SH 67 Granity Ngakawau LCSIA

Bathurst Resources Limited

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Table of Contents

List of Tables

List of Figures

Executive Summary

Bathurst Resources Limited ("Bathurst") are planning to progress their development and mining of coal resources across the Buller Plateau 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 Granity Ngakawau [1395] level crossing

	Updated Existing	Change in Use	Proposed Design	Future Score
LCSS	**25**	**26**	**22**	**21**
LCSS Band	**Medium Low**	**Medium Low**	**Medium Low**	**Medium Low**
Criterion Met	C1	C1	C1 & C2	C1 & C2
Form of Control	FLBs	FLBs	FLBs	FLBs
ALCAM risk band	Medium Low	Medium Low	Medium Low	Medium Low
ALCAM % change	N/A	24%	22%	-2%
Fatal return period	12,243 years	9,760 years	9,984 years	12,565 years

The Updated Existing and Change in Use LCSS risk band is Medium Low. The Proposed Design and Future Score achieves both Criterion 1 and Criterion 2. Therefore, half-arm barriers are not required to achieve Criterion 1 for the Proposed Design or Future Score.

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.	Re-new advanced warning signs, steam engine, level crossing alignment signs	Maintenance
2.	Trim or remove vegetation in the northeast quadrant to improve sightlines	Maintenance
3.	Consider installing additional FLBs in the southwest quadrant facing northwards on SH67, to provide better visibility of the crossing controls obscured by the horizontal curve and vegetation	
4.	Investigate installing half-arm barriers to greatly reduce the occurrence of near misses at the level crossing	
5.	Relocate the crossbuck signs to on top of the FLBs	Maintenance
6.	Renew line marking on the approaches to the level crossing	Maintenance
7.	Install new tactile pavers and delineation tape at the pedestrian level crossing	Maintenance
8.	Improve the maintenance inspection regimes of the road signage and line marking for both the level crossings	Maintenance

No.	Recommendation	Level of Necessity
9.	Improve delineation of the curves on the level crossing approaches	

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

[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).

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***.

1.3 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 Granity Ngakawau level crossing location. This LCSIA has been conducted prior to the application phase.

1.6 Site Visit

On Tuesday 5th November 2024 the site visit was conducted by the LCSIA Assessor (Sayuni Jayasinghe).

Those present at the site visit were:

- Stantec: Sayuni Jayasinghe and Chris Rossiter (Observer)

On Friday 29th November 2024, an online meeting was held to assess the Engineers 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: Sayuni Jayasinghe, Chris Rossiter and Shaun Bosher
- KiwiRail: Robert Armstrong and Lindsay Baker.
- NZTA: Jodi Enright
- BDC: Alan Bradbery

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.

Note that the change in HCV movements will have no material effect on the pedestrian level crossing, therefore it has not been assessed. However, the report does highlight some issues that were witnessed on site.

2.2 Top down, Hierarchy of Controls Assessment

The closure of SH67 Granity Ngakawau 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. It would also have negative impacts on some private properties and houses. 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 Granity Ngakawau LCSIA

3.1 Level Crossing Details

The SH67 Granity Ngakawau level crossing is located approximately 28 km northeast from Westport as seen in Figure 3-1 and crosses over the Stillwater - Ngakawau Line. It is currently controlled by duplicated flashing lights and bells (FLBs). Figure 3-2 shows the aerial view of the level crossing layout and how it interacts with other aspects of the transport network.

Within close walking distance to the level crossing are the following vulnerable users.

