Report: Scruttons Road LCSIA (2024)

Ref: 310203418

PREPARED FOR: Christchurch City Council

PREPARED BY: [redacted]

Stantec

Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer	Independent Reviewer	Project Manager Final Approval
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Executive Summary

Christchurch City Council (CCC) has recently opened the Heathcote Expressway Major Cycle Route (MCR), which has increased the volume of cyclists and pedestrians over the Scruttons Road level crossing. Whilst there is a plan to upgrade the level crossing in the future, the final timing of this is uncertain.

CCC therefore requested that a Level Crossing Safety Impact Assessment (LCSIA) be completed of the existing level crossing situation, to help them determine if the existing situation is deemed unsafe, requiring that the MCR should be closed until such time as the level crossing is upgraded. CCC also asked for an assessment of whether the existing situation could be improved with safety interventions, other than increasing the form of control. Therefore, the Proposed Design and Future Score assessments in this instance do not show an increase in the main controls to a separate pedestrian facility with automatic gates. The work assessing this was conducted in a previous LCSIA report in 2019.

Note, to better assess the impact of cyclists and pedestrians who are using a road level crossing to cross the rail corridor, the pedestrian ALCAM model was used as a proxy instead of the road ALCAM model. Using the pedestrian model better equates for how pedestrians and cyclists move and interact within the rail space. Therefore, the existing conditions of the road level crossing were replicated as best they could be in the pedestrian model, i.e. a deteriorating crossing panel for vehicles was scored as poor crossing panel for pedestrians. If the road model was used, ALCAM would effectively treat them as additional light vehicles and that would minimise the different risks experienced by pedestrians and cyclists.

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 table below details the progression of the scoring for the level crossing through the stages of the LCSS.

Scruttons Road Level Crossing LCSS

Summary of LCSS changes at Scruttons Road (proxy pedestrian) level crossing

Crossing Name		Updated Existing	Change in Use	Proposed Design	Future Score
Scruttons Road (proxy pedestrian) level crossing	LCSS	39	45	32	38
	LCSS Band	Medium	Medium High	Medium	Medium
	Criterion Met	FAIL	FAIL	C2	C2
	Form of Control	FLBs	FLBs	FLBs	FLBs

Based on the assessment of pedestrians and cyclists continuing to use the road crossing to cross the rail corridor, the assessment has determined that the Updated Existing LCSS is Medium, and the Change in Use LCSS increases into the Medium-High risk band. The Proposed Design and Future Score do not achieve Criterion 1 but do meet Criterion 2. The Future Score increases to the top end of the LCSS Medium risk band, whereas the Proposed Design was at the lower end. Therefore, either a higher form of control such as half-arm barriers and/or automatic gates, or if they do not work (this was not tested) grade separation is required to achieve Criterion 1 for the Future Score.

The following are proposed safety treatments tested by the LCSIA Assessor for the level crossing to reduce the LCSS to attempt to achieve Criterion 1. These do not include solutions such as a separate pedestrian crossing facility with automatic gates or half-arm barriers, as the point of this assessment is to understand what the LCSS value equates to by doing any remaining peripheral treatments, until such time as the long term solution of active controls are installed.

Summary of proposed safety treatments tested at the level crossing

No.	Tested Treatment/Recommendation	Level of Necessity
1.	As the proposed peripheral treatments fail to achieve Criterion 1, the level crossing situation is deemed unsafe and access to and from the cycleway over the level crossing should be restricted.	Criterion 1
2.	A separate pedestrian facility should be installed as per Section 8.2 of TCD Pt. 9.	TCD Pt.9
THE FOLLOWING TREATEMENTS WERE TESTED TO CONFIRM IF THE LEVEL CROSSING CAN CONTINUE TO OPERATE AS INTENDED UNTIL THE LONG TERM DESIGN IS IMPLEMENTED		
3.	Install crossing panel treatment to remove flange gaps on skew angle of level crossing	
4.	Install additional set of pedestrian focused FLBs in southeast quadrant	

No.	Tested Treatment/Recommendation	Level of Necessity
5.	Cut back or clear vegetation in southeast quadrant to improve sight lines	Maintenance
6.	Install lighting over the level crossing for the benefit of train drivers	
7.	Improve minor pavement issues either side of the level crossing	Maintenance
8.	Consider widening the road crossing when repairing edge break	Maintenance
9.	Remark pavement markings	Maintenance
10.	Review signage around the level crossing	Maintenance

ALCAM Summary

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score
Scruttons Road Level Crossing				
ALCAM risk band	High	High	Medium High	High
ALCAM risk score % change	N/A	87%	-53%	-17%

In summary, the selection of level crossing controls for an upgrade are dictated by the Signals and Telecommunication Standard for active level crossings. In that respect, we could only support the installation of half-arm barriers and automatic gates as the best at-grade solution for this level crossing.

Road Level Crossing LCSS with 2019 volumes

CCC requested an assessment of the existing situation using the same approach and user volumes used in the 2019 LCSIA report, so a comparison can be made. Stantec notes that the 2019 LCSIA approach is no longer the way LCSIA's are conducted when assessing cycleways over a road level crossing, and the approach taken in the 2024 LCSIA (above) is the appropriate method. Therefore, we do not support the outcome of this assessment.

The volumes estimated for the 2019 LCSIA are much higher than the surveyed volumes captured for the 2024 assessment. The 2019 LCSIA estimated 160 cyclists over the level crossing for the Proposed Design phase and 300 cyclists for the Future Score phase. One of the recommendations of the report was to capture volumes once the MCR was operational and update scoring based on the new data. These is the volumes used in the 2024 LCSIA, however with the different ALCAM assessment method.

Summary of LCSS changes at Scruttons Road crossing with 2019 volumes

	Updated Existing	Change in Use	Proposed Design	Future Score
LCSS	**16**	**23**	**19**	**21**
LCSS Band	**Low**	**Medium Low**	**Low**	**Medium Low**
Criterion Met	**C1**	**C1**	**C1**	**C1**
Form of Control	**FLBs**	**FLBs**	**FLBs**	**FLBs**

The Updated Existing LCSS is Low, and the Change in Use LCSS increases to Medium Low. The Proposed Design LCSS is in the Low risk band and achieves Criterion 1, whilst the Future Score LCSS is in the Medium Low risk band and still achieves Criterion 1.

Road Level Crossing ALCAM Summary with 2019

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score
ALCAM risk band	Medium Low	Medium Low	Medium Low	Medium Low
ALCAM risk score % change	N/A	30%	10%	20%
Fatal return period	10,348 years	7,931 years	9,058 years	8,368 years

No assessment of the pedestrian facility with mazes was conducted, as the KiwiRail minimum standard at a double track pedestrian level crossing is automatic gates, which is supported by Stantec.

Contents

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 crossing is placed into the following risk bands in Figure 1-1.

