CHRISTCHURCH MAJOR CYCLEWAYS ROUTE

HEATHCOTE EXPRESSWAY

LEVEL CROSSING SAFETY IMPACT ASSESSMENT (LCSIA) – SCRUTTONS ROAD

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GLOSSARY

AADT	Average Annual Daily Traffic
ALCAM	Australian Level Crossing Assessment Model
CAS	Crash Analysis System
CCC	Christchurch City Council
FLB	Flashing Lights & Bells
HAB	Half Arm Barriers
HCV	Heavy Commercial Vehicle
IRIS	Incident Recording Information System
LCSIA	Level Crossing Safety Impact Assessment
LCSS	Level Crossing Safety Score
LE	Locomotive Engineer
LX	Level Crossing
MCR	Major Cycle Route
RCA	Road Controlling Authority
SRT	Safety Review Team
SSSS	Site Specific Safety Score
TCD	Traffic Control Devices

1 EXECUTIVE SUMMARY

Christchurch City Council's (CCC) are designing the Heathcote Expressway (HX) as part of the Major Cycle Route (MCR) project. A new cycle path facility is proposed parallel to the western side of the Main South Rail corridor.

While the HX proposal does not cross the MSL there is expected to be an increase in on road cycle usage of the Scruttons Road crossing for patrons linking to the HX from the greater catchment area. A new pedestrian connection is proposed to link the HX to the existing footpath on Scruttons Road on down side of the road crossing.

The purpose of this Level Crossing Safety Impact Assessment (LCSIA) report is to assess the level of risk in the change in use for the existing road crossing and, also determine what Level Crossing Safety Score (LCSS) is for the proposed pedestrian level crossing and if the concept design proposes appropriate controls to manage the risk.

1.1.1 Scruttons Road Level Crossing #2281

The existing protection at the Scruttons Road crossing consists of Flashing Lights & Bells (FLB) Control and a second train approaching warning lights. The new cycleway is expected to generate 160 additional cycle trips (80 each way) at the existing road level crossing for cyclists accessing the HX.

1.1.2 Scruttons Pedestrian Level Crossing #4619

A concept design for a new pedestrian crossing has been provided (Figure 3 3: Pedestrian Crossing Concept), and a new ALCAM survey for pedestrian crossing carried out by a third party. The proposed protection for the pedestrian crossing consists of a Maze with static signage.

Conclusion

The Level Crossing Safety Score (LCSS) procedure assesses and scores the risk of level crossings. For level crossings, KiwiRail policy is;

- Criteria 1: The Proposed Design and Future Scores of a level crossing to achieve a "Low" or "Medium-Low" level of risk, as determined by the LCSS.
- Criteria 2: The Proposed Design and future Score of a level crossing to achieve a LCSS number (out of 60) lower than, or equal to the Updated Existing LCSS number.

For a new facility, Criteria 1 must be met.

The LCSS results for the existing situation, proposed shared path crossing are shown below in Table 1-1 and Table below;

- The proposed road crossing has assumed that from opening day an additional 120 on-rod cycle movements with occur at the crossing, no additional infrastructure has been proposed for the road crossing.
- The pedestrian volume has been estimate at 20 pedestrians per day after opening. It is recommended that actual pedestrian counts are collected after opening.

- The location proposed pedestrian maze will restrict maintenance vehicles from accessing the rail corridor.
- The Future scores are a sensitivity test of the proposals with 3% traffic growth per annum 10 years beyond opening. An initial high uptake[1] for both on-road cyclists and pedestrians has been estimated at 10% per annum as users familiarise themselves with the new facility, a reduction in the growth to 3% per annum is estimated after the initial increase.

Table 1-1: LCSS Road Level Crossing Results Summary

Scenario		Updated Existing	Change in Use	Proposed Design[2]	Future Score
Existing Road Level Crossing	LCSS	12 / 60	12/ 60	16 / 60	17 / 60
	LCSS Risk Band	Low	Low	Low	Low
	Criterion Met	Criteria 1 & 2	Criteria 1 & 2	Criteria 1	Criteria 1

Table 1-2: LCSS Pedestrian Level Crossing Results Summary

Scenario		Updated Existing	Change in Use	Proposed Design	Future Score	SRT Proposed Design	SRT Future Score
Proposed Shared Path / Pedestrian Level Crossing	LCSS	22 / 60	28 / 60	6 / 60	9 / 60	20 / 60	25 / 60
	LCSS Risk Band	Med-Low	Med-Low	Low	Low	Med-Low	Med-Low
	Criterion Met	Criteria 1	Criteria 1	Criteria 1	Criteria 1	Criteria 1	Criteria 1

This satisfies KiwiRail criteria 1 for a new facility. Notwithstanding any risk assessments, KiwiRail's Signals and Telecommunications Standard: S-ST-LC-2103 2018 requires the following minimum protections to be provided at Active Level Crossings for new and upgraded level crossings.

Railway Type	Multi Track	
	Road	Ped/Cycle
Metro[3]	Barriers	Gates
Non-Metro	Barriers	Gates

[1] Traffic Growth Per Annam for Cycle and Pedestrians Y1 10%, Y2 10%, Y3 5%, Y4 5%, Y5 5%, Y6 5%, Y6 5%, Y7 3%, Y8 3%, Y8 3%, Y10 3%.

[2] The proposed design assessment has been based on the projected increase in the Road AADT from 75 to 235 with an expected approximate 160 additional cycle trips (80 each way) will use the existing road level crossing after the HX is constructed.

[3] Metropolitan (metro) passenger rail services operate in two cities, Auckland and Wellington.

However, the concept design does not meet the KiwiRail minimum protection requirement for pedestrian and cyclists crossing multi track in a non-metro area. The minimum protection required is 'Gates'. The construction of gates in this location is considered to be cost prohibitive with the footpath connection unlikely to constructed if the gates are required. The implication may result in uncontrolled pedestrian movements across the road level crossing.

The SRT recommend that the final detail design of the shared path crossing includes;

- That SFARP principal is applied in this instance and the SRT modified design with a second train approaching active warning sign is included in favour of the full automatic gates.
- Installation of an adequate length of fencing is provided to ensure that pedestrians do not use the road crossing to 'bypass' the new pedestrian facility.
- Full compliance with NZTA TCD-9;
- KiwiRail maintenance staff confirm access requirements for maintenance track running parallel to the MSL.
- Post-construction pedestrian/cyclist counts will provide more accurate ALCAM and LCSS results in the future.
- An alternative 'desire line' approach has been considered to install a smooth, flat pedestrian path close to the desire line but without the maze controls, this was due to the site constraints resulting in limited scope to install wing fencing to encourage pedestrians to use the maze. However, it is not recommended that this option is progressed as the score is at the upper echelon of the Medium-Low risk band and does not meet the minimum protection requirements.

2 INTRODUCTION

As part of Christchurch City Council's (CCC) construction of the Heathcote Expressway (HX) Major Cycle Route (MCR) which part of is proposed to be constructed to run parallel to the MSL, this report documents the Level Crossing Safety Impact Assessment (LCSIA) for

1. The existing road level crossing at Scruttons Road, Heathcote Valley, Christchurch; and
2. A proposed pedestrian crossing at the same location.

The purpose of this LCSIA is to inform the design process going forward. The proposed MCR Route does not cross the rail line, but is sufficiently nearby (see Figure 2-1 below), that it is expected to generate both;

1. increased number of cyclists using the existing road crossing; and
2. increased pedestrian demand. There are no existing formal pedestrian facilities at the Scruttons Road level crossing.

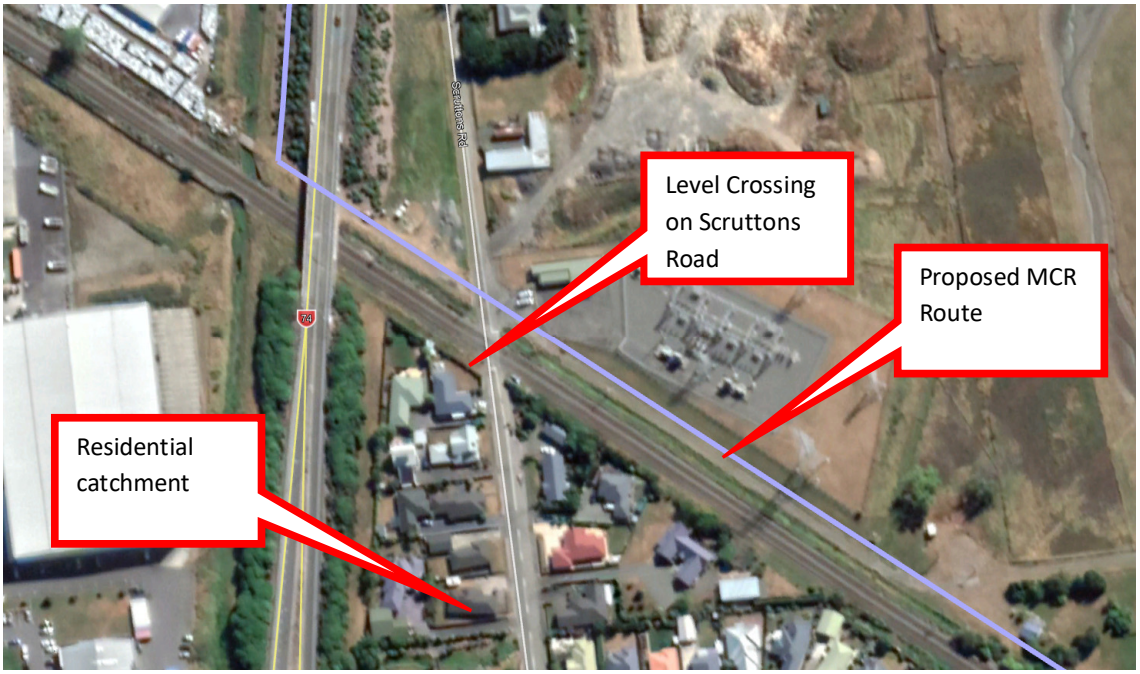


Figure 2-1: Location

3 EXISTING CONDITIONS

Road Crossing

North of the level crossing is a 'no-exit' road with a small number of rural properties (see Figure 3-1 below).

Figure 3-1: Existing Crossing - Looking North

South of the Crossing, Scruttons Road is a conventional residential street (see Figure 3-2 below).

Figure 3-2: Existing Crossing - Looking South

Rail Info

Key features of the current crossing;

- Located at 5.2km on KiwiRail's Main South Line (MSL);
- Road Crossing ALCAM #2281;
- 40 Train movements per day (20 each way);
- Estimated 75 Annual Average Daily Traffic (AADT) on this section of Scruttons Road;
- 40km/h speed limit;
- Double Tracks;
- Skewed Crossing (approx 45 degrees);
- Flashing Lights & Bells (FLB) Control – No barriers;
- Second train approaching warning lights;

Crash & Safety Data

3.1.1 KiwiRail IRIS Data

KiwiRails Incident Recording Information System (IRIS) database records zero incidents (either Road or Pedestrian) at the Scruttons Road crossing.

3.1.2 NZTA CAS Data

The NZ Transport Agency's (NZTA) Crash Analysis System (CAS) database also records zero incidents at the level crossing.

ALCAM Results

3.1.3 Road Crossing (2017)

An ALCAM assessment was done in 2017. Key information is;

- Located at 5.200km on the South Island Main South Line (MSL);
- Trains per day 9
- ALCAM ID# 2281;
- Risk Score 0.0005 fatalities per year
- Assessed as 'Medium-Low' Risk

3.1.4 Road Crossing (2019 Update)

The 2017 ALCAM assessment used a train volume of 9 per day. KiwiRail advise the current train volumes across the Scruttons Road level crossing is 40 (20 trains each way).

The 2017 ALCAM assessment used a figure of 6% HCVs, this is considered unrealistic given the nature of the properties and activities within the 'no-exit' portion of Scruttons Road. A more realistic HCV% is considered to be 20%.

The 2017 ALCAM assessment was done with a 70km/h speed restriction on locomotives, this has now further reduced to 40km/h. The ALCAM risk assessment has been updated to reflect these changes;

- Risk Score 0.00013 fatalities per year
- Assessed as 'Low' Risk

3.1.5 Pedestrian Crossing

No existing pedestrian facilities exist, and existing pedestrian numbers are expected to be very low (less than 5) per day. A pedestrian ALCAM for a proposed footpath on the western side of Scruttons Road (see Figure 3-3 below) was completed in 2019. Key information;

- Proposed 'Maze' control
- Perpendicular crossing

Figure 3-3: Pedestrian Crossing Concept

3.1.6 Pedestrian Crossing (2019)

An ALCAM desktop assessment was done in 2019. Key information is;

- Located at 5.200km on the South Island Main South Line (MSL);
- Trains per day 9
- ALCAM ID# 4619;
- Risk Score 33,206
- Assessed as 'Low' Risk

3.1.7 Pedestrian Crossing (2019 Update)

The 2019 ALCAM assessment used a train volume of 9 per day. KiwiRail advise the current train volumes across the Scruttons Road level crossing is 40 (20 trains each way).

The 2019 ALCAM assessment was done with a 70km/h speed restriction on locomotives, this has now further reduced to 40km/h. The ALCAM risk assessment has been updated to reflect these changes;

- Risk Score 147,973
- Assessed as 'Medium Low'

Site Inspection

A site visit was undertaken on Wednesday 17th April 2019, members of the Safety Review Team (SRT) were;

- [redacted] CCC Safety Engineer
- [redacted] CCC Project Manager
- [redacted] KiwiRail Operations Manager & representing the Locomotive Engineers (LE's)
- [redacted], KiwiRail Signals Engineer
- [redacted], Velos, LCSIA Reporter

The site is a new public crossing. As such the site is required by KiwiRail to meet LCSIA Criteria 1:

"The proposed design/upgrade of a new crossing to achieve a "Low" or "Medium-Low" level of risk, as determined by the LCSS.