- Granity School (4-minute walk)

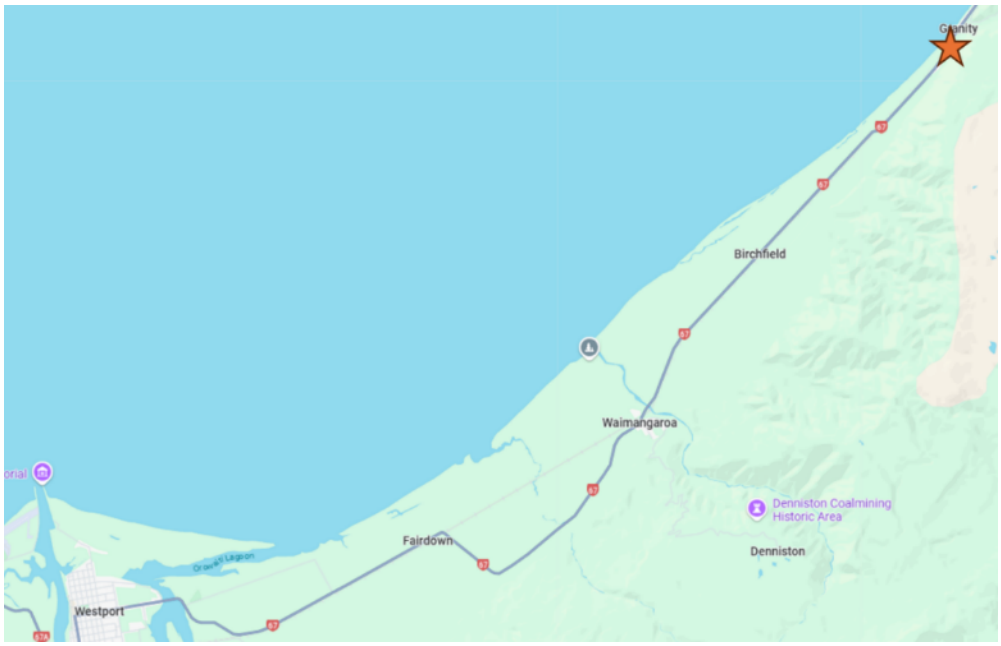

Figure 3-1: SH67 Granity Ngakawau level crossing location (Source: Google Maps)

Figure 3-2: SH67 Granity Ngakawau 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 HCV per day for an 18-24 month period. 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		1,148	1,328	1,148
HCV (%)		6%	19%	6%
Posted Speed Limit		50 km/h	50 km/h	50 km/h
FRIEGHT Trains	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

3.3.1 Road Level Crossing Observations

The level crossing is controlled by duplicated FLBs provided on both approaches. Both the primary and secondary FLBs face the approaching the north and south lanes of SH67 as seen in Figure 3-3 and Figure 3-4. FLBs are visible from both approaches only after navigating the first of the reverse curves in each direction. This means the advanced warning signs act as the primary indicator to a motorist that a level crossing lies ahead on the road.

Figure 3-3: Southern approach to the level crossing from Torea Street

Figure 3-4: Northern approach to the level crossing from Torea Street

The WX6 crossbuck signs are installed on separate poles approximately 10-15m in front of the FLBs on both approaches (as seen in Figure 3-4). The crossbuck sign for the southern approach is in a poor condition. The sign is damaged, lacks reflectivity, is leaning over, and the pole is no longer a white colour, with lichen growing on it. The crossbuck on the northern approach is in much better condition.

Sightlines up and down the track from the southern limit line area are shown in Figure 3-5 and Figure 3-6. There is good visibility in both directions with no obstruction to sightlines.

Figure 3-5: UP track sightline on southern approach

Figure 3-6: DOWN track sightline on southern approach

Sightlines up and down track from the northern limit line area are shown in Figure 3-7 and Figure 3-8. There is good visibility in both directions with no obstruction to sightlines.

Figure 3-7: UP track sightline on northern approach

Figure 3-8: DOWN track sightline on northern approach

While visibility of the level crossing is good at the limit line, the northern approach is obstructed by vegetation, hindering the view of southbound trains as shown in Figure 3-9.

The reverse curve bend obscures the level crossing controls until after the bend is navigated, thereby reducing user awareness of the proximity of the controls as shown in Figure 3-10

Figure 3-9: Poor visibility of crossing controls from the north (Google Street View)

Figure 3-10:Vegetation masking the approach of southbound trains (Google Street View)

The track panel is in a good condition as seen in Figure 3-11. However, the line marking is starting to fade on both approaches. The average condition of the line marking on the northern approach is shown in Figure 3-12.