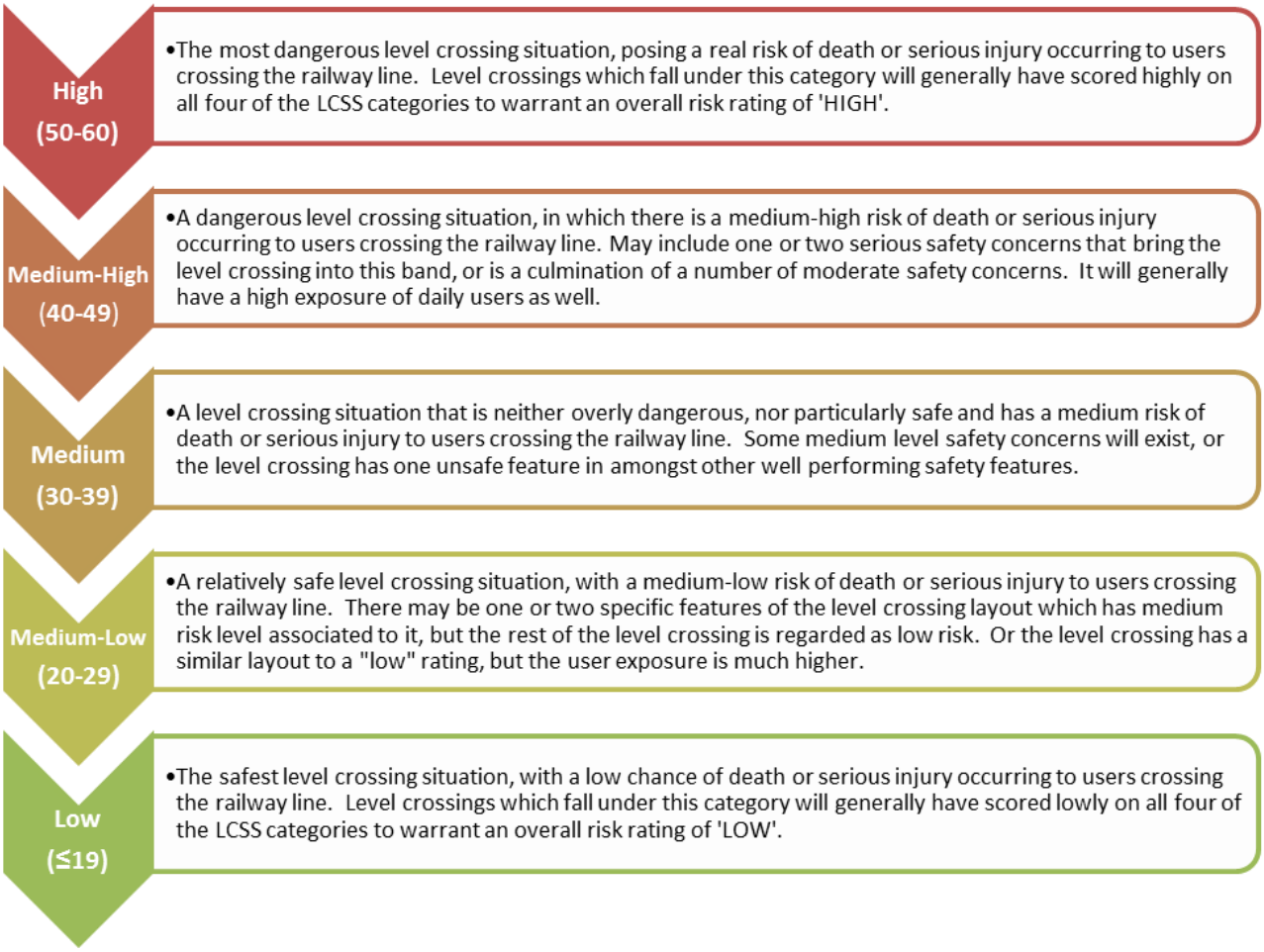

Figure 1-1: Level crossing safety score risk bands

[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.

1.2 LCSIA Criteria

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

1.3 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)

[2] Refer to section 1.3.1 of the Level Crossing Risk Assessment Guidance v5 (April 2022).

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 issues that need to be addressed at the crossings.
4. An assessment of the proposed upgrade.
5. Recommended modifications for the proposed upgrade to further reduce the risk of crashes.
6. 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[3] 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[4].
    c. **PROPOSED DESIGN:** An LCSS of the change in use that aims to achieve Criterion 1. Allows for an initial increase of users attracted to the new facility.
    d. **FUTURE SCORE:** An LCSS that aims to achieve Criterion 1 ten years post opening. Includes a forecast increase in user numbers which may require a further increase in the form of control.

1.5 LCSIA Assessor Independence

The LCSIA Assessor has had no prior involvement with the change in use project at the Scruttons Road level crossing location. This LCSIA has been conducted after the Heathcote Expressway Major Cycle Route (MCR) was opened.

1.6 Site Visit

On Thursday 11th July 2024 at 10am the site visit was conducted by the LCSIA Assessors (Shaun Bosher and Sayuni Jayasinghe) to assess the Site Specific Safety Score and meet with KiwiRail and Christchurch City Council (CCC) representatives to discuss the change in use and the history of the level crossing.

Those present at the site visit were:

- KiwiRail: [redacted]
- CCC: [redacted]
- Stantec: [redacted]

A subsequent meeting to discuss the level crossing with KiwiRail locomotive engineer [redacted] (who was unable to attend the site visit), was held on 24th July.

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.

[3] Includes change in demographic percentage of pedestrians or heavy vehicles in ALCAM
[4] If the proposed project is a transformational change to the crossing location, then assessing the 'Change in Use' risk of increased volumes over the Updated Existing pedestrian crossing situation may not be relevant, e.g. an existing double track pedestrian crossing where a new central platform train station is proposed between the tracks. This would change a single ALCAM crossing point over two tracks into multiple crossing points over two ALCAM crossings.

2. The Change in Use

2.1 Brief Project Outline

CCC has recently opened the Heathcote Expressway MCR, which has increased the volume of cyclists and pedestrians over the Scruttons Road level crossing. Whilst there is a plan to upgrade the level crossing in the future, the final timing of this is uncertain.

CCC therefore requested that a LCSIA be completed of the existing level crossing situation, to help them determine if the existing situation is deemed unsafe, requiring that the MCR should be closed until such time as the level crossing is upgraded. CCC also asked for an assessment of whether the existing situation could be improved with safety interventions, other than increasing the form of control. Therefore, the Proposed Design and Future Score assessments in this instance do not show an increase in the main controls to a separate pedestrian facility with automatic gates. The work assessing this was conducted in a previous LCSIA report in 2019.

2.2 Documents Provided

- The original Scruttons Road LCSIA report (Velos consortium, May 2019) completed prior to the construction of the MCR.

3. Top down, Hierarchy of Controls Assessment

The closure of Scruttons Road level crossing is unlikely as it would landlock some parcels of land. Although Scruttons Road has a very low traffic volume, this route is critical to providing connectivity to the nearby electrical substation, farmland, and a small business. The Heathcote River and State Highway 74 (SH74) surround these different land uses and no access can be obtained from Truscotts Road (near Ferrymead Heritage Park).

The predominant vehicular users of the level crossing are light vehicles with a few small trucks from the nearby business. With the implementation of the Heathcote Expressway MCR there is an increasing number of pedestrians and cyclists using the level crossing to access the MCR and this volume is expected to keep increasing.

Grade separation would be an expensive option to implement on a low volume road such as this, which would not benefit a large number of users.

