

Request to vary the Regional Land Transport Plan for Taranaki 2015-2021

Purpose:	To enable the Regional Transport Committee of the Taranaki Regional Council to consider a request for a variation to the <i>Regional Land Transport Plan for Taranaki 2015-21</i> (RLTP).
Requesting organisation:	South Taranaki District Council
Contact person/s:	Vincent Lim
Variation request:	Add new project - Upgrade of rail level crossing at Nukumaruru Station Road.
Background to variation request <p>Due to the proposed Nukumaruru Station Road with the associated increased in traffic volume across the existing rail level crossing, Kiwirail has requested for a Level Crossing Safety Impact Assessment (LCSIA) to be carried out. The Safety Review Team (SRT) has identified improvements to the rail level crossing to reduce the risk score to an acceptable level. The recommended improvements or upgrade are listed as follows:</p> <ol style="list-style-type: none"> 1. Installation of flashing lights and bells on all approaches to the level crossing. 2. Reshaping the cut face to improve visibility of any approaching train (we expect this is unlikely to occur as may need private land to achieve). 3. Lifting up the road approach to the level crossing to improve visibility of the approaching trains and remove the hump at the level crossing, which could lead to grounding out. 4. Rail X pavement marking on all approaches to the crossing. 5. Level Crossing Ahead Steam Train (WX1L) sign on both approaches to the level crossing. 6. Consideration should be given to installing a level crossing ahead advance warning (WX3) sign. 7. Install cross buck sign on both approaches. 	
Details of variation request <p>Details of work are as above. Work is required to comply with Kiwirail's safety standard due to the construction of Nukumaruru Station Road with the associated increase in traffic volume over the existing rail level crossing.</p>	
Location:	Rail level crossing at Nukumaruru Station Road, 3kms from SH3.
Scope and duration:	Scope: The existing rail level crossing upgraded to Kiwirail requirements which consists of the upgrade listed above. Duration: 12 weeks.
Estimated cost/s:	\$150,000
Funding source/s:	N funds (100% subsidised)
Links to RLTP Policies: <i>Refer to Table 5 on page 48 of the Plan</i>	This activity will contribute most significantly to improving safety (Policies S1,S2,S3,S4)
Impacts on RLTP:	This proposal does not negatively affect any other projects in the RLTP, nor affect the overall integrity or affordability of the Plan.

	Rather it will contribute to the overall route safety for the new extension of Nukumaru Station Road that is to be constructed at the same time.	
Relationship to the RLTP’s Significance policy on variations: <i>Refer to Section 7.4 on page 59 of Plan</i>	The proposed change of adding this rail level crossing upgrade project to the RLTP does require a variation process to be undertaken. The variation does not trigger the significance policy in terms of requiring that a new public consultation process is undertaken however. The works are necessary to meet Kiwirail’s safety standard due to the proposed extension of Nukumaru Station Road.	
Process for consideration and approval of variation requests The current RLTP for Taranaki was approved in April 2015 and any significant new capital works that need to be included require a variation to the programme of activities component of the RLTP. A project must be included within the RLTP before it can be approved for funding from the National Land Transport Fund which the NZ Transport Agency (NZTA) distributes through the National Land Transport Programme. In accordance with the RLTP Variation Policy, any variation to the RLTP should be considered and supported by the Regional Transport Advisory Group (RTAG) before being forwarded to the Regional Transport Committee (RTC) for consideration and endorsement, then to the Taranaki Regional Council (TRC) for final approval. The NZTA is then notified of the varied Plan, per section 18D of the <i>Land Transport Management Act 2003</i> .		
Timeframes for consideration of variation request The following outlines the expected timeframes for processing this variation request. The organisation requesting the variation is responsible for outlining the proposal to the RTAG and RTC.		
Consideration by RTAG	Wednesday 12 April 2017	<i>Progression to the following step will only occur if support of the variation request is given by the considering body.</i>
Consideration by RTC	Wednesday 14 June 2017	
Consideration by TRC	Tuesday 27 June 2017	
Forward to NZTA	Wednesday 28 June 2017	
Supporting attachments Doc 1842580 – Level Crossing Safety Impact Assessment (LCSIA) report on Nukumaru Station Road Extension		

This document has been prepared for the benefit of South Taranaki District Council. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to KiwiRail and other persons for an application for permission or approval to fulfil a legal requirement.

QUALITY STATEMENT

PROJECT MANAGER

Ali Sher Siddiqui

AUDIT TEAM LEADER

Shane Turner

PREPARED BY

Dharmendra Singh

CHECKED BY

Shane Turner

REVIEWED BY

Shane Turner

APPROVED FOR ISSUE BY

Ali Sher Siddiqui



..... 23 / 02 / 2017

..... 23 / 02 / 2017

..... 23 / 02 / 2017

..... 23 / 02 / 2017

HAMILTON

468 Tristram St, Whitiōra, Hamilton 3200
 PO Box 13-052, Armagh, Christchurch 8141
 TEL +64 7 839 0241, FAX +64 7 839 4234

REVISION SCHEDULE

Rev No	Date	Description	Signature or Typed Name (documentation on file).			
			Prepared by	Checked by	Reviewed by	Approved by
1	22.02.17	Draft for comment	DS	ST	ST	ASS
2	02.03.17	Final	DS	ST	ST	ASS

Executive Summary

South Taranaki District Council propose to extend Nukumaru Station Road by approximately another 6.5m to connect onto Wainu Beach Road. The proposed road will be a two lane sealed road and cross at the existing Nukumaru Road Level Crossing. The project will also consist of a new Nukumaru Station Road/SH3 intersection. Refer to Appendix A for the proposed corridor extension plans.

The Nukumaru Station Road level crossing will remain at its current location and is proposed to be upgraded. It is estimated that the road traffic volume on the new Nukumaru Station Road will increase to approx. 500vpd from the current volume of 27vpd. Pedestrian and cyclist volumes on this road will be close to nil in the future due to the remoteness of the location (although there may be the occasional recreational walker/cyclist).

The corridor extension impacts on the existing Nukumaru Station Road level crossing hence KiwiRail has requested for a Level Crossing Safety Impact Assessment (LCSIA) to be undertaken for this site. The Level Crossing Safety Score (LCSS) procedure assesses and scores the risk of the road way level crossing point. The LCSS is conducted first on the existing site to create the Existing Score, while the Proposed Score assesses the proposed design. Ideally any proposed design should score a risk of 'LOW' or 'MEDIUM-LOW'.