Figure 3-11: Track panel in good condition

Figure 3-12: Faded line markings on the northern approach

The WX3 sign from the southern approach is in an average condition (Figure 3-13), while the sign itself is in a relatively good shape, the pole has lichen growing on it. It is assumed that the sign may no longer have adequate night-time retro-reflectivity, as it was installed sometime between 2013 and 2018.

The WX3 sign from the northern approach has lichen growing on the sign and pole as shown in Figure 3-14. The pole is also loose in the ground and on a slight lean. This sign was installed in October 1999, which means its night-time retro-reflectivity is probably non-existent.

Figure 3-13: WX3 on left side on the southern approach

Figure 3-14: WX3 on left side on the northern approach

There is a WX1L and WX1R sign on the southern approach to the level crossing. The WX1L sign, as shown in Figure 3-15, is damaged and the pole has lost its white colour with lichen growing on it. The installation of the sign dated back to October 1999. The WX1R sign (not pictured), was in a similar condition.

Figure 3-15: WX1L sign on southern approach

The WX1L sign on the northern approach to the level crossing was in a moderate condition with little lichen growing on the sign and pole as shown in Figure 3-16. This sign was installed in October 1999 hence the night-time retro-reflectivity of the sign may not be effective now.

The WX1R sign on the northern approach was in a good condition as shown in Figure 3-17. It too is assumed that this sign may have lost its night-time retro-reflectivity.

Figure 3-16: WX1L sign on northern approach

Figure 3-17: WX1R sign on northern approach

A level crossing curve alignment sign was located on the left side of Torea Street (SH67) from the southern approach, as shown in Figure 3-18. This sign was in a moderate condition, with no damage, but it may have lost its night-time retro-reflectivity as well. The pole has some lichen growing on it. It is very closely spaced from the WX1L sign seen in the background of the same figure.

Figure 3-18: Level crossing alignment sign from southern approach

Figure 3-19 and Figure 3-20 show the 'Rail X' road markings from the southern and northern approaches to the level crossing.

Figure 3-19: Rail X markings from southern approach

Figure 3-20: Rail X markings from northern approach

Back Road is a nearby side road to the level crossing from the southern approach. There are good sightlines to the north of SH67 towards the level crossing as shown in Figure 3-21. This allows good visibility of the level crossing controls from the intersection. The one street light pole near the level crossing can also be seen in Figure 3-21.

The GIVE WAY sign at the intersection has lichen growing on it and the height of the sign is mounted too low, as shown in Figure 3-22.

Figure 3-21: Sightlines from Back Road towards the level crossing

Figure 3-22: Condition of GIVE WAY sign at Back Road / SH67 intersection

Domain Road is a nearby side road to the level crossing from the northern approach. There are clear sightlines to the south of SH67 towards the level crossing as shown in Figure 3-23. This allows good visibility of the level crossing controls from the intersection.

The GIVE WAY sign at the intersection is unclean, leaning, and has some lichen growing on it as shown in Figure 3-24.

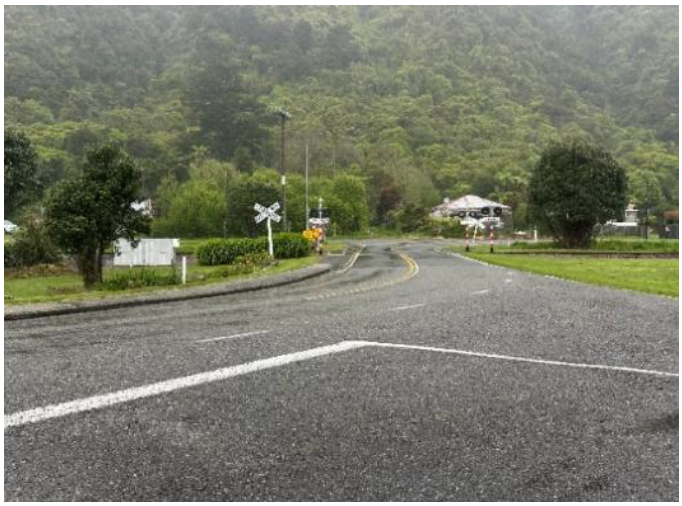

Figure 3-23: Sightlines from Domain Road towards the level crossing

Figure 3-24: Condition of Give Way sign at Domain Road / SH67 intersection

3.3.2 Pedestrian Level Crossing Observations

While not specifically assessed for this LCSIA investigation, as the increase in road traffic does not impact on pedestrian volumes, there were some issues with the pedestrian crossing that are worth noting.