KiwiRail provides the following guidance regarding the meaning of the Level Crossing Safety Score Risk bands.

Figure 7: Level crossing safety score risk bands

Figure 1: Level Crossing Safety Score Risk Bands

Issues identified by the SRT for the existing level crossing were;

- The High skew angle combined with vegetation in the Southeast corner obscured visibility (see Figure 3-4 below);
- Noticeable hump in the road and poor pavement condition increased the risk of trucks grounding (see Figure 3-5 below);
- Vegetation on the northeast quadrant was also less than ideal (see Figure 3-6 below).

Figure 3-4: Visibility to the SE Corner

Figure 3-5: Vertical Hump at Crossing

Figure 3-6: Visibility in NE quadrant

In addition to the existing concerns, for any proposed pedestrian crossing, the SRT identified the following further issues;

- High skew of tracks, and presence of multiple service boxes would make the installation of a pedestrian maze difficult (see Figure 3-7 below);
- The close proximity of driveways reduces the length available for wing-fencing, which in turn, means pedestrian compliance is likely to be an issue (see Figure 3-8 below);

Figure 3-7: Existing service boxes

Figure 3-8: Driveways close to LX

4 EXISTING CROSSING

Road Crossing #2281

Once the HX MCR is completed, it is expected that approximately 160 additional cycle trips (80 each way) will use the existing road level crossing. This would increase the Road AADT from 75 to 235. The resulting change in traffic composition reduces the HCV% from 20% to 6%.

These changes increase the ALCAM Risk score from 0.00013 to 0.00014 fatalities per year.

4.1.1 Updated Existing

The existing ALCAM score for the road level crossing updated to reflect the current train volume and speed restriction on the line.

4.1.2 Change in Use

Future volumes based on 3% per annum traffic growth volume if no changes were to occur at the crossing.

4.1.3 Proposed Design

The proposed design based on the updated AADT 235vpd resulting from an additional 160 on road cycle trips per day. The resulting change in traffic composition reduces the HCV% from 20% to 6%.

4.1.4 Future Score

Future volumes based on 3% per annum traffic growth and an initial high uptake for both on-road cyclists has been estimated at 10% per annum as users familiarise themselves with the new facility, a reduction in the growth to 3% per annum is estimated after the initial increase.

Pedestrian Crossing #4619

Once the HX MCR is completed, it is expected that some local residents will want to cross the rail line and use the new cycleway as a recreational walking path. For the purposes of the initial ALCAM, this has been estimated at an average of 20 per day, with the expectation that it is likely to be slightly higher on weekends and with seasonal fluctuations.

4.1.5 Updated Existing (Concept Design)

The 2019 ALCAM score for the proposed pedestrian level crossing was updated to reflect the current train volume and speed restriction on the line.

4.1.6 Change in Use

Future volumes based on the initial high uptake for pedestrians has been estimated at 10% per annum as users familiarise themselves with the new facility, a reduction in the growth to 3% per annum is estimated after the initial increase.

per annum growth volume if no changes were to occur to the concept design.

4.1.7 Proposed Design

The proposed design is based on an estimated average daily used of 20 pedestrians per day, and the inclusion of automatic gates as per the KiwiRail minimum protection requirements

4.1.8 Future Score

Future volumes based on high uptake growth volume per annum if the proposed design was to occur at the crossing.

4.1.1 Safety Review Team (SRT) Score

The proposed design is based on applying the SFARP principal with the inclusion of second train approaching sign in favour of automatic gates.

5 LEVEL CROSSING SAFETY SCORE (LCSS) – ROAD CROSSING

ALCAM Score (30 Points)

The raw road ALCAM risk scores are multiplied by 10,000. The resulting score then corresponds to an ALCAM LCSS[4]. The scores are outlined in Table 5-1 below;

Table 5-1: ALCAM LCSS Score

Scored Item	Raw Risk Score	ALCAM Score	ALCAM LCSS Score	Fatality Return	Risk Change %	ALCAM Risk Band
Updated Existing	0.00013	1.3	3 / 30	7,861 years	-	Low
Change in Use	0.00013	1.3	3 / 30	7,755 years	1.3%	Low
Proposed Design	0.00014	1.4	4 / 30	7,059 years	10%	Low
Future Score	0.00017	1.7	7 / 30	5,823 years	26%	Med-Low

Crash & Incident History Score (10 Points)

There is no existing crash history at the crossing. The proposed scenario increases the crossing volume, and given the IRIS database records near misses, it is considered reasonable that an additional IRIS incident is likely within the next 10 years.

For the LCSIA, all results are rounded up to the nearest whole number, therefore the proposed scenario scores 1/10.

These results are summarised in Table 5-2 below;

Table 5-2: Crash & Incident History Score

Scenario	IRIS Data	Total Score	Comment
Existing	Zero	0 / 10	No recorded incidents have occurred at the crossing.
Change in Use	Zero	0 / 10	No additional incidents are estimated to occur under the change in use.
Proposed Design	1 incident	1 / 10	With the increase in on road cycle usage, it is estimated that 1 additional near miss will occur at the crossing within the next 10 years.
Future Score	1 incident	1 / 10	No additional incidents are estimated to occur under the future score.

[4] Appendix A4, Table 11, Level Crossing Risk Assessment Guide (KiwiRail, July 2017)

Site Specific Safety Score (10 Points)

The Site-Specific Safety Score (SSSS) for an urban road crossing is based on four categories of scoring. For the existing Scruttons Road crossing, these are assessed below in **Error! Reference source not found.** below;

Table 5-3: SSSS Score Summary

Scenario	Raw Score	Total Score	Comment
Existing	5 / 30	2 / 10	Crossing Controls 3 / 5 Flashing Lights and Bells. Queuing 0 / 6 No bisecting intersection at either side of the level crossing Short Stacking/Grounding Out 0 / 10 No evidence of grounding out Adjoining Major Accessway/Side Roads & Bisecting Intersections 1 / 6 One accessway (Substation) on departure side but low chance of queues forming back over crossing. Observed Non-Compliance 1 / 3 Rare to low level non-compliance issues
Change in Use	5 / 30	2 / 10	
Proposed Design	6 / 30	2 / 10	Crossing Controls 3 / 5 Flashing Lights and Bells. Queuing 0 / 6 No bisecting intersection at either side of the level crossing Short Stacking/Grounding Out 0 / 10 No evidence of grounding out Adjoining Major Accessway/Side Roads & Bisecting Intersections 1 / 6 One accessway (Substation) on departure side but low chance of queues forming back over crossing. Observed Non-Compliance 2 / 3 Rare to low level non-compliance issues
Future Score	6 / 30	2 / 10	

For the proposed design scenario with additional volume of cyclists using the crossing, it is considered reasonable that the 'Observed Non-Compliance' score increases from 1/3 to 2/3. This increases the raw score from 5/30 to 6/30, however does not alter the final SSSS of 2/10.

Locomotive & RCA Engineers Risk Assessment (10 Points)

The risk assessment ratings were as follows;

- Locomotive Engineer (LE) 4
- Road Controlling Authority (RCA) Engineer 2

The LE score weighted 2:1 in favour of the LE scores, this gives a total risk assessment score of (4*2) + 2= 10÷1.5 = 7/10

Under the proposed design scenario, with increased cycle volumes, the RCA Engineer would increase their score to 3/5, however due to the weighting of the LE score the risk assessment score remains at 7/10.

Table 5-4: Locomotive & RCA Engineer Score

Scenario	Locomotive Engineer	RCA Engineer	Total Score
Existing	4 / 5	2 / 5	7 / 10
Change in Use	4 / 5	2 / 5	7 / 10
Proposed Design	4 / 5	3 / 5	7 / 10
Future Score	4 / 5	3 / 5	7 / 10

Level Crossing Safety Score (LCSS) Summary

For the Scruttons Road road level crossing, the LCSS scores are summarised below in **Error! Reference source not found.**

Table 5-5: LCSS Summary – Road Crossing

Category	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
Traffic Info	75 AADT 20% HCV	101 AADT 15% HCV	235 AADT 6% HCV	400 AADT 7% HCV	A traffic growth of 3% per annum has been applied over a 10yr period for vehicle traffic growth.
ALCAM Score	3 / 30	3 / 30	6 / 30	7 / 30	The change in use increase the volume of on road cyclists. The in
Crash & Incident History Score	0 / 10	0 / 10	1 / 10	1 / 10	The increase in usage estimates that 1 near miss will occur at the crossing within the next 10 years.
Site Specific Safety Score (SSSS)	2 / 10	2 / 10	2 / 10	2 / 10	it is considered reasonable that the 'Observed Non-Compliance' score increases from 1/3 to 2/3
Locomotive & RCA Engineers Risk Assessment	7 / 10	7 / 10	7 / 10	7 / 10	Under the change in use scenario, with increased cycle volumes, the RCA Engineer would increase their score to

					3/5, however due to the weighting of the LE score the risk assessment score remains at 7/10.
Total Level Crossing Safety Score (LCSS)	12 / 60	12 / 60	16 / 60	17 / 60	
LCSS Risk Band	Low	Low	Low	Low	

Therefore, the change in use crossing with greater cyclist numbers satisfies KiwiRail criteria that a modified design achieves a "low" or "medium-low" level of risk as determined by the LCSS.

Future Score Assessment Summary

A future score assessment forecast the estimated increase in AADT volume over the next 10-year period at the crossing and if necessary recommends an amendment to form of controls.

The assessment has forecasted an increase of 3% per annum for traffic growth, and an initial high uptake for both on-road cyclists and pedestrians has been estimated at 10% per annum as users familiarise themselves with the new facility, a reduction in the growth to 3% per annum is estimated after the initial increase, if the proposed design was to occur at the crossing.

The future score LCSS is 17, which corresponds to a risk band of "Low" and therefore still satisfies KiwiRail Criteria 1.

6 LEVEL CROSSING SAFETY SCORE (LCSS) – PEDESTRIAN DOWN CROSSING

As there is no existing pedestrian crossing facility at the level crossing, the Level Crossing Safety Score (LCSS) is for a proposed pedestrian crossing only, a concept sketch is shown in Figure 6-1 below;

Figure 6-1: Pedestrian Crossing Concept

An ALCAM survey was completed in 2019 on the concept design (crossing number 4619) giving a Raw Risk Score of 33,206. This corresponds to an ALCAM LCSS score of 2[5] and ALCAM risk band of Low.

The LCSIA has noted that the concept design does not include any activity controls, with the specific risk relating to a second train approaching, while there would be residual noise from the FLB on the road crossing the risk is not actively managed and does not provide the minimum level of protection requirement for pedestrian and cyclists crossing multi track in a non-metro area. The minimum protection required to the new pedestrian crossing is Gates.

The LCSIA assessors 'Proposed Design' includes pedestrian gates at the crossing.

[5] Table 18 '2018/19 ALCAM pedestrian crossing LCSS Scores', Level Crossing Risk Assessment Guide (KiwiRail, October 2018)

ALCAM Score (30 Points)

The pedestrian crossing ALCAM survey has been updated to include an updated train speed and volume. The risk score has been adjusted to 147,973 ("Medium-Low" risk band). This corresponds to an ALCAM LCSS score of 9.

Table 6-1: ALCAM LCSS Score

Scored Item	Raw Risk Score	Band Range	ALCAM LCSS Score	ALCAM Risk Band
Updated Existing (concept design)	147,973	131,900 – 148,299	9	Medium-Low
Change in Use	244,156	239,600 – 266,799	15	Medium
Proposed Design	42,323	30,400 – 43,699	2	Low
Future Score	69,833	65,300 – 78,599	5	Low

It is considered that the cost associated with the construction of a pedestrian crossing with gates would make the installation of the crossing cost prohibitive and project not go ahead. Due to low estimated usage, the 'so far as reasonably practicable' (SFARP) principal could be applied in this situation.

6.1.1 Safety Review Team (SRT) modified design

The SRT consider that the concept design does not manage the risk of the multi-track situation, it is recommended that as the gate solution would likely be cost prohibitive to the project progressing. The SRT recommends that SRARP principal is applied and the concept design is modified to include an active second train approaching warning sign in favour of gates.

Table 6-2: Safety Review Team Modified ALCAM LCSS Score

Scored Item	Raw Risk Score	Band Range	ALCAM LCSS Score	ALCAM Risk Band
Safety Review Team Modified Design	122,277	99,178 – 115,499	7	Medium-Low
Safety Review Team Design Future Score	185,256	181,000 – 197,345	12	Medium-Low

Crash & Incident History Score (10 Points)

For a shared path/pedestrian scenario, 100% of the crash score is from the IRIS score involving pedestrians. As there is no existing pedestrian facility with very limited pedestrian demand, the IRIS database has no recorded pedestrian or cyclist incidents. However as outlined in section 0, the construction of the MCR is expected to generate about 20 pedestrian crossings per day. Therefore, it is considered that a near miss

incident has been included and a Crash & Incident History Score of 2/10 is appropriate for the proposed scenario.

