



ROLLESTON ACCESS IMPROVEMENTS

DETAILED BUSINESS CASE

WAKA KOTAHI NZ TRANSPORT AGENCY
SEPTEMBER 2023

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ABBREVIATIONS

ABBREVIATION	TERM
AADT	Annual Average Daily Traffic
AMP	Activity Management Plan
AST	Appraisal Summary Table
BCR	Benefit-Cost Ratio
CAG	Cultural Advisory Group
CERF	Climate Emergency Response Fund
CPTED	Crime Prevention Through Environmental Design
CRETS	Christchurch Rolleston and Environs Transportation
CRPS	Canterbury Regional Policy Statement
CSM	Christchurch Southern Motorway
CSM2	Christchurch Southern Motorway Stage 2
CTC	Centralized Traffic Control
DBC	Detailed Business Case
DPS	Design Philosophy Statement
DSI	Death & Serious Injury
EAST	Early Assessment Sifting Tool
GPS	Government Policy Statement (on Land Transport) 2018
HCV	Heavy Commercial Vehicle
IDMF	Investment Decision Making Framework
ILM	Investment Logic Mapping
IP	Interpeak
IQA	Internal Quality Assurance
IRR	Infrastructure Risk Rating
IS	Infrastructure Sustainability
ITS	Intelligent Traffic Systems
iZone	iZone Industrial Zone
KAC	Key Activity Centre
KPI	Key Performance Indicator
LCSIA	Level Crossing Safety Impact Assessments
LILO	Left In Left Out
LO	Left Out
LPC	Lyttleton Port Company
LTMA	Land Transport Management Act 2003
LTP	Long Term Plan
MBCM	Monetised Benefits and Costs Manual
MCA	Multi Criteria Analysis
MoU	Memorandum of Understanding
MSE	Mechanically Stabilised Earth
MSL	Main South Line

ABBREVIATION	TERM
NB	North-bound
NLTF	National Land Transport Fund
NOF	Network Operating Framework
NOR	Notices of Requirement
NPV	Net Present Value
NZPTA	New Zealand Pouhere Taonga Act 2014
NZUP	New Zealand Upgrade Programme
P&R	Park 'n' Ride
PBC	Programme Business Case
PC	Plan Changes
PSC	Project Steering Committee
R2Z	Road To Zero
RAB	Roundabout
RDN	Rolleston Drive North
RIAWS	Rural Intersection Activated Warning Signs
RIZ	Rolleston Industrial Zone
RSA	Road Safety Audit
RMA	Resource Management Act
SH (#)	State highway (number)
SH	State Highway
SCM	Supplementary Cementitious Material
SDC	Selwyn District Council
SFAIRP	"So Far As Is Reasonably Practical"
SID	Safety in Design
SIMT	South Island Main Trunk Rail Line
SIP	Speed and Infrastructure Programme
SME	Subject Matter Expert
SSA	Safe System Audit
SUP	Shared Use Path
TESL	Taylor Energy Solutions Ltd
TEU	Twenty-foot Equivalent Units
TMP	Traffic Management Plan
TOF	Transport Outcomes Framework
VKT	Vehicle Kilometres Travelled
VOC	Vehicle Operating Costs
VPH	Vehicles Per Hour
WK	Waka Kotahi (New Zealand Transport Agency)
WRSN	Wire Rope Safety Barrier
WTOC	Wellington Traffic Operations Centre

EXECUTIVE SUMMARY

Overview

Rolleston is one of the fastest growing towns in New Zealand and is experiencing transport pressures to keep the community connected and state highway intersections safe. The urgent need for investment in the Rolleston transport network has been recognised through the New Zealand Upgrade Programme (NZUP), with \$125m of funding approved in June 2021 as part of the 'Canterbury package'¹.

Investment is targeted for the following interventions that improve safety, connect communities, enable better movement of rail freight and are future-proofed for growth:

- A **new multi-modal flyover** that will connect the residential and industrial areas of Rolleston. The flyover will provide improved facilities for walking and cycling.
- **Safety improvements to intersections** along SH1 through Rolleston, with a range of improvements to reduce deaths and serious injuries and better manage the forecast future growth in traffic volumes.
- An **upgrade of the rail corridor** to improve rail freight efficiency and operations.
- Safer access to the town centre and service businesses alongside SH1.

Together these interventions will deliver a safer state highway corridor² and improve the connection between the Rolleston Industrial Zone (RIZ), Rolleston Town Centre and the residential areas. Doing so also means that we are proactively responding to the growth that is occurring, but in a manner that improves travel choices with a more integrated active and public transport network.

What does investment get us?

The project will give us a range of transport benefits which go towards meeting every one of the Ministry of Transport's outcomes for the transport system – inclusive access, safety, economic prosperity, environmental sustainability and resilience.

In terms of the traditional transport benefits, we expect investment to give us:

- A reliable connection between the residential and employment sides of Rolleston.
- A reliable, resilient transport network where:
 - Journey times across the state highway are more reliable.
 - Freight journeys along SH1 are quicker and more reliable, with the removal of two sets of traffic lights and freight routes to the industrial zone.
 - A safer corridor with less crashes to cause disruption.
- Better walking and cycling choices, with safer and higher quality connections across the state highway and linking with Selwyn Districts expanding cycle network.
- Major safety benefits:
 - A 40% reduction in DSIs on the state highway.
 - Almost fully remove the possibility of a collision between a train and vehicle at the Hoskyns Road level crossing, which sees numerous 'near-misses' each year.
- A rail corridor that is future-proofed for growth with railyard improvements that can deliver significantly shorter journey times for trains travelling between the Midland Line and Main South Line. This essentially provides travel choice for freight, with more opportunity to shift road-based freight onto rail.

In 2018 Rolleston had a population of 16,000 residents. It now has a population of 28,000, and by 2043 it is expected to be 39,000.

Enabling long term change for Rolleston

This project is more than just about delivering the traditional transport benefits.

This project will be a facilitator for real long-term change in Rolleston by enabling land use change that will help make Rolleston a self-sustaining and vibrant place where people work and live. Whilst the Town Centre redevelopment is a great addition, the growth (and extent) of commercial and employment land use is still not going to keep pace with the growth in population.

¹ www.nzta.govt.nz/planning-and-investment/nz-upgrade/canterbury-package/

² Rolleston lies within the Road to Zero Speed and Infrastructure corridor of Templeton to Selwyn River that is looking to deliver a "safe system transformation" with barriers and intersection safety interventions.

So, the question is - where can this new development go?



Without utilising space on the northern side of SH1, which is geographically very close to the Town Centre, the only alternative greenfield areas would be on the outskirts of the current residential areas. If opportunity is not taken now to better connect both sides of Rolleston, it could become a town that ends up with a series of sporadic small commercial areas and never achieves a strong feeling of community.

If Rolleston becomes a more self-sustaining town, residents will no longer rely on travel to Christchurch for work. This means that **the potential for this project to be an enabler of significant change in terms of vehicle kilometres travelled is significant.**

Recommended programme

The process of identifying a recommended programme of works captured responses to community consultation, extensive optioneering (informed by technical assessments), a value-engineering exercise and a road safety audit. The scope of the proposed programme is shown below.



Figure A – Recommended programme

The NZUP scope was generally founded upon the recommendations from the Programme Business Case (PBC). However, the evolution of the project through the DBC process has led to the following changes to the original proposal (as consulted upon in August 2021):

- **“Straight” flyover** rather than ‘skewed’ flyover.
- **Southbound off-ramp** (‘loop road’) from SH1 (southbound) to Rolleston Drive. This will provide much improved accessibility into Rolleston via the main road network, and reduces demands through the Weedons Ross Road interchange, Jones Road and Levi Road.

- A **'left-out' from Hoskyns Road onto SH1** (rather than full closure of the intersection). The key safety problem relates to queuing back across the level-crossing from Hoskyns Road/SH1 signals. A 'left-out' onto SH1 provides benefits of access, resilience and overall network performance without influencing the desired safety outcomes. The inclusion of an off and onramp near central Rolleston significantly reduce pressure at the Weedons Ross Road / SH1 interchange to help maintain freight access reliability to the industrial area.
- A **cycle underpass for a safe crossing of the state highway at the Walkers Road / Dunns Crossing Road roundabout**. The underpass connects the proposed Burnham Cycleway (along Runners Road) with the Rolleston residential area and a walking and cycling connection to the expanding industrial area and shared use paths along Walkers Road and Two Chain Road (refer Plan Changes 73 and 80)³.
- **Removal of the southbound 2 to 1 lane merge at the end of the Christchurch Southern Motorway on SH1** thereby extending two lanes from the Weedons Ross Road interchange through to the off-ramp into Rolleston. This will provide a safer transition from the higher speed CSM to the slower 80 km/hr section passing through Rolleston.
- The **service lane** will be developed as an extension from the southbound off-ramp to Rolleston Drive and formalises left-hand turns into businesses on SH1 and to Tennyson Street for access to the Town Centre. The inclusion of a central median barrier ensures that all right turning conflicts are removed, with left-in / left out enabled at Tennyson Street (via the service lane) and Brookside Road.

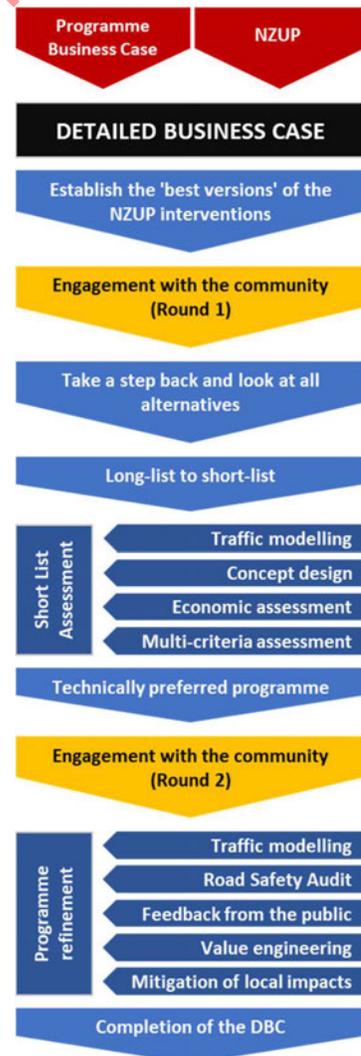
The 'flyover concept' has been around since 2007, and this investment will give both the community and developers confidence around how transport in Rolleston will look and function.

Business case process

This business case is unusual in the sense that the starting point was a relatively well-defined set of improvements for Rolleston. Whilst Crown funding has been allocated, the **DBC ensures that the right things are being proposed and at the right price**.

Our process involved:

1. **Technical analysis** of problems and system performance, and assessment of the merits of various options. This involved extensive transport modelling and other technical considerations for the option assessments.
2. **Public engagement (round 1)**. We presented the NZUP programme and asked the public what they thought – did it look about right, or were there things that we needed to further explore?
3. **Taking a step back to consider all the option** | Not all the feedback received from the first round of engagement was positive, and we were asked to explore some alternatives – most notably in relation to the flyover. We therefore took a step back to make sure we had robustly explored all the options. The first part of that process was to try and establish the best versions of the interventions that were described by the NZUP – e.g. how could we make the originally proposed 'skewed flyover' better?
4. **'Long-list' to 'short-list' to 'technically preferred option'** | This took the form of a multi-criteria analysis (MCA) that was informed by various technical assessments including traffic modelling and concept design. The outcome was a set of technically preferred options that had buy in from all the project partners – Waka Kotahi, Selwyn District Council (SDC) and KiwiRail.
5. **Public engagement (round 2)**. We asked the public what they thought of the refined programme. The feedback was far more positive than the first round of engagement, with wide reaching support. There were however some issues that the public raised, particularly regarding improving safety on local roads that would see more traffic.
6. **Refining the preferred option**. We took on board the feedback, undertook technical analysis and made some changes which looked to address the main feedback we received. We also did a value engineering exercise which saw some changes to the proposed service lane. We then completed our technical assessments, design, cost estimates, safety audits and the overall business case.



³ www.selwyn.govt.nz/property-And-building/planning/strategies-and-plans/selwyn-district-plan/plan-changes

The outcome of this DBC is a preferred programme of works that is technically the best thing to do, presents value for money and has wide reaching buy-in from stakeholders.

Problems

The Problem Statements agreed amongst the Project Partners are:

- **Safety (40%)** – Increasing traffic and rail movements and poor interface with local road intersections and level crossings is resulting in increased conflicts – particularly at uncontrolled right turns, and the risk of death and serious injury.
- **Connectivity (60%)** – Rapid changes in land use has outpaced the delivery and availability of alternative transport choices, maintaining a reliance on private vehicles, resulting in increased severance, poor connectivity and reduced liveability and sustainability of Rolleston.

The following sections describe how the proposed interventions will address these core problems.

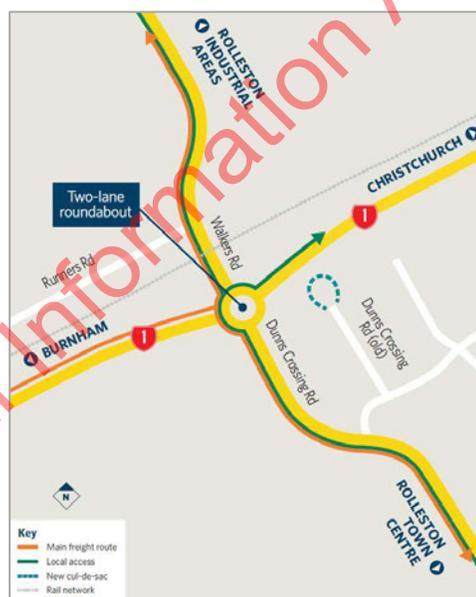
Dunns Crossing Road / Walkers Road roundabout

This is the most dangerous intersection along the state highway corridor through Rolleston (x2 DSIs in the last 5 years). People are also actively avoiding this intersection due to the perceived safety risks. Dunns Crossing Road and Walkers Road provide a key cross district route and forms part of the Rolleston peripheral arterial network. It serves key destinations including the Rolleston Prison, West Rolleston Primary School and the Resource Recovery Centre, Significant growth within the near vicinity is also planned with residential development along Dunns Crossing Road and industrial development along Walkers and Two Chain Road. This key intersection will become increasingly important as the southern access to both Rolleston township and the industrial area. Hence without both safety and capacity improvements at this location, growth cannot be supported.

This is also the intersection between two key freight routes – east-west along the state highway (regional movement) and north-south (district movements). Its long-term efficiency therefore carries even wider importance.

A dual lane roundabout is proposed to cater for the expected growth in the area, as opposed to a single lane safety intervention. Dunns Crossing Road will be realigned into greenfield areas to provide separation from the rail level crossing and avoid the need to acquire some newly constructed homes on the residential side of the intersection. This roundabout will become the main entrance to Rolleston from the south to both the industrial area via Walkers Road and Two Chain Road, and to the residential side via Dunns Crossing Road, Brookside Road and Lowes Road. While this adds traffic to these roads the impacts are not out of context with their arterial and collector road functions.

The DBC has been developed in close partnership with SDC who have plans for upgrades on these roads in the future to cater for the ongoing land use growth in the area. We have also undertaken extensive engagement with local schools and SDC to ensure that we are collectively delivering appropriate mitigation to ensure safe outcomes for all.



Rolleston Drive South – left in / left out

Right turning into or out of this intersection presents a high safety risk. This risk will worsen in response to:

- Traffic volumes increasing along the state highway and in response to the rapid growth of the town.
- The removal of the traffic signals at Rolleston Drive North and Hoskyns Road, which will essentially create an extension of the Christchurch Southern Motorway. This means that a give-way control intersection at Rolleston Drive South will be very much out of context and unsafe.

During the DBC several options were identified and assessed. One option was for a roundabout, but it soon became apparent that this would not be easily achievable due to land constraints. It would also attract traffic down Rolleston Drive South, which is not designed to carry a significant amount of traffic.

Given the relatively low use of the road as an access point into Rolleston, the recommended solution is to restrict turns at this intersection to left in/left out. This is also consistent with the Safe System Transformation for the state highway corridor between Templeton and Selwyn River that is proposing median barriers as part of the Road to Zero safety strategy. With the proposed Dunns Crossing Road roundabout, a U-turn facility would be provided for local resident wishing to travel north to Christchurch.

Rolleston Connectivity (Flyover)

The Rolleston Flyover addresses the safety and reliability problems associated with the state highway traffic signals in a high-speed environment and the rail risks due to the signals short stacking space to the rail level crossing and provides three major benefits:

- 1. Connectivity** – it will help bring the town together by providing a direct link for all modes of travel between the Rolleston residential area and all parts of the industrial area on the northern side of the state highway and rail corridor, providing social, commercial and employment opportunities.
- 2. Safety** – it resolves a major safety issue at the Hoskyns Road rail level crossing and removes the current state highway traffic signals to create a corridor that is more in keeping with the Christchurch Southern Motorway environment.
- 3. Supports future growth** – continued growth in Rolleston will soon see delays at the Rolleston Drive North and Hoskyns Road traffic signals reach unmanageable levels. This will lead to increased safety risks and people re-routing via less desirable streets and makes it more difficult for further development on the industrial side of Rolleston to occur.



Why are we not proposing the skewed flyover?

Significant effort was put into further developing and refining the skewed flyover option.

An 'optimised version' was identified that saw the inclusion of a left-out from Hoskyns Road and a slip lane from SH1 southbound to Kidman Street. However, even with these refinements, a fundamental issue would remain – the severing of Jones Road which would have a significant impact to the accessibility of existing businesses within the Industrial Area. This was a key matter of concern raised during the first round of public consultation, which meant that whilst the overarching flyover concept had strong community support, the alignment itself did not. Furthermore, the size, scale and complexity of constructing the very long bridge spans questioned the buildability and carbon sustainability of the option.

This meant that we needed to take a step back, look at alternative flyover alignments and to challenge previous decisions that had previously resulted in options being rejected (e.g. the gradient of the bridge approaches). A robust multi-criteria assessment process, along with concept design and transport modelling for over 25 different options was undertaken with input from a variety of independent subject matter experts. Both at-grade and grade-separated options were explored and a short list of 7 options were then challenged by senior members from Waka Kotahi and council, with more detail added into concept designs alongside cost estimates. As a final check, we retested the new preferred (straight) option the community and stakeholders such as emergency services. The response we received was more positive than for the original 'skewed' alignment. This has provided us with the confirmation that we're doing the right thing.

Having listened to community feedback, undertaken further transport analysis and compared a wide range of possible options against a range of factors, a straight flyover alignment has emerged as the best option for the Rolleston connection across SH1 and the rail corridor.

We acknowledge that the 'straight flyover' does not have 100% support. Indeed, none of the options would have. This is largely because of the nature of the environment, which is constrained by existing properties and a railway line, meaning that some compromises would always be needed. In the case of the 'straight flyover', we will have a slightly steeper (but not uncommon) gradient and require property from adjacent land owners. This is why an evidence-based approach (informed by traffic modelling, concept design and MCA) was so important to ensuring the best possible recommendation against all factors.

Access into the town centre and commercial properties along SH1

Current access arrangements to the town centre and highway amenities off SH1 present a safety risk, with a confusing road configuration where SH1 (southbound) effectively splits into three lanes with two separate service accesses to McDonalds and BP. This means that vehicles need to diverge quickly across two lanes. Furthermore, the right turn access to and from Brookside Road and Tennyson Street pose significant safety risks that will worsen with continued traffic growth.

The removal of signals at Rolleston Drive North and Hoskyns Road (required for safety reasons) will essentially create an extension of the CSM2. Without mitigation this could create two new safety issues because of (a) higher traffic speed; and (b) fewer safe gaps in the traffic (the current signals help create 'platoons' of traffic).

The recommended option is to extend two lanes from the CSM that then reduces to one lane after the off-ramp to Rolleston Drive North. The central median will be extended through Rolleston to just south of Brookside Road making all accesses left in left out. A service lane will extend from the offramp to provide left-in access to McDonalds, BP and Tennyson Street. Tennyson Street will retain left out access onto the main state highway lane. Brookside Road and the Z Service Station will continue to have left in, left out access from the main state highway lane. The existing 80km/hr speed limit through Rolleston would be retained.

Essentially this will formalise what already exists in terms of commercial access, plus adding a new central median to address the critical right turn safety risks. Larger scale options were considered with additional barriers, but upon review of the risks, costs and likely benefits the recommended option gives a good return on the investment.

Rail corridor improvements

Rolleston is at the junction of the Midland rail line serving the West Coast, including coal and milk products, and the Main South Line. The Main South Line is part of the South Island's Main Trunk rail line (running north and south), connecting key economic hubs in the South Island for freight import and export. The Rolleston includes two inland ports that connect with Lyttelton Port and PrimePort Timaru. The efficiency of rail movement is critical to the national economy, and there are about 40 rail movements a day north of Rolleston. However, the movement of freight is being constrained by the facts that there is:

- No direct connection between the Main South Line (to the south) and Midland line and adjacent Inland Port
- No direct connection to the Lyttelton Port Company (LPC) Inland Port and siding from the south.
- Inefficient rail operations resulting in additional level crossing closures and long shunting movements to the Middleton rail yard in Christchurch.
- Shunting operations require personnel to be physically present on the ground creating a potential unsafe working environment.

Various options were considered for improvement, starting from completing the third leg of the "triangle". The investigations found that signaling costs and lack of full connectivity to all siding locations detracted from this option. The preferred rail option is to create a new third rail yard track and run around area for trains to turn around to head south. This will be located just to the north-east of the current LPC siding and therefore provides turning opportunity for trains from the Midland Line and all sidings within the Rolleston station environ. A key benefit of this option is that it enables southbound 'run around' within Rolleston rather than having to travel to Middleton (15km away). It also removes the need for a third track over Hoskyns Road and improves the operational safety for personnel maneuvering trains.

Value engineering and design refinements

In anticipation of ongoing cost and funding pressures, each of the interventions were reviewed to ensure appropriate value for money is delivered. A value engineering exercise was undertaken (led by an independent external party) to explore whether there were any opportunities to scale back the project scope without significantly impacting the desired outcomes.

Separately the preferred programme and designs were refined in response to public feedback. Key changes to the preferred programme, when compared to what was presented during the 2022 consultation, were:

- Local road improvements near to the Rolleston Primary School
- Cycling underpass at the Dunns Crossing Road / Walkers Road roundabout
- Merge extension from the Weedons Ross Road interchange through to the service lane (SH1 southbound)
- Refinement of the service lane design, to extend through to Tennyson Street, rather than Brookside Road. This avoids a large amount of property acquisition, without notably affecting the scale of safety benefits that would be gained.

Programme Assessment

Achieving the KPIs

Several Key Performance Indicators (KPI) have been developed to assess the recommended programme. The extent to which these KPIs will be delivered as summarised below.

Benefit	Key Performance Indicator		
	KPI	Baseline (Do Min)	Forecast (Preferred Programme)
Work towards zero injuries and deaths	Crashes and DSIs	<ul style="list-style-type: none"> 70 crashes per year on SH1 and 6 DSIs per year on SH1 (2038) 	<ul style="list-style-type: none"> 75% reduction in crashes on SH1 and 40% reduction in DSIs
	Collective and Personal Risk on SH1	3 high risk, 1 medium, 1 low medium risk intersections	<ul style="list-style-type: none"> Collective risk reduced to Medium or lower. Personal risk reduction at intersections of >50%
	Reduced road/rail incidents	26 incidents at Hoskyns Road level crossing, including 11 collisions, and a temporary train speed.	The number of near misses is expected to drop close to zero at the Hoskyns Level Crossing. At other level crossings, no significant change in traffic volume is expected.
Support a more connected community	Rolleston town centre to/from the RIZ	9 / 15 minutes (AM/PM peaks)	6 / 6 minutes (AM/PM peaks)
	Social connectedness population within 15-45 minutes travel time by different modes to employment opportunities in iZone	Forecast travel times of 10-13 minutes in the peak direction between Rolleston Drive North and Jones Road in 2038	5-10-minute reduction in the travel by vehicle from Rolleston Drive North to Jones Road in the peak direction by 2038.
	More people walking and cycling between Rolleston Town Centre and the RIZ	Unpleasant environment for pedestrians and cyclists crossing SH1	Nicer and more direct connection will attract more people, with up to 100 users by 2038.
Provide a more resilient and sustainable network	Burnham to/from industrial area	7 / 14 minutes (AM/PM peaks)	6 / 7 minutes (AM/PM peaks)
	North of Weedons Road interchange to/from industrial area (to represent travel times between Christchurch and Rolleston)	15 / 19 minutes (AM/PM peaks)	13 / 12 minutes (AM/PM peaks)
	Train speeds on the Main South Line through Hoskyns Road level crossing	Temporary rail speed of 40kph on Main South Line	Restore rail speed to 80kph on Main South Line, saving 2 minutes per train
	Train movement time between the Midland Line and the Main South Line to the South of Rolleston.	Trains need to run to Middleton yard	Trains turn at Rolleston, saving 15km in each direction.
	Rail shunting time	2km shunt at 6kph backwards, 3x day, 5 days per week	2km shunt at 15kph
	Resilience to unplanned events (crash related road closures)	70 crashes per year on SH1 (2038)	<ul style="list-style-type: none"> 75% reduction in crashes
	Flexible – the ability to adapt to future changes in the form of the State Highway corridor	No future proofing	<ul style="list-style-type: none"> Improvements support any four laning of the SH1 corridor. Supports future Park and Ride off Jones Road.

Traffic network performance and effects

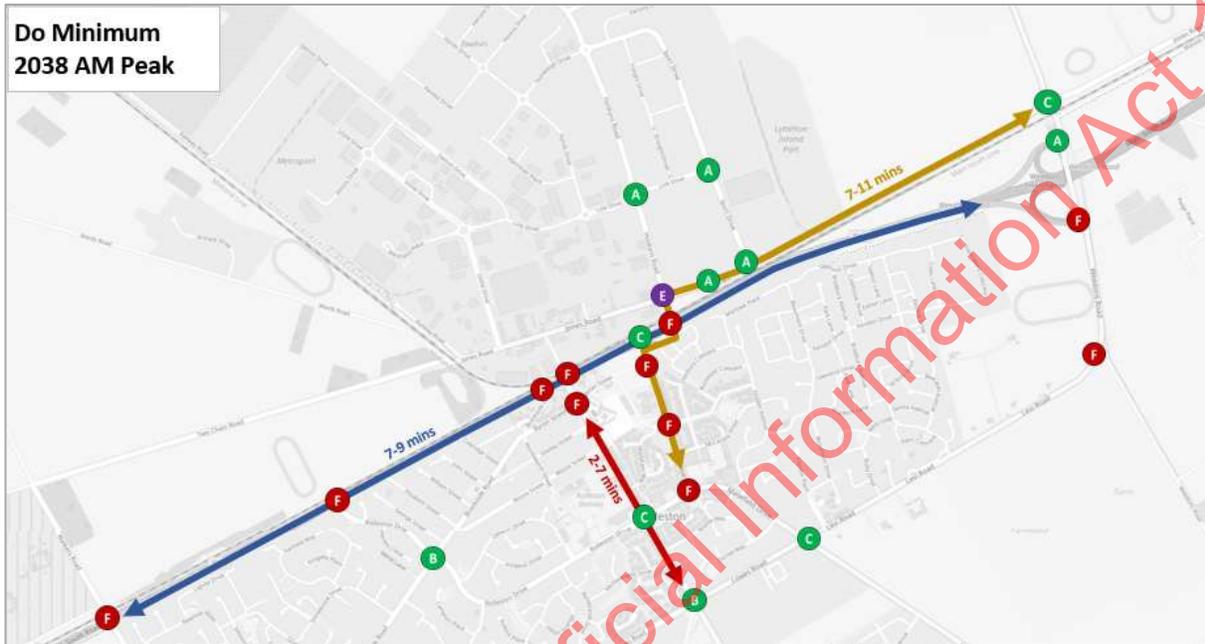
An assessment of the programme was undertaken using the project microsimulation traffic model. The broad outcomes of the traffic modelling assessment can be summarised as:

- Without substantial investment, the transport network is expected to deteriorate over time with significant levels of delays, congestion, and queueing anticipated beyond 2028.
- The programme will mitigate this deterioration and allow the network to continue to operate at a similar level of performance over the next 20-years despite the anticipated high traffic growth.
- With the NZUP improvements in place, significant changes in traffic volumes are limited to the immediate area around the northern end of the Flyover; a large increase in traffic flow on Jones Road between the Flyover and Hoskyns Road is expected, while there will be some reduction towards the Weedons

interchange with the inclusion of the on ramp from Hoskyns Road and the offramp to Rolleston Drive North.

- Other traffic volume changes are focused on the main arterial or collector road network within Rolleston, namely Dunns Crossing Road, Walkers Road, Two Chain Road and Levi/Lowes Road. Selwyn District Council (SDC) are planning for ongoing growth and have road improvements planned on most of these corridors.
- Waka Kotahi have engaged closely with the West Rolleston Primary School on Dunns Crossing Road and SDC so that there will be appropriate safety treatments in place along the corridor.

The following diagrams show how intersection level of service and travel times are expected to improve as a result of the proposed improvements.



Do Minimum – 2038 AM Peak



2: Straight flyover (preferred option) – 2038 AM Peak

Supporting a reduction in Vehicle Kilometres Travelled (VKT)

The Rolleston Transport Improvements project supports this climate goal in the following ways:

- **Better connectivity = better opportunities for Rolleston to become self-sustaining.** There is a huge dependency on car use within Rolleston because the vast majority of people need to travel into Christchurch for employment opportunities. Providing better connectivity between the northern and southern sides of Rolleston helps enable development within the RIZ, which will be a significant local employment generator. The more local employment, the lower the VKT as commuter journey distances are significantly reduced. Moreover, with a strong active travel network, many people working with Rolleston will choose to leave their car at home.
- **Walking and cycling improvements** are part of the solution, with new safe connections being provided across SH1 with the flyover and underpass at Dunns Crossing Road. Once implemented, there is opportunity for growth in usage that will increase further as Selwyn District expand their share path network. For this assessment we assumed around 100 new cyclists per day to use the flyover.
- **Public transport** is being supported with improved bus stops at Kidman Street and a network that delivers more reliable journey times and connectivity to the RIZ, which is part of the route for most of the bus trips in Rolleston. The flyover also presents an opportunity for a quick connection to any future Park and Ride expansion at Kidman Street or on the Northern side at Jones Road (that also allows for rail connectivity).

The project is an enabler of land use change which will reduce the need for travel into Christchurch. Whilst short-term VKT reductions may be negligible, the long-term potential is significant.

Cost estimates

The programme cost estimates are summarised below.

s 9(2)(g)(i)

Economics

The economic evaluation has been carried out in accordance with the full procedures of the Monetised Benefits and Costs Manual v1.5 2023 (MBCM).

The economic benefit streams include travel time, vehicle operating costs (VOC), resilience, safety and active modes. The microsimulation model developed for this project was the tool used to derive the travel time and VOC benefits, plus acted as an input into the safety benefit calculations.

Table 35 provides the economic results.

2. Benefit-Cost Ratio

	Benefit (40 Year NPV)						Cost (40 year NPV)	BCR
	Active modes	Safety	Travel time	Vehicle Operating Costs	Rail	Total Benefit		
Latest MBCM	s 9(2)(g)(i)							3.6

Investment Prioritisation

The Recommended Option has been assessed as having a 'Very High' GPS alignment, a 'High' scheduling factor, and 'Medium' efficiency rating (based on the application of the 2023 MBCM).

This gives the project a **Priority of 1.**

Funding gap

To respond to the critical problems and deliver expected outcomes, there is still a **funding gap of at least \$9(2)(g) that needs to be explored across the whole of the NZUP Canterbury Package.**

To address the funding gap there are several options that will need to be explored, including:

- Requesting additional NZUP funding
- Co-investment with Road to Zero (SIP) funding for:
 - Dunns Crossing Road / Walkers Road roundabout.
 - Wire rope barrier between Dunns Crossing Road and Rolleston Drive South.
 - Rolleston Drive South Left-in / Left-out.
- Co-investment with SDC for the Dunns Crossing Road cyclist underpass.
- Co-investment with KiwiRail for the rail improvements.

The other funding sources that could be explored are a top up from the National Land Transport Fund (NLTF), from Transport Options (shared path components) or CERF (walking/cycling components).

These discussions would need to be initiated as soon as possible but it is understood that funding availability is equally constrained and further clarity may not be possible until the 2024 financial year.

Next Steps

The overall recommendation of the DBC is to progress the project through to pre-implementation. The Waka Kotahi board will confirm both the funding and scope for this next phase of the project

This business case has several next steps that will be required to ensure successful funding and implementation. These are outlined below.

Business Case Approval

- Waka Kotahi to undertake the formal Internal Quality Assurance (IQA) assessment required by Waka Kotahi funding and prioritisation processes to confirm funding commitment.
- Finalise Waka Kotahi endorsement of the DBC via Value, Outcomes and Scope (VOS) Committee, the Investment and Delivery (I&D) Committee and Waka Kotahi Board.
- Seek endorsement of the committed activities within Rolleston through the NZUP Governance Group.
- Confirmation of funding allocation.
- Discussions with SIP regarding funding sources and timing of interventions.

Engagement

- Public engagement to inform outcome of DBC.
- Continue engagement and communication with affected landowners, identified through the preliminary land requirement plans.
- Undertake engagement with the Selwyn District council throughout the detailed design process and prior to implementation.
- Undertake targeted engagement with KiwiRail and the Rolleston Prison.
- Undertake engagement with the wider community and stakeholders prior to implementation.

Procurement

- Further refinement of the procurement approach/model to enable the procurement of detailed design and construction contractors.
- Preparation of the necessary tender documents prior to engaging with the supplier market for professional design services.
- Engagement with the supplier market for professional services to undertake detailed design.
- Following statutory approval for consents and land requirements, appointment of a construction supplier.

Governance

- Establish a dedicated governance and project management team to provide oversight and other responsibilities including scope management, risk, procurement, finances, and quality assurance.

Property acquisition

- Property Acquisition Strategy approved.
- Property Team engage with all Owners.

- Commencement property acquisition.

Technical investigations ahead of detailed design

- Undertake geotechnical investigations.
- Potholing for existing utilities and engagement with utilities suppliers.
- Urban design framework.
- Road Safety Audit addendum completed for service lane/merge alteration and underpass at the Dunns Crossing Road / Walkers Road roundabout.

Level crossings

- Ahead of detailed design
 - Discussions with Kiwirail/Waka Kotahi about the acceptability of retaining the crossings at Hoskyns Road and Weedons Ross Road, as proposed given the recommendations in the LCSIA report.
 - Discussions with SDC/Kiwirail in regard to responsibility for any small scale changes at Two Chain Road/Jones Road crossing.
- During detailed design
 - Design refinements to the Walkers Road crossing
- During implementation
 - Vegetation clearance
 - Construction monitoring / safety reviews
- Confirmation that the residual risks at Hoskyns Road and Weedons Ross Road level crossing are as low as reasonably possible for Kiwirail.

Detailed design

- Preparation of Consenting documentation.
- Lodge and gain resource consents.
- Prepare Implementation tender documentation.
- Supporting local road improvements will need to be investigated through SDC.

PROJECT OVERVIEW

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1 INTRODUCTION

1.1 Overview

The urgent need for investment in the Rolleston transport network has been recognised through the NZUP, with \$125m of funding approved as part of the 'Canterbury package'⁴. Investment is targeted for interventions that improve safety, connect communities, enable better movement of rail freight and future-proofs for growth.

The following interventions earmarked for Rolleston were:

- A **new multi-modal flyover** that will connect the residential and industrial areas of Rolleston. The flyover will also provide improved facilities for walking and cycling.
- **Safety improvements to six intersections** along SH1 through Rolleston, with a range of improvements to reduce deaths and serious injuries and better manage the forecast future growth in traffic volumes.
- An **upgrade of the rail corridor** to improve the efficiency of freight movement.
- A new **service lane** alongside SH1 that will provide safe access to important businesses.

Purpose of the Detailed Business Case

This business case demonstrates the need to invest in the Rolleston transport network. It reconfirms the need for each intervention, explores the alternatives, takes on board stakeholder and public feedback and presents an evidenced based 'refined preferred option'.

The NZUP announcement has provided assurance to the local community that investment is going to be made and changes to specific locations along the state highway will occur. But whilst somewider funding has been allocated, the **DBC still needs to ensure that the right things are being proposed and at the right price.**

This means that this DBC has had to follow a slightly different path to establishing a preferred programme of interventions. A typical process would see a long list taken through and refined down to a preferred option. However, for this project the starting point was the defined, and publically announced, NZUP Canterbury scope. The process was therefore to test/optimize the proposals, consult on them, refine as necessary and then consult again. The outcome is a preferred option that is technically the best thing to do, presents value for money and has wide reaching buy-in from stakeholders. The journey taken to get there was just a little different because the project already had some allocated funding.

1.2 The need to invest in Rolleston's transport network

Rolleston is growing at an unprecedented rate which, given the large number of current Plan Change requests for the area⁵, shows no signs of slowing down.

Over the last ten years the population of the Selwyn District has grown by an average of 5.2% per annum, placing it ahead of the Queenstown-Lakes district on 4.5% and making it New Zealand's fastest growing region. People and businesses are being drawn to the district by the affordability of property and good road transport connections – most notably the recently opened Christchurch Southern Motorway Stage Two (CSM2). SDC's (SDC) latest projections are for the population in Rolleston to more than double in the next 20-25 years, going from 16,000 residents in 2018 to 39,000 in 2043. **The population is currently 28,000 people⁶.**

Population growth in Rolleston is outpacing the level of investment in the local transport network. **This means that safety, connectivity and liveability issues that are already being experienced will worsen.**

As demonstrated later within the Strategic Case, without investment we are likely to see:

- More deaths and serious injuries (DSIs) along State Highway 1 (SH1) through Rolleston. There is a high risk of DSIs occurring at:
 - The Hoskyns Road rail level crossing.
 - SH1 intersections at Rolleston Drive North, Tennyson Street, Brookside Road and Rolleston Drive South.
 - SH1 / Dunns Crossing Road / Walkers Road intersection.
- Increased severance and disconnect between the two sides of Rolleston.
- Restricted growth potential of Selwyn district in the longer term.

Investing in roads, rail, walking and cycling will mean people can travel through and around Rolleston more safely. Travel times will be more reliable and having more travel choice will benefit the community, the environment and help to grow the economy. Improving the connection between town and industrial areas will make it easier to shop and support local businesses.

⁴ www.nzta.govt.nz/planning-and-investment/nz-upgrade/canterbury-package/

⁵ www.selwyn.govt.nz/property-and-building/planning/strategies-and-plans/selwyn-district-plan/plan-changes

⁶ <https://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7981#>

1.3 Project history

The growth of Rolleston and the need for accompanying transport improvements have been signaled since early strategic studies in 2000 and the Christchurch Rolleston and Environs Transportation (CRETS) in 2007. This identified the need to extend the CSM2 and improve connections between satellite towns of Rolleston, Lincoln and Prebbleton, and between Christchurch and Rolleston via SH1.

These early investigations showed a multi-modal flyover would improve connections between the residential and industrial sides of Rolleston, improve safety – reduce the number of people being killed and seriously injured in crashes, as well as provide a more resilient and sustainable road and rail network.

As part of its Long-Term Plan (LTP) 2015/2025, SDC signaled major transport projects planned as part of CSM2 and the need to connect Rolleston Township areas across SH1 and Main Railway Lines. Draft consultation with the public included a skewed⁷ flyover alignment.

Building on the adoption of CRETS, in 2015, transport partners led by Waka Kotahi developed the original Programme Business Case (PBC) for Rolleston Transport Improvements. This centered around what changes would be required to facilitate the growth of the Rolleston Industrial Area (RIA), whilst ensuring safe, efficient and effective transport access outcomes.

The PBC confirmed the ‘case for change’, developed a list of alternatives and identified a recommended programme for investment. This recommendation then informed the scope for NZUP investment.

1.4 How do we want Rolleston to look and feel?

This is a key question that has strong links to our desired project outcomes.

We are not just trying to address the problems we have now, but we’re thinking more broadly and about the future generations who will call Rolleston “home”. Essentially – how can this project support the wider vision for Rolleston as a self-sustaining and liveable community.

Over the last decade, the pace of residential development in Rolleston has far exceeded that of supporting employment opportunities or local amenities. This means that most people who live in Rolleston work in Christchurch, and then at the weekend, a large proportion of people again travel to Christchurch for shopping or recreational reasons. This, coupled with the low-density nature of much of the development, has resulted in a car dominated town.

The Rolleston Town Centre development is a key step in helping to localise far more trips and create a more vibrant community. But Council recognises that more commercial and employment land will be required to support a growing population.

Given the level of in-fill development, the question is “where can this new development go?”. Without utilising space on the northern side of SH1, which is geographically very close to the Town Centre, the only alternative greenfield areas would be on the outskirts of the current residential areas. If opportunity is not taken now to better connect both sides of Rolleston, it could become a town that ends up with a series of sporadic small commercial areas and never achieves a strong feeling of community.

The flyover not only addresses a major safety issue (the Hoskyns Road level crossing) but will physically help ‘pull the town together’ so that the commercial centre of Rolleston itself can grow.



⁷ Skewed alignment - connecting between Rolleston Drive North and a roundabout, to the east of the Hoskyns Road/Jones Road traffic signals, which is futureproofed for the development of a ‘Bulk Retail Area’.

1.5 Building on from previous work

A substantial amount of work had been completed prior to the start of the DBC, including business cases and other investigations. This work has allowed us to establish a clear picture of the drivers for change, some of the potential options and the key design constraints/risks. The future proposals for the IPort large format retail area have been considered as options for the Flyover have been assessed.

This DBC is bringing to affect the PBC's recommendations for improvements to the state highway. Identified improvements for the local roads, such as the local road upgrade of Two Chain Road, will be captured as part of a separate piece of work. This is because necessary improvements on the local road network are inherently linked to what improvements are made on the state highway – especially if some improvements result in a redistribution of traffic. Notwithstanding, this DBC outlines a recommended programme of local road improvements along with a staging plan.

Alignment with the PBC

In terms of the wider alignment between the PBC and DBC:

- The PBC's strategic case was used as a starting point. A refresh was undertaken as part of the DBC in order to ensure that it captured the latest evidence (for example - crash statistics).
- There is a strong alignment between the Investment Logic Maps (ILM) of the PBC and DBC. The essence of the problems remains unchanged. Similarly, the identified benefits of investment are largely consistent. *Refer to Section 5 of this DBC.*
- The long-list of alternatives (for specific interventions such as the flyover) identified in the PBC has been captured as part of the DBC.

■

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2 ENGAGEMENT

2.1 The engagement story

Extensive engagement was central to this business case, which has attracted significant interest from a wide range of stakeholders and the local community. Several of the interventions, most notably the flyover and service lane had been earmarked by council for a number of years – as far back as 2007 when CRETS was produced. This means several parties have had set expectations around the type of infrastructure that was going to be delivered, especially given funding had been earmarked through the NZUP.

It was therefore important to ensure that messaging around the purpose of the DBC was clear. Essentially - whilst the DBC would help enable the delivery of the NZUP scope, the details of each intervention were still to be worked through – and therefore some changes to what was presented in the PBC were possible⁸.

To this end, initial engagement with the public took place at an early stage (July and August 2021) to provide opportunity for feedback on those PBC proposals. Engagement with project partners and key stakeholders was then undertaken, along with several technical assessments, to understand the relative benefits, and feasibility, of alternatives options. The strong message from the community was that ‘changes to the original proposals were needed’, and this was backed up by robust and tangible evidence.

This is why a second round of community engagement (June and July 2022) was undertaken⁹. The team had listened to feedback, gone away and thoroughly investigated alternatives, and then come back with a refined solution that had buy-in from technical specialists and senior management of all project partners. Prior to this second round of community engagement, one-on-one engagement with immediately affected parties and key stakeholders (such as ECan (the bus operator) and emergency services) had already been undertaken.

The refined plan generally received far more support than the original (PBC) proposal. Some key concerns were still expressed – most notably in relation to the safety impacts of additional traffic past schools and the implications to travel times. This feedback was taken on board, and additional detail was added into the DBC in order to clearly articulate the scale of those issues. Where necessary, measures to address potentially negative effects on the local road network have been included as part of the final recommended programme of works. The project team continue to engage directly with key parties that still expressed concern around any aspect of the proposal.

Engagement with local authorities, hapū, developers, residents, schools, Spokes Cycle advocacy group and the wider community was undertaken at strategic points during the development of this DBC.

Section 24 shows how stakeholder viewpoints were responded to, and how they directly influenced the options assessment and design process.

2.2 Key Stakeholders

Table 3 provides a summary of the investment partners, Treaty Partners and key stakeholders who have a vested interest in the outcomes of this business case.

3 Project partners

Organisation	Role
Investment Partners	
Waka Kotahi	Waka Kotahi is the road controlling authority for the state highway network, is a funder of land transport activities and provides access to and regulation of land transport
Selwyn District Council (SDC)	SDC is the local road controlling authority responsible for fully managing the local transport network. Alongside Waka Kotahi, SDC is a project partner. SDC has provided key input into the optioneering and design to date and holds a Memorandum of Understanding (MoU) with Waka Kotahi to address the State Highway corridor downstream of CSM2.
KiwiRail	KiwiRail is the rail authority and plays a critical role in New Zealand’s freight and supply chain industries. Trains carry bulk goods to/from the inland ports and Lyttleton Port. KiwiRail is a significant landowner, owning the rail corridors parallel to SH1 Main South Road and Railway Road. KiwiRail is also an NZUP partner who will inherit the improvement to the rail line.
Ngai Tahu/Te Taumutu Rūnanga	Iwi have a role as Treaty partners and are identified by statute for collaboration. Refer to Section 2.5 for how iwi have been engaged as part of the project.

⁸ www.nzta.govt.nz/assets/projects/sh1-rolleston/SH1-Rolleston-flyover-community-engagement-feedback-form.pdf

⁹ <https://createsend.com/t/t-D7D6E1AF52EBD83A2540EF23F30FEDED>

Organisation	Role
Partners	
Environment Canterbury (ECan)	In the context of this corridor, ECan is responsible for transport planning and public transport in the region. They are also the overarching consenting authority for the region's water, soil, and air. ECan is a member of the Greater Christchurch Partnership, together with Christchurch City Council and Waimakariri District Council
Key Stakeholders	
Lyttleton Port Company (Midland Port)	Lyttleton Port Company owns Midland Port in the iZone. The site is adjacent to the main south rail line that connects to City Depot and the Container Terminal, meaning that containers can be moved in bulk between Rolleston and Lyttelton. Midland Port is positioned to offer freight connectivity by road and rail throughout the South Island.
Port of Tauranga (MetroPort)	Port of Tauranga developed MetroPort Christchurch, an intermodal freight hub at the iZone industrial park. It receives, packs and distributes containerised cargo and acts as an empty container depot. MetroPort connects to PrimePort Timaru.
Other	Other key stakeholders who would have a high level of interest in the project include: <ul style="list-style-type: none"> • Christchurch City Council • Canterbury Regional Transport Committee • Emergency services - NZ Police, Fire and Emergency Services and St John • SDC Rolleston Road Safety Stakeholders Group • Rolleston Prison (Corrections) • Developers, including the Carter Group (who are proposing several significant commercial and residential developments in Rolleston) • Ministry of Education, West Rolleston Primary School • Local schools, especially West Rolleston Primary School • Freight businesses and Associations, NZ Trucking • NZDF Burnham Military Camp • Rolleston Residents Association • Spokes cycling advocacy group (Canterbury) • AA Rolleston District • Mobility impairment advocacy groups • Jones Road businesses

Stakeholders are being updated at various stages throughout development of the DBC via emails, newsletters and detail on the Waka Kotahi website. This includes communications with the technical advisory group that was involved during the PBC stage.

2.3 Stakeholder engagement plan

A **Stakeholder Engagement Plan** has been developed for this project (see **Appendix A**), which outlines the purpose and objectives of engagement, the engagement methods and programme. The plan also defines the roles and responsibilities of key stakeholders.

Key messages were developed for the project to support engagement with stakeholders and the community, according to the following themes:

- The Rolleston Transport Improvements project is an exciting and unique opportunity for Selwyn District to develop the connection to between Rolleston Township and the business and industrial zone.
- The project is being funded through The New Zealand Upgrade Programme which is investing \$6.8 billion to save lives, get our cities moving and boost productivity in the country's growth areas.
- The NZUP offers the opportunity to not only build key transport infrastructure for New Zealand, but to drive innovation through its delivery.
- The project will improve the connection between the industrial and residential areas of Rolleston, address safety risks and improve rail efficiency.
- The project is being led by Waka Kotahi NZ Transport Agency with support from SDC and partnership with Ngai Tahu/Te Taumutu Rūnanga, and Kiwi Rail.
- The project is funded through the NZUP crown fund.

2.4 DBC engagement

2.4.1 Community engagement No. 1 – July and August 2021

The first public engagement session undertaken during the DBC phase took place during July and August 2021. During this period engagement took place with residents, interest groups, local business groups, business owners and commercial property owners.

Refer to **Section 24** to see how feedback from both community engagement sessions have helped to shape the DBC.

To ensure that our engagement process was robust and provided everyone the opportunity to participate, Waka Kotahi did the following:

- Sought feedback on the proposed concept plan from SDC.
- Promoted the community information sessions through multiple channels, including community e-newsletters, Waka Kotahi website, including distribution of project brochures and through paid advertising in local print and social media.
- Conducted two letterbox drops to residents adjacent to proposals planned.
- Worked with SDC to make brochures available at the council's customer service centre and at libraries.
- Held five community drop-in sessions.
- Held one session for the Rolleston resident's association.
- Held one session for the Rolleston rotary group.
- Used a series of display maps at each of the community sessions with information to explain the project.
- Provided relevant information on the project website as well as through the SDC site.
- Asked for feedback through printed materials including a questionnaire, an online questionnaire and interactive map (Social Pinpoint), email and verbally at the various face to face events.

The engagement report is provided as **Appendix B**.

2.4.2 Community Engagement No. 2 – June and July 2022

The feedback from the first community engagement session sent a clear message that alternative flyover alignments needed to be further explored and tested. This was important to deliver assurance to the community that the right option was being progressed.

This meant that the project team needed to take a step back, look at alternative flyover alignments and to challenge previous decisions that had previously 'flawed' options. A robust multi-criteria assessment process, design, modelling for over 25 different options was undertaken with input from a variety of independent subject matter experts. Both at-grade and grade-separated options were explored and a short list of seven options were then challenged by senior members from Waka Kotahi and the Council, with more detail added into concept designs alongside cost estimates.

The emerging preferred option following this process saw several significant changes to the one presented during the first round of engagement. This included improving access to and from State Highway 1, retaining east-west connectivity on Jones Road and reducing pressure on the existing Weedons Ross Road interchange. But that most notable change was a revised alignment of the flyover – straight, rather than skewed.

This second round of community engagement was a check-in to gauge opinion on the revised plan and to provide another opportunity to ensure nothing important had been missed. Engagement took the form of four open days, 20+ meetings with stakeholders, a letter drop and an online survey. In total, over 700 separate pieces of feedback were received and analysed.

The engagement report is provided as **Appendix C**.



2.5 Iwi engagement

Waka Kotahi partners with Iwi regionally through their relationship with Mahaanui Kurataiao and directly with Te Taumutu Rūnanga via a Cultural Advisory Group (CAG). This relationship is managed by the Project Director with support from the Regional Maori Advisor and the Waka Kotahi project team, with regular monthly meetings held.

The CAG is supportive of the project outcomes and proposals and leading the development of how the flyover will fit within the Manu whenua.