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

4. Scruttons Road LCSIA

4.1 Level Crossing Details

The Scruttons Road level crossing is in the suburb of Ferrymead and crosses over the Main South Line. The road level crossing is currently controlled by flashing lights and bells (FLBs) on the northern and southern sides, with no formal pedestrian crossing across the rail corridor. The recently opened Heathcote Expressway MCR runs parallel to the rail corridor at Scruttons Road, on the northern side of the tracks.

Figure 4-1 shows the level crossing location in relation to nearby environs, whilst Figure 4-2 shows the aerial view of the level crossing layout and where the new MCR approximately runs in relation to the rail corridor.

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

- Residential area (1 minute).

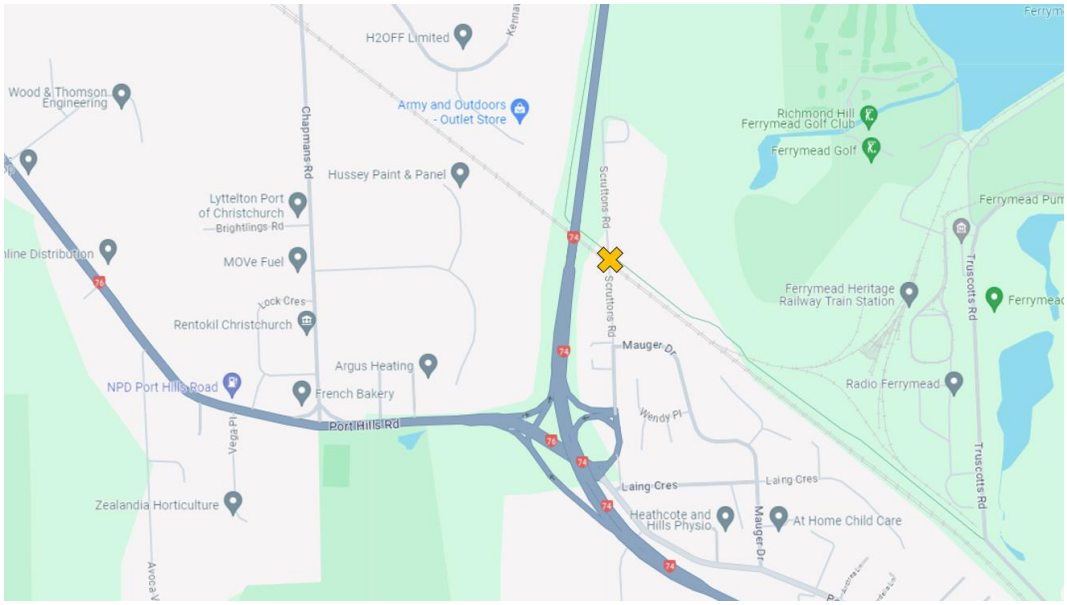

Figure 4-1: Scruttons Road level crossing location (Source: Google Maps)

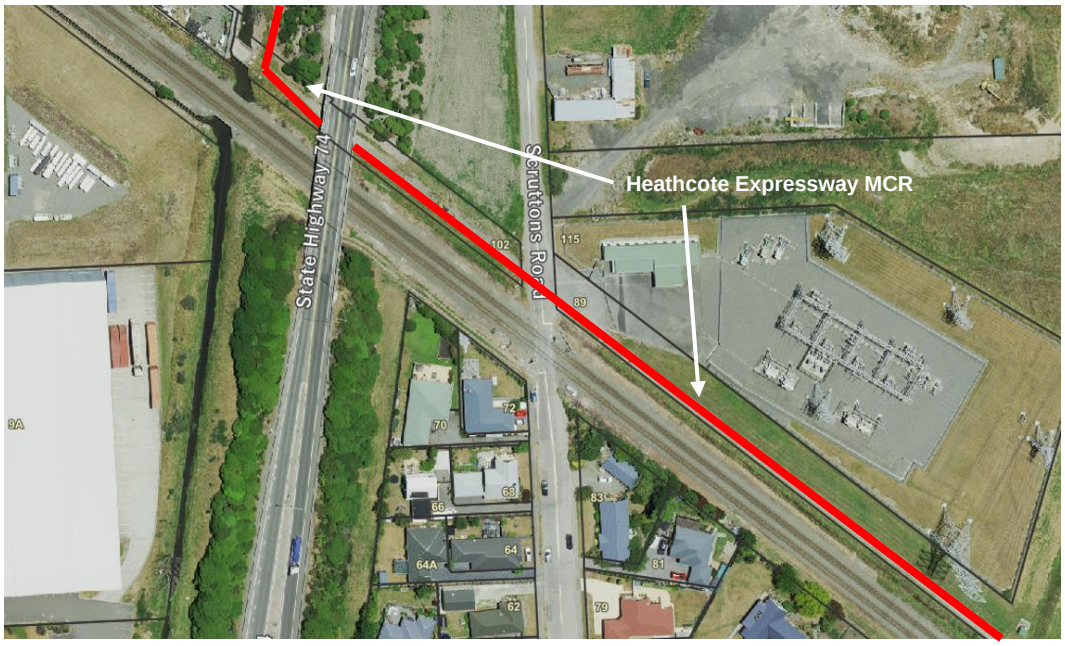

Figure 4-2: Scruttons Road level crossing aerial (Source: Canterbury Maps)

4.2 Existing and Future User Volumes

The Mobile Road traffic data website reports an Annual Average Daily Traffic (AADT) of 50 vehicles per day (vpd) from November 2017 on Scruttons Road. Discussions with the CCC Roading Engineer indicated that there may be some development activities proposed just north of the level crossing (wetland improvements, and other enhancements of the natural area) which could potentially increase traffic volumes on Scruttons Road. Additionally, the newly implemented Heathcote Expressway MCR is open and likely to attract more users into the future.

KiwiRail locomotive engineers outlined train drivers usually go through Scruttons Road level crossing and other nearby level crossings at the line speed of 50km/h. On average, 40 freight trains pass through this level crossing each day. There has been no allowance for increased train volumes in the future.

A pedestrian survey was conducted on 21st and 22nd of June (a Friday and Saturday) to understand the existing pedestrian / cycle use over the level crossing with the MCR now operational. The weather was fine and following data in Table 4-1 was recorded.

Using the NZTA Cycling Network Guidance[5] to calculate an ADT volume for cyclist based on a single day survey, the Saturday volume was adopted and returned an estimated volume of 35 cyclists per day. This equates to a higher percentage of cyclists than surveyed, however it must be noted the survey was conducted in winter, although the weather was fine. We expect that like the NZTA estimation tool provided, cyclist volumes will be higher at other times of the year and form a larger share of the users. The bottom row of Table 4-1 was adopted for the assessment of the existing usage over Scruttons Road.

Table 4-1: Pedestrian survey data

Date	Pedestrians	Cyclists	Total Users	Peak hour	% cyclists	% school children
21st June (Friday)	35	3	**38**	12	7.9%	5.3%
22nd June (Saturday)	45	19	**64**	19	29.7%	1.6%
Estimated existing AADT	***40***	***35***	***75***	***20***	***47%***	***<5%***

All user data at the level crossing is presented in Table 4-2.