Table 6-3: Crash & Incident History Score

Scenario	IRIS Data	Total Score	Comment
Updated Existing (concept design)	Assumed one near miss	2 / 10	Assumed that a near miss will occur will occur with the proposed configuration.
Change in Use	Assumed two near miss	4 / 10	Assumed that an additional near miss will occur.
Proposed Design	Zero	0 / 10	Assumed that pedestrian gates will mitigate incidents.
Future Score	Zero	0 / 10	Assumed that pedestrian gates will mitigate incidents.

Site Specific Safety Score (10 Points)

The Site-Specific Safety Score (SSSS) for a pedestrian/cyclist crossing scenario is based on 5 categories of scoring, for the proposed site at Scruttons Road these are assessed below;

Table 6-4: SSSS - Summary

Scenario	Raw Score	Total Score	Comment
Existing	12 / 30	4 / 10	Crossing Type 7 / 10 Excellent visibility from proposed limit lines, and only look for train signs, -1 for proposed maze. Warning bells are present at the adjacent road crossing. Distraction/Inattention 2 / 5 Low user numbers, assume distraction/inattention occurs from time to time Flange gap wheel entrapment for wheeled pedestrians 1 / 5 Proposed rubber inserts. Volume of vulnerable users (i.e. visually impaired, school children, physically disabled, elderly, or intoxicated users) 1 / 6 Very low (<10) vulnerable user numbers Cycle Patronage 1 / 4 Cyclists expected to use road crossing, however occasional cyclist use possible
Change in Use	12 / 30	4 / 10	
Proposed Design	5 / 30	2 / 10	Crossing Type 0 / 10 Automatic Gates are in operation at the crossing, -1 for proposed maze. Warning bells are present at the adjacent road crossing. Distraction/Inattention 2 / 5 Low user numbers, assume distraction/inattention occurs from time to time
Future Score	5 / 30	2 / 10	

			Flange gap wheel entrapment for wheeled pedestrians 1 / 5 Proposed rubber inserts. Volume of vulnerable users (i.e. visually impaired, school children, physically disabled, elderly, or intoxicated users) 1 / 6 Very low (<10) vulnerable user numbers Cycle Patronage 1 / 4 Cyclists expected to use road crossing, however occasional cyclist use possible

Locomotive & RCA Engineers Risk Assessment (10 Points)

The risk assessment ratings (based on maze control) were as follows;

- Locomotive Engineer (LE) 3
- Road Controlling Authority (RCA) Engineer 1

The LE rating score is weighted 2:1 in favour of the LE. This gives a total risk assessment score of 5/10

Table 6-5: Locomotive & RCA Engineer Score

Scenario	Locomotive Engineer	RCA Engineer	Total Score
Updated Existing	3 / 5	1 / 5	5 / 10
Change in Use	3 / 5	1 / 5	5 / 10

The LE and RCA were not asked to provide a rating for the automated gated Assessor proposed design, however it is considered that the rating scores for would be reduced.

Scenario	Locomotive Engineer	RCA Engineer	Total Score
Proposed Design	1 / 5	1 / 5	2 / 10
Future Score	1 / 5	1 / 5	2 / 10

Level Crossing Safety Score (LCSS) Summary

For the proposed pedestrian crossing, the LCSS is 6, which corresponds to a risk band of "Low". This is summarised in Table 6-6 below;

Table 6-6: LCSS Summary – Pedestrian Crossing

Category	Updated Existing	Change in Use	Proposed Design	Future Score	Comments
ALCAM Score	9 / 30	15 / 30	2 / 30	5 / 30	The maze and pedestrian gate combination reduces the ALCAM score
Crash & Incident History Score	4 / 10	4 / 10	0 / 10	0 / 10	The maze and pedestrian gate combination reduces the C score
Site Specific Safety Score (SSSS)	4 / 10	4 / 10	2 / 10	2 / 10	The maze and pedestrian gate combination reduces the SSSS for the proposed and future score
Locomotive & RCA Engineers Risk Assessment	5 / 10	5 / 10	2 / 10	2 / 10	The LE and RCA were not asked to provide a rating for the automated gated Assessor proposed design, however it is considered that the rating scores for would reduce
Total Level Crossing Safety Score (LCSS)	22 / 60	28 / 60	6 / 60	9 / 60	The maze and pedestrian gate combination provides the greatest reduction in the LCSS.
LCSS Risk Band	Medium-Low	Medium-Low	Low	Low	

The proposed crossing therefore satisfies KiwiRail Criteria 1, that a new crossing achieves a 'Low' or 'Medium-Low' level of risk, as determined by the LCSS.

The SRT consider that the recommended gate solution would likely be cost prohibitive to the project, with the footpath connection not progressing. The SRT recommends that SRARP principal is applied and the concept design is modified to include an active second train approaching warning sign in favour of gates.

Table 6-7: LCSS Summary – SRT Modified Pedestrian Crossing

Category	SRT Proposed Design	SRT Future Score	Comments
Total Level Crossing Safety Score (LCSS)	20 / 60	25 / 60	The replacement of the physical controls with an active sign increases the ALCAM rating
LCSS Risk Band	Medium-Low	Medium-Low	

Therefore, the safety review team modified crossing also still satisfies KiwiRail Criteria 1, that a new crossing achieves a 'Low' or 'Medium-Low' level of risk, as determined by the LCSS.

Future Score Assessment Summary

A future score assessment forecast the estimated increase in AADT volume over the next 10-year period at the crossing and if necessary recommends an amendment to form of controls.

The assessment has forecasted an initial high uptake for both on-road cyclists and pedestrians has been estimated at 10% per annum as users familiarise themselves with the new facility, a reduction in the growth to 3% per annum is estimated after the initial increase, if the proposed design was to occur at the crossing.

The future score LCSS is 9, which corresponds to a risk band of "Low" and therefore still satisfies KiwiRail Criteria 1.

7 ALTERNATIVE 'DESIRE LINE' DESIGN – PEDESTRIAN CROSSING

A concern with the proposed pedestrian crossing design is that the site constraints and proximity to a private access way will mean there is limited scope to install meaningful lengths of wing fencing to encourage pedestrians to use the maze, pedestrians are more likely to simply bypass the maze system and use the road crossing.

An alternative approach would be to install a smooth, flat pedestrian path close to the desire line, but without the maze controls. This would be more likely to get used and installation of rubber matting would ensure that wheel entrapment for vulnerable users is avoided.

- ALCAM risk increases to 181,324 & 299,185
- ALCAM score increases to 12 & 17
- SSSS score increases from 2/10 to 5/10
- Engineer's Risk Assessment increases from 2/10 to 7/10
- Overall LCSS increases from 15 to 35

The net result on the LCSS would be;

Category	Alternative Desire Line	Alternative Desire Line Future Score	Comments
ALCAM Score	12 / 30	17 / 30	Due to the removal of the engineering controls the ALCAM risk increases to 181,324 and ALCAM score increases to 12, with the future score increasing to 299,185 and 17
Crash & Incident History Score	4 / 10	6 / 10	Assumed that two near miss will occur at the facility over the next 10-year period based on the double track. Assumed third near miss with future growth.
Site Specific Safety Score (SSSS)	5 / 10	5 / 10	Excellent visibility from proposed limit lines, and only look for train signs. Low user numbers, assume distraction/inattention occurs from time to time. Small well maintained flange gap. Low vulnerable and cyclist usage.
Locomotive & RCA Engineers Risk Assessment	7 / 10	7 / 10	Anticipated that the LE score increases to 4 Anticipated that the RCA score increase to 2
Total Level Crossing Safety Score (LCSS)	28 / 60	35 / 60	The removal of the physical engineering controls increases the ALCAM rating and LCSS beyond the acceptable level.
LCSS Risk Band	Medium-Low	Medium	

This alternative design which is more likely to get used in the manner for which it is intended, still satisfies KiwiRail criteria #1 - that a new crossing achieves a 'Low' or 'Medium-Low' level of risk, as determined by the LCSS. However, it is not recommended that this option is progressed as the score is at the upper echelon of the Medium-Low risk band and also does not meet the minimum protection requirements.

Future Score Assessment Summary

A future score assessment forecast the estimated increase in AADT volume over the next 10-year period at the crossing and if necessary recommends an amendment to form of controls.

The assessment has forecasted an initial high uptake for both on-road cyclists and pedestrians has been estimated at 10% per annum as users familiarise themselves with the new facility, a reduction in the growth to 3% per annum is estimated after the initial increase, if the proposed design was to occur at the crossing.

The future score assessment the LCSS is 35, which corresponds to a risk band of "Medium" and therefore does not satisfies KiwiRail Criteria 1 or 2.

Again, this future emphases that this option should not proceed.

8 SENSITIVITY ANALYSIS

Road Crossing

Some sensitivity testing has been undertaken to determine the effect on the LCSS for increased future traffic volume scenarios, and to also determine at what level of increased volume would Half-Arm Barrier (HAB) control be appropriate. The overall LCSS results are summarised

Table 8-1: Road Crossing Sensitivity

CONTROL	TRAFFIC VOLUME				
	235	500	1,000	2,000	4,000
FLB	15 / 60 [LOW]	18 / 60 [LOW]	21 / 60 [MED-LOW]	22 / 60 [MED-LOW]	24 / 60 [MED-LOW]
HAB	8 / 60 [LOW]	8 / 60 [LOW]	9 / 10 [LOW]	10 / 60 [LOW]	12 / 60 [LOW]

The sensitivity analysis indicates that as expected, volume increases lead to higher LCSS scores, and HAB control reduces LCSS scores.

The sensitivity analysis shows that existing FLB control would still satisfy KiwiRail criteria 1, even for significant future volumes.

Pedestrian Crossing

Sensitivity testing has been undertaken to determine the effect on the LCSS for increased future pedestrian volume scenarios, and to also determine at what level of increased volume would automated gates control be appropriate. The overall LCSS results are summarised

Table 8-2: Pedestrian Crossing Sensitivity

CONTROL	PEDESTRIAN VOLUME				
	20	50	100	150	200
MAZE (proposed)	18 / 60 [LOW]	28 / 60 [MED-LOW]	34 / 60 [MED]	37 / 60 [MED]	37 / 60 [MED]
PATH (alternative)	24 / 60 [MED-LOW]	32 / 60 [MED]	37 / 10 [MED]	40 / 60 [MED-HIGH]	42 / 60 [MED-HIGH]
AUTOMATIC GATE	12 / 60 [LOW]	19 / 60 [LOW]	27 / 10 [MED-LOW]	32 / 60 [MED]	33 / 60 [MED]

The sensitivity analysis indicates that as expected, volume increases lead to higher LCSS scores, and automated gates reduces LCSS scores.

The existing the proposed maze option would still satisfy KiwiRail criteria 1, even for future volumes up to 100 movements per day, with the alternative design only allowing future growth up to 50 movements per day.

The sensitivity analysis shows that if the pedestrian volumes were to exceed 150 movements per day, then grade separation should be considered.

9 CONCLUSIONS & RECOMMENDATIONS

The Heathcote Expressway (HX) Major Cycle Route (MCR) is proposed to be constructed parallel to a portion of the Main South Line (MSL). A new pedestrian level crossing is proposed to be constructed to connect Scruttons Road, while the HX does not physical cross the MSL it is expected that some local residents will cross the rail line and use the new cycleway as a recreational walking path and an expected 160 additional cycle trips (80 each way) will use the existing road level crossing

The proposed design and future with the Scruttons Road Crossing associated with 160 additional cycle path satisfies KiwiRail criteria that achieves a “low” or “medium-low” level of risk as determined by the LCSS.

- The LCSS for the Road Crossing is 13 / 60 (Low Risk)

The concept pedestrian layout with the expected volumes satisfies KiwiRail criteria that achieves a “low” or “medium-low” level of risk as determined by the LCSS.

- The LCSS for the concept design for the pedestrian path is 20 / 60 (Medium-Low Risk)
- The LCSS for the proposed design including the pedestrian gates is 6 / 60 (Low Risk)
- The LCSS for a Safety Review Team (SRT) modified design is 18 / 60 (Low Risk)

The SRT recommend that the final detail design of the shared path crossing includes;

- That SFARP principal is applied in this instance and the SRT modified design with a second train approaching active warning sign is included in favour of the full automatic gates.
- Installation of an adequate length of fencing is provided to ensure that pedestrians do not use the road crossing to ‘bypass’ the new pedestrian facility.
- Full compliance with NZTA TCD-9;
- Post-construction pedestrian/cyclist counts will provide more accurate ALCAM and LCSS results in the future.
- An alternative ‘desire line’ approach has been considered to install a smooth, flat pedestrian path close to the desire line but without the maze controls, this was due to the site constraints resulting in limited scope to install wing fencing to encourage pedestrians to use the maze. However, it is not recommended that this option is progressed as the score is at the upper echelon of the Medium-Low risk band and does not meet the minimum protection requirements.

APPENDIX A – ALCAM ASSESSMENT

ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

SURVEY CONDUCTED BY

Name [redacted] Name .....

Signature .....

Date 7 June 2017 Time .....

PRE ASSESSMENT DATA.

Office sourced information.

#File Ref : .....

#PLC Status :.....Statutory / DOG / Unauthorised / Other

#Deed of Grant Yes / No .....No .....

#User / Grantee's Name

.....

#User / Grantee's Residential Address

.....

.....

LX Street / Road Name Scruttens Rd

City / Town Christchurch

#LXM Database ID No: 2281

Line or Branch Name MAIN SOUTH LINE

Rail Km : 5.20

WORKPLACE SAFETY REQUIREMENTS.