There is a pedestrian crossing on the up-track side of the road level crossing. The northern and southern approaches are shown in Figure 3-25 and Figure 3-26 respectively. The 'look for trains' signs on both sides are in good condition and were installed in September 2016. There are good sightlines for pedestrians on both approaches to the level crossing.

The tactile pavers on the northern approach are in a poor condition with one tile missing and others being misaligned, as shown in Figure 3-25. While the southern approach (Figure 3-26), does not have any tactile pavers and the yellow delineation tape across the tracks is faded.

Figure 3-25: Pedestrian crossing northern approach

Figure 3-26: Pedestrian crossing southern approach

3.4 Existing Safety Issues

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

3.4.1 Road Level Crossing Issues

1. **Lack of half-arm barriers to control the level crossing.** The level crossing is only controlled by FLBs and there are no half arm barriers present to stop vehicles. This can lead to motorists choosing to 'beat' an approaching train if they believe it will uphold their journey.
2. **Lack of compliance with the level crossing controls.** There are six near misses recorded in ORA over the last 10 years, which shows that motorists are ignoring the active controls. This is a lot more than we would typically expect to find at a low volume crossing, when compared to other LCSIA we have conducted around the country. The Locomotive Engineer mentioned that the problem is worse and often near misses do no go recorded if no license plate it captured from the offending vehicle.
3. **Vegetation obscuring trains travelling in downtrack direction, when approaching from the north.** The up-track visibility for motorists approaching from the north is significantly reduced due to vegetation obscuring the line of sight of an oncoming southbound train. The ORA near miss records note the near misses are often coming when southbound trains are approaching (the even numbered trains travel downtrack, while odd numbered trains travel up-track).
4. **Poor quality of level crossing signs.** Both approaches have the appropriate level crossing signage, however many of the signs are very old – many are 25 years old. These signs are damaged and have most likely lost all their night-time retro-reflectivity which reduces awareness of the level crossing for motorists in dark and low light conditions.
5. **Aging and tired line marking.** Some of the line marking near the level crossing is fading / cracking and requires re-marking.
6. **Crossbuck signs should not be on separate poles.** These should be located on top of the FLBs as per TCD Pt9.
7. **A poor maintenance inspection regime is occurring at this level crossing for signage and road marking.** The state of the signs and line marking at this level crossing suggests that very few maintenance inspections are occurring at this level crossing. If these checks are occurring, they are either not been done by someone suitably qualified, they have not been undertaken at night to determine retro-reflectivity of the signs and delineation or a blind eye is being turned to the defects. The NZTA Safety Engineer mentioned that inspections had occurred at this level crossing in recent times, therefore was surprised to hear of the poor state of the sign assets, in particular.

3.4.2 Pedestrian Crossing Issues

1. **Lack of maintenance occurring at the pedestrian level crossing facility.** There are missing tactile pavers on both approaches and the delineation tape over the pedestrian crossing is very damaged and needs to be replaced. Again, this follows the same narrative as the road level crossing, defects are being ignored.