Cultural narrative

The main cultural narrative opportunity on this project is with the flyover structure, which could be used to enforce the cultural narrative that Iwi and SDC are seeking to bring through as part of the Rolleston Town Centre upgrade. The cultural narrative developed to date is built around three pillars:

- Direction of the structure
 - Ki uta ki tai – from the mountains to the sea - east to west.
 - Waikirikiri/Selwyn River.
 - Linkage to the new town centre and Te Ara Ātea (Rolleston Library).
- Our travels
 - SDC Te Arātia - connection to the trails and plains.
- Relationship between Taumutu and Ngāi Tūāhuriri.
 - Ancestors that connect us together.
 - One side of the structure might represent Tane Tiki.
 - Te Rakitāmau is Taumutu connection to the interland and trails.
 - Rich tapestry of relationship from Moki from Tūāhuriri and Te Rakitāmau.
 - Concept of kākahu (cloak) and represent wahine elements.

The flyover can help represent protection for the community as well as a welcome for travellers. A potential name is “tai o mihi”, which translates to “tides of welcome”.

Regular meetings will continue as the project heads into the pre-implementation phase as the cultural narrative will drive guide the Urban Design Framework for the project.

2.6 Safer Speed Review

As part of the initial engagement in 2021, the community were asked about the current SH1 speed limits from Hoskyns Road right through to Dunsandel. Questions were asked around whether speeds felt safe and right for the road, if they had experienced near misses or found it hard turning on or off the highway.

Following a review of the feedback, alongside technical safety assessments, Waka Kotahi determined that the current speed limits along SH1 can remain for the time being, while planning for infrastructure upgrades was underway. This DBC includes a recommendation for the speed limit through the study area.

The engagement material is presented as Figure 3.



3 Consultation on SH1 speeds

PART A: STRATEGIC CASE



Released under the Official Information Act 1982

3 TRANSPORT AND LAND USE

This section provides an overview of the transport and land use environment for Rolleston. This is important context that has helped steer the DBC process, because providing safe and efficient access is at the core of what the NZUP investment is about. This means we need to have clarity around:

- Where are the main places for which we need to improve connectivity?
- How can we create a better sense of community?
- What are the primary routes for each mode of transport, and can we support the desired transport system?
- How can improvements to rail support the desired NZUP outcomes?

3.1 Context

For almost ten years running, Selwyn has been one of New Zealand’s fastest growing regions and Rolleston continues to accommodate the majority of this growth. New residential subdivisions continue to be built, and to keep pace SDC are making considerable strides to help deliver community facilities that makes the town a more sustainable and liveable place.

Along with a revitalised Town Centre (described below), new medical centres, child day-care, cafes, shops and schools have been built recently to support Rolleston’s population spike. As a reference - in 2012, there was one primary school; now there are seven schools - including a high school that opened in 2016. A map of Rolleston is provided as Figure 4, which highlights the location of schools and commercial centre.



4 Map of Rolleston¹⁰

However, the car dominates as the preferred transport mode of choice – especially for journeys to work. The main reason is because almost 80% of the employed population works outside of Rolleston (mostly in Christchurch) and the car is currently the most appealing option (used for almost 95% of commutes). Whilst Rolleston seeks to become a more self-sustaining community (i.e. where most people live and work in the same town), it is likely that for the foreseeable future most people will continue to commute to Christchurch. Ultimately a lot of people are attracted to move to Rolleston because the town offers affordable modern houses, with typically larger than average plot sizes. This by nature creates a place with a low density of housing, spread across a wide area which, in turn, results in greater car dependency. So, whilst this project, alongside a suite of planned local roading improvements, seeks to help support sustainable travel choices (such as bike and bus), travel by car will be needed for many journeys.

However, this project is not about adding capacity to the road network.

It is about helping to make those longer commutes safer and more reliable, and to provide those who live and work in Rolleston more appealing walking and cycling choices. The project also seeks to support longer term mode shift from car to public transport.

¹⁰ OpenStreetMap

The DBC is seeking to help change the way people travel and improve connectivity. It is specifically targeting:

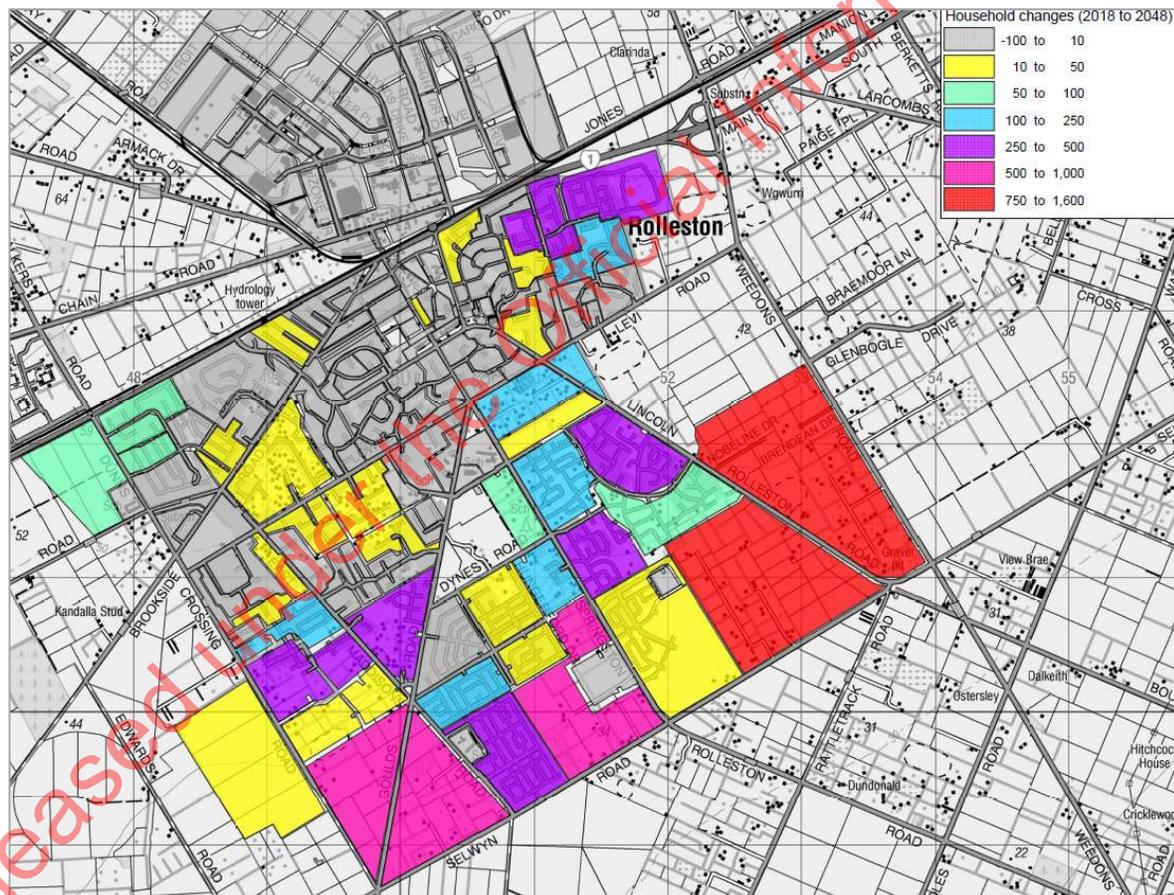
- **Work trips between the residential areas and the industrial zone** which are separated by the railway line. Of those working in the industrial zone, 40% live in Rolleston but still over 96% of journeys are by car.
- **Trips to the town centre** – encouraging journeys by walking and cycling and reducing the amount of ‘through traffic’. This will improve the liveability, safety and vibrancy of the area.
- **Trips to places of recreation and schools.** This will not be directly addressed as part of this DBC, which is focusing on improvements to the State Highway. However, this will be captured as part of a separate ‘Rolleston local roads’ DBC (led by SDC) which will focus on progressing those local road interventions identified within the overarching PBC.

3.2 Travelling between home and work

3.2.1 Growing residential population

The expansion of Rolleston shows little signs of slowing down, with a multitude of Plan Changes proposed which would see the residential population continue to rise over the short to medium term. This anticipated future growth has been captured as part of the traffic modelling and transport analysis that has informed the DBC. While the future adoption of Plan Changes is not yet known, we have applied an approach that tests our options based upon conservative design flows.

Figure 5 provides an overview of the extent of the planned residential growth in the southeast of Rolleston, which is based on known Plan Changes (as of April 2021) and the expected full development levels. Where relevant, we have allowed for further growth or run sensitivity tests to ensure that our recommended options can cater for relevant design volumes.



5 | 2018 to 2048 household changes

3.2.2 More local employment opportunities – the growing industrial area

The Rolleston Industrial Zone (RIZ) on the northern side of SH1 is also expected to grow. In doing so, more localised employment opportunities will be created. Future plans for the RIZ include:

- A big box retail park accessed from Jones Road/Hoskyns Road.
- A new industrial development named Tāwhiri at the northern extent of the RIZ, being led by Ngāi Tahu.

The RIZ's employment will grow to more than 2,000 jobs when development is fully completed¹¹. Whilst development of this nature support local economic growth and job creation, from a transport perspective these types of retail centres tend to reinforce local tendencies to travel by car, even for short journeys. The development is also likely to induce new additional, and long distance, trips from Christchurch.

Overall, growth in industrial employment will increase local travel demand to cross SH1 and the rail line, conflicting with the increase in both road and rail freight volumes on these corridors. This reinforces the need to act now to resolve the safety issues which will worsen in time (due to population and employment growth).

South Island's biggest bulk retail centre planned for Rolleston.

3.2.3 Burnham Military Camp

The Burnham Military Camp is also looking to expand, with military personnel expected to be living in Rolleston and commuting to work in Burnham. Given the relatively short distance, the Ministry of Defence are very keen to see provision of a safe active mode connection between the town and the Military Camp. SDC are looking to develop a Burnham Cycleway along Runners Road and seeking a safe crossing of the State Highway to connect with the Rolleston residential area, preferably at Dunns Crossing.

3.3 Revitalisation of the Town Centre

To improve the liveability and sustainability of Rolleston, SDC is creating a revitalised Town Centre which will include a range of community services and retail providing employment and drawing people into the town. The upgrade captures:

- Developing **Tennyson Street** as a two-sided shopping street which would become Rolleston's main street. It would be home to a range of shops and food/beverage outlets.
- Developing **Te Ara Ātea** - a new library, community and technology centre which would include multi-use spaces. This has already been opened.
- A new **Town Square** as a meeting place for locals and visitors, and a place for holding events and staging performances.
- Enhancing **Rolleston Reserve** with a playground and water feature.
- Introducing pedestrian crossings, traffic lights and on-street parking to **Rolleston Drive**.

Using the Christchurch Key Activity Centres (KACs) as a reference and adjusting for gross floor area, it is estimated the redeveloped Rolleston Town Centre will create around 500 jobs.

3.4 Creating a better sense of community

Most people who live in Rolleston work in Christchurch. Then at the weekend, a large proportion of residents again go back and forth to Christchurch for shopping or recreational reasons. These kind of travel patterns have a negative impact on the environment (carbon impacts) and the community ("sense of place").

The Town Centre will help localise far more trips. But Council recognise that more commercial and employment opportunities need to be created to support a growing population.

But the question is "where can this new development go?". Without utilising space on the northern side of SH1, which is geographically very close to the Town Centre, the only alternative greenfield areas would be on the outskirts of the current residential areas. Therefore, if opportunity is not taken now to better connect both sides of Rolleston, it risks becoming a town that ends up with a series of sporadic small commercial areas and never achieves a strong feeling of community.

It is imperative that this project improves the physical connections between the two commercial areas either side of the State Highway. In doing so, this will help 'bring the town together' and make it more self-sustaining.

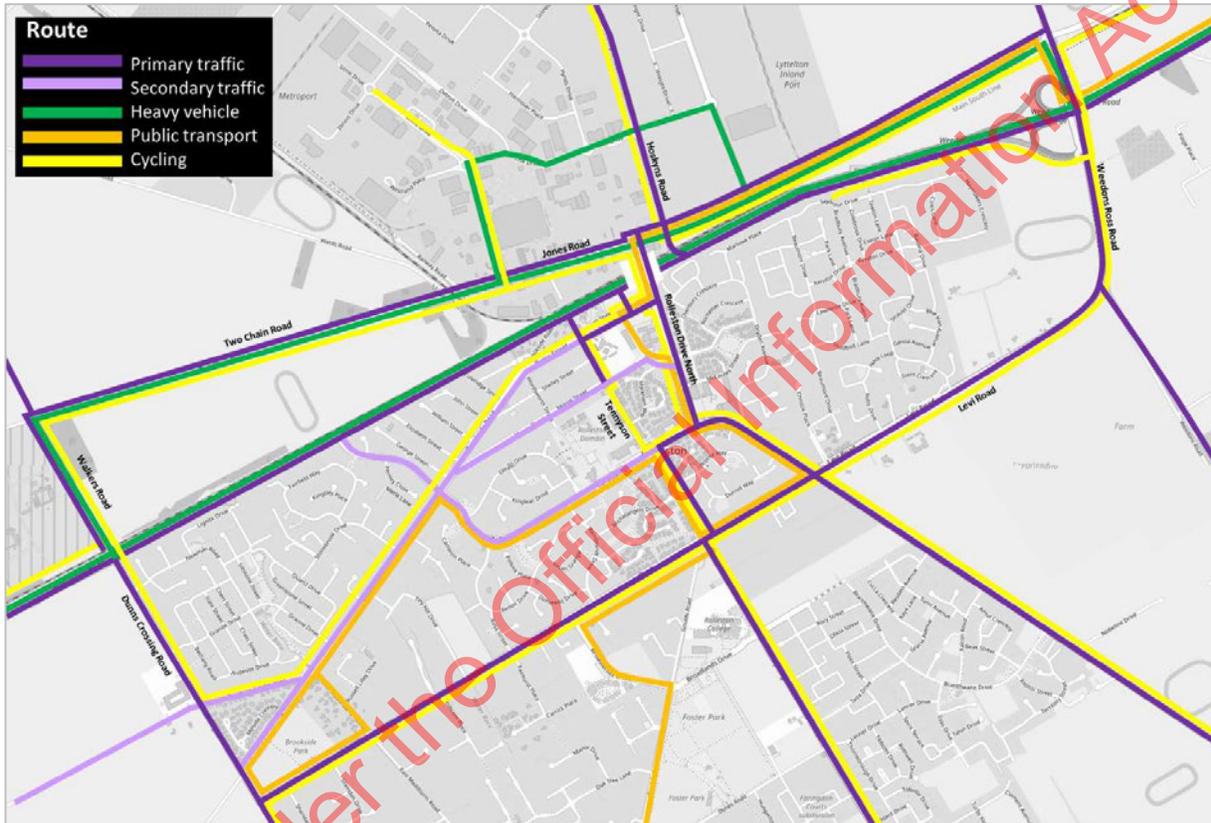
¹¹ Selwyn's iZone industrial park a finalist in LGNZ EXCELLENCE Awards, LGNZ, 2017. Retrieved May 2021

3.5 Supporting Rolleston's desired transport system

Improvements along the state highway need to support the desired transport network for Rolleston and enable various road corridors function as they are intended. Essentially, keep the right traffic on the right roads such as the peripheral ring arterial roads outlined in SDC's road hierarchy. Doing this means we can manage the movement of people better, have a safer network and make Rolleston a more liveable place by having quieter local streets.

We then also need to think about how the future network will need to support a town that is changing shape, with significant residential growth to the south. To gain an appreciation of what the desired transport network for Rolleston is, and the potential points of conflict for various modes, a 'Network Operating Framework' (NOF) style map has been sketched.

The intent of the map is to show how the transport network will work, and how the NZUP programme will better help bring together the two sides of Rolleston which are separated by the State Highway.



6: How the Rolleston transport network will work

The map helps to demonstrate:

- The role of Dunns Crossing Road and Walkers Road as a key cross-district route, part of the peripheral arterial ring road system.
- Walkers Road-Two Chain Road and Jones Road are the primary freight routes to the industrial area.
- The importance of a direct multi-modal connection from the town centre to Jones Road for connectivity between the township and the industrial employment area, as well as the two commercial centres in the town centre and large format area on Jones Road.
- Rolleston Drive North is reinforced as the main vehicle route from the wider Rolleston township areas.
- The desire for Tennyson Street to be a low speed, local access, route (i.e., to the Town Centre) only.
- A strategic desire to reduce the number of local road conflicts with the high-volume strategic roads.
- The Weedons Ross Road interchange is the primary entrance to Rolleston from the north, especially for access to the industrial area and access to the township side via Levi Road and Lowes Road.
- Levi Road / Lowes Road becomes a more central arterial connection through the township area.
- Additional state highway access to/from Christchurch is provided via Hoskyns Road and the service lane to Rolleston Drive North and Tennyson Street.

3.6 What else is being planned?

3.6.1 Active travel improvements

There are several planned cycling projects relevant to the project area, as outlined in the SDC Walking and Cycling Strategy 2018. These include:

- A new cycleway from Rolleston to connect onto the 'South Express' major cycle route at Templeton through an extension along Jones Road to connect with the existing Manion Road and Weedons cycle routes.
- Planning to extend the short section of cycleway on Hoskyns Road further north towards West Melton.
- Rolleston to Burnham shared use path (SUP). This is shown to go along Two Chain Road, Walkers Road and Runners Road – connecting the industrial area in Rolleston to the Prison. This is however only a concept plan at this stage which has not yet been agreed with Waka Kotahi. A more recent plan change application for PC80 includes an Outline development plan that shows a SUP along Two Chain and Walkers Road, hence providing more clarity on how this may eventuate. This project sits outside of the scope of this DBC but has been considered to ensure appropriate integration for multimodal travel option improvements.

The intent is that these cycleways could carry through and connect to the proposed flyover, which would mean that the cycle network would broadly mirror the vehicle transport network.

3.6.2 Public transport

SDC has a strategic desire to support mode shift towards public transport. Currently three Metro bus routes serve Rolleston (Nos. 5, 820 and 85), plus two Park'n'Ride (P&R) facilities – one on Kidman Street (close to the proposed flyover) and a second located on the edge of Foster Park. The majority (84%) of bus passengers from Rolleston go to Christchurch¹².

Possible Future Public Transport improvements

The recommended programme from Waka Kotahi's *Public Transport Futures Business Case* includes all day services from Rolleston at 10 minute peak frequency and 20 minute inter-peak frequency to aim for better travel time parity with car travel time (a significant improvement from the current 30 minute frequency). SDC have provided park and ride facilities near the Kidman Street bus stops and are exploring opportunities for further expansion, including near the bus stop on Jones Road near Hoskyns Road.

The Rolleston Access Improvements DBC supports the desired outcomes of the *Public Transport Futures Business Case*. To this end, the proposed flyover which would deliver improved access to both the industrial (via Jones Road) and residential (via Kidman Street) allows for the need to support improved connectivity for public transport services. This may mean providing bus priority at intersections, helping improve reliability for bus services or supporting the introduction of a new Park and Ride service.

3.6.3 Local roading improvements

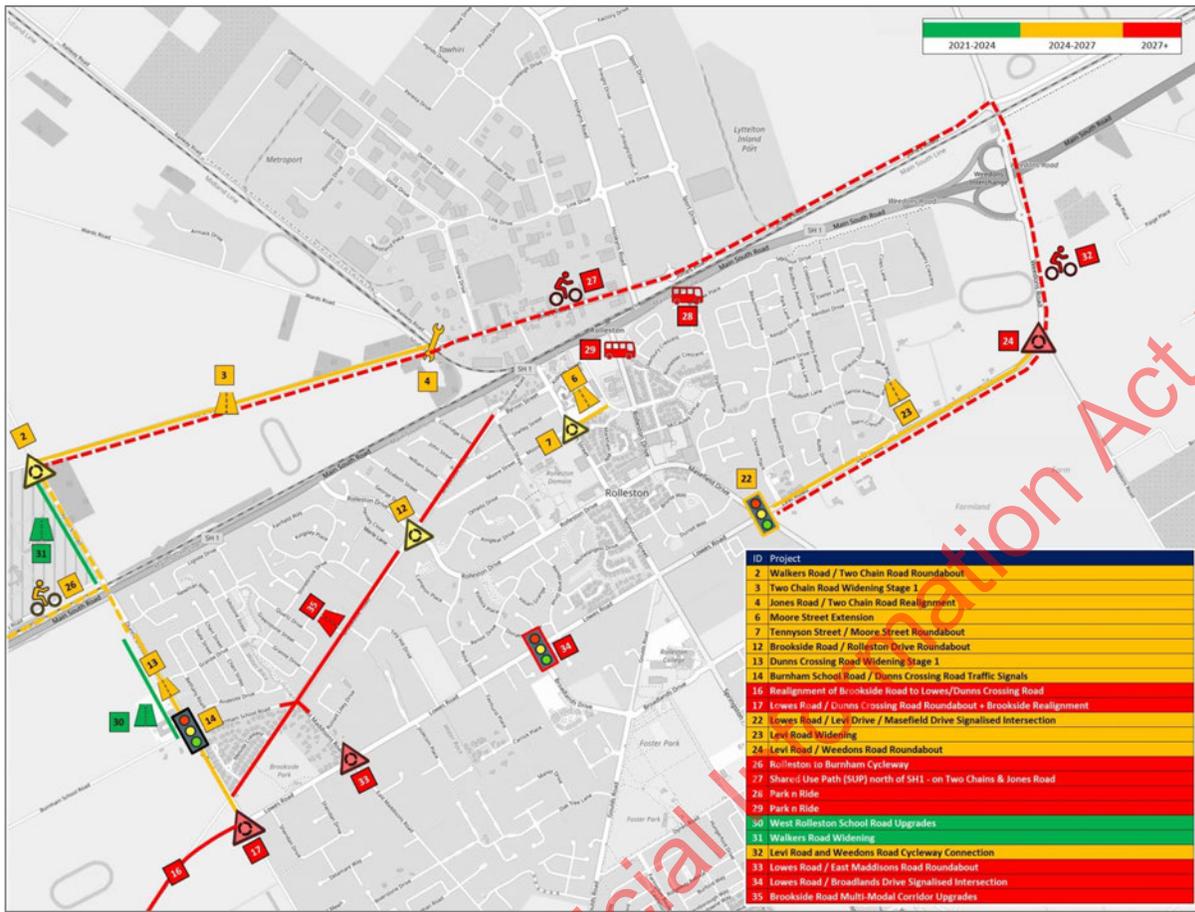
SDC is planning for the future and know that improvements to the local road network are required to (a) support continued growth; and (b) ensure that wider effects of the NZUP improvements (caused by rerouting of traffic) are appropriately mitigated.

SDC also has several local road improvements in their 2018-28 Long Term Plan (LTP), but at this stage the only projects with committed funding are:

- Roundabout at Rolleston Drive South / Brookside Road.
- Dual laning of the existing roundabout at Lowes Road / Masefield Drive.
- Widening of Railway Road north of Detroit Drive.

Figure 7 shows the suite of planned wider local transport improvements for the next 10+ years.

¹² Environment Canterbury data



7 Local transport improvements

The following upgrades have been earmarked (subject to SDC funding):

- Burnham School Road / Dunns Crossing Road – safety upgrade to provide a more controlled form of intersection (traffic signals) (ID: 14).
- Burnham School Road – widening (ID: 15).
- Dunns Crossing Road / Brookside Road (ID:16) – intersection upgrade with the potential to combine with Lowes Road / Dunns Crossing Road intersection.
- Lowes Road / Dunns Crossing Road – roundabout (ID: 17).
- Levi Road – widening and shared use path to improve resilience and provide an alternative route to Weedons Road interchange (ID:23).
- Levi Road / Weedons Road – safety upgrade from priority-controlled intersection to roundabout (ID: 24).
- Rolleston to Burnham cycleway along the north side of SH1 and along Runners Road (ID: 26).

This DBC has informed the necessary timing of these interventions – refer to Part C.

The first stage of safety improvements outside West Rolleston School has already been completed with a new, 2.5m wide shared path for walking and cycling on Dunns Crossing Road, additional line marking and upgrades around the kea crossing.

3.7 Rail network

Rail plays a critical role in New Zealand's freight and supply chain industries. With New Zealand's freight market projected to grow by 30% by 2030, rail will play a significant part in handling the increase and providing greater resilience to the New Zealand transport network¹³. The Rolleston industrial zone already includes two inland ports serving Lyttelton and Timaru ports, so is well placed for freight transfer to rail.

3.7.1 Current rail network

Rolleston is the site of the junction of the Midland Line and Main South Line. The Midland Line passes to the southwest of the RIZ and goes west to the West Coast and Greymouth. The Main South Line (MSL) is part of the South Island Main Trunk rail line (SIMT) running to the north and south, connecting key economic hubs in the South Island for freight import and export. The eastern end of the MSL connects to the Midland Line to the south edge of the Rolleston station.

There is **no direct connection between the Midland Line and the west extent of the MSL – all rail connections face to the east which creates a connectivity problem to the south.**

MetroPort and Westland Milk within iZone operate from sidings off the Midland Line. The MSL connects the major rail nodes of: LPC, the yard in Middleton in Christchurch, the two inland ports in Rolleston, and the major rail nodes to the south - e.g., Ashburton, Port of Timaru, Oamaru, Dunedin and Port Chalmers, and Southland and South Port. Both the Midland Line and the Main South Line outside of Rolleston station are single tracked. Midland Port (Lyttelton Port) within iPort operates from a siding off the MSL.

The local rail network is shown in Figure 8.

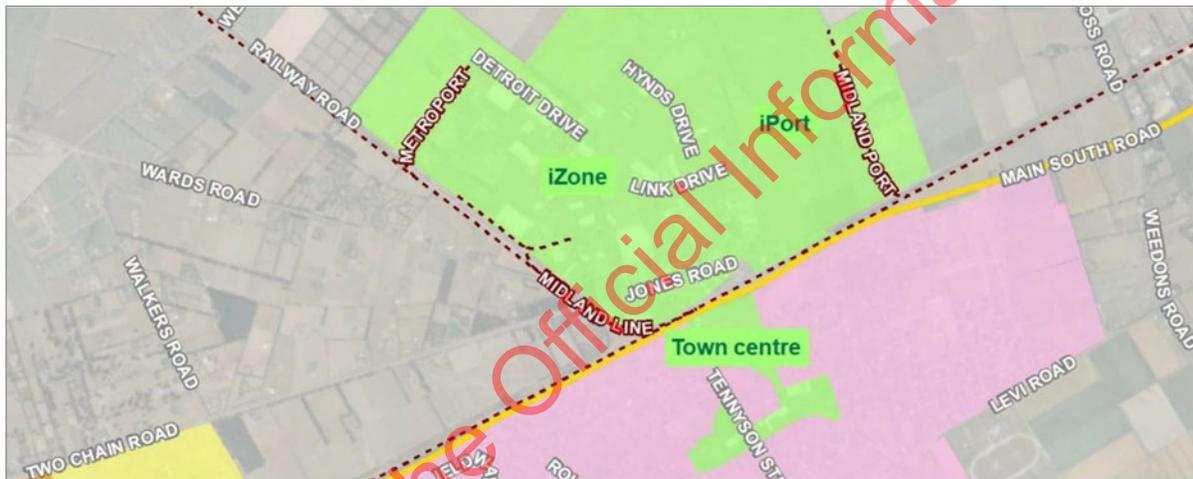


Figure 8 Rail infrastructure and inland ports in project area

KiwiRail indicated that there are 20-30 rail movements a day on the Midland Line to the West Coast, 40 per day north of Rolleston (including A-trains to LPC everyday), and 16 movements south of Rolleston on MSL (inc. Synlait shunts). The fact there is significantly less demand south of Rolleston highlights the significance of the freight activity of the two inland ports at Rolleston.

The rail services that go through Rolleston are primarily freight, with one tourist-orientated service TranzAlpine train stopping at Rolleston for pre-booked passengers. There are no commuter passenger services operating.

Level Crossings

There are existing at-grade rail level crossings on Weedons Ross Road, Hoskyns Road, Walkers Road, Jones Road and Two Chain Road. The location of the MSL rail line parallel to SH1 results in short (typically 30 m) vehicle stacking distances between SH1 and the rail level crossing, creating both safety and efficiency issues for road and rail.

Numerous near misses and actual collisions are recorded at the Hoskyns Road level crossing each year, typically for the longer vehicles exiting Hoskyns Road and turning right onto SH1 southbound which do not fully clear the rail tracks. A *Level Crossing Safety Impact assessment (LCSIA)* was carried out on level crossings at Walkers Road, Jones Road, Hoskyns Road (and pedestrian), Jones Road (Siding) and Weedons Ross Road. The LCSIA criteria indicates that at-grade level crossing solutions are sufficient to keep the risk at the level crossing below a certain threshold for these crossings, except for Hoskyns Road where an at-grade solution is unlikely to be sufficient to mitigate safety risks.

It is important to note that the MSL connects to the Midland Line from the north only. While fewer in number, rail movements on MSL from the south that need to connect onto the Midland Line must continue north to the

¹³ www.kiwirail.co.nz/what-we-do/freight/

Middleton yard in Christchurch (activating nine level crossings in this urban area), where yard space at Middleton allows a locomotive to uncouple and 'run-around' to the other end of the train, recouple then head south back to Rolleston. There is an existing third track at Rolleston station however the section is too short to run-around there. While there is a section of double track at the end of the Midline Line at Rolleston, due to the slow shunting movements of locomotives 'running-around', it is safer and more efficient to be undertaken off the main line to avoid conflict with other rail movements.

3.7.2 Expected growth

Rail freight container volumes from LPC are expected to grow from 480 twenty-foot equivalent units (TEUs) per day to 750 TEUs per day in the short term. The bulk of this growth on MSL will go through Rolleston, as the growth is primarily linked to the Synlait factory expansion at Dunsandel (south of Rolleston) but could come from a range of sources in the future. This also highlights the growth in activations expected at the level crossings between Rolleston, Middleton yard (for 'running around') and Lyttelton Port.

There continues to be an increase in rail freight volumes with major industrial exporters increasingly opting to switch modes from road to rail transport. LPC's Midland Port has seen an increase in container movements from two or three trains a week in 2016 to currently be sixteen return services a week from Midland Port (approximately 450% growth). Containerised cargo at Midland Port is forecast to increase from about 370,000 TEUs in 2015 to over 1 million TEUs by 2041¹⁴.

This growth highlights LPC's importance as the major South Island port for export and import (by volume and value), having significant deep-water berths and shipping lines, and retaining operational capacity for future growth. However, LPC's constrained linear waterfront site means use of the inland Midland Port is critical to operations and LPC will increasingly rely on rail connections.

3.7.3 Future rail plans

KiwiRail currently have no plans for double tracking MSL to Christchurch as capacity is not yet required, and the only major capital works currently planned in the short term is funding being sought for a new Westland Milk siding at MetroPort (Port of Tauranga).

That said, the DBC considers this potential need so as not to preclude such capacity improvement in the future.

¹⁴ LPC Midland Port brochure, sourced May 2021

4 STRATEGIC CONTEXT

The Rolleston Access Improvements DBC sits within a broader context of projects seeking to improve the safety and efficiency of transport networks across the Selwyn District, while also improving the amenity of urban areas. This section sets out some of the key projects that are occurring alongside this DBC, and some of the strategies that have led to the identification of the improvements that are the subject of this business case.

4.1 Safe System approach

The safe system approach to transport planning recognises that people make mistakes and are vulnerable in a crash. It reduces the price paid for a mistake, so crashes don't result in being killed or suffering life-changing serious injuries. Mistakes are inevitable – dying or being seriously injured from road crashes are not. To reach our national road safety strategy Road to Zero target of 40% fewer deaths and serious injuries on our roads by 2030, Waka Kotahi has five internationally proven focus areas. These focus areas, including infrastructure and speed, vehicle safety, work-related road safety, road user choices and system management work together to create a safe transport system.

4.2 Safer Infrastructure Programme

The Safer Infrastructure Programme is a collaborative initiative that aims to reduce deaths and serious injuries across New Zealand's state highway and local road networks. The programme uses the Safe System approach, the international gold standard in road safety. Rolleston lies within the SH1 Templeton to Selwyn River package that is aiming for a safe system transformation. Specifically, the package includes the following proposed projects on SH1 between Burnham and Rolleston:

- Rural roundabout at the SH1/Burnham Road/Aylesbury Road intersection (access to Burnham Camp), assumed to include speed thresholds and rail level crossing upgrade.
- Central median barrier along SH1, between Burnham Road/Aylesbury Road and Brookside Road.

These improvements target the SH1 safety and connectivity issues specifically. In addition, the Burnham Road roundabout creates a strong speed-reducing feature northbound into Rolleston, and a safer SH1 connection for vehicles from the Burnham Military Camp and further west.

4.3 Previous strategies

4.3.1 Christchurch, Rolleston and Environs Transport Study (CRETS) 2007

The CRETS, developed in 2007, considered the transportation investment that may be required to support growth in Christchurch and Rolleston across a 25-year horizon. Relevant to this DBC, CRETS identified a grade separated link within Rolleston, and numerous network integration upgrades for the short, medium, and long term. This study has formed the basis of much of the future planning by SDC for Rolleston. This includes investment in transport infrastructure that was delivered through previous Long-Term Plans, such as local intersection upgrades (rural and urban) and speed management areas.

4.3.2 Tennyson Street Scheme Assessment – 2012

Waka Kotahi commissioned this Scheme Assessment Report to investigate options to improve safety at the Tennyson Street and Brookside Road intersections on SH1 (Main South Road) in Rolleston. The Tennyson Street and Brookside Road intersections are closely spaced, full movement intersections which had several near misses and reported crashes over the previous five years, especially involving right turning movements. The assessment undertook public consultation to investigate upgrading the intersections and improving the movement of vehicles in the vicinity.

The recommended option was a service lane along SH1 and left-in-left-out only access.

4.4 CSM2 –Memorandum of Understanding

The CSM2, opened in 2020, ends immediately north of Rolleston at Hoskyns Road. The extent of CSM2 will not address emerging challenges at Rolleston. In recognition of this, in 2013 an MoU was signed between SDC and Waka Kotahi to "proactively work together to deliver one transport network for the Rolleston Area Network" at a future date, recognising the increasing pressure on SH1 and connections with the Rolleston road network. The MoU records the intention to integrate with land use and community needs to ensure value for money and achieve optimal One Network outcomes.

This MoU recognises the foreseen wider network impacts of the CSM2, combined with growth in Rolleston, and acknowledges the need for local road investment to support an integrated 'one network' approach. This business case follows on from the MoU.

4.5 National and regional strategic context

SH1 is a high-volume corridor of strategic importance, providing inter-regional connectivity and freight movement capabilities. The strategic context for the project identifies how the project will deliver on the wider regional and national outcomes sought.

4.5.1 Government Policy Statement

At a national level, the Government Policy Statement on land transport (GPS) outlined the government's strategy for investment in land transport over the next 10 years, implemented by Waka Kotahi via the National Land Transport Programme (NLTP). GPS 2018 commits to safety, mode neutrality, liveable cities, regional economic development, protecting the environment, and delivering the best possible value for money.

4.5.2 Arataki

Arataki is Waka Kotahi's view on how to deliver the Government objectives for land transport system, and guides implementation through the actions through a wide range of plans, policies and processes led by Waka Kotahi and investment partners. The regional summary for Canterbury¹⁵ notes:

- The region has a poor safety record in terms of deaths and serious injuries (DSIs), particularly around the Christchurch urban area and SH1 between Christchurch and Timaru
- Continuing residential growth on the edges of Christchurch and surrounding communities risks locking residents into increased dependence on private vehicles to access employment and essential services. Growth in greater Christchurch also provides opportunities to increase use of public transport, walking and cycling in urban areas.
- Regional and rural communities will look for improved connections to greater Christchurch for people to access education and work. The major funding and financing challenge facing the region will be how to fund new infrastructure and services to keep pace with expected growth in greater Christchurch.
- While Christchurch will remain the primary South Island freight hub, the Port of Timaru will play a greater role in the freight system. It will be important to maintain safe and reliable road and rail freight access to the Lyttelton Port, PrimePort Timaru and associated connections to the inland port in Rolleston. Maintaining strong freight connections to the West Coast will be critical for its communities and economy.

The focus areas that relate to Rolleston are to significantly reduce harms, including high-risk intersections on SH1, infrastructure improvements for walking and cycling, and speed management. There is opportunity to grow use of public transport, walking and cycling in Rolleston. There is desire to strengthen freight access to Lyttelton, Timaru and West Coast.

4.5.3 Regional context

At a regional and local level there is a clear desire and focus to create a more balanced transport system by enabling greater use of alternative modes to the private vehicle, as signalled within the Canterbury Regional Policy Statement (CRPS) and Christchurch Transport Strategic Plan. This includes the need to ensure that land transport decision making is aligned to land-use outcomes. A desire for greater integration of transport planning and land use is being sought through the Greater Christchurch Partnership, enabled through greater residential intensification in existing urban areas.

¹⁵ Arataki version 2 - Canterbury Regional Summary, Retrieved May 2021

5 PROBLEM STATEMENTS

As part of the PBC, an Investment Logic Mapping (ILM) workshop was held on 3rd December 2019 with key members of the project team and project partners. The purpose of this workshop was to better understand the problems identified within the project area, including the underlying causes and consequences associated with each problem.

Three general problems were identified:

- Problem 1 - **safety** concerns due to increase in traffic and rail movement which creates conflicting movements (particularly right turns)
- Problem 2 - there is need to improve **connectivity** and provide more sustainable travel options.
- Problem 3 - uncertainty in the timing and extent of transport investment limits **economic potential**.

Then in January 2020, the New Zealand Government announced the NZUP and the earmarked funding for transport improvements in Rolleston. This meant that the third problem became less relevant and was hence removed at the start of the DBC. Economic benefits would however be driven by improving safety, supporting road/rail freight access, and driving business activity through improved connectivity between the residential and industrial (workplace) sides of the town.

Because of the NZUP decision-making processes, the main issues that this DBC needed to address related to safety and connectivity between Rolleston township and the industrial zone. The final problem statements that were agreed by project partners are:

Safety (40%)

Increasing traffic and rail movements and poor interface with local road intersections and level crossings is resulting in increased conflicts, and the risk of death and serious injury.

Connectivity (60%)

Rapid growth and changes in land use has outpaced the delivery and availability of alternative transport choices, maintaining a reliance on private vehicles, resulting in increased severance, congestion and reduced liveability and sustainability of Rolleston.

The following sections provide the evidence to substantiate the two problems.

6 PROBLEM 1 – SAFETY

Increasing volumes of traffic and rail movements, coupled with network constraints are resulting in increased conflicts, and risk of death and serious injury (40%)

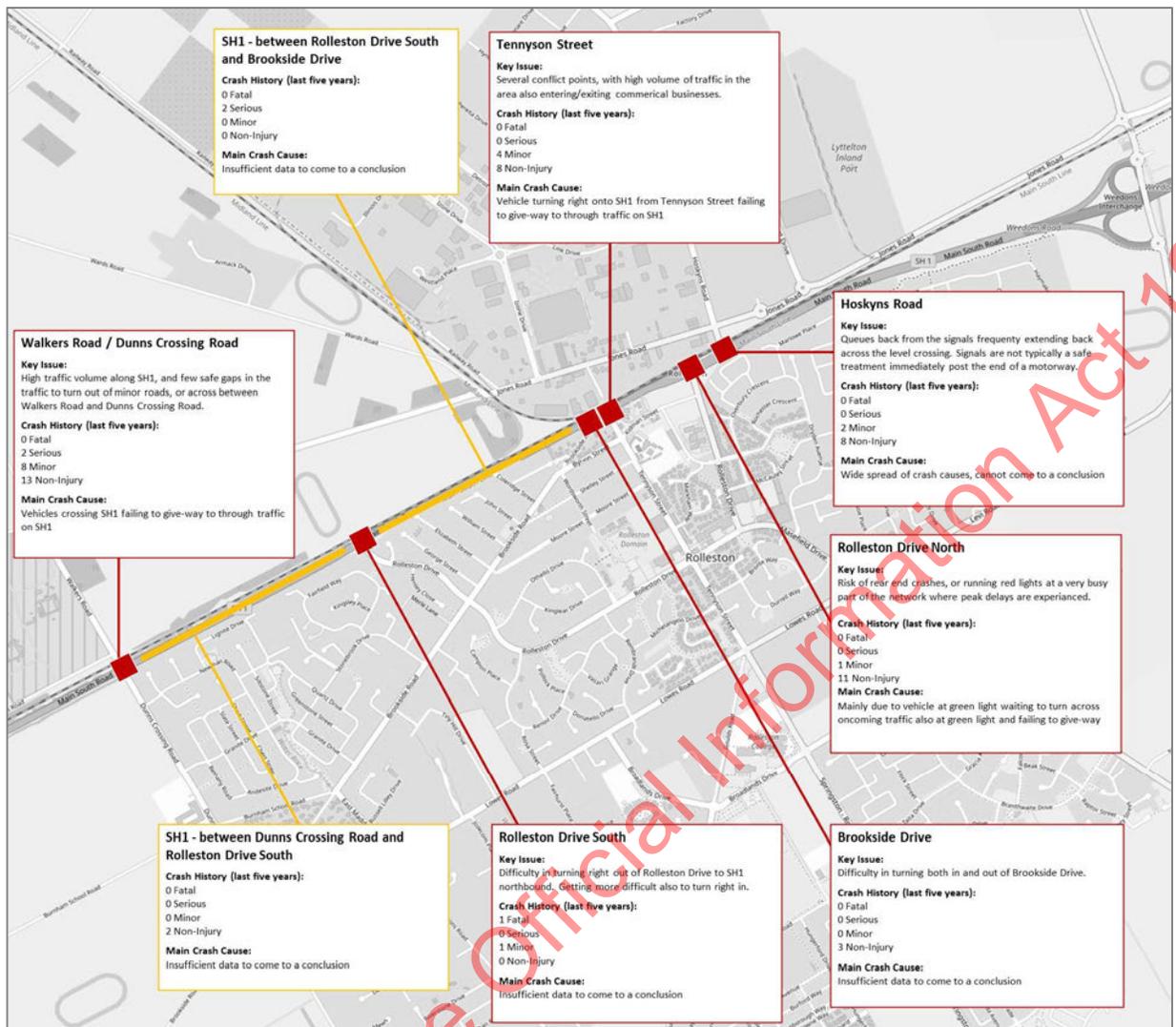
6.1 Context

The high-speed Christchurch Southern Motorway (CSM) starts/ends to the east of Rolleston, which means that for southbound traffic the environment quickly changes from a 100kph motorway to 80kph urban area at the Hoskyns Road traffic signals. Elsewhere along SH1 through Rolleston, right turn movements at the give-way controlled intersections are becoming increasingly unsafe as traffic volumes along SH1 keep rising. There are fewer gaps in the stream of vehicles, which means that more people are taking risks.

There is also a lack of uniformity along the SH1 through corridor, which means that the road is not 'self-explaining'. This essentially means that drivers might end up travelling too fast or encountering turning vehicles that they are not expecting to see. For example - west of Rolleston Drive South, the road alignment is straight and has a lack of any kerbside features which is more in-keeping of a rural rather than semi-urban corridor. An overarching objective of the NZUP investment is to make journeys safer, and target zero injuries and deaths on the road. People will always make mistakes, and so we need to provide infrastructure that will minimise the chances of anyone getting hurt.

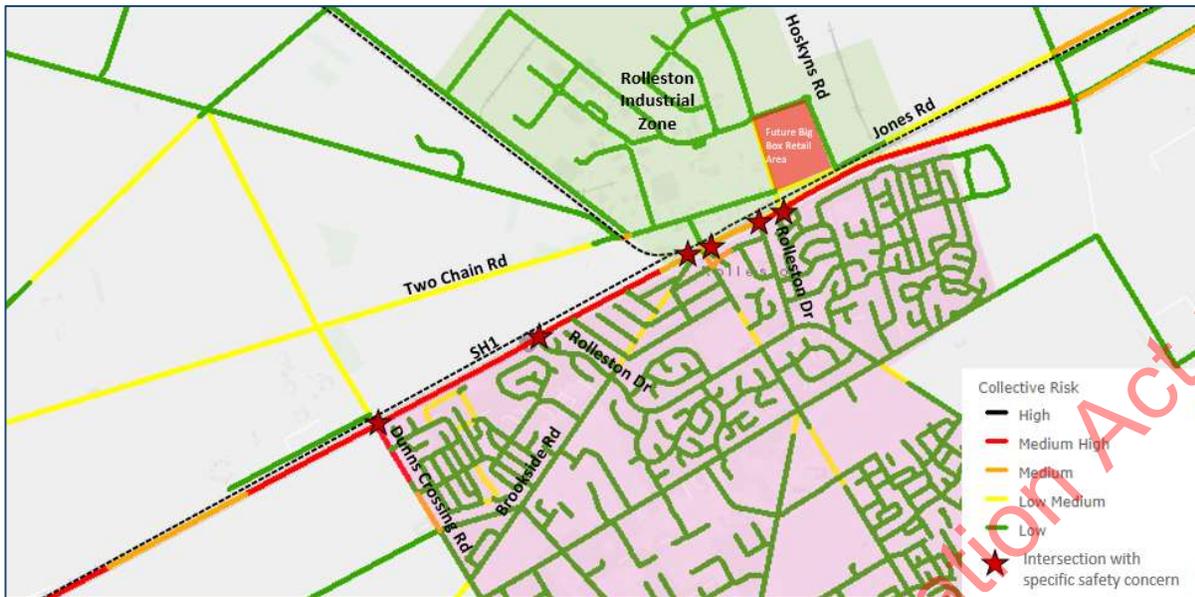
Figure 9 highlights the specific safety concerns at each intersection along SH1 through Rolleston, along with the recent (last 5 year) crash history. The most critical safety concerns along SH1 relate to queues of traffic extending back over the Hoskyns Road level crossing and infrequent safe gaps in the traffic to make turn movements into SH1 northbound¹⁶.

¹⁶ Safety at Dunns Crossing Road / Walkers Road is currently being managed with a temporary 70kph speed limit.



9 Existing safety issues and crash history

Figure 10 shows the Collective Risk for the area and highlights intersections on SH1 identified as hotspots. The length of SH1 through Rolleston has a collective risk of Medium/Medium High. Without any changes, as traffic continues to rise in response to growth, we would expect more crashes and DSIs to occur along SH1.



10 Collective Risk map – highlighting SH1 intersections issues with specific safety concerns

6.2 Factors which influence safety risk

6.2.1 Increasing traffic movements along SH1

Increasing traffic is the key factor that will increase the safety risk on SH1. Specifically:

- SH1 volumes at Hoskyns Road are forecast to increase from 24,600 vehicles per day (in 2018) to 33,300 vehicles per day (in 2038). The current traffic signals do not have sufficient capacity to accommodate this growth which means that queues of vehicle back over the Hoskyns Road level crossing would be a very regular occurrence throughout the day.
- The Weedons Ross Road interchange will act as the primary access point to new development areas, but its capacity will be pushed to the limit during later years. Once capacity is reached, people are more likely to rat-run on local streets or take alternative routes on rural roads which present a higher safety risk than the CSM2 (e.g., due to minimal shoulder widths and multiple accesses).
- Long delays at signals could encourage more people to try and access the SH1 corridor from less safe connections such as Brookside Road and Tennyson Street.
- Heavy vehicles currently account for around 12% of all traffic using SH1 through Rolleston. This translates to higher than typical exposures at intersections (as trucks travel and turn more slowly than cars), increased driver frustration (demand to overtake) and higher crash severity.
- The implications of increased traffic also extend to the safety of pedestrians, cyclists, and other vulnerable user groups. Intersections become more difficult to cross, and people need to become more aware of more potential points of conflict.

One dead following crash between two trucks south of Christchurch

Jonathan Gaultford - 13:30, Jan 17 2022

Health shuttle in serious crash on SH1 near Rolleston, southwest of Christchurch

Christchurch reporter - 11:56, Aug 19 2022

Woman dead after car and truck collide in Canterbury

Tom Kitchin - 16:46, Jul 08 2019

6.2.2 Intersection types along SH1

Within the project area, SH1 intersects with six different local roads over a 3km stretch. The types of intersections vary, as does the proportion of turning vehicles. Table 4 provides the forecast¹⁷ number of right turning vehicles into and out of these intersection per day, should no change occur. The purpose of this table is to provide context around the scale of the issue at each location and the number of people per day who are subject to crash risk. **The key risks relate to right turns in and out from side roads.**

The proportion of heavy vehicles highlights:

- Rolleston Drive North has the same proportion of heavy vehicles as Tennyson Steet and Rolleston Drive South, indicating that it is not serving as a heavy vehicle route.
- Walkers Road is being used as a heavy vehicle route to/from the industrial area.

¹⁷ 'Do Minimum' forecast traffic volumes (based on traffic modelling)

- Heavy vehicles on Dunns Crossing Road are likely to be coming from the wastewater treatment plant and resource recovery park on Burnham School Road.

4: Intersections with SH1

Location	Current intersection type	2038 ADT			% heavy vehicles		
		SH1 through	Right in from SH1	Right out onto SH1	SH1 through	Right in from SH1	Right out onto SH1
Hoskyns Road	Signals	32,850	4,600	7,000	13%	25%	7%
Rolleston Drive North	Signals	26,500	650	1,700	13%	3%	2%
Tennyson Street	Priority T-intersection	23,350	1,400	800	14%	3%	3%
Rolleston Drive South	Priority T-intersection	21,950	850	550	14%	2%	2%
Walkers Road	Stop controlled crossroads	19,000	1,400	200 ¹⁸	14%	13%	13%
Dunns Crossing Road	Stop controlled crossroads	19,000	1,250	1,150	14%	3%	15%

Waka Kotahi's *High-Risk Intersection Guide*¹⁹ describes how at priority crossroads (such as Walkers Road / Dunns Crossing Road), 45% or more of DSI casualties are caused by 'crossing, no turn movements'.

For a roundabout, this factor influences only between 5 and 14% of all crashes. Simply, rural crossroads have the highest number of conflict points compared to any other type of intersection. Then, as an intersection becomes busier (which is the expectation for all intersections along SH1 through Rolleston), the complexity of decision-making increases because several conflicts can occur at the same time.

6.2.3 Presence of level crossings

There are existing at-grade rail level crossings on Weedons Ross Road, Hoskyns Road, Walkers Road, Jones Road and Two Chain Road. Table 5 provides an overview of the existing level crossing infrastructure and the current risk ratings.

5: Level Crossing Infrastructure Overview²⁰

Location	Crossing type	Barrier arms	Level Crossing Safety Risk	Pedestrian provision	Stacking space (to SH1)
Walkers Road	At-grade	No	Medium-High	None	Approximately 30m between line and SH1 limit line.
Hoskyns Road	At-grade	Yes	High	Yes - partial. On eastern side of the crossing. No maze provided. Flashing lights located on approaching vehicle side of road (so opposite side for southbound pedestrians).	Approximately 20m between line and SH1 limit line (catering for 1 b-train) No stopping markings over crossing.
Two Chain Road	At-grade	No	Medium-High	Yes - partial. On northern side of crossing. No maze provided.	Two other intersections in close proximity, although Jones Road has priority.
Weedons Ross Road	At-grade	Yes	Medium	None.	Approximately 40m between the limit line and the Jones Road / Weedons Ross Road roundabout.
Jones Road (to LPC)	At-grade	Yes	Low	Yes. On northern side of the level crossing there is a maze provided. No pedestrian provision on southern side.	The nearest intersection is the Iport Drive / Jones Road intersection over 200m to the southwest.

The Level Crossing Safety Impact Assessment (LCSIA), provided as **Appendix D**, identifies a series of deficiencies at each level crossing which contributes to the significant safety risk presented by the rail corridor. In general, there is a lack of median barriers, narrow level crossing widths, short stacking spaces with minimal emergency escape zones and incorrect signage. Older crossing at Walkers Road and Two Chain Road lacks half-arm barriers.

Limited stacking space is creating issues for vehicles who can become trapped over level crossings²¹. Longer vehicles such as b-trains need enough space to wait in queue, or at the limit line, without being at risk of a

¹⁸ Potentially this volume could substantially increase if Plan Change 80 is approved.

¹⁹ www.nzta.govt.nz/resources/high-risk-intersections-guide/

²⁰ Note this is only a high-level assessment. There are other considerations such as maintenance, sight lines, grades, path quality etc.