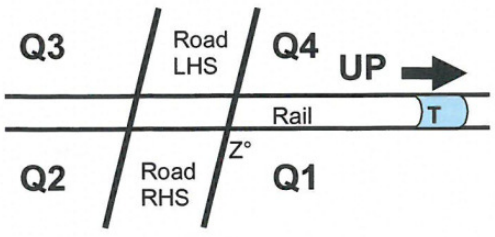
Before going on site make sure that all safety requirements have been checked and are in compliance.

☑ PPE ☐ ITD ☑ Job Plan

☑ Traffic Plan ☐ Other

☑ If TC or STMS certified carry card while on site.

SITE DEFINITION.



LEVEL CROSSING GPS COORDINATES

(Centre of rail and road)

WP No : .....Accuracy.....

* Latitude
S ddd/mm/ss.s : 43 / 34 / 04.1

* Longitude
E ddd/mm/ss.s : 172 / 41 / 38.9

* Record to the nearest decimal of a second in terms of the WGS84 Datum.

VEHICLE & TRAIN PARAMETERS.

A drivers ability to see is made at an eye height of 1.5m above the road (NZ = 1.1m Car & 1.8m Truck; average 1.5m) to a target at a height of 2.6m above the rail (NZ = 2.6m Locomotive) which is the height of a train headlight.

Fixed Parameters.

(Ld)	Drivers eye to front of vehicle	2.00 m
(d)	Deceleration rate	0.29 unit
(RT)	Drivers Perception Reaction Time	2.50 sec
(BT)	Brake delay	1.0 sec
(J)	Start off P & R times + brake time	2.00 sec
(a)	Vehicle accelerating across LX	0.36 sec

Measured Parameters.

(Vv) Vehicle LHS Road speed ≥ 85%ile 40 km/h
(Vv) Vehicle RHS Road speed ≥ 85%ile 50 km/h

Definition.
The 85%ile speed is the speed at which 85% of vehicles will travel through the site.

If an Estimated 85%ile Road Speed cannot be determined by driving back and forward over the LX use the Road Sign Posted Speed for the vehicle ≥ 85%ile speed.

LHS Road Sign Posted Speed Limit 50 km/h
RHS Road Sign Posted Speed Limit 50 km/h

(WR) Width of approach road 4.6 m
Useable approach road width 4.6 m

The width of the approach road shall be recorded to the nearest 100mm so that the S3 viewline distances can be calculated. The useable road width is used for a different purpose in the ALCAM Model.

(WT) Width of track 6.46 m

The width of the track is measured outside rail edge to outside rail edge to the nearest 100mm.

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ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

(L) Maximum Length of Vehicle ..25..m

A default vehicle length of 25m shall be used unless advised otherwise.

(VT) Fastest train UP / DN speed ..70..km/h

If you are given the fastest average LX approach speed then record the value above. If you are not given the fastest average LX approach speed then use the fastest UP or DN track operational speed.

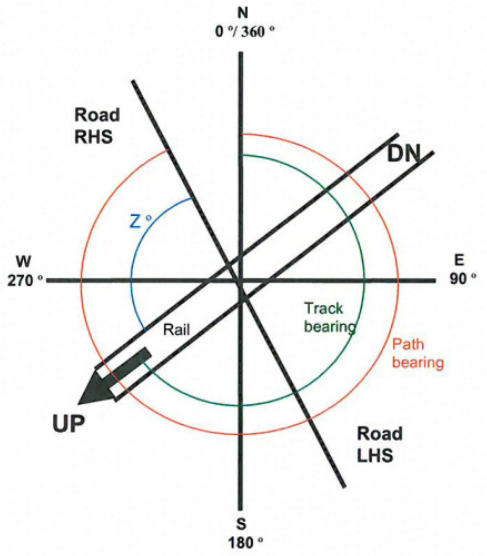
(Cv) Longest LL to nearest rail distance ..4.1..m

Measure the distances (Cv) from the LHS and RHS Limit Line (LL) outside edge to the nearest rail outside edge to the nearest 10mm so that the S1, S2 and S3 viewline distances can be calculated. **If no LL marked use 2.4m.** Distance from the centre line of the line to the Limit Line is 3m and due to the width of the rail the distance from the limit Line to the nearest rail edge is 2.4m.

LHS ..4.1..m RHS ..4.1..m

Rail and path readings are to be taken and the bearings are to be used to determine the angle (Z) between the rail and path.

Magnetic bearings are to be recorded to the nearest 1°.



RHS Road Bearing (facing away from track)..174..deg

Track Bearing (facing UP)..127..deg

(Z) Angle between road & rail ..47..deg

S1 GRADIENT TO BE USED TO CALCULATE VIEWLINE DISTANCES.

Gradients measured between nearest rail edge and 30m (an estimated S1 distance) and recorded to the nearest one percent.

For the calculation of the viewline distance always introduce the lower numeric value (i.e. 2% = 0.02 in the viewline calculation).

Sign convention: upgrade towards crossing is positive and downgrade towards crossing is negative.

(G) LHS Approach G for S1..2..%

(G) RHS Approach G for S1..0..%

S3 GRADIENT TO BE USED TO CALCULATE THE VIEWLINE DISTANCE.

Gradients measured between nearest rail edge and 10m from nearest rail edge.

LHS Approach G for S3..6..%

RHS Approach G for S3..5..%

VIEWLINE DISTANCES

S1 = Vehicle stops after seeing train and before reaching the LX.

Note: If LX is a simple Road / Rail LX the S1 ID's will be S1 RHS & S1 LHS If LX is complex with more than two S1 positions label the S1 positions asS1 A, S1 B, S1 C etc and show approximate positions on the sketch

$S1 = (R_T + B_T)Vv/3.6 + Vv \times Vv/254(d + G) + Ld + Cv$

61m+A.1

LHS $S1_A$ 65.1m LHS $S1_B$.....m LHS $S1_C$.....m

RHS $S1_A$ 89.1m RHS $S1_B$.....m RHS $S1_C$.....m

85+A.1

*** IMPORTANT**

Measurement of S2 and S3 distances

The four measured S2 distances and the four measured S3 distances will be taken from the point at which the driver of a vehicle would first be able to sight a train (ie the maximum viewline distance available). This will apply irrespective of the calculated viewlines.

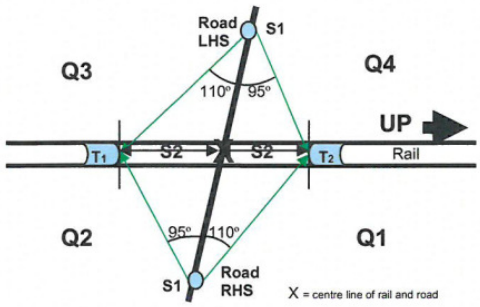
The maximum distance that is necessary to walk along the track is shown in the table below. Where the actual viewline distances are greater than the value in the table use a + after the distance (i.e. 650m +).

Maximum gradient at the restart position	Single track	Double track	Three or more tracks
< 5 %	650 m	700 m	750 m
> 5 %	800 m	900 m	950 m

ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

S2 Measured.

S2: Distance of an approaching train from the LX at which a vehicle driver at the distance S1 from the LX can first see the train.



Place the sighting board on the calculated S2 position and view the sighting board from the S1 point. If the sighting board can be seen from the S1 point record the viewline distance to the nearest metre from the centre of the LX. If a clear view of the sighting board cannot be seen from the S1 point then move the sighting board towards the LX until it can be seen then measure the viewline distance from the centre of the LX. Repeat the process for each quadrant.

In order to ensure a motor vehicle driver can see along the prescribed sight without excessive head movement or sight obstruction by parts of the vehicle itself, the following maximum sighting angles measured from the direction of travel of the vehicle at the point or points at which sightings must be made, should be available:

To the left: 95 degrees
To the right: 110 degrees

LHS	Max Visibility Available (m)	Angle (Deg)
S2 Sighting Up (Q4)	21	12°
S2 Sighting Down (Q3)	114	95°
S2 Sighting Up (Q4)		
S2 Sighting Down (Q3)		

RHS	Max Visibility Available (m)	Angle (Deg)
S2 Sighting Up (Q1)	9	5
S2 Sighting Down (Q2)	10	5
S2 Sighting Up (Q1)		
S2 Sighting Down (Q2)		

For Passive LX Only.
Subjective observation of viewline compliance.

These observations are to provide an early and subjective indication of the condition of the viewlines only. Further on site investigation will be carried out if preliminary rectification work is required prior to a detailed ALCAM analysis / evaluation.

Tick more than one answer where applicable.

Quadrant	Q1	Q2
Viewline	S1 – T2	S1 – T1
Viewline Obstructed	☐	☐
By Vegetation and / or	☐	☐
By Tree and /or	☐	☐
By Building and /or	☐	☐
By Embankment / Hill and / or	☐	☐
By Containers / Vehicles	☐	☐

For vegetation and / or tree obstruction(s) tick below if you believe the obstruction(s) can be removed to enable the viewline to comply.

Vegetation and / or Tree	☐	☐

Tick more than one answer where applicable.

Quadrant	Q3	Q4
Viewline	S1 – T1	S1 – T2
Viewline Obstructed	☐	☐
By Vegetation and / or	☐	☐
By Tree and /or	☐	☐
By Building and /or	☐	☐
By Embankment / Hill and / or	☐	☐
By Containers / Vehicles	☐	☐

For vegetation and / or tree obstruction(s) tick below if you believe the obstruction(s) can be removed to enable the viewline to comply.

Vegetation and / or Tree	☐	☐

COMPLETE THE FOLLOWING SECTIONS FOR ADDITIONAL S2 VIEWLINES.

Tick more than one answer where applicable.

Quadrant	Q	Q
Viewline	S – T	S – T
Viewline Obstructed	☐	☐
By Vegetation and / or	☐	☐
By Tree and /or	☐	☐
By Building and /or	☐	☐
By Embankment / Hill and / or	☐	☐
By Containers / Vehicles	☐	☐

For vegetation and / or tree obstruction(s) tick below if you believe the obstruction(s) can be removed to enable the viewline to comply.

Vegetation and / or Tree	☐	☐

Tick more than one answer where applicable.

Quadrant	Q	Q
Viewline	S – T	S – T
Viewline Obstructed	☐	☐
By Vegetation and / or	☐	☐
By Tree and /or	☐	☐
By Building and /or	☐	☐
By Embankment / Hill and / or	☐	☐
By Containers / Hills	☐	☐

For vegetation and / or tree obstruction(s) tick below if you believe the obstruction(s) can be removed to enable the viewline to comply.

Vegetation and / or Tree	☐	☐

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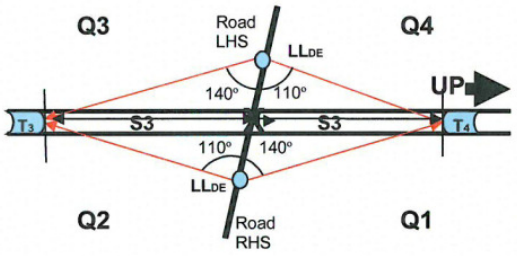
S3 VIEWLINE DISTANCE – MEASURED.

S3: Distance of an approaching train from the LX for a vehicle driver stopped at the LX to first see the train.



X = centre line of rail and road LLDE() = 5m from nearest rail

S3 Measured.

Place the sighting board on the calculated S3 position and view the sighting board from the Limit Line Drivers Eye position eg 1.5m back from the Limit Line. If the sighting board can be seen from the Limit Line Drivers Eye position record the viewline distance to the nearest metre from the centre of the LX. If a clear view of the sighting board cannot be seen from the Limit Line Drivers Eye position move the sighting board towards the LX until it can be seen then measure the viewline distance from the centre of the LX. Repeat process for each quadrant.

In order to ensure a motor vehicle driver can see along the prescribed sight without excessive head movement or sight obstruction by parts of the vehicle itself, the following maximum sighting angles measured from the point where vehicle is stopped at crossing to both sides of the tracks must be made, should be available:

To the left: 110 degrees
To the right: 140 degrees

LHS	Max Visibility Available (m)	Angle (Deg)
S3 Sighting Up (Q4)	250	50
S3 Sighting Down (Q3)	250	130

RHS	Max Visibility Available (m)	Angle (Deg)
S3 Sighting Up (Q1)	37	120
S3 Sighting Down (Q2)	370	15

For Passive LX Only.

Subjective observation of viewline compliance.

These observations are to provide an early and subjective indication of the condition of the viewlines only. Further on site investigation will be carried out if preliminary rectification work is required prior to a detailed ALCAM analysis / evaluation.

Tick more than one answer where applicable.

Quadrant	Q1	Q2
Viewline	LLDE – T4	LLDE – T3
Viewline Obstructed	☐	☐
By Vegetation and / or	☐	☐
By Tree and /or	☐	☐
By Building and /or	☐	☐
By Embankment and / or	☐	☐
By Hill	☐	☐

For vegetation and / or tree obstruction(s) tick below if you believe the obstruction(s) can be removed to enable the viewline to comply.

Vegetation and / or Tree	☐	☐

Tick more than one answer where applicable.

Quadrant	Q3	Q4
Viewline	LLDE – T3	LLDE – T4
Viewline Obstructed	☐	☐
By Vegetation and / or	☐	☐
By Tree and /or	☐	☐
By Building and /or	☐	☐
By Embankment and / or	☐	☐
By Hill	☐	☐

For vegetation and / or tree obstruction(s) tick below if you believe the obstruction(s) can be removed to enable the viewline to comply.

Vegetation and / or Tree	☐	☐

COMPLETE THE FOLLOWING SECTIONS FOR ADDITIONAL S3 VIEWLINES.

Tick more than one answer where applicable.