In this instance the Safety Review Team (SRT) have recommended additional modifications to reduce the risk score of the road level crossing. This is shown as the Modified Score in the table below, which also shows the progression of the LCSS for Nukumaru Station Road through the three stages of the LCSIA.

- Summary of LCSS changes

Crossing	Existing Score	Proposed Score	Modified Score
Nukumaru Station Road Roadway level crossing	17/60	22/60	17/60
	Low	Medium Low	Low

As part of this safety assessment the SRT have identified improvements to reduce the risk score to an acceptable level, these improvements are listed as follows:

1. Installation of flashing lights and bells on all approaches to the level crossing.
2. Reshaping the cut face to improve visibility of any approaching train (we expect this is unlikely to occur as may need private land to achieve).
3. Lifting up the road approach to the level crossing to improve visibility of the approaching trains and remove the hump at the level crossing, which could lead to grounding out.
4. Rail X pavement marking on all approaches to the crossing.
5. Level Crossing Ahead Steam Train (WX1L) sign on both approaches to the level crossing.
6. Consideration should be given to installing a level crossing ahead advance warning (WX3) sign.
7. Install cross buck sign on both approaches

The modified design meets the two key KiwiRail safety criteria for a LCSIA. These criteria's are listed as follows:

- Criteria 1: ALCAM and LCSS risk category to be in the Low or Medium-Low risk band.
- Criteria 2: LCSS score to be at or lower than the existing site score.

The proposed design does not meet Criteria 2. We are also concerned that use of a passive control (give-way and stop signs - which are assumed in the proposed design) would be risky when there is a visibility issue caused by a railway line cutting to the west. Hence we would recommend the active control provided by the flashing light and bells in the modified option in this case.

South Taranaki District Council

LEVEL CROSSING SAFETY IMPACT ASSESSMENT

Nukumarū Station Road Extension

CONTENTS

Executive Summary	4
1 Introduction	1
1.1 Level Crossing Safety Impact Assessment (LCSIA)	1
1.2 Structure of the Report	2
1.3 The Safety Review Team (SRT)	3
1.4 Independence	3
1.5 Documents Provided	3
1.6 Recommended Modifications to the Design	3
2 Risk Assessment.....	5
2.1 Nukumarū Station Road Level Crossing Location	5
2.2 Site Detail	5
2.3 Nukumarū Station Road Site Inspection Findings	6
2.3.1 Signage.....	6
2.3.2 Visibility of Train Approach and Grounding out Issue	7
2.4 Risk Assessment of the Proposed Level Crossing Design	8
2.4.1 Road Extension Project Overview	8
2.4.2 Proposed Design of the Level Crossing.....	8
2.5 Level Crossing Safety Score (LCSS).....	9
2.5.1 ALCAM Score	9
2.5.2 Crash and Incident History Analysis	11
2.5.3 Site Specific Safety Score.....	11
2.5.4 Locomotive Engineer / RCA Engineer's Assessment of Risk	12
2.6 Recommended Modifications to the Design	13

LIST OF TABLES

Table 1-1: Documents Provided to SRT	3
Table 1-2: Concern Assessment Rating Matrix.....	4
Table 1-3: Concern Categories	4
Table 2-1: ALCAM Likelihood Risk Bands	9
Table 2-2: ALCAM Scores – Nukumarū Station Crossing (ID: 483, Rail KM: 71.75)	10
Table 2-3: Assessment of the Nukumarū Station Road Level Crossing	12
Table 2-4: Overall LCSS for the Nukumarū Station Road Roadway Level Crossing	13

Table 2-5: Modifications to the Proposed Design	13
---	----

LIST OF FIGURES

Figure 1-1: Level Crossing Safety Score Risk Bands	2
Figure 2-1: Nukumarū Station Road Level Crossing Site Location Plan (Source Google Maps).....	5
Figure 2-2: Nukumarū Station Road Level Crossing Site Plan (Source Google Maps)	6
Figure 2-3: South Bound Approach.....	7
Figure 2-4: North Bound Approach	7
Figure 2-5: Visibility of the Train on the South Bound Road Approach.....	7
Figure 2-6: Hump on the Road at the Level Crossing.....	7
Figure 2-7: Nukumarū Station Road Extension Proposed Alignment	8
Figure 2-8: Roadway ALCAM Risk Score	10
Figure 2-9: Pedestrian ALCAM Risk Score.....	10
Figure 2-10: Score Bands for Site Specific Safety Score.....	11

APPENDICES

Appendix A: Proposed Shared Path Design

1 Introduction

1.1 Level Crossing Safety Impact Assessment (LCSIA)

There are 1329 road, 743 pedestrian and a large number of private level crossings in New Zealand. While there are relatively few motor vehicle and pedestrian crashes at level crossings (compared with the rest of the road network) the consequences of a crash at a level crossing are often severe (Approximately 85% of reported injury crashes include serious injury or a 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 process has been developed to assess the level of crash risk of existing and new/upgraded level crossings designs. The risk of pedestrians and motor vehicle crashes is assessed using the Level Crossing Safety Score (LCSS). This score is out of 60, with 60 being a very unsafe crossing. If a level crossing scored the lowest default scores on every assessment, the lowest possible score a site could obtain is 10/60, therefore the “Low” category begins at 10. This score consists of;

- the crossings ALCAM Score (30 points),
- crash and incident history (10 points),
- the site specific safety score (factors not covered adequately in ALCAM) (10 points), and;
- the Locomotive Engineers / RCA Engineer’s assessment of risk (10 points).

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



Figure 1-1: Level Crossing Safety Score Risk Bands

The proposed design for a new crossing must achieve a “Low” or “Medium-Low” level of risk, as determined by the LCSS. This will ensure that any new infrastructure constructed is safe for all users and the risk of death or serious injury occurring is unlikely to occur. Where exposure (traffic and pedestrian volumes) is high, then it may not be possible to achieve a “low” risk without grade separation.

For an upgraded level crossing there are two criteria to achieve. The first criteria is for the level crossing to achieve an ALCAM score and LCSS that is either “low” or “medium-low”¹. The second criteria is that the LCSS score of the proposed/modified level crossing is lower than the existing level crossing scores. In some instances it will not be possible to meet the first criteria. The ability to achieve the first criteria must be balanced against any exorbitant costs required to construct a “low” or “medium-low” facility, or the space available to provide such a facility. In such circumstances KiwiRail may accept that only Criteria 2 is to be met. This is the reason why a proposed/modified option that only meets Criteria 2 may be presented, especially if this is the best that can be done without grade separation.