Table 4-2: Existing and Future Level Crossing User Volumes

Level Crossing Characteristics		Updated Existing	Proposed Design	Change in Use / Future Score
Vehicle AADT		50	50	55
HCV (%)		4	4	4
Posted Speed Limit		50	50	50
One Network Road Classification (ONRC)		Local Road	Local Road	Local Road
Pedestrians	Total Volume	75	75	140
	Peak Hour	20	20	40
	Pedestrians	40	40	65
	Cyclists	35 (47%)	35 (47%)	75 (56%)
	School Children	<5 (<5%)	5%	5%
FRIEGHT Trains	No. per day	40	40	40
	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		2	2	2

[5] https://www.nzta.govt.nz/walking-cycling-and-public-transport/cycling/cycling-standards-and-guidance/cycling-network-guidance/

4.3 Existing Conditions at Site Visit

The Scruttons Road level crossing is controlled by FLBs, with duplicated FLBs provided on the northern side of the level crossing and a single FLB on the southern side. The primary FLBs are angled to face traffic approaching from the north and south of Scruttons Road as seen in Figure 4-3 and Figure 4-4. Note that the bells are soft-tone bells as the level crossing is adjacent to residential housing. Two more recent FLB installations have occurred on the northern side that face the approaches of the MCR from the east and west.

The level crossing is skewed on an angle approx. 42° from the perpendicular (or 48° to the road).

Figure 4-3: Southern approach to level crossing from Scruttons Road

Figure 4-4: Northern approach to level crossing from northeast angle

Figure 4-5 shows the FLB with a WX6 crossbuck sign and the sightline western side from the southern approach. Figure 4-6 shows the sightline to the east from the southern approach. The vegetation and signal control boxes obstruct view from this position.

Figure 4-5: FLB with 'RAILWAY' crossbuck sign and West track sightline on the southern approach

Figure 4-6: East track sightline on southern approach

In Figure 4-5 a track signal (lit green) is visible and there is a replicated signal for the other track on the opposite side of the level crossing. KiwiRail staff noted that these signals needed to be changed, so that trains when stopped for a red signal, did not block Scruttons Road. There was no timeline provided on when this might occur, but the fact that stopped trains block Scruttons Road was not desirable to the staff present. The signals could be relocated such that the signal was before the level crossing and not after it, which would remove this issue.

Figure 4-7 shows the FLB with a WX6 crossbuck sign (not pictured) and the sightline to the east from the northern approach. It can also be seen that track signals for the trains are located very close to the level crossing on this north-east quadrant. Road users, pedestrians and cyclists may get confused by the two conflicting signs. Out of shot to the left of the image, is a separate set of recently installed FLB facing directly at the westbound cyclists on the MCR.

Figure 4-8 shows the FLB with a WX6 crossbuck sign and the sightline to the west from the northern approach. This FLB faces the cyclists approaching the level crossing from the western approach of the MCR.

Figure 4-7: FLB with "RAILWAY" crossbuck sign and east track sightline on the northern approach

Figure 4-8: FLB with "RAILWAY" crossbuck sign and west track sightline on the northern approach

Figure 4-9 shows the edges of the carriageway are breaking away and maintenance repairs on the road covering over the line marking, which is beginning to fade. Figure 4-10 shows the slight hump at the level crossing, which hides the opposing lane limit lines from view, but the centreline in the distance is still clearly visible. Of note is that the centrelines either side of the crossing panel are misaligned.

Figure 4-9: Edge break and faded line markings

Figure 4-10: Slight hump over level crossing

There are no parking lines in three quadrants, except the southeast quadrant (nearest vegetation). Some of the pavement marking is starting to fade as seen in Figure 4-11. The track panel is in an average condition, with asphalt starting to warp by the EPflex rubber edging along the tracks, which by its very nature creates small flange gaps at this skewed level crossing, as seen in Figure 4-12.

Figure 4-11:Faded line markings, no parking lines

Figure 4-12: Flange gaps, EPflex on track panel

Figure 4-13 shows a blue signpost on the eastern side of the road from the northern approach, which warns cyclists to beware of trains and dismount when travelling over the level crossing. Figure 4-14 shows the 'second train coming' active sign that turns on when a second train approaches in the opposite direction after the first train, warning users to wait longer. The '2 tracks' sign below the crossbuck also implies to users of the second train risk.

Figure 4-13: Signpost warning cyclists to dismount when crossing

Figure 4-14: 'Second train coming' active sign

The culvert beside the level crossing from the northern approach is fenced off as seen in Figure 4-15. Also visible in Figure 4-15 is the recently installed FLB for the eastern approach of the MCR.

The footpaths and MCR approaches all stop prior to approaching the level crossing. Therefore, pedestrians and cyclists need to use the road crossing to travel over the rail corridor. Figure 4-16 shows the footpath on the south-west quadrant stopping just before the level crossing, continuing onto an unsealed section

Figure 4-15: Fenced culvert, with set of FLB facing the eastern MCR approach

Figure 4-16: End of footpath

There are no advanced warning signs, including signposts or 'RAIL X' road markings, for the level crossing on the northern approach. The lack of sign on the northern approach, may be due to the road being a 'no exit'. However, there is a singular pedestrian warning sign on the left-hand side of the road as seen in Figure 4-17, which is replicated on the southern approach as well. It is not clear precisely what these signs are intended for, possibly related to the new cycleway, as the signs appear to be newly installed. Although, one would expect cyclist signs instead.

The southern approach to the crossing has a WX1L signpost on the left-hand side of the road, approximately 60m from the level crossing as seen in Figure 4-18. There are no 'RAIL X' road markings on this approach either.

Figure 4-17: Pedestrian warning sign (north approach)

Figure 4-18: WX1L signpost

Figure 4-19 shows a pedestrian walking with their dog on the carriageway through the level crossing. The confidence this pedestrian has to walk in the middle of the road, confirms how little traffic this level crossing has throughout the day.

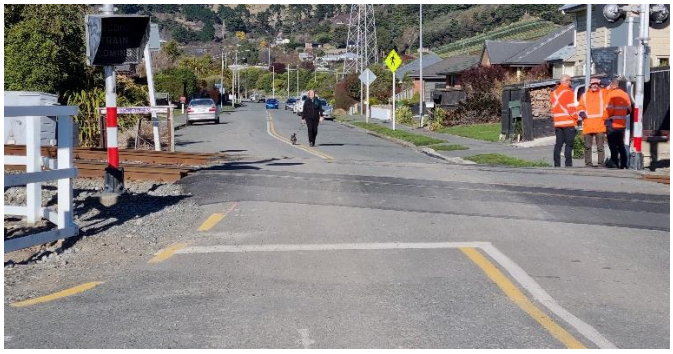

Figure 4-19: Pedestrian walking towards the level crossing

Figure 4-20 shows the FLB in the northeast quadrant specifically to warn pedestrians and cyclists westbound that are coming off the MCR to cross the rail corridor at Scruttons Road. Figure 4-21 shows another FLB in the northwest quadrant to warn eastbound MCR users of approaching trains.