²¹ Note that rail improvement work is also being undertaken in parallel through NZUP seeking to reduce the frequency of actuations.

collision with trains. This is most notable at the Hoskyns Road level crossing because of the effects of the traffic signals at the Hoskyns Road / SH1 intersection. Increasing traffic volumes on all approach result in increased cycle times at the signals, and consequently far more frequent occurrence of queues extending back past the railway line (approx. 20m distance). The current high risks at this location have led to Kiwirail having to implement a 40kph speed restriction resulting in delays to train services through the Rolleston area.

6.2.4 Rail connections in Rolleston creating additional movements across level crossings

It is important to note that the MSL connects to the Midland Line from the north only. While fewer in number, rail movements on MSL from the south that need to connect onto the Midland Line must continue north to the Middleton yard in Christchurch (activating nine level crossings in this urban area), where yard space at Middleton allows a locomotive to uncouple and ‘run-around’ to the other end of the train, recouple then head south back to Rolleston. There is an existing third track at Rolleston station however the section is too short to run-around there. While there is a section of double track at the end of the Midland Line at Rolleston, due to the slow shunting movements of locomotives ‘running-around’, it is safer and more efficient to be undertaken off the main line to avoid conflict with other rail movements.

There is a further risk presented for KiwiRail staff, as current shunting operations require train operations to walk along the railway line back to the LPC siding.

6.2.5 Poor connectivity for active modes

Provision for active travel users across the State Highway and railway corridors is limited to the signalised at grade intersections – a poor amenity environment with high levels of delay to movement. There is a shared use path on the western side of both Rolleston Drive North and Hoskyns Road with a signalised crossing of SH1 but currently no other facilities for cycling.

6.2.6 Future speed environment

The travel speed along SH1 through Rolleston changes several times over a relatively short distance. Heading southbound, coming off the CSM the posted speed drops from 100kph down to 80kph just before the Hoskyns Road signals. This speed limit change has been intentionally supported by the retention of the two lane to one lane merge at the end of the CSM to ensure traffic is slower before approaching the traffic signals.

The speed then increases back to 100kph just past the Brookside Road intersection, before dropping back down to 70kph (a temporary safety intervention) through the Dunns Crossing Road, and then back up to 100 km/hr. The overall corridor safe speed review is being undertaken separately, but the proposals for NZUP improvements will recommend supporting speed limits.

6.3 Consequences of increasing safety risks

6.3.1 More deaths and serious injuries

A total of 63 crashes were recorded during the last 5-year period. Of the crashes recorded one was a fatal crash at the SH1 / Rolleston Drive South intersection. There were 21 injury crashes (33%, 1x fatal, 4x serious), and 42 non-injury crashes (67%). Recently fatal injury crashes have occurred close to the Rolleston Drive North intersection (2022, one fatality), Rolleston Drive South intersection (2019, one fatality) and Dunns Crossing Road / Walkers Road (2022, two fatalities). The trend for more DSIs along this section of SH1 is rising. Table 6 provides a summary of the crash records for the last five and ten-year periods, including the number of DSIs and estimated DSIs (based on crash modelling).

6: Crash history

Intersection	Last 10 years (2013-2022)		Last 5 years (2018-2022)		Expected DSIs per annum (Do Minimum)	
	All	DSIs	All	DSIs	2028	2038
Hoskyns Road / Jones Road	15	1	9	0	0.67	0.82
Hoskyns Road / SH1	29	0	10	0	1.04	1.14
Rolleston Drive (North) / SH1	30	0	10	0	0.46	0.47
Tennyson Street / SH1	21	0	12	0	0.21	0.23
Rolleston Drive (South) / SH1	5	1	2	1	0.11	0.14
Walkers Road / Dunns Crossing Road / SH1	28	4	23	2	0.70	0.67

However these crash records do not tell the whole story.

They do not account for the number of near misses, unreported incidents or the perception of safety which reinforces a tendency to travel by car, as that is safer than walking or cycling at these intersections. Essentially, it is fortunate that more crashes haven’t occurred.

6.3.2 'Near misses' at level crossings become serious crashes

Numerous near misses and actual collisions are recorded at the Hoskyns Road level crossing each year, typically for the longer vehicles exiting Hoskyns Road and turning right onto SH1 southbound which do not fully clear the rail tracks. Table 7 provides a summary of the recorded incidents at level crossings in the project area over the last five years. These level crossings have safety score bands of Low (Jones Road siding), Medium-High (walkers Road), High (Hoskyns Road).

7: Summary of level crossing incidents (2010–20)

Level Crossing	Incidents ²²	Incident Summary	Crashes within 50m of level crossing (2018-2022)
Hoskyns Road	26	<ul style="list-style-type: none"> • x15 near misses • x1 collision with illegal obstruction • x6 damage with light vehicle • x4 damage with heavy vehicle 	<ul style="list-style-type: none"> • 2 minor • 9 non-injury
Walkers Road / Dunns Crossing Road / SH1	3	<ul style="list-style-type: none"> • 2 near misses • 1 struck car (non-injury) 	<ul style="list-style-type: none"> • 2 serious • 7 minor • 7 non-injury
LPC siding on Jones Road	3	<ul style="list-style-type: none"> • 3 near misses 	<ul style="list-style-type: none"> • 1 minor • 3 non-injury

As both the volume of rail and road movements increase, the number of near misses and actual crashes will increase. Any collision between a train and a vehicle is likely to result in injury.

The snapshots below from CCTV footage show two of the many near misses.

The first shows a bus extending over the rail safety space, and the train just stopping after having applied full emergency brakes. If the train had been travelling at normal speed, rather than the currently enforced 40 km/hr, then it would not have stopped in time and the consequences would have been catastrophic.



11: Near miss at the Hoskyns Road level crossing (Incident No.1)

The second shows a truck that was stranded in the short stacking space due to queuing onto the state highway and had to quickly back up to avoid the oncoming train. It snapped the barrier arm that had come down behind his cab and then jack knifed as he backed up, fortunately his front bumper managed to be just clear of the train that then passed through the level crossing.



12: Near miss at the Hoskyns Road level crossing (Incident No.2)

6.4 Safety problem – summary

²² Incidents recorded (Kiwirail ALCAM data Jan 2010 - June 2020)

There are three major safety risks along the corridor:

- There are a significant number of right turning movements from side roads (such as Tennyson Street and Rolleston Drive South) onto the busy state highway. Without major improvement we would soon expect 5 - 6 crashes per year that result in Death or Serious Injury (DSI) along SH1.
- The **Walkers Road / Dunns Crossing Road** intersection is currently a give-way controlled crossroads, with high volumes on all approaches. A temporary speed limit currently mitigates some risk – but this will be removed (for legal reasons).
- The rail level crossing at Hoskyns Road is the site of regular near-misses. Industry standards already dictate that this should already be grade-separated. **It is a case of when, rather than if, someone will be killed** at this level crossing.

Released under the Official Information Act 1982

7 PROBLEM 2 – CONNECTIVITY

Rapid changes in land use outpaced the delivery and availability of alternative transport choices, maintaining a reliance on private vehicles, resulting in increased severance, congestion and reduced liveability and sustainability of Rolleston (60%)

7.1 Context

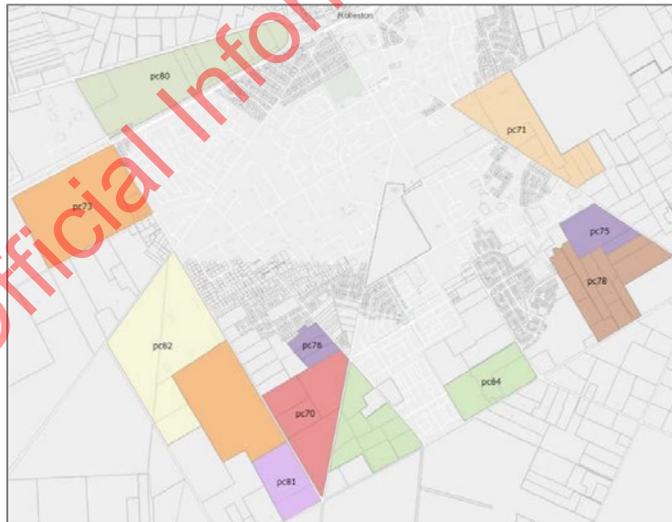
Problem 2 is about the severance of the State Highway and rail corridor and how the current signals incur congestion in the future. Additionally, Problem 2 covers how the lack of travel choice reinforces increased car use with effects on the wider liveability and sustainability of Rolleston.

Currently, locals generally only have one viable transport option (the car) for most of their journeys, which in part is driven by that fact that many employment opportunities are in the industrial area of Rolleston or other places for shopping, recreation and work opportunities are in Christchurch. This is likely to remain the case for the foreseeable future, with the increase in the housing (typically low density) expected to continue to outpace the increase in the number of employment opportunities locally in Rolleston.

These factors result in increasing traffic volumes, which in turn influences connectivity, especially when negotiating the traffic signals to cross or turn across the large volume of state highway traffic. This is exacerbated by the presence of train movements across the Hoskyns Road level crossing. Journeys to, from and across Rolleston become longer and less reliable with high-volume roads increasing severance. These factors make walking and cycling, particularly across SH1, unappealing.

This continued reliance on the private car is simply not “sustainable”, which covers several facets:

- The rapid growth of Rolleston is expected to continue over the next ten years, both residential on the township side and business/commercial on the industrial side. This is not sustainable from a traffic operations perspective given that there is only a finite level of road capacity available. We need to provide connections that support all modes of travel and maximise throughput for key movements and high occupancy vehicles.
- The majority of housing developments are low-density, which increases the urban sprawl of the town and distances to the town centre and community facilities (see map to the left for current proposed Plan Changes). This increases the challenge of encouraging new residents coming to live in these outer suburbs to make journeys by walking and cycling.
- The Plan Changes and growth on the western edge of Rolleston will place more demands on the Dunns Crossing Road and Walkers Road cross district arterial and add to conflicts at the Dunns Crossing/Walkers/State Highway intersection.
- Having a disproportionate amount of residential development when compared to local employment and commercial land uses is not sustainable. To become a more sustainable and vibrant place to live, Rolleston needs to be a self-sustaining town which offers choice for workplace and shopping trips.
- A car-centric town centre does not provide a “liveable” community and is not environmentally sustainable. People need appealing active and public transport choices if we are to meet the national climate change objectives.



Ultimately, Rolleston requires a truly integrated land use and transport solution that connects walking and cycling paths and enables greater uptake of public transport, while managing traffic flows on roads that are appropriate for their movement. The NZUP intends to be part of this solution, and the preferred programme identified through this DBC will help support this change along with other improvements that SDC has proposed through their LTP. While the rapid development is part of the connectivity problem, it is also an opportunity to attract more businesses locally with workers having a fuller suite of better travel options available.

7.2 Factors which influence connectivity and liveability

7.2.1 Rapid change in population

Accelerated changes in land use are affecting travel demand patterns, with increased demand to access SH1 for employment opportunities further afield (primarily at Christchurch) and to access local employment and amenity on the other side of SH1. Selwyn District and Waimakariri District (to the north of Christchurch) have seen their populations grow rapidly post-earthquake in response to a lack of robust housing stock, and more affordable prices outside of the Christchurch greater urban area. **Selwyn's population growth has been greater than national growth every year for over 20 years** with most years since 2001 recording population growth more than 4%²³. It is currently the fastest growing district in New Zealand. From 2013 to 2018, **Rolleston has experienced 60% population growth** which is notably higher than the wider Selwyn District, Christchurch City and the national growth.

The rapid changes in land use are characterised by forecast population and commercial growth as well as uncertainty in the level of growth at key locations such as Burnham Camp and Rolleston Prison. The population in Rolleston is forecast to increase by a further 69% from 2018 to 2043, with an average increase of 2.8% annual growth, compared to the national average annual growth rate of 0.9%.

The population growth represents an increasing number of people needing to cross or access SH1, which Table 8 demonstrates will become busier – driven by wider economic growth and activity.

8: SH1 traffic growth in Rolleston

Location	SH1 Traffic Volume			Percent Growth %		Percent Growth per year %	
	2013	2018	2038	2013 - 2018	2018 - 2038	2013 - 2018	2018 - 2038
Hoskyns Road to Weedons Ross Road	20,500	24,200	33,000	18%	36%	3.61%	1.45%

Plan Change 73 is one of the key development areas which, if approved, would further drive the need for change along the state highway. Located immediately south-west of the SH1 / Dunns Crossing / Walkers Road intersection, it covers a large parcel of land (87.5 hectares) and could potentially accommodate around 1,050 residential lots/units. The developer has prepared their masterplan on an assumption that Waka Kotahi / SDC will require some land to construct a future roundabout.

7.2.2 Economic growth of Selwyn District

Along with residential growth, another driver for increasing traffic volumes is the wider economic growth of the Selwyn District. It is still predominantly a rural economy with a primary industry focus, including dairy, agriculture, and manufacturing. The overall growth of 3.8% is double the national average of 1.9% in the last year. Selwyn also recorded an economic productivity growth of 2.9% in 2019, which is more than double the national average growth of 1.1%.

This evidence shows that there has been a significant growth in the overall economy and a change in the structure of the economy. There has been a large uptake of businesses within the RIZ as it has become a major centre for manufacturing, processing and freight distribution, for example the “Warehouse” has its main South Island distribution centre in the RIZ, and two inland ports have been established with road and rail connections. This will in turn put further importance on maintaining the reliability of journey times along SH1 and will see a rise in heavy traffic.

The Kotahi/Port of Tauranga inland port and LPC/Midland Port, located within the industrial zone forms part of demand for longer distance trips. Trucks pick up freight from the inland Ports and distribute it around the South Island by road. Likewise, trucks also deliver freight to the inland Port to be transferred to rail and taken to Lyttelton or Prime Port Timaru. Ensuring safe and efficient rail freight connections is important for growth across Canterbury and hence rail improvements are proposed as part of the NZUP programme. Furthermore, as truck movements in-and-out of the RIZ increase and become more congested these longer distance movements also become impacted and separating local Rolleston connectivity from the national state highway movements has benefits for everyone. This is evidenced by increasing volumes on the state highway in Table 8 that are impeded by the current traffic signals in Rolleston and create further severance to the connection between the northern and southern sides of the town.

7.2.3 Inefficient access between the Rolleston town and industrial area

Currently around 1,000 people travel to work daily to Rolleston iZone (RIZ)²⁴. The Rolleston urban area south of SH1 makes up a third of all arrivals to the iZone. Other arrival come from the Weedons interchange via Jones Road, or local roads to the north and west of the industrial area. The motor vehicle is by far the prevalent mode of transport to the iZone for workers with around 96% of people arriving by vehicle against 1% who cycle and

²³ <https://ecoprofile.infometrics.co.nz/Selwyn%2BDistrict/Population/Growth>
²⁴ 2018 census

0.5% who walk. Generally there is high car usage for journeys to work, whether short-distance or long-distance for those workers who live in Rolleston.

The Rolleston Drive North to Hoskyns Road connection is the principal means of access to the RIZ; however:

- The connection requires people to go through two sets of traffic signals. As traffic volumes increase, delays at all intersection approaches are increasing and people experience high delays of up to 10 minutes getting between north and south Rolleston across SH1 – despite the ‘crow-fly distance’ being less than 100m. This results in some vehicles re-routing through the Weedons Road interchange.
- The demand for the Rolleston Drive North to/from Hoskyns Road connection is high – forecast at up to 700 vehicles during the 2038 AM peak hour. The development of employment within the RIZ and trips associated with Rolleston town centre create the demand for significant cross network movements. Growth in vehicle trips in the industrial area between 2021 and 2038 is around 1750 vehicle trips in the PM peak hour.

7.2.4 Limited uptake of active modes and effects

SDC has established some sealed off-road cycleways between townships and more recently they have been establishing shared use paths within the urban areas, such as that along Rolleston Drive North. It is recognised that the focus needs to shift to improve active mode infrastructure within townships to develop connected routes and opportunities that cater for 5-7km trips that people will feel comfortable to cycle.

Rolleston residents have high access to motor vehicles with around 80% of households owning two or more vehicles. Combined with limited investment to enable active modes to cross SH1, this cements travel by private car even for local trips. As a result, liveability, and carbon use reduction objectives are not currently being met.

SDC’s Walking and Cycling Strategy notes that residents have been generally supportive of Selwyn Council’s current endeavours to enable additional walking and cycling opportunities within and between Selwyn’s townships, and residents wish to see pace of current walking and cycling improvements continue²⁵.

There are limited separated cycle lanes in Rolleston town centre (although some are being installed as part of current Town Centre redevelopment works) and the RIZ. There are cycle and pedestrian shared paths along Hoskyns Road in the industrial zone and Rolleston Drive in the town centre, however SH1 creates major severance between the two with only a single signalised pedestrian crossing across SH1 between these intersections. There is a shared path that links the eastern Rolleston urban area with the Weedons Ross Road flyover, recently completed as part of CSM2. There is a disconnect with these routes not joined up which reduces effective use.

7.2.5 Increasing use of rail for freight

KiwiRail are forecasting a 40% increase in freight tonnage in New Zealand by 2052 and is expecting rail to expand to support this growth. This will be delivered through increased rail movements taking some of the freight off the roads and onto rail. This is expected to provide significant safety, congestion, and environmental benefits as every tonne of freight moved by rail delivers at least 70% reduction in carbon emissions compared with heavy vehicle road freight. The benefits of transferring freight from road to rail extend beyond Rolleston, as it would help relieve pressure at more sensitive locations such as Brougham Street in Christchurch.

The inland Ports in Rolleston provide rail connectivity to Lyttelton Port and PrimePort Timaru. While the latter have relatively low usage at present, it is important for resilience of the transport system to be able to go to either port. This was particularly evident during the Christchurch earthquakes when Lyttelton Port was temporarily out of action, leaving Timaru as the only operating port in Canterbury.

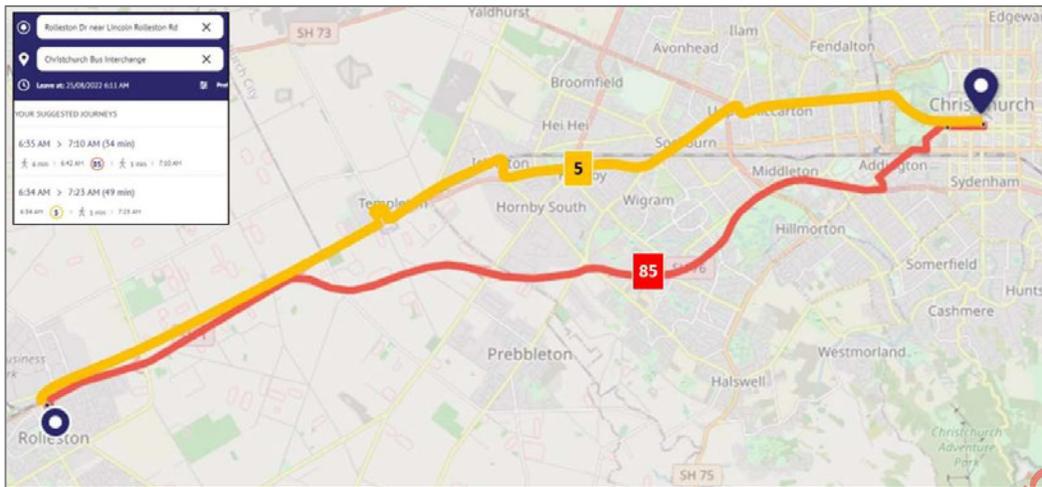
Currently the Midland rail line and all rail sidings point eastwards meaning that any train wishing to go south (i.e. to Timaru) on the Main South Line require a convoluted shunting operation or movement to the Middleton Rail yard. The NZUP rail improvements aim to provide better connectivity to the south and safer, more efficient rail operations within Rolleston.

7.2.6 Public transport and active mode accessibility

Most of the places of employment in the Canterbury region are outside the reach of Rolleston-based walkers, cyclists, and public transport users.

The minimum bus journey time between Rolleston and the Christchurch Bus Exchange is 34 minutes (not accounting for walk distances from home or work at either end of the journey). However, this relatively good journey time is offered only for the express bus service which departs in the morning peak period (at 06:35, 07:00 or 07:35). Otherwise, typically journey times are around 50-65 minutes in length, which compares poorly with a typical car journey of around 25-30 minutes. Employment in Christchurch is also not heavily concentrated within the CBD, but rather spread across much of the city which means that a high proportion of places of work are not reasonably accessible by public transport.

²⁵ Residents’ surveys and feedback from Annual Plan submissions



13 Public transport journey to Christchurch

In terms of cycling accessibility, most places of work in Rolleston are a reasonably accessible distance from any place of residence in Rolleston (no more than a 4km journey). However, most local employment opportunities are within the industrial area, and SH1 currently presents a notable obstacle for ease of movement. Getting across SH1 is neither quick (due to the traffic lights), direct (the need to dog-leg across via Hoskyns Road) or pleasant (poor quality footpaths, and no cycle connection). Currently around 19,500 people live within a 30-minute cycle trip of the RIZ²⁶.

SDC's District Plan outlined the desired future cycle network²⁷ for Rolleston and highlights the needed for a direct, high-quality, connection between Rolleston Town Centre and the iZone. Currently there is a notable gap in the network between the cycle facilities on Tennyson Street (Town Centre) and those on Jones Road.

7.2.7 Rail operations

A high proportion of the rail freight passing through Rolleston terminates at the Inland Port. From here, there is a transfer of goods between road and rail. It is therefore essential from an economic perspective for efficient transfer of goods. This can be achieved in part by minimising shunting operations that effect the level crossings. There are also several shunting movements each day into the Synlait siding.

There are several limitations on the rail network in Rolleston that result in reduced connectivity and limit utilisation. Poor access to the Rolleston area from the south can result in additional shunting movements. This limits network capacity and results in delays to other services. The movements between the south and the west are particularly restricted, requiring back-shunts.

Level crossings across key roads (Hoskyns Road, Weedons Ross Road, Two Chain Road and Jones Road) result in delays to traffic and to reduced rail speeds due to elevated safety risks. Key operational influences are:

- There is a change in signalling systems at Rolleston between the Main South Line and the Midland Line where paperwork²⁸ is to be undertaken before train movements can progress. This can create delays and inefficient operations (this is a wider network problem, rather than one specific to Rolleston).
- The limited extent of the Rolleston station yard (from a signalling perspective) means that many shunting movements may extend beyond the limits of the station yard and therefore may result in delays to the adjacent track sections.
- Access to the LPC siding is from the north only. Trains wishing to access the siding from the south need to be reversed back into siding from the Main South Line (at walking pace). This creates delays for other trains and delays traffic on both Jones Road and Weedons Ross Road).

7.3 Consequences of poor connectivity

7.3.1 Severance

The limited provision to cross SH1 and the railway lines by active modes and overall poor accessibility by active modes and public transport means that SH1 forms a barrier to these modes. The high reliance on motor vehicles coupled with growth of SH1 volumes means that the highway also forms a partial barrier to private car and road freight.

At the existing signals, active modes, road freight and buses approaching from local roads will face higher delays as volumes increase on SH1. In conjunction with growing congestion, this will increase demand to use

²⁶ Based on cycling accessibility mapping

²⁷ www.selwyn.govt.nz/_data/assets/pdf_file/0016/14371/090923-08-MovementNetwork.pdf

²⁸ Train warrant system, as opposed to modern automation

parallel routes (rat running). This will have a detrimental effect on the road network performance and create severance on other parts of the network.

7.3.2 Sustainability & carbon use

The current dependence on motor vehicle use and limited investment in other modes does not align with objectives for sustainability and decarbonisation.

Due to limited connections between employment sites and the town centre, the 20-30 minute catchment area for pedestrians and cyclists to industrial employment sites from Rolleston town centre is small (as far as Link Drive). This illustrates how actual and perceived severance of SH1 and the rail corridor is hindering access by active modes between employment sites in the west and the town centre and residential areas to the east.

The lack of investment in routes as Rolleston has grown in recent times has created a 'barrier' with very limited active mode permeability between the residential area and SH1. This lack of direct routes increases the travel distance between residential and employment areas, which exacerbates reliance on private car use.

In addition to this, the restrictions to rail operations in the Rolleston area reduce the competitiveness of rail transport relative to road transport.

7.3.3 Inefficient movement for freight

A specific issue aligned to the growth of the RIZ is the route for freight to/from SH1 to the south. The preferred strategic route to the RIZ is to turn left into Walkers Road, across the level crossing and then turn right into Two Chain Road, across a second level crossing before finally turning right into Jones Road²⁹.

The issue is the return journey (heading southbound along SH1), with the forecast increased flows on SH1 through Rolleston. The already challenging and unsafe right turn out of Walkers Road onto SH1 will become even more difficult in the future, which may force freight to use alternative and much longer routes (such as via the Weedons Ross Road interchange). As discussed earlier, the issues facing rail also results in inefficient road freight movements as additional delays are being encountered at level-crossings.

7.3.4 Social and community liveability

As described earlier, there are wider social impacts associated with poor connectivity between the north and south of Rolleston. Physical separation of the town centre with the main employment area translates into an emotional sense of disconnection and limits opportunity for the town itself to feel like a vibrant area. Even in a simple sense, a lot of people are not afforded that opportunity 'to walk into town for lunch'.

7.4 Connectivity problem – summary

The rapid, and continued, growth of Rolleston means that travel times (for all modes) across town and to Christchurch will also rise. Without improvements significant congestion is expected to be experienced. This has wider economic impacts to freight efficiency and public transport journey times. The lack of rail connectivity further limits the efficient movement of freight.

Furthermore, the physical separation of the town centre with the main employment area creates an emotional disconnect and limits the opportunity for the town itself to feel like a vibrant area. In general, a car-centric town centre does not feel "liveable".

²⁹ Note that through an inter-dependant project SDC will upgrade Two Chain Road, including a roundabout at Walkers Road / Two Chain Road, and a new aligned level crossing to Jones Road.

8 SITE SPECIFIC PROBLEMS

8.1 Dunns Crossing Road / Walkers Road

The key problem at the Dunns Crossing Road / Walkers Road intersection is safety. There is a high volume of traffic looking to cross the SH1, which itself is a high speed (100kph) road with high traffic volumes (approx. 12,000 vehicles per day³⁰). The effects of southbound traffic platooning from the signals at Rolleston Drive North have been dissipated by the Dunns Crossing Road / Walkers Road intersection, which means that there is a steady stream of high-speed traffic going through the intersection. This makes it difficult for vehicles, and particularly trucks, to find a safe gap in the traffic to enter or cross the state highway.

Over the last ten years there have been 28 crashes of which 4 resulted in a DSI.

Whilst these statistics may seem moderate in comparison to some other intersections, the statistics are not telling the whole story. The rapid growth in development in the area means that the context of the area is changing from a rural to an urban landscape, and soon there will be a step change in the demand for people wanting to turn right into the state highway.

The driving factors behind the safety risk are:

- High volume of traffic along SH1, with growth being driven by population and regional economic growth.
- High volumes of side road traffic, with growth driven by significant increase in resident population.
- High speed environment along SH1. A temporary speed limit reduction (70kph) is currently in place as an interim solution to the safety issue.
- High volume of trucks crossing SH1, which travel at a slower speed and need longer to turn into roads.

These factors are resulting in fewer safe gaps in the stream of traffic on SH1, and consequently an increase in the number of drivers taking risks. On top of these issues is the presence of a rail level crossing approximately 30m north of the intersection on Walkers Road. This creates an environment where the driver has a multitude of potential conflicts to consider, which means the risk of them making a critical mistake is even higher.

Travel delays are another consequence of how it is becoming ever more difficult to access SH1 at this intersection. This then has knock-on effects to freight efficiency and accessibility. Furthermore, the Dunns Crossing Road and Walkers Road corridors provide the main access routes into the Rolleston residential and industrial areas from the south.



8.2 Rolleston Drive South

The SH1 Main South Road / Rolleston Drive South intersection is priority-controlled onto a high-speed high-volume highway. As a consequence of this conflict, there is a high crash risk for right turning movements (inc. a recent fatality).

The removal of the Rolleston Drive North and Hoskyns Road signals as part of the NZUP proposal will effectively create an extension of the CSM2, where the first intersection heading southbound off the motorway will be the SH1 / Rolleston Drive South intersection. This means that travel speeds, and the expectation for a major side road intersection, will change.

The proposed service lane (see section 6) will restrict any movement from Tennyson Street and Brookside Road and provide safe acceleration and deceleration lanes on/off the State Highway. A roundabout at the Dunns Crossing Road / Walkers Road intersection will be highly visible and act as safety intervention that will help transition the speed. This means that if no improvement is made at



³⁰ TMS site Burnham - Sth of Burnham Rd, ID: 01500376

the SH1 / Rolleston Drive South intersection, then there would be a gap in what would otherwise be a **fully safe system** covering the entire corridor.

The already high risk of conflicts between the turning movements onto and off SH1 will be amplified as Rolleston continues to grow and traffic volumes increase. The intent is in the first instance to reduce the risk of the right turn against type crash, as this most likely contributes to DSIs. Reducing the likelihood of rear-end type crashes is the next priority.

8.3 SH1 through Rolleston

SH1 through Rolleston passes through several major intersections - Hoskyns Road, Rolleston Drive North, Tennyson Street, Brookside Road and Rolleston Drive South. Between Rolleston Drive South and Brookside Road there are also several accesses to major commercial enterprises, including McDonalds and BP.

For an 80kph national State Highway carrying over 10,000 vpd the desirable spacing between intersections and accessways is 400m³¹, but the current environment sees multiple accesses over just a 300m section south of Rolleston Drive North.

With so many closely spaced accesses and intersections, on a road with a high volume of traffic, the complexity of entering and exiting is increased. **Right turning movements create a significant crash risk at Tennyson Street and Brookside Road**, with drivers also needing to negotiate busy conflict points in close succession, with some opting to take narrow gaps. Increasing travel demands will directly correlate with an increase crash risk at this location. Figure 14 provides a Google Streetview image which shows the complexity of the current access to McDonalds and BP. It shows a second lane splintering off the exit lane without median (flush or otherwise) separation from through traffic.



14: Existing access from SH1 to McDonalds and BP

8.4 Level crossing risks at Hoskyns Road

The interaction between the level crossing and signals on both Jones Road and SH1 means that the risk of vehicles queuing back across the railway line is constantly high. Even with relatively low train frequencies, KiwiRail and Council have recorded a high number of 'near misses'. Traffic through both intersections is growing, and there is a feeling of "when", rather than "if", a major collision between a train and vehicle will occur. A crash would likely cause serious or fatal injuries. To resolve the safety issue, the conflicts between rail and road need to be removed or reduced.

8.5 Supporting future rail operations

Rolleston is a key inland freight hub with road-rail transfer capability. Rail operations include long distance line haul, shunts to the LPC siding and the Middleton railyard, plus long-distance connectivity to PrimePort Timaru, Synlait, Darfield and even further south.

Figure 15 provides a diagram of the Rolleston rail network, including key sidings and destinations.

³¹ As per Waka Kotahi Planning Policy Manual



15: Rolleston Rail Network

Improvements to rail operations in the area are needed as a means of addressing existing issues and supporting future growth in rail movements. Existing problems relating to the rail network at Rolleston are:

- Poor connectivity between the Main South Line and Midland Line results in additional shunting movements and level crossing closures. This limits network capacity and results in delays to other services.
- Train movements at level crossings across key roads (Hoskyns Road, Weedons Ross Road, Two Chain Road and Jones Road) result in delays to traffic and safety risks requiring reduced rail speeds. If there is investment in rail to increase its share of freight and passengers, these disruptions will be more frequent.
- The limited size and operations of the Rolleston station means that many shunting movements extend beyond the limits of the station yard and therefore result in delays to the wider network. The station may eventually be needed for passengers, and expansion may be required. This should not be precluded.
- Dual signaling systems between the Main South Line and Midland Line can create delays and inefficient operations.
- Lack of access to LPC siding from the south results in trains having to be reversed back into siding from the Main South Line (at walking pace). This creates delays for other trains and delays traffic on both Jones Road and Weedons Ross Road.

The most prominent issues to be addressed through rail network improvements are related to safety and operational efficiency of rail. In this context, we specifically refer to reducing the likelihood of road/rail conflict and improving rail operator safety.

9 WHAT IF WE ADOPT THE DO MINIMUM?

9.1 What is the Do Minimum?

The Do Minimum captures committed and funded activities, plus the minimum level of expenditure (upgrades and improvements) required to maintain the operation of the transport network. The interventions included within the Do Minimum form part of every option that is considered.

Defining the Do Minimum is important for two key reasons:

- It provides a basis for comparison, which means that we can better understand the relative benefits and cost of different options. The economic benefits are derived from a comparison against the Do Minimum.
- Assessment of the Do Minimum allows us to demonstrate the need for investment and helps us to establish when certain upgrades would be required.

Table 9 details the Do Minimum interventions. These were agreed at the start of the project with the project partners at a meeting on the 15th June 2021. Generally, there was a desire to include projects listed in the 10-year LTP within the Do Minimum, although it was noted this does not necessarily fit with current practice and the standard definition of a Do Minimum scenario as used in an economic assessment.

9 Do Minimum interventions

Theme	KPIs
Speed limit	<p>The Safer Speed Review (SPR) programme has identified the following proposed speed limits. It is proposed to include these in the Do Minimum network, as these changes would be made irrespective of the NZUP Flyover and Improvements:</p> <ul style="list-style-type: none"> • End of CSM2 to Brookside Road: 60kph • Brookside Road to Burnham: 80kph
Network upgrades	<ul style="list-style-type: none"> • Rolleston Town Centre links / improvements (Wordsworth Street extension, Moore Street extension). • Rolleston Drive / Tennyson Street, upgrade from roundabout to signals. • Tennyson Street / Moore Street roundabout (as per SDC Rolleston 2028 model). • Lowes Road / Levi Road / Masefield Drive, upgrade from roundabout to signals. • Brookside Road / Rolleston Road, upgrade from priority intersection to roundabout. • Broadlands Drive extension, between Springston Rolleston Road and Lincoln Rolleston Road. • Southwest Connector, extending between Weedons Road and Dunns Crossing (identified as "New Collector Road" in CRETS study) • Goulds Road / East Maddison Road, upgrade from off-set priority to roundabout which provides sensible linkage/structure around the Southwest Connector (not in SDC Rolleston 2028 model). • Selwyn Road / Weedons Road, upgrade from priority to roundabout. • Selwyn Road / Lincoln Rolleston Road, upgrade to seagull priority (noting SDC advice that this is improvement is paired roundabout upgrade above). • Jones Road / Two Chain Road re-alignment. • Two Chain Road / Walkers Road, upgrade from priority to roundabout

The 2028 and 2038 Do Minimum networks are largely identical. One minor addition included in the 2038 Do Minimum is a simple signalised intersection at Kidman Street / Rolleston Drive.

This has been included to manage the expected queue on the left turn out of Kidman Drive that was identified through the transport modelling.

9.2 What if we only do the 'Do Minimum'?

The most tangible impacts of adopting a Do Minimum approach are to safety and travel time. Simply – more people are likely to get injured on the roads, and people will start to experience very high level of congestion. Both factors influence local economic prosperity and lifestyles. **Appendix E** is the modelling report which indicates the traffic volumes that are likely to be experienced on the network in the Do Minimum scenario.

9.2.1 Safety

The evidence documented earlier highlighted the specific safety risks on the state highway. However, the impact of continued growth to the safety of the road network goes beyond the state highway corridor, and without intervention risks on local roads are likely to increase. As access onto SH1 becomes more difficult, people will start to use alternative (rat-run) routes on parts of the network which were designed to accommodate high volumes of traffic. These could be roads which where priority is for more vulnerable users – such as cyclists, or where there are more likely to be vulnerable users (such as children walking to school).

Crash predication models have been developed for the project, which covers a total of 37 intersections and 42 sections of road across Rolleston. Under 'Do Minimum' conditions the following is predicted:

- 5-6 crashes per year that result in Death or Serious Injury (DSI) will occur on SH1, from 2028.
- 12-15 DSIs will occur on the local road network from 2028.

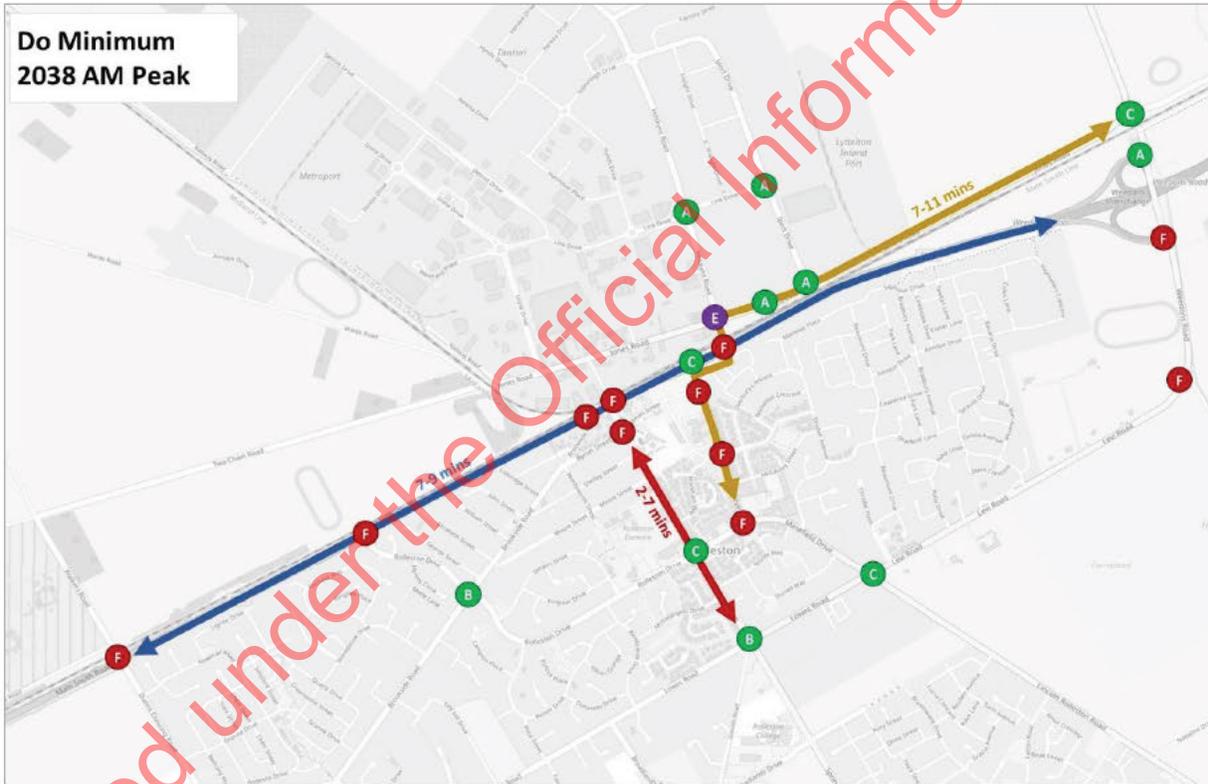
9.2.2 Congestion

To understand the implications of future growth on the Rolleston transport network, and the potential benefits of the NZUP proposals, a bespoke microsimulation (Paramics) model was developed for the project. The model has also provided wider applications including the evaluation of alternative options, inputs into the design and inputs for the economic assessment. **Appendix E** provides the Do Minimum traffic modelling outputs.

A representation of the intersection level of service (LOS) and travel times for key journeys is provided within Figure 16 for the 2038 AM peak. The AM peak is the most critical, as this is when there is a concentration of demand for travel from Rolleston to Christchurch (morning peak commute). This is when the operational performance of the network is most stretched.

AM, Inter-Peak (IP) and PM period models have been calibrated and validated to observed transport data collected since the opening of the Christchurch Southern Motorway Stage 2 (CSM2), representing broadly March 2021. The development of the model and key calibration/validation outcomes are described in **Appendix G**.

For reference – LOS E or F is typically considered to be unacceptable in terms of intersection delay.



16 Do Minimum – 2038 AM Peak

The major takeaway from the model is that there is a high degree of confidence that at some point between 2028 and 2038 significant congestion will occur at all intersections on the state highway.

This result is driven by two factors – the limited capacity of the intersections and the expected continued growth of Rolleston. Whilst the signals are operating relatively well now, we’re soon reaching the tipping point where a small amount of additional traffic will trigger long delays³². The following figures are ‘heatmap’ snapshots from the microsimulation model which provide a representation of queuing during the 2038 AM and PM peaks respectively.

³² The assumed overall growth (in total trips across the network), based on the land use inputs agreed with the client group, is 3.3 - 3.5% per annum in 2028 and 2.2 - 2.5% per annum in 2038.



17 Do Minimum - 2038 AM Peak - Congestion Heat Map



18 Do Minimum - 2038 PM Peak - Congestion Heat Map

In both periods, significant queuing is expected at the pair of signals on the state highway and at the Weedons Ross Road interchange (particularly in the PM peak). The poor performance of the interchange is due to

rerouting of trips as people seek to minimise their travel times – meaning people choose to exit/access the state highway at this location to avoid high delays at the Rolleston Drive North and Hoskyns Road signals.

Summary – the case for change in a nutshell

Simply – the current access arrangements across and onto the state highway cannot support future growth and if we do nothing we will see:

- More deaths and serious injuries on the state highway, and potentially also across the level-crossings.
- Unacceptable levels of delay on both the state highway and across the local road network. This will reduce liveability and limit further future growth (inc. new employment opportunities).
- Continued low number of people walking or cycling between home, work and recreational places.
- Increasing traffic that will create even more disconnect between the town centre and employment area.
- A disconnected cycling network, with the state highway continuing to be the point of severance.
- Reduced reliability for freight journeys
- Continued reliance on road-based freight for movement between the West Coast and Lower South Island.

SDC are planning for significant investment in the local road network, with numerous intersection upgrades and plans to create a step change in the level of service being provided for pedestrian, cyclists and public transport users. However, without investment on SH1 the benefits of these interventions might not be fully realised – with people taking alternative routes to avoid bottlenecks at the state highway

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10 BENEFITS, INVESTMENT OBJECTIVES & KPIS

10.1 Benefits

This business case has referred to the Benefits Framework outlined in Waka Kotahi’s Investment Decision Making Framework (IDMF). This new benefits framework is aligned with the five outcomes in the Ministry of Transport’s Transport Outcomes Framework (TOF)³³.

The problem statements align strongly with three of the five TOF outcomes – ‘inclusive access’, ‘economic prosperity’ and ‘healthy and safe people’. The project would also partly deliver the ‘resilience and security’ outcome as the NZUP proposals provide flexibility for changes to the State Highway (e.g., future four laning, or changes to the posted speed limit). When compared to the ‘Do Minimum’, which requires slower speeds on road and rail, the project would also come some way to addressing ‘environmental sustainability’ as overall network congestion would be reduced.

The IDMF benefit framework was then applied to help determine the range of potential monetised and non-monetised benefits of solving each of the problems. These are outlined within Table 10 along with an overview of which of the outcomes are captured by which problem statement.

10 Benefits of investment

Problem Statement	Transport Outcome					Benefits
	Inclusive access	Economic prosperity	Healthy & safe people	Resilience & security	Environmental sustainability	
Safety. Increasing traffic and rail movements and poor interface with local road intersections and level crossings is resulting in increased conflicts, and the risk of death and serious injury.			✓	✓		Monetised <ul style="list-style-type: none"> • Lower likelihood of DSIs and number of crashes • Reduced road/rail incidents Non-Monetised <ul style="list-style-type: none"> • Improved infrastructure risk rating – road and rail • Improved safety perceptions of all modes - via surveys • Improved personal and collective risks • Impacts on physical and mental health, emissions, noise
Connectivity. Rapid growth and changes in land use has outpaced the delivery and availability of alternative transport choices, maintaining a reliance on private vehicles, resulting in increased severance, congestion and reduced liveability and sustainability of Rolleston	✓	✓		✓	✓	Monetised <ul style="list-style-type: none"> • Travel time and delays between key destinations • Access to key economic destinations • Network productivity – freight throughput • Vehicle operating cost and emission reduction • Number of active mode trips between workplace in iZone and residence in Rolleston • Walking and cycling times and delay between iZone and Rolleston Town Centre Non-Monetised <ul style="list-style-type: none"> • Punctuality – public transport • Improved feeling of social connectiveness • Improved access to key social destinations • Improved travel choice – mode share • Reduced severance created by high traffic volumes on the state highway • Ability to adapt to future changes in land use and transport options (state highway corridor, public transport, walk and cycle) • Availability of viable alternatives – (reduced road closures due to crash occurrence)

³³ www.nzta.govt.nz/assets/planning-and-investment/docs/benefits-framework-june-2020.pdf

10.2 Investment Objectives

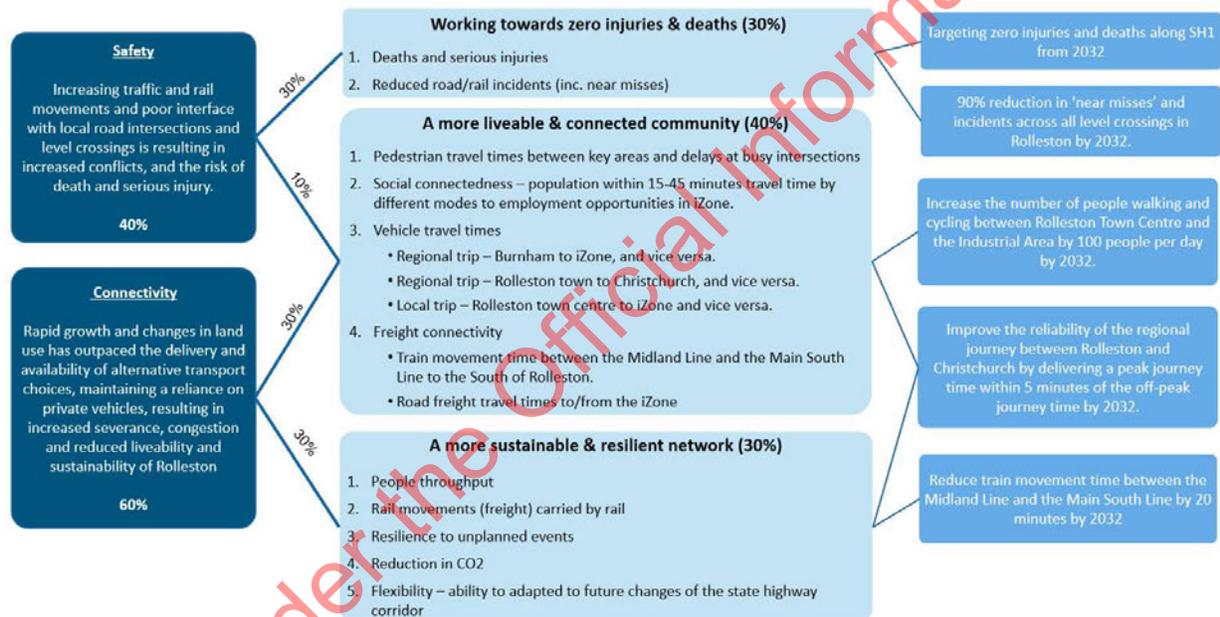
Three general benefit themes that have emerged, aligned to Waka Kotahi’s Benefits Framework:

1. Work towards zero injuries and deaths
2. Support a more connected community
3. Provide a more resilient and sustainable network

This has then informed the Investment Objectives through an Investment Logic Map (ILM) process. The ILM is provided as Figure 19, whilst the Investment Objectives are outlined in Table 11.

11 Investment Objectives

KPIs	Investment Objective
Safety	Targeting 40% deaths and serious injury reduction along SH1 from 2032.
	75% reduction in ‘near misses’ and incidents across all level crossings in Rolleston by 2032.
Connectivity	Increase the number of people walking and cycling between Rolleston Town Centre and the Industrial Area by 100 people per day by 2032.
Sustainability and Resilience	Improve the reliability of the regional journey between Rolleston and Christchurch by delivering a peak journey time within 5 minutes of the off-peak journey time by 2032.
	Reduce train movement time between the Midland Line and Main South Line by 20 minutes by 2032.



19 Investment Logic Map

10.3 Key Performance Indicators

The full list of Key Performance Indicators (KPIs) that align to each benefit are outlined in Table 12.

12 Key Performance Indicators

Benefit	Key Performance Indicator		
	KPI	Baseline (Do Min)	Forecast (Preferred Programme)
Work towards zero injuries and deaths	Crashes and DSIs	<ul style="list-style-type: none"> 70 crashes per year on SH1 and 6 DSIs per year on SH1 (2038) 	<ul style="list-style-type: none"> 75% reduction in crashes on SH1 and 40% reduction in DSIs
	Collective and Personal Risk on SH1	3 high risk, 1 medium, 1 low medium risk intersections	<ul style="list-style-type: none"> Collective risk reduced to Medium or lower. Personal risk reduction at intersections of >50%.
	Reduced road/rail incidents	26 incidents at Hoskyns Road level crossing, including 11 collisions, and a temporary train speed.	The number of near misses is expected to drop close to zero at the Hoskyns Level Crossing. At other level crossings, no significant change in traffic volume is expected.
Support a more connected community	Rolleston town centre to/from the RIZ	9 / 15 minutes (AM/PM peaks)	6 / 6 minutes (AM/PM peaks)
	Social connectedness population within 15-45 minutes travel time by different modes to employment opportunities in iZone	Forecast travel times of 10-13 minutes in the peak direction between Rolleston Drive North and Jones Road in 2038	5-10-minute reduction in the travel by vehicle from Rolleston Drive North to Jones Road in the peak direction by 2038.
	More people walking and cycling between Rolleston Town Centre and the RIZ	Unpleasant environment for pedestrians and cyclists crossing SH1	Nicer and more direct connection will attract more people, with up to 100 users by 2038.
Provide a more resilient and sustainable network	Burnham to/from industrial area	7 / 14 minutes (AM/PM peaks)	6 / 7 minutes (AM/PM peaks)
	North of Weedons Road interchange to/from industrial area (to represent travel times between Christchurch and Rolleston)	15 / 19 minutes (AM/PM peaks)	13 / 12 minutes (AM/PM peaks)
	Train speeds on the Main South Line through Hoskyns Road level crossing	Temporary rail speed of 40kph on Main South Line	Restore rail speed to 80kph on Main South Line, saving 2 minutes per train
	Train movement time between the Midland Line and the Main South Line to the South of Rolleston.	Trains need to run to Middleton yard	Trains turn at Rolleston, saving 15km in each direction.
	Rail shunting time	2km shunt at 6kph backwards, 3x day, 5 days per week	2km shunt at 15kph
	Resilience to unplanned events (crash related road closures)	70 crashes per year on SH1 (2038)	<ul style="list-style-type: none"> 75% reduction in crashes
	Flexible – the ability to adapt to future changes in the form of the State Highway corridor	No future proofing	<ul style="list-style-type: none"> Improvements support any four laning of the SH1 corridor. Supports future Park and Ride off Jones Road.

Although the NZUP package will contribute to liveability benefits, other investment may be required to realise these benefits (for example, through the Rolleston Town Centre masterplan process). Therefore, no specific liveability KPIs have been defined, with the focus being on connectivity by different modes as a way of quantifying this particular investment objective.

11 KEY CONSTRAINTS & DEPENDENCIES

This business case has many interdependencies with other projects which will assist the preferred option to achieve the project objectives.

Achieving the objectives, in particular improving access for people in the Rolleston area to Christchurch, access for freight to the inland ports, and public transport reliability, will depend on the concurrent complementary projects being implemented along the SH76 Brougham Street and SH1/SH76 CSM corridors.