1.2 Structure of the Report

This report outlines the site observations and analysis undertaken of the existing and proposed upgrade of the Nukumara Station Road level crossings. The elements of the report consist of:

1. Record site visit observations.
2. Identify the key risks that need to be addressed at the existing crossings.

¹For every assessment of a change to an existing crossing, a do-nothing LCSS will be produced in order to confirm whether the proposed changes would raise or lower the crossing safety level when compared to the existing scenario. This will include an updated ALCAM ‘proposal’ that factors in the current AADT volumes of all applicable users.

3. The LCSS of the existing crossing (unless no facility currently exists i.e. a new pedestrian/cyclist crossing). This includes analysis of ALCAM, CAS & IRIS databases, a Site Specific Safety Score (on-site safety review) and locomotive engineer and council engineer ranking of the sites' safety risk.
4. The LCSS of the proposed design for the upgraded or new facility (as shown in upgrade plans).
5. Recommended modifications to proposed design to further reduce the risk of crashes.
6. The LCSS of the modified design which includes additional changes we suggested need to happen at the level crossing to reduce the crash risk.

This report is limited to the railway level crossing only and is not a road safety audit (RSA). A separate RSA may also be required.

At the time this report was written the LCSS was in development and we have used the criteria that was available at the time.

1.3 The Safety Review Team (SRT)

The LCSIA was conducted by the following SRT members;

Name	Position	Company	Role
Shane Turner	National Specialist – Road Safety	MWH	Team Leader
Dharmendra Singh	Traffic and Safety Engineer	MWH	Team Member

A site inspection was undertaken by Dharmendra Singh and Bryan Blencowe on Wednesday 8 February 2017, carried out between 1:00pm - 2:30pm in fine weather conditions.

1.4 Independence

The SRT has had no involvement with any of the design teams prior to the LCSIA.

For this particular project, the LCSIA was undertaken on 'draft for review designs' of the Nukumar Station Road Level Crossing. This upgrade was required due to the proposed Nukumar Station Road extension and the additional traffic expected along it when it is connected to SH3.

A number of concerns are identified and are presented back to the client (South Taranaki District Council) for their consideration and response.

MWH (now part of Stantec) is unaware of any previous safety assessment of this level crossing.

1.5 Documents Provided

The following draft for information drawings were reviewed as part of this safety review. Refer to Appendix A for a copy of these plans.

Table 1-1: Documents Provided to SRT

Drawing Reference	Sheet(s)	Revision	Title
16305-02	5	0	Proposed Survey Plan
16305-03	x		Proposed Centreline Alignment

1.6 Recommended Modifications to the Design

In a similar manner to what is provided in a Road Safety Audit report the safety concerns raised in this report have been given a rating. This safety assessment is undertaken regardless of the design stage of the project, so is applied to projects at either scheme or final design stages.

The expected crash frequency is qualitatively assessed on the basis of expected exposure (how many transportation users will be exposed to a safety issue) and the likelihood of a crash resulting from the presence of the issue. The severity of a crash outcome is qualitatively assessed on the basis of factors such as expected speeds, type of collision, and type of vehicle involved. On a number of occasions the

concern would involve a train as one of the 'vehicles' involved, so the severity in this instance would always rank as 'Likely' or 'Very Likely'.

The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Risk Assessment Matrix in Table 1-2. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Table 1-2: Concern Assessment Rating Matrix

Severity (likelihood of death or serious injury)		Frequency (probability of a crash)			
		Frequent	Common	Occasional	Infrequent
Very Likely		Serious	Serious	Significant	Moderate
Likely		Serious	Significant	Moderate	Moderate
Unlikely		Significant	Moderate	Minor	Minor
Very Unlikely		Moderate	Minor	Minor	Minor

While all safety concerns should be considered for action, the KiwiRail representative will make the final decision as to what course of action will be adopted based on the guidance given in this ranking process.

As a guide a suggested action for each risk category is given in Table 1-3.

Table 1-3: Concern Categories

Concern	Suggested Action
Serious	Major safety concern that must be addressed and requires changes to avoid serious safety consequences.
Significant	Significant safety concern that should be addressed and requires changes to avoid serious safety consequences.
Moderate	Moderate safety concern that should be addressed to improve safety.
Minor	Minor safety concern that should be addressed where practical to improve safety.
Comment	Items that may have a safety implication but lie outside the scope of the LCSIA process.

2 Risk Assessment

2.1 Nukumarū Station Road Level Crossing Location

The Nukumarū Station Road Level Crossing is located within the South Taranaki District Council jurisdiction as shown in Figure 2-1 below. This road level crossing is located approximately 63km to the south of Hawera Town.