Quadrant	Q	Q
Viewline	LLDE – T	LLDE – T
Viewline Obstructed	☐	☐
By Vegetation and / or	☐	☐
By Tree and /or	☐	☐
By Building and /or	☐	☐
By Embankment and / or	☐	☐
By Hill	☐	☐

For vegetation and / or tree obstruction(s) tick below if you believe the obstruction(s) can be removed to enable the viewline to comply.

Vegetation and / or Tree	☐	☐

Tick more than one answer where applicable.

Quadrant	Q	Q
Viewline	LLDE – T	LLDE – T
Viewline Obstructed	☐	☐
By Vegetation and / or	☐	☐
By Tree and /or	☐	☐
By Building and /or	☐	☐
By Embankment and / or	☐	☐
By Hill	☐	☐

For vegetation and / or tree obstruction(s) tick below if you believe the obstruction(s) can be removed to enable the viewline to comply.

Vegetation and / or Tree	☐	☐

ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

LEVEL CROSSING GEOMETRY.

Q61. Number of operational rail tracks.

Number of Tracks.....2.....unit

Q62 Immediate approach & departure road surface ; not the LX panel.

☑ Sealed/good condition.

☐ Sealed but breaking up/unsealed but firm.

☐ Unsealed /loose/potholed.

Q63. Is the LX on a hump, dip or rough surface.

☑ No hump, dip. or rough surface (LX is level)

☐ Hump, dip or rough surface exists (low clearance vehicle issue)

Q74. Sun glare ; unable to see LX controls.

☐ Sun glare is not a problem on the road approach.

☑ Sun glare may be a problem on the road approach.

Q75. Sun glare ; unable to see approaching train.

☐ Sun glare is not a problem on the rail approach.

☑ Sun glare may be a problem on the rail approach.

Q76. Temporary visual impediments (fog, mist, steam etc) ; unable to see LX controls.

☐ No known visual impediments

☐ Some which may impact on the LX 1day/year.

☑ Some which may impact on the LX 1day/month.

☐ Some which may impact on the LX 1day/week.

Q77. Temporary visual impediments (fog, mist, steam etc) ; unable to see approaching train.

☐ No known visual impediments

☐ Some which may impact on the LX 1day/year.

☑ Some which may impact on the LX 1day/month.

☐ Some which may impact on the LX 1day/week.

ROAD GEOMETRY.

Q21. Proximity to an intersection.

☐ >200m ☑ 200-50m ☐ 50-20m ☐ <20m

Q22. Proximity to a siding / shunting yard.

☑ >200m ☐ 200-100m ☐ 100-50m ☐ <50m

Q23. Proximity to a station.

☑ >200m ☐ 200-100m ☐ 100-50m ☐ <50m

Q24. Possibility of short stacking from either side.

☑ Short stacking is not an issue where the available space is greater than 30m measured from nearest rail edge.

☐ Short stacking could be an issue where the available space is between 20m and 30m equals the longest measured from nearest rail edge.

☐ Short stacking is an issue where the available space is less than 20m measured from nearest rail edge.

Q26. Highest number of road lanes in any one approach.

Highest number of lanes in any one approach.....1.....unit

Q27. Vulnerable to road user fatigue.

Road long and boring or subject to fatigue related accidents.

☑ Non fatigue zone ☐ Possible fatigue zone

☐ Fatigue zone

ROAD TRAFFIC CONTROL.

Q31. Presence of adjacent distractions.

Driver confronted with a large number of varieties of visual distractions.

☑ Few ☐ Some ☐ Many

Q32. Condition of traffic control at LX.

Signage, lights, etc incomplete and / or in poor condition.

☑ Complete & in good order

☐ Some wear & tear but readable.

☐ Message is unreadable or does not exist.

Q33. Visibility of LX controls from safe stopping distance.

☑ Easily observed,

☐ Partly obscured or poorly aligned,

☐ Not visible or doesn't exist.

ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

Q34. Distance from advance warning sign to LX.

LHS advance warning sign to LX N/A m

RHS advance warning sign to LX 60 m

ROAD VEHICLES.

Q41. Heavy vehicle proportion.
Office sourced information.

☐ <5% ☐ 5-10% ☐ 11-25% ☐ >25%

Q42. Level of service (vehicle congestion).
Office sourced information.

☐ A – Free flow
☐ B – Stable flow
☐ C – Stable restricted flow
☐ D – Unstable flow
☐ E – Close to capacity
☐ F – Forced flow

Annual Average Daily Traffic Volume.....
Office sourced information.

Q43. Queuing from adjacent intersections.
Extent to which queuing may interfere with the LX.

☑ No queues back to LX.

☐ No known queuing however traffic environment could allow queuing.

☐ Traffic known to queue back to LX.

Q44. Road Traffic 85%ile speed.
These 85%ile speed ranges when entered into the ALCAM model are given a risk weighting which is used along with other LX characteristic risk weightings to determine an overall risk score. These speed ranges are not used to determine the S1 and S2 viewline distances.

☑ <or =60kph ☐ 60-80kph ☐ >80kph

LEVEL CROSSING CONTROLS.

Select one LX control only from Q102 to Q112. Duplicate means that there are two sets of the same type of control on the same side, left & right, of the LX.

Q102. Active Control, Duplicated 1/2Boom + Flashing Lights.

☐ Yes

Q103. Active Control, Single Full Boom + Flashing Lights.

☐ Yes

Q104. Active Control, Single 1/2 Boom + Flashing Lights.

☐ Yes

Q105. Active Control, Duplicated Primary Flashing Lights only.

☐ Yes

Q106. Active Control, Single Primary Flashing Lights only.

☑ Yes

Q107. Passive Control, Duplicate Stop Signs.

☐ Yes

Q108. Passive Control, Single Stop Signs.

☐ Yes

Q109. Passive Control, Duplicate Give Way Signs.

☐ Yes

Q110 Passive Control, Single Give Way Signs.

☐ Yes

Q111. Passive Control, Single Position Markers Only or Inverted Red Triangle.

☐ Yes

Q112. Rail Operated Gates at LX.
Road traffic to stop at manually operated gate.

☐ Yes

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ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

SUPPLEMENTARY ROAD TRAFFIC CONTROL INFORMATION.

LHS.
Identify any supplementary road traffic controls that have not already been identified and report any deficiencies in the comments section.

☐ Triangle ☐ Give Way ☐ Stop ☐ XBuck

☐ Flashing Lights ☐ Flashing Lights (with LED)

☐ ½ Booms ☐ Full Booms

☐ Kerbed Median L, ☐ Look for Trains ☑ 'x' Tracks

Any Other Controls SECOND TRAIN COMING, AUDIO

RHS.
Identify any supplementary road traffic controls that have not already been identified and report any deficiencies in the comments section.

☐ Triangle ☐ Give Way ☐ Stop ☐ XBuck

☐ Flashing Lights ☐ Flashing Lights (with LED)

☐ ½ Booms ☐ Full Booms

☐ Kerbed Median ☐ Look for Trains ☑ 'x' Tracks

Any Other Controls SECOND TRAIN COMING AUDIO

ADDITIONAL / IMPROVED CONTROL AT LEVEL CROSSING.

Q201. "Keep Tracks Clear" signs.

☐ Yes ☑ No

Q202. "Cross Hatching of LX".

☐ Yes ☑ No

Q203. Backing Boards / LED lights.

☐ Yes ☑ No

Q204. Hump / Dip advisory sign to road user.

☐ Yes ☑ No

Q205. PW - 14 Signage (Confederate Flag).

☐ Yes ☑ No

Q206. Train speed advisory sign to road user.

☐ Yes ☑ No

Q207. Additional Traffic Control Devices mounted on overhead mast arm.

☐ Yes ☑ No

Q208. Railway LX width marker assembly

☐ Yes ☑ No

ADVANCE WARNING.

Q301. Single standard passive advance warning eg WX1R, WX1L, WX3.

☑ Yes ☐ No RHS ONLY

Q302. Duplicated standard passive advance eg WX1R, WX1L, WX3.

☐ Yes ☑ No

Q303. Duplicated train activated advance warning eg Traffic Lights.

☐ Yes ☑ No

Q304. Single train activated advance warning eg Traffic Lights.

☐ Yes ☑ No

Q305. Duplicated large passive advance warning

☐ Yes ☑ No

Q306. Single large passive advance warning.

☐ Yes ☑ No

Q307. Vehicle activated advance warning e.g. strobe lights.

☐ Yes ☑ No

Q308. Passive tactile advance warning, e.g. rumble strips.

☐ Yes ☑ No

Q309. Rail-X pavement marking.

☐ Yes ☑ No

ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

HUMAN FACTORS.

Q401. Localised public education strategies.

☐ Yes ☑ No

Q402. Red light camera (legal enforcement).

☐ Yes ☑ No

Q403. CCTV surveillance.

☐ Yes ☑ No

Q404. Hand signallers (flagmen) to warn road users of approaching trains.

☐ Yes ☑ No

Q405. Public response phone number for reporting faults.

☑ Yes ☐ No

TRAIN RELATED.

Q502. Whistle Board / Location board for train

☐ Yes ☑ No

Q503. Reduce train speed sign to achieve S2 & S3.

☐ Yes ☑ No

Annual Average Daily Traffic Volume.....
Office based.

LEVEL CROSSING ENVIRONMENT.

Q601. Street lighting at LX.
Lighting specifically placed to illuminate the LX.

☐ Yes ☑ No

Q602. Maintenance program for vegetation control.
Office based assessment.

☐ Yes ☐ No

ROAD WORKS.

Q702. Barrier posts/median along road centreline.

☐ Yes ☑ No

Q705. Vehicle escapes zones.
Vehicle can move into a section of clear road space if road ahead is blocked.

☐ Yes ☑ No

SIGNALLING / DETECTION SYSTEMS.

Q801. Control of LX ; CCTV or on-site.
Office based assessment.

Q802 Activated sign for second train approaching

☑ Yes ☐ No

Q803. Detectors in LX conflict zone (Signal to Train Driver or Train Controllers when vehicle stopped on LX).

☐ Yes ☑ No

Q804. Train activated road traffic signals.

☐ Yes ☑ No

Q805. Healthy state signal system monitoring.
Office based assessment.

☐ Yes ☐ No

Q806. Queue relocation.
Office based assessment.

☐ Yes ☐ No

ROAD APPROACH VISIBILITY OF LX CONTROLS.

RHS Approach Visibility Distance.

☑ LX controls are visible at distance > 90m.

☐ LX controls are visible at distance < 90m.

Actual distance is.....m

LHS Approach Visibility Distance.

☑ LX controls are visible at distance > 90m.

☐ LX controls are visible at distance < 90m.

Actual distance is.....m

ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

OBSERVATIONS.

Road centre line (dotted) extends to advance warning signs

☐ Yes ☑ No ☐ N/A

LHS road centre line distance is short by.....N/A.....m

RHS road centre line distance is short by.....30.....m

LX Control is made of non-frangible material.....☐

LX Fencing is made of non-frangible material.....☐

LX Guardrail is made of non-frangible material.....☐

LX is in a Built Up Area.....☑

LX is in an Open Area.....☐

The following Observations to be recorded within 250m either side of the LX and to an accuracy of +/- 5m.

Points Up Track	☐	Distance from LX.....m
Points Dn Track	☐	Distance from LX.....m
Curves Up Track	☐	Distance from LX.....m
Curves Dn Track	☐	Distance from LX.....m
Culverts Up Track	☐	Distance from LX.....m
Culverts Dn Track	☐	Distance from LX.....m
Tunnels Up Track	☐	Distance from LX.....m
Tunnels Dn Track	☐	Distance from LX.....m
Bridges Up Track	☐	Distance from LX.....m
Bridges Dn Track	☐	Distance from LX.....m
Overbridge Up Track	☐	Distance from LX.....m
Overbridge Dn Track	☑	Distance from LX.....80.....m
Major Power Track Lines Up	☑	Distance from LX.....195.....m
Major Power Track Lines Dn	☐	Distance from LX.....m

COMMENTS.

