SAFETY, HEALTH AND ENVIRONMENT

ENTERPRISE-WIDE SHE TEMPLATE (Adapted for LCRAG SFAIRP Process)

04-TEM-006-SHE
SFAIRP STATEMENT REPORT

1. DOCUMENT DETAILS

Project Name:	Homebush Rd Level Crossing SFAIRP Report

Project Stage:	Design ☒	Implementations/Closeout (Construction) ☐	Operations ☐

Disciplines Covered:					
Track ☒	Civil ☐	Structures ☐	Signals & Comms ☒	Mechanical ☐	Traction/Elec ☐
Facilities ☐	Operations ☒	Rollingstock ☐	Network Service ☒	Ships ☐	
Others Please Specify:					

Document Control:		
DRAFT v1	For internal review by KiwiRail.	26/11/24
DRAFT v2	No changes after KiwiRail internal review.	28/11/24
FINAL	Added clarification of role of RPO in section 9 after discussion at SFAIRP meeting.	12/12/24

2. DOCUMENT APPROVAL

Project Assurance SFAIRP Due-diligence Declaration Confirming that:	Completed
1. SHE Risk Assessment has been implemented as intended and communicated to the key stakeholders and that the hazard/risks associated with project stage have been established, understood, and the relevant controls have been identified, implemented or planned.	☐
2. SFAIRP statement demonstrate a reasoned and supported arguments, that there are no other practical measures that could reasonably be taken to reduce risks further and that the controls implemented provide the highest level of protection that is reasonably practicable for these circumstances.	☐
3. Due diligence checks have been undertaken verifying that the identified controls are appropriate and documented evidence is available to confirm the risks have been mitigated to a degree consistent with KiwiRail systems and standards.	☐

Prepared by Author:	Phil McQueen Ltd	Signature	[redacted]	Date	12/12/24
Content Reviewed by:	Senior Level Crossings Engineer	Signature		Date	12/12/24
Technical Authority Approval:	Professional Head Signals and Telecommunications	Signature		Date	
Operations Approval:	GM Operations SI (signed by delegated authority for SI Infra Manager)	Signature		Date	15/01/25
Zero Harm Approval:	Head of Safety Risk Assurance	Signature		Date	15/01/2025

3. PURPOSE AND SCOPE OF THIS REPORT

The level crossing on Homebush Road will have increased road traffic during the construction period for a solar energy farm project proposed by Darfield Solar and Energy Storage Limited (DSESL). After construction is finished and the solar farm is operational, the road traffic volumes will reduce back to levels similar to the existing traffic volumes.

The increased road traffic during the construction period constitutes a “change in use” of the crossing and has triggered a Level Crossing Safety Impact Assessment (LCSIA) as required by the Level Crossing Risk Assessment Guidance (2022) (LCRAG).

The LCSIA report describes the effects of the construction traffic on the level crossing, the associated changes in risk, and the recommended safety improvements. Briefly:

- Homebush Rd is a rural road near Darfield and crosses the single main line track of the Midland Line railway at kilometrage 28.73km Mid.
- The crossing is currently controlled by STOP signs.
- Road traffic volumes will increase during the 1.5 years construction period of the solar farm.
- Rail traffic volumes have been assumed not to change during the construction period.
- The LCSIA considered two options for at grade improvements at the crossing: Rail Protection Officer (RPO), and active warnings ie flashing lights & bells with half arm barriers (FLB/HAB).
- The LCSIA found that FLB/HAB would achieve criterion 1 and 2 during the construction period, and that RPO would not achieve criterion 1 or 2 during the construction period.
- The LCSIA, and DSESL, consider that FLB/HAB may not be reasonably practicable for the construction period, hence triggering this SFAIRP report, to assist the stakeholders to make a decision.

The purpose of this SFAIRP report is to review whether FLB/HAB is reasonably practicable for the Homebush Rd crossing for the construction period, by applying the process described in the LCRAG (v5), Appendix 9.

The figures below show the existing level crossing (source LCSIA report, Google maps).

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

4. APPLICABLE REGULATIONS, ACTS AND STANDARDS

Type	Description
KiwiRail Engineering Standards	KiwiRail Infrastructure has a comprehensive suite of engineering standards and supporting documents, including those applying to level crossings.
NZTA Traffic control devices manual (TCD manual) – Part 09: Level crossings	The TCD manual provides standards for traffic control devices including at level crossings.
Level crossing risk assessment	The Level Crossing Safety Impact Assessment (LCSIA) and Australian Level Crossings Assessment Model (ALCAM) are methods used in NZ for assessing level crossing risk and identifying appropriate risk controls. The Level Crossing Risk Assessment Guide (LCRAG), prepared jointly by KiwiRail and NZTA Waka Kotahi, provides guidance on risk assessment and describes the SFAIRP review process to be used if there are risk controls identified that are considered to be "not reasonably practicable" to implement.
Act	Railways Act 2005
Act	Health & Safety at Work Act 2015
Regulations	Health & Safety at Work Regulations 2016

5. KEY CONSTRAINTS, ASSUMPTIONS, AND DEPENDENCIES

The risk has been assessed, and safety improvements proposed, using the LCSIA process.