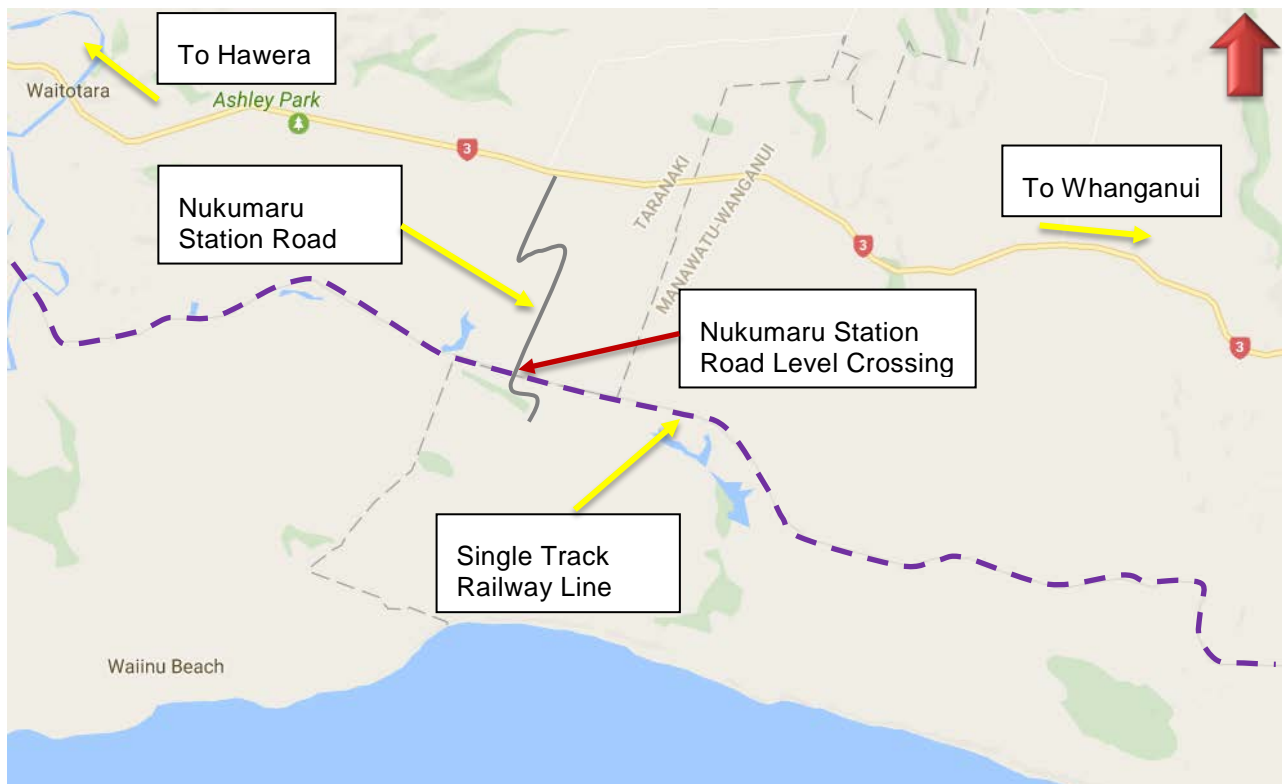


Figure 2-1: Nukumarū Station Road Level Crossing Site Location Plan (Source Google Maps)

2.2 Site Detail

Nukumarū Station Road is currently a dead end road approximately 1.5km in length which services adjacent private properties. This road has a very low traffic volume of only 27vpd (based on counts received from the local council). Most of Nukumarū Station Road is sealed but the road approaches to the level crossing is currently unsealed and in good maintenance condition. The road approaches to this level crossings are controlled by give way priority and cross buck (railway crossing) signs. Nukumarū road currently has an open road speed limit (100km/h).

No pedestrian level crossing facilities e.g. sealed footpath, pedestrian signage etc. are provided at this site and this is due to a very low pedestrian volume (Although there may be the occasional recreational walker /cyclist). This is typical on low volume rural roads.

Figure 2-2 below shows an aerial view of the Nukumarū Station Road level crossing and identifies some of the key features.

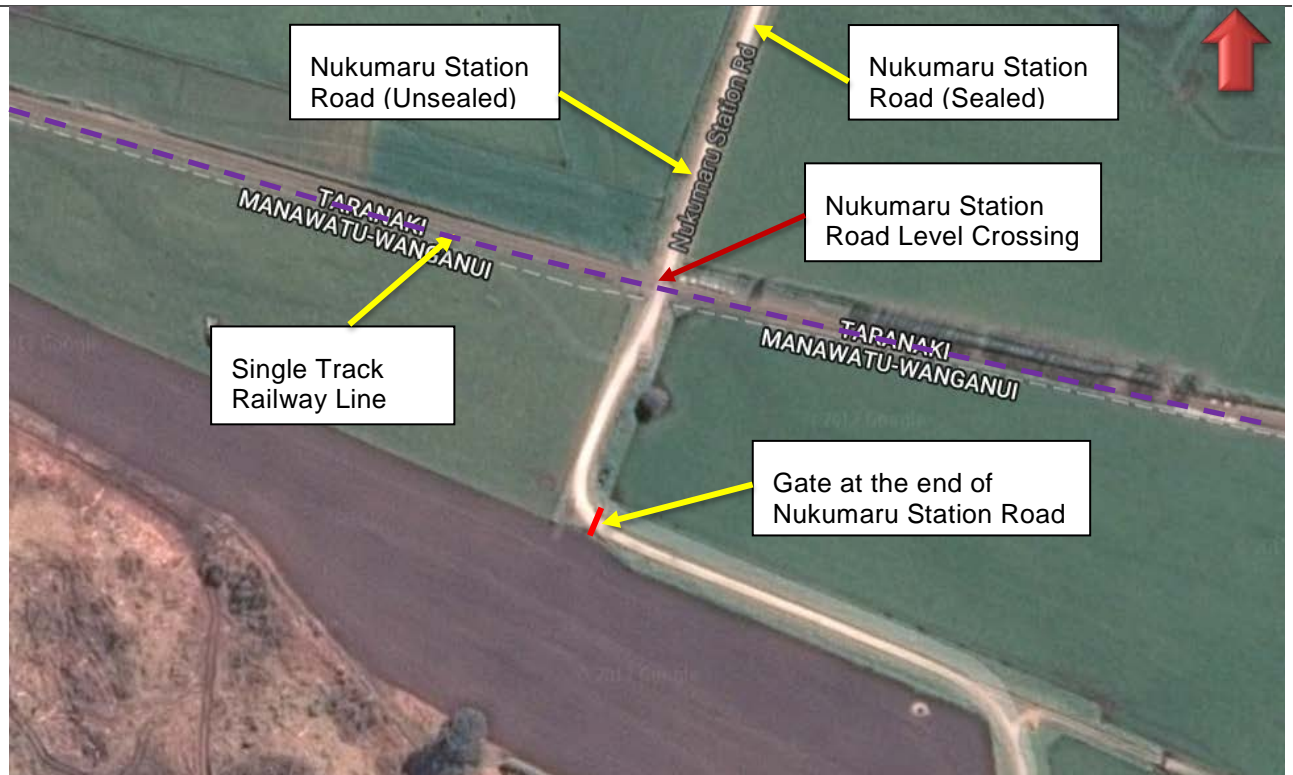


Figure 2-2: Nukumarū Station Road Level Crossing Site Plan (Source Google Maps)

2.3 Nukumarū Station Road Site Inspection Findings

2.3.1 Signage

The site inspection has revealed some missing signage. Well maintained and appropriate signage safely guides road users at the level crossing and helps to reduce confusion. Inadequate signage can be a factor in level crossing crashes. The deficiencies are listed below:

1. On the south bound approach to the level crossing a Level Crossing Ahead Steam Train sign is provided on the right hand side of Nukumarū Station Road. This sign looks fairly old and likely to have lost its reflectivity over time. This sign is easy to spot during day time but would be hard to identify during adverse weather or low light conditions. We suggest this sign is replaced when the crossing is upgraded.
2. There is no Level Crossing Ahead Steam Train sign on the north bound approach to the level crossing. This could be due to Nukumarū Station Road being a no exit road and the level crossing located towards the end of this road. Level Crossing Ahead Steam Train sign helps warn the drivers that they are approaching a railway level crossing and to expect trains. Ideally a compliant Level Crossing Ahead Steam Train sign should be installed on each approach to the road level crossing, especially given traffic volumes are expected to rise significantly in the future.