13: Constraints, dependencies, opportunities and assumptions

Constraints	
Rail corridor	Not encroaching onto the rail corridor in order to protect for a potential double track south of the Midland junction. There is also a desire to protect for potential widening of the state highway in the future, which would need to be on the north-western side of the Main South Rail line.
Dwellings and buildings	Residential dwellings are located on the southern side of the State Highway, while there are several businesses located on the northern side. Property acquisition needs can affect the project programme and other effects such as noise pollution and access restrictions during construction could place restrictions on construction, which can also affect the programme.
Dependencies	
Road to Zero Speed and Infrastructure Programme (SIP)	SIP has identified various safety improvements south of the Rolleston area. This project will need to complement and enhance the SIP safety improvements and align with the delivery timelines. Without Rolleston Access Improvements other works may be required to enable appropriate connections. The scale of outcomes being delivered by this DBC will be dependent on what is being delivered also by the SIP – for example, wire rope barriers along the state highway.
Rail improvements	KiwiRail improvements and shunting operations at Rolleston are an important interdependency with this project, both between the inland ports and direct access from the south from the Main South Line to the Midland Line
Opportunity	
Rolleston Industrial Zone development	The future development of the RIZ can exacerbate existing issues related to congestion and road safety. However, there is also an opportunity to accelerate the development of the iZone by implementing the improvements proposed in this DBC. The improvements provide better transport connections within Rolleston, leading to a more resilient and sustainable transport network. The agglomeration of businesses in the RIZ and the improved transport network will enable Rolleston to be a more self-sustained community that is more attractive to live in. Therefore, the developer contributions from the RIZ to further enhance the community will need to be carefully managed.
Assumptions	
Wider programme elements	It is assumed that in order to deliver a comprehensive multi-modal response to the identified problems that other parallel elements such as public transport (for example from the Public Transport Futures Business Case) will be supported and developed. It is assumed the Rolleston Access Improvements, and possible public transport projects, can be developed in a complementary manner.
Growth	It is assumed that over the assessed project period population growth will proceed in line with Greater Christchurch Partnership scenarios / projections (such as those in the Christchurch Transport Model, CTM). These assumptions are used in the traffic modelling assumptions and flows onto economic evaluation. Further checks have been made against the evolving Selwyn District Plan Changes and bulk retail growth area.
Rolleston Structure Plan	It is assumed that growth will occur in the areas identified in the structure plan. The traffic distribution and routing rely on this assumption.
SDC Long Term Plan	It is assumed that SDC LTP elements can be successfully coordinated and integrated with the delivery of the Rolleston Access Improvements. There are complementary projects that will enable the safe and efficient delivery of the Rolleston Access Improvements. The key local road upgrades are identified in Section 36.3.
Active mode connections	It is assumed that in order to deliver a comprehensive multi-modal response, SDC will develop additional walking and cycling connections where appropriate to link into active mode provisions delivered as part of the Rolleston Access Improvements. In reciprocity, the Rolleston Access Improvements project will ensure that the future expansion of the SDC's walking and cycling network is not materially affected by the proposed design.
On-going maintenance	It is assumed that maintenance of SH1 will be on-going in the project area, including annual and periodic maintenance as outlined in the Forward Works Programme.
District Plan - Private Plan changes	It is assumed that the plan changes under application will not adversely affect the proposed programme of works within this DBC. There is an opportunity to leverage these plan changes and associated developer contributions to enhance the local road network, which could complement the work delivered by Waka Kotahi. It is acknowledged that this is subject to discussions between developers and SDC, and sits outside the scope of the DBC.

PART B: ECONOMIC CASE

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12 FEEDBACK FROM ENGAGEMENT (ROUND 1)

12.1 Overview

During the first round of community engagement, Waka Kotahi reached out to the local community and businesses with a first draft of what the Rolleston transport improvements could look like. The plans that were presented were those that were defined as part of the NZUP scope which was informed by the PBC. Any emerging refinements to the skewed option, as indicated in the previous chapter, were not presented.

The engagement period ran for one month in July/August 2021. A robust engagement process allowed opportunity for the community to participate through a range of information sessions and communication platform. Residents, interest groups, local business groups, businesses and commercial property owners were involved and had an opportunity to provide feedback.

12.2 Community feedback and concerns

Suggestions and comments were received through the Social Pinpoint platform, community information sessions and email submissions. While people acknowledged the need to connect both sides of Rolleston, the public consultation process revealed some key community concerns about the draft proposal for Rolleston which prompted further investigation.

These concerns included:

- Reduced highway access – multiple points should remain open.
- The potential for overloading Weedons Interchange.
- Emergency service response times potentially affected.
- Increased traffic on local roads and past schools.
- Vehicles are being re-routed to drive through too many roundabouts on the industrial side.
- Removing the Hoskyns Road level crossing required travel through multiple roundabouts.
- Closure of a section of Jones Road would affect access and be detrimental to businesses, services and facilities to the southwest of the industrial area.

Some people commented that a bridge connecting to the east on Jones Road – and then having to backtrack to other industrial areas and businesses – was too limiting. People said they wanted access to all the industrial area and the continuity of Jones Road to remain.

Feedback received has been used to assist in technical investigations for further improvements to the Rolleston flyover and transport improvements.

12.3 Targeted engagement

During the project, one-on-one engagement with key stakeholders and/or directly affected parties was undertaken. This kind of engagement captured, but was not limited to, sessions with the following parties:

- KiwiRail and SDC (regular throughout the project)
- St Johns Ambulance (September 2021)
- Jones Road businesses (September 2021)
- Rolleston Cycle and Mobility Advocacy Group (March 2021)

13 APPROACH TO OPTIONEERING

13.1 Step-by-step process

As the DBC scope was defined by the NZUP proposals, the following step-by-step process was agreed and undertaken to identify a preferred programme of works. Optioneering has considered the alternatives for individual components of the programme (e.g. service lane, flyover, Dunns Crossing Road/Walkers Road roundabout and then rail improvements). The individual components are mutually exclusive, as such optioneering at a “programme” level was not necessary or appropriate.

13.1.1 Step 1: Initial testing of the NZUP proposals

1. Consult with the community around the NZUP proposals, as established by the PBC.
2. Test and refine the ‘skewed flyover’ option (in parallel to step 1). The purpose was to ‘try and get the skewed flyover working as best as possible’. It involved the following tasks:
 - a. In parallel to consultation, initial testing of the NZUP proposals (with focus on the skewed flyover) to understand the benefits and identify and potential wider network impacts. Traffic modelling focused tasks using the peer-reviewed microsimulation model.
 - b. Investigation into ‘add-ons’, such as a slip lane from SH1 to Kidman Street and roundabout metering at the Weedons Ross Road interchange, that could further improve the performance of the ‘skewed flyover’ option.
 - c. Identification of a ‘refined skewed flyover’ option.



20 Stage 1 – Initial testing of the NZUP proposals

At the end of Stage 1 there was a clear message coming from both the modelling investigation and feedback from public consultation. This was to **take a step-back and confirm that the options presented within the PBC are indeed the optimal ones that should ultimately be taken forward to construction.**

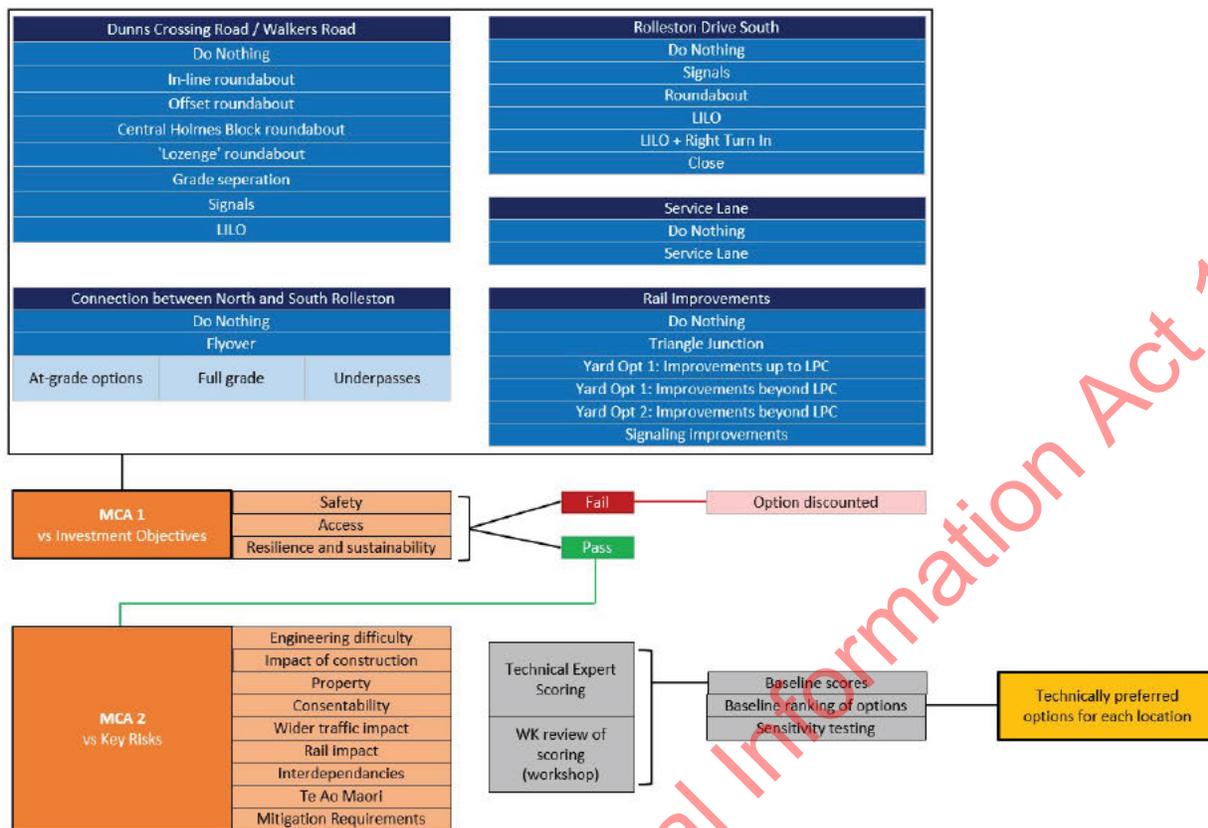
Refer to **Appendix B** for the engagement summary report.

Stage 2 of the process then follows the standard DBC processes and conforms with the requirements of the Resource Management Act.

13.1.2 Step 2: Alternatives and Options Assessment

The purpose of Stage 2 was to identify and assess all feasible alternatives for the flyover, service lane, rail improvements and the Dunns Crossing Road/Walkers Road intersection. Indeed, when it came to the flyover that was intended to provide an Improved Rolleston Connection the team took a step back further and investigated a wide range of alternatives and options including whether there were any feasible at-grade solutions.

The ultimate outcome of the option development and assessment process as summarised in the following diagram, were the **technically preferred options for each location.** The refined options then went out to a second round of public engagement.



21 Stage 2 – Alternatives and Options Assessment

13.1.3 Step 3: Refining designs and responding to feedback

Generally, there was strong support from the community in relation to the technically preferred options. There were however some remaining questions that needed to be answered, and specific design and property related issues to be addressed.

Approval process

The 'technically preferred options' were established through the MCA process plus a review of technical work such as traffic modelling, concept design, cost estimates and environmental impacts. These 'technically preferred options' were then taken forward to the Project Partners for review and approval before then being presented to the public (engagement round 2).

The final preferred options were established following a review of the public feedback on the 'technically preferred option'.

13.2 Approach to MCA

A Multi-Criteria Analysis (MCA) approach has been adopted for the evaluation of potential alternatives. It captures the following two-phase approach, which is further detailed in **Appendix F**.

- **Phase 1:** A pass/fail of each alternative against the investment objectives. Any alternatives that could cause any of the agreed problems to worsen (e.g. increase the potential number of DSIs) were dropped at the end of this phase. This aligns with the general approach of Waka Kotahi's Early Assessment Sifting Tool (EAST). This assessment was undertaken by the project team with conclusions agreed with partners.
- **Phase 2:** MCA of remaining alternatives, focusing on criteria that correspond to the key project risks.

13.2.1 Phase 1: Pass/Fail vs Investment Objectives

To recap, the themes of the investment objectives are:

1. **Safety:** Work towards zero injuries and deaths by reducing intersection conflicts.
2. **Connectivity:** Support a more connected community, resulting in liveability benefits.
3. **Resilience and sustainability:** Provide a more sustainable and resilient network.

The NZUP outcomes are broadly covered under the investment objective themes, and as such a specific assessment of the options against the inherent NZUP outcomes was not required.

13.2.2 Phase 2: MCA against key risks

The MCA criteria are provided within Table 14. For the Investment Objectives, sub-criteria were identified which capture the project KPIs.

14: MCA criteria

Theme	Criteria	Sub-criteria
Investment Objectives	Investment Objective 1 Work towards zero injuries and deaths	Deaths & serious injuries
		Road/rail incidents
	Investment Objective 2 Support a more connected community, resulting in liveability benefits	Pedestrian travel times
		Social connectedness
		Vehicle travel times
		Freight connectivity
	Investment Objective 3 Provide a more sustainable and resilient network	People throughput
		Rail movements
		Resilience
CO2 emissions		
Flexibility		
Critical Success Factors	Engineering difficulty (inc. structures and stormwater)	
	Impact of construction (timeframes and temporary traffic management)	
	Property	
	Consentability (inc. noise, emissions and visual effects)	
	Wider traffic impact, capturing impact to other road users	
	Rail impact	
	Interdependencies	
Environmental, Social and Cultural Factors	Impacts on Te Ao Maori (not assessed by the technical working group)	
	Additional works required to mitigate negative environmental and social effects	

Appendix F also outlines that rationale behind excluding other criteria that are sometimes used within MCAs. The main reason for excluding criteria was when there was unlikely to be notable differentiation between options. By limiting the number of criteria being assessed, a clear picture of the relative benefits/disbenefits of alternatives can be established. This removes a risk of other scores being ‘watered down’ to make room for other criteria which have a low bearing on the final result (or have low risk).

13.2.3 Process and scoring moderation

In accordance with Waka Kotahi guidance, a -3 to +3 scoring scale was adopted. Generally, a score of zero has been taken as being ‘as per the status quo’, but with consideration that the network is experiencing rapid growth and other network changes are currently progressing.

The scoring for specific criteria was owned by separate Subject Matter Experts (SMEs). A briefing was then held to present the options to the SMEs, whereafter they independently undertook scoring. Each SME produced a memorandum which outlined (a) the KPIs used to inform the scoring; (b) definitions for scores of -3 to +3; (c) the evidence used to inform the scores.

Scores were presented back to the wider group, and a moderation session was undertaken. The purpose of that moderation workshop was to ensure that a consistent approach to scoring was taken, that key assumptions were communicated and to allow the wider perspectives of the technical group to be accommodated.

13.2.4 Weightings

As a complete package, the preferred programme should make a significant contribution to addressing all three problems. However, the relative scale of the issues at each location is different – for instance, safety is the most prominent issue at Dunns Crossing Road / Walkers Road with the ‘sustainability/resilience’ issue relatively low. Therefore, for each geographic area, different weightings have been agreed and applied to reflect the relative scale of the issues at each location.

For the base case, the total score for an option reflects 50% of the total score for the Investment Objectives and 50% of the total score for the Key Risks. Sensitivity analysis was then used to assess relative bias towards the Investment Objective themes, plus environmental, social and cost considerations.

The various ‘baseline’ and ‘sensitivity test’ weightings are shown in **Appendix F**.

13.2.5 Sensitivity tests

Accompanying each MCA are a series of sensitivity tests which are intended to establish how the relative ranking of the options may change according to various bias.

The following sensitivity tests are intended to capture the main project risks:

- **Equal weighting** = all criteria will be weighted equally.
- **Investment Objectives** = 60% of the total score (baseline = 50%)
- **Connectivity** = 40% of total score
- **Traffic operations** = 30% of total score
- **Safety** = 30% of total score

13.3 Technical assessments

13.3.1 Traffic modelling

A project microsimulation model has been developed for the purposes of informing the option testing, design and transport economic analysis for the DBC. AM, Inter-Peak (IP) and PM period models have been calibrated and validated to observed transport data collected since the opening of the Christchurch Southern Motorway Stage 2 (CSM2), representing broadly March 2021.

The development of the model and key calibration/validation outcomes are described in **Appendix G**.

13.3.2 Environmental and Social Responsibility Screen

An Environmental and Social Responsibility (ESR) Screen for each key part of the corridor is provided as **Appendix H**.

13.3.3 Concept design

Concept level designs were developed for the short-listed options for each intervention. These concept designs were then used:

- To inform the initial cost estimates
- By SMEs to inform their assessments

Scheme level designs were later developed for the preferred options. The final programme cost estimates are based upon these scheme designs.

**PART B1(I): ALTERNATIVES ASSESSMENT – SAFETY
AND RAIL IMPROVEMENTS**

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14 DUNNS CROSSING ROAD / WALKERS ROAD

14.1 Context

SH1 is the main national arterial that intersects with the Selwyn District peripheral arterials of Walkers Road and Dunns Crossing Road. This intersection has a very poor safety record, with a high risk of DSIs occurring in future in response to growth, more freight movements and its high-speed environment.

The extent to which any option reduces the likelihood of a DSI occurring is therefore critical. But another key consideration when it comes to identifying the preferred option, is the availability of land and key constraints such as proximity of the railway line and residential property:

- Rolleston Prison is located on the northern side of SH1, bound between Runners Road and Walkers Road. The site itself represents a considerable constraint in that, as it is Crown owned, any land acquisition at the Prison (e.g. to enable realignment of Walkers Road) is considerably more challenging.
- Plan Change 73, which covers a large parcel of land (87.5 hectares), is located south-west of the intersection. It proposes a total of 1,052 residential lots/units. This is referred to as the 'Holmes Block'³⁴.
- Existing properties along Fountain Place that back onto the state highway corridor.

14.2 Long list

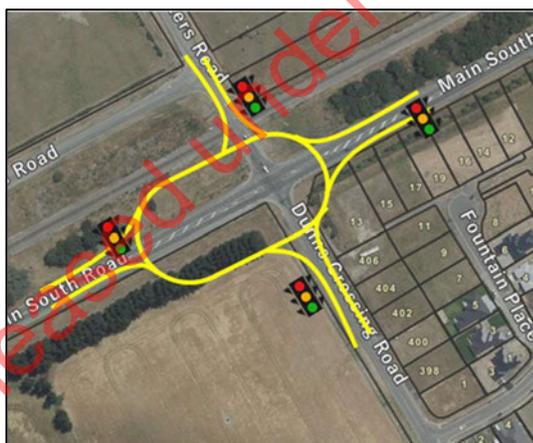
The long list of options for the Dunns Crossing Road/ Walkers Road intersection is presented within Table 15. Diagrams of the roundabout and signalised crossroad options are shown as Figure 22.



Option 1 (Yellow) - Inline roundabout
Option 2 (Pink) - Offset roundabout



Option 3 - Central Holmes Block roundabout



Option 4 - 'Lozenge' roundabout



Option 6 - Signalised crossroads

Figure 22: Dunns Crossing Road / Walkers Road options

³⁴ A 20,000 sqm plot (Lot 7000) has been earmarked in the corner of the Block, bound by SH1 and Dunns Crossing Road. The project team understands that the developer has prepared their masterplan in recognition that Waka Kotahi / SDC will require some of this plot to construct a future roundabout.

15: Dunns Crossing/Walkers Road – Long List

ID	Definition
DM	Do minimum. In the case of this intersection, this is the 'Do Nothing'.
1	In-line roundabout. Roundabout located approximately 30m south of the current intersection (yellow).
2	Offset roundabout. Roundabout offset to the south-west of the current intersection, requiring the realignment of all approach roads (pink).
3	Central Holmes Block roundabout. Roundabout located approximately 200m south-west of the current intersection. This option would be a 'step change', as it would be a new, rather than realigned, intersection. With this option, Dunns Crossing Road would become a left-in, left-out only. Access to the southern side of Rolleston would be via a new road that would pass through development land (Holmes Block - Plan Change 73).
4	'Lozenge' roundabout.
5	Grade separated intersection.
6	Signalised crossroads intersection.
7	Left-in/Left-out for both Walkers Road and Dunns Crossing Road. U-turns and access to Rolleston provided at a new roundabout at Rolleston Drive south.

14.3 Multi-Criteria Analysis

14.3.1 Assessment vs Investment Objectives

Five options, which all scored well against the Investment Objectives, progressed to the assessment vs key risks. These were **Option 1** (in line roundabout), **Option 2** (offline roundabout) and **Option 3** (roundabout central to the Holmes Block), **Option 4** (Lozenge roundabout) and **Option 5** (grade separation).

The key rationale behind discounting options during Phase 1 was:

- The **Do Minimum (Do Nothing)** would see existing severance and safety issues worsen (as traffic volumes increase in the future). Fundamentally it would fail to deliver upon the NZUP outcomes. However, this was still taken through the full MCA process purely for comparative reasons.
- A **signalised crossroads** intersection (Option 6) was excluded primarily for safety reasons. There is a risk that this option would create new safety issues due to the high-speed environment, and simply would not go far enough to reduce the risk of DSIs at this location. This open does not align with Waka Kotahi's 'Safe System' approach.
- A **left-in/left-out** (Option 7) was excluded due to the implications to accessibility and freight access.

14.3.2 Assessment vs Key Risks

The five options that progressed through Phase 1 of the MCA were then assessed against the key project risks.

This process discounted three of the options for the following reasons:

- Whilst Option 3 ('Central Holmes' roundabout) did not have any fatal flaws, it would carry significant risk in terms of affordability (due to high property costs) and design. The most notable design issues are:
 - The Walkers Road (Runners Road) approach would not have a clear sight line to and along the rail crossing (because the realigned approach would be on a curve at an acute angle).
 - Additional cost associated with moving the level crossing and upgrading to meet current KiwiRail level crossing guidelines. Using KiwiRail's Level Crossing Safety Impact Assessment (LCSIA) process, the new crossing would need to meet Criterion 1 which essentially requires grade separation of the rail crossing to achieve a Low or Medium-Low risk profile.
 - Safety concerns at the Runners Road/Walker Road intersection, where there may be compromised sight lines for drivers exiting from Runners Road. There is not enough land between Runners Road and the rail corridor to provide a safe intersection layout that could provide the necessary visibility. This is further exacerbated by this approach being used by large trucks travelling to and from iZone.
- Whilst Option 5 (grade separation) would bring the highest benefits, the cost of the option would be such that it would be unaffordable given the current NZUP funding envelope. The option also carries significant risks in terms of consentability, construction impact and property. As such, the option should be excluded from further consideration.
- The 'Lozenge' is potentially feasible; but is ultimately less safe than a standard roundabout (Option 1 or 2).

14.3.3 Final scores

A breakdown of the individual scores for Options 1 and 2 is provided in Table 16.

16: Dunns Crossing Road / Walkers Road – Scoring Overview

DN	Do Nothing	Investment Objectives											Planning Effects		Technical Effects		Wider Network Effects			Raw score						
		Safety			Accessibility				Resilience				Consentability	Property	Engineering difficulty	Constructability	Wider traffic effects	Rail network effects	Interdependencies	Investment Objectives	Planning Effects	Wider Network Effects	Wider Network Effects	Mitigation	Total	
		Disis	Rail	Pedestrian	Social connectivity	Vehicles	Freight	People throughput	Rail movements	Resilience	CO2	Flexibility														
1	In line roundabout	1	-1	-1	2	1	3	2	0	1	1	1	0	-2	-2	-2	-2	2	1	0	9	-4	-4	3	0	4
2	Offline roundabout	2	-1	-1	2	1	3	2	1	1	1	2	-1	-1	-1	-2	2	0	2	13	-2	-3	4	0	12	

Using the workshop agreed scores and weightings, Option 2 is the highest-ranking option.

14.3.4 Sensitivity testing

Under all sensitivity scenarios, Option 2 scored better (or equal) to Option 1.

14.4 Technically preferred option

The MCA process has provided strong justification for the selection of Option 2, an offset roundabout, as the technically preferred option for the upgrade of the Dunns Crossing Road / Walkers Road intersection. Option 1 would be the backup option, as it would deliver similar benefits – but comes with a higher risk profile.

The design is shown as Figure 23.

Appendix I provides the final set of scheme design plans for the recommended programme.

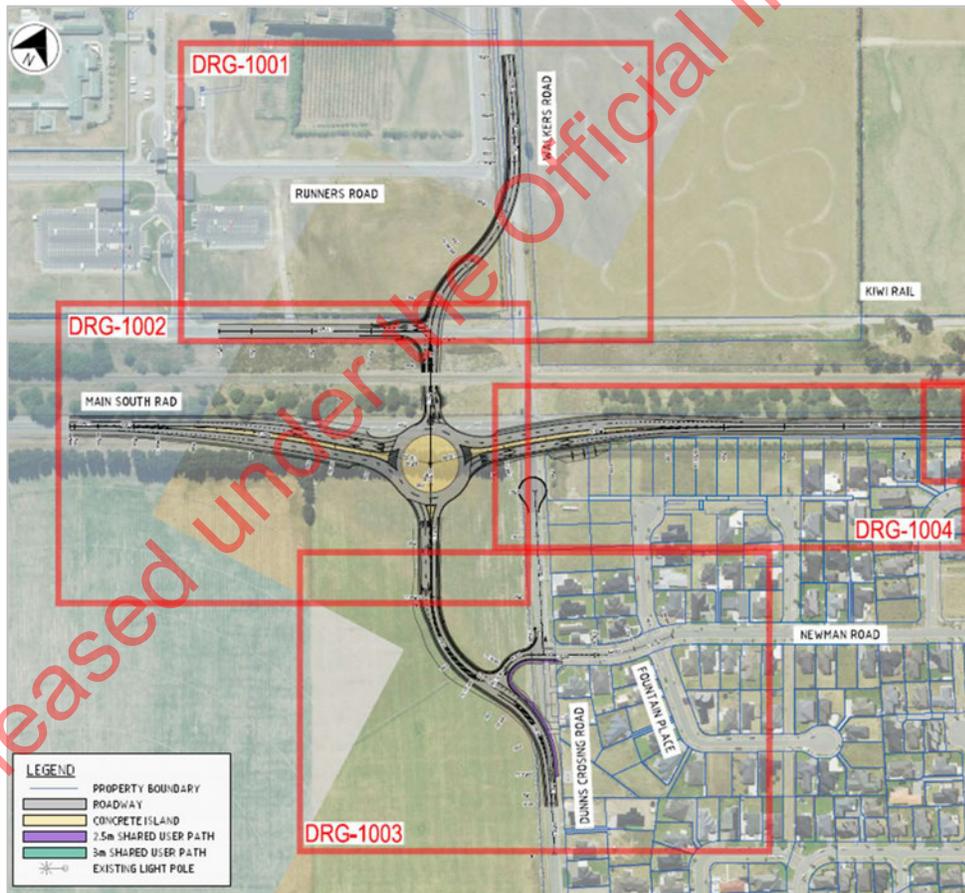


Figure 23: Dunns Crossing / Walkers Road – Technically Preferred Option

15 ROLLESTON DRIVE SOUTH

15.1 Context

The SH1 Main South Road / Rolleston Drive South intersection is priority-controlled onto a high-speed high-volume highway. The removal of the Rolleston Drive North and Hoskyns Road signals as part of the NZUP proposal will effectively create an extension of the CSM2, where the first intersection heading southbound off the motorway will be the SH1 / Rolleston Drive South intersection. This means that travel speeds, and the expectation for a major side road intersection, will change.

The proposed service lane (refer to Section 16) will restrict any movement from Tennyson Street and Brookside Road and provide safe acceleration and deceleration lanes on/off the state highway. A roundabout at the Dunns Crossing Road / Walkers Road intersection will be highly visible and act as safety intervention that will help transition the speed. This means that if no improvement is made at the SH1 / Rolleston Drive South intersection, then there would be a gap in what would otherwise be a **fully safe system** covering the entire corridor.

Safety is the key issue, and as such that Investment Objective has been given a 60% weighting. Connectivity is also important (30% weighting), but a compromise may be needed so that safe outcomes are guaranteed.

15.2 Long List

The long list for improvements to Rolleston Drive South is presented within Table 17.

17: Rolleston South – long list

ID	Definition
DN	Do Minimum (Do Nothing)
1	Signalised intersection – a three-legged signalised intersection
2	Roundabout – a three-legged roundabout intersection
3	Right turn out ban – drivers would be unable to turn right out of Rolleston Drive South onto SH1. A right-turn from SH1 into Rolleston Drive would however be provided.
4	Left-in-left-out <ul style="list-style-type: none">• Drivers would only be able to turn left into or left out of Rolleston Drive South onto SH1.• To turn right onto the SH1 drivers would need to access from Dunns Crossing Road (to the south, via a new roundabout) or head towards the Weedons Ross Road interchange.
5	Closed – no access between Rolleston Drive South and SH1.

15.3 Multi-Criteria Analysis

15.3.1 Assessment vs Investment Objectives

The roundabout, banning the right turn in, left-in/left-out and closing the intersection options all progressed forward to the next stage of the MCA on the basis that each contributes to the safety Investment Objective.

The following options were however discounted at this first stage:

- Do Minimum (Do Nothing)
 - Does not align with the NZUP outcomes.
 - The safety risk at this location will worsen as traffic volumes rise in response to growth.
 - Does not support a safe system approach for the corridor, with non-local drivers continuing along CSM not likely to expect to experience a major give-way intersection.
 - Was carried through for comparative reasons only.
- Option 1 - Signalised intersection
 - Scores poorly for safety as it does not align with a safe system approach for the high-speed environment of the state highway and would feel out of context.
 - A signalised intersection also introduces delays for through traffic, and to implement the signals would likely require a wider corridor speed limit reduction.
 - Both consequences have negative implications to freight efficiency.

Generally – banning movements is beneficial for safety, but negative for accessibility, on SH1. That reduction in accessibility then has wider implications on the local network, as people wishing to make those movements will need to find alternative routes.

Understanding the scale of the diversion effects, and consequently requirements for any local road mitigation is something that has been captured as part of the DBC – refer to Section 24.

15.3.2 Assessment vs key risks

The most notable negative scores (i.e. -2 or worse) generally appeared with the roundabout option. The assessment identified several notable challenges/risks with this option that related to:

- **Consentability (-2).** The road alignment will be closer to residential properties. This will change noise effects (mitigation required), have some visual changes, and will require land acquisition and the alteration of the state highway designation.
- **Property (-2).** Likely to require some property acquisition, else the roundabout would be right up against the existing houses.
- **Engineering difficulty (-2).** This would be a simple roundabout design but might need some manipulation to fit within property boundaries. Further work would be required to determine whether there was sufficient available space to construct a two-lane roundabout.

One of the key concerns from the community expressed during the first (and indeed second) round of consultation was a perception that proposed roundabouts (such as Dunns Crossing Road / Walkers Road) would not provide sufficient capacity. Whilst the Dunns Crossing Road / Walkers Road roundabout is proposed to be dual lane, the availability of land (due to property and rail) constraints at Rolleston Drive South are more significant – to the point whereby a dual lane roundabout might not be realistically achievable³⁵.

15.3.3 Final scores

A breakdown of the individual scores is provided in Table 16.

18: Rolleston Drive South – Scoring Overview

	Safety			Accessibility				Resilience				Consentability		Property		Engineering difficulty		Constructability		Wider traffic effects		Rail network effects		Interdependencies		Te Ao Māori		Mitigation works		Investment Objectives		Planning Effects		Wider Network Effects		Wider Network Effects		Mitigation		Total	
	Dis	Rail	Pedestrian	Social connectivity	Vehicles	Freight	People throughput	Rail movements	Resilience	CO2	Flexibility	Consentability	Property	Engineering difficulty	Constructability	Wider traffic effects	Rail network effects	Interdependencies	Te Ao Māori	Mitigation works	Investment Objectives	Planning Effects	Wider Network Effects	Wider Network Effects	Wider Network Effects	Mitigation	Total	Investment Objectives	Planning Effects	Wider Network Effects	Wider Network Effects	Mitigation	Total								
2 Roundabout	2	0	-1	1	1	-1	0	0	1	0	0	-2	-2	-2	-2	-1	0	-1			9	-4	-4	-2	0	-7	9	-4	-4	-2	0	-7									
3 RT out banned	-1	0	0	-1	-1	0	0	0	0	-1	0	0	-1	0	0	0	0	0			-4	0	0	0	0	-4	-4	0	0	0	0	-4									
4 LULO	2	0	0	-1	-1	0	0	0	0	-1	0	0	-1	-1	1	0	-1			-1	0	-2	0	0	-3	-1	0	-2	0	0	-3										
5 Closed	3	0	1	-2	-2	0	0	0	-1	-2	1	-2	0	-1	-1	1	0	0			-2	-2	-2	1	0	-5	-2	-2	-2	1	0	-5									

An initial glance at the results may raise a question as to why, if there are negative impacts to one or more of the Investment Objectives (such as accessibility) and technical challenges, should any of the short-listed options be progressed?

The answer is because the key focus at this intersection is on improving safety, and when it comes to the impact to accessibility and resilience, the influence of the other NZUP interventions needs to be considered. Whilst banning movements will reduce accessibility at this location, the introduction of a roundabout at Dunns Crossing Road will more than offset these negative effects.

The key desire is to deliver a fully safe system, where the first major intersection from a motorway is a roundabout rather than a give-way intersection. A roundabout at this location would have some significant technical challenges, given the proximity to the railway line to the north and property constraints on the Rolleston Town side. This means, that only a one-lane rather than two-lane roundabout could be constructed in this location – which it may not provide the necessary vehicle capacity.

Therefore, the Dunns Crossing Road / Walkers Road roundabout, which allows for two through lanes, is best placed to function as the first major southbound intersection.

15.3.4 Ranking of options

Table 19 provides a summary of the raw and weighted scores for each option.

19: Rolleston Drive South – Total MCA Scoring

	Total	Total Weighted Score	Ranking	
			Raw Score	Weighted Score
Option 2 – Roundabout	-9	-0.2	3 rd	3 rd
Option 4 – Left-in, Left-out	-3	0.3	1 st	2 nd
Option 5 – Closed	-5	0.4	2 nd	1 st

The MCA has established that the Left-in / Left-Out and ‘Closed’ options generally ranked evenly.

³⁵ i.e. without significant property purchase

However, fully closing access from Rolleston Drive South would (as confirmed in the first round of engagement) be very unpopular amongst the local community. The safety benefits of banning the left-in and left-out would also be negligible considering that traffic 'would have to go somewhere' – i.e. this could simply push traffic through local streets and reduce safety elsewhere on the network. Furthermore, SDC originally facilitated the introduction of this connection at the time of the original residential development. Therefore, residents are likely to want some sort of connection to remain.

15.3.5 Sensitivity testing

The sensitivity analysis identified that:

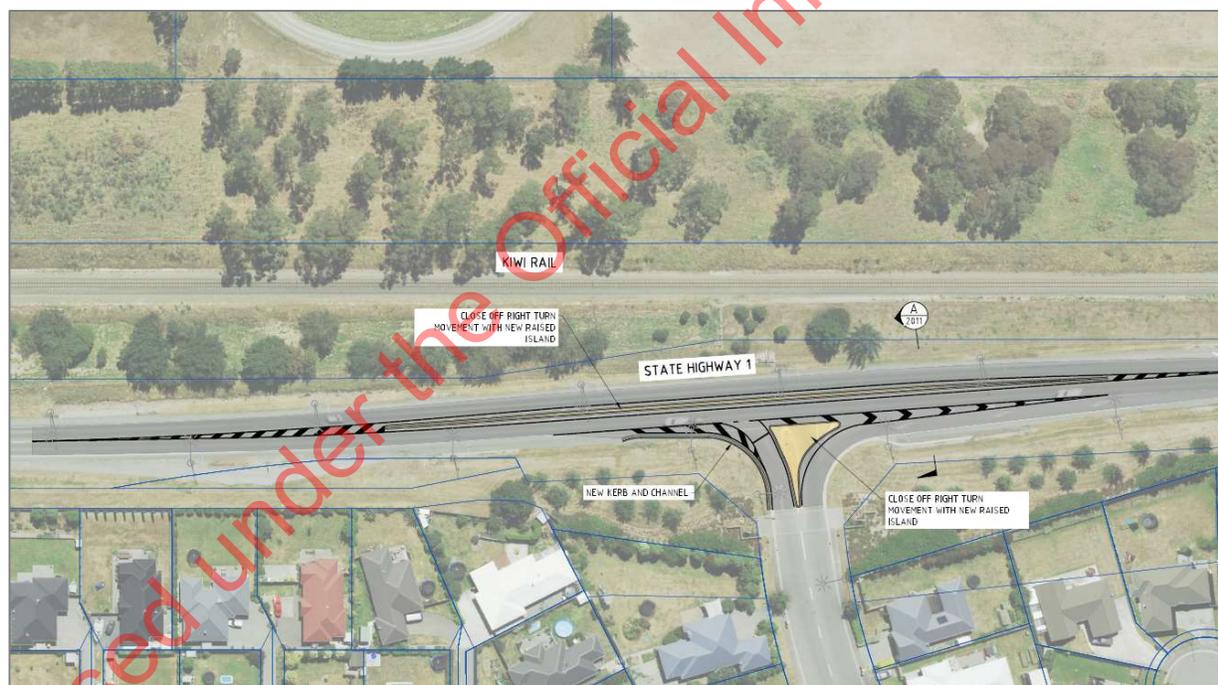
- The left-in / left-out option ranks either the best, or second best, option under all sensitivity tests.
- The best safety outcomes are delivered by closing the intersection – noting that these result does not consider the negative knock-on safety impact on local roads.
- The roundabout option ranked best when social effects are considered – this is because it provides improved connectivity to the local road network, whilst other options reduce connectivity. However, it ranked third when considered against economics and cost. The negative economic costs related to how the roundabout would slow down vehicles travelling along the highway. A roundabout also would not align with the aspirational network hierarchy, which has the Dunns Crossing Road / Walkers Road as the southern gateway to Rolleston.

15.4 Technically preferred option

The technically preferred option is for Rolleston Drive South to function as a left-in / left-out.

Adopting such an option will help, along with wider improvements (such as median barriers, that would be delivered by the SIP), would help create a transformational change along the state highway in terms of safety.

The concept design for the option is provided as Figure 24.



24 Rolleston Drive South – Technically Preferred Option

Why not provide the right-turn in?

The context of SH1 will change once the flyover is completed. The signals at both Rolleston Drive North and Hoskyns Road will be removed, which will essentially create an extension of the high-speed Christchurch Southern Motorway through Rolleston. By the time the flyover is constructed, traffic volumes along the road will also have risen in response to a growing population. This all means that the state highway environment will change – it will feel like a busier and faster road compared to what we see now. This places increased risk for people turning in and out of Rolleston Drive South, where we recently saw a fatal injury crash occur.

Safety improvements at this intersection are therefore required. A roundabout would be a safe intervention, as is proposed for the Dunns Crossing / Walkers Road intersection, but the proximity of the railway line and houses means that there simply is not enough space to introduce a roundabout (without significant cost and disruption). Moreover, we do not want to encourage more people to access the town using Rolleston Drive South, as this road goes through a predominantly residential area which was never intended to be used as a primary access point to the town.

Our long-term goal is for a safe system that targets zero deaths and injuries on our roads. This intersection also lies with the Road to Zero corridor from Templeton to Selwyn River that is aiming for a safe system transformation that recommends median safety barriers in the future. Simply - the right turn movements present the greatest risk at Rolleston Drive South, and that is why we propose to only allow 'left-in / left-out' access from the state highway.

The 'right-turn out' will be facilitated by the new flyover, and the 'right-turn in' will be facilitated by the new roundabout at the Dunns Crossing / Walkers Road intersection. We understand that for some, this will mean longer journey times. However, the expected number of people making either the 'right-turn in' or 'right-turn out' is relatively small (fewer than 900 vehicles per day based on our forecasts for the year 2038).

We have considered the balance of longer journey time and safety risk, and concluded that in the interest of saving lives, the best solution is to ban right turn movements.

16 STATE HIGHWAY ACCESS TO TOWN CENTRE COMMERCIAL PROPERTIES

16.1 Long List

There is a need to enable safe access both to the Rolleston township and the numerous commercial properties that front SH1. During the PBC stage the solution was identified to be a service lane that separates southbound through traffic from turning traffic. The key safety benefit of a proposed service lane relates to **the removal of the right-turning conflicts** between side roads (e.g. Tennyson Street) and the state highway.

The plans to introduce a service lane go back several years, with initial investigation (and public consultation) taking place in 2012 as part of a Scheme Assessment Report undertaken by Waka Kotahi. Council planning (including development approvals) has proceeded since 2012 on the basis that there would be a service lane to address the safety issues.

16.2 MCA

The MCA has simply captured the with or without (Do Nothing) scenarios in order to reaffirm the need for the service lane. The MCA identified that the predominantly negative impacts of adopting a 'Do Nothing' approach were to the desired long-term safety and connectivity outcomes:

- **Safety** - high risk of crashes continuing at priority-controlled T intersections onto high-speed high-volume highway. High risk of conflicts between the turning movements onto and off SH1 remain.
- **Connectivity** - increased traffic creates challenges accessing businesses on southern side of SH1 and restricts access to/from Tennyson/Brookside. Increased traffic also adds delay for traffic accessing businesses and side roads to the south of SH1.

16.3 Preferred option

Based on the MCA and project team discussions, it was agreed that the service lane option (rather than a Do Nothing, or Do Minimum) should be progressed to be included in the preferred option. This decision was endorsed by Project Partners based on the historical position. Key rationale was:

- The option largely addresses the identified KPIs for the Investment Objectives.
- The nature and magnitude of residual issues (such as consentability, and engineering difficulty) are considered relatively low risk and should be manageable following standard processes.
- The option is largely congruent with other options being considered for inclusion in the preferred option.

The concept design for the service lane is shown as Figure 25.



25 Service Lane - Technically Preferred Option

During the design process there were two notable factors which were identified as having potentially high-cost implications:

- The need to move the centre-line of the road. This likely triggers the need for re-grading the entire state highway (along the length of the proposed service lane) which would trigger the need for significant pavement reconstruction.
- Need to acquire land from KiwiRail in order to accommodate a cross-section that includes the service lane.

Following the second round of public engagement, the service lane concept underwent a value engineering exercise. The purpose was to identify whether there was opportunity to amend the design in a means that would reduce capital expenditure, but without notably detracting from the desired safety benefits.

The value engineering exercise, described in **Section 27**, identified an alternative design which avoided property acquisition and significant pavement cost. However, it would require the removal of the southbound acceleration lane from the service lane and median separation between the service lane and state highway southbound lane.

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17 RAIL NETWORK IMPROVEMENTS

17.1 Context

The NZUP seeks to improve the connectivity between the Main South Line and Midland Line, with the identified solution in the PBC being the option to 'complete the triangle' between the two lines.

However, following the NZUP announcement, follow-up investigations and liaison with KiwiRail into the feasibility of this option was undertaken by Waka Kotahi. The work established that the option would necessitate the need to re-signalise the "Rolleston station" precinct with changes to the location of several signal heads, which would add significantly higher costs than initially anticipated (circa \$11m). Therefore, a broader range of options needed to be investigated. KiwiRail also expressed openness around exploring alternative options. The agreement was that the focus was around improving the rail and freight connectivity and efficiency problem in Rolleston, rather than look to specifically deliver the defined NZUP option.

Other relevant context that was considered as part of the MCA included:

- Access from the south (Timaru) to the west is constrained. Currently there is no yard for shunting operations and 'run arounds'³⁶ which means that these activities occur on the main line. This increases the number of shunting movements and restricts the movement of through trains.
- Trains travelling south can switch between lines north of Rolleston. Additionally, there are 2 further crossovers within Rolleston station.
- Shunting movements within the Rolleston station are restricted and result in delays to other services.
- Network operations are affected by the change in signaling system currently operating:
 - Midland Line operates an administration system (paper based)
 - Main South Line runs on CTC (operates all signals)
 - Connection to the Midland Line requires a manual form to be completed, which adds to the travel time.
- There is only a single access into the LPC siding (from the north). Trains from the south need to reverse into the siding (at walking speed), which blocks the Main South Line and causes the level crossings on Jones Road and Weedons Ross Road.
- There are no controlled signals between Rolleston and Darfield. This means that eastbound trains on the Midland Line are held at Darfield while shunting operations are taking place in Rolleston.
- Currently (based on existing freight volumes) it is more efficient to break up the larger freight trains in Middleton and deliver any freight back to Rolleston via another service.

17.2 Long List

The long list of options for rail network improvements is presented within Table 20. The list was developed through consultation with KiwiRail during a targeted workshop that was held on the 14 May 2021.

20: Rail Network improvements – Long List

ID	Definition
DN	Do nothing.
1	Triangle Junction. Completion of triangle junction south of Rolleston station providing a direct connection between the Midland Line and Main South Line.
2	Yard Option 1 improvements up to LPC. Improvements at Rolleston Station adding a third line and run around (Yard 1). Works are located between the Midland Line and LPC siding.
3	Yard Option 1 improvements beyond LPC. Improvements at Rolleston Station adding a third line and run around. The yard is located between the Midland Line and LPC siding. The third line extends north past the LPC siding.
4	Yard Option 2 improvements beyond LPC. Improvements at Rolleston Station adding a third line past the LPC siding. Yard Option 2 is located north of the LPC siding.
5	Signalling improvements. Signalling changes to improve connectivity between Midland Line and Main South Line. (not illustrated – no infrastructure change)

Diagrams of each option (aside from Option 5) are shown as Figure 26.

³⁶ 'Run around' – enables the engine to be transferred to the other end of the train carriages, to enable forwards movement, in the opposite direction.

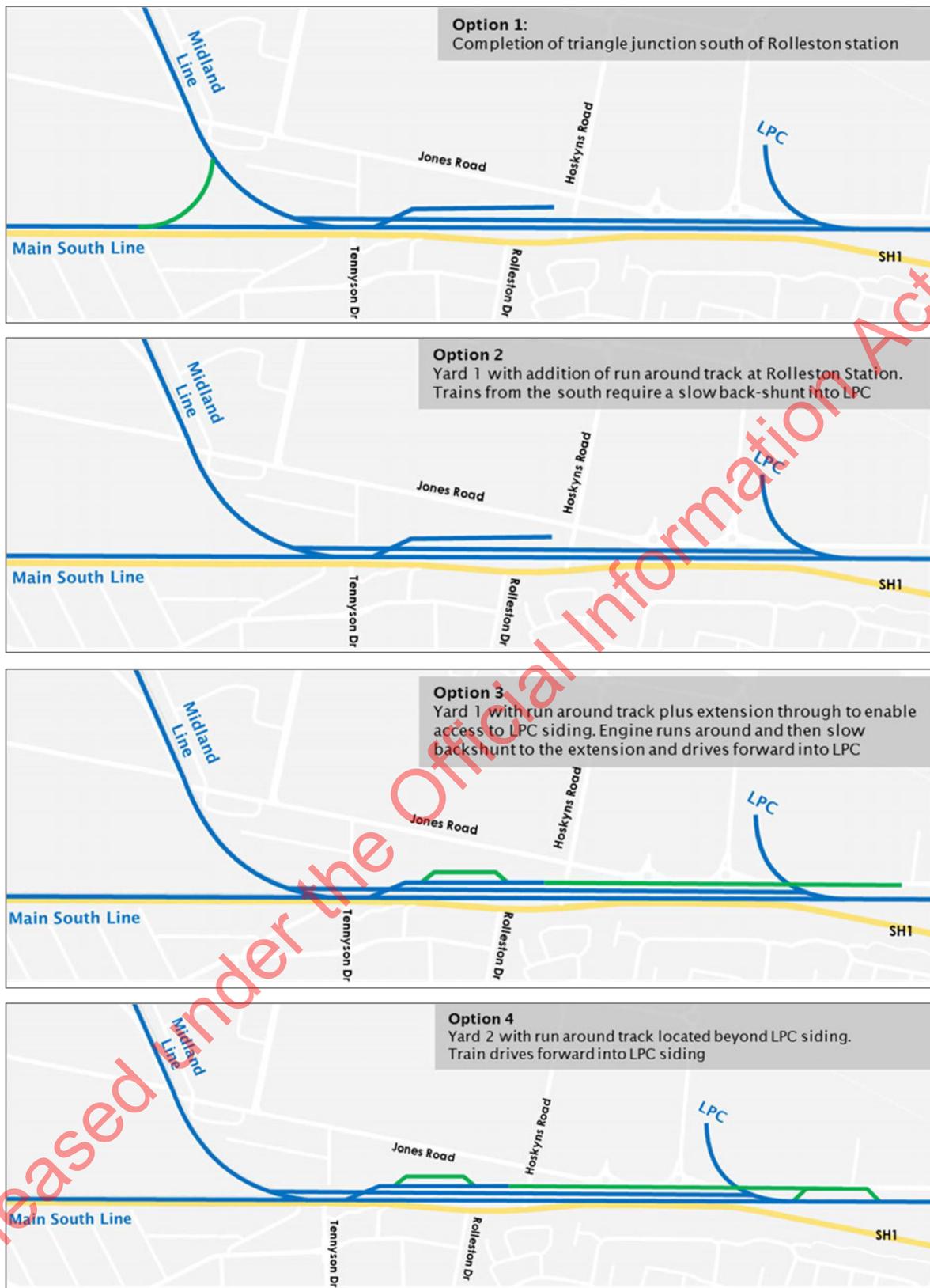


Figure 26: Rail Network improvement options

17.3 Assessment vs Investment Objectives

Notable comments included as part of the assessment were:

- Some shunting currently occurs by reversing the train, which requires a person (“spotter”) to be on the ground at the back of the train. This is an acceptable practice that can be engineered out/improved.
- The signaling system is relatively rigid making it difficult to make changes to the current layouts.
- There is little to no demand forecast for West to South freight movements which would use the triangle junction (**Option 1**). It does provide opportunity for future routes to be introduced in the future.
- Adding a third line at the level crossing on Hoskyns Road would only be acceptable if the existing issues at Hoskyns Road are addressed due to the road/rail conflict that would eventuate.

Only the Do Nothing was discounted at the first MCA stage. The key rationale was because it would see existing operational constraints and safety issues worsen (as rail volumes increase in the future). Fundamentally it would fail to deliver upon the NZUP outcomes. It was however carried through to the second round of MCA purely for comparative purposes.

17.4 Assessment vs Key Risks

Key points of differentiation noted from the second round of the MCA were:

- **Option 1** (Triangle Junction) does not improve rail movements within Rolleston Station and requires major signaling improvements. In addition, there is currently no demand forecast from the south to the west unless there is a change to shipping patterns. The same connectivity is achieved from improvements to the Rolleston yard. While it would increase resilience by providing an additional connection, there is a trade-off with efficiency and demand. Progressing one of the yard options does not preclude completing the triangle at some point in the future.
- **Option 2** provides the ability to run around rakes of wagons; however, adding the third line extension beyond the Midland Port Siding in Options 3 & 4 is preferred as it reduces the barrier time at the level crossing on Jones Road by enabling trains to drive forward into the siding. This will be important given the increase in traffic volumes forecast on Jones Road. Extending the third line beyond LPC also enables trains to use the Main South Line while shunting operations are occurring.
- With **Option 3**, extending the third line beyond LPC offsets one shunting movement with another. It enables trains to be driven forward into LPC but does not address the reverse shunt which is still required.

17.5 Preferred option

17.5.1 Final Scores

A breakdown of the individual scores is provided in Table 21.

Table 21: Rail Network Improvements – Scoring Overview

		Investment Objectives											Planning Effects	Technical Effects	Wider Network Effects	Mitigation	Raw score										
		Safety		Accessibility			Resilience										Investment Objectives	Planning Effects	Wider Network Effects	Mitigation	Total						
		Bus	Rail	Pedestrian	Social connectivity	Vehicles	Freight	People throughout	Rail movements	Resilience	CO2	Flexibility										Consentability	Property	Engineering difficulty	Constructability	Wider traffic effects	Rail network effects
DN	Do Nothing	-1	-1				-2		-2	-1	0		0	0	0	0	0	-1	0			-7	0	0	-1	0	-8
1	Triangle Junction	-2	-2				2		1	1	0		-2	0	-1	-1	0	0	0			0	-2	-2	0	0	-4
2	Yard Option 1 to LPC	0	0				2		1	0	0		-1	0	-1	0	0	0	0			3	-1	-1	0	0	1
3	Yard Option 1 past LPC	0	1				2		1	1	0		-1	0	-1	-1	1	1	0			5	-1	-2	2	0	4
4	Yard Option 2 beyond LPC	0	1				2		2	1	0		-1	0	-1	-1	1	2	0			6	-1	-2	3	0	6
5	Signalling Improvements	0	0				0		1	0	0		0	0	-1	0	0	1	0			1	0	-1	1	0	1

Those criteria not scored were not considered to be relevant in the context of the rail options.