This SFAIRP report has been prepared using the process set out in LCRAG (v5) Appendix 9 and relies on the information contained in the reference documents listed in section 10, and where noted further information provided separately.

The analysis in this report assumes that all the safety improvements recommended by the LCSIA for the option selected by the stakeholders, other than those found to be not reasonably practicable, will be implemented.

6. STAKEHOLDER ENGAGEMENT

The Key Stakeholders are:

Stakeholder	Reason for Engagement
KiwiRail	The KiwiRail South Island Region is responsible for the maintenance of the infrastructure and the rail operations at the level crossing. KiwiRail Engineering and Safety Health & Wellbeing groups are KiwiRail's technical authorities re level crossing design and safety risk.
Darfield Solar and Energy Storage Limited (DSESL)	DSESL is the sponsor of the solar farm project.
Selwyn District Council (SDC)	SDC is the Road Controlling Authority for the road at the crossing.

Engagement with stakeholders took place as part of the LCSIA and included all relevant parties including worker representatives. Details are in the LCSIA report.

7. RISKS BEING CONSIDERED

Risk/Hazard ID	System/Rail Network - Key Risks/Hazards Description
	The risk of harm caused by a train vs road user collision at the road level crossing.

The key factors driving this risk at the subject crossings are the existence of a level crossing of road and rail, and the volumes of road and rail traffic volumes:

- Road traffic volumes at the crossing will increase during the construction period for the solar farm.

This risk is not new, as it exists to a degree today at the existing crossing. Neither is it novel, as the same risk exists in varying degrees at numerous other level crossing locations on the rail network. However, the proposed change of use will result in changes in risk which must be considered, and appropriate controls identified.

8. SFAIRP JUSTIFICATION STATEMENT

KiwiRail currently manages this risk through a number of existing controls, selected and applied to each crossing site as appropriate, and which fall under KiwiRail's Safety Case and Licence to Operate. Therefore, this SFAIRP statement focuses on how existing controls will be applied at the subject crossing sites.

The Risk has been assessed and the following Hierarchy of Controls considered:

Controls Considered		Results
Engineering	Flashing Lights & Bells and Half Arm Barriers (FLB/HAB).	Not Reasonably Practicable
Administrative	Rail Protection Officer (RPO).	To be Implemented
Engineering	Road/rail intersection layout and design details physical works.	To be Implemented
Administrative	Signs and road markings.	To be Implemented

FLB/HAB is considered not reasonably practicable by the LCSIA authors and by DSESL, for the 1.5 years construction period.

The SFAIRP analysis (see details in section 9) supports that position:

- FLB/HAB and RPO are both suitable and available controls, but the additional cost of FLB/HAB compared to RPO, when evaluated over the construction period, is grossly disproportionate to the value of the additional safety benefit.
    - ICAF = 36 for FLB/HAB compared to RPO, when evaluated over the construction period.
- Therefore FLB/HAB is not reasonably practicable for the construction period.

The controls proposed to be implemented:

- Will not achieve criterion 1 or criterion 2 for the Proposed Design case. (RPO).
- Will achieve both criterion 1 and criterion 2 for the Future case. (STOP signs).

9. CONTROLS IMPLEMENTED / CONSIDERED

Homebush Rd crossing

Risk/Hazard ID	RISK DESCRIPTION	SFAIRP JUSTIFICATION	Hierarchy of Control IMPLEMENTED	Hierarchy of Control CONSIDERED
	The risk of harm caused by a train vs road user collision at the road level crossing for the future use cases.	Flashing Lights & Bells and Half arm barriers, or, Rail Protection Officer (RPO) *[Includes:* - *Install flashing lights and half-arm barriers (FLB/HAB) or, alternatively, provide a RPO while construction traffic is using the crossing.* *FLB/HAB is considered against the alternative of RPO, over the assumed 1.5 year period for which the Homebush Rd crossing will have increased road traffic due to the solar farm construction. The function of the RPO would be to manage road traffic and be in contact with train control to aware of approaching trains. It would not include stopping trains, which would continue to run as normal.* *Considering suitability:* *FLB/HAB or RPO are both suitable controls as they would reduce the risk at the level crossing, albeit by different amounts.* *Considering availability:* *FLB/HAB is an available control as it is NZ industry accepted practice and could be constructed but noting that the 1 – 2 year construction lead time typical for FLB/HAB may not align with project timelines.* *RPO is an available control as it is NZ industry accepted practice and could be used.* *Considering cost proportionality:* - *The LCRAG App 9 guidance is that an ICAF ratio of:* o *2 or less will generally be considered proportionate.*	Engineering	