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. Figure 3-27 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. Renew advanced warning signs, steam engine, level crossing alignment signs	Maintenance
Install new advanced warning signs on approaches as these are over 25 years old, being installed in October 1999 and well past their use by date effectively. These signs must meet current reflectivity standards. The signs will be the main form of warning for motorists prior to the corner bend, hence, need to be in good condition.	
2. Trim or remove vegetation in the northeast quadrant to improve sightlines	Maintenance
Trim or remove the trees and hedges along in the north-east quadrant to improve sightlines of approaching downtrack (southbound) trains for SH67 motorists approaching from the north. Trains in particular, and the FLBs, are obscured from view for approaching motorists.	
3. Consider installing additional FLBs in the southwest quadrant facing northwards on SH67, to provide better visibility of the crossing controls obscured by the horizontal curve and vegetation	
Moving the existing secondary FLBs further away from the level crossing on both approaches (or installing another set of FLBs) will increase user awareness of the level crossing from a greater distance away. If vegetation clearing can only be limited, adding this FLB will increase the warning of the hazard of oncoming trains. Most of the near misses occurring are with southbound trains as per ORA records.	
4. Investigate installing half-arm barriers to greatly reduce the occurrence of near misses at the level crossing	
Although not required to be installed for the purposes of this Change in Use, the number of near miss incidents at this FLB controlled level crossing is demanding that half-arm barriers are installed. This would significantly increase safety at this level crossing.	
5. Relocate the crossbuck signs to on top of the FLBs	Maintenance
TCD Pt.9 expects that crossbucks are located on top of the FLBs. Moving them from their existing separate posts would also reduce the sign clutter, as there are several signs for this level crossing.	
6. Renew line marking near the level crossing	Maintenance
The pavement marking at the level crossing and on the approaches is faded and needs to be renewed.	
7. Install new tactile pavers and delineation tape at the pedestrian level crossing	Maintenance
The pedestrian level crossing is in a bad state of repair and needs tactile pavers and delineation tape to be renewed.	
8. Improve the maintenance inspection regimes of the road signage and line marking for both the level crossings	Maintenance
Whilst we were informed that inspections are occurring at the level crossing, the sign faults noted (in particular) are not being recorded for renewal. Either identifying the problems is an issue, there have not been any night inspections to determine retro-reflectivity of the signs and delineation or there is a low threshold for quality that the signage should be at, which needs to be challenged by the road controlling	

Safety Recommendation	Necessity
authority. Regardless of the way it is happening, it is the motorist who loses out the longer the old, damaged signs remain.	
9. Improve delineation of the curves on the level crossing approaches	
Although not directly a level crossing issue, the reverse curves in the road only exist because of the level crossing. A couple of crashes have occurred with vehicles leaving the road, therefore there needs to be a review of what else can be done (despite the presence of side roads) to increase the visibility of the curves	

Figure 3-27: Recommendations for the SH67 Granity Ngakawau road 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 1395 - SH67 Granity Ngakawau level crossing ALCAM score

Stage	LCSS	Fatality return	Risk % change	Comments
Updated Existing	7	12,243 years	-	The following changes were made based on conditions found on site. • Increased AADT from 997vpd to1,148vpd • Increased shortest warning time from 0s to 22s due to FLBs • Increase minimum train speed from 5km/h to 10 km/h • Changed Track Panel Surface Condition to 'Good'. • Changed road width to 6m and clearance width to 8m. • Selected bells/audible warning devices • Selected 'An inspection program exists but maintenance follow-up is inadequate'.
				ALCAM risk score is **0.82** **and the risk band is Medium Low.**
Change in Use (2027)	7	9,760 years	24%	The predicted changes to the road crossing volume are: • Increased AADT from 1,148vpd to 1,328vpd • Increased HV% from 6% to 19%
				ALCAM risk score is **1.02** **and the risk band is Medium Low.**
Proposed Design	7	9,984 years	22%	Changes to the road crossing are stated below: • Selected 'Crossing Controls – an effective inspection and maintenance programme is evident'.
				ALCAM risk score is **1.0** **and the risk band is Medium Low.**
Future Score (2030)	7	12,565 years	-2%	The predicted changes to the road crossing are stated below: • The crossing returns to 1,148 vpd after haul route is complete • Reduced HCV% back to 6%
				ALCAM risk score is **0.80** **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.