17.5.2 Ranking of options

Table 22 provides a summary of the raw and weighted scores for each option.

22: Rail network improvements – ranking of options

	Total	Total Weighted Score	Ranking	
			Raw Score	Weighted Score
Do Nothing	-8	-0.92	6th	6th
Option 1 – Triangle Junction	-4	0.35	5th	4th
Option 2 – Yard Option 1 to LPC	1	0.56	3rd	3rd
Option 3 – Yard Option 1 past LPC	4	0.59	2nd	2nd
Option 4 – Yard Option 2 beyond LPC	6	0.72	1st	1st
Option 5 – Signalling Improvements	1	0.03	3rd	5th

The MCA has established that Option 4 is the best performing option using the workshop agreed scores and weightings. Under all categories, Option 4 scores highest. The incremental benefits gained from the signalling improvements in Option 5, although relatively minor, could be added to any of the yard options.

17.5.3 Sensitivity testing

Sensitivity testing confirmed that Option 4 (Yard Option 2) is the highest-ranking option for safety and economic benefit, although has ranks lower in the environmental and cost sensitivity tests because it is one of the larger scale options.

17.5.4 Technically preferred option

Option 4 (Yard Option 2) is the technically preferred option for rail network improvements. It provides the most operational efficiency at Rolleston Station and presents an opportunity to resolve rail operator safety during shunting movements. The option reduces disruption to local traffic on Jones Road by minimising the duration of level crossing activations on Jones Road.

In the future, it would also be feasible to add Option 5 (signaling improvements).

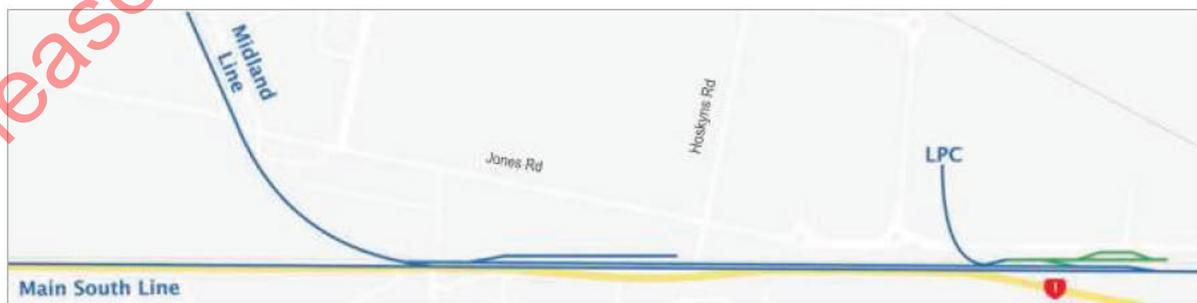
Relocating the home signal moves the point of control between sections to outside the extents of Rolleston Station/yard. It then reduces the manual work required to move through the station and enables shunting activities to occur within the same signaled section. Signaling improvements will enable trains which are currently held at Darfield to progress to Rolleston (thereby reducing journey time). These incremental benefits lead to improved rail efficiency.

17.6 Refining the rail option

Yard Option 2 (Option 4) is the technically preferred option identified through the alternatives assessment for rail network improvements. The refined rail option gives the greatest flexibility for rail connectivity, is cost-effective, provides better access to LPC and offers operational improvements by:

- Removing the need for a third track over Hoskyns Road and improving safety with a two-track level crossing.
- Left out access only from Hoskyns Road will remove short stacking across the rail line.
- Preserving land at Hoskyns Road and Jones Road for future development opportunities including expanded Park'n'Ride facilities.

The refinements to the preferred rail option are highlighted on Figure 27.



27: Refined rail improvements indicated by green lines

**PART B1(II): ALTERNATIVES ASSESSMENT –
ROLLESTON CONNECTIVITY / FLYOVER**

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18 THE PATH TO A FLYOVER

A flyover would separate local traffic (including pedestrians, cyclists and buses) from state highway traffic, making travel much safer and more reliable in all directions. Because the separation of traffic and rail removes the risk of a train/vehicle collision, the safety benefits of a flyover for people using the road and rail are substantial. Although the flyover is a significant piece of infrastructure, there is strong rationale for why this intervention (rather than any other in the intervention hierarchy) is required.

Part B2(II) of the DBC shows how we have got to a preferred flyover option, why grade-separation is required and how consultation was a key influence on the decision-making process. The optioneering process for the flyover ran in parallel to that of the other NZUP interventions (described in the previous chapters).

18.1 Feedback from the initial engagement

The PBC option (the starting point for this project) was presented to the community in late 2021 in the context of the wider package of improvements and a significant amount of feedback was received. While people acknowledged the need to connect both sides of Rolleston, the public consultation process revealed some key community concerns about the draft proposal for Rolleston which prompted further investigation.

Key concerns raised in relation to the original flyover concept included:

- Closure of a section of Jones Road would affect access and be detrimental to businesses, services and facilities to the southwest industrial area. People said they wanted access to all the industrial area and the continuity of Jones Road to remain.
- Emergency service response times potentially.
- Closure of the Hoskyns level crossing would mean that people had to drive through multiple roundabouts to get to the state highway - raising safety concerns with this increased traffic.
- Rerouting of traffic (caused by closures of movements onto SH1), would put significant pressure on the Weedons Ross Road interchange.

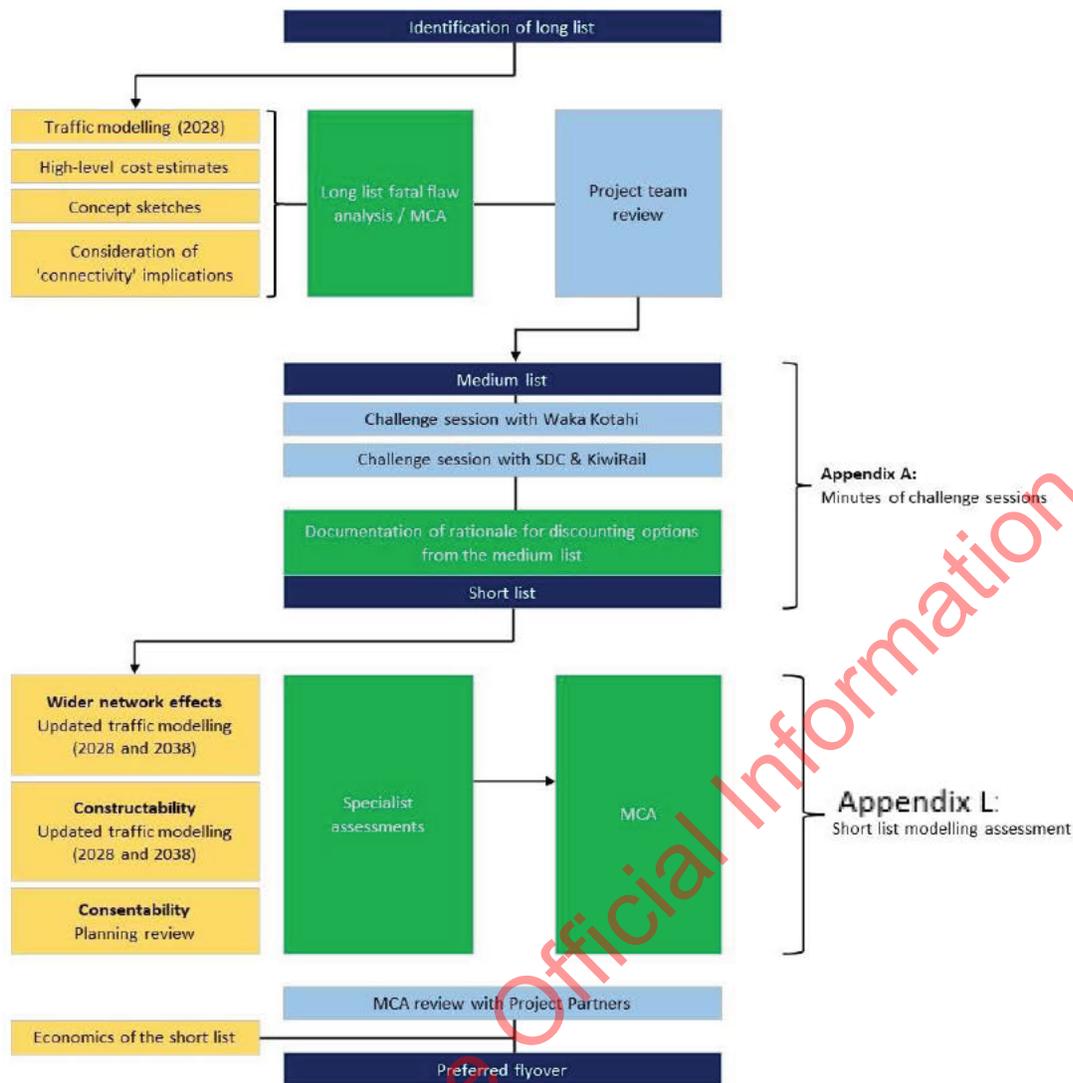
With this new community feedback and ongoing analysis confirming some operational and constructability issues and given a fair amount of time had passed since the options were first explored, it was deemed necessary to revisit options with an open mind.

18.2 Optioneering process

Following engagement, the following processes were then adopted to establish the technically preferred option (which included consideration of at-grade alternatives):

1. Asking the public for their views on the 'skewed flyover' - concept presented in the PBC.
2. In parallel to consultation, test how the original (PBC version) of the 'skewed flyover' would impact the operational performance of the network in future years.
3. Identify how the 'skewed flyover' option could be optimised – referred to as the 'refined skewed flyover'.
4. Identification of long-list of options (including at-grade solutions) for connecting the Rolleston town centre and industrial area. This was followed by an initial sifting of those options using Waka Kotahi's Early Assessment Sifting Tool (EAST) / fatal-flaw analysis.
5. Medium list to short-list. This involved an MCA of the medium list, which included concept level designs and indicative cost estimates.
6. Short list to 'technically preferred option'.
7. Asking the public for their views on the 'technically preferred option'.
8. Respond to any concerns in relation to the 'technically preferred option' and refine the design to provide further optimisation in terms of cost, property take and traffic operational performance.
9. Final concept design and cost estimates.

The approach to identifying a preferred flyover option is shown within Figure 28.



28: Approach to identifying a preferred flyover option

The project team assessment was reviewed by the Waka Kotahi steering committee members with assistance of independent advisors (challenge review) to confirm the robustness and emerging direction. Essentially:

- The **'long list' to 'medium list'** took the form of a fatal flaw analysis and EAST assessment. This narrowed the range of alternatives down from 25 to eight. The analysis was informed by traffic modelling, concept designs, high-level cost estimates and a MCA.
- The **'medium list' to 'short list'** process took the form of a 'challenge review' from Waka Kotahi and project partners (SDC) of the fatal flaw analysis. This narrowed the range of alternatives from eight to four.
- The **'short list to preferred option'** process took the form of a refreshed MCA with input for a range of Subject Matter Experts (SMEs), and additional evidence. The approach aligned with the agreed approach that was undertaken for the assessment of other aspects of the NZUP programme (e.g. Dunns Crossing Road / Walkers Road improvements).

Appendix J documents the MCA process for the flyover alternatives.

19 SEEKING TO OPTIMISE THE SKEWED OPTION

This chapter provides a summary of the initial testing of the 'PBC NZUP proposals' using the project traffic model. The purpose was to better understand the wider implications of the proposals, and whether any refinement may be required to deliver better outcomes – essentially, could the proposal be optimised?

19.1 Initial modelling of the NZUP proposals

The initial 2028 and 2038 scheme model runs demonstrated high levels of congestion around the Weedons Road interchange in both AM and PM periods. This was a consequence of the access closure with the additional traffic through the interchange resulting in large delays and potential queues back onto the state highway and local streets. The reduced accessibility onto the state highway would have some major impacts:

- Increase in total vehicle kilometers (more CO₂)
- Increase in traffic passing through the local road network and onto Levi Road.
- Increased demands though the Weedons Ross Road interchange.
- Increasing the number of vehicles using the railway level crossings at the Jones Road/LPC and Weedons Ross Road (near Jones Road).

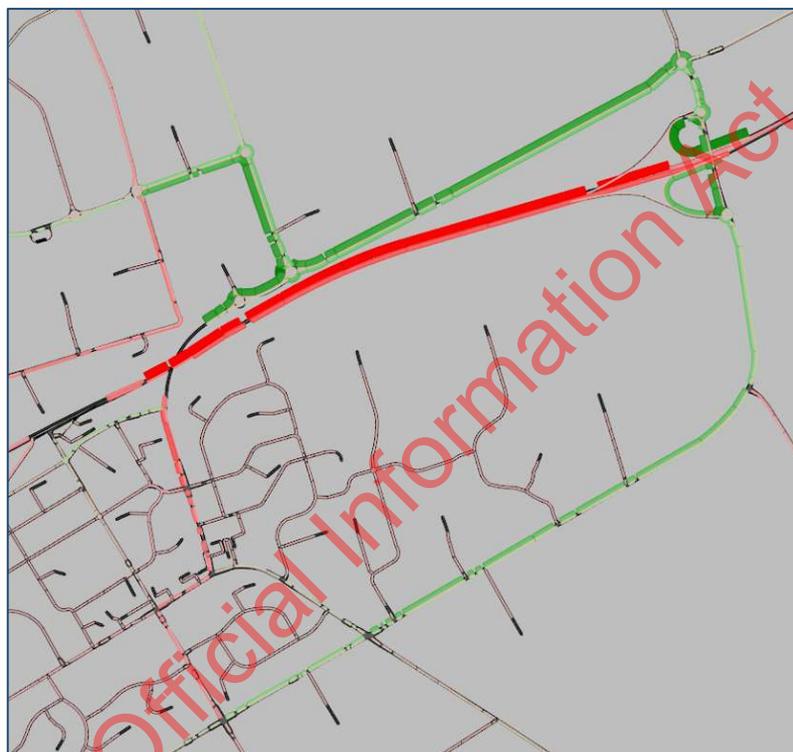
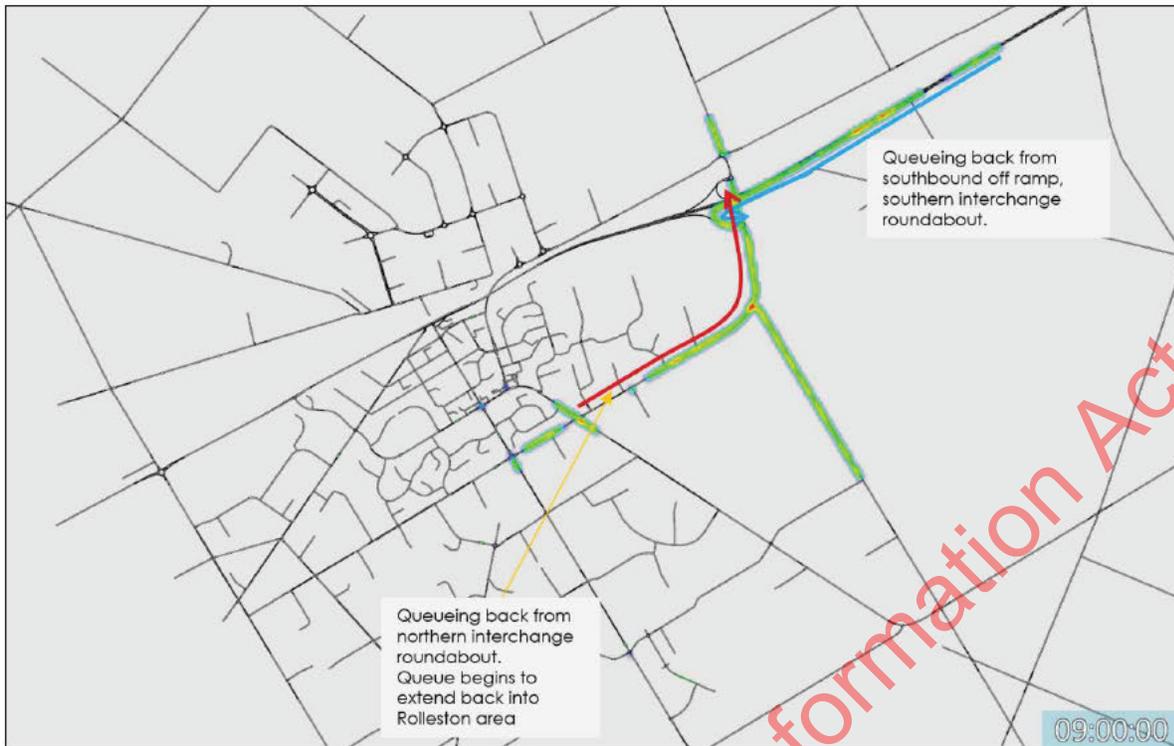


Figure 29: AM Peak Hour Flow Difference (Do Min vs PBC NZUP)

Figure 29 provides a traffic difference plot (Do Minimum vs PBC NZUP proposals). The scale is -1000 vehicles per hour (vph) (red) to +1000vph (green).

The figure shows a large increase in traffic along Jones Road and Levi Road, and through the Weedons Interchange for travel to / from the east (towards Christchurch). Correspondingly, a large decrease in volume can be seen along SH1 from Rolleston to the east of the Weedons Interchange. The two Weedons Interchange roundabouts and Weedons Interchange on / off ramps carry a significant volume of traffic which would otherwise travel along SH1.

Figure 30 shows how this redistribution of trips translates into congestion during the morning peak. It shows that shows long queues stretching back from the northbound movement along Levi Road through the Weedons Interchange. In the 2038 scenario, this queue blocks significant areas of the Rolleston town centre. A queue back from the southbound SH1 off-ramp can also be seen, extending back onto CSM2 towards the SH1 / CSM2 interchange. During the PM peak the queue back from the SH1 southbound off-ramp along the CSM2 extends towards, and reaches, the CSM2 / SH1 interchange. In the 2038 scenario, this queuing is extensive.



30: AM 2028 Queueing, Initial Scheme Scenario

The 2028 and 2038 predicted operation from the initial scheme model showed significant and concerning levels of congestion and queuing around the Weedons Ross Road interchange in the AM and PM peak periods. The level of congestion and delay appears greater than the Do Minimum scenario.

It is essential that the 'whole network' performance is considered. It is not acceptable to relieve congestion at Rolleston Drive North and Hoskyns Road by 'pushing the problem' elsewhere - which is evident by the modelling. The Weedons Ross Road interchange would experience the negative effects of this change.

The results from the preliminary analysis indicated that, in order to deliver a 'total network' solution, that the following would be required:

- Changes to the original skewed flyover proposed to provide better accessibility to the state highway (i.e. reduce the amount of traffic 'pushed' towards the interchange); and/or
- Significant mitigation to the Weedons Ross Road interchange.

Conclusion

The initial modelling identified a need to revisit the NZUP proposals.

In the first instance, this was seeking to identify what additional features could help improve the overall network performance whilst retaining the 'skewed' flyover alignment.

19.2 Optimising the 'Skewed flyover'

19.2.1 Process

The initial modelling confirmed that a refinement to the 'PBC NZUP proposal' for the flyover would be required. Further work was therefore needed to understand what could be done to improve the overall network performance and improve connectivity to the state highway. The objective was to determine "what is the best version of the skewed flyover option?".

The process involved:

- Reviewing the outputs of the initial modelling to understand where the major capacity constraints are.
- Identification of potential options.
- High-level assessment of the relative benefits and risks of each option.
- Testing of options using the microsimulation model.

19.2.2 Options

As outlined earlier, several issues with the original PBC skewed flyover concept were identified as part of the public engagement process and further analysis.

As a result of this, the project team looked to identify mitigation measures that could be adopted as part of the design in order to reduce any negative impacts (especially on the Weedons Ross Road interchange and access to the western end of Jones Road). Following liaison with Waka Kotahi technical specialists and KiwiRail, the following features were added to the option:

- Left-out from Hoskyns Road onto SH1. This would be a free-flow movement (meaning that it is very unlikely that any blocking back to the railway line would occur, thereby addressing the safety issue), with an auxiliary lane added onto SH1.
 - Provides a more direct access point to SH1 from the industrial area (northbound to Christchurch)
 - Enables the right turn out of Rolleston movement onto SH1 via a slightly convoluted route over the flyover, through the Bulk Retail area and then through the Hoskyns Road/Jones Road signal.
- Slip-lane from the southbound service lane to connect onto Kidman Street. This provides a direct access to Rolleston Drive North (rather than using Tennyson Street) and an alternative route (from the Weedons Ross Road interchange) from SH1 to the industrial area (via the flyover).
- Roundabout at Jones Road intersection replaced by signals

19.2.3 Refined skewed flyover option

Figure 31 provides a representation of the refined skewed flyover option.



31: Refinement of the skewed flyover concept

Reconsidering the alternatives for the Flyover

The feedback from the first round of consultation dictated that the team should take a step back and consider a wider range of flyover alternatives. This means following the standard business case process by first identifying a long-list of options, sifting those options to get to a short-list, and then robustly assess that short-list.

Note that the above 'refined skewed' option was brought directly through to the short-list of flyover alternatives.

20 LONG LIST TO MEDIUM LIST

20.1 Long list assessment

The long list of flyover options is outlined in Table 23. The list was identified based on feedback from the community, key stakeholders and advice from technical staff within the Partner and consultant organisations. The long list includes by 'at-grade' and grade-separated options.

The long list was then subject to a high-level evaluation using input from subject matter experts and a process that aligned with Waka Kotahi's Early Assessment Sifting Tool (EAST). This was moderated using independent specialists from Waka Kotahi to produce a medium (shorter) list of viable options (i.e. 8 rather than 25 options).

Table 23 sets out the alternatives that were identified for further evaluation as part of a medium list, and why.

Table 23: Long list

ID	Option	Progress to Medium List	Rationale for including or discounting
At grade			
DM	Do Minimum <ul style="list-style-type: none"> Assumes the other elements of the package are included Signals are retained at Rolleston Drive North and Hoskyns Road 	Yes	<ul style="list-style-type: none"> Progress as it is the Do Minimum (acknowledging that modelling indicates that this is not a sustainable option beyond 2028).
1	Signal optimisation <ul style="list-style-type: none"> Refine current signals to increase capacity. Adding second right turn into Hoskyns Road from the state highway (full connectivity). 	No	<ul style="list-style-type: none"> Optimisation unlikely to deliver any notable long-term improvement. Signals are out of context coming off CSM2. Potential queuing back from the Hoskyns Road/SH1 signals – this will worsen the level crossing safety risk. Limited improvement for connectivity and does not support future growth
2	At grade (changes to Hoskyns Road) <ul style="list-style-type: none"> Retain Rolleston Drive North signals Hoskyns Road – Left in / Left out 	No	<ul style="list-style-type: none"> Addresses most of the level crossing risk. Does not provide full connectivity (i.e. IZone to Rolleston town). Signals are out of context coming off CSM2.
Rolleston Drive North to Jones skewed options			
3	Skewed flyover (consulted PBC option) <ul style="list-style-type: none"> Original 'PBC option' (skewed) Skewed connection between Rolleston Drive North and Jones Road/bulk retail roundabout No Hoskyns or Rolleston Drive North Connection to SH1 	No	<ul style="list-style-type: none"> Option has already been thoroughly assessed, summarised in options and alternatives report Following consultation and further analysis there is a technically improved alternative that has been identified for a Rolleston Drive North to Jones Road skewed alignment (see option 4)
4	Refined Skewed Flyover <ul style="list-style-type: none"> Left-out from Hoskyns Road Slip lane to Kidman Street from the service lane. New road through the Bulk Retail development, connecting Jones Road (East) to Hoskyns Road. Signals at either ends of the flyover. 	Yes	<ul style="list-style-type: none"> Maintains easy gradients and improves access and local connectivity Need to assess buildability, traffic flows and performance and costs
5	Skewed Flyover + Left-Out at George Holmes Road <ul style="list-style-type: none"> Left-out from George Holmes Road (grade-separated to avoid additional rail level crossing) Slip lane to Kidman Street from the service lane Signals at either ends of the flyover Closes Hoskyns level crossing 	No	<ul style="list-style-type: none"> Additional structure - higher cost. Removes Hoskyns Road left out residual risk, but this is minor improvement over refined skew consultation option. KiwiRail will not accept a new at-grade level crossing for the left-out from George Holmes Road, hence additional structure

ID	Option	Progress to Medium List	Rationale for including or discounting
At grade			
6	Flyover Hoskyns North (S-Bend underpass or overbridge) <ul style="list-style-type: none"> Left-out from Hoskyns Road Slip lane to Kidman Street from the service lane 	No	<ul style="list-style-type: none"> Technical difficulty Clears Jones Road, needs link back through IPort High additional cost with low (if any) additional benefit Local property access disbenefits
Rolleston Drive North to Jones direct options			
7	Direct Flyover (or underpass) Straight (Rolleston Drive North to Jones Road) <ul style="list-style-type: none"> Left-out from Hoskyns Road Slip lane to Kidman Street from the service lane. Signals at either ends of the flyover 	Yes	<ul style="list-style-type: none"> Further work required to assess property impacts Further work required to assess traffic operations
8	Direct Flyover Straight (Rolleston Drive North to Jones Road) Half Interchange <ul style="list-style-type: none"> Left-out from Hoskyns Road (for heavy vehicles) Slip lane to Kidman Street from the service lane Northbound on-ramp from the bridge to SH1 	Yes	<ul style="list-style-type: none"> Further work required to assess property impacts Further work required to assess traffic operations Additional structures required
Roundabouts			
9	Rolleston Dr N roundabout (priority) <ul style="list-style-type: none"> George Holmes LO grade separated Hoskyns Road – Left in / Left out 	No	<ul style="list-style-type: none"> Priority controlled roundabout has high traffic delays due to unbalanced flows, performs worse than Do Min in all periods. U-turn movement puts a lot of pressure on the roundabout
10	Rolleston Drive North roundabout (signalised) <ul style="list-style-type: none"> George Holmes LO grade separated Hoskyns Road – Left in / Left out Pedestrian/cycle overbridge to Tennyson Street 	Yes	<ul style="list-style-type: none"> Signalised roundabout needed to address imbalanced flows, and works reasonably well
11	Rolleston Drive North roundabout + Hoskyns Road roundabout	No	<ul style="list-style-type: none"> Larger property take New safety risks and does not resolve level-crossing issues
12	Rolleston Drive North / Hoskyns Road – combined roundabout	No	<ul style="list-style-type: none"> May worsen SH through movement
Tennyson Street to George Holmes Road under/overpass			
13	Tennyson Under (or over) pass + Rolleston Drive North signals <ul style="list-style-type: none"> Hoskyns Road – Left in / Left out 	Yes	<ul style="list-style-type: none"> Note that the connection is for light/medium vehicles only – heavies would have to use the Weedons Ross Road interchange.
14	Tennyson Under (or over) pass + Rolleston Drive North roundabout <ul style="list-style-type: none"> Hoskyns Road – Left in / Left out 	Yes	
SH1 tunnel			
15	SH1 Trench + Rolleston Drive North signals and Hoskyns Road all-movements with signals	No	<ul style="list-style-type: none"> Complexity – Scale and cost High construction impact for the community (i.e. long period of TMP and disruption)
16	SH1 Trench + Rolleston-Hoskyns Realignment (one signalised intersection)	No	<ul style="list-style-type: none"> Doesn't address safety issues at Hoskyns Road level crossing
17	More capacity (vs option 16) Rolleston Drive North / Hoskyns Road	No	
SH1 (E-W) overbridge			
18	SH1 Flyover, Tennyson Underpass, Hoskyns LILO	No	<ul style="list-style-type: none"> Cost (unaffordable)

ID	Option	Progress to Medium List	Rationale for including or discounting
At grade			
19	SH1 Flyover + Rolleston Drive North signals and Hoskyns all-movements with signals	No	<ul style="list-style-type: none"> High construction impact for the community (i.e. long period of TMP and disruption) Don't provide industrial to township connectivity (hence needed GH left out and roundabout OR Tennyson/GH connection)
20	SH1 Flyover + Rolleston Drive North signals and Hoskyns LILO	No	
21	Rolleston Drive North realigned to Hoskyns underneath	No	
22	Rolleston Drive North realigned to Hoskyns underneath, no connections South	No	
23	Rolleston Dr N realigned to Hoskyns & LILO	No	
Two flyovers			
24	Tennyson Street to George Holmes under (or over) pass AND SH1 (east-west) flyover + Hoskyns Left In / Left Out	Yes	

20.2 Medium List

The following diagrams provide simple representations of each option identified in the Medium List. The diagrams identify the corresponding local intersection treatments which accompany each flyover option.



Option 4
Skewed Flyover (Refined Consulted Option)



Option 7
Straight flyover



Option 8
Straight flyover (plus NB on-ramp)



Option 10
Rolleston Drive North roundabout (signalised) + grade-separated left out @ George Holmes Road



Option 13
Tennyson Street overpass + Rolleston Drive North signal



Option 14
Tennyson Street overpass + Rolleston Drive North roundabout



Option 24
Tennyson Street to George Holmes underpass + SH1 (east-west) flyover + Hoskyns LO

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21 MEDIUM LIST TO SHORT LIST

21.1 Medium list assessment

The medium-list to short-list process took the form of a MCA using a consistent set of criteria to that used for other MCAs' outlined above. The scores were drafted by Subject Matter Experts and then moderated in the various challenge sessions. The MCA scores are presented within **Appendix J**.

The following challenge sessions from Project Partners and key stakeholders were then undertaken to review the findings of the assessment and to confirm a short-list of flyover options:

- 19th January 2022 – challenge session from senior members of the Waka Kotahi team
- 1st February 2022 – challenge session from SDC and Kiwirail

The key feedback from these challenge sessions, and the rationale behind discounting options is outlined within Table 24.

24 Medium List Assessment

ID	Option	Key feedback/risks	Progress to short list
DM	Do Minimum	<ul style="list-style-type: none"> • DM doesn't address the safety or connectivity issues • Additional congestion on the network will result in deteriorating conditions for all modes 	Yes Business case requirement to progress the Do Minimum
4	Rolleston Drive North to Jones Road - Skewed Flyover	<ul style="list-style-type: none"> • Refined version of option presented as part of the public consultation exercise • Refinements provide improved access to SH1 and reduce pressure on Jones Road/Weedons interchange • Delivers on investment objectives • High cost and complex structure • Large embankment required which could prevent future rail opportunities 	Yes
7	Rolleston Drive North to Jones Road - Straight Flyover	<ul style="list-style-type: none"> • Straight alignment is a more straightforward alignment on the desire line between Rolleston Drive North and industrial zone • Has shorter, steeper ramps to flyover • Provides same access to SH1 as skewed option • Delivers on investment objectives • Risk around property impacts 	Yes Has re-emerged from pre-consultation assessment
8	Rolleston Drive North to Jones Road - Straight Flyover (NB on-ramp to SH)	<ul style="list-style-type: none"> • Same as option 7 but with on ramp provided to reduce pressure on Jones Road and Hoskyns Road intersections • Complex to provide on ramp without increasing gradients on either side of flyover • Not favoured due to need for controlled intersection at top of flyover with poor sight lines 	Yes Sub-option of Option 7.
10	Rolleston Drive North roundabout (signalised)	<ul style="list-style-type: none"> • Signalised roundabout has a large footprint • Although a roundabout is a safe system, the provision of signal metering does not address key safety risk on SH1 • Doesn't provide for north-south connectivity without additional access ramp from George Holmes Road 	No
13	Tennyson Underpass + Rolleston Drive North signals	<ul style="list-style-type: none"> • Decoupled highway access from local connectivity • Underpass takes local traffic and active travel under Highway/railway • Results in increased traffic on Kidman and Tennyson Street through town centre • Significant property effects to be considered 	Yes Could also be an overpass option with Rolleston Drive North signals
14	Tennyson overpass + Rolleston Drive North roundabout	<ul style="list-style-type: none"> • Delivers similar connectivity and safety benefits to option 13 but has similar property and wider network effects. • Overpass takes local traffic and active travel over Highway/railway 	No Option 13 provides similar functionality
24	Tennyson Street to George Holmes underpass AND SH1 (east-west) flyover + Hoskyns LO	<ul style="list-style-type: none"> • Two significant structures delivering grade separation in two locations (decoupling highway access from local connectivity) • Very complex to construct around a live highway and railway 	No

The evidence for discounting Options 10, 14 and 24 is presented below.

Option 10: Rolleston Drive North – signalised roundabout

A large, signalised roundabout at Rolleston Drive North would cater for turning movements into and out of Rolleston town centre and provides a left in/left out connection to Hoskyns Road for traffic from Rolleston and Christchurch (via a U-turn at the roundabout). However, the traffic modelling established that any roundabout at this location would need to be signalised in order to prevent excessive queuing from developing.

Whilst a roundabout on a busy state highway is compliant with the Safe Systems approach, the implementation of signals is not. Similarly, the left turn into Hoskyns Road retains a higher rail level crossing risk and may trigger the need for rail signal improvements. Therefore, this option fails to address a key safety issue.

Furthermore, the roundabout does not cater for north-south movements from the industrial area to the town centre (it does, however, provide for south-north movements). It therefore fails to address one of the key connectivity objectives of the project. This could be remedied by the provision of an on-ramp facility from George Holmes Road to the State Highway to the south of the roundabout, but this has safety issues with merging and weaving over a short distance. A roundabout of this scale would also have a large footprint and not cater for active travel users (without additional infrastructure).

The MCA assessment indicated a modest negative score against the safety investment objective. Without the George Holmes Road connection, this option would also score poorly against the connectivity investment objective. With the George Holmes Road connection, the option scored poorly in terms of property, visual effects, engineering difficulty, planning consent and constructability.

Option 14: Tennyson Street overpass + Rolleston Drive North roundabout

The option combines the Rolleston Drive North roundabout with an overpass connecting Tennyson Street and George Holmes Road. The overpass caters for active travel as well as local traffic movements between the town centre and the industrial zone and the roundabout caters for access between the town centre and the State Highway.

As for Option 10, the traffic modelling confirmed that any roundabout (even with a separate overpass at Tennyson Street) would still need to be signalised. Signalising the roundabout addresses the congestion issue but doesn't address the desire to remove signals from the highway.

Overall, this option was considered to be less desirable than Option 13. Although neither option allows for the removal of the traffic signals, the intersection footprint for Option 13 is significantly smaller and traffic modelling indicated a higher level of performance. This option also received a slight negative score against the safety investment objective and high negative scores for property (two locations impacted at Tennyson Street and Rolleston Drive North) and constructability.

Option 24: Tennyson Street to George Holmes underpass AND SH1 (east-west) flyover

Option 24 provides grade separation in two locations – an east-west flyover of SH1 over the local road network and a north-south underpass connecting Tennyson Street to George Holmes Road. This separates local traffic from traffic accessing the State Highway. Putting the highway on an elevated structure, however, is likely to be expensive and disruptive to construct.

This option scored relatively well against the investment objectives (it achieved the highest score of the discounted options and the fourth highest score overall), however it received a high negative score against the effects criteria – particularly consentability, engineering difficulty, constructability and visual effects.

21.2 Short list option description

This section describes the short-listed options. Appendix K provides further details regarding the three short listed options. It also includes the physical specifications, long sections (gradient) and cross sections.

All options have the following consistencies:

- SH service lane with left in left out
- Signals for the Kidman Street / Rolleston Drive North intersection

21.2.1 Option 4: Rolleston Drive North to Jones Road – Revised Skewed Flyover

Option 4 is a refinement to that presented as part of the public consultation – refer to Section 2.4.1.

This included:

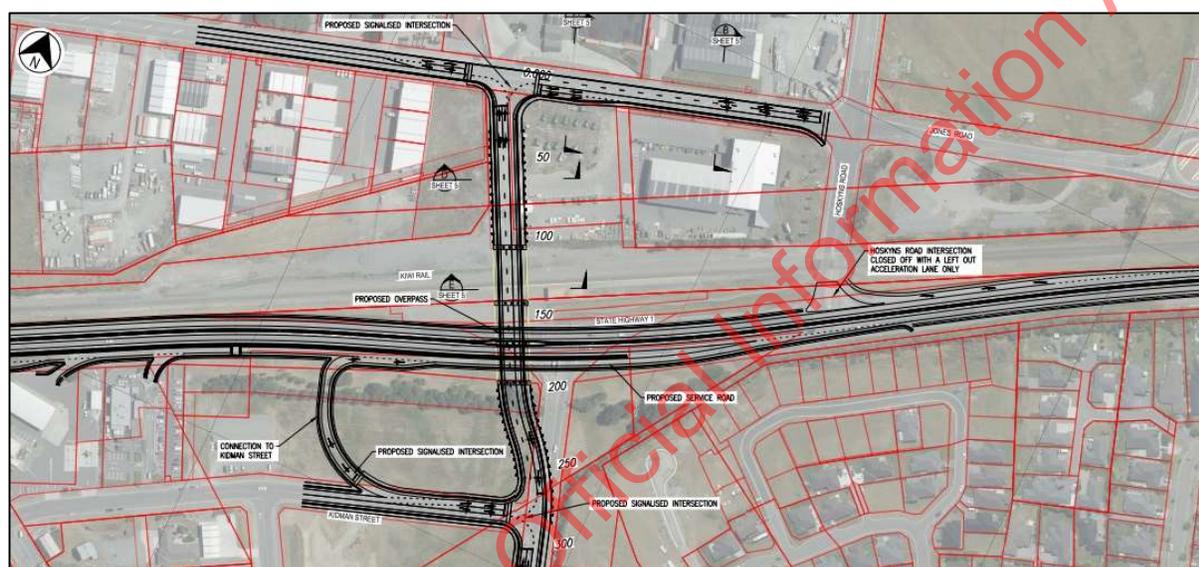
- Left-out from Hoskyns Road onto SH1. This would be a free-flow movement (meaning that it is very unlikely any blocking back to the railway line will occur), with an auxiliary lane added onto SH1.
- Slip-lane from the southbound service lane to connect onto Kidman Street. This provides a direct access to Rolleston Drive North (rather than using Tennyson Street) and an alternative route (from the Weedons Ross Road interchange) from SH1 to the industrial area (via the flyover).

21.2.2 Option 7: Rolleston Drive North to Jones Road – Straight Flyover

This option provides a direct (straight) connection between Rolleston Drive North and Jones Road. The key features of this option are:

- A three-lane overbridge.
- New signalised intersection for the flyover/Jones Road.
- Signal at Kidman Street / Rolleston Drive North.
- Design bridge for 60km/h design speed (posted speed limit 50 km/hr)
- As per the skewed option, a looped off ramp facility is provided from SH1 southbound, from the service lane around to a new signal on Rolleston Drive North.
- Includes a left-out from Hoskyns Road onto SH1.
- Some property would be required on the Jones Road side (true of all flyover options).

The concept layout for Option 7 is provided as Figure 32.



Rolleston Drive North to Jones Road – Straight Flyover initial concept

21.2.3 Option 13: Tennyson Street Underpass

This option is somewhat of a departure from other alternatives, in that the primary connection on the Rolleston township side is from Tennyson Street rather than Rolleston Drive North. This deviates from anything that has previously been considered, going as far back as the original CRETS³⁷ report in 2007.

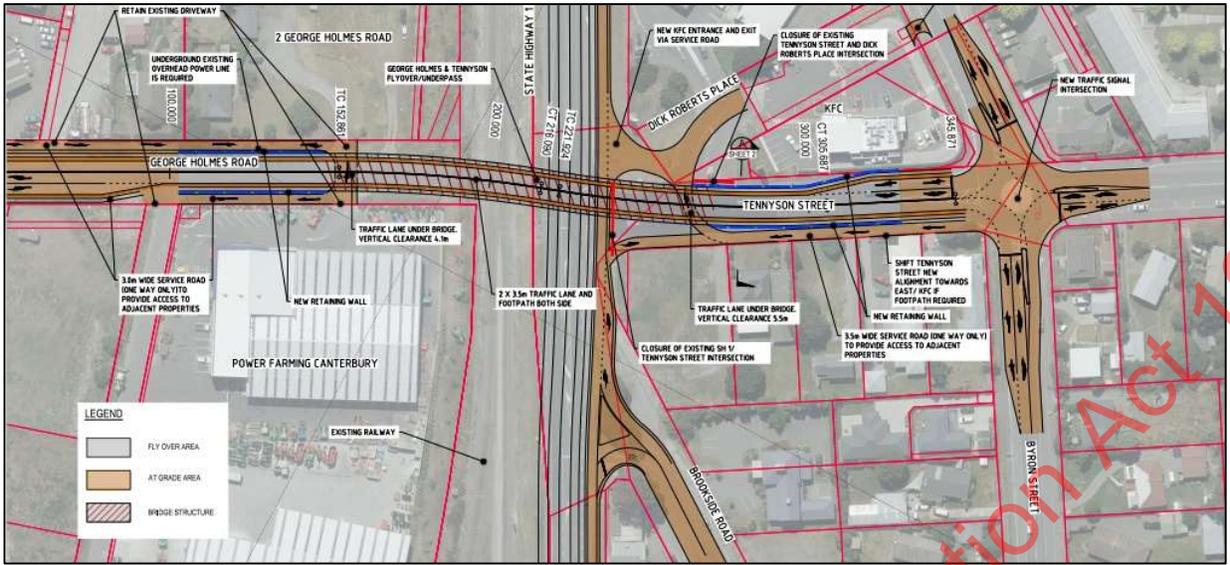
The option focuses on grade-separation between Tennyson Street and George Holmes Road, with the local road being an underpass and the state highway remaining at-grade. However, the option for the local road connection being an overpass has not been ruled out. The other key feature of this option is the **retention and modification of the traffic signals at the Rolleston Drive North / SH1 intersection.**

The key features of this option are:

- Two-lane underpass
- Retention and modification of the signals at Rolleston Drive North / SH1
- Signalisation of the Tennyson Street / Kidman Street intersection
- New signals at Kidman Street / Rolleston Drive North.
- Access issues for properties on both sides
- Service lane bypasses Tennyson Street - i.e. underpass also goes under the service lane, note SH access to town centre will be via Rolleston Drive North and Kidman Street.
- Site distance achieved for 60km/h design speed.

Figure 33 provides the concept for the Tennyson Street underpass option (noting that this also includes the retention of the signals at Rolleston Drive North).

³⁷ Christchurch, Rolleston and Environs Transportation Study



33 Tennyson Street to Jones Road – Underpass initial concept

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22 SHORT LIST ASSESSMENT

22.1 Overview

The short list assessment was informed by:

- Traffic modelling of each option, and consideration of the wider network effects.
- Concept design.
- Planning review of the options.

These technical assessments then informed an updated MCA of the options. The key traffic modelling results and an overview of the MCA process is summarised below.

22.2 Traffic modelling

Traffic modelling for each of the short-listed options was undertaken using the Paramics micro-simulation model for the AM, inter and PM peak periods for future years 2028 and 2038. The base year, do minimum, and forecasting microsimulation modelling aspects have been Peer Reviewed and signed off as appropriate.

The following sub-section provide a summary of the key results, focusing on the differences in traffic volumes, travel times and queuing.

22.2.1 Traffic volumes

Table 25 provides a summary of the traffic volumes along key roads and highlights the wider implications to some of key outcomes that are being sought through the Detailed Business Case (DBC).

Table 25 Traffic volumes on key local roads (2038 – two way hourly)

Road	Key implications	AM peak				PM peak			
		Do Minimum	Skewed flyover	Straight flyover	Tennyson-George Holmes	Do Minimum	Skewed flyover	Straight flyover	Tennyson-George Holmes
Tennyson Street (north of Moore Street)	Connectivity / liveability	512	396	362	734	558	506	516	884
Hoskyns Road Level Crossing (north of SH1)	Rail / road safety	1,506	564	1,056	445	1,626	726	978	633
Levi Road (west of Weedons Road)	Safety and efficiency on the local roads	1,391	1,336	1,391	1,239	1,560	1,529	1,504	1,394
Weedons Road (south of interchange)	State highway access	1,783	1,504	1,567	1,569	1,934	1,826	1,833	1,750
Weedons Road (south of interchange)		1,212	1,075	1,047	1,257	1,390	1,091	1,066	1,212
Jones Road (west of Hoskyns)	Industrial zone access / level crossing on Jones Road	793	564	1,976	1,172	480	560	1,767	1,278
Jones Road (east of IPort Drive)		621	854	626	613	658	615	390	463
Selwyn Road (West of Weedons Ross Road)	Travel to/from Christchurch	1,290	1,507	1,445	1,298	1,253	1,187	1,155	1,126

Red = traffic volumes higher than the Do Minimum (dark the shade, the more significant the change)

Green = traffic volumes lower than the Do Minimum

The key results are:

- The Tennyson-George Holmes option will increase traffic through the Rolleston Town Centre. This goes against the Town Centre vision that SDC have been striving towards.
- With the Straight Flyover and Tennyson-George Holmes options the traffic volumes on Jones Road increases. However, the traffic modelling has confirmed that this traffic can be managed with signal optimisation and highlights the importance of this link referred to through consultation.
- Jones Road east of the Industrial area increases most significantly in the Skewed Flyover option, to around 850 vehicles per hour (vph) by 2038.
- In 2028 in all options the volumes on Selwyn Road (the alternative route from Rolleston towards Christchurch) increase and the corresponding section of SH1 decreases. This is because of the reduced access from Rolleston to SH1 towards Christchurch which is a particular factor in the AM peak.

22.2.2 Travel times

By the 2038 AM peak, a Do Minimum network would become very congested, particularly along SH1 through the Rolleston Drive North and Hoskyns Road signals. The short-listed options resolve these issues, with resultant travel time improvements of 2-3 minutes along SH1.

The main negative impacts of the options are to travel times along the Lowes-Levi-Weedons route, because of additional demand (and subsequent delays) at the Weedons Ross Road interchange. The increase in travel time along Levi Road from a Do Minimum of 5.3 minutes to 12.5 minutes with a 'Skewed flyover' represents a **significant degradation** compared to current travel times. The change is less significant with the 'straight' option as more people access the state highway via Hoskyns Road (using the left-out).

The Tennyson Street underpass show improvements on most routes by 2038. The exception is a small increase on Lowes Road / Levi Road / Weedons Road (0.5 minutes) and on Tennyson Street southbound (0.1 to 0.2 minutes). The main negative impact for the straight flyover option is again on the Levi Road route, but the added increase in travel time is not as significant (additional 3 minutes) as what would be expected for the skewed flyover.

22.2.3 Queuing

The traffic modelling of the short-listed options has identified:

- There are no significant issues at either the Walkers Road or Hoskyns Road crossings (aside from the Do Minimum where there is a queue back from Hoskyns Road).
- The skewed and straight flyover options tend to produce slightly longer queues on the north approach to the Weedons Road crossing. The Weedons Ross Road / Jones Road roundabout is only around 40-60m from this crossing, therefore queues back into this roundabout from the rail crossing are likely in all scenarios and may be mildly exacerbated in the Flyover options.
- The Tennyson Street over/underpass options tend to produce mildly longer queues on the south approach to the Weedons Road crossing. The northern Weedons interchange roundabout is around 100-120m from the rail crossing, so this does not appear to be a significant issue.

22.3 Multi Criteria Assessment

A more detailed assessment has been undertaken of the short-listed options using a multi criteria assessment framework. A nominated specialist for each of the KPIs or effects was asked to develop and implement a methodology. These methodologies and the resulting outputs were peer reviewed by Waka Kotahi, SDC and Kiwirail specialists and documented in a series of specialist reports.

The specialist reports were used to score the options using a seven-point scale (from -3 to +3) relative to the existing situation. The final MCA scores were also informed from insights through the following engagement:

- 9th December 2021 – Waka Kotahi challenge session No.1 (medium to short list)
- 19th January 2022 – Waka Kotahi challenge session No.2 (short-list review)
- 1st February 2022 – KiwiRail and SDC review
- 22nd February 2022 – workshop with Fire and Emergency Services
- 16th March 2022 – Workshop with ECan (relating to public transport impacts)

Note that 'cost' was not considered as part of the MCA. The fundamental objective of the MCA was to establish the best solution, weighing up other key considerations.

22.3.1 Scores

Table 26 provides the full MCA results, with annotation provided highlighting the key points of differentiation.

All options retain a left-out function at Hoskyns Road so were all awarded a slight negative score by the specialist rail assessor

Option 4 achieved the highest score for social connectedness as it provides direct connectivity between the specialist retail area in the town centre and the bulk retail area to the north. It also has a gentler gradient

Option 7 scores highest for freight productivity as it allows for the removal of the Rolleston Drive North and Hoskyns Road signals without needing to sever Jones Road

Options 4 and 13 were considered more challenging from a consentability perspective. Option 4 is larger with more visual effects and option 13 has effects on a larger number of sensitive businesses

Option 4 scores poorly for engineering difficulty and constructability due to the scale of structure required for the skewed flyover

Table 26: Short list MCA

		DSIs	Road/rail incidents	Ped travel times	Social connectedness	Traffic travel times	Freight productivity	People throughput (travel choice and liveable community)	Rail operations	Resilience (reliability)	CO2 emissions	Flexibility	Consentability	Property	Engineering difficulty	Constructability	Wider traffic effects	Rail network effects	Interdependencies	Amenity/visual effects
DM	No Flyover all other programme elements included	-3	-3	-1	-3	-2	-2	-1	-2	-1	0	0	0	0	0	0	-1	-2	0	0
4	Rolleston Drive North to Jones Road - Skewed Flyover, Hoskyns LO	0	-1	1	3	1	1	1	1	1	-2	2	-2	-2	-3	-3	1	1	-1	-2
7	Rolleston Drive North to Jones Road – Straight Flyover, Hoskyns LO	1	-1	2	2	2	3	2	0	2	-1	2	-1	-1	-1	-2	1	0	0	-1
13	Tennyson Underpass + Rolleston Drive North signals, Hoskyns LO	-2	-1	2	2	2	0	-2	1	2	-1	-1	-2	-1	-2	-2	0	1	-2	-1

Option 13 scores poorly for safety as it retains the traffic signals on the State Highway which is not a safe system approach

Both of the straight alignments provide more direct connectivity between the town centre and the industrial area than the skewed alignment. Modelling indicates slightly faster travel times as a result

Option 13 scores poorly for the liveable community aspect of this score as it encourages increased traffic on Tennyson Street – a corridor with higher "place" value where reduced traffic volumes would be desirable

Option 4 has the highest negative score for CO2 emissions due to the scale of the structure involved and associated higher levels of embodied carbon

Option 13 scores relatively poorly for interdependencies as it is likely to trigger a number of local road improvements to prevent traffic from rat running through undesirable parts of the network

22.3.2 MCA Results and Sensitivity Testing

Table 27 provides the total scores for each option and relative rankings. For completeness the Do Minimum has also been included within the final set of results.

The table also provides rankings based on the following sensitivity tests which are intended to capture the key identified risks:

- **Investment Objectives** = 60% of the total score
- **Connectivity** = 40%
- **Traffic operations** = 30%
- **Safety** = 30% (baseline = 20%)

For each sensitivity test the weightings for all other criteria have been distributed proportionally with the original baseline weightings.

27 MCA scores and sensitivity testing

	Baseline			Sensitivity Analysis (Ranking)			
	Unweighted score	Weighted score	Rank	Investment Objectives	Connectivity	Traffic Operations	Safety
Do Minimum	-21	-1.2	4	4	4	4	4
Skewed flyover	-3	-0.4	2	2	2	2	2
Straight flyover	9	0.3	1	1	1	1	1
Tennyson-George Holmes	-7	-0.6	3	3	3	3	3

Noting that all options perform significantly better than the do minimum overall, the results of the MCA present a clear front-runner in terms of the highest scoring option – namely the ‘Straight flyover’ option. Not only is it the only option that has an overall positive weighted score, it also ranked highest using the baseline weightings and for all sensitivity tests.