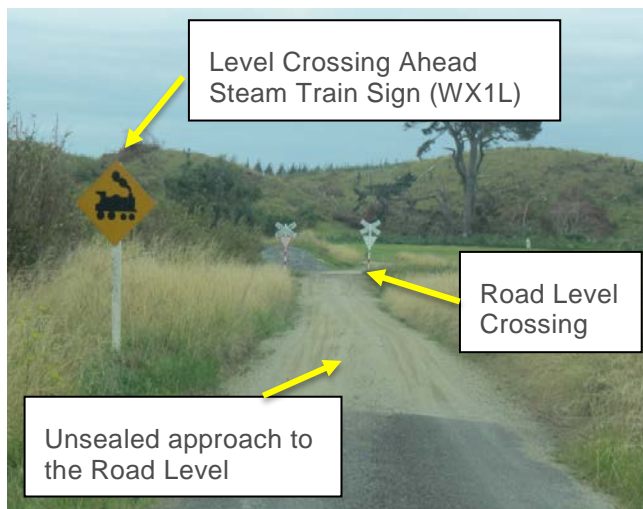


Figure 2-3: South Bound Approach



Figure 2-4: North Bound Approach

2.3.2 Visibility of Train Approach and Grounding out Issue

On the south bound road approach to the level crossing the visibility of the south east bound train is restricted due to the rail line being in cutting. This visibility is made worse due to the sag in the road on approach to the level crossing. This sag also creates a hump in the road at the point where the railway tracks cross the road and this difference in road level is likely to cause heavy vehicle grounding out issues. If this were to remain a give-way controlled passive crossing, then consideration should be given to reshaping the cut face to improve visibility of any approaching trains. Raising the approach road level to the same level as the railway tracks will further improve visibility of approaching trains and will also resolve any potential vehicle grounding out issue.



Figure 2-5: Visibility of the Train on the South Bound Road Approach



Figure 2-6: Hump on the Road at the Level Crossing

2.4 Risk Assessment of the Proposed Level Crossing Design

2.4.1 Road Extension Project Overview

South Taranaki District Council propose to extend Nukumar Station road by approximately another 6.5m to connect onto Wainu Beach Road. The proposed road will be a two lane sealed road. The project will also consist of a new Nukumar Station Road/SH3 intersection. Refer to appendix A for the proposed corridor extension plans (proposed survey plan).

There is an existing railway level crossing on Nukumar Station Road which is proposed to be upgraded. It is estimated that the road traffic volume on the new Nukumar Station Road will increase to approx. 500vpd from the current volume of 27vpd.

It is assumed that the pedestrian and cyclist volume on this road will be close to nil in the future due to the remoteness of the location (although there may be the occasional recreational walker/cyclist). Refer to drawings attached under Appendix A for the proposed shared path design.

2.4.2 Proposed Design of the Level Crossing

The Nukumar Station Road Level Crossing will remain at its current location as part of the proposed design. The road alignment on the northern side of the level crossing will also remain close to its current alignment. On the southern side of the level crossing there will be a short straight (approximately 14 meters long) before the road goes into a right hand horizontal curve towards the southwest (as shown by the proposed centreline alignment on Figure 2-7).

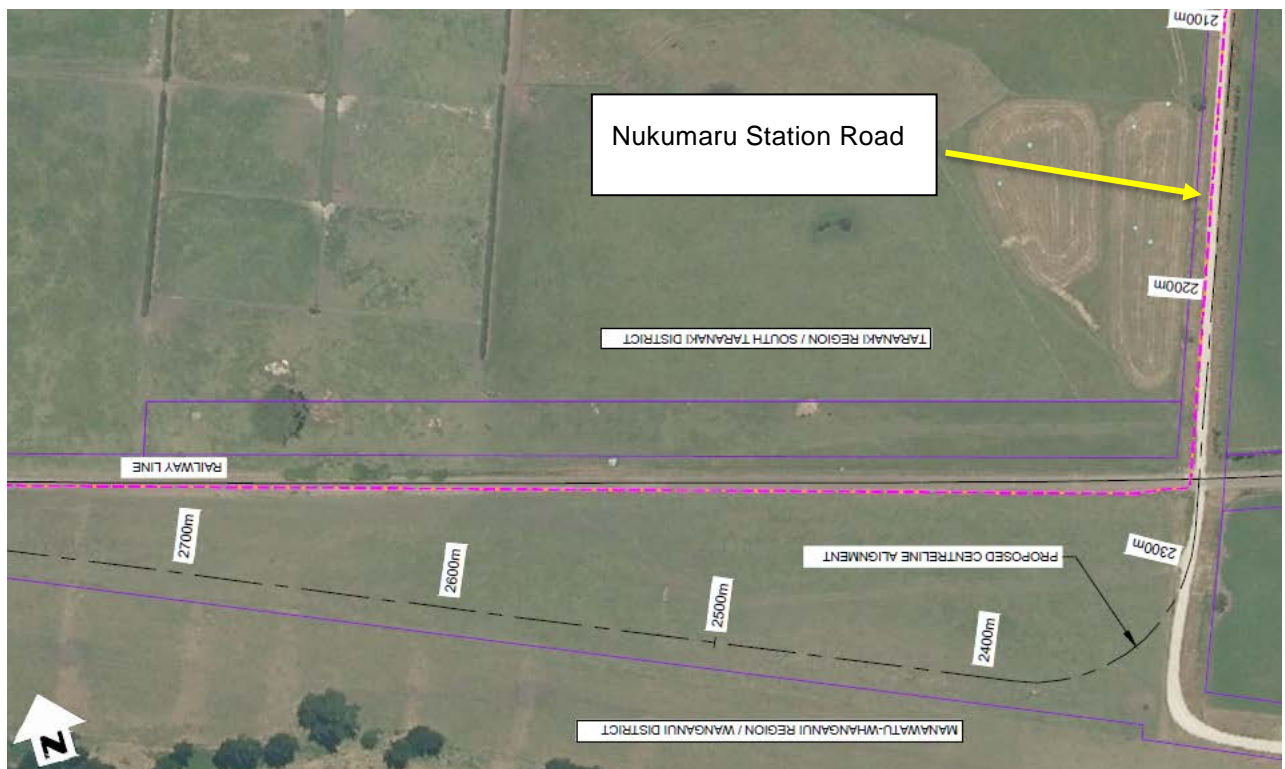


Figure 2-7: Nukumar Station Road Extension Proposed Alignment

The proposed design does not show any improvements to the road level crossing point. So it is assumed that the proposed design retains the existing give-way priority controls. With the extension works this will no longer be a dead-end road. Given the increased traffic volume and the 100km/h posted speed limit on a sealed road, it is likely that the level crossing needs to be upgraded to address the increased crash risk. This has been considered in the modified design that has been developed.