Figure 4-20: FLB northeast quadrant

Figure 4-21: FLB on the north-west quadrant

4.4 Existing Safety Issues

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

1. **Lack of half-arm barriers to control the level crossing.** The level crossing is only controlled by FLBs and 'Second Train Coming' signs, so 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 hold up their journey.
2. **Lack of specific facilities for pedestrians and cyclists to cross over the level crossing:** no formal footpath or shared path for pedestrians to use over the level crossing, hence currently using the road to cross over rail corridor. Reliance on such an arrangement contravenes TCD Pt 9, section 8.2 states the following;

   "Where an informal pathway crosses a railway line (i.e. a non-granted or non-statutory level crossing), steps should be taken to:

   - *install a fence or other barrier to prevent use of the crossing, or*
   - *formalise the crossing and provide appropriate pedestrian facilities."*
3. **Skew angle of the level crossing combined with flange gaps.** While not creating much of an issue for motorists, it is a concern for the increasing volume of cycle movements over the level crossing with the MCR operational. As the skew is 48° to the road, there is a very risk that cyclists can get their wheel trapped in the flange gap and they fall off their bike.
4. **Train signals when activated to stop, would cause a train to block Scruttons Road.** Risk is that when this does need to occur, cyclists and pedestrians might try and cross in between the wagons to avoid delays, only to be caught out by a train restarting, or pass through the train and get hit by a second train passing on the other track.
5. **Poor sightline visibility:** The east track sightline on the southern approach is partially restricted by the vegetation and signal control boxes.
6. **Deteriorating condition of crossing panel:** The crossing panel is starting to show signs of wear / deterioration, with the asphalt warping in places. This will need to be monitored so that a renewal can be timely programmed when required. Currently trip hazards are developing for pedestrians that walk over the road. There is also edge break occurring to the crossing panel that is further narrowing the road over the level crossing.
7. **Inadequate lighting of level crossing from nearby streetlights:** the streetlights near to the level crossing fail to provide adequate illumination of the level crossing for pedestrians and cyclists in the dark. The nearest streetlight to the level crossing is located on the left hand side of the road by the footpath from the southern approach.
8. **Fading pavement markings.** Some of the pavement markings are fading and will need to remarked in the near future.
9. **Pavement defects:** There are some minor pavement defects forming that if not addressed in a timely manner, will become a bigger issue if left unattended.
10. **Missing advanced warning signage and 'RAIL X' marking.** There are no advanced warning signs for the level crossing on the northern approach, and there is one WX1L sign on the southern approach. This may not be an issue due to the road being a 'no exit' and all road users will have approached from the south to cross initially and hence have had prior warning of the level crossing. Neither of the approaches have 'RAIL X' road markings.
11. **Narrow width of road over the level crossing.** The road width is rather narrow over the level crossing, however it is not currently a significant issue due to the low volume of traffic.
12. **Lack of corridor fencing to prevent trespass movements:** The rail corridor is very accessible to both pedestrians and vehicles due to lack of corridor fencing. However, with the opening of the MCR the desire to walk in the rail corridor has much reduced. KiwiRail staff and locomotive engineer did not raise trespassers as an issue in this vicinity.

4.5 Future Issues

There are no expected concerns with traffic volumes over the level crossing, the main increase in use will come from cyclists accessing the MCR.

There is potential Council redevelopment of existing paddocks to the north of the site into wetland, which may attract pedestrians and cyclists in the future to the area and through the level crossing. This has not been factored into the assessment.

4.6 Proposed Safety Treatments Tested

The following items in Table 4-3 are the proposed safety treatments tested by the LCSIA Assessor for the level crossing to reduce the LCSS to attempt to achieve Criterion 1. These do not include solutions such as a separate pedestrian crossing facility with automatic gates or half-arm barriers, as the point of this assessment is to understand what the LCSS value equates to by doing any remaining peripheral treatments, until such time as the long term solution of active controls are installed.

The column on the right states the level of necessity of the recommendation from the following list:

- Meet KiwiRail's 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.

Figure 4-22 shows how these changes would look in an aerial view.

Table 4-3: Safety recommendations adopted for the purposes of the Scruttons Road level crossing assessment

Safety Recommendation	Level of Necessity
1. Restrict access to cycleway over the level crossing as it fails Criterion 1	Criterion 1
As the proposed peripheral treatments fail to achieve Criterion 1, the level crossing situation is deemed unsafe and access to and from the cycleway over the level crossing should be restricted.	
2. A separate pedestrian facility should be installed as per Section 8.2 of TCD Pt.9	TCD Pt.9
Section 8.2 of TCD Pt.9 states that "*where an informal pathway crosses a railway line, steps should be taken to either install a fence or barrier to prevent use of the crossing or formalise the crossing and provide appropriate pedestrian facilities*". In this scenario fencing/barrier of the informal crossing point will do little to stop users crossing, as they can simply walk on the road like they currently do. Formalising the crossing is the preferred approach.	
THE FOLLOWING TREATMENTS WERE TESTED TO CONFIRM IF THE LEVEL CROSSING CAN CONTINUE TO OPERATE AS INTENDED UNTIL THE LONG TERM DESIGN IS IMPLEMENTED	
3. Install crossing panel treatment to remove flange gaps on skew angle of level crossing	
Due to the skew angle of the crossing panel and an increase in cyclists over the level crossing from the adjacent cycleway, a product such as veloSTRAIL should be installed.	
4. Install additional set of pedestrian focused FLBs in southeast quadrant	
Install a set of flashing lights in the southeast quadrant of the level crossing to complete duplication of FLBs on both sides of the level crossing. The intention of these lights is to better forewarn any pedestrians or cyclists approaching from the footpaths on the southeastern approach to the level crossing.	
5. Cut back or clear vegetation in southeast quadrant to improve sight lines	Maintenance
Cut back the vegetation in the southeast quadrant that is restricting sight lines for users approaching from the south. This is both inside out and outside of the rail corridor.	
6. Install lighting over the level crossing for the benefit of train drivers	
No lighting provision currently exists at the level crossing. This means train drivers have less visibility of approaching road users to whom they could blast the horn at if necessary to stop them advancing over the level crossing.	
7. Improve minor pavement issues either side of the level crossing	Maintenance
Review pavement integrity and repair any minor defects on either side of the crossing panel.	
8. Consider widening the road crossing when repairing edge break	Maintenance
The road level crossing width is narrow, consider widening the crossing when repairing the edge break or installing flange gap treatment options.	
9. Remark pavement markings	Maintenance
Repaint pavement markings. Consider painting 'Rail X' on both approaches.	
10. Review signage around the level crossing	Maintenance
There is a non-standard sign for cyclists to dismount over the level crossing, and pedestrian symbol PW29 signs installed either side of the level crossing. It is unclear what the pedestrian signs achieve, other than perhaps inform motorists to expect pedestrians on the road. The cyclist dismount signs are likely to be ignored by all cyclists, so	

Safety Recommendation	Level of Necessity
probably do not achieve the intended effect. Review for installing WX1L signs on both approaches, particularly the southern approach to the level crossing.	

