed HV% from 6.7% to 6.6% • Changed Track Panel Surface Condition to 'Good' • Increased shortest and longest warning time from 0s to 22s due to FLBs • Increase minimum train speed from 10 km/h to 5 km/h • Changed Crossing Characteristic: Road traffic controls do not conform to TCD Pt 9, but understandable • Changed Crossing Characteristic: Visibility – Temporary visual impediments "no known" • Changed Crossing Characteristics: Road Geometry – Possible fatigue zone.