The following safety deficiencies have been identified. These deficiencies need to be addressed prior to the road being connected to SH3:

1. The current crossing has no active control, such as flashing lights and bells. While passive controls (in this case a give-way control) are currently provided this is typically not suitable when the traffic volumes are at 500vpd. We would strongly recommend that flashing lights, bells and cross buck sign assembly be installed on both approaches to this level crossing.
2. Due to the north bound horizontal curve on approach to the level crossing forward visibility of the flashing lights, bells and cross bucks assembly at the level crossing will be limited. Consideration should be given to installing a level crossing ahead advance warning (WX3) sign. The orientation of the flashing lights should also be aligned so that drivers can see it when they are on the approach curve.
3. No Rail X pavement markings are proposed for this site. Rail X pavement marking help warn the drivers of the upcoming railway level crossing and are a requirement for sites which have posted speed limit of 70km/h or higher. Rail X pavement marking should be installed at this site as part of the project.
4. The current approaches to the level crossing are in a sag curve. Consideration should be given to lifting the road up on the approach to the level crossing to improve visibility of the approaching trains and to remove the existing sag which could potentially cause heavy vehicles to bottom out at the level crossing.
5. The existing cut face to the west of the level crossing currently restricts visibility of the approaching trains. The sight distance (S2) required and measured as per the ALCAM LXM Rail Detail is 155.69m and 127m respectively. Consideration should be given to reshaping the cut face to improve visibility of any approaching train. The road approaches currently meet the stop sign requirement but due to the proposed sealed approaches, potential high approach speeds and general user noncompliance of the stop signs flashing lights and bells should be installed at this site as a minimum improvement.

Please note that this LCSIA only focuses on facilities related to the level crossing and that this is not a road safety audit of the extension of the road or of the new SH3 intersection. A separate road safety audit would be required for the road.

2.5 Level Crossing Safety Score (LCSS)

The following four sections display how the individual scores that make up the overall LCSS (out of 60 points) were derived.

2.5.1 ALCAM Score

There are five ALCAM risk bands and the associated LCSS scores are presented in Table 2-1. The jurisdiction risk score is used, as New Zealand has been classified as one jurisdiction by ALCAM.

Table 2-1: ALCAM Likelihood Risk Bands

ALCAM Jurisdiction Likelihood Risk Band	LCSS (points)
High	30
Medium-High	24
Medium	18
Medium-Low	12
Low	6

ALCAM risk scores for roadways are calculated by using the formula in Figure 2-8.

$$\text{ALCAM Risk Score} = \text{Infrastructure Factor} \times \text{Exposure Factor} \times \text{Consequence Factor}$$

Figure 2-8: Roadway ALCAM Risk Score

ALCAM risk scores for pedestrians are calculated by using the formula in Figure 2-9.

$$\text{ALCAM Risk Score} = \text{Infrastructure Factor} \times \text{Exposure Factor}$$

Figure 2-9: Pedestrian ALCAM Risk Score

The ALCAM scores for the Nukumaru Road Level Crossing is listed and discussed in Table 2-2 below.

Table 2-2: ALCAM Scores – Nukumaru Station Crossing (ID: 483, Rail KM: 71.75)

Stage	Score	Comments
Existing Site	6/30	The published ALCAM risk score is 1.8 and the risk band is Low based on a traffic volume of 58vpd. The existing score has been updated based on the most recent traffic data provided by STDC. The new risk score is 1.5 based on a road traffic volume of 27vpd and the risk band remains in the Low risk category scoring 6/30.
Proposed Site	12/30	The proposed works will increase traffic volumes at this level crossing to approx. 500vpd. Based on this the ALCAM risk score increases to 3.9 pushing the risk band up to the Medium-Low category.
Modified Site	12/30	<p>Following improvements are recommended:</p> <ul style="list-style-type: none"> • Flashing lights and bells • Gated advance warning signs • Rail X pavement marking • Improved approach train visibility <p>Based on these the risk score drops to 3.8 and the risk category remains medium-Low.</p>

Due to the anticipated nil future pedestrian's volume pedestrian level crossing safety score is not relevant and has not been assessed for this site.

2.5.2 Crash and Incident History Analysis

Road Score	Existing	Proposed	Modified
	2/10	2/10	2/10

This combines the IRIS, CAS and published KiwiRAP data² (where available) to rate the crash and incident history of the site, with a weighting of 25%, 50% and 25% respectively. If KiwiRAP data is not available, the weighting is 50:50 between IRIS and CAS

The proposed and modified scores are estimations of what the crash history and incident levels may change to under the new designs. The following tables show the results of the existing situation.

IRIS data (KiwiRail Database):

The 10 year (2007 – 2016) IRIS data provided by KiwiRail has been analysed and no crashes or near misses have been identified for the Nukumarū Station Road level crossing.

CAS data (NZTA Database)

The 10 year CAS data for 2007 -2016 was analysed. There were no reported crashes involving train or train infrastructure at this site over this period.

KiwiRAP Data

No KiwiRAP data is available for Nukumarū Station Road, hence the scoring will be weighted 50% to IRIS data and 50% to CAS data.

Existing Scores

After analysing the KiwiRAP, IRIS and CAS data a score of 2/10 has been scored for this site. There are no recorded instances of crashes or near misses for this location, so the scores are low accordingly.

2.5.3 Site Specific Safety Score

This site based score aims to analyse elements of the layout that are not well covered or missing from the ALCAM risk rating. Score bands for the site specific safety score are as follows;

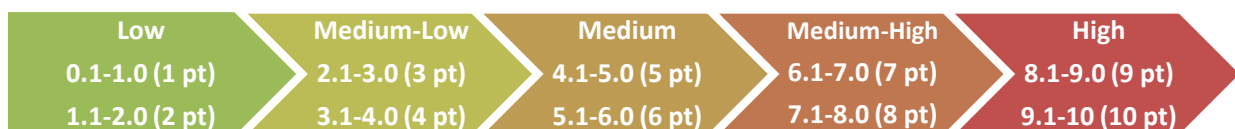


Figure 2-10: Score Bands for Site Specific Safety Score

To achieve a score out of ten, the site specific safety score is simply prorated and then rounded up to the nearest whole number, i.e. $19/35 = 0.54 \times 10 = 5.4 \therefore 6/10$

ID: 483 – Nukumarū Station Road Roadway Crossing	2/10
--	------

Table 2-3 below outlines the score of the roadway crossing of the railway line.