It provides a clear indication that the **straight flyover is the emerging preferred option**. The next highest scoring alternative is the skewed flyover. Overall this two-phase analysis process demonstrated the value of community engagement and taking a broader look at options.

23 TECHNICALLY PREFERRED OPTION

23.1 Technically preferred option

As outlined through the MCA process, the clear front runner was the 'straight' alignment.

The main benefits include:

- A direct connection between Rolleston township via Rolleston Drive North to the industrial area on Jones Road and the Hoskyns Road arterial route to West Melton and also SH73.
- A direct connection providing for a greater range of multi-modal journeys between the town centre and industrial areas – footpath on one side, shared path on the other.
- Removal of short-stacking risk at the rail level crossing – significantly reducing the safety risk to people – 40 near-misses and collisions over the past ten years.
- Some highway access is restored with a left out from Hoskyns Road and southbound off-ramp from service lane to Kidman Street and Rolleston Drive North, enabling people to 'loop' back across the flyover to the industrial area. This distributes highway access to more locations, taking pressure off Weedons Interchange and reducing Tennyson Street traffic.
- Engineering and construction advantages (less complex, lower embodied carbon and visual impact).
- Retaining full east-west Jones Road connectivity.
- Reduces traffic along Jones Road east and having to use the Weedons Ross Road rail level crossing.
- Maximising land for future development opportunities adjacent to Kidman Street and Jones Road – including expanded Park'n'Ride facilities (future proofing for rail-based Park and Ride).
- Simpler bus service integration compared with the skewed option.

Concerns which remain include:

- A flyover gradient is steeper than ideal but is manageable and like the Christchurch Northern Corridor Preston's Road overbridge – up to eight per cent gradient. This is still deemed acceptable by Waka Kotahi cycling advisors and less steep than other active travel paths around the country.
- Property acquisition is required, particularly at the northern end
- Some outstanding issues to resolve in design such as bridge landing point intersection designs and understanding property and access impacts.

This option scores best against the investment objectives. It is also the option that has the lowest level of negative effects. Overall, it is the only option that achieves a weighted positive score against the MCA criteria.

23.2 Travel Demand Management

Appendix L provides a summary of the various Travel Demand Management measures that were considered as part of the optioneering process.

The key opportunity is presented with the introduction of new traffic lights which could be designed to include "bus jumps" (or "B" phases). This would help improve public transport service reliability, with quicker access onto the flyover from the bus stops (and the Park and Ride) located within the Rolleston township.

23.3 Why not the alternatives?

23.3.1 Skewed Flyover

The skewed flyover was the original preferred alignment on the basis that it offered a gentle gradient, had minimal property access disruption, and delivered on the safety objective of having zero harm at the Hoskyns Road level crossing. Following public consultation, and subsequent technical analysis, the design was refined to improve access to the highway and improve east-west connectivity along Jones Road albeit in a rather convoluted manner.

Fundamentally, the skewed flyover was not preferred to the straight flyover because:

- The option did not perform as well as the straight flyover option as it resulted in more convoluted routing for all modes travelling between the Rolleston Town Centre and the industrial zone.
 - Average distances travelled across the network are further with the skewed flyover than straight flyover, resulting in higher vehicle-kilometers and emissions. The additional travel distance is largely due to the discontinuity of Jones Road at the northern end of the skewed flyover which contributes to

the longer route to access SH1 heading towards Christchurch. Jones Road is the main heavy vehicle route through the industrial area and with this severed, connectivity is reduced meaning freight and other traffic needs to divert via a new internal road through the bulk retail area.

- The straight flyover option has faster travel times than the skewed flyover in the AM period, which leads to better overall travel time outcomes compared to the skewed option when the peak periods are weighted by the number of vehicles.
 - On the skewed flyover in the northbound direction, a proportion of traffic travelling towards Christchurch uses Jones Road and the Weedons Interchange. Traffic volumes on Jones Road east of the industrial area increase most significantly in the skewed flyover option. In other options the volume of traffic using the overbridge and Jones Road to access Weedons Interchange is minimal, the Hoskyns Road left-out movement to SH1 is well-used in these scenarios which eases the pressure at the Weedons Interchange.
 - The right turn out of Hoskyns Road into Jones Road (priority control intersection) in the skewed flyover option has a 2-minute delay in 2038 in the evening peak which generates the overall LOS F result at that intersection
- The structure is more complex to construct and will result in higher embodied carbon emissions.
 - The bridge structure for the skewed flyover would comprise four spans at 48-66m long and a total length of 170m. The straight flyover is 90m long with 4 20m spans.
 - The skewed flyover has very long spans and high skew resulting in design complexity for both sub and super structure. It would be challenging to minimize impacts on road and rail corridors and retain flexibility for future changes to the form of SH1. Greater disruptions during construction are expected.
 - The straight flyover uses simple technology, short spans and perpendicular angle resulting in simpler engineering and design processes.
 - The differences in terms of benefits for future public transport connectivity and accessibility to growth areas are negligible between the two options.
 - There is a difference in land acquisition requirements with the skewed flyover needing land from the large format retail site and SDC land; while the straight flyover needs property along Jones Road and SDC land.
 - The skewed flyover would be subject to a complicated consenting process (needing a new designation or 'full' alteration), with noise and visual effects for residential properties being key issues. Whilst also likely to be complex, the straight flyover would have limited amenity effects as it is further from sensitive receivers such as residential properties.
 - The skewed flyover has a higher exposure to crashes with an alignment connecting to the bulk retail area and the closure of Jones Road at Hoskyns Road, meaning motorists must navigate more intersections to access the broader industrial area from the town centre.

Early comparative estimates obtained for the short list assessment indicated that the skewed flyover is \$21M more expensive than the straight flyover. Cost is an important consideration given that the transport benefits of the 'straight' vs the 'skew' option are relatively similar. From a value-for-money perspective, the 'straight' option is the most optimal.

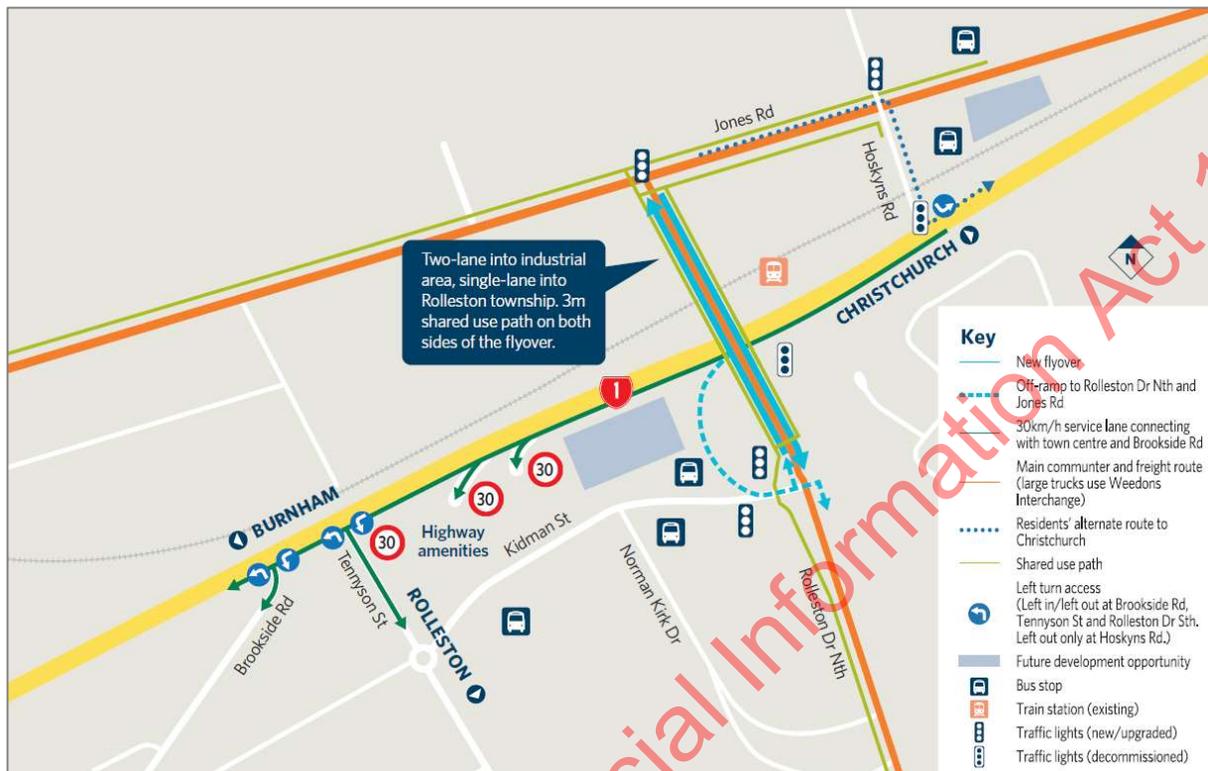
23.3.2 Tennyson to George Holmes Underpass

The Tennyson-George Holmes connection offers some advantages. It separates out local north-south movements from State Highway access and provides good connection between the town centre and industrial zone. The main problem with this design is it results in increased traffic along Tennyson and Kidman Streets areas and past the primary school significantly increasing vehicle traffic into these areas – modelling indicates 15,000 vehicles a day – this would be detrimental to SDC's vision for a community and retail focused Town Centre which is a pedestrian friendly, community hub.

Also, this option would still require traffic signals at the Rolleston Drive North/SH1 intersection. This would not support a safe transport network or project safety investment objectives. As well, highway freight productivity would be negatively impacted if this intersection remained.

23.3.3 Overview of the flyover

An overview of the flyover proposal is presented as Figure 34.



34: Flyover proposal

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PART B2: REFINING THE PREFERRED OPTION

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24 RESPONSE TO FEEDBACK (ROUND 2)

24.1 Overview

A second round of community engagement was completed in June/July 2022 with a focus on the 'technically preferred' programme. The purpose of this second round of public consultation was to check our changes were on track, and if there was anything else we needed to consider before making any last adjustments before finalising the business case.

The community engagement process involved:

- 4 community pop-up sessions.
- 20+ meetings with stakeholders, businesses, and community groups.
- 166 letters with feedback forms dropped to nearby homes.
- Updates on the project website (e.g., Frequently asked questions page, publication of documents such as – 'SH1 Rolleston Transport Improvements – The path to a flyover – a summary of investigations').

The above methods were used to communicate the changes to the design since the first round of community engagement. The outreach resulted in the following:

- 12,121 views on our project website.
- 1,851 subscribers to our e-newsletter.
- 756 pieces of feedback (via pop-up sessions, survey responses, letters and emails).

One-on-one engagement with emergency services and public transport providers (ECan) also took place.

Summary

The general feedback from the public was positive, with many expressing that the programme presented was a notable improvement to that shown during the first round of consultation. This has provided the team with confidence that the 'technically preferred' programme was the right the path to progress down.

Whilst there was a stronger degree of support for the revised flyover alignment, it remained the most contentious aspect of the programme. Some specific concerns were also expressed in relation to other parts of the 'technically preferred' programme. The following sections outline those key concerns, and what the project team has done post consultation to seek to mitigate (or address) those concerns.

24.2 Dunns Crossing Road / Walkers Road

The key feedback in relation to the Dunns Crossing Road / Walkers Road roundabout captured:

1. Safety concerns in relation to the anticipated increase in traffic on Dunns Crossing Road and past West Rolleston Primary School.
2. Desire for a safe walking and cycling connection across SH1, between Dunns Crossing Road and Walkers Roads to link with the proposed Burnham Cycleway along Runners Road.

The response to these two key concerns is provided below.

24.2.1 Traffic volumes past the Rolleston Primary School

Following the second round of public engagement, Waka Kotahi engaged directly with the West Rolleston Primary School and the SDC regarding potential ways to manage an increase in traffic flows along Dunns Crossing Road.

Appendix M provides further details regarding issues and recommended mitigation.

Table 28 identifies how traffic volumes change across different years, and under different scenarios. Overall, the project is expected to increase the volume of traffic on Dunns Crossing Road by 2,700 vehicles per day compared to a Do-Minimum scenario (which also experiences significant growth relative to the current traffic volumes). These volumes do not include growth from any of the known future Plan Change areas.



28: Predicted Traffic Flows

Road Section	AADT - Total Two-Way Volume			Change (Do Min vs Scheme)	
	Expanded Count*	Baseline (no NZUP scheme)			
	2021	2021	2038	2038	
Dunns Crossing Road (North of Burnham School Rd)	3,200	3,100	5,500	8,200	2,700

The key issues that are currently present, and which could worsen in response to an increase in traffic, are:

- Unsafe speeds on Burnham School Road and Dunns Crossing Road.
- A lack of dedicated safe crossing facilities to school and community bike track.
- Unsafe parking during school peaks.
- Conflicting movement and place priorities.

The issue is compounded by the fact that Dunns Crossing Road is an arterial road and has several trucks traveling along it, including from the nearby Recovery Centre on Burnhams School Road. These issues are evidenced against a review of crash history, a site visit and identification of the Infrastructure Risk Rating (IRR).

The predicted increase in traffic volume, in itself, is not expected to increase the existing risk significantly purely based on the IRR analysis. Therefore, additional safety measures on the Dunns Crossing Road corridor are not warranted due to an increase in traffic volumes alone. However, if we look beyond the quantitative analysis and consider the wider impacts to the West Rolleston School and the community, there is an opportunity to proactively introduce safety measures for a growing community in Rolleston and undertake work in alignment with the Road to Zero vision³⁸. Mitigation of some form is therefore recommended.

Figure 35 and Figure 36 provide an overview of the recommended short, and long term, mitigation measures for Dunns Crossing Road.

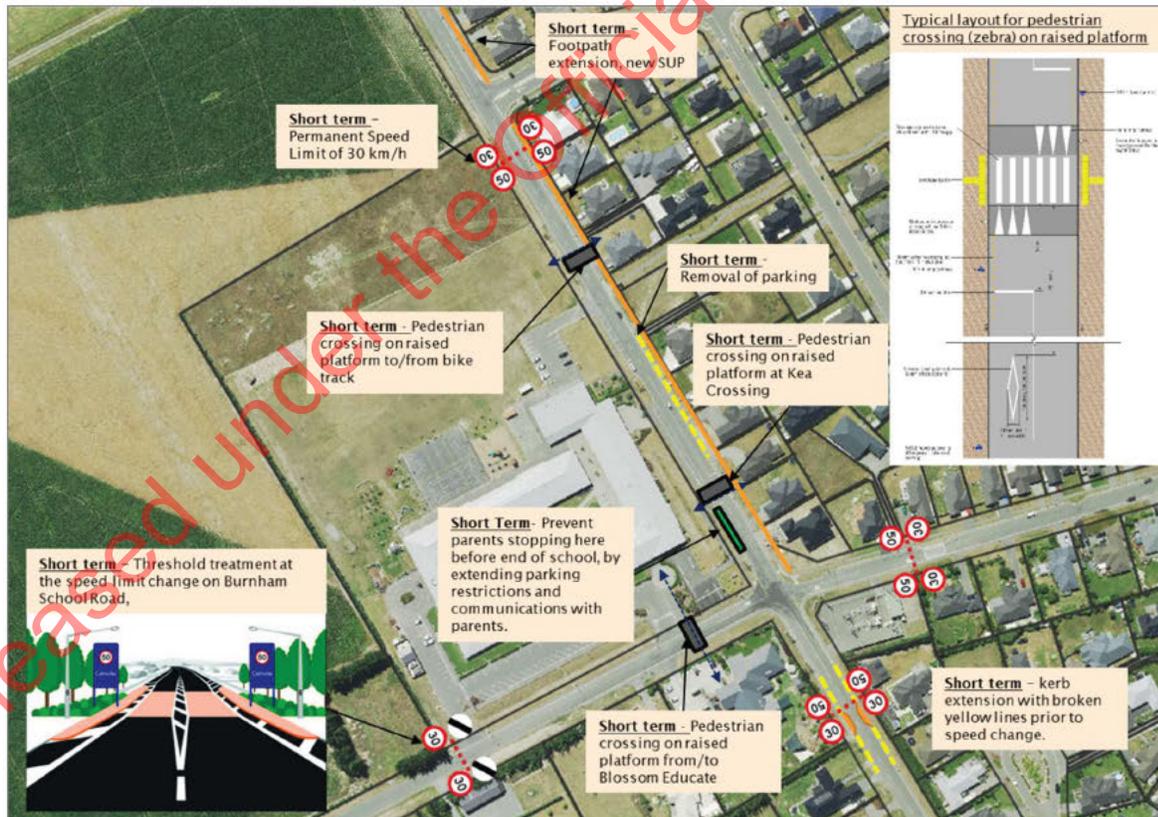


Figure 35: Dunns Crossing Road – short term mitigation options

³⁸ https://www.transport.govt.nz/assets/Uploads/Report/Road-to-Zero-strategy_final.pdf



Figure 36: Dunns Crossing Road – long term mitigation options

24.2.2 Cycling underpass

SDC have expressed a desire that a walking and cycling underpass/underpass should be provided at the same time as the construction of the SH1/Dunns Crossing Road roundabout, with the intent to connect to a future Rolleston to Burnham Cycleway. Some wider community support, including from the Burnham Military Camp, for this option also came through during consultation.

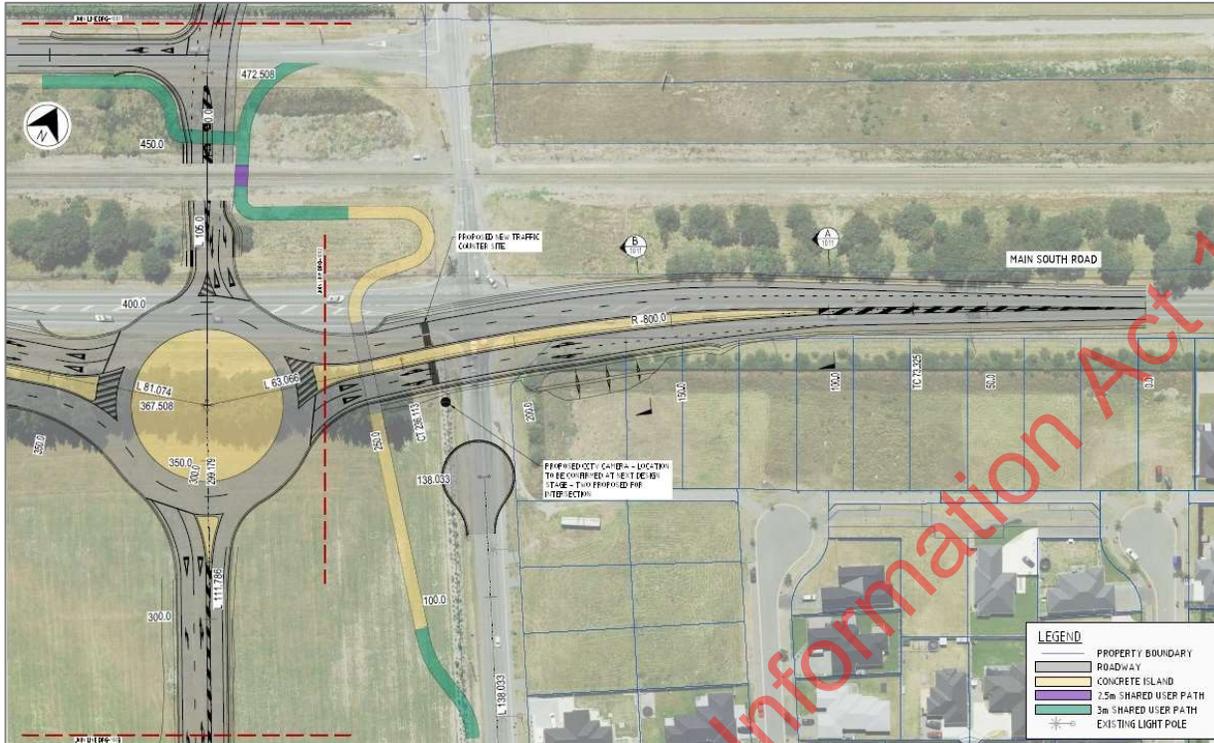
With the proposed expansion and development of the Burnham Military Camp and the PC80 Industrial area expansion, it is expected that there will be more cyclists wanting to make the state highway crossing. While the immediate numbers would be low, these could increase to between 50 and 100 cyclists per day. The safety audit has concluded that the crash risks for cyclists trying to cross at grade would be serious.

Following this feedback and safety assessment, the project team undertook a high-level feasibility assessment and concept design for the proposal. This captured two options – one for an at-grade level crossing with safety gates and a underpass under the state highway only, and the other one where the underpass went under both the railway line and state highway.

The feasibility assessment established that the construction under the state highway would be relatively simple when timed with the physical work and traffic management for the roundabout. The rail underpass is more challenging due to space constraints and with stronger structures involving difficult construction methods requiring more rail “block of line”. These complexities add to the risk and cost, and hence the single SH underpass is recommended. The other determining factor was the tight radii needed for the access ramps (potential CPTED issues) and potential clash with utility services on Runners Road.

For the following reasons, the most preferable alternative would be for the cycleway under the state highway with at grade cycle crossing of the rail.

- It has the least construction risk and cost.
- It is appropriate for the estimated number of users.
- It has more open paths and access ramps.
- It addresses the risk of pedestrians and cyclists crossing at grade at the rail crossing and state highway.



37: Dunns Crossing Road - Walking/Cycling underpass - Recommended Option

Providing the cycle underpass now as part of the programme would be a significant opportunity cost saving – i.e. ‘coming back’ and constructing a underpass later would be notably more disruptive and expensive when compared to including it as part of the roundabout construction.

24.3 Rolleston Drive South

There was a consensus amongst the community that changes at the Rolleston Drive South intersection were required, with strong support (and understanding of the need) for banning the right turn out onto SH1.

Some members of the community noted a preference for retaining the right-turn into Rolleston Drive South, with the key concern relating to the loss of accessibility for northbound traffic. Specifically, this focused on a scenario where drivers missed the turnoffs at the Dunns Crossing Road / Walkers Road roundabout, and then had to access at the Weedons Ross Road interchange.

In response to the above concern the team made the following considerations and determined that additional northbound access was not appropriate. The key reasons were:

- Retaining a right turn at Rolleston Drive South is not safe in this road environment. The capacity of Dunns Crossing Road / Walkers Road roundabout will provide sufficient capacity, and while traffic does increase here and along parts of Brookside Road and Lowes Road, these roads are intended to accommodate the anticipated level of traffic. In some cases, the Council has already proposed upgrading these roads in response to local residential growth.
- To prevent head-on crashes and keep people safe, flexible barriers in the middle of the highway will be installed from the end of the Christchurch Southern Motorway through to Dunns Crossing Road. The barrier will prevent head-on collisions.
- The main southern entrance to Rolleston at Dunns Crossing Road will be clearly signposted to give people plenty of warning.
- Ultimately, the recommended flyover and traffic signals are designed to provide a coordinated route for people traveling to the city. Vehicles will be able to travel from Rolleston Drive North to the Hoskyns Road onramp where people will get their own free-flowing lane joining the Christchurch Southern Motorway.

24.4 Flyover

Whilst there is strong community support for the revised plans for the flyover, there were several questions/queries raised during consultation. The key points captured:

- The ability to integrate with a future Park and Ride or commuter rail service to Christchurch.
- A perception of a steep gradient on the flyover.
- The directness of connectivity to key growth areas.
- The wider traffic efficiency implications when compared to the original skewed option.

24.4.1 Integration with future public transport improvements

The community stressed the need for improved travel options to encourage more walking, cycling and public transport, and allowance for future changes, such as Park and Ride sites or improved rail facilities. The project team are in strong agreement with these principles, and the preferred option (and design) seeks to support both existing and (potential) future public transport services.

Intercity buses currently stop on Norman Kirk Drive, which will continue in the future. Buses entering Rolleston (from the south) can turn off at the Walkers Road roundabout, head via Two Chain and Jones to the flyover and then loop around Norman Kirk Drive or turn onto Dunns Crossing Road and Brookside Road to access Kidman Street to Norman Kirk Drive. Travel northbound will then turn onto Kidman or Rolleston Drive North to follow the same route as general traffic over the flyover to access the state highway via Hoskyns Road.

Southbound buses will exit the state highway via the offramp to Rolleston Drive North and the loop around to the Norman Kirk bus stop, and then exit turning left onto Kidman Street, right onto Tennyson Street and the left onto the state highway.

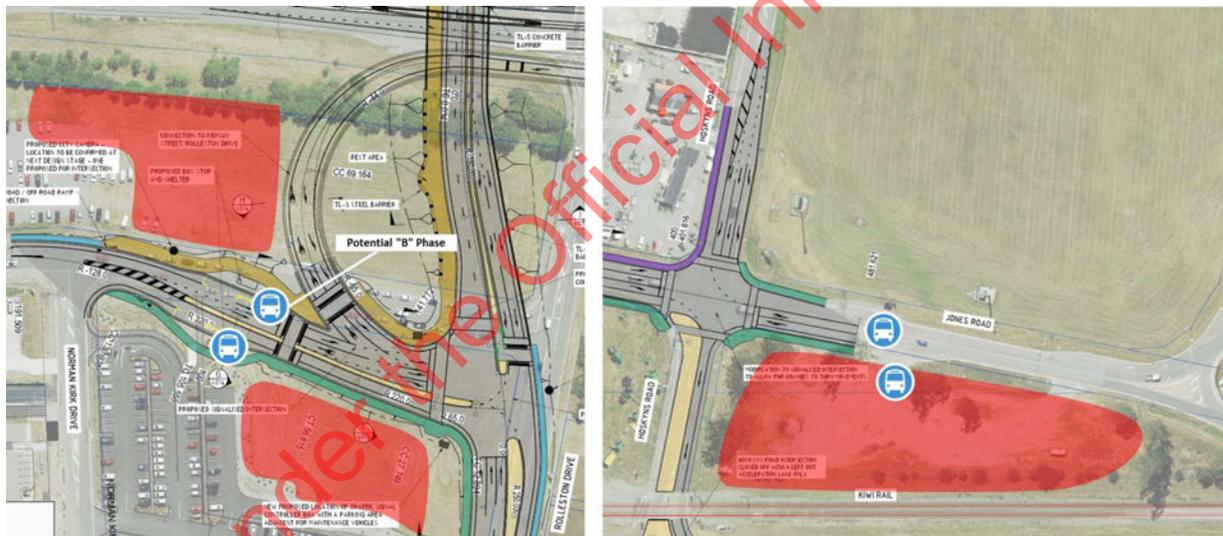


Figure 38: Areas for potential Park and Ride expansion

The new signals associated with the flyover will be phased to provide green waves, which will keep traffic flowing efficiently, especially at peak times. The scheme will reduce delays (when compared to a Do Minimum scenario) for movement onto and across the state highway. This will have direct benefits to bus reliability, and there is also an opportunity to introduce a “B” phase (bus queue jump) at the Kidman Street signals.

Changes to bus services

There are currently three main bus routes that serve Rolleston. Two of these services (Routes 5 and 820) go across SH1 to Jones Road, whilst the other service (Route 85) goes directly onto SH1.

Figure 39 shows how the bus routes will change following completion of the project.

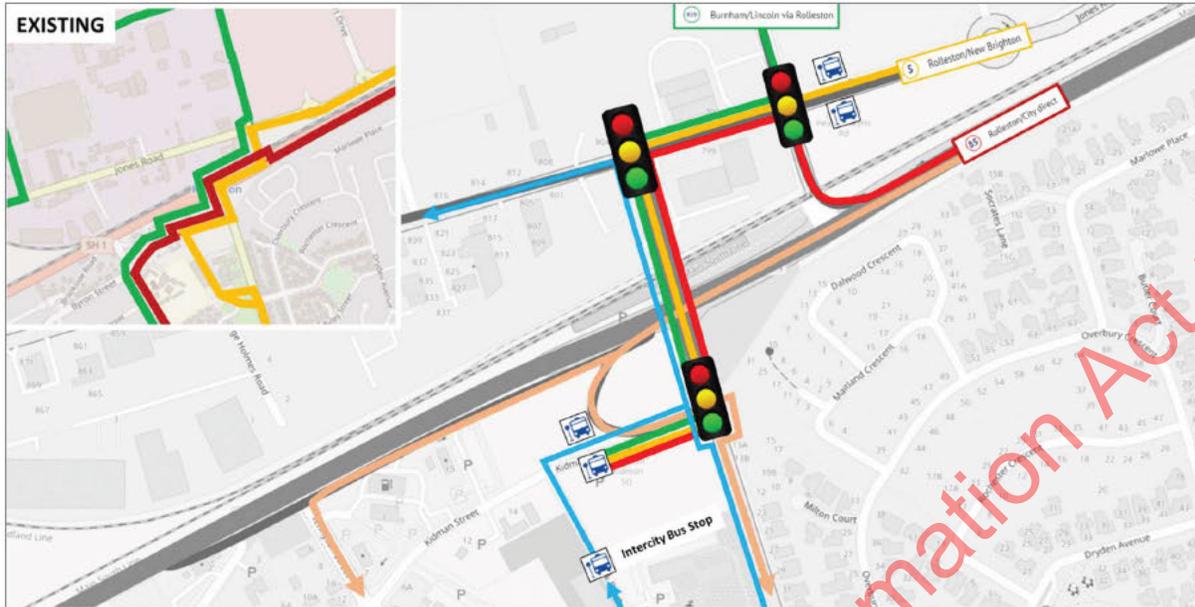


Figure 39: Implications to bus services

The project will deliver benefits to public transport, with only minor amendments to routing required. This includes Routes 5 and 820 are to be provided with more direct (and quicker) connections between Rolleston and the Industrial Area. Whilst access onto the state highway for Route 85 requires buses to go over the flyover and back via Hoskyns Road, the coordination of the three sets of signals means that, overall, this would be a quicker journey than waiting at the current signals on SH1/Rolleston Drive North. Generally, the flyover concept supports an increase in potential public transport service frequencies.

Could the left-in to Hoskyns Road be retained?

As an alternative means of providing additional northbound access into Rolleston, retaining the left turn into Hoskyns Road was investigated. The overall assessment concluded that the short stacking issue at the level crossing is unacceptably high. A key driver for the project is to improve safety, specifically at this location, and retaining the left-in goes against this. It also has potential implications for the ability for KiwiRail to expand their future operations.

Equally, the Hoskyns Road rail level crossing (when activated) could cause vehicle traffic to back up down the highway, creating queues and increasing crash risks on SH1. Once the proposed flyover is completed traffic from the residential side of Rolleston will no longer need the Hoskyns Road entry.

More generally, there is minimal travel time advantage for people looking to access the RIZ from the south if the left-into Hoskyns Road were proposed. The preferred route via Walkers Road and Two Chain Road offers a similar journey time.

24.4.2 Gradient of the flyover

A key consideration as part of the options assessment, and a matter raised during consultation, was the gradient of the flyover. The gradient reaches a maximum of 8%. This meets current guidelines³⁹ (i.e. to be less than 1/12 gradient), and is similar to that being provided at the Preston’s Road bridge across the Christchurch Northern Corridor – as shown in Figure 40.

It is acknowledged that ideally the gradient would be less, but the constraints of the railway line (minimum clearance heights need to be achieved) and distance to Jones Road means that this is the best gradient that can be achieved at this location. The skewed flyover option could deliver a lower gradient, but that alignment takes cyclists away from a desire line – to connect to Jones Road (and existing local businesses). This is particularly relevant because the ‘skewed’ option severs Jones Road, which means that the length of the cyclist journey goes beyond just how long the flyover structure is. Cyclists seeking to travel along Jones Road (south) would need to loop through the internal roads of the Bulk Retail Area.

The length of the climb in the skewed option would also be longer than the ‘straight’ option. Following consultation with cycling advocacy groups the consensus was that ‘short and direct, but steeper’ would be

³⁹ www.nzta.govt.nz/walking-cycling-and-public-transport/walking/walking-standards-and-guidelines/pedestrian-network-guidance/design/paths/footpath-design-geometry/gradient/

preferable to an alternative that is more indirect and a longer overall climb. Overall, it is very unlikely that the flyover gradient will deter new cyclists, especially as a shared path will be provided for them.



40 Preston’s Road Bridge (north Christchurch)

Response to the Safe System Audit

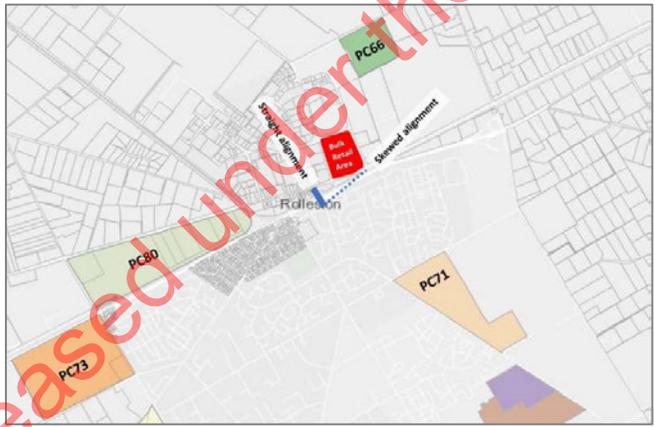
The Safe System Audit also identified the steepness of the gradient as a potential concern, particularly in relation to safety for cyclists. The concern was regarding the ability for cyclists to slow down appropriately as they approach the new traffic signals on Jones Road (end of the flyover). Concern was also raised about the path on the east side requiring people to cross at the base of the flyover.

The subsequent changes to the flyover design were:

- Amended the flyover cross-section to have a single, wider shared use path on the west side of the bridge only (5m wide). This enables a larger area for stopping at the base of the flyover and reduces the number of crossings for users at the Jones Road intersection with the flyover and reinforces a more direct linkage to the shared use path along the north side of Jones Road.
- Introduced two rest areas (one on each side of the flyover in the embankment areas) for cyclists / pedestrians to rest if required.

24.4.3 Direct connection to growth areas

Another concern raised during consultation was that the ‘skewed’ alternative would link better to growth areas when compared to the ‘straight’ option. Aside from the Bulk Retail Area (referred to as ‘The Station’) the two main growth areas north of SH1, as identified by SDC⁴⁰ are Plan Changes (PC) 66 and 80. The comparative distances between these growth areas and Rolleston⁴¹ are:



41 Relative distances to key growth areas

- Plan Change 66**
- Via a ‘straight’ flyover = 1.9km (+0.2km)
 - Via a ‘skewed’ flyover = 1.7km
- Plan Change 80**
- Via a ‘straight’ flyover = 1.2km
 - Via a ‘skewed’ flyover = 2.1 km (+0.7km)
- Bulk Retail Area**
- Via a ‘straight’ flyover = 0.6km (+0.1km)
 - Via a ‘skewed’ flyover = 0.5km

Overall, the straight flyover provides more direct connections to all destinations within the industrial area, including the key growth areas in North Rolleston. The differences in travel distance to PC66 and the Bulk Retail Area is relatively small (approximately 200m extra for the ‘straight’ option), whilst the extra distance to PC80 with the ‘skewed option’ is relatively notable (an extra 700m). This is driven in part by the severance of Jones Road, which means all road users must loop around the internal roads of the Bulk Retail area. Other

⁴⁰ www.selwyn.govt.nz/property-and-building/planning/strategies-and-plans/selwyn-district-plan/plan-changes
⁴¹ Kidman Street / Rolleston Drive North intersection

The other key outstanding questions raised during consultation were:

- Could the design include the removal of the two-to-one lane merge on the Christchurch Southern Motorway ahead of the traffic signals at Hoskyns Road?
- Are four lanes along SH1 through Rolleston needed now? And does the design future-proof for this?

24.4.4 Removing bottlenecks on SH1

The final key piece of feedback from the community related to the current two to one-lane lane merge on the Christchurch Southern Motorway ahead of the traffic signals at Hoskyns Road. This was also raised by the internal safety team as a crash risk.

The original design of this feature was intended to encourage motorway traffic to slow down before the traffic signals, and reinforce the speed limit change to 80 km/hr. As traffic volumes have grown this bottleneck is observed to cause delays and queuing back onto the higher speed section of the motorway causing a nose to tail crash risk. The transport analysis undertaken has also identified potential capacity issues at the Weedons interchange, and hence the design philosophy is to have a second exit onto Rolleston Drive North to spread the access load. With this configuration it has been found beneficial to continue two lanes from the motorway with one exiting into Rolleston and the other continuing past Rolleston. The question was therefore whether the two lanes could be extended through past the flyover.

An aerial image of this merge area and queuing is shown as Figure 42.

This scenario occurs regularly for close to an hour during the evening peak, and even longer during events and other busy periods on the state highway.



Figure 42: SH1 southbound merge issue (September 2022)

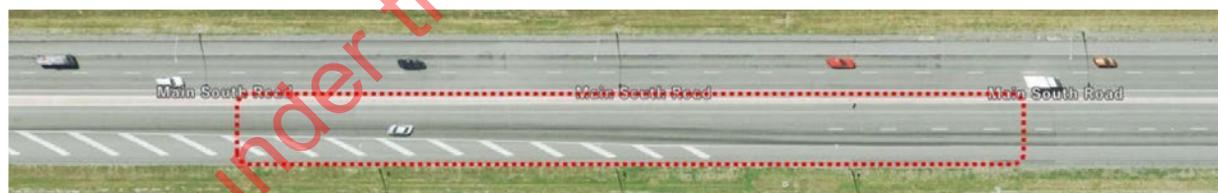


Figure 43: SH1 southbound – two to one merge location

The recommended option is for the southbound merge to be removed, and two lanes continue southbound until a short distance beyond the flyover exit. This improvement has been captured as part of the final design and cost estimate. Figure 44 shows how the kerbside lane from the CSM will transition directly into the offramp to Rolleston Drive North.



44: Final concept design for the merge extension

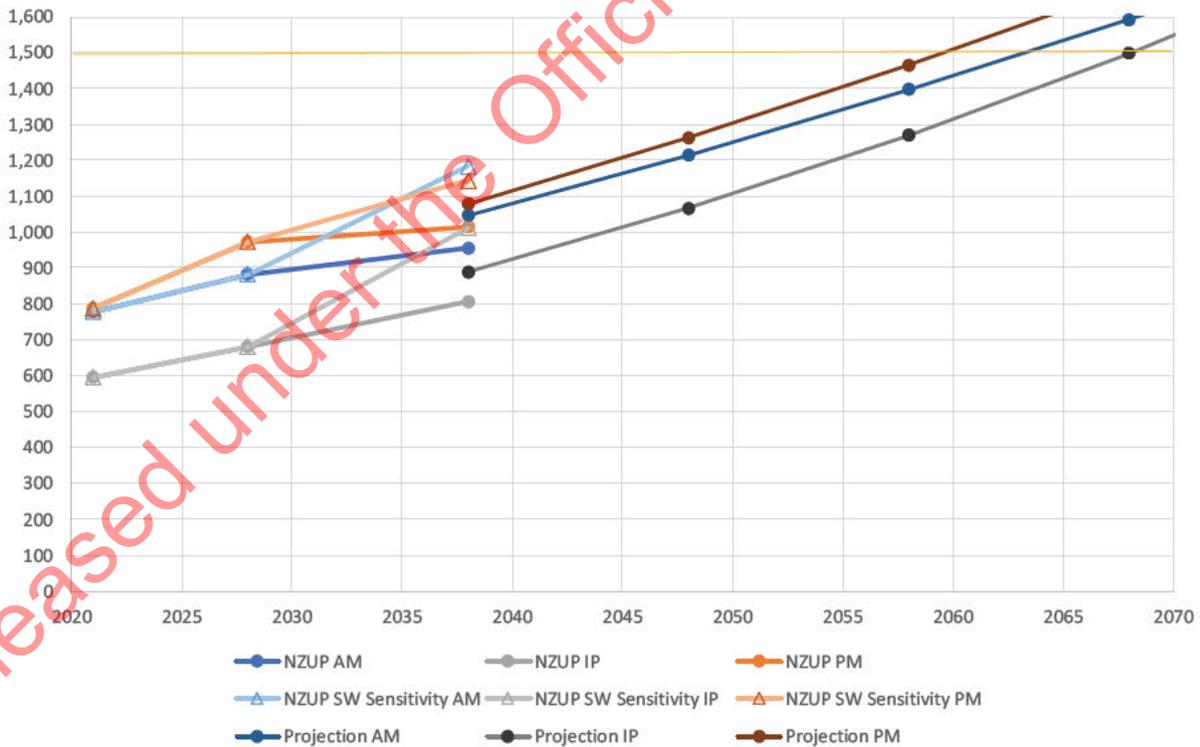
24.4.5 Future-proofing for four laning

The need for four lanes on the state highway was questioned alongside whether the space (or designation) for four lanes is protected for the future under the flyover.

When would four laning be required?

Figure 45 shows the current and modelled AM, PM and Inter-Peak peak hour peak directional volume on SH1 east of Dunns Crossing Road (the busiest section of SH1 east of the Flyover). The 2021 volumes and modelled 2028 and 2038 forecasts are shown, along with a 2038 southwest development sensitivity test where traffic demand in 2038 was adjusted to specifically stress-test the Dunns Crossing Road roundabout – i.e. a higher-than-anticipated level of development in the southwest area.

The projection has been carried out by averaging the two 2038 forecasts (core and sensitivity) and averaging the growth rates between the modelled forecast years. A weekday peak directional threshold has been used for this analysis, to identify when four laning may be required, is 1,500 vehicles per hour.



45: Current, modelled and projected SH1 Volumes (East of Dunns Crossing Road) - One Direction

The traffic assessment has identified that traffic volumes are not estimated to reach a commonly used threshold for four-laning until after 2060. These projections also do not consider potential changes in travel patterns (e.g. more working from home), more local employment (reducing the need for travel along the state highway) or mode shift to public transport.

Does the flyover design future proof for four laning?

Yes. The recommended flyover design provides for over dimension vehicles and there is sufficient space under the flyover to accommodate future additional lanes if needed. The width between bridge piers and abutments for the new bridge has been set to be wide enough to accommodate a future four-laning scheme. The design for the service lane and associated changes to SH1 from the flyover to Dunns Crossing has been designed to not preclude the future four-laning. It should be noted that further property purchase and infrastructure changes (pavement widening) would be required to deliver this if needed in the future.

In addition, the investigations undertaken as part of this DBC showed if there is a need to increase highway capacity, the 'pinch points' for widening the highway would be further south of the flyover, where the rail corridor and adjacent properties make such a proposal a very challenging undertaking. This would be a key constraint as part of any 'four laning between Christchurch and Ashburton'.

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25 REFINING THE STRAIGHT FLYOVER

Post the second round of consultation, there were still some remaining design details that needed to be worked through which included:

- The landing of the flyover on the northern (Jones Road) side
- Access and operational impacts on adjacent businesses
- Active travel arrangements
- Intersection optimisation

25.1 Alignment of the 'straight' flyover

The preferred flyover option, as presented to the local community during recent (July 2022) consultation, is for a 'straight' across connection that directly links Rolleston Drive North and Jones Road.

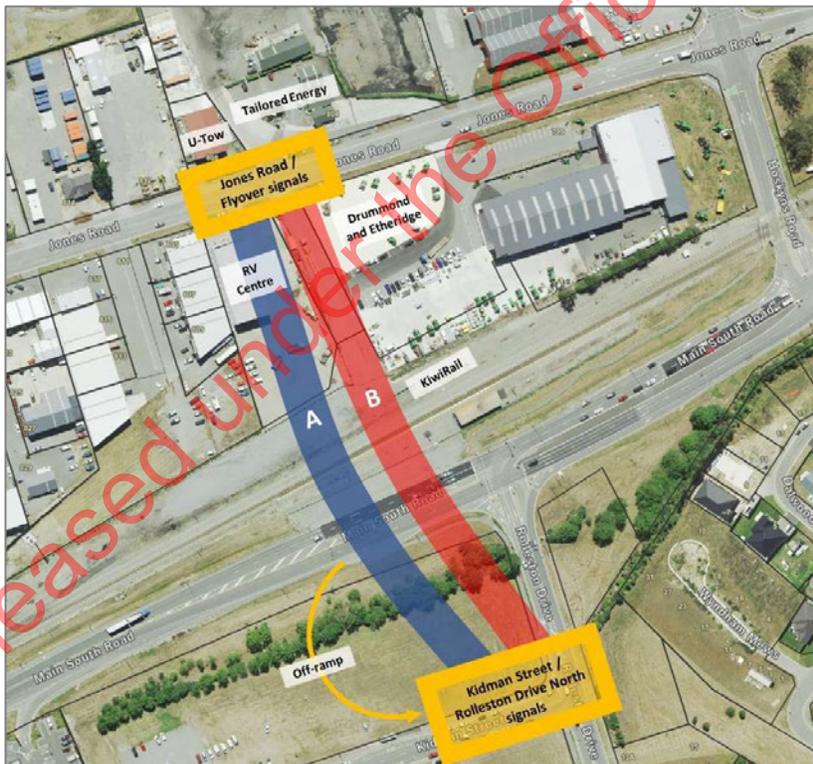
For all potential flyover options that were considered, some form of property acquisition on the northern (Jones Road) side would have been required. In the case of the 'straight' (technically preferred) flyover the following properties are affected, with either land needing to be purchased, or accesses being impacted:

- Drummond and Etheridge (D&E)
- RVCentre
- U-Tow New Zealand
- Tailored Energy Solution Ltd (TESL)

Following consultation with affected parties, two alternative options have been explored:

- A. Alignment that would land on the current the RVCentre, triggering the need for them to relocate.
- B. Alignment that utilises the KiwiRail accessway that is used by D&E and KiwiRail

A simple representation of these options is presented in Figure 46.



46: Alignment options

An MCA of the two options was undertaken in order to establish a recommendation. Key considerations included impact to access, property costs (inc. business loss) and the operational performance of the Jones Road/ Flyover intersection.

Table 29 provides an assessment against key criteria. The final column of the table provides a conclusion as to which option presents the better balance of risk (or cost) vs benefit.

The colour coding of the columns (green = preferred) highlights the best alternative for each criteria.

29 Assessment of alternatives

	Option A – RVCentre	Option B – KiwiRail / D&E accessway	Conclusion
Property / business impact	<ul style="list-style-type: none"> The RVCentre would be inoperable and would need to be relocated to alternative premises. Outright purchase of the RVCentre would be required. The RVCentre would be used to facilitate the construction site, with the intention of limiting impact to D&E. Access to the TESL could be incorporated into the intersection design, but requires land acquisitions. The current Weighbridge operations requiring U-turns of large trucks would not be possible and would need relocation. Access to the U-Tow shed frontage would be compromised, potentially rendering it unusable. 	<ul style="list-style-type: none"> Property would be required from both the RVCentre and D&E. Once completed approximately 2-5m of land would be required from both sites. During construction, land occupancy would be even higher. The financial (business revenue) impact to both the RVCentre and D&E would be high. As such, both businesses would be due some form of financial compensation. Providing suitable access to the RVCentre would be challenging – to the extent whereby the property is likely to be purchased outright. Property acquisition and impacts on TESL are similar to Option A. Access to U-Tow shed frontage would be compromised, potentially rendering it unusable. 	<ul style="list-style-type: none"> There are some impact on the frontage of D&E that could be avoided with Option A, especially is there is a decision for the shared use path to be on the north side of Jones Road. (Safety assessment recommendation) Due to the construction impacts, both options are likely to end up requiring the outright purchase of the RVCentre. The impacts on TESL are similar for both options. The impact to U-Tow NZ is the same in both options. Option A has a far lower impact to D&E operations. <p>Option A is preferred.</p>
Access	<ul style="list-style-type: none"> A signalised access could be provided to facilitate access to KiwiRail land and D&E. The RVCentre would need to be relocated, and hence no access would need to be provided. Access to Tailored Energy provided by the new Jones Road / Flyover traffic signals, but not to the U-Tow frontage. U-turn access to the public weighbridge is not possible and would need relocation or reconfiguration within the TESL site. Access to the KiwiRail land during construction could potentially be maintained – but this will require work with the contractor at the time. Egress from Tailored Energy will require modification 	<ul style="list-style-type: none"> Providing access to the KiwiRail land and D&E would be challenging. The potential solution could be a specific new access from Hoskyns Road with associated costs and requiring property agreement. Initial engagement suggests that this arrangement is not preferred. Providing access to the RVCentre may not be possible, given the proximity of the new traffic signal and the need for some land. This hence renders the site potentially inoperable. Access to Tailored Energy can be provided by the new Jones Road / Flyover traffic signals, but not to the U-Tow frontage. U-turn access to the public weighbridge is not possible and would need relocation or reconfiguration within the TESL site. Egress from Tailored Energy will require modification. 	<ul style="list-style-type: none"> Several access implications for Option B. In the case of KiwiRail and D&E, an alternative connection from Hoskyns Road would likely be required. For the RVCentre, access cannot be provided (and as such that property would need to be acquired). Impacts on TESL, U-Tow and the public weighbridge are similar for both options. <p>Option A is preferred.</p>
Constructability	<ul style="list-style-type: none"> D&E construction footprint would be minor. Access during construction could potentially be limited from the access (stub) road which may require temporary adjustment to access from Jones Road. Access rights from the stub road could potentially be negotiated but would need to be considered with the contractor at the time. RVCentre construction footprint is significant and hence requires purchase. 	<ul style="list-style-type: none"> Construction of the ramp will potentially sterilise 5-10m either side of the ramp position during construction. Most of the RVCentre and some of the D&E site would be inoperative or have significant impacts. Access to the RV and D&E site would be severely limited/not possible during construction raising significant business effects. Any access to the KiwiRail land would need to be provided elsewhere. The safety risk of retaining access in an active construction zone is too high. 	<ul style="list-style-type: none"> Manageable and relatively low construction risks for Option A. However, high construction impacts for multiple parties with Option B. <p>Option A is preferred.</p>

	Option A – RVCentre	Option B – KiwiRail / D&E accessway	Conclusion
Traffic Effects	<ul style="list-style-type: none"> Minimal impact when comparing either option. An additional 'leg' to the intersection is provided – to facilitate access to D&E/KiwiRail. However, this will be called relatively infrequently. 	<ul style="list-style-type: none"> Minimal impact when comparing either option. 	<ul style="list-style-type: none"> Difference in traffic flow is less than 50 vehicles per hour. The volumes are lower for Option A, as the travel distance to SH1 is marginally longer. <p>Neither option is notably better than the other.</p>
Cost	<ul style="list-style-type: none"> Flyover length would be slightly longer. This would not have a significant impact to either construction cost or traffic management. RVCentre offers better opportunities for a worksite base – and may reduce construction costs. Opportunity to put a batter slope on one side of the bridge on the RVCentre land. This potentially saves cost for retaining walls. 	<ul style="list-style-type: none"> Slightly shorter bridge span. Higher worksite / construction implementation costs 	<ul style="list-style-type: none"> RVCentre, on balance, likely to present slightly lower overall costs. This is a consequence of the availability of a much bigger worksite. <p>Option A is preferred.</p>
Active modes	<ul style="list-style-type: none"> More complex to integrate pedestrian and cyclist movements due to the additional 'leg' to the intersection. However, this will be rarely called. 	<ul style="list-style-type: none"> Relatively straight-forward signal operation for the Jones Road/flyover intersection but space constraints for people waiting for crossings at the foot of the flyover. This assumes that alternative access for Kiwirail and D&E can be achieved. 	<ul style="list-style-type: none"> Option B is marginally better if alternative access for Kiwirail and D&E can be agreed – as it would operate as a four, rather than five, leg intersection. <p>Neither option is notably better than the other.</p>

The assessment drew a strong conclusion that **Option A – acquiring RVCentre** should be progressed as the recommended option. This option has a significant impact on RVCentre that will need to be worked through, but presents the lowest risk in terms of property, access, impact to businesses and constructability. Option A large negates the property requirements from D&E. Both options require working with TESL through the final design. Conversations with affected landowners will be ongoing.