Risk/Hazard ID	RISK DESCRIPTION	SFAIRP JUSTIFICATION	Hierarchy of Control IMPLEMENTED	Hierarchy of Control CONSIDERED
		○ *10 or greater will generally be considered grossly disproportionate.* ○ *Between 2 and 10 will require specific consideration and justification.* - *The cost to use a RPO is estimated (based on advice from KiwiRail) as $337,500 for the duration of construction.* - *The cost to install FLB/HAB is advised by KiwiRail as minimum of $500,000.* - *FLB/HAB has a FRP of 2,488 years and RPO an FRP of 1,550 years (for the construction traffic).* - *FLB/HAB has a FRP of 4,065 years and STOP signs an FRP of 3,038 years (for traffic levels after the construction period).* - *ICAF = 36 for FLB/HAB compared to RPO, when evaluated over the construction period.* ○ *The additional cost of FLB/HAB compared to RPO, when evaluated over the construction period, is grossly disproportionate to the value of the additional safety benefit.* - *ICAF = 5 for FLB/HAB compared to RPO, when evaluated over the construction period plus the remaining lifespan of the FLB/HAB, assuming they remained in place.* ○ *The additional cost of FLB/HAB compared to RPO, when evaluated over the construction period plus the remaining lifespan of the FLB/HAB, is inconclusive compared to the value of the additional safety benefit.]*		
	The risk of harm caused by a train vs road user collision at the road level crossing for the future use cases.	<u>Road/rail intersection layout and design details to maximise effectiveness of controls and reduce hazard likelihood at this site.</u> *[Includes:* - *Extend seal on eastern approach to meet TCD Pt.9 requirements and line-mark accordingly alongside full level crossing line re-mark.* - *Repair sealed edge on western approach.* - *Replace failing sleepers on the track panel.* - *Replace track panel if individual sleeper replacement methodology will not work.* - *Widen the level crossing if the track panel is replaced.]*	Engineering	

Risk/Hazard ID	RISK DESCRIPTION	SFAIRP JUSTIFICATION	Hierarchy of Control IMPLEMENTED	Hierarchy of Control CONSIDERED
	The risk of harm caused by a train vs road user collision at the road level crossing for the future use cases.	<u>Road/rail intersection layout and design details to maximise effectiveness of controls and reduce hazard likelihood at this site.</u> *[Includes:* - *Construction traffic management plan to provide clear guidance on level crossing protocols, including use of a Rail Protection Officer for level crossing.* - *Poor condition of existing signage.* - *Locate eastern STOP limit line in such a location that avoids the power poles creating a visual obstruction.* - *Paint yellow cross hatching at level crossing to raise conspicuity.]*	Administrative	

Summary of crossing risk assessment data and cost proportionality calculations:

Homebush Rd Summary of LCSIA and SFAIRP Review Data

Ref: Stantec LCSIA Report Rev 2

Construction period	1.5
Lifespan active warnings	30
Lifespan grade separation or closure	100

VoSL (2023) $m 12.5

Evaluated over construction period 1.5 years

Homebush Rd

LCSIA Scenario	LCSS	C1	C2	FRP	FLB/HAB cf RPO Suitable	FLB/HAB cf RPO Available	Cost $m	ICAF	Reasonably Practicable
Future (FLB/HAB)	17	Y	Y	4,065	Y	Y	0.163	36	N
Future (STOP signs)	25	Y	Y	3,038					
Proposed Design (FLB/HAB)	21	Y	Y	2,488					
Proposed Design (RPO)	31	N	N	1,550					
Change in use (STOP signs)	36	N	N	1,515					
Updated Existing (STOP signs)	26			3,125					

Evaluated over assumed lifespan 30 years

Homebush Rd

LCSIA Scenario	LCSS	C1	C2	FRP	FLB/HAB cf RPO Suitable	FLB/HAB cf RPO Available	Cost $m	ICAF	Reasonably Practicable
Future (FLB/HAB)	17	Y	Y	4,065	Y	Y	0.163	5	Inconclusive
Future (STOP signs)	25	Y	Y	3,038					
Proposed Design (FLB/HAB)	21	Y	Y	2,488					
Proposed Design (RPO)	31	N	N	1,550					
Change in use (STOP signs)	36	N	N	1,515					
Updated Existing (STOP signs)	26			3,125					

Note: only "Change in Use" and "Proposed Design" scenarios include construction traffic.

Cost estimates for cost proportionality assessment:

Homebush Rd

Option		Estimate $m		Source
FLB/HAB		$	0.5000	KiwiRail estimate, Arrie vdM email 26/11/24.
RPO	Assumes 40hrs/wk for 50wks/yr for 1.5 years.	$	0.3375	KiwiRail correspondence, re Sorensons Rd project

10. REFERENCE DOCUMENTS

1. Stantec report: Homebush Road LCSIA, Rev 2, 20/11/2024.
2. Joint KiwiRail and Waka Kotahi publication: Level Crossing Risk Assessment Guide (LCRAG), v5.