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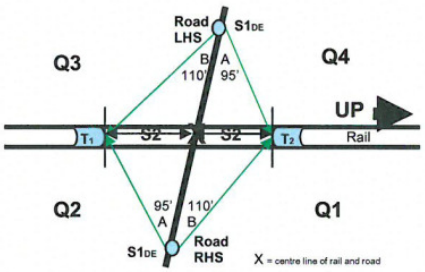
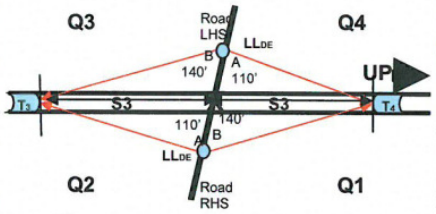
ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

ROAD / RAIL ASSESSMENT PHOTOGRAPHS



Ensure angles A and B are not exceeded



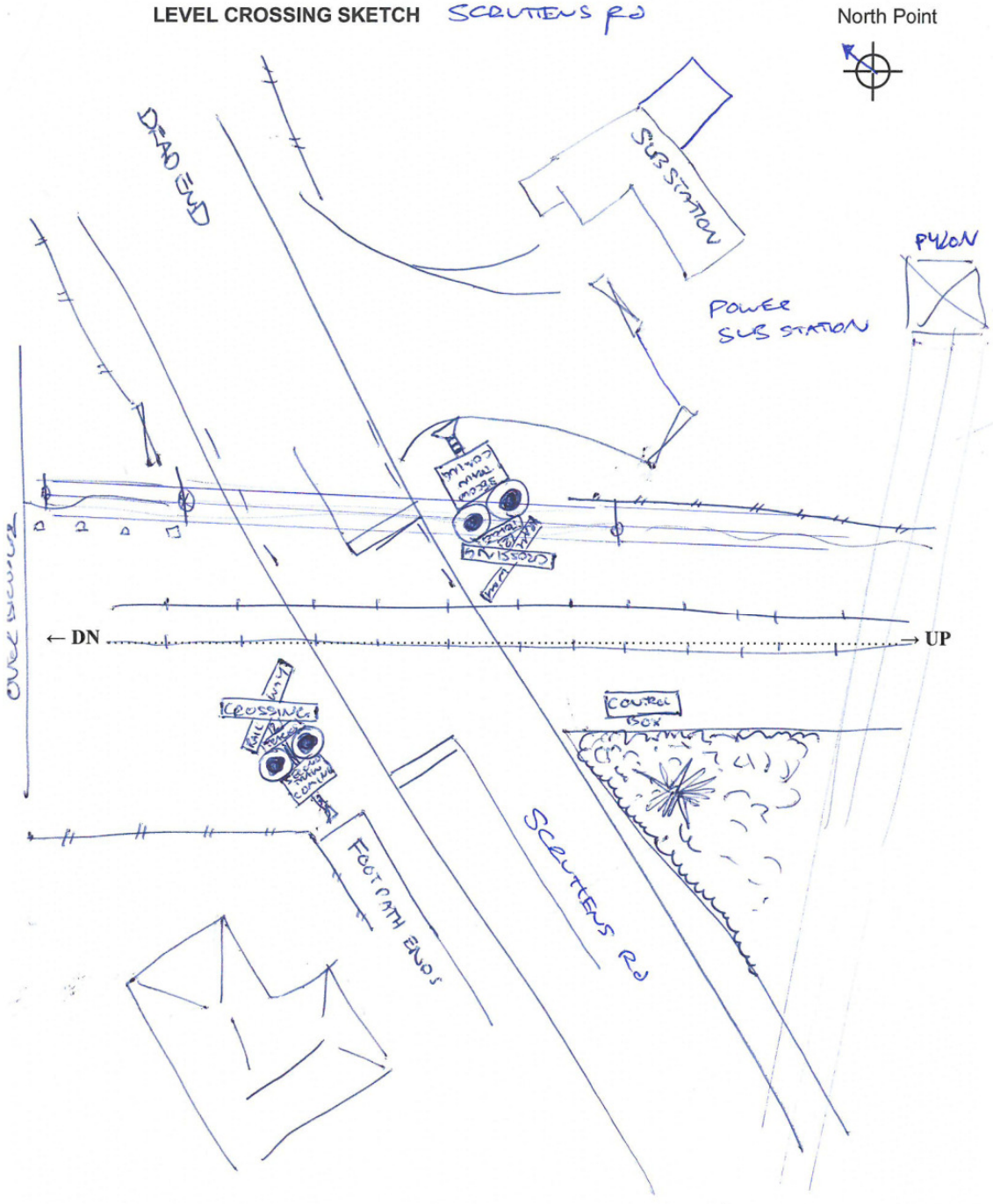
Location

Name	Photo No	Name	Photo No
X – Up Track		RHS Signage 1	
X – Dn Track		RHS Signage 2	
RHS S1 - X		RHS Signage 3	
LHS S1 - X		RHS Signage 4	
RHS 10m - X		RHS Signage 5	
LHS 10m - X		RHS Signage 6	
Q1 LLDE – T4		RHS Signage 7	
Q2 LLDE – T3		LHS Signage 1	
Q3 LLDE – T3		LHS Signage 2	
Q4 LLDE – T4		LHS Signage 3	
Q1 S1 – T2		LHS Signage 4	
Q2 S1 – T1		LHS Signage 5	
Q3 S1 – T1		LHS Signage 6	
Q4 S1 – T2		LHS Signage 7	

Comments

ALCAM PUBLIC & PRIVATE LEVEL CROSSING ROAD / RAIL ASSESSMENT SHEET

LEVEL CROSSING SKETCH SCRUTTENS Rd



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KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form

KiwiRail

SURVEY CONDUCTED BY

Name: Jodi Enright Name: .....

Signature: JEnright Signature: .....

Date: 19/6/2019 Time: .....

Conducted by: KiwiRail / Other: Stantec

PRE ASSESSMENT DATA

 # Office sourced information.

#File Ref: .....

#PLC Status: Statutory / DOG / Unauthorised / Other

#Deed of Grant: Yes / No ..... № .....

#User / Grantee's Name

.....

#User / Grantee's Residential Address

.....

.....

WORKPLACE SAFETY REQUIREMENTS

Before going on site. make sure that all safety requirements have been checked and are in compliance.

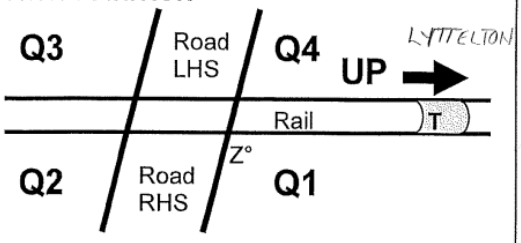
☒ PPE ☒ ITD ☒ Job Plan

☐ Traffic Plan ☐ Track Safety Rules

☐ Other

☒ If TC or STMS certified carry card while on site.

SITE DEFINITION



PED CROSSING GPS COORDINATES

(Centre of rail and path)

WP No: .....Accuracy.....

* Latitude S ddd/mm/ss.s: 43 / 34 / 03.91

* Longitude E ddd/mm/ss.s: 172 / 41 / 38.37

* Record to the nearest decimal of a second in terms of the WGS84 Datum.

CROSSING DETAIL

LX Street / Road Name: .....

Scruttons Rd

City / Town: Heathcote

#LXM Database ID No: 4619

Line or Branch Name: MSL

Rail Km: 5.220

Path Owner: CCC

Pedestrian Crossing Desc: Down track

Tracks

Physical tracks: 2 Operational tracks: 2

Metro/Non-Metro

☐ Metro ☒ Non-Metro

Surrounds

☐ Industrial ☐ Rural ☒ Urban

Path Status

☒ Proposed ☐ Open ☐ Closed

Emergency Access

Is the crossing in an area with difficult emergency access?

☐ Yes ☒ No

RAIL TRAFFIC

(supplied by rail manager)

	Pass - DMU/EMU		Pass - Loco		Freight
	Express	Stop	Express	Stop	Express
Number of trains (AADT)					9
Max Speed (Up)					70
Max Speed (Down)					70
Min Speed (Up)					0
Min Speed (Down)					0
Longest Train					468
Longest Warning					25
Shortest Warning					0
Occupancy					2
# of Wagons/Cars					24

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KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form

KiwiRail

Path Manager

Path Type

☐ Main Rd ☒ Local Govt ☐ Private ☐ Service

Path Infrastructure Manager (Primary)

Christchurch City Council

Path Infrastructure Manager (Other)

.....

Daily Pedestrian Traffic Volume (AADT)

20 peds/day ☒ Estimated

Average Peak Hour Pedestrian Traffic Volume

2 peds/h ☒ Estimated

Available Sighting Distances

Measured from the pedestrian hold point to train.

Available S3

Quadrant	Available Sighting	Sighting Limitation
Left Up (Q4) except signals	Clear 1000	☐ None ☐ Structures ☐ Terrain ☐ Vegetation
Left Down (Q3) Bridge	next crossing 710	☐ None ☐ Structures ☐ Terrain ☐ Vegetation
Right Up (Q1)	1000	☐ None ☐ Structures ☐ Terrain ☐ Vegetation
Right Down (Q2)	710	☐ None ☐ Structures ☐ Terrain ☐ Vegetation

Walking Speed (s)

Normal speed to be used unless there is significant use by people with disabilities

☒ Normal (1.0m/s)

☐ Slow - Ambulant Disability (0.8m/s)

Path crossing distance 10 m

Crossing Surface

Left Hold Point to Track

Surface Condition:
☒ Good ☐ Fair ☐ Poor

Surface Treatment:
☐ Removable Panels ☒ Sealed

☐ Unsealed-Formed ☐ Unformed

Surface Material:
☐ Rubber ☐ Steel ☐ Timber

☒ Asphalt ☐ Concrete ☐ Chip-seal

☐ Gravel ☐ Dirt ☐ Ballast

Right Hold Point to Track

Surface Condition:
☒ Good ☐ Fair ☐ Poor

Surface Treatment:
☐ Removable Panels ☒ Sealed

☐ Unsealed-Formed ☐ Unformed

Surface Material:
☐ Rubber ☐ Steel ☐ Timber

☒ Asphalt ☐ Concrete ☐ Chip-seal

☐ Gravel ☐ Dirt ☐ Ballast

Path over Tracks

Surface Condition:
☒ Good ☐ Fair ☐ Poor

Surface Treatment:
☐ Removable Panels ☒ Sealed

☐ Unsealed-Formed ☐ Unformed

Surface Material:
☐ Rubber ☐ Steel ☐ Timber

☒ Asphalt ☐ Concrete ☐ Chip-seal

☐ Gravel ☐ Dirt ☐ Ballast

Maze Condition

Left Maze:
☒ Good ☐ Fair ☐ Poor

Right Maze:
☒ Good ☐ Fair ☐ Poor

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KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form

KiwiRail

CHARACTERISTICS

Effectiveness of Equipment Inspection and Maintenance

☒ An effective inspection and maintenance program is evident.

☐ Inspection program exists but maintenance follow up in adequate.

☐ No inspection and maintenance program exists.

Presence of adjacent visual distractions

☒ Few ☐ Some ☐ Many

Explain: .....

.....

Proximity to a Station

.....m

☐ >500m ☐ 500-100m ☐ <100m

Proximity to a Siding / Shunting Yard?

.....260.....m

☐ >500m ☒ 500-100m ☐ <100m

Proximity to a licensed / special event venue.
(Hotel, Club or Sports Ground)

≈ 200 .....m Ferrymead

☐ >500m ☐ 500-200m ☒ 200-100m ☐ <100m

Proximity to school / playground and / or aged facility.

.....m

☒ >500m ☐ 500-200m ☐ 200-100m ☐ <100m

Ambient noise level / audibility of alarm.

☒ Train / alarm easily heard.

☐ Train / alarm only partially audible.

☐ Train / alarm cannot be heard over background noise.

Adjacent Road Traffic Activity

☐ There is no adjacent traffic activity

☒ There is some adjacent traffic activity

☐ There is a lot adjacent traffic activity

Conspicuity of pedestrian controls.

☒ Complete and in good condition.

☐ Some wear and tear but message is understandable.

☐ Deteriorated so message is unreadable or does not exist.

Visibility of pedestrian controls.

☒ Easily observed from the approach.

☐ Partly obscured, poorly aligned but visible from the approach.

☐ Not visible from the approach or does not exist

Likelihood of vandalism to control.

☒ No history of vandalism.

☐ Some history of vandalism negating controls.

☐ History of frequent vandalism negating controls.

Volume of children pedestrians

☒ Low = <25% of school children.

☐ Medium = 25% to 45% of school children.

☐ High = >45% of school children.

Volume of physically disabled pedestrian.

☒ Low = <25% of physically disabled users.

☐ Medium = 25% to 45% % of physically disabled users.

☐ High = >45% of physically disabled users.

Volume of sensory disabled pedestrians.

☒ Low = <25% of sensory disabled users.

☐ Medium = 25% to 45% of sensory disabled users.

☐ High = >45% of sensory disabled users.

KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form

KiwiRail

Volume of intellectually disabled pedestrians.

☒ Low = <25% of intellectually disabled users.

☐ Medium = 25% to 45% of intellectually disabled users.

☐ High = >45% of intellectually disabled users.

Volume of cyclists, wheelchairs, prams pedestrians

☐ Low = <25% of cyclist, w/chair & pram users.

☐ Med = 25% to 45% of cyclist, w/chair & pram users.

☒ High = >45% of cyclist, w/chair & pram users

Volume of pedestrian elderly

☒ Low = <25% of elderly pedestrians.

☐ Med = 25% to 45% of elderly pedestrians.

☐ High = >45% of elderly pedestrians.

Infrequent/Seasonal Movements/Special Trains

☒ Low Risk of special trains (not likely or very high volume of trains anyway)

☐ Medium risk of special trains (low train volumes and some unscheduled train movements)

☐ High risk of special trains (low train volumes and likely train movements)

Angle of pedestrian LX and width of flange gap.

☒	90 to 70°	or	F.G. <70mm
☐	70 to 30°	or	F.G. 70 - 90mm
☐	< 30°	or	F.G. >90mm

Condition of LX maze fencing and / or adjacent fencing and / or path surface.

☒ Maze fence and / or adjacent fencing and / or path are in good condition.

☐ Maze fence and / or adjacent fencing and / or path are in average condition.

☐ Maze fence and / or adjacent fencing and / path are in poor condition or missing.

Trains stand across LX.

☒ Trains rarely stand across LX.

☐ Trains occasionally stand across LX.

☐ Trains frequently stand across LX.

Crossing to NZ Standards (Gradients, widths and manoeuvring space of maze / pathway)

Record gradients to the nearest one percent.

Sign convention: upgrade towards crossing is positive and downgrade is negative

LHS approach...1...% RHS approach ..1.....%

Maze narrowest width.

LHS ...1.7... m RHS ...1.7... m

LHS

☒ LX meets TCD Manual Part 9.

☐ LX partially meets TCD Manual Part 9.

☐ LX does not meet TCD Manual Part 9.

RHS

☒ LX meets TCD Manual Part 9.

☐ LX partially meets TCD Manual Part 9.