25.2 Shared paths along Jones Road

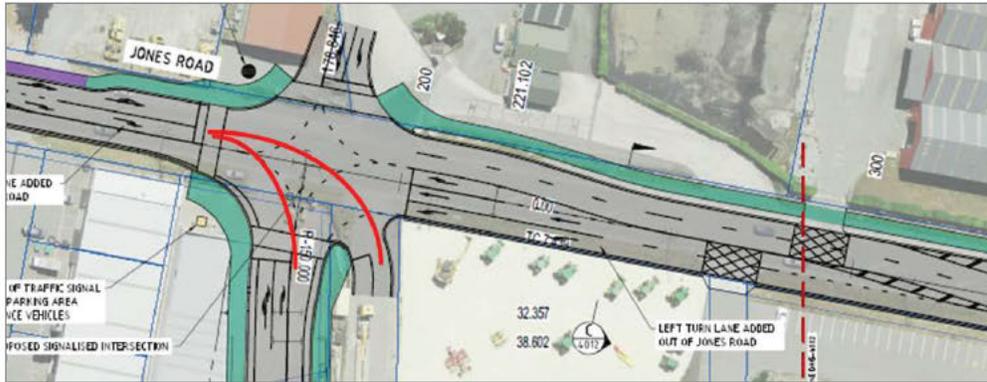
During the design process there was considerable debate about the requirements for cyclists along Jones Road. It was concluded that there was not sufficient on road space on the busy Jones Road arterial that has a high proportion of trucks. It was therefore concluded that cyclists must be provided for on an offroad shared use path (SUP), the next debate was about whether that should be on the south or north side. To avoid property and safety issues at the Kiwirail access road, it was concluded to have the SUP on the north side. The agreed concept is as shown in Figure 45.

This configuration is considered to offer the appropriate level of service to cyclists and pedestrians moving around this area and provides connections to the intended SDC SUP network on the north side of Jones Road further to the east (and potentially expanding to the west)

It is also acknowledged that there is no path on the south side of Jones Road between the Hoskyns Road and the flyover. It is acknowledged that this does not provide maximum access and levels of service to pedestrians and cyclists, but its omission is supported by the following:

- There are safety concerns for pedestrians and cyclists who may want to cross the stub access road immediately to the west of the flyover. Vehicles turning from any of the approaches to the intersection into the access road could well give the impression to cyclists and pedestrians waiting to cross the access road that they are turning onto an intersection leg that is not the access road, and thereby have a collision with high consequence (e.g. the red paths shown in Figure 47).

With the access road being used so infrequently, it was considered that cyclists and pedestrians are more likely to cross at any time (regardless of signal instructions) and thereby be vulnerable.



47: Potential collision point at the Jones Road / Flyover intersection (mitigated)

- Consideration was given to minimising property acquisition. The current arrangements require minimal Jones Road property frontage, other than at the Tailored Energy site and the RVCentre site. To provide a 3m wide SUP on the south side of Jones Road would have required considerable property from D&E potentially affecting their operation.

This plan was submitted to the Safe System Audit, that raised concerns about the gradient of the bridge and tight space at the base of the east side. A further review concluded that an extra wide SUP on the west side would be better, that reinforces the more intuitive connection with the SUP on the north side of Jones Road. The configuration of Shared Use Paths (SUP) on Jones Road, in the preferred option is:

- Wide shared path on the western side of the bridge.
- Paths on the north side of Jones Road, from Hoskyns Road extending to west of the flyover intersection.
- Signalised pedestrian/cyclist crossings of Jones Road and the TESL entrance.

25.3 Intersection optimisation

The refinement phase also considered how the proposed sets of traffic signals on the flyover and Jones Road could be optimised in order to maximise efficiency of movement onto the state highway.

For example - in the AM peak the dominant movement is from Rolleston Drive north over the flyover, turning right onto Jones Road and then turning right onto Hoskyns Road intersection. The traffic signal phasing has been set up to provide progression for this particular movement during the AM peak.

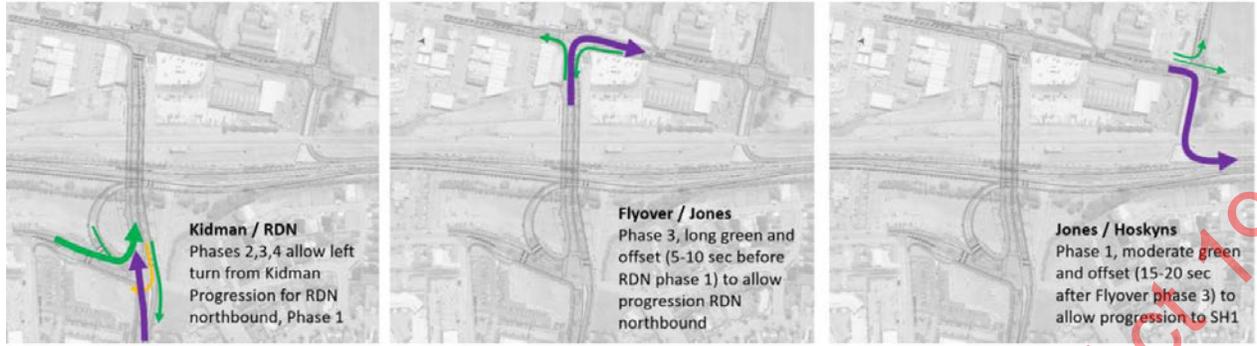
The proposed phasing also includes pedestrian protection on every cycle, with late-starts on left turn movements. This allows for north-south crossing on the Jones Road west approach, and east-west cross on Flyover south approach. The traffic modelling used to assess the preferred option accommodates this protection every cycle - which represents a worst-case scenario.

The operation of these signals has been developed in consultation with the Wellington Traffic Operations Centre (WTOC) who operate the Intelligent Traffic Systems (ITS) on the State Highway network in areas of the South Island.

Co-ordination of the new traffic signals on either side of the flyover plus those at Jones Road / Hoskyns Road will be critical to the future network operational performance.

Signal phasing

It has been assumed in the traffic modelling and DBC that the three signalised intersections surrounding the Flyover would operate as a 'system'. In particular progression (a signal 'green wave') would be provided for traffic travelling on Rolleston Drive northbound, over the Flyover, right onto Jones Road, and right at Hoskyns Road to travel to SH1 eastbound. WTOC has advised that this appears straightforward and that this localised movement of traffic through these intersections could be thought of as similar to the progression provided on a one-way system. Figure 48 provides a diagram which indicates the assumed progression / linkage between the three signalised intersections around the Flyover.



48: How the flyover signals would be phased

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26 DESIGN PHILOSOPHY

This section provides an overview of key aspects of the Design Philosophy Statement (DPS) which is provided as **Appendix N**. The final scheme designs are provided as **Appendix I** to this main report (and are included in the DPS), whilst the Safe System Audits are provided in **Appendix O**.

26.1 Overall design philosophy

The scheme development for the project was driven by the Investment Objectives to improve intersection safety and improve the connectivity of Rolleston, by all modes of travel. The strategic approach was to grade separate the connection between the township and industrial area, to reinforce the use of the Selwyn District peripheral arterial network of Weedons Road, Jones Road, Two Chain, Walkers, Dunns Crossing, Lowes and Levi Roads, to reduce rail level crossing risks and improve rail connectivity and operations. The original concept was to have the southern access to Rolleston at the Walkers/Dunns Crossing roundabout and the Weedons Interchange, but traffic analysis identified that this would overload the Weedons interchange and level crossing. As a result, north facing access has been provided with a Rolleston Drive North offramp and a Hoskyns Road onramp to ensure reliable freight access is achieved at the Weedons interchange.

The project design detail was then based around the following high-level design philosophy:

- Keep traffic on the main roads where possible.
- Minimise traffic on local streets to provide a more liveable community.
- Retain existing walking / cycle connectivity and expand the local network.
- Provide new pedestrian / cycle connectivity routes where feasible.
- Integrate with existing bus stops on Kidman Street and Jones Road.
- Minimise property impacts where possible.
- Utilise existing drainage network where possible.
- Minimise impact to existing noise bunds.
- Avoid existing stock water races where possible.
- Minimise impact to emergency services access where possible.
- Consideration of wider network impacts (such as increased demand on the Weedons Ross Interchange).

26.2 Site specific design philosophy

26.2.1 Dunns Crossing

The overall objective of the upgrade at Dunns Crossing is to provide peripheral arterial cross district connectivity between Dunns Crossing Road and Walkers Road, ensure safe rail separation and level crossing safety, be consistent with the Road to Zero Safe System transformation, and expected wire rope barriers along the SH 1 corridor in the future, and provide connectivity to existing and future walking and cycling upgrades along Runners Road (SUP to Burnham proposed by SDC), Walkers Road (SUP proposed as part of Plan Change 80) and Dunns Crossing Road (SUP extension past West Rolleston Primary School).

Other site-specific factors are outlined in the DPS.

Interaction with the level crossing

Note that when the level crossing is activated there is a risk of potential queuing back across (akin to what is observed currently at Hoskyns Road). Traffic volumes along Walkers Road are significantly less than on Hoskyns Road which means that the likeliness of this safety risk occurring is significantly smaller. Notwithstanding, part of the mitigation is to provide two lanes on each approach to the roundabout – which essentially doubles the holding capacity.

Traffic modelling has confirmed that the risk of queuing back across would be low.

26.2.2 Rolleston Drive South

- Close off right turns in and out of Rolleston Drive South
- Do not incorporate barriers in the current design. It is assumed that this will be incorporated in the future by the SIP when an upgrade is completed through this area.

26.2.3 Service Lane

The objectives of the improvements along SH 1 are to separate Rolleston traffic from the southbound SH 1 traffic flow through the inclusion of a service road from the off ramp to Kidman Street to Tennyson Street, which also provides access to the highway service centre, remove right turn movements from side roads by making them left in left out, with wire rope safety barrier (WRSB) along the central median, provide access to the Rolleston town centre via Tennyson Street, and enables offramp access to Rolleston Drive North / Kidman Street. This also removes the current two to one lane merge that currently occurs just west of the Weedons interchange.

26.2.4 Flyover

The objectives of the inclusion of the flyover are:

- To provide a grade separated connection between the south side and north side of Rolleston.
- Separate main Rolleston access traffic from the town centre / liveable community traffic (using Tennyson Street).
- Tie into existing networks (minimise changes to Kidman Street / Norman Kirk Road and Norman Kirk Road / Rolleston Drive north intersections).
- integrate the bus services and stops and aligns to and expands on existing walking and cycling facilities in this area of Rolleston.

Site specific considerations include:

- Avoid impacting Norman Kirk Road / Kidman Street intersection.
- Requirement to maintain vertical and horizontal clearances for over dimensional vehicles on SH 1 and rail (detailed later in this report).
- Allow enough width between pier and abutment for potential future four laning of SH1.
- Incorporate existing bus stops on Kidman Street into the new design.
- Providing strong walking and cycling connectivity across SH1.
- Retaining (although more limited) access to the train station for pedestrians and vehicular traffic. Access from the west/south will be from a left in access at the start of the carpark and left out access at the end of the carpark and then using the wider network to continue their journey. Vehicular access from Rolleston or Industrial area or the east/north will need to be via the new flyover and parking in the vacant lot on Jones Road near the Hoskyns Road intersection and then using new and existing pedestrian paths to cross over Hoskyns Road and the rail level crossing to connect to the station platform.
- Minimising impact to businesses along Jones Road and residential properties on Rolleston Drive North.
- Limiting spans for the bridge to less than 35m so a 1500 Super Tee beam could be used.

26.2.5 Rail

Midland Line and rail sidings are all east facing with poor connectivity to Main South Line. The proposed rail siding and fourth turnaround track enables all lines to connect south. Operations off the main line will be safer incorporating this siding and rail turnaround enabling more efficient access i.e. trains can be driven frontwards rather than backwards at walking pace.

The new siding will improve rail connections and operations in Rolleston to make freight by rail more efficient and help to reduce the number of trucks on the roads. The siding positioned to the east of Hoskyns Road is to provide more connection to the Lyttelton Port Company Inland Port, avoid impacting Hoskyns Road and the rail yard with additional train movements, and preserves land at Hoskyns Road and Jones Road for future development opportunities including expanded Park'n'Ride facilities. Other key consideration include:

- An existing underground power cable and existing lighting can be relocated
- Existing trees within the KiwiRail land can be removed and will be replaced by KiwiRail.
- Minimise any changes at Hoskyns Road to avoid changes to rail signaling through here.

27 VALUE ENGINEERING

27.1 Overview

In anticipation of cost pressures and escalation post Covid the options have been reviewed to ensure appropriate value for money is delivered. A value engineering exercise was undertaken (led by an independent external party – see **Appendix P**) to explore whether there were any opportunities to scale back the project scope without significantly impacting the desired outcomes. The review took the form of a collaborative workshop (14 June 2022), with outcomes and recommendations outlined within a report that was provided to the Project Steering Committee (PSC) for the NZUP Canterbury programme. The drivers behind this value engineering exercise were:

- A desire to deliver the best value for money.
- Acknowledgment that, in light of the Covid-19 pandemic, that the construction industry is experiencing increasing pressures through soaring material costs, supply chain delays and a lack of skilled workers in key areas. These factors have been amounting to unexpectedly higher costs for construction.

For the Rolleston Transport Improvements project, as the improvements include several individual upgrades at distinct locations, a review of each scope items was completed on a case-by-case basis, rather than reviewing this project at the corridor level. Therefore, each specific scope item was reviewed to determine alternative design solutions; the impact on outcomes and costs were then reviewed.

Approach to the review

To understand how the different options / scenarios would perform from a cost and outcomes perspective, a scoring system and MCA approach was adopted. Each option / scenario was reviewed and scored against the desired outcomes listed within the relevant project overview / business case documents. Each option / scenario was then scored against these outcome criteria on a scale of +3 to -3, where +3 represents the most positive outcome, 0 represents a neutral outcome, and -3 represents the most negative outcome. This was a consistent scoring system to that used for other MCAs undertaken through the Rolleston Improvements DBC.

27.2 Dunns Crossing Road / Walkers Road

A total of six options (inc. the technically preferred) were considered:

- O1: Four Arm Dual Lane Roundabout
- O1a: O1 plus cycle underpass
- O2: Full Single Lane Roundabout
- O3: Partial Single Lane Roundabout (closing the Walkers Road approach)
- O4: Three Arm Roundabout
- O5: Signalised Intersection

Based on the analysis completed, it was concluded that Option 1a presents the preferred option. The reason for this option scoring the highest relates to the inclusion of a cycle underpass, therefore achieving better walking and cycling facilities (safety, accessibility, connectedness, throughput, reduced carbon emission).

In response to the Value Engineering assessment and the Safe System Audit, the Project Steering Committee requested that the cycle underpass option be developed and costed. This identified an option with an additional physical work cost of around **s 9(2)**, which was then accepted to form part of the recommended programme.

Whilst a one lane roundabout might work from an operational sense in the short-term, retrofitting to include a second lane in the medium term (within 10 years) would be disruptive and expensive.

Conclusion – no change to the technically preferred option.

Subsequent to the Value Engineering assessment the Safe System Audit reconfirmed the significant cycle safety issues for those wanting to cross the State Highway. In response to this the Project Steering Committee requested that the cycle underpass option be developed and costed. This identified an option with an additional physical work cost of around **s 9(2)**, that was then accepted to form part of the Recommended Option.

Would a one lane roundabout work?

Initial testing of the Dunns Crossing Road / Walkers Road intersection focused around two questions:

1. Is there justification, from an operational perspective for upgrading the intersection – with the acknowledgment that the safety issue alone drives the need for change?
2. Is it necessary for the roundabout to be dual laned (as specified in the NZUP scope)?

To answer these questions, the micro-simulation model was used to test the following of alternative layouts for the potential roundabout (for the 2038 future year).

Table 30 provides the modelling results and a description of the various options.

The results confirmed that adopting a ‘Do Minimum’ approach at this intersection would be unacceptable from an operational perspective. It also established that a two-lane roundabout, with two lanes on the SH1 approaches (one of these lanes need only be 50-100m in length) would deliver good levels of service until at least 2038.

Table 30: Dunns Crossing Road / Walker Road – initial modelling (2038 future year)

Option	Level of Service		
	AM Peak	Inter Peak	PM Peak
Do Minimum	F	D	F
Two lane roundabout • Two lanes on all approaches and exits	C	C	C
One lane roundabout • One lane on all approaches	F	D	F
One lane roundabout • One lane approach for Dunns Crossing Road & Walkers Road • 100m additional short lanes on SH1 approaches	C	C	C

27.3 Flyover

A total of six options were considered:

- O1: Direct Alignment Overbridge
- O2: Timber bridge
- O3: Narrow to 2 Lanes
- O4: Shared path (one side)
- O5: Skewed with no active modes
- O6: Roundabout

The analysis concluded that Option 1 and Option 2 are the preferred options. Option 2 scores slightly higher due to the reduction in embodied carbon emissions this option would realise. However, after discussion with the project team, it is not considered that any cost savings will be realised through the pursuit of a timber bridge structure. There were also significant concerns around the constructability of a timber overbridge for this kind given its geometry; this may present a fatal flaw for Option 2.

The review did however conclude that potentially an option could be pursued where a shared path is provided on only one side of the flyover (Option 4), which could save approximately \$4m in cost. This would however reduce active mode connectivity and given the design life of the flyover (100+ years) this could be seen as somewhat short-sighted regarding how the flyover could be used in the future (in response to changing travel patterns).

Conclusion – no change to the technically preferred option. Explore any opportunities for a timber structure as part of the next phase of the project.

27.4 Service lane

The key objectives for the proposed service lane are to (a) ensure safe access to commercial properties (e.g. BP and McDonalds) off the state highway and (b) create a step-change in safety by eliminating all right-turning movements out of Brookside Road, Tennyson Street and the various commercial properties.

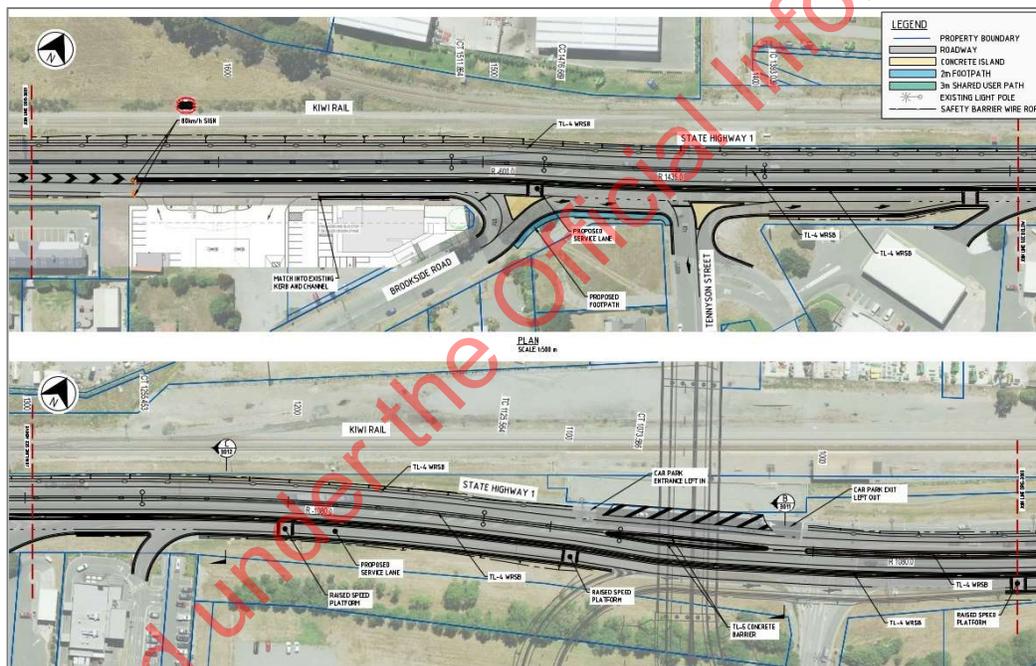
The cost for the service lane, as per the design that was consulted upon was **s 9(2)(g)(i)** This high cost was largely attributed to:

- An absence of a concept design to inform the PBC estimates.
- The need for land acquisition from KiwiRail.
- The need to regrade the entire state highway corridor, which added significant pavement cost.
- Cost escalation since the PBC was completed in 2020.

Whilst cost escalation could be expected given the current trends in construction costs across New Zealand post the Covid-19 pandemic, the proportion increase in costs for the service lane are notably much higher than other aspects of the programme.

A value engineering exercise was therefore essential in order to ensure that the preferred programme presents optimal value for money, but whilst ensure the key objectives are still delivered. More generally, given the desire to extend the merge from the Christchurch Southern Motorway (CSM) to the service lane, in any case, an element of redesign was required. The value engineering exercise therefore seeks to (a) improve value for money; (b) establish a service lane design that safely integrates with the proposed CSM merge extension.

For reference, the originally proposed service lane design is shown Figure 49.



49 Consulted service lane design

27.4.1 Optioneering process

The most significant cost elements in the service lane design related to property acquisition, barriers, drainage and pavement construction. This original concept had three sets of barrier, for edge protection of the north bound lane, median barrier to prevent head on crash risks and right turn conflicts and edge barriers to separate the service lane from the flyover to beyond Brookside Road. The key implication of this was that the road centre line needed to shift towards the rail corridor and required total pavement reconfiguration and property acquisition from Kiwirail with potential loss of rail future proofing.

A revisit to the fundamental project objectives was then undertaken to understand the fundamental issues that the service lane seeks to address.

An assessment of the run-off road risk found that there has been no occurrence of this, nor any issues involving left turn manoeuvres to businesses and side roads. This review concluded that the greatest safety gain is provided by the inclusion of a central median barrier to remove the right turn conflict risks.

Three alternative options were looked at:

Option 1 - A service road along the south side of SH1 from opposite Hoskyns Road through to south of the Rolly Inn (Brookside Road). This included a three-barrier system, with a WRSB included on the north side of SH1, central median and between SH1 and new service road within a raised island.

- **Option 2** – No separate service road provided. This option removed the service road and provided a central median WRSB only.
- **Option 3** – a shortened service road, which finishes at Tennyson Street and includes two WRSB, one in the central median and one between SH1 and the service road at pavement level.

Table 31 provides the assessment of the service lane alternatives.

31 Service lane options assessment

Option	Benefits	Disbenefits
Option 1 Three barriers (as consulted)	<ul style="list-style-type: none"> • Provides separated service thereby providing the safest solution of the three options. • Provides a clear separation and gateway into Rolleston. • Eliminates the right turn movements out of Rolleston onto SH1. 	<ul style="list-style-type: none"> • Requires significant land purchase from KiwiRail on the north side of the highway. • Due to the extensive nature of the work which requires the crown of SH1 to move north results in full pavement reconstruction been required. • High cost due to the land purchase requirements and full pavement reconstruction.
Option 2 One central median barrier	<ul style="list-style-type: none"> • Reduces the land purchase required with minimal land required from KiwiRail on the north side of the highway. • Minimises the pavement works required to overlay of the existing. • Eliminates the right turn movements out of Rolleston onto SH1. • Lowest cost option. 	<ul style="list-style-type: none"> • Does not separate the movements into and out of Rolleston from side roads and commercial properties from the SH1 traffic. • The end of the two lanes southbound occurs just prior to the McDonalds access which may result in weaving movements where the lanes merge into one lane.
Option 3 Central barrier plus partial service lane to Tennyson Street	<ul style="list-style-type: none"> • Provides separated service road most side roads (except Brookside Road and out movement for Tennyson Street) and commercial property movements (except Rolly Inn and Z Service Station) along the south side of SH1 through Rolleston town centre. • Reduces the land purchase required with minimal land required from KiwiRail on the north side of the highway. • Minimises the pavement works required to overlay of the existing. • Eliminates the right turn movements out of Rolleston onto SH1. 	<ul style="list-style-type: none"> • Doesn't provide full separation of all movements occurring through here.

27.4.2 Preferred option

The recommendation is to adopt Option 3 as it was seen to provide the best balance between safety benefits, cost whilst minimising the impact to adjacent land.

This would see the extension of two lanes from the CSM that then reduces to one lane after the off-ramp to Rolleston Drive North. The central median will be extended through Rolleston to just south of Brookside Road thereby restricting all right turns. A southbound service lane will extend from the state highway off ramp for left in access to McDonalds, BP and Tennyson Street. Tennyson will have a high angle left turn entry onto the state highway. Brookside Road and the Z Service Station will retain left in left out access as existing.

Although right-hand turns onto SH1 will be prevented, this is accommodated for by the flyover, Jones Road and the left turn from Hoskyns Road. The existing 80km/hr speed limit change location would be retained.

Essentially this new option would be formalising what already exists in terms of commercial access, plus adding a new central median. We would therefore expect a similar scale of benefit (as the major safety issues are addressed) but with much reduced cost.

The design for how the service will connect to the state highway at the southern end (Tennyson Street) is shown as Figure 50.



50: Preferred access arrangement for SH1 commercial properties

27.4.3 Cost saving

The removal of the two-to-one merge along the state highway would cost an additional $\$9(2)(g)(i)$. However, the new access arrangements for SH1 commercial properties would see a cost saving of around $\$9(2)(g)(i)$.

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PART B3: PROGRAMME ASSESSMENT & ECONOMICS

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28 COST ESTIMATES

28.1 Project delivery costs

Project delivery costs at this stage are based on a concept level design. These include a comprehensive, costed risk assessment and associated contingency (analysed and funding). These costs have been used to inform the economic analysis. A peer review and a full parallel cost estimate were completed for the business case.

The full cost-estimation sheets are provided as **Appendix Q**.

The parallel cost estimate report is provided, along with other peer reviews, in **Appendix R**.

Table 32 outlines the expected capital costs.

s 9(2)(g)(i)



28.2 On-going maintenance

The proposed works will result in new assets and therefore a corresponding change to the ongoing maintenance and operation⁴². The ongoing maintenance and renewals requirements will be covered by Waka Kotahi. Most of the new on-going maintenance costs will be a result of the new widened paved areas, drainage facilities and ITS. The ITS components on the state highway will be managed by WTOC, while the new/altered traffic signals on SDC roads will be managed by the Christchurch City Council signals team. SDC will have a separate agreement to cover this aspect. New associated signage and line markings may also require maintenance additional to what is already undertaken.

The costs for ongoing maintenance have been based on historical maintenance costs for similar types of infrastructure (e.g. flyovers, two lane roundabouts) that current exist on the Canterbury state highway network.

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⁴² Indicative maintenance costs captured in the economics.

29 ECONOMIC ANALYSIS

29.1 Overview

The economic evaluation has been carried out in accordance with the full procedures of the Monetised Benefits and Costs Manual v1.6 2023 (MBCM), with the recommended programme against the Do Minimum using a 40-year analysis period and a 4% discount rate. The microsimulation model developed for this project was the tool used to derive the travel time and VOC benefits, and also provided inputs into the safety benefit calculations.

In terms of the assessment the following should be noted:

- Active mode benefits have been calculated separately based upon an estimate for potential users using population and distance from the Flyover or Dunns Crossing underpass. To be conservative, the active mode benefits are based upon a calculation that the project will create a relatively modest 100 new cyclists per day at the flyover and 30 at the Dunns Crossing Road/Walkers Road underpass upon opening. However, SDC are confident the uptake in cycling would be much more.
- Benefits and costs for supplementary local road improvements have been excluded. This is because this project is seeking funding investment only for the state highway interventions.
- Resilience, public transport and wider economic benefits have not been calculated. This is because the relative scale of such benefits is likely to be minimal in comparison to other benefit streams and will not notably change the BCR.

The economics approach has undergone an external peer review⁴³ and been accepted as being robust and suitable for a DBC – refer to **Appendix R**.

Appendix S provides further detail regarding the economic methodology and the traffic modelling outputs that have informed the analysis.

29.2 Assumed timeframes

The economics has focused on a direct comparison between the preferred option (full build) and the Do Minimum. The economic assessment applies cost estimates in terms of Net Present Value (NPV) based on the final DBC cost estimates (provided within the Financial Case) and application of those costs in line with the dates within Table 33.

33 Project timeframes

Year start	Dunns Crossing Road / Walkers Road roundabout	Flyover / Rail Improvements	Service Lane	Rolleston Drive South
Property	2023	2024	2024	2024
Design	2024	2025	2026	2028
Pre-implementation	2024	2026	2027	2029
Implementation	2025	2026	2027	2029
Physical works (Year 1)	2026	2027	2028	2030
Physical works (Year 2)	2027	2028	2029	
Physical works (Year 3)		2029		

29.3 Economic approach

A conservative approach was taken to the calculation of benefits, which means that the **benefits are more likely to be understated rather than overstated**. This approach captured:

- The update factors used are to update values to July 2022.
- Travel time benefits and vehicle operating costs have been derived from the traffic model outputs for years 2021, 2028, and 2038. Intermediate years are linearly interpolated to obtain benefits, capped at 2038.
- The initial basis is a 40-year analysis period and a 6% discount rate. Sensitivity tests have been considered applying higher discount rates (6%) and the longer assessment period (60-years).

⁴³ FLOW Transportation Specialists

- Annualisation of travel time benefits (Value of Time (VOTs) and Vehicle Operating Costs (VOCs) has been carried out assuming Inter-Peak benefits can be applied to some weekend hours and assuming no benefits in overnight periods.
- Estimating benefits past 2038 has been based on setting the non-discounted benefit in 2038 and projecting this value forward with discounting applied. This is based on the level of congestion in the 2038 Do Minimum scenario, particularly in the Industrial Area and around the bulk retail development area. Congestion in this area is due to the existing State Highway signal capacity being exceeded particularly in the PM peak. Delays and queuing estimated in this location would begin to restrict and limit future traffic growth past the level represented in the 2038 modelled scenario in the Do Minimum scenario resulting in unrealistic Do Minimum operation past 2038.
- A sensitivity test has been considered where the travel demand and traffic growth considered to represent 2038 in the traffic modelling doesn't occur until a later year (e.g. 2058) and the year-to-year economic projections calculated on this basis.
- The increment for congestion has been applied to travel time savings as for the majority of the modelled weekday periods the network and trips experience some level of delay (i.e. time waiting at intersections).
- Due to the strong value-of-time outcomes, reliability benefits have not been evaluated in the vehicle-based economic assessment. Although there will clearly be travel time reliability benefits and notably freight travel time reliability benefits, the value-of-time benefits are significant and an additional mark-up for reliability is considered unnecessary.

29.4 Cost estimates

The P50 project cost estimates and corresponding 40-year Net Present Values are presented in Table 34.

34

Item	P50	40 Year NPV
Dunns Crossing Road / Walkers Road roundabout	s 9(2)(g)(i)	
Rolleston Drive South - LILO		
Service Lane, including SH improvements		
Flyover		
Rail improvements		
SH1 underpass at Dunns Crossing Road / Walkers Road		
TOTAL		

29.5 BCR

The 40-year NPV costs and benefits, along with the project BCR is presented within Table 35.

35: Benefit-Cost Ratio

	Benefit (40 Year NPV)						Cost (40 year NPV)	BCR
	Active modes	Safety	Travel time	Vehicle Operating Costs	Rail	Total Benefit		
Preferred programme	s 9(2)(g)(i)							3.6

An overview of the project costs and benefits is shown as Figure 51.

29.6 Commentary

29.6.1 Overall

The economic analysis has shown that:

- The project delivers a strong BCR of 3.6.
- Most of the project benefit (87%) comes from travel time. This is largely a factor of the significant congestion on the state highway that would be expected if a 'Do Minimum' was adopted.
- The safety and active mode benefits are also significant.
- Some drivers would expect long journeys due to the restrictions to movement onto the state highway. This would see an increase in Vehicle Operating Costs (VOC) for some, but these are more than offset by other VOC results – such as a reduction in congestion (stop-start at signals). This generates a good overall net VOC benefit.

29.6.2 Travel time and VOC

The raw (not discounted) annualised VOT and VOC economic values are presented in Table 36.

It demonstrates that the economic travel time and vehicle-operating-cost outcomes are negative (the option has higher travel times and longer distances than the Do Minimum) with the current traffic demand. This is driven by increased travel times and distances in the AM peak which are largely due to the restriction to right turns out of Rolleston onto SH1 (travel towards Christchurch in the morning peak period).

However, in the short-term forecast (2028) the option is predicted to produce travel time benefits in the IP and PM periods which are greater than the (small) AM peak disbenefits. These benefits become significant in the longer-term forecast (2038), particularly in the PM peak where the Do Minimum experiences more significant delays and congestion. In the longer-term forecast VOC benefits are positive because re-routing due to delays / congestion in the Do Minimum is reduced by the option, again this is most significant in the PM peak.

36 Total Raw (not discounted) Annualised VOT and VOC Economic Values

	VOT	VOC	TOTAL
2021			
2028			
2038			

29.6.3 Safety

Dunns Crossing Road / Walkers Road

Over the most recent five-year period there have been 23 crashes at the Dunns Crossing Road / Walkers Road of which 2 resulted in serious injury and 8 minor injuries. During the last quarter of 2022 alone, there were 5 separate crash events.

If no improvements are made, we expect 0.7 DSIs per year to occur at this intersection. This corresponds to a social cost of around \$2.5 million per year. The proposed dual lane roundabout will reduce expected DSIs by around 70% (i.e. 0.2 DSIs per year). Across a 40-year period this corresponds to a crash reduction benefit of \$63 million,

s 9(2)(g)(i)

Figure 51 Overview of costs and benefits

Rolleston Drive South

At the Rolleston Drive South intersection there have been two crashes during the most recent five-year period. However, one of those crashes (in 2022) resulted in a fatality and involved the collision between two trucks (one of which was turning out of the intersection). The historical number of crashes at this intersection means that in accordance with the MBCM methodology, the analysis needs to be undertaken using a crash prediction model (Method C). Typically, analysis using Method C will establish a lower crash cost than when Method A (which is more heavily influenced by actual historical crashes is used).

The economic analysis has been based on Method C and has predicts that the project will reduce the number of annual DSIs from 0.17 to 0.008. This reflects an annual crash reduction benefit of around \$160,000.

For context, if Method A were adopted the DSI reduction would be 0.34 DSIs per annum and a corresponding annual crash reduction benefit of around \$900,000.

Overall, the analysis has shown that the proposed intervention (LILO) at Rolleston Drive South will significantly reduce the likeliness (close to zero) of a DSI occurring at this intersection in the future.

29.6.4 Rail benefits

The rail solution provides the opportunity for a greater uptake of freight by rail, particularly from the south. Currently around 1.4M tonnes of freight is moved between the West Coast to Canterbury (mostly towards the Lyttelton Port), plus a further 0.1M tonnes between the West Coast and Otago.

The rail commercial team advise that by 2038 there is potential for up to 30,000 TEU per annum originating from the North Otago - Mid Canterbury catchment that could rail north for centralisation in Rolleston that would be more efficient with the proposed rail improvements. The product would be exporting goods from the primary sector, such as dairy, meat, potatoes and grain and with access to rail for connection to the ports it is estimated that this could reduce the number of trucks that would otherwise be on the road by up to 50 per day (compared to the current 1800 trucks per day).

Benefits

High-level benefits for rail have been derived based on:

- Current (2022) annual freight volumes by rail⁴⁴ are 1.42M tonnes from West Coast to Canterbury and 0.01M tonnes from West Coast to Otago.
- Assuming 10% of the rail freight West Coast to Canterbury uses the midland to main south (south) movement (in addition to the West Coast to Otago freight) – therefore currently assumed to be ~150k tonnes of freight per annum for this movement.
- Reduced train travel distance and time, as trains can be turned around in Rolleston rather than Middleton (a 30km travel distance saving by rail) – approximately a 22.5 minute saving.
- Growth in freight movement is adapted from the South Island Freight Study⁴⁵ that forecasts 4.35M tonnes originating from the West Coast in 2042. Straight line growth is applied from 2022 to 2042.
- Value of time per tonne is in the order of \$0.83-2.53 with a median around \$1.33/tonne/hour⁴⁶.

Rail economic assessment

Table 37 provides an overview of the economic assessment for rail improvements.

37 Rail economics	
NPV & BCR	
s 9(2)(g)(i)	
BCR	0.3

It is important to note that the economic benefits are highly sensitive to the volume of freight that is moved between the Midland Line and the Main South Line (south). The range in value of time per tonne gives a spread of BCR in the order of 0.2 to 0.8 (based on a range of \$0.83-2.53/tonne/hour).

The rail benefits and costs have been captured as part of the overall economic appraisal.

⁴⁴ Freight Information Gathering System (FIGS Rail, updated March 2023)

⁴⁵ South Island Freight Study: Identification of the opportunity for mode shift and preparation of a mode shift implementation plan. Environment Canterbury and the South Island Regional Transport Committee, 2019

⁴⁶ Waka Kotahi Research Report 665 - Valuing freight transport time and reliability

29.7 Sensitivity analysis

Several sensitivity tests have been undertaken to provide a likely BCR range for the preferred programme (staging upgrade), focusing on the most influential factors (based on the most notable project risks):

- Impact of slower growth – a test based on the premise that assumed ‘2038 residential development’ does not eventuate until 2048 or 2058.
- Construction cost – double the construction cost (i.e. 100% rise in costs)
- Discount date – comparing a 4% and 6%

The economic sensitivity analysis is presented within Table 35.

38 Sensitivity analysis

Sensitivity test	Variance	BCR Range
2038 travel time and VOC benefits eventuate in a later year	2038 - 2058	2.4 - 3.6
Discount rate	4% - 6%	2.6 - 3.6
Construction cost	Double construction costs	1.8 - 3.6

The sensitivity analysis shows that under all scenarios the BCR is expected to be at least 1.8.

29.8 Incremental economics

29.8.1 Overview

During finalisation of the Business Case Waka Kotahi has undertaken a Phase Readiness review to identify areas to be refined. The review requested an economic assessment of alternative programmes.

The purpose is to better understand the value for money presented by key components of the preferred programme – specifically, the Dunns Crossing Road/Walker Road roundabout, the service lane and the flyover. To this end, the following scenarios have been assessed:

39 Incremental economics – scenarios

Scenario	Details
Scenario 1 “Full scheme”	<p>This captures the recommended programme, which differs slightly to that previously assessed and presented as part of the documentation that informed the Phase Readiness review. Key changes capture:</p> <ul style="list-style-type: none"> • A revised service lane, which sees the removal of the acceleration lane from Brookside Road. The change was predominantly a response to a desire to avoid property take from KiwiRail and pavement costs. • Upgrade of SH1 southbound, provide two lanes through from the Weedons Ross Road interchange through the service lane (i.e. remove the current two-to-one lane southbound 2-1 merge). • New pedestrian/cyclist underpass at the Dunns Crossing Road/Walker Road roundabout. <p>This scenario forms the basis for comparison.</p>
Scenario 2 “Dunns Crossing Road / Walkers Road roundabout only”	<ul style="list-style-type: none"> • Assumes the only upgrade to the SH1 corridor is the introduction of a dual lane roundabout at Dunns Crossing Road/Walkers Road. • Includes the new proposed pedestrian/cyclist underpass. • Excludes all other features of the preferred programme – i.e. signals will remain at Rolleston Drive North and Hoksyns Road. No banned turns at Rolleston Drive South, Tennyson Street or Brookside Road.
Scenario 3 “Dunns Crossing Road / Walkers Road roundabout + wire rope barrier”	<ul style="list-style-type: none"> • Roundabout at Dunns Crossing Road/Walkers Road (inc. the pedestrian/cyclist underpass) • Wire rope barrier through to traffic signals at Rolleston Drive North – i.e. banned right turns at Rolleston Drive South, Tennyson Street or Brookside Road.

29.8.2 Results

A summary of the economic appraisal results is provided within Table 40.

40 Incremental economic assessment results

Scenario	Benefits (40 Year NPV) - \$m						Cost (40 Year NPV) - \$m	BCR
	Active modes	Safety	Travel Time	VOC	Rail	Total		
Full Scheme	s 9(2)(g)(i)							3.6
Dunns/Walkers Roundabout Only								4.3
Dunns/Walker Roundabout + Wire Rope ⁴⁷								-1.1

The results of the incremental economics assessment show that:

- The recommended programme (full scheme) gives a strong economic result (BCR of 3.6) due to connectivity and safety benefits.
- The Dunns Crossing Road / Walkers Road roundabout provides excellent value for money (BCR of 4.3) but the increasing delays at the SH traffic signals significantly reduce the connectivity benefits.
- The pedestrian/cyclist underpass also has merit from an economic perspective – even with the application of very conservative (low) demand assumptions, an economic benefit of almost \$6m is expected. The cost estimate for the underpass is approximately s 9(2)(g)(i)
- Including the wire-rope barrier, without the flyover, is likely to create some high disbenefits due to the restrictions of right turns. This is because post 2028 the Rolleston Drive North and Hoskyns Road signals will be operating close to (or beyond) capacity. If a wire-rope barrier is included (without the flyover), traffic wanting to turn right-out from Tennyson Street or Brookside Road would then do so from the Rolleston Drive North signals.
- Higher safety benefit would be achieved for the wire-rope barrier (i.e. Rolleston Drive LILO and the service lane) if those interventions were brought forward. In the analysis it is assumed these are not constructed until 2029/30, which means the NPV of benefits is heavily reduced.

Essentially - the wire-rope barrier would trigger more demand being added to a traffic signal that is already overcapacity.

29.8.3 Conclusions

The key conclusions, from a purely economic perspective, are:

- There is strong justification for the roundabout (and underpass for a multi modal solution) at Dunns Crossing / Walkers Road, and it presents good value for money.
- There is strong justification to include the Flyover, and still presents good value for money.
- Adding the wire-rope barrier (banning right turns out of Rolleston Drive South, Tennyson Street and Brookside Road) without the flyover have large negative impacts and should only be introduced once the flyover is completed.

⁴⁷ Assumed features for this scenario are the roundabout at Dunns Crossing Road / Walkers Road, Rolleston Drive South and the Service Lane.

30 RECOMMENDED PROGRAMME

30.1 Overview

The programme assessment demonstrates how the preferred option functions, delivers the benefits sought by addressing the problems and aligns with key transport strategies.

The core elements of the preferred option are demonstrated in Figure 52, which also include:

- A pedestrian/cycling underpass to connect Dunns Crossing Road with Walkers Road.
- Removal of the two to one lane merge southbound along SH1, to provide two lanes between the Weedons Ross Road interchange and the Rolleston offramp accessing Rolleston Drive North and the service lane to the town centre and commercial properties adjacent to the state highway.



52 Core elements of the preferred programme

30.2 How does this support Rolleston's transport network?

There is no current all-inclusive Network Operating Framework (NOF) for Rolleston. Rather, there are several local strategies which describe the primary freight, traffic, cycling, walking and public transport routes. To gain an appreciation of what the desired transport network for Rolleston is, and the potential points of conflict for various modes, a NOF style map has been sketched for future network. This NOF has been agreed between both Waka Kotahi and SDC.

It is most important to recognise that:

- Tennyson Street between Kidman Street and Rolleston Drive is seen as a primary walking and cycling link, with high amenity access for active modes, with reduced emphasis on vehicle movement.
- Norman Kirk Drive is a public transport route, providing local access, but again not a key traffic route.
- Rolleston Drive North is earmarked as the main traffic route, shown secondary below the State highway and arterial roads of Jones Road, Levi Road and Weedons Road, but is also used as walking/cycling route.
- Routes shown as heavy vehicle routes access the industrial area and are typically "arterial roads" in the SDC road hierarchy (Walkers Road, Two Chain Road, Jones Road and Weedons Ross Road), and hence are also important traffic routes.
- Heavy vehicles are expected to use Weedons Ross Road interchange and Jones Road, Two Chain and Walkers Road.
- The southern access to industrial zones moves from the SH1/Hoskyns Road intersection to Walkers Road/Two Chain Road/Jones Road.

- The southern access to Rolleston township is via Dunns Crossing Road and then Brookside or Lowes Roads
- People looking to access Rolleston from Christchurch have the option to use Levi Road via the Weedons Ross Road interchange or the offramp to Rolleston Drive North or Tennyson Street.

The key access points to Rolleston, and resultant traffic demands, are closely aligned to the map in Figure 53.

Most importantly this shows the streets where traffic is encouraged, and those where traffic is to be kept at a minimum to enable improved walking, cycling, public transport and liveable community outcomes. (Kidman Street, Norman Kirk Road and Tennyson Street).



53: How will the future network look?

The proposed changes will make it safer for local people to cycle, walk, connect with buses or travel in cars across the highway and travel between and around the residential side and the industrial area of Rolleston.

Traffic will also move more efficiently as a result of the upgrades.

30.3 Network performance

The network with the NZUP Improvements in place is predicted to operate effectively in the future. Minimal increases in congestion, delays, and queuing are anticipated with around 20-years of assumed traffic growth.

The programme includes three signalised intersections around the area of the Flyover, Kidman Street / SH1 offramp / Rolleston Drive North, Flyover / Jones Road, and Jones Road / Hoskyns Road. These intersections are anticipated to operate as an integrated traffic signal system, providing progression (a 'green wave') for traffic northbound on Rolleston Drive North, east on Jones Road, and accessing SH1 via the free left-slip movement from Hoskyns Road. This area of the network is expected to carry higher traffic volumes in the future.

Table 41 shows travel times on key routes in the Existing and Do Minimum modelled networks from 2021 through to the assumed 2038 forecast year for the AM, IP and PM peak periods.

41 Key Route Travel Times, Existing & Do Minimum 2021, 2028 and 2038

Route	Dir	2021 Peak Period			2028 Peak Period			2038 Peak Period		
		AM	IP	PM	AM	IP	PM	AM	IP	PM
SH1	Ebd	6.1	5.9	6.2	6.6	6.3	6.5	6.8	6.4	7.4
	Wbd	6.7	6.3	6.8	6.8	6.6	9.0	9.3	7.0	15.4
Rolleston Dr North / Jones Road	N-Ebd	3.5	4.0	3.7	3.5	4.1	4.2	10.9	5.8	12.8
	S-Wbd	3.9	4.2	3.7	4.3	3.8	4.9	6.9	10.3	7.8
Tennyson St	Nbd	2.4	2.0	2.4	3.3	2.4	3.8	6.9	3.2	4.4
	Sbd	1.9	1.8	2.1	1.9	1.9	2.1	2.0	2.0	2.3

The table above demonstrates that the performance of key routes in the Existing / Do Minimum network deteriorates significantly beyond 2028. Significant delays are expected in all three time periods in the future.

In contrast, Table 42 shows modelled travel times on key routes with the NZUP Improvements in place.

42 Key Route Travel Times, NZUP Improvements, 2021, 2028 and 2038

Route	Dir	2021 Peak Period			2028 Peak Period			2038 Peak Period		
		AM	IP	PM	AM	IP	PM	AM	IP	PM
SH1	Ebd	5.9	5.9	6.0	6.0	5.9	6.0	6.1	6.0	6.0
	Wbd	6.3	6.2	6.4	6.3	6.3	6.8	6.4	6.3	8.0
Rolleston Dr North / Jones Road	N-Ebd	3.0	3.0	3.3	3.4	3.3	3.6	3.6	3.5	3.7
	S-Wbd	3.5	3.5	3.4	4.0	3.7	4.2	4.1	3.8	4.8
Tennyson St	Nbd	1.9	1.9	2.0	1.9	1.9	2.1	2.2	2.0	2.4
	Sbd	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.0	2.2

The table above shows that with minimal improvement the network performance degrades considerably but the travel time on the key routes will operate well into the future with the NZUP Improvements in place. Despite the anticipated high level of traffic growth, there is minimal increase in travel times predicted on these routes.

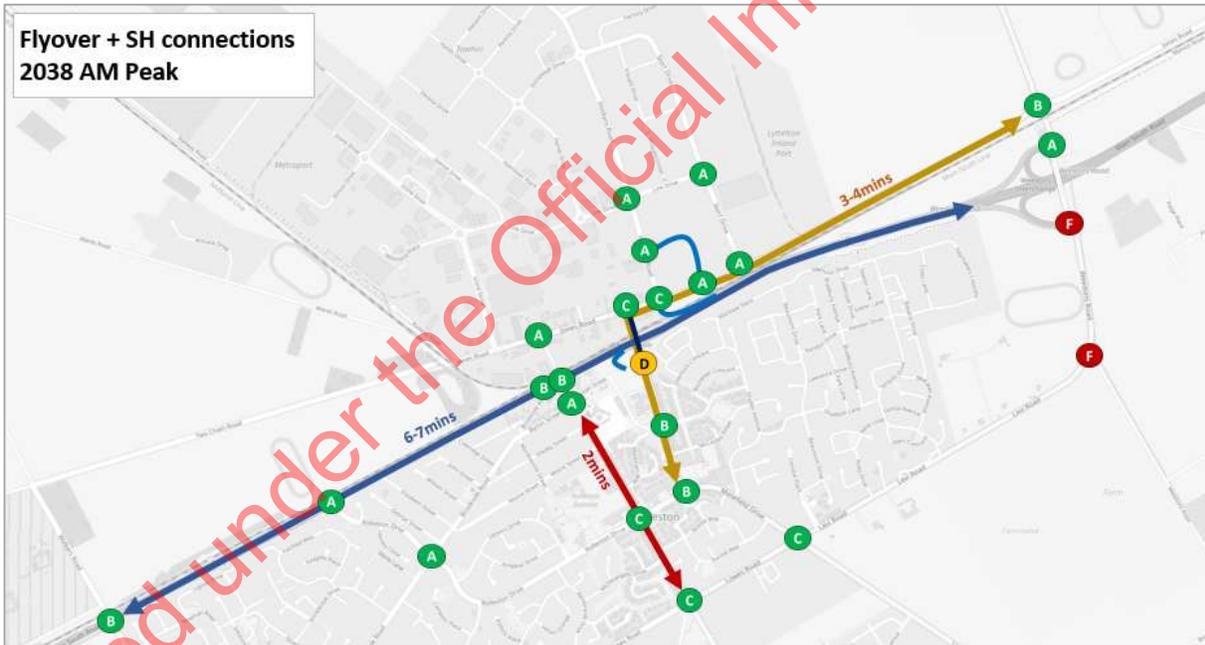
The information above, alongside the level of service at key intersections are shown in Figure 54 to Figure 57, for the 2038 morning and evening peak periods. The intent of these figures, alongside the tables above, are to show the demonstrable improvements in a visually digestible form, while a full breakdown of the modelled results, alongside a more in-depth analysis of the modelling are provided in **Appendix S**

The broad outcomes of the traffic modelling assessment can be summarised as follows:

- Without substantial investment, the transport network is expected to deteriorate over time with significant levels of delays, congestion, and queueing anticipated beyond 2028.
- The NZUP Improvements mitigate this deterioration and allow the network to continue to operate at a similar level of performance over the next 20-years despite the anticipated high traffic growth.
- With the NZUP improvements in place, significant changes in traffic volumes are limited to the immediate area around the northern end of the Flyover; a large increase in traffic flow on Jones Road between the Flyover and Hoskyns Road is expected. Other traffic volume changes are less significant and in-line with the function of the local road hierarchy.
- The network configuration and traffic signal operation associated with the NZUP improvements has been demonstrated to operate effectively and accommodate the expected traffic volumes over the next 20-years, notably at the three signalised intersections providing connections to the Flyover and SH1 on/off ramps.
- The NZUP Improvements provide several more direct connectivity improvements; notably between:
 - The industrial area and town centre.
 - Dunns Crossing Road and Walkers Road (a key regional route).
- There are strong vehicle travel time and operating cost economic outcomes from the NZUP Improvement. These are driven by the longer-term demand forecast scenario where congestion in the Do Minimum scenario becomes significant and this is most notable in the PM evening peak period. By proving a more reliable transport system there will be freight efficiencies and less vehicle emissions due to stop-start congestion.