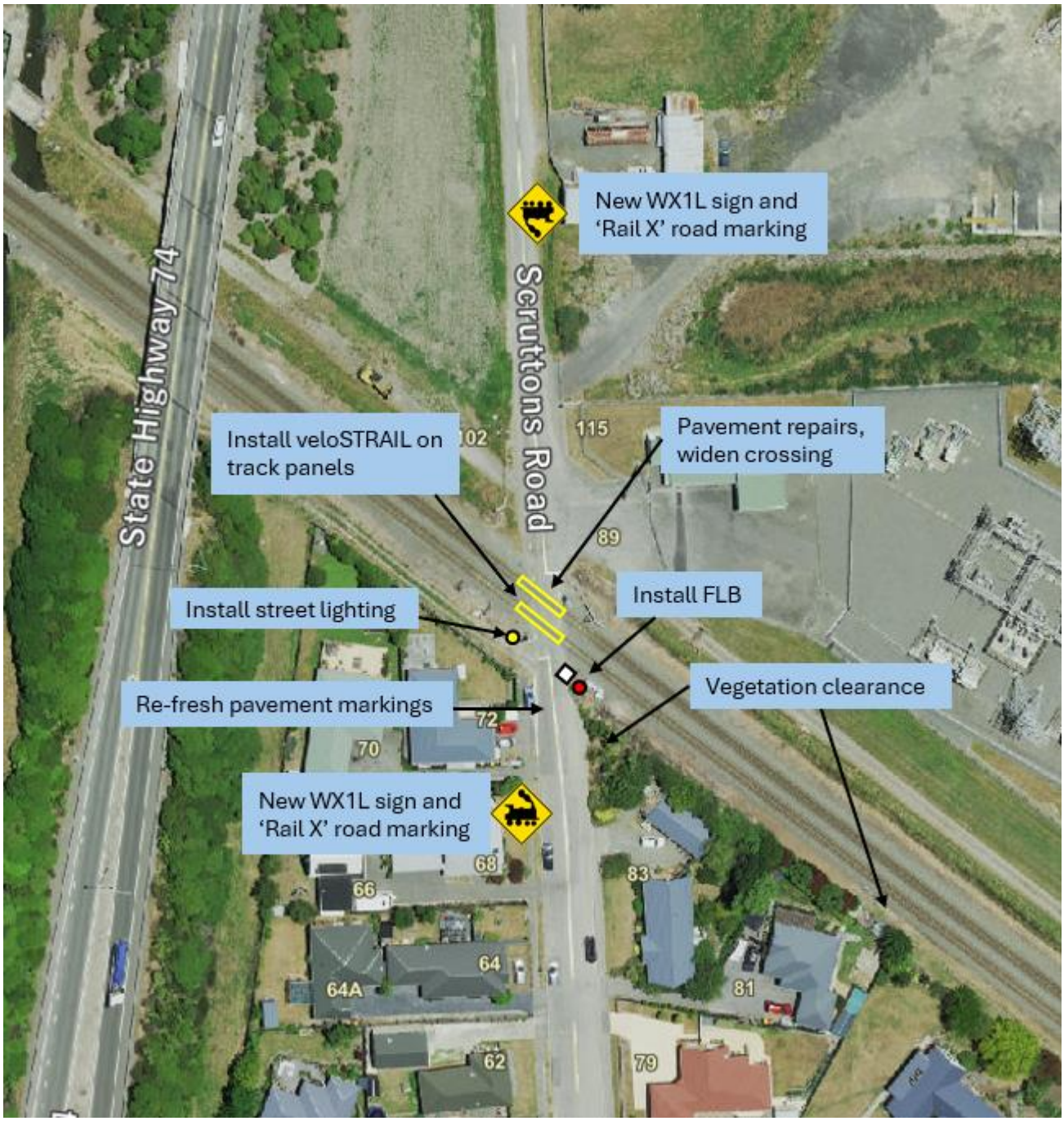

Figure 4-22: Proposed safety treatments tested for the Scruttons Road level crossing

4.7 Level Crossing Safety Score (LCSS)

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

4.7.1 ALCAM Score

ALCAM scores are assessed in 'Proposals' mode in the LXM database[6] and forecast the possible risk scenario due to the change in use and for the future, ten years after the proposed change to the level crossing. The overall pedestrian volume and percentage of vulnerable pedestrians (disabled, elderly, school children etc.) and cyclists is important for the pedestrian crossing risk profiling.

The Scruttons Road ALCAM assessment is presented in Table 4-4. It is based on using the pedestrian ALCAM model as a proxy, to better assess the effects of cyclists and pedestrians over the road level crossing, which is not possible using the road ALCAM model. This approach has been used for cyclists over low volume rural roads previously, however on this occasion it includes pedestrians as well. ALCAM has a pedestrian model available that is a 'proposed' level crossing, which may have been created for the previous LCSIA report in 2019.

Table 4-4: ALCAM ID 4619 - Scruttons Road (proxy pedestrian) level crossing ALCAM score

Stage	Score	Risk % change	Comments
Updated Existing	26	-	The following changes were made based on conditions found on site. • Changed number of freight trains to 40 trains a day (changed from 9 trains a day) • Changed maximum train speed up and down track to 50km/h (changed from 70km/h) • Increased daily volume of users (pedestrian and cyclists) to 75 with peak hour volume being 20 users • Decreased sightline distance in right-upper quadrant to 150m due to vegetation • "An inspection programme exists but maintenance follow up is inadequate" • Adjacent activity: changed proximity to licensed/special event venue to more than 500m • Conspicuity of pedestrian control - "Deteriorated such that message is unreadable (or does not exist) • Visibility of pedestrian control – "Not visible from the approach (or does not exist)" • Angle of crossing "30-70 degrees" • "Maze fencing and / or fencing is in poor condition or missing, path in poor condition" • 'Crossing does not meet DDA requirements • "Crossing does not meet NZTA TCD Part 9 requirements" • Control Measures: No defined path. Visual and audible alarm. Fault reporting number. Active sign "another train coming" warning. Advanced warning signs for mobility devices/cyclists. **ALCAM risk score is** **984,254** **and the risk band is High**
Change in Use (2034)	27	87%	The predicted change to pedestrian volume and user demographics are: • Increased daily volume of users (pedestrians and cyclists) to 140 with peak hour volume being 40. **ALCAM risk score is** **1,845,352** **and the risk band is High**
Proposed Design	21	-53%	Changes to the pedestrian crossing are stated below: • Crossing Details "An effective inspection and maintenance programme is evident" • Conspicuity of pedestrian control "Complete and in good condition" • Visibility of pedestrian control – "Easily observed from the approach". • Control measures added: Path lighting at crossing. Flange gap filler. **ALCAM risk score is** **464,100** **and the risk band is Medium High**
Future Score (2034)	25	-17%	Changes to the pedestrian crossing are stated below: • Increased daily volume of users (pedestrians and cyclists) to 140 with peak hour volume being 40. **ALCAM risk score is** **812,558** **and the risk band is High**

Table 4-4 shows the Future Score ALCAM score has reduced by 17% compared to the Updated Existing score. The Proposed Design has meanwhile reduced by 53%.

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

4.7.2 Crash and Incident History Score

The ten year ORA[7] and CAS data for 2014 - 2023 was analysed (including any incidents from 2024). Where the total score is greater than 10 points, only a maximum of 10 points can be adopted.

There were no recorded incidents in the ORA or CAS databases relating to the level crossing for the past 10 years.

Table 4-5 summarises the change in LCSS through the assessment stages, with commentary on how reductions or increases in score were forecast for the hypothetical scenarios.

Table 4-5: Summary of Crash and Incident History LCSS

Crossing	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Scruttons Road level crossing	**0**	**4**	**2**	**2**	No recorded incidents in the past 10 years at the level crossing. Nothing anecdotal from locomotive engineer either. Risk may increase in the future with increase in cycle users through the skewed level crossing, extra incident recorded for cycle crash due to skew angle. One near miss was scored for each scenario that integrates improvements.