² Using <https://roadsafetyrisk.co.nz/> for urban roads (where available) and https://nzta.abley.com/SafetyNET_2016/ for the rural state highway network.

Table 2-3: Assessment of the Nukumar Station Road Level Crossing

Assessed Item	Existing Score	Proposed Score	Modified Score	Comments
Horizontal and Vertical Alignment	7/10	7/10	4/10	<ul style="list-style-type: none"> Existing site has a moderate horizontal and vertical curve on approach to the level crossing which causes some visibility constraints of the crossing point. Proposed is likely to have a large radius curve on approach to level crossing and does not identify suggest to improve the vertical curve hence it is assumed that this is likely to have some visibility constraints.
Side road proximity and issues with right turn off main road	0/5	1/5	1/5	<ul style="list-style-type: none"> Currently no side roads present. Likely Side road on the southern side with low chance of queuing or visibility constraints.
Short stacking/grounding out/Queuing	10/10	10/10	0/10	<ul style="list-style-type: none"> Currently the site has a hump at the level crossing and this is likely to cause heavy vehicles bottoming out. Proposed draft design only shows the new road centreline alignment and it is assumed that removal of this hump has not been yet considered by this design.
Road Surface Condition	5/5	1/5	1/5	<ul style="list-style-type: none"> Existing road approach to the level crossing is unsealed and contains some un-compacted loose metal. Road extension proposes to install a two coat chip seal surface at this road level crossing.
TOTAL SCORE	22/30	19/30	6/30	
MODIFIED SCORE	-	-	-	
RISK BAND	Medium-High	Medium-High	Low	
SSSS	8/10	7/10	2/10	Score to take forward to LCSS

2.5.4 Locomotive Engineer / RCA Engineer's Assessment of Risk

	Existing	Proposed	Modified
Site Score for Road Level Crossing	1/10	1/10	1/10

Locomotive Engineer Opinion

No site specific Locomotive Engineer opinion has been provided by KiwiRail for this crossing hence reference is made to the Tracksafe report which was produced in December 2014. This report surveyed the Locomotive Engineers from KiwiRail, Tranz Metro and Transdev Auckland, to identify which level crossings they perceived to be the worst in their region. The survey had a 10% response rate, with over 100 responses received. Response received from the Taranaki Region does not mention Nukumar Station Road as a site with safety concern. This is to be expected given low traffic volumes

Road Controlling Authority Engineer Opinion

South Taranaki District Council Road Project Manager comments have been received via email in relation to the Safety this location. In the engineers opinion there is no record of issues at the level crossing.

Based on the feedback received the Nukumar Station Road crossing was given a low score of 1/10 as it didn't really come out as a site with known safety issues. This is not expected to change in the proposed and modified designs.

Level Crossing Safety Score (LCSS) Results

ID: 483 – Nukumar Station Road Level Crossing (road):

17/60

Table 2-4 summarises the scores of the four different assessments into a combined LCSS score for the Nukumar Station Road Level Crossing.

Table 2-4: Overall LCSS for the Nukumar Station Road Roadway Level Crossing

Scored Items	Existing Score	Proposed Score	Modified Score	Comments
ALCAM score	6/30	12/30	12/30	
Crash and incident history score	2/10	2/10	2/10	
Site specific safety score	8/10	7/10	2/10	
Locomotive engineer / local authority engineer risk score	1/10	1/10	1/10	
LCSS SCORE	17/60	22/60	17/60	
RISK BAND	Low	Medium-Low	Low	

The modified design meets the two key KiwiRail safety criteria for a LCSIA. These criteria's are listed as follows:

- Criteria 1: ALCAM and LCSS risk category to be in the Low or Medium-Low risk band.
- Criteria 2: LCSS score to be at or lower than the existing site score.

2.6 Recommended Modifications to the Design

There are some elements of the design that would benefit from modification or additions. These are outlined in Table 2-5.

Table 2-5: Modifications to the Proposed Design

1. Flashing Lights and Bells	Significant
The design does not show provisions for flashing lights and bells. Flashing lights and bells activate when a train approaches the level crossing and gives drivers with visual and audible queues that a train is approaching. Flashing light and bells should be installed at this site as a minimum.	
2. Visibility of the Approaching Train	Significant
Existing cut face to the west of the level crossing currently restricts visibility. Consideration should be given to reshaping the cut face to improve visibility of any approaching train.	
3. Heavy Vehicle Grounding Out	Moderate
Current approaches to the level crossing are in a sag curve followed by a hump at the level crossing This can potentially lead to heavy vehicles bottoming out and being stranded on the tracks. If a train happens to arrive at the same time then the result would be devastating. Consideration should be	



given to lifting the road up on the approach to the level crossing to improve visibility of the approaching trains and to prevent vehicles bottoming out. It was unclear from the details provided whether such changes are proposed.

4. Level Crossing Design

Moderate

Reference should be made to the required standards for the design of this road level crossing. E.g. Traffic Control Devices Manual (Part 9) – level crossings and any KiwiRail design requirements etc.

5. Mark “RAIL XING” on Road Approaches

Moderate

Consider installing Rail X pavement marking at this site as the posted speed limit on the proposed sealed road will be 100km/h.