☐ LX does not meet TCD Manual Part 9.

Alignment of approach path to LX path.

☐ Adequate approach path alignment

☒ Poor approach path alignment if approach path changes direction more than 20°

Crossing to NZ Standards (Signage and path marking.

LHS

☒ LX meets TCD Manual Part 9.

☐ LX partially meets TCD Manual Part 9.

☐ LX does not meet TCD Manual Part 9.

RHS

☒ LX meets TCD Manual Part 9.

☐ LX partially meets TCD Manual Part 9.

☐ LX does not meet TCD Manual Part 9

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KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form

KiwiRail

Sun glare issues at the LX.

☒ Sun glare does not become a problem.

☐ Sun glare obscures approaching train.

Temporary visual impediments sighting of train

☒ No known visual impediments which may impact on the visibility of an oncoming train

☐ Visual impediments which may impact 1day / year.

☐ Visual impediments which may impact 1day / mth.

☐ Visual impediments which may impact 1day / wk.

Masking of moving or stationary trains

☐ 1st train masks 2nd train rarely or never.

☒ 1st train masks 2nd train occasionally.

☐ 1st train masks 2nd train frequently.

Disabled access to LX

☒ LX meets TCD Manual Part 9.

☐ LX partially meets TCD Manual Part 9.

☐ LX does not meet TCD Manual Part 9.

CONTROLS

Physical Controls

Select one crossing control only from 102 to 107.

102 Automatic gates

☐ Yes

103 Pedestrian booms

☐ Yes

104 Manual gates, with or without a maze.

☐ Yes

105 Maze

☒ Yes

106 LX Path is formed or paved.

☐ Yes

107 There is no LX Path.
There is no specific LX Path which forces the pedestrians to use the road or cross over the railway.

☐ Yes

Audio Visual Controls

Select one LX control only from 110 to 114.

110 Visual alarm only.

☐ Yes

111 Audible alarm only.

☐ Yes

112 Visual & Audible alarm.

☐ Yes

113 Signs only.

☒ Yes

114 Unmarked Crossing.

☐ Yes

KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form

KiwiRail

Adjacent Road Controls

Is there an adjacent actively controlled road crossing?
☒ Yes ☐ No

If Yes select one LX control only from 120 to 123.

120 Adjacent boom gates, lights & audio.

☐ Yes

121 Adjacent visual & audio.

☒ Yes

122 Adjacent boom gates & lights (no audio)

☐ Yes

123 Adjacent lights only.

☐ Yes

Emergency Egress

Select one pedestrian LX control only from 130 to 132 if and only if either an Automatic Gate(s) or a Pedestrian Boom(s) is used.

130 Emergency egress with latch.

☐ Yes

131 Emergency egress without latch.

☐ Yes

132 No emergency egress.

☐ Yes

Other Controls

140 Hand signallers (flagmen) to warn pedestrian users of approaching trains.

☐ Yes ☒ No

141 Controlled LX swing gates by human activation through CCTV observation or through local signaller.

☐ Yes ☒ No

142 Healthy state monitoring of LX active controls.

☐ Yes ☒ No

HUMAN FACTORS:

201 Police enforcement of LX traffic infringements.

☐ Yes ☒ No

202 Public education strategies.

☐ Yes ☒ No

203 Fault reporting number.

☐ Yes ☒ No

204 Supervision of children.

☐ Yes ☒ No

205 CCTV monitoring.

☐ Yes ☒ No

Pedestrian Signage/Path Marking

301 Sign advising train speed.

☐ Yes ☒ No

302 Sign "LX unsuitable for mobility devices".

☐ Yes ☒ No

303 Active sign "another train coming" warning.

☐ Yes ☒ No

304 Painted stop line

☐ Yes ☐ No

305 Painted delineation lines at side of path.

☒ Yes ☐ No

306 Tactile ground surface indicators.

☒ Yes ☐ No

Crossing Environment

401 Path lighting at LX.

☐ Yes ☒ No

402 Maintenance program for vegetation.

☒ Yes ☐ No

403 Target boards / LED's.

☐ Yes ☒ No

404 Whistle boards.

☐ Yes ☒ No

Whistle board to LX.....metres

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KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form

KiwiRail

405 Wing / funnel / guide fencing.

☐ Yes ☒ No

406 Funnel pathway.

☒ Yes ☐ No

407 Adjacent corridor fencing / four quadrant booms.

☐ Yes ☒ No

Pathway Works

502 Flange Gap Filler

☐ Yes ☒ No

Advance warning signs to warn approaching cyclist of a LX

☐ Yes ☒ No

Operational

601 Train Lights

☒ Yes ☐ No

COMMENTS:

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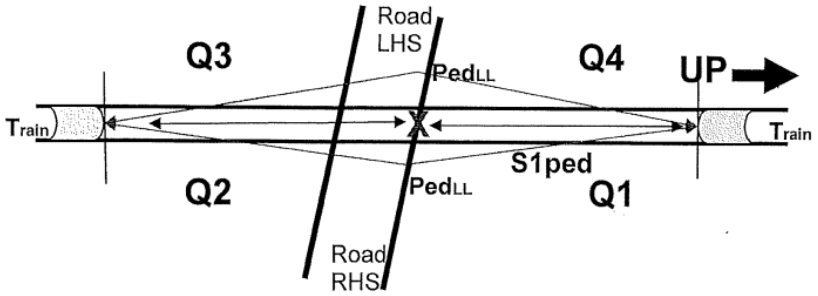
KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form

KiwiRail

Pedestrian Assessment Photographs

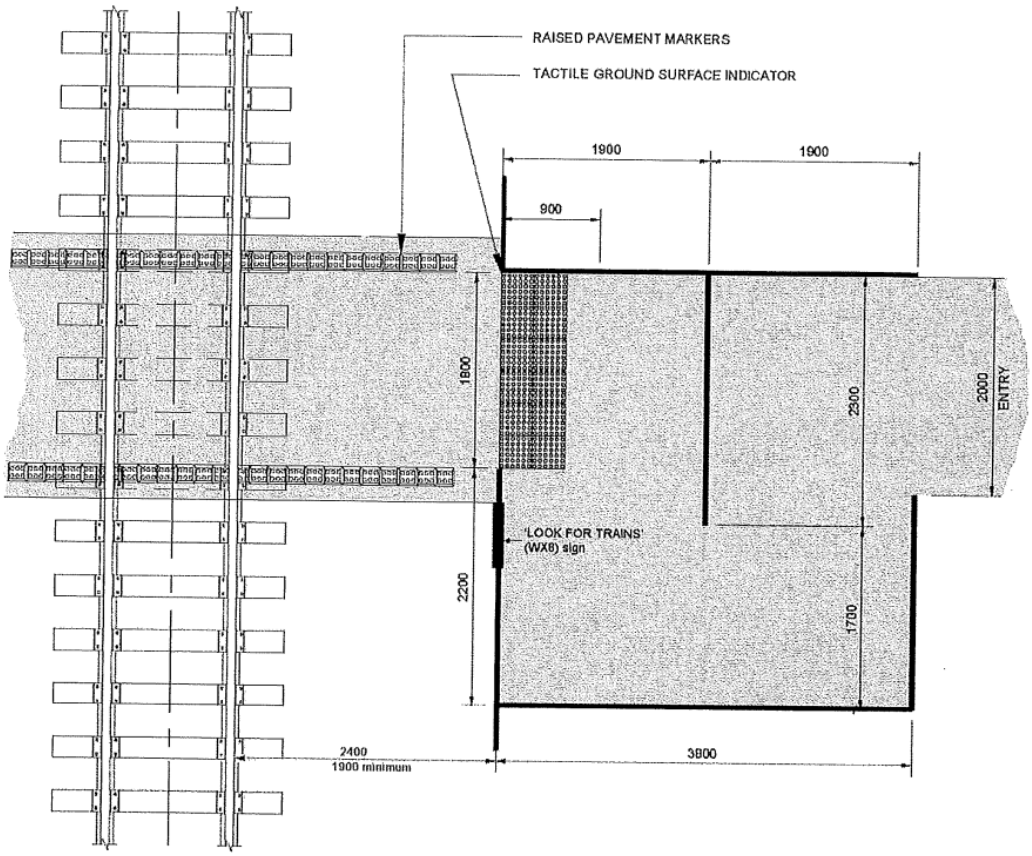


X = centre line of Pedestrian Level Crossing PedLL = Distance from nearest rail to pedestrian limit line

Location

Name	Photo No		Name	Photo No
Q1 S1ped - Train	IMG-1432		RHS Signage 1	
Q2 S1ped - Train	IMG-1431		RHS Signage 2	
Q3 S1ped - Train	IMG-1421		RHS Signage 3	
Q4 S1ped - Train	IMG-1423		RHS Signage 4	
S1ped to LHS			RHS Signage 5	
S1ped to RHS			RHS Signage 6	
			RHS Signage 7	
			LHS Signage 1	
			LHS Signage 2	
			LHS Signage 3	
			LHS Signage 4	
			LHS Signage 5	
			LHS Signage 6	
			LHS Signage 7	

KiwiRail ALCAM Data Collection – Pedestrian Crossing Survey Form



Typical pedestrian maze diagram
Compliance with NZ Transport Agency Traffic Control Devices, Part 9 Level Crossings.
Due to width of the rail, the distance from the limit line to the nearest rail edge is 2.4m.

APPENDIX B – ALCAM RATING REPORTS (RESULTS ONLY)

SCRUTTIONS ROAD – ROAD LEVEL CROSSING

Figure 9-1: Scruttons Road Level Crossing – Updated Existing

Controls

Controls at Crossing	Primary Flashing Lights
Additional Crossing Controls	Bells/Audible Warning Devices
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Human Factors	Public response phone number
Train Related	Whistle board / location board for train
Crossing Environment	Maintenance programme for vegetation etc (Road)
Signalling / Detection Systems	Sign (active) for second oncoming train warning

Crossing Volume (AADT) Road: 75 Rail: 40

Outputs

Raw Infrastructure Factor:	**96**		
Infrastructure Factor:	**0.89369**		
Exposure Factor:	**0.00918**		
Likelihood Factor:	**0.00821**	Years Between Collisions:	**122**
Consequence Factor:	**0.0155**		
Risk Score:	**0.00013**	Years Between Fatalities:	**7861**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**Medium Low**	Likelihood Band All:	**Medium High**
Risk Band Jur.	**Low**	Likelihood Band Jur:	**Low**

Within Primary Flashing Lights Control Class

Risk Band All:	**Low**	Likelihood Band All:	**Medium**
Risk Band Jurisdiction:	**Low**	Likelihood Band Jurisdiction :	**Medium Low**

Flags:

Multiple Tracks
Sun Glare Sighting Crossing on Road

Figure 9-2: Scruttons Road Level Crossing – Change in Use Existing

Controls

Controls at Crossing	Primary Flashing Lights
Additional Crossing Controls	Bells/Audible Warning Devices
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Human Factors	Public response phone number
Train Related	Whistle board / location board for train
Crossing Environment	Maintenance programme for vegetation etc (Road)
Signalling / Detection Systems	Sign (active) for second oncoming train warning

Crossing Volume (AADT) Road: 101 Rail: 40

Outputs

Raw Infrastructure Factor:	**96**		
Infrastructure Factor:	**0.89369**		
Exposure Factor:	**0.00992**		
Likelihood Factor:	**0.00887**	Years Between Collisions:	**113**
Consequence Factor:	**0.01454**		
Risk Score:	**0.00013**	Years Between Fatalities:	**7755**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**Medium Low**	Likelihood Band All:	**Medium High**
Risk Band Jur.	**Low**	Likelihood Band Jur:	**Low**

Within Primary Flashing Lights Control Class

Risk Band All:	**Low**	Likelihood Band All:	**Medium**
Risk Band Jurisdiction:	**Low**	Likelihood Band Jurisdiction :	**Medium Low**

Flags:

Multiple Tracks

Sun Glare Sighting Crossing on Road

Figure 9-3: Scruttons Road Level Crossing – Proposed Design

Controls

Controls at Crossing	Primary Flashing Lights
Additional Crossing Controls	Bells/Audible Warning Devices
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Human Factors	Public response phone number
Train Related	Whistle board / location board for train
Crossing Environment	Maintenance programme for vegetation etc (Road)
Signalling / Detection Systems	Sign (active) for second oncoming train warning

Crossing Volume (AADT) Road: 235 Rail: 40

Outputs

Raw Infrastructure Factor:	**94**		
Infrastructure Factor:	**0.88476**		
Exposure Factor:	**0.0125**		
Likelihood Factor:	**0.01106**	Years Between Collisions:	**90**
Consequence Factor:	**0.01281**		
Risk Score:	**0.00014**	Years Between Fatalities:	**7059**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**Medium Low**	Likelihood Band All:	**High**
Risk Band Jur.	**Low**	Likelihood Band Jur:	**Low**

Within Primary Flashing Lights Control Class

Risk Band All:	**Low**	Likelihood Band All:	**Medium High**
Risk Band Jurisdiction:	**Low**	Likelihood Band Jurisdiction :	**Medium**

Flags:

Multiple Tracks
Sun Glare Sighting Crossing on Road

Figure 9-4: Scruttons Road Level Crossing – Future Score

Controls

Controls at Crossing	Primary Flashing Lights
Additional Crossing Controls	Bells/Audible Warning Devices
Advance Warning	SINGLE Standard Advance Warning (W7-4, W7-7, NZ WX1 OR NZ WX3)
Human Factors	Public response phone number
Train Related	Whistle board / location board for train
Crossing Environment	Maintenance programme for vegetation etc (Road)
Signalling / Detection Systems	Sign (active) for second oncoming train warning