54 Do Minimum – 2038 AM Peak

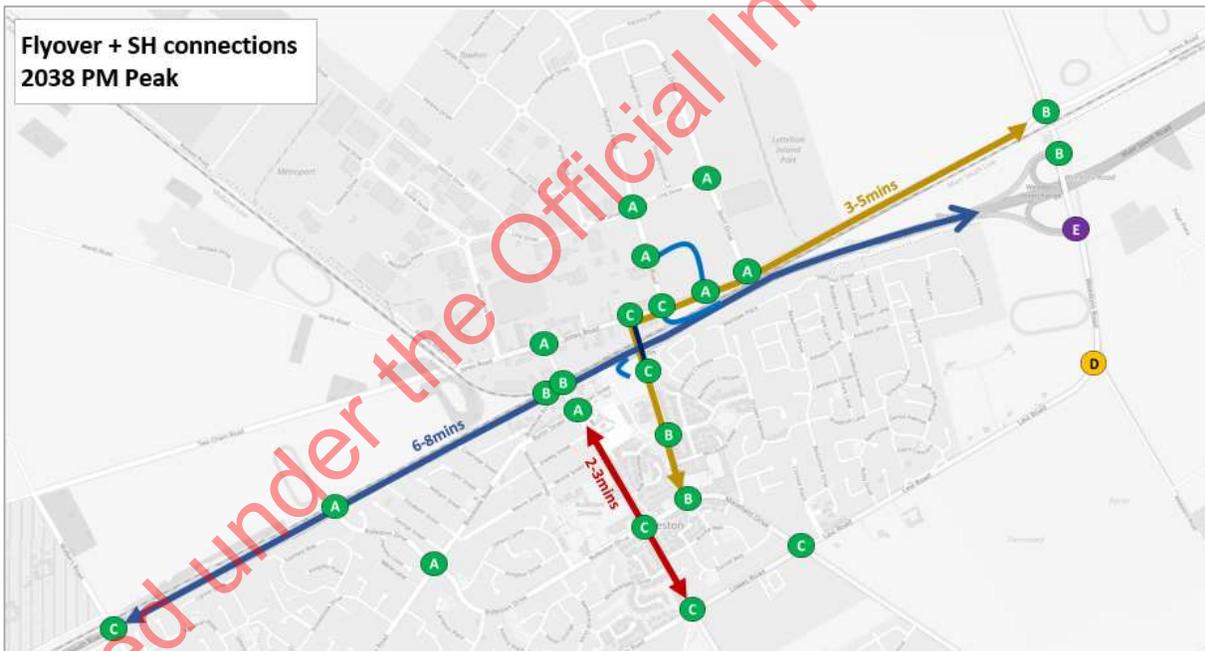


55. Straight flyover (preferred option) – 2038 AM Peak

Released under the Official Information Act 1982



56 Do Minimum – 2038 PM Peak



57 Straight flyover (preferred option) – 2038 PM Peak

31 PROGRAMME ASSESSMENT

31.1 Alignment vs key strategies

Table 43 provides an assessment of the preferred programme against key strategies.

43 Programme alignment vs key strategies

Strategy	Preferred programme	Alignment
National strategies		
Government Policy Statement (GPS) on Land Transport (2021/22 – 2030/31)	The focus of the project around delivering strong liveability, safety and freight efficiency objectives aligns very strong with GPS objectives. The project also supports key resilience outcomes and a need to mitigate the impacts of climate change.	Very Strong
Road to Zero	Each component of the proposed programme will contribute to increasing safety on the road network and is consistent with the "Road to Zero" vision and objectives. Key benefits of the programme are a reduction in right turning traffic onto the state highway and safer means of travel for pedestrians and cyclists.	Strong
Arataki	Programme directly addresses specific regional issues identified in Arataki – i.e. addressing DSIs, supporting growth and providing better connectivity to local jobs	Very Strong
Local strategies		
SDC Long Term Plan 2021-31	The preferred programme aligns well with the SDC LTP, as the LTP outlines coordination with the NZUP programme to provide a SH1 Rolleston "Fly Over" and key intersection safety upgrades along the SH1 e.g., Dunns Crossing and Walkers Road. This coordination is as part of a majority project called 'Rolleston/SH1 Access Local Road Upgrades' and programmed between 2021-43 with an indicative funding/cost allocation ⁴⁸ .	Very Strong
Transportation Activity Management Plan (AMP) 2021-31	While there is no specific reference to the preferred programme within the AMP, there are references to complementary projects such as Jones Road/Two Chain Road Realignment. These complementary projects are required in order for the successful delivery and performance of the preferred programme of works.	Strong
Walking and Cycling Strategy (2018)	The preferred programme unlocks the ability to extend the cycleway to north of Rolleston, providing a grade separated crossing point over the SH1 via the flyover, and mirroring the existing road network.	Strong
Other business cases / projects		
Greater Christchurch Public Transport Futures Combined Business Cases (2020) and MRT Interim Report (2021)	This work informs the future vision for public transport in Greater Christchurch and the proposed flyover, which would deliver improved access to both the industrial (via Jones Road) and residential (via Rolleston Drive North) will support improved connectivity for public transport services. The preferred programme enables more reliable travel for public transport by releasing bottlenecks and connectivity issues as well as supporting the introduction of a new Park and Ride services.	Strong

31.2 Supporting freight efficiency

Improving safety and freight efficiency are two of the Ministry of Transport's enduring transport outcomes. The end of the CSM (100kph speed) currently merges to a single lane and the meets traffic signals at Hoskyns Road and Rolleston Drive North. The presence of these signals has negative impacts to both safe and efficiency outcomes; and the effects will worsen as traffic volumes rise in response to growth.

Removing the traffic signals will support road-based freight efficiency along the state highway and accessing the industrial area via the Weedons interchange and Jones Road or via Walker and Two Chain Road. This reliability will support access for rail-based freight and encourage a shift from road to rail. This is because engagement with KiwiRail has established that any discernible improvements (such as a third line) on the rail network are dependent on the removal of the Hoskyns Road level crossing (refer to Chapter 7). Increasing capacity of the rail corridor directly impacts the ability for KiwiRail to support greater freight movement and potential future passenger services.

⁴⁸ <https://www.selwyn.govt.nz/your-council/plans-and-reports/long-term-plan>

The recommended rail option also provides the potential opportunity to increase rail operating speeds through Rolleston from the current limit of 40kph.

31.3 Impact to Local Roads

Appendix M provides a memorandum which looks at the potential safety implications on the local roads where we expect traffic volumes to increase, with a specific focus on:

- Roads which provide direct access to schools, where there are a high number of vulnerable road users.
- Roads which form part of SDC's core pedestrian and cycle network.
- The industrial area, where there is a mix of light and heavy traffic with numerous movements (throughout the day) into and out of businesses.
- The Town Centre, where delivering high amenity value is essential for the future liveability of Rolleston.

The analysis shows an increase in traffic along Dunns Crossing Road due to both residential growth and the Dunns Crossing roundabout enabling safe use of the cross district arterial route. This has potential impacts for vulnerable users around the West Rolleston Primary School.

Discussions with the School and Selwyn District has captured a series of short (e.g. speed limit, raised platforms and parking restrictions) and long term interventions (new traffic signals and improved staff parking) that will be delivered by SDC and the Ministry of Education to help manage the corridor. The proposed mitigation measures are described in Section 24.2.1.

A traffic flow difference plot for the 2038 AM peak is provided below. Increases are shown in orange up 1000+ vehicles, and decreases in blue down to -1000+ vehicles.



58: Flow difference plot (scheme vs Do Minimum) - 2038 AM Peak

Refer to **Appendix S** for similar graphs for the 2028 future year and PM peak period.

31.4 Programme assessment

Table 44: Programme assessment

Problem	Benefit	Investment Objectives			Key Performance Indicator			Benefits realisation				
		IO	Preferred programme		KPI	Baseline (Do Min)	Forecast (Preferred Programme)	Monitoring	Responsibilities			
Safety – Increasing traffic and rail movements and poor interface with local road intersections and level crossings is resulting in increased conflicts, and the risk of death and serious injury.	Work towards zero injuries and deaths	Targeting 40% deaths and serious injury reduction along SH1 from 2032.	<p>Major safety improvements proposed:</p> <ul style="list-style-type: none"> Traffic signals to be removed at the SH1 intersections with Rolleston Drive North and Hoskyns Road. Left-in / Left-out at Rolleston Drive South Wire-rope median barrier along SH1 Service lane Roundabout at Dunns Crossing Road / Walkers Road <p>This programme reflects near the maximum possible level of safety intervention that could be delivered and removes all right turning conflicts at SH1 intersections.</p>	Strong	Crashes and DSIs	<ul style="list-style-type: none"> 70 crashes per year on SH1 and 6 DSIs per year on SH1 (2038) 	<ul style="list-style-type: none"> 75% reduction in crashes on SH1 and 40% reduction in DSIs 	Annual	Waka Kotahi / SDC			
		75% reduction in 'near misses' and incidents across all level crossings in Rolleston by 2032.	<p>Over the last 10 years there were 26 reported near-misses at the Hoskyns Road level crossing. This intersection is now proposed to be left-out only, with free flow movement onto SH1.</p> <p>The number of near-misses is expected to drop close to zero. At other level crossings, no significant change in traffic volume is expected. Hence expected that this Investment Objective will be strongly delivered</p>		Very Strong	Reduced road/rail incidents	26 incidents at Hoskyns Road level crossing, including 11 collisions, and a temporary train speed.	The number of near-misses is expected to drop close to zero at the Hoskyns Level Crossing. At other level crossings, no significant change in traffic volume is expected.	Annual	Waka Kotahi / KiwiRail		
Connectivity – Rapid growth and changes in land use has outpaced the delivery and availability of alternative transport choices, maintaining a reliance on private vehicles, resulting in increased severance, congestion and reduced liveability and sustainability of Rolleston	Support a more connected community	Increase the number of people walking and cycling between Rolleston Town Centre and the Industrial Area by 100 people per day by 2032.	The shared path on the flyover structure will address the key existing gap in the active mode network between Rolleston and the RIZ. Flyover expected to generate 100 new cyclists per day, with more active mode journeys created with the underpass at Walkers Road – Dunns Crossing Road.	Strong	Rolleston town centre to/from the RIZ	9 / 15 minutes	6 / 6 minutes	Every 2 years	Waka Kotahi / SDC			
					Social connectedness population within 15-45 minutes travel time by different modes to employment opportunities in IZone	Forecast travel times of 10-13 minutes in the peak direction between Rolleston Drive North and Jones Road in 2038	5-10 minute reduction in the travel by vehicle from Rolleston Drive North to Jones Road in the peak direction by 2038	Every 2 years	Waka Kotahi / SDC			
					More people walking and cycling between Rolleston Town Centre and the RIZ	Unpleasant environment for pedestrians and cyclists crossing SH1	Nicer and more direct connection will attract more people, with up to 100 users by 2038	Every 2 years and census period	Waka Kotahi / SDC			
	Provide a more resilient and sustainable network	Improve the reliability of the regional journey between Rolleston and Christchurch by delivering a peak journey time within 5 minutes of the off-peak journey time by 2032.	Modelling suggests that peak hour travel times will be subject to delays of up to 1 minute compared with travel during the inter-peak	Very Strong	Burnham to/from industrial area	7 / 14 minutes	6 / 7 minutes	Every 2 years	Waka Kotahi / SDC			
					North of Weedons Road interchange to/from industrial area	15 / 19 minutes	13 / 12 minutes	Every 2 years	Waka Kotahi / SDC			
					Reduce train movement time between the Midland Line and Main South Line by 20 minutes by 2032.	Expected saving of around 20-25 minutes. The programme provides a closer turnaround facility, and reduces rail travel distance by around 30km (avoiding need to travel to Middleton).	Very Strong	Train speeds on the Main South Line through Hoskyns Road level crossing	Temporary rail speed of 40kph on Main South Line	Restore rail speed to 80kph on Main South Line, saving 2 minutes per train	Every 3 years	KiwiRail
					Train movement time between the Midland Line and the Main South Line to the South of Rolleston.	Trains need to run to Middleton yard		Trains turn at Rolleston, saving 15km in each direction.	Every 3 years	KiwiRail		
Rail shunting time	2km shunt at 6kph backwards, 3x day, 5 days per week	2km shunt at 15kph	Every 3 years	KiwiRail								
Resilience to unplanned events (crash related road closures)	70 crashes per year on SH1 (2038)	<ul style="list-style-type: none"> 75% reduction in crashes on SH1 	Every 3 years	Waka Kotahi								
Flexible – the ability to adapt to future changes in the form of the State Highway corridor	No future proofing	<ul style="list-style-type: none"> Improvements support any four laning of the SH1 corridor Supports future Park and Ride off Jones Road 	n/a	Waka Kotahi								

31.5 Assessment vs desired transport outcomes

Figure 61 provides a comparison between:

- The desired outcomes at the start of the project in terms of the five Transport Outcomes, derived weightings the ILM map.
- The monetised outcomes, again apportioned to the each of the five Transport Outcomes, derived from the economic appraisal. Note that the travel time benefits have been split across 'inclusive access', 'economic prosperity' and 'resilience'.

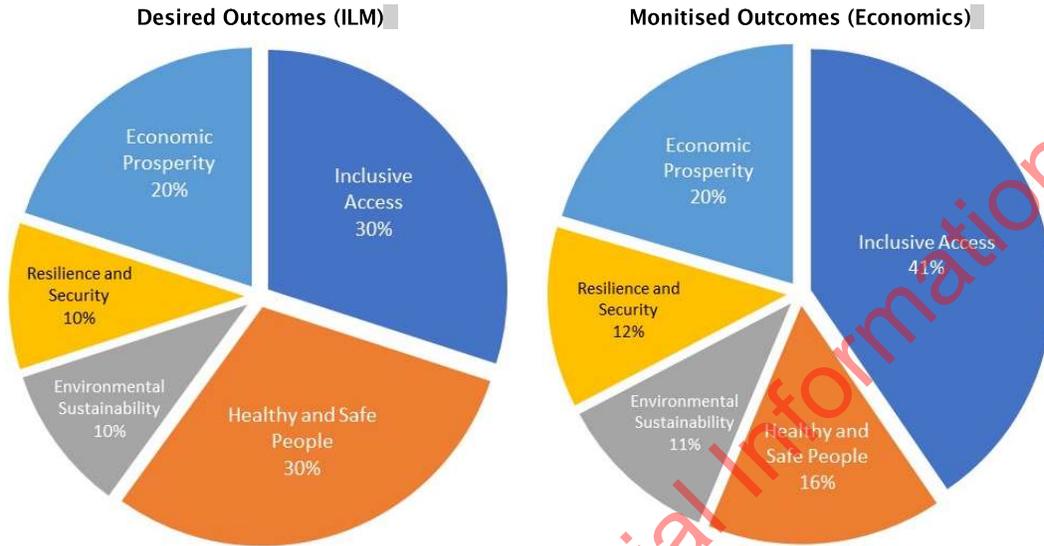
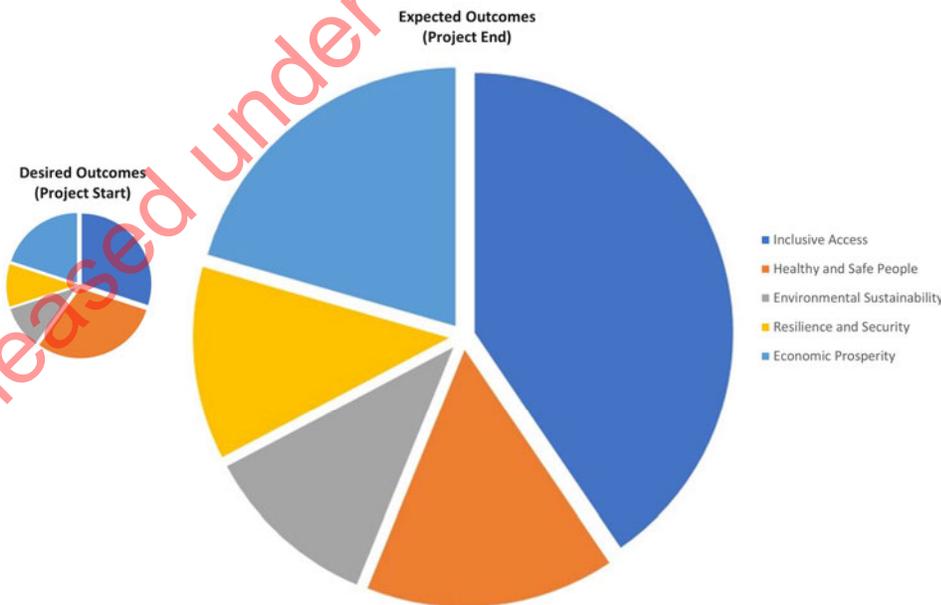


Figure 59: Programme Outcomes

The pie graphs shows that broadly the desired outcomes, and proportions, that the project set out to achieve are being met. Whilst the overall proportion of monetised benefit for "health and safe people" is less than 30% derived from the ILM this is purely a consequence of the very high absolute economic benefit for 'inclusive access' (derived from the travel time benefit).

To put into context the scale of which benefits are expected to be delivered, the pie graphs have been replicated but scaled according to the BCR desired at the start of the project (i.e. 1.0) and the BCR being achieved (3.6). This comparison is provided below.



60: Originally desired vs expected outcomes

32 CARBON IMPACT

32.1 Overview

The Ministry of Transport Outcomes Framework⁴⁹ identifies five core outcomes for improving wellbeing and the liveability of places through the transport system:

- Inclusive access
- Healthy and safe people
- Economic prosperity
- Resilience and security
- Environmental Sustainability

It is necessary to also consider the Environmental Sustainability outcome which is defined as *'transitioning to net zero carbon emissions, and maintaining or improving biodiversity, water quality and air quality'*. An important indicator for this outcome relevant to this project is greenhouse gases emitted from the transport system.

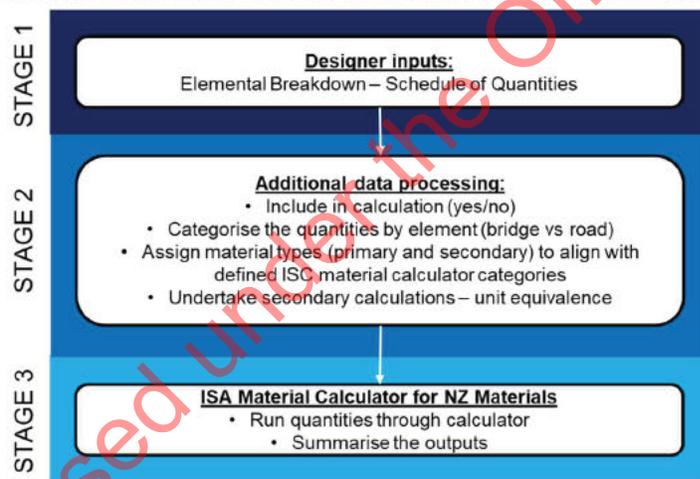
This section presents quantification of this outcome. Following consultation with Waka Kotahi, the scope of the assessment has been limited to only the embodied (construction) emissions of the current design. The assessment carried out is further limited as it is sole focus is on the flyover and immediate roading improvements (e.g., on Jones Road and new Loop Road) leading up to the flyover. Emissions from construction or operational activities (e.g., energy and fuel used) will need to be assessed during the next phases when there is more certainty around the potential construction methodology for the flyover.

What is embodied carbon?

- Embodied carbon is defined as emissions from activities associated with a particular material or product e.g., production and transportation. However, it does not include operational energy and water use.
- Embodied carbon is assessed on a life-cycle basis therefore emissions from all points in the supply chain and over the lifetime of that material

32.2 Methodology

Greenhouse gas emissions due to construction activities are an unavoidable consequence of any construction project for new infrastructure or replacement of structures due to end of life. The methodology used for deriving estimates for embodied carbon emissions is outlined in Figure 61.



61: Methodology for calculating emissions

This assessment used the Waka Kotahi endorsed 'Project Emissions Estimation Tool' (PEET)⁵⁰ to calculate the carbon emissions. The estimates reported below are a result of using the aforementioned tool.

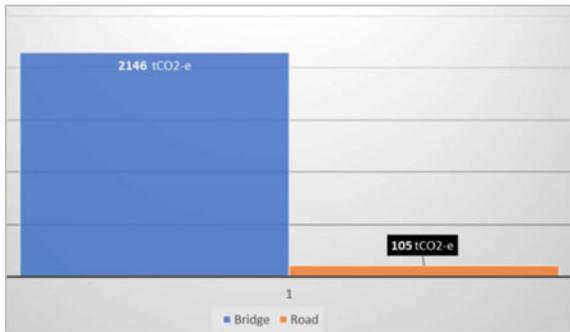
⁴⁹ www.transport.govt.nz/assets/Uploads/Paper/Transport-outcomes-framework.pdf

⁵⁰ www.nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/environment-and-sustainability-in-our-operations/environmental-technical-areas/climate-change/climate-change-mitigation/project-emissions-estimation-tool-peet/

32.3 Flyover – Embodied carbon estimates

The estimated construction emissions are based on the final DBC designs and focuses on the Rolleston Flyover and associated roads (i.e. Jones Road and Loop Road).

The bridge structure is the main contributor of embodied carbon emissions – accounting for 95% of the total (approximately 2,100 tonnes of CO₂). The road contributes approximately 100 tonnes of CO₂. The graphs below provide a breakdown of the emissions for the flyover and road components, respectively.



62 Embodied Carbon Estimate, Bridge vs Road



Figure 63: Embodied Carbon Estimate, Bridge vs Road – breakdown by key materials

The most significant sources of embodied carbon for the bridge were: steel - bridge reinforcements (78%) and concrete (22%). The three components dominating the road were: asphalt (42%), concrete (38%) and steel (13%).

Note that the preferred (straight) flyover option has a shorter span when compared to the alternative skewed options, and by nature, would have a lower embodied carbon impact.

32.4 Flyover – opportunities to reduce emissions

Greenhouse gas emissions reduction opportunities for the project were identified through a series of interviews between technical discipline leads and the sustainable infrastructure experts. A key workshop with the technical discipline leads was then held on 16th December 2022 to discuss potential opportunities to reduce embodied carbon, which must be explored further during Detailed Design.

A total of nine key opportunities were identified, as described in Table 45. Commentary is also provided around the implications of any option to the wider outcomes desired as part of the project. Some options have significant impacts on the desired outcomes of the project - e.g., using timber as the key material to construct the bridge, and reducing the width of the bridge. These are significant as these options reduce the use of key construction materials such as steel and concrete. These two materials make up the largest share of embedded carbon in the assessment, as shown in Figure 63.

This challenge, (i.e., exploring opportunities to reduce emissions) introduces a healthy tension for the detailed design stage, but it should be noted that progressing any option that has significant impacts on the desired outcomes of the project represents a trade-off which should be explored, but which is not likely to be acceptable to the project owners.

The opportunities to reduce the embodied carbon emissions are categorised into six key categories (Structure, Pavement, Procurement, Cement Substitutes, Drainage and Lighting), see Table 45. A carbon reduction potential rating has also been provided in the table, at this stage, this reduction potential rating is only an estimate, with the rating split as follows:

- **Low** carbon reduction potential: <5%.
- **Medium** carbon reduction potential: 5-20%.
- **High** carbon reduction potential > 20%.

In a similar fashion, the risk to wider project outcomes is also rated, with the logic for the rating as follows:

- **Low risk** – minor (or less than minor) impact on the project cost and programme.
- **Medium risk** – no major risk to the implementation of the project, but cost and time increases are expected.
- **High risk** – there is potential for major re-design and has the potential to greatly increase the cost and time required to complete the construction of the proposed improvements.

The two rating above are both qualitative assessments, and the quantum of change (i.e., change to budget or project programme) is not defined at this stage.

Table 45 Opportunities to reduce embodied carbon emissions

Category	Opportunity	Further considerations	Carbon reduction potential	Risk to wider project outcomes
Structure	Reduce width of the bridge by having the shared use path on just one side of the bridge.	<ul style="list-style-type: none"> • Having a SUP on only one side could potentially alter the loading on the beams. This might require larger beam on the other side as the traffic will be close to the edge, increasing overall carbon. This needs to be considered. • Reduces weight – lighter beams, less foundations required. • Implications to futureproofing of the bridge and level of service for active modes. Having the SUP on just one side limits the ability to expand the walking/cycling network in the future. 	Medium	Low – There are implications to walking and cycling, but still providing a safe connection over SH1.
	Pile footing vs spread footing. Changing the design from pile footing to spread footing, subject to ground conditions.	<ul style="list-style-type: none"> • Having spread footing instead of piles for the foundations of the flyover can reduce the amount of steel and concrete used in the construction of the structure. • There is no major disruption to the construction sequencing or constructability. • There is opportunity to save on cost and time on construction based on this design change. 	High	Low
	Refine the design of the northern abutment.	<ul style="list-style-type: none"> • The northern abutment will be constructed using Mechanically Stabilised Earth (MSE) walls and will comprise of vertical panels tied back using geogrids. • The current arrangement for the abutment comprises a bored/driven pile group with columns extending from the pile cap to the bank seat through the MSE wall. An alternative option would be to sit the abutment bank seat on top of the MSE wall, which would eliminate the need for the piles and save on concrete and steel. 	Medium	Low
Pavement	Use low carbon pavement technologies for roundabouts and approaches, such as EME-2 ⁵¹ (or the similar).	<ul style="list-style-type: none"> • The EME-2 carbon reduction impact is more associated with reduced construction associated emissions. • EME-2 also requires less material but higher upfront cost. 	Low	Low
Procurement	Specify in tender documents requirement for low carbon footprint (explore incentives).	<ul style="list-style-type: none"> • Low carbon materials may cost more. • Could have low carbon as a non-price attribute in the tender evaluation. • Design/build process has an in-built cost/material saving component that could help with the carbon reductions. • Market transformation needed. 	Medium	Low

⁵¹ EME-2 is a high modulus asphalt. It was created to build stronger, thinner, longer-lasting pavements.

Category	Opportunity	Further considerations	Carbon reduction potential	Risk to wider project outcomes
Cement Substitutes	In combination with specifying low carbon footprint in procurement, the material specifications could explore alternatives such as low carbon cement substitutes / supplementary cementitious material (SCM).	<ul style="list-style-type: none"> A reduction analysis needs to be completed to understand the magnitude of the percentage reduction from using alternatives/SCM. At present a “low” carbon reduction is given to this category, due to the uncertainty around the overall contribution of cement within the current emissions estimate. This is an Item to be developed further as the design progresses. 	Medium	Low
Lighting	Replace steel with low carbon lighting poles	<ul style="list-style-type: none"> Investigate options for low carbon lighting poles, in material use and operation. 	Low	Low

32.5 Infrastructure Sustainability Essentials

32.5.1 Overview

As well as being safer for people, this project will offer people more travel options between residential and industrial areas and more sustainable travel choices – such as cycling, scootering and walking. This will help Rolleston to become a more accessible and self-sufficient town.

In addition, a Preliminary Infrastructure Sustainability Assessment has been undertaken and will be continued as the project progresses into detailed design. The assessment will evaluate the project design against the Infrastructure Sustainability Council’s Infrastructure Sustainability (IS) Essentials rating scheme. The IS Essentials rating scheme encompasses a range of environmental, social, and economic outcomes. The climate emergency declared by the government means that all public agencies, including Waka Kotahi, must focus on achieving a net carbon zero in New Zealand by 2050.

Ultimately, the Project has considered the effects on the environment, neighbours, and how we can reduce its carbon footprint and emissions from the start. This consideration is critical in gaining the various consents required before construction starts.

The *Rolleston Access Improvement - Flyover Preliminary Infrastructure Sustainability Management Plan* is provided as **Appendix T**.

32.5.2 Rolleston Flyover sustainability objectives and targets

Preliminary project-specific objectives and targets have been proposed to ensure sustainability outcomes are aligned with Waka Kotahi’s overarching priorities and objectives.

The material sustainability issues identified as part of the Preliminary IS Materiality Assessment and subsequent initial project team input have been captured within the Rolleston flyover objectives and targets to ensure strong sustainability performance within these areas, and alignment with IS credit Integrating Sustainability (Lea-1) requirements.

Table 46 presents the preliminary sustainability objectives and targets and identifies where each objective and target align with broader policy objectives and the associated IS Essentials credits. These objectives and targets should be further reviewed and refined as the project progresses.

Table 46 Rolleston flyover sustainability objectives and targets

Theme	Rolleston flyover objective	Alignment with broader policy objectives	Rolleston Flyover target	IS Credit Ref
Sustainable Procurement	Deliver long term public value and broader outcomes through sustainable procurement practices	<ul style="list-style-type: none"> New Zealand Government Procurement Rules Waka Kotahi Broader Outcomes Procurement Strategy 2021 Waka Kotahi Interim Specification for Climate Change for NZUP 	Ensure consideration of environmental, cultural, social and economic aspects throughout all stages of the procurement process.	Spr-1
Resilience	Deliver an asset resilient to the effects of climate change.	<ul style="list-style-type: none"> Waka Kotahi 2018 Resilience Framework Government Policy Statement on Land Transport 	<ul style="list-style-type: none"> Undertake a climate change risk assessment with input from a multi-disciplinary team and 	Res-1

Theme	Rolleston flyover objective	Alignment with broader policy objectives	Rolleston Flyover target	IS Credit Ref
		<ul style="list-style-type: none"> Building for Climate Change Programme RMA 1991 Waka Kotahi Interim Specification for Climate Change for NZUP 	external stakeholders including consideration of both direct and indirect climate change risks and identify treatment options for direct and indirect risks.	
Energy and Carbon	Reduce land transport Greenhouse Gas (GHG) emissions to mitigate climate change	<ul style="list-style-type: none"> Waka Kotahi Sustainability Action Plan objective Z/19 Environmental and Sustainability Minimum Standard RMA 1991 LTMA 2003 Building for Climate Change Programme Carbon Neutral Government Programme Waka Kotahi Interim Specification for Climate Change for NZUP Resource efficiency strategy 	<ul style="list-style-type: none"> Implement measures to minimise energy use and GHG emissions across the projects' lifecycle including fully investigating opportunities to reduce energy and carbon emissions and renewable energy opportunities. 	Ene-1 Ene-2
Reducing environmental and cultural harm	Reduce adverse effects of land transport on biodiversity and water quality	<ul style="list-style-type: none"> Waka Kotahi Sustainability Action Plan objective Z/19 Environmental and Sustainability Minimum Standard RMA 1991 LTMA 2003 	<ul style="list-style-type: none"> Identify receiving water quality goals and implement measures to achieve goals and ensure no adverse impacts to receiving water environmental values during construction and operation. No quantifiable loss of ecological values of the site and investigate opportunities to achieve a net gain in ecological value. Develop and implement an ecological monitoring program for the design, construction and operation. 	Env-1 Eco-1
	Reduce harmful discharges and emissions to air and land.	<ul style="list-style-type: none"> Waka Kotahi Sustainability Action Plan objective Z/19 Environmental and Sustainability Minimum Standard RMA 1991 LTMA 2003 	<ul style="list-style-type: none"> No recurring or major exceedances of noise goals for construction and operation. No exceedances of vibration goals for structural damage to buildings and structures during construction, no recurring or major exceedances for human comfort criteria for operation and no physical damage caused to any buildings or structures cause by construction or operation. No recurring or major exceedances of air quality goals. 	Env-2 Env-3 Env-4
	Improve resource efficiency and waste management	<ul style="list-style-type: none"> Waka Kotahi Sustainability Action Plan objective Z/19 Environmental and Sustainability Minimum Standard RMA 1991 LTMA 2003 	<ul style="list-style-type: none"> Develop and implement a Resource Efficiency Strategy to identify, implement and manage efficient use of resources including minimising resource requirements, 	Rso-1 Rso-6

Theme	Rolleston flyover objective	Alignment with broader policy objectives	Rolleston Flyover target	IS Credit Ref
			re-using on-site materials where feasible, maximising recycled content within materials and minimising waste outputs.	
Stakeholder Engagement and Legacy	Establish and implement high quality stakeholder engagement and leave a lasting legacy for the community	<ul style="list-style-type: none"> Z/19 Environmental and Sustainability Minimum Standard Environmental and Social Responsibility Policy 	Develop and implement a comprehensive Stakeholder Engagement Strategy. Deliver initiatives that contribute long-lasting social and environmental outcomes.	Sta-1 Leg-1

32.6 Supporting a reduction in VKT

Transport is one of our largest sources of greenhouse gas emissions and is responsible for 17% of Aotearoa New Zealand's gross emissions⁵². The Government's Emissions Reduction Plan outlines that improving urban form, offering better transport options, and using demand management levers to reduce VKT by cars is vital.

The target is: *reduce total vehicle kilometres travelled (VKT) by the light fleet by 20% by 2035 through improved urban form and providing better travel options, particularly in our largest cities*

The Rolleston Transport Improvements project supports this climate goal in the following:

- **Better connectivity = better opportunities for Rolleston to become self-sustaining.** There is a huge dependency on car use within Rolleston because the vast majority of people need to travel into Christchurch for employment opportunities. Providing better connectivity between the northern and southern sides of Rolleston helps enable development within the RIZ, which will be a significant local employment generator. The more local employment, the lower the VKT as commuter journey distances are significantly reduced. Moreover, with a strong active travel network, many people working with Rolleston will choose to leave their car at home.
- **Walking and cycling improvements** are part of the solution, with new safe connections being provided across SH1 with the flyover and underpass at Dunns Crossing Road. Once implemented, we only expect these improvements to generate a moderate number (i.e. 100 per day) of new cyclists per day; primarily because the northern side of Rolleston is largely not developed yet. However, the improvements future-proof for development on the northern side and an increase in local commuter trips.
- **Public transport** is being supported with a network that delivers more reliable journey times and connectivity to the RIZ, which is part of the route for most of the bus trips in Rolleston. The flyover also presents an opportunity for a quick connection to any future Park and Ride on the Northern side, or even a future passenger rail service. Generally, the project will provide better connectivity to local bus services.

The project includes several banned turns onto the state highway, which by nature will increase vehicle kilometres travelled some people. However, this is offset by that fact that other people would see a VKT improvement as they no longer seek to take longer journeys to avoid congestion on the state highway. Based on the traffic modelling outputs the project has a neutral impact to VKT.

The bigger picture is that the project is an enabler of land use change which will reduce the need for travel into Christchurch. Whilst the short-term VKT reductions are likely to be small, the long-term potential is significant.

⁵² <https://environment.govt.nz/publications/aotearoa-new-zealands-first-emissions-reduction-plan/transport/>

33 ASSESSMENT PROFILE

33.1 Investment Assessment Framework

Typically, an assessment of the preferred programme using Waka Kotahi's Investment Prioritisation Method (IPM)⁵³ is used to inform a decision for funding through the National Land Transport Fund (NLTF). Whilst this project has funding already earmarked through NZUP, there is still a need to provide this assessment.

This is because Waka Kotahi still needs the relative benefits of potential projects to be understood. This has been given increased importance because that the cost estimates that informed the original NZUP funding allocations were undertaken during the Covid-19 pandemic. Some of those costs (including those for this Rolleston Transport Improvements) were also based on higher (PBC) level estimates that were not informed by any previous design. Since the NZUP announcement, the Covid-19 pandemic has also had a notable (and unanticipated) impact on the prices for key commodities and construction material.

This all means that, across all NZUP projects (nationally), the overall cost is very likely to exceed the original budget. Should additional Government funding for NZUP funding not be provided, potentially some projects may need to be scaled back or deferred to a later date.

This assessment therefore will help Waka Kotahi, if required, evaluate the relative importance of this project when compared to other projects within the NZUP. This is therefore simply an indicative IPM for Waka Kotahi to consider as part of their decision-making process.

33.2 Project appraisal

33.2.1 GPS alignment

An assessment has been undertaken against the 2021 GPS, which introduces improved freight connections as a key strategic priority. This, along with safety, are important aspects of the recommended programme. The assessment against various GPS priorities is provided within Table 47.

Table 47 GPS alignment of the preferred programme

Priority	GPS alignment	Comment																																									
Improving Freight																																											
Impact on network productivity and utilisation	VERY HIGH	<p>This metric is defined by the changes in the reliability of freight movement, and the relevant results have been provided as a traffic model output.</p> <p>Heavy vehicle journey time along SH1 (2038) between Burnham and Springs Road (average of both directions)</p> <table border="1"> <thead> <tr> <th rowspan="2">Peak</th> <th colspan="2">Do Min</th> <th colspan="2">Preferred option</th> <th colspan="2">Benefit</th> </tr> <tr> <th>Travel time (mins)</th> <th>Variation vs the IP (mins)</th> <th>Travel time (mins)</th> <th>Variation vs the IP (mins)</th> <th colspan="2">Reduction in journey time variation (DM vs option)</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <th>Minutes</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>AM</td> <td>15.7</td> <td>2.6</td> <td>14.1</td> <td>1.2</td> <td>1.4 mins</td> <td>53%⁵⁴</td> </tr> <tr> <td>IP</td> <td>13.1</td> <td>-</td> <td>12.9</td> <td>-</td> <td>-</td> <td></td> </tr> <tr> <td>PM</td> <td>17.2</td> <td>4.1</td> <td>15.9</td> <td>3.0</td> <td>1.1 mins</td> <td>27%⁵⁵</td> </tr> </tbody> </table> <p>Improvement in predictability of travel time by freight is calculated as being above > 50% for the AM peak and close to 31% for the PM peak.</p> <p>This result is largely driven by the removal of the traffic signals at Hoskyns Road and Rolleston Drive North, providing far more reliability journey times for freight.</p>	Peak	Do Min		Preferred option		Benefit		Travel time (mins)	Variation vs the IP (mins)	Travel time (mins)	Variation vs the IP (mins)	Reduction in journey time variation (DM vs option)							Minutes	Percentage	AM	15.7	2.6	14.1	1.2	1.4 mins	53% ⁵⁴	IP	13.1	-	12.9	-	-		PM	17.2	4.1	15.9	3.0	1.1 mins	27% ⁵⁵
Peak	Do Min			Preferred option		Benefit																																					
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Very high >31% improvement in predictability of travel time on priority routes for freight																																											

⁵³ www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/2021-24-nltp/2021-24-nltp-investment-prioritisation-method/

⁵⁴ 2.6 mins / 1.2 mins

⁵⁵ 1.1 mins / 4.1 mins

Priority	GPS alignment	Comment
Improving freight connections and climate change		
Impact on mode choice (e.g. shift from road-based freight to rail or coastal shipping) ----- Medium Up to 3% change in road freight mode share to rail or coastal shipping measured as percentage change in volume of road freight AADT on corridor moved to alternative modes	MEDIUM	The project includes a third rail track on the Main South Line which will improve the efficiency of freight movement (especially for movements between the West Coast and lower South Island). This will provide some efficiency benefits that could encourage some (albeit likely to be less than 3%) transfer of road freight to rail freight.
Safety		
Impact on social cost and incidences of crashes ----- Medium or greater collective risk corridors or intersections to achieve a death and serious injuries reduction of >15% over a five-year period.	MEDIUM	The economic analysis has identified that by 2028, the project will deliver a 50% across the Rolleston road network (inc. state highway).
OVERALL GPS 2021 Results Alignment Rating		VERY HIGH

33.2.2 Scheduling

Scheduling indicates the criticality or interdependency of the proposed activity or combination of activities with other activities in a programme or package or as part of a network. Whilst the definitions for scheduling are not necessarily fully relevant for NZUP projects (as the criticality has already been established by nature of funding having already being allocated), an assessment has still been undertaken.

The scheduling assessment is provided as Table 48.

Table 48 Scheduling assessment

Factor	Assessment	
Criticality	Medium	<ul style="list-style-type: none"> Need to undertake this activity to deliver/ prepare for remainder of programme/package where its implementation is to begin in 2024 NLTP. There are significant existing issues – notably safety at the Hoskyns Road level crossing and Dunns Crossing Road / Walkers Road roundabout. Rolleston is experiencing rapid growth that shows no signs of slowing down, with multiple Plan Changes being proposed.
Interdependency	High	<ul style="list-style-type: none"> At a national and regional level, this project sits within the NZUP and the NZUP Canterbury Package where one of the key focus areas is delivery efficiency Local interdependency with programmes/projects in the Rolleston area (e.g. SIP Templeton to Selwyn River and SDC projects) Non-delivery of the proposed activity in the early 2024 NLTP has a significant impact on realising the estimated benefits of the area-wide improvements. The changes along the state highway corridor are key enablers for wider local roading improvements. SDC rapid growth and local road improvements. Need to align the Network Plan to keep traffic on the arterial network to protect places like the town centre for improved liveability outcomes. SDC have plans for upgrades on Dunns Crossing Road, Walkers and Two Chain Road. NZUP improvements integrate with the SDC Shared Use Path network and bus stops at Kidman Street and Jones Road.
Overall	High	

33.2.3 Benefit cost appraisal

The IPM 2021-24 classifies BCR ratings into the following bands:

- Low (BCR of between 1 to 2.9)
- Medium (BCR of between 3 to 4.9)
- High (BCR of between 5 to 9.9)
- Very high (BCE of 10 and above).

The economic analysis has identified a BCR of 3.6, which meets the 'medium' rating

33.2.4 Investment Profile

The Recommended Option has been assessed as having a 'Very High' GPS alignment, a 'High' scheduling factor, and 'medium' efficiency rating. This gives the project a **Priority of 1.**⁵⁶

33.2.5 Appraisal Summary Table

The Appraisal Summary Table (AST) for the preferred programme is provided as **Appendix U.**

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⁵⁶ www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/2021-24-nltp/2021-24-nltp-investment-prioritisation-method/determining-the-priority-order-of-an-activity-or-combination-of-activities/

34 CONSTRUCTION SEQUENCING

34.1 Overview

The construction sequencing is a key consideration for the project, as it has a bearing on the level of community disruption, overall project timeframes and ultimately when benefits can be realised.

There is also a level of interdependency between various aspects of the programme. A key example is that in order to construct the flyover, we will need to first provide people a safe alternative means of accessing the industrial area and town centre, especially from the south. This is why the Dunns Crossing Road / Walkers Road roundabout is the first piece of infrastructure that needs to be constructed – because:

- This location represents the most dangerous part of the current corridor, with highest DSI rate, and addressing the safety issue helps us realise benefits (by saving lives) at the earliest opportunity.
- It facilitates traffic management options for construction of other interventions.

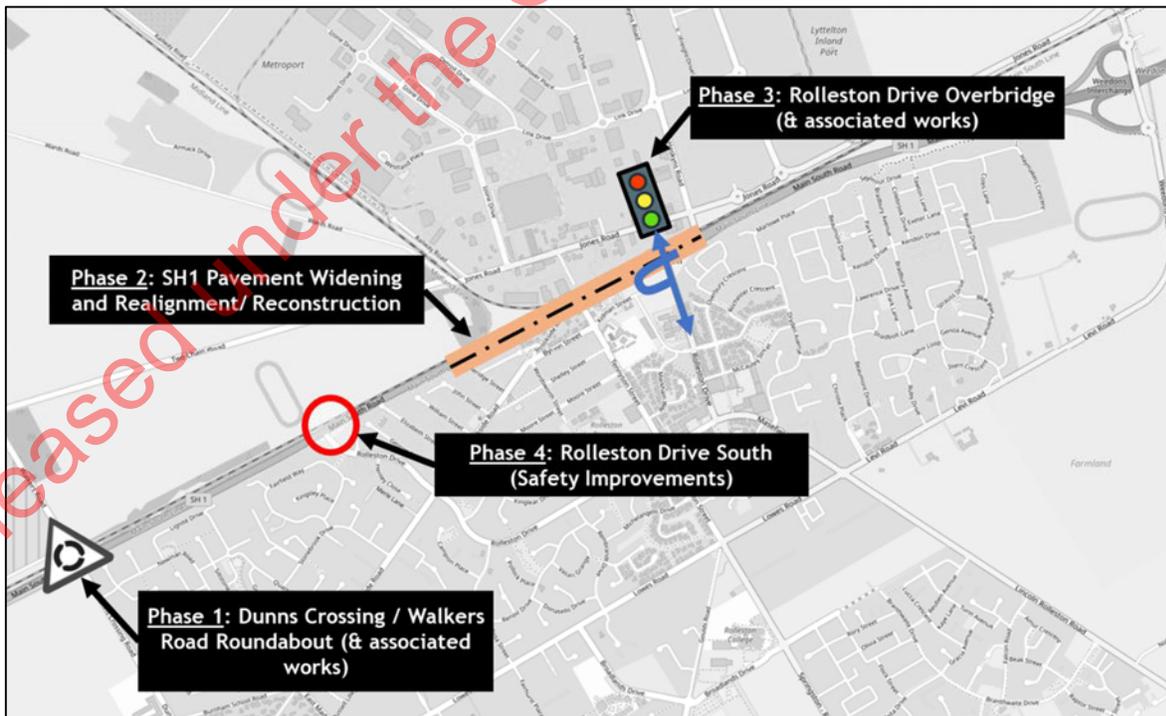
The construction sequencing has also considered the complementary SDC projects that needs to be integrated and completed relative to the different stages of the Project's construction sequence. For example, ensuring that the Walkers/Two Chain route and level crossing is safe for increased use is a critical early intervention. This section provides a high-level construction sequence (developed for DBC assurance), and is subject to final 'Design and Construction' processes (i.e. the constructor will dictate final sequencing).

At this stage, it excludes any KiwiRail works.

Potential construction sequence

The proposed construction sequence of the project is illustrated below in Figure 64. It has been broken down into four key phases:

- **Phase 1** – two-lane roundabout at Dunns Crossing / Walkers Road intersection and associated work, such as upgrading the Walkers Road level crossing.
- **Phase 2** – SH1 pavement widening, realignment and reconstruction, effectively enabling works for the delivery of Phase 2. This phase is further broken down into three stages.
- **Phase 3** – Flyover and associated works. This is when peak construction activity occurs and has been broken down into six stages.
- **Phase 4** – Rolleston Drive South safety improvements, which includes turn restrictions at the intersection. This is best to be delivered in conjunction with the SIP corridor median barriers.



64 Overview of construction sequencing for preferred programme of works

34.2 Upgrade of SH1 – sequence

Details of the various stages of each project phase are outlined in Table 49, which are visualised within a timeline provided as Figure 65.

Table 49: Construction stages and phases

ID	Phase	Stages	Period	Commentary
P1	Phase 1: Dunns Crossing / Walkers Road Roundabout	Stage 1 – Walkers Rd - starting with the offline section south of the prison to minimise traffic impact.	2023-26	The construction of the roundabout includes key steps such as: property acquisition, procurement, design, consent lodgement (and approvals), construction of the roundabout, and upgrading Walkers Road level crossing. This phase could be constructed in isolation to other phases. The construction duration is anticipated to be approximately 18 months, but the other steps (i.e., procurement, design and consenting) could extend the duration to 2-3 years. (Note: SDC upgrades on Two Chain Road should coincide with this timeframe.)
		Stage 2 – Offline works - south of SH1 and Dunns Crossing Rd tie in.		
		Stage 3A – Construct online SH1 works, including tie in at Newman Road and new rail crossing.		
		Stage 3B – Close existing rail crossing, complete online SH1 works		
		Stage 4 – New roundabout concrete works		
P2	Phase 2: SH1 Pavement Widening and Realignment / Reconstruction - Construction	Stage 1 – SH1 widening.	2025-26	The pavement widening is to begin after the completion of Phase 1 above, to minimise the construction effects (e.g., delay due to temporary traffic management). The construction works is expected to take approximately 8 months.
		Stage 2 – Existing SH1 realignment / reconstruction (south of overbridge)		
		Stage 3 – Existing SH1 realignment / reconstruction (north of overbridge)		
P3	Phase 3: Rolleston Drive Overbridge – Construction	Stage 1 – Offline and temporary works construction	2026-28	The construction works is expected to take approximately 26 months, with the project starting in mid-2025 and opening at the start of 2028. It is noted that this duration is conservative and will likely be optimised by the contractor delivering the works.
		Stage 2 – Northern section of overbridge from SH1 central pillars to Jones Road		
		Stage 3 – Southern section of overbridge from SH1 central pillars to Rolleston Drive		
		Stage 4 – Southern works completion		
		Stage 5 – Existing SH1 Realignment / Reconstruction and SMA surfacing		
		Stage 6 – Temporary works removal, barrier installation and redundant pavement removal		
P4	Phase 4: Rolleston Drive South Safety Improvements	Stage 1 – turn restrictions	2028	This could involve turn restrictions at the intersection of Rolleston Drive South and SH1. Therefore, this phase is scheduled to occur at the end of the Project to minimise potential disruption created by turn restrictions. Construction works expected to take approximately 3 months and could occur in parallel to latter stages of Phase 3.

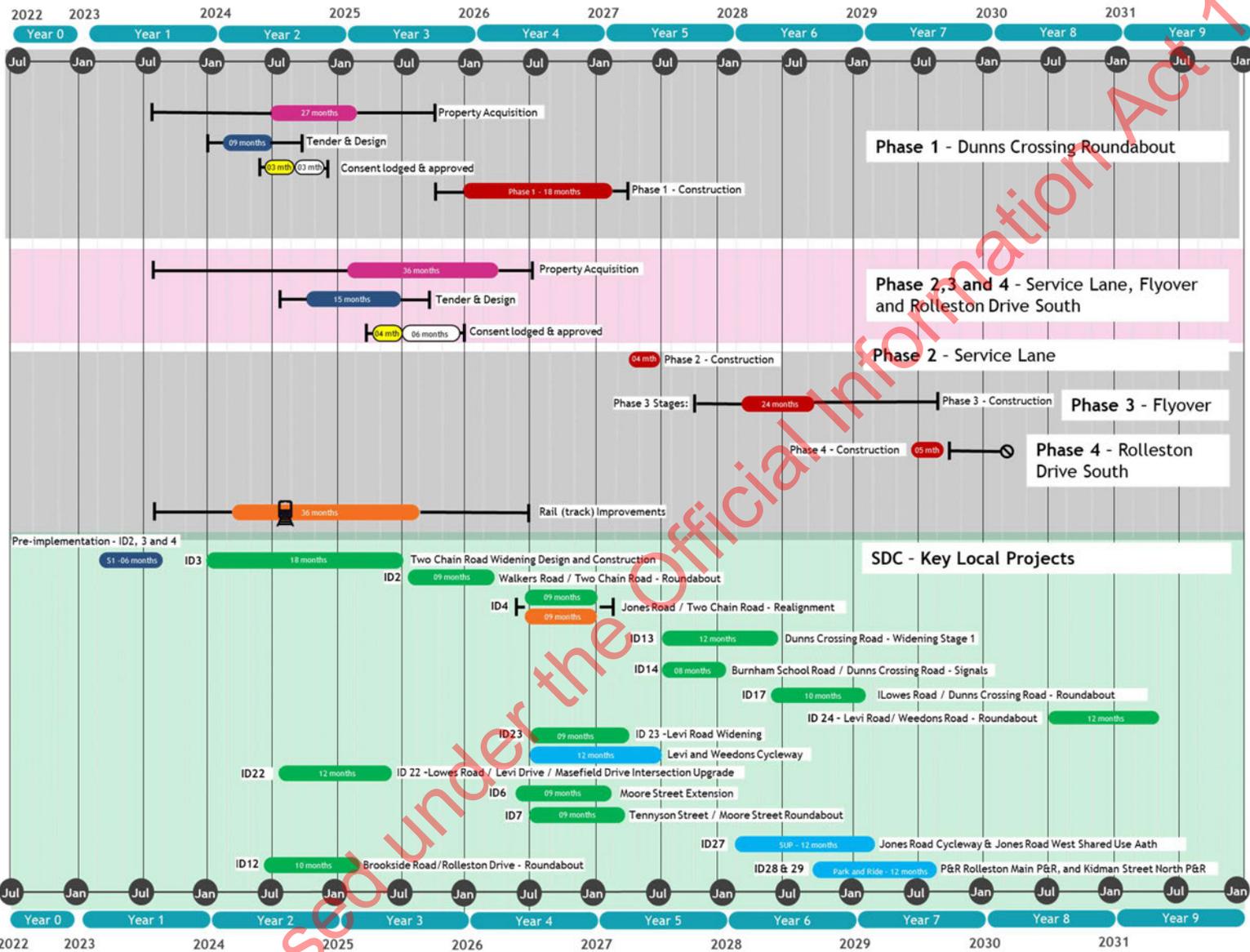