4.7.3 Site Specific Safety Score (SSSS)

This site based score aims to analyse some elements of the level crossing layout. The crossing is assessed in Table 4-6.

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 4-6: Scruttons Road level crossing SSSS – ID 4619

Assessed Item	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Crossing type and visibility ($x_{/10}$)	6	6	3	3	Good visibility, warning bells and "look for trains" sign present. FLBs are not installed for all pedestrian approaches. Increase visibility by trimming vegetation and installing FLBs to face all pedestrian approaches.
Distraction / Inattention ($x_{/5}$)	2	2	2	2	Peri-urban with relatively low user numbers. Assumes that distraction / inattention must occur from time to time.
Flange gap wheel entrapment ($x_{/5}$)	4	4	0	0	Small flange gaps (which could get wider in time) that could entrap a wheeled pedestrian. Level crossing is on a skew angle. Implement veloSTRAIL to close flange gaps.
Volume of vulnerable users ($x_{/6}$)	1	1	1	1	Less than 25 vulnerable user numbers per day
Cycle Patronage ($x_{/4}$)	1	1	2	2	Up to 50 cyclists per day at present time. Number of cyclists expected to increase to approximately 51-100 in the next 10 years.
TOTAL SCORE ($X_{/30}$)	**14**	**14**	**8**	**8**	
SSSS	**5**	**5**	**3**	**3**	Score to take forward to LCSS
MODIFIED SSSS	**N/A**	**N/A**	**N/A**	**N/A**	

[7] ORA = Operational Reporting Architecture. This is the KiwiRail database that records incidents and near misses as reported by the locomotive engineers.

4.7.4 Engineer Risk Score

The Engineer risk score is a combination of Locomotive Engineer and the local Road Controlling Authority 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: [redacted]
- CCC Engineer: [redacted]

The risk score for the level crossing is presented in Table 4-7. Any specific comments provided by either Engineer are recorded in the appropriate comments section.

Table 4-7: Engineer Risk Scores for Scruttons Road Level Crossing

Engineers Opinion	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Scruttons Road Level Crossing					
Locomotive Engineer	8	9	6	8	There is no formal pedestrian crossing over the level crossing currently. With increasing volumes of pedestrians and cyclists in the next 10 years, the safety risk will increase. Pedestrians are hard to see in the dark. With implementation an extra FLB to face the south-east corner for pedestrians on that approach, the implementation of a veloSTRAIL type solution for the tracks, trimming vegetation blocking sightlines up-track will improve safety and reduce risk.
Roading Engineer	4	4	3	3.5	Reduction in safety risk with provision of pedestrian path. The 'Beware trains cyclists dismount and walk across' sign is in a blue colour, where warning signs are usually displayed in a yellow colour which may allow people to misinterpret the sign. Proposal to turn farm paddock north of the level crossing into a wetland within the next 2 years, which could potentially attract leisure walkers and may require parking access in the future.
TOTAL SCORE	**12**	**13**	**9**	**11.5**	
LCSS	**8**	**9**	**6**	**8**	

The Signals Engineer ([redacted] noted that a level crossing that is used by pedestrians should have a specific pedestrian crossing provided and not use the road. Whilst the suggested improvements that did not materially change the form of control at this crossing do make it slightly safer, it is still well short of the protection provided half-arm barriers and automatic gates.

4.8 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 4-8 presents the results of the Scruttons Road (proxy pedestrian) LCSS.

Table 4-8: Scruttons Road (proxy pedestrian) LCSS

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
ALCAM score	26	27	21	25	Main improvements arise from flange gap treatments, duplicated FLBs both approaches,
Crash & incident history score	0	4	2	2	No reported incidents at this level crossing.
Site specific safety score	5	5	3	3	Decrease in SSSS from trimming vegetation to increase sightlines and implementing veloSTRAIL on track panels.
Engineer risk score	8	9	6	8	The scoring reflects the existing issues and how these issues will be addressed with decreasing safety risks.
LCSS	**39**	**45**	**32**	**38**	
LCSS RISK BAND	**Medium**	**Medium High**	**Medium**	**Medium**	
CRITERION MET	**FAIL**	**FAIL**	**C2**	**C2**	
FORM OF CONTROL	**FLBs**	**FLBs**	**FLBs**	**FLBs**	

Based on the assessment of pedestrians and cyclists continuing to use the road crossing to cross the rail corridor, the assessment has determined that the Updated Existing LCSS is Medium, and the Change in Use LCSS increases into the Medium-High risk band. The Proposed Design and Future Score do not achieve Criterion 1 but do meet Criterion 2. The Future Score increases to the top end of the LCSS Medium risk band, whereas the Proposed Design was at the lower end. Therefore, either a higher form of control such as half-arm barriers and/or automatic gates, or if they do not work (this was not tested) grade separation is required to achieve Criterion 1 for the Future Score.

A summary of the changes to the ALCAM risk band are presented in Table 4-9.

Table 4-9: Scruttons Road (proxy pedestrian) crossing ALCAM changes

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score
ALCAM risk band	High	High	Medium High	High
ALCAM risk score % change	N/A	87%	-53%	-17%

In summary, the selection of level crossing controls for an upgrade are dictated by the Signals and Telecommunication Standard for active level crossings (refer to Section 1.3). In that respect, we could only support the installation of half-arm barriers and automatic gates as the best at-grade solution for this level crossing.

5. Alignment with 2019 LCSIA

5.1 Background

In May 2019, the Velos consortium produced an LCSIA which assessed cyclists using the road crossing and pedestrians over a separate facility.

CCC requested Stantec to provide an updated assessment that aligns with the methods and user volumes adopted by Velos. This means that cyclists are modelled using the road ALCAM model and pedestrians via the pedestrian model. This differs from the assessment in Section 4 of this report, which used the pedestrian model as a proxy over the road crossing to ensure that cyclists and pedestrians were appropriately assessed on the current crossing arrangement.

This section of the report only discusses the scoring to provide the comparison to the original LCSIA and does not go into great details outside of that.

5.2 Existing and Future User Volumes

The volumes in Table 5-1 align with those used in the original LCSIA, as best can be determined from the information supplied. The 2019 LCSIA report is less clear on the user data input for the assessments, therefore we cannot guarantee perfect alignment with the prior LCSIA.

It is unclear whether the previous LCSIA reduced the heavy vehicle percentage when they included the cyclists as part of the traffic AADT over the level crossing. We have allowed for this in our refresh of the scoring.

The train volumes are the same as used in the new assessment, although the trains were assessed as travelling at 40 km/h, whereas the speed limit is currently 50 km/h, which is used in this update.

Table 5-1: Existing and Future Level Crossing User volumes

Level Crossing Characteristics		Existing (2024)	Change in Use (2034)	Proposed Design (2024)	Future Score (2034)
Vehicle AADT		75 (est)	101 (3% growth)	235	400
HCV (%)		20% (est)	20% (est)	Unknown (6.4% est)	Unknown (5% est)
Pedestrians	Volume	20	33	20	33
	Peak Hour	None provided	None provided	None provided	None provided
	School Children	None provided	None provided	None provided	None provided
Cyclists (over road)	Volume	0	0*	160	300
	Peak Hour	None provided	None provided	None provided	None provided
	School Children	None provided	None provided	None provided	None provided

* It seems that an error was made not to include the 300 cyclists when conducting the Change in Use assessment over the road level crossing. The point of conducting the Change in Use is to assess the implications if no changes were made, in this case they should have assumed the MCR was open and the estimated 300 cyclists per day were active over the level crossing. Our refresh has included the 300 cyclists.