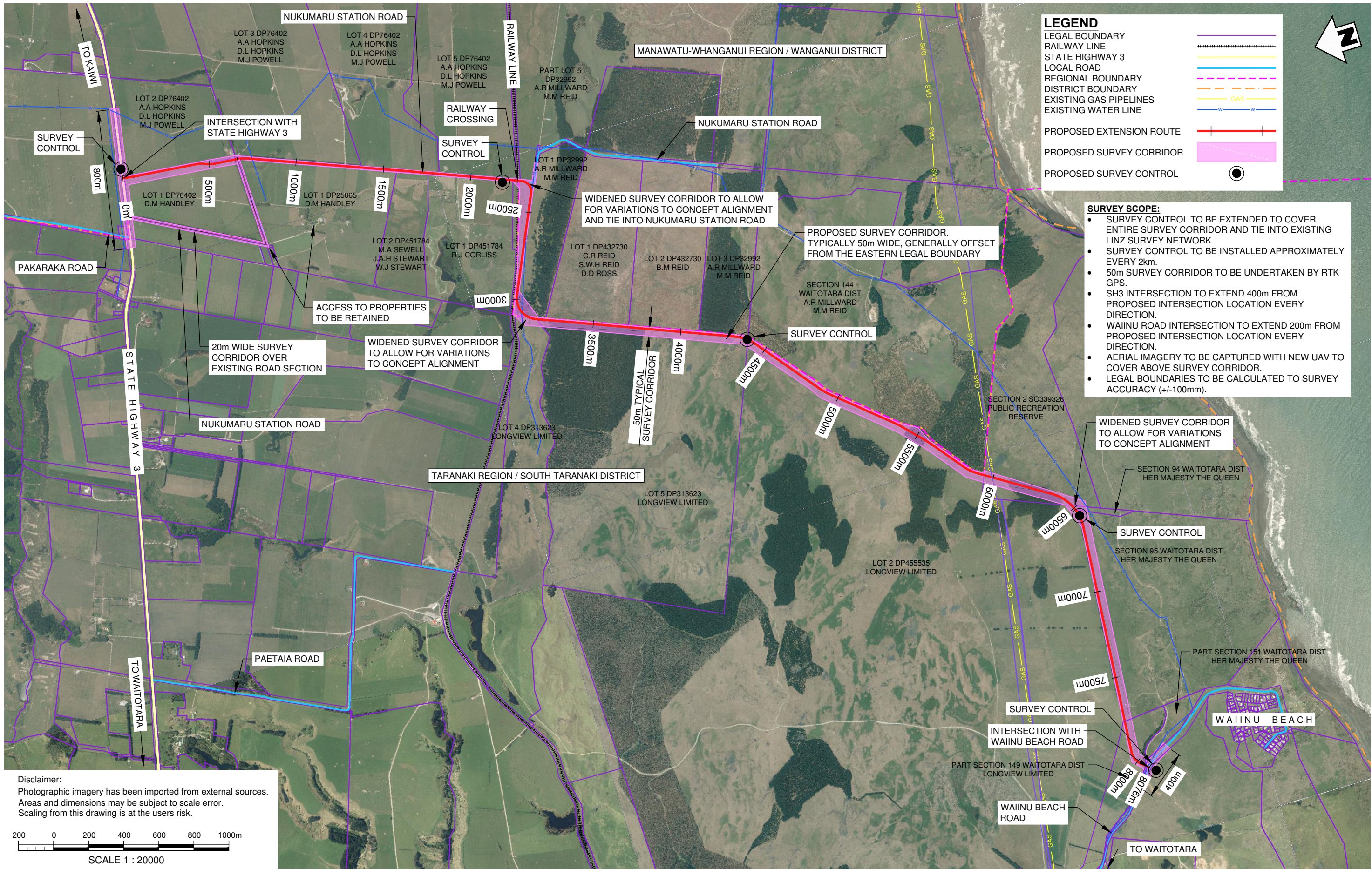
6. Suggested Signage for Location

Moderate

There are no signs on the provided drawing, the following are signs that should be included at this site as a minimum;

- Level Crossing Ahead Steam Train (WX1L) sign on both approaches to the level crossing. These signs can be duplicated if there are visibility restriction to the LHS sign or to provide with added emphasis of the level crossing ahead.
- Assemblies are unlikely to be clearly visible on the north-bound approach due to the proposed horizontal curve. Consideration should be given to installing a level crossing ahead advance warning (WX3) sign.
- Install cross buck sign on both approaches

Appendix A Proposed Shared Path Design



LEGEND

LEGAL BOUNDARY
RAILWAY LINE
STATE HIGHWAY 3
LOCAL ROAD
REGIONAL BOUNDARY
DISTRICT BOUNDARY
EXISTING GAS PIPELINES
EXISTING WATER LINE

PROPOSED EXTENSION ROUTE
PROPOSED SURVEY CORRIDOR
PROPOSED SURVEY CONTROL

- SURVEY SCOPE:**
- SURVEY CONTROL TO BE EXTENDED TO COVER ENTIRE SURVEY CORRIDOR AND TIE INTO EXISTING LINZ SURVEY NETWORK.
 - SURVEY CONTROL TO BE INSTALLED APPROXIMATELY EVERY 2km.
 - 50m SURVEY CORRIDOR TO BE UNDERTAKEN BY RTK GPS.
 - SH3 INTERSECTION TO EXTEND 400m FROM PROPOSED INTERSECTION LOCATION EVERY DIRECTION.
 - WAIINU ROAD INTERSECTION TO EXTEND 200m FROM PROPOSED INTERSECTION LOCATION EVERY DIRECTION.
 - AERIAL IMAGERY TO BE CAPTURED WITH NEW UAV TO COVER ABOVE SURVEY CORRIDOR.
 - LEGAL BOUNDARIES TO BE CALCULATED TO SURVEY ACCURACY (+/-100mm).

Disclaimer:
Photographic imagery has been imported from external sources.
Areas and dimensions may be subject to scale error.
Scaling from this drawing is at the users risk.



BTW Company Ltd
Cnr. Courtenay & Eliot Sts.
P.O Box 551, NEW PLYMOUTH 4340
Ph (06) 759 5040
Ph 0800 289787 Fax (06) 759 5049
E-mail survey@btw.nz
Web www.btwcompany.co.nz

NO	DATE	BY	CHKD	APPR	OPER	DESCRIPTION	NUMBER	TITLE
0	05.12.16	CSM	BB			ISSUED FOR REGISTRATION OF INTEREST		
B	29.11.16	CSM	IDS			ISSUED FOR CONSULTATION		
A	28.11.16	CSM	IDS			ISSUED FOR REVIEW		
REVISIONS							REFERENCE DRAWINGS	

GENERAL NOTES

1. Coordinates in terms of : NA
2. Elevations in terms of : NA
3. Contour interval is : NA



LOCATION	
PROJECT No.	16305-02
A3 SCALE	AS SHOWN
SURVEYED	-
DRAWN	C MILLER
CHECKED	I STEELE

SOUTH TARANAKI DISTRICT COUNCIL
NUKUMARU STATION ROAD EXTENSION
PROPOSED SURVEY PLAN

ORIGINAL SIZE	DRAWING No	SHEET	REVISION
A3	16305-02	5	0