Table 3-4: Crash and Incident History

Database	Incident Type	No.	Comments	Score
ROAD CROSSING				
ORA	NCLV – Near Collision Light Road Vehicle	6	All six instances were near misses involving a vehicle crossing in front of an approaching train while the FLBs were operating. Four of the near misses were within 20m of the approaching train and two were approximately 5m to the train.	6 x 1 =6
CAS	Hit Object	2	Two crashes involving vehicles hitting a flashing light pole. Alcohol was a factor in one of the crashes, and the failure to negotiate the left-hand bend was the cause of the other crash.	2 x 1 = 2
			TOTAL	**8**

In addition to the crashes mentioned above there were two other crashes recorded at this level crossing in the CAS database for this time period. Both of these crashes were due to the drivers failing to negotiate the sweeping left-hand bend in the road geometry. One was from the northern approach and the other from the southern approach.

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 Granity Ngakawau level crossing	**8**	**8**	**6**	**6**	Renewing road signs, remarking road markings and controlling vegetation growth near the level crossing will increase road user awareness of the level crossing and trains, which in turn will ideally reduce the crashes and incidents occurring.

3.7.3 Site Specific Safety Score (SSSS)

This site-based score aims to analyse some elements of the level crossing layout. The level crossing 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 Granity Ngakawau level crossing SSSS – ID 1395

Assessed Item	Updated Existing	Change in Use	Proposed Design	Future Score
Crossing Controls ($x_{/5}$)	3	3	3	3
Queuing ($x_{/6}$)	1	1	1	1
Short stacking / grounding out ($x_{/10}$)	0	0	0	0
Accessways / side roads and bisecting intersections ($x_{/6}$)	1	1	1	1
Observed non-compliance ($x_{/3}$)	3	3	2	2
TOTAL SCORE ($X_{/30}$)	**8**	**8**	**7**	**7**
SSSS	**3**	**3**	**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 Locomotive Engineer and NZTA Engineer opinion 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 Granity Ngakawau

Engineers Opinion	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Locomotive Engineer	7	8	7	6	Notes there have been a lot of cars crossing through activated FLBs, particularly when the FLBs are immediately activated and the train is further away from the level crossing. This is a common occurrence at this level crossing. Noted this level crossing is slightly worse in terms of compliance than other level crossings around the area.
Roading Engineer	3.5	4	4	3.5	At this level crossing there is low speed for traffic and trains compared to the wider West Coast NZTA network.
TOTAL SCORE	**10.5**	**12**	**11**	**9.5**	
LCSS	**7**	**8**	**7**	**6**	

The Signals Engineer agreed with the Locomotive Engineer's commentary.

4 LCSS Results

This section calculates the overall LCSS rating for the level crossing. A brief discussion on the progression of the LCSS and ALCAM risk score through the assessment stages is also provided. Table 4-1 presents the results of the road LCSS.

Table 4-1: SH67 Granity Ngakawau level crossing LCSS [1395]

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score
ALCAM score	7	7	7	7
Crash & incident history	8	8	6	6
Site specific safety score	3	3	2	2
Engineer risk score	7	8	7	6
LCSS	**25**	**26**	**22**	**21**
LCSS Risk Band	**Medium Low**	**Medium Low**	**Medium Low**	**Medium Low**
Criterion Met	**C1**	**C1**	**C1 & C2**	**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	24%	22%	-2%
Fatal return period	12,243 years	9,760 years	9,984 years	12,565 years

The Updated Existing and Change in Use LCSS risk band is Medium Low. The Proposed Design and Future Score achieves both Criterion 1 and Criterion 2. Therefore, half-arm barriers are not required to achieve Criterion 1 for the Proposed Design or Future Score.

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 Granity Ngakawau crossing #1395
• Increased AADT from 997vpd to1,148vpd • Increased shortest warning time from 0 s to 22 s due to FLBs • Increase minimum train speed from 5km/h to 10 km/h • Changed Track Panel Surface Condition to 'Good'. • Changed road width to 6m and clearance width to 8m. • Selected bells/audible warning devices • Selected 'An inspection program exists but maintenance follow-up is inadequate'.