5.3 Level Crossing Controls for Different Assessment Phases

Table 5-2 outlines the controls adopted by the previous LCSIA, to provide comparison. No assessment of the pedestrian facility with mazes was conducted, as the KiwiRail minimum standard at a double track pedestrian level crossing is automatic gates, which is supported by Stantec.

Table 5-2: Controls used in assessment

Level Crossing	LCSIA Year	Updated Existing	Change in Use	Proposed Design	Future Score
Road	2019	FLBs	FLBs	Unknown	Unknown
Road	2024	FLBs	FLBs	Duplicated FLBs	Duplicated FLBs

5.4 Level Crossing Safety Score (LCSS)

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

5.4.1 ALCAM Score

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 5-3.

Table 5-3: ALCAM ID 2281 – Road level crossing ALCAM score

Stage	LCSS	Fatality return	Risk % change	Comments
Updated Existing	7	10,348 years	-	The following changes were made based on conditions found on site. • Traffic volume 75 AADT, with 20% HCV estimated • Stated crossing panel sealed but breaking up • Changed from half-arm barriers to Primary flashing lights • Deselected; street lighting, advanced warning sign (not both sides); vegetation maintenance; • Selected 'Second train coming' active sign **ALCAM risk score is 1.0 and the risk band is Medium Low.**
Change in Use (2034)	8	7,931 years	30%	The predicted changes to the road crossing volume is: • Traffic volume 400 AADT, with 5% HCV estimated **ALCAM risk score is 1.3 and the risk band is Medium Low.**
Proposed Design (2024)	8	9,058 years	10%	Changes to the road crossing are stated below: • Traffic volume 300 AADT, with 6.4% HCV estimated • Advanced warning signage location less than standard but more than safe stopping distance. • Stated crossing surface in good condition • Changed to Duplicated flashing lights • Selected; street lighting, advanced warning sign (now both sides); vegetation maintenance. **ALCAM risk score is 1.1 and the risk band is Medium Low.**
Future Score (2034)	8	8,368 years	20%	The predicted changes to the road crossing are stated below: • Traffic volume 400 AADT, with 5% HCV estimated **ALCAM risk score is 1.2 and the risk band is Medium Low.**

Table 5-3 shows the Future Score ALCAM score has increased by 20% and the return period of a fatal collision has reduced by 1,980 years to 8,368 years.

Note there is no ability to score a benefit for the installation of a VeloSTRAIL type treatment when assessed as a road level crossing, as the skewed angle flange gap is not a particular issue for vehicles.

5.4.2 Crash and Incident History Score

The below adopts the same Updated Existing and Change in Use scores from Section 4.7.2 by default to apply to the road level crossing.

Table 5-4 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 5-4: Summary of Crash and Incident History LCSS

Crossing	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Scruttons Road level crossing	**0**	**4**	**2**	**2**	No recorded incidents in the past 10 years at the level crossing. Nothing anecdotal from locomotive engineer either. Risk may increase in the future with increase in cycle users through the skewed level crossing level crossing, extra incident recorded for cycle crash due to skew angle. One near miss was scored for each scenario that integrates improvements.

5.4.3 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 5-5.

Table 5-5: Road level crossing SSSS – ID 2281

Assessed Item	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Crossing Controls ($x_{/5}$)	3	3	3	3	All stages have FLBs as the lead controls.
Queuing ($x_{/6}$)	0	0	0	0	Not possible here in reality.
Short stacking / grounding out ($x_{/10}$)	3	3	3	3	Whilst no evidence of grounding out occurring, it is a possibility due to hump of level crossing.
Accessways / side roads and bisecting intersections ($x_{/6}$)	0	0	0	0	No side roads or accessways, very low traffic volumes.
Observed non-compliance ($x_{/3}$)	1	2	2	2	Assumes some non-compliance will occur and then increase with additional users
TOTAL SCORE ($X_{/30}$)	**7**	**8**	**8**	**8**	
SSSS	**2**	**3**	**3**	**3**	Score to take forward to LCSS
Red Flag Scenario	**N/A**	**N/A**	**N/A**	**N/A**	
MODIFIED SSSS	**N/A**	**N/A**	**N/A**	**N/A**	

5.4.4 Engineer Risk Score

The risk score for the level crossing is presented in Table 5-6. Any specific comments provided by either Engineer are recorded in the appropriate comments section.

Table 5-6: Engineer Risk Scores for Road Crossing

Engineers Opinion	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Road level crossing					
Locomotive Engineer	8	10	7	9	The higher volume of cyclists over the level crossing meant both engineers scored slightly higher than for the 2024 LCSIA scoring.
Roading Engineer	2	2.5	2	3	
TOTAL SCORE	**10**	**12.5**	**9**	**12**	
LCSS	**7**	**8**	**6**	**8**	

The Signals Engineer scored somewhere in between the two engineers, with scores of 4; 4; 3 and 3.5 for the four stages.

5.5 LCSS Results

Table 5-7 presents the results of the road LCSS.

Table 5-7: Road level crossing LCSS

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
ALCAM score	7	8	8	8	Score does not change much, as cyclists assessed as vehicles in this method, so the risk profile does not really change when 200-300 extra 'vehicles' are added to the ALCAM model.
Crash & incident history score	0	4	2	2	Same as the assessment in Section 4.
Site specific safety score	2	3	3	3	We have done this the same way as the previous assessment, for comparison purposes. However we would have used a modified SSSS score to account for the cycling risk. Even if these were increased to an 8 for the last three phases, the crossing would still meet Criterion 1.
Engineer risk score	7	8	6	8	Scoring is higher due to the increased volume of users adopted for this comparative analysis.
LCSS	**16**	**23**	**19**	**21**	
LCSS RISK BAND	**Low**	**Medium Low**	**Low**	**Medium Low**	
CRITERION MET	**C1**	**C1**	**C1**	**C1**	
FORM OF CONTROL	**FLBs**	**FLBs**	**FLBs**	**FLBs**	

The Updated Existing LCSS is Low, and the Change in Use LCSS increases to Medium Low. The Proposed Design LCSS is in the Low risk band and achieves Criterion 1, whilst the Future Score LCSS is in the Medium Low risk band and still achieves Criterion 1.

A summary of the changes to the ALCAM risk band are presented in Table 5-8.

Table 5-8: Road level crossing ALCAM changes

Scored Items	Updated Existing	Change in Use	Proposed Design	Future Score
ALCAM risk band	Medium Low	Medium Low	Medium Low	Medium Low
ALCAM risk score % change	N/A	30%	10%	20%
Fatal return period	10,348 years	7,931 years	9,058 years	8,368 years

Stantec notes that the 2019 LCSIA approach is no longer the way LCSIA's are conducted when assessing cycleways over a road level crossing, and the approach taken in the 2024 LCSIA is the appropriate method. Therefore, we do not support the outcome of this assessment.

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