Crossing Volume (AADT) Road: 400 Rail: 40

Outputs

Raw Infrastructure Factor:	**94**		
Infrastructure Factor:	**0.88476**		
Exposure Factor:	**0.01493**		
Likelihood Factor:	**0.01321**	Years Between Collisions:	**76**
Consequence Factor:	**0.013**		
Risk Score:	**0.00017**	Years Between Fatalities:	**5823**

Risk / Likelihood Bands

Across Control Classes

Risk Band All:	**Medium Low**	Likelihood Band All:	**High**
Risk Band Jur.	**Low**	Likelihood Band Jur:	**Low**

Within Primary Flashing Lights Control Class

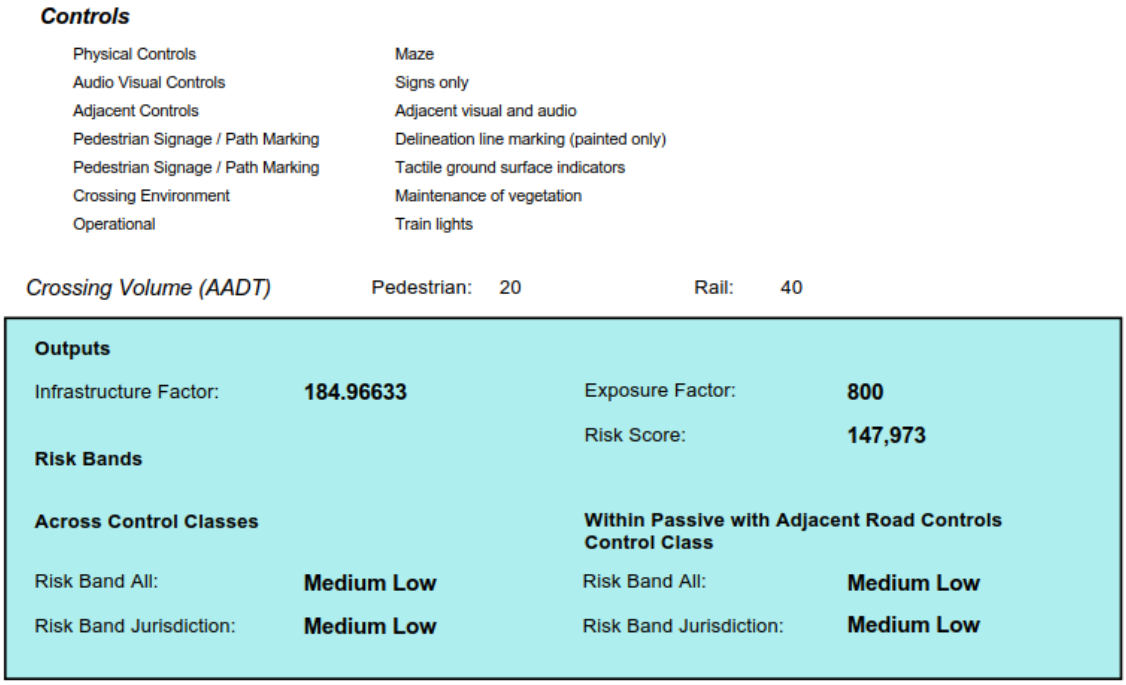
Risk Band All:	**Medium Low**	Likelihood Band All:	**Medium High**
Risk Band Jurisdiction:	**Low**	Likelihood Band Jurisdiction :	**Medium High**

Flags:

Multiple Tracks
Sun Glare Sighting Crossing on Road

SCRUTTIONS ROAD – PEDESTRIAN LEVEL CROSSING

Figure 9-5: Scruttons Road Pedestrian Level Crossing – Updated Existing



Controls

Physical Controls	Maze
Audio Visual Controls	Signs only
Adjacent Controls	Adjacent visual and audio
Pedestrian Signage / Path Marking	Delineation line marking (painted only)
Pedestrian Signage / Path Marking	Tactile ground surface indicators
Crossing Environment	Maintenance of vegetation
Operational	Train lights

Crossing Volume (AADT) Pedestrian: 20 Rail: 40

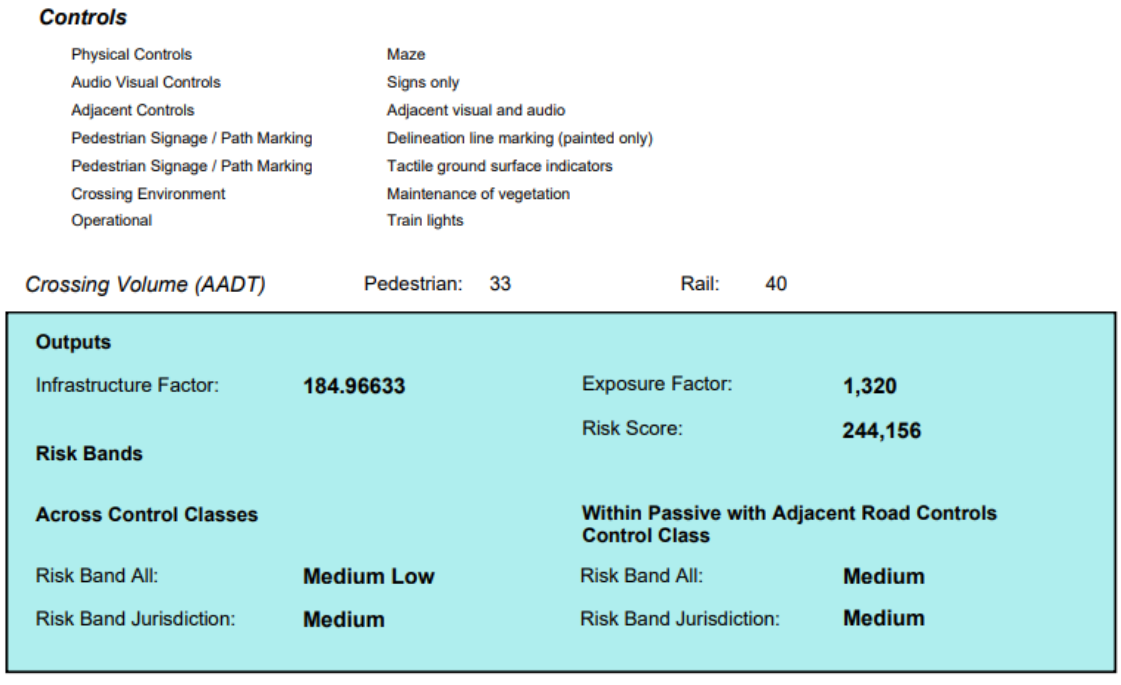
Outputs

Infrastructure Factor:	**184.96633**	Exposure Factor:	**800**
		Risk Score:	**147,973**

Risk Bands

Across Control Classes		**Within Passive with Adjacent Road Controls Control Class**	
Risk Band All:	**Medium Low**	Risk Band All:	**Medium Low**
Risk Band Jurisdiction:	**Medium Low**	Risk Band Jurisdiction:	**Medium Low**

Figure 9-6: Scruttons Road Pedestrian Level Crossing – Change in Use



Controls

Physical Controls	Maze
Audio Visual Controls	Signs only
Adjacent Controls	Adjacent visual and audio
Pedestrian Signage / Path Marking	Delineation line marking (painted only)
Pedestrian Signage / Path Marking	Tactile ground surface indicators
Crossing Environment	Maintenance of vegetation
Operational	Train lights

Crossing Volume (AADT) Pedestrian: 33 Rail: 40

Outputs

Infrastructure Factor:	**184.96633**	Exposure Factor:	**1,320**
		Risk Score:	**244,156**

Risk Bands

Across Control Classes		**Within Passive with Adjacent Road Controls Control Class**	
Risk Band All:	**Medium Low**	Risk Band All:	**Medium**
Risk Band Jurisdiction:	**Medium**	Risk Band Jurisdiction:	**Medium**

Figure 9-7: Scruttons Road Pedestrian Level Crossing – Proposed Design

Controls

Physical Controls	Automatic Gates
Physical Controls	Maze
Audio Visual Controls	Signs only
Adjacent Controls	Adjacent visual and audio
Emergency Egress	With latch (including holding enclosure)
Pedestrian Signage / Path Marking	Delineation line marking (painted only)
Pedestrian Signage / Path Marking	Tactile ground surface indicators
Crossing Environment	Maintenance of vegetation
Operational	Train lights

Crossing Volume (AADT) Pedestrian: 20 Rail: 40

Outputs

Infrastructure Factor:	**52.904**	Exposure Factor:	**800**
		Risk Score:	**42,323**

Risk Bands

Across Control Classes		**Within Train Activated Gates Control Class**	
Risk Band All:	**Low**	Risk Band All:	**Low**
Risk Band Jurisdiction:	**Low**	Risk Band Jurisdiction:	**Low**

Figure 9-8: Scruttons Road Pedestrian Level Crossing – Future Score

Controls

Physical Controls	Automatic Gates
Physical Controls	Maze
Audio Visual Controls	Signs only
Adjacent Controls	Adjacent visual and audio
Emergency Egress	With latch (including holding enclosure)
Pedestrian Signage / Path Marking	Delineation line marking (painted only)
Pedestrian Signage / Path Marking	Tactile ground surface indicators
Crossing Environment	Maintenance of vegetation
Operational	Train lights

Crossing Volume (AADT) Pedestrian: 33 Rail: 40

Outputs

Infrastructure Factor:	**52.904**	Exposure Factor:	**1,320**
		Risk Score:	**69,833**

Risk Bands

Across Control Classes		**Within Train Activated Gates Control Class**	
Risk Band All:	**Low**	Risk Band All:	**Low**
Risk Band Jurisdiction:	**Low**	Risk Band Jurisdiction:	**Low**

Figure 9-9: Scruttons Road Pedestrian Level Crossing – LCSIA Alternative Design

Controls

Physical Controls	Maze
Audio Visual Controls	Signs only
Adjacent Controls	Adjacent visual and audio
Pedestrian Signage / Path Marking	Active sign "another train coming" warning
Pedestrian Signage / Path Marking	Delineation line marking (painted only)
Pedestrian Signage / Path Marking	Tactile ground surface indicators
Crossing Environment	Maintenance of vegetation
Operational	Train lights

Crossing Volume (AADT) Pedestrian: 20 Rail: 40

Outputs

Infrastructure Factor:	**140.34583**	Exposure Factor:	**800**
		Risk Score:	**112,277**

Risk Bands

Across Control Classes		**Within Passive with Adjacent Road Controls Control Class**	
Risk Band All:	**Medium Low**	Risk Band All:	**Medium Low**
Risk Band Jurisdiction:	**Medium Low**	Risk Band Jurisdiction:	**Medium Low**

Figure 9-10: Scruttons Road Pedestrian Level Crossing – LCSIA Alternative Design Future Score

Controls

Physical Controls	Maze
Audio Visual Controls	Signs only
Adjacent Controls	Adjacent visual and audio
Pedestrian Signage / Path Marking	Active sign "another train coming" warning
Pedestrian Signage / Path Marking	Delineation line marking (painted only)
Pedestrian Signage / Path Marking	Tactile ground surface indicators
Crossing Environment	Maintenance of vegetation
Operational	Train lights

Crossing Volume (AADT) Pedestrian: 33 Rail: 40

Outputs

Infrastructure Factor:	**140.34583**	Exposure Factor:	**1,320**
		Risk Score:	**185,256**

Risk Bands

Across Control Classes		**Within Passive with Adjacent Road Controls Control Class**	
Risk Band All:	**Medium Low**	Risk Band All:	**Medium**
Risk Band Jurisdiction:	**Medium Low**	Risk Band Jurisdiction:	**Medium Low**

Figure 9-11: Scruttons Road Pedestrian Level Crossing – Desire Line Assessment

Controls

Physical Controls	Path
Audio Visual Controls	Signs only
Adjacent Controls	Adjacent visual and audio
Pedestrian Signage / Path Marking	Delineation line marking (painted only)
Pedestrian Signage / Path Marking	Tactile ground surface indicators
Crossing Environment	Maintenance of vegetation
Operational	Train lights

Crossing Volume (AADT) Pedestrian: 20 Rail: 40

Outputs

Infrastructure Factor:	**226.65506**	Exposure Factor:	**800**
		Risk Score:	**181,324**
Risk Bands			
Across Control Classes		**Within Passive with Adjacent Road Controls Control Class**	
Risk Band All:	**Medium Low**	Risk Band All:	**Medium**
Risk Band Jurisdiction:	**Medium Low**	Risk Band Jurisdiction:	**Medium Low**

Figure 9-12: Scruttons Road Pedestrian Level Crossing – Desire Line Assessment Future Score

Controls

Physical Controls	Path
Audio Visual Controls	Signs only
Adjacent Controls	Adjacent visual and audio
Pedestrian Signage / Path Marking	Delineation line marking (painted only)
Pedestrian Signage / Path Marking	Tactile ground surface indicators
Crossing Environment	Maintenance of vegetation
Operational	Train lights

Crossing Volume (AADT) Pedestrian: 33 Rail: 40

Outputs

Infrastructure Factor:	**226.65506**	Exposure Factor:	**1,320**
		Risk Score:	**299,185**
Risk Bands			
Across Control Classes		**Within Passive with Adjacent Road Controls Control Class**	
Risk Band All:	**Medium**	Risk Band All:	**Medium**
Risk Band Jurisdiction:	**Medium**	Risk Band Jurisdiction:	**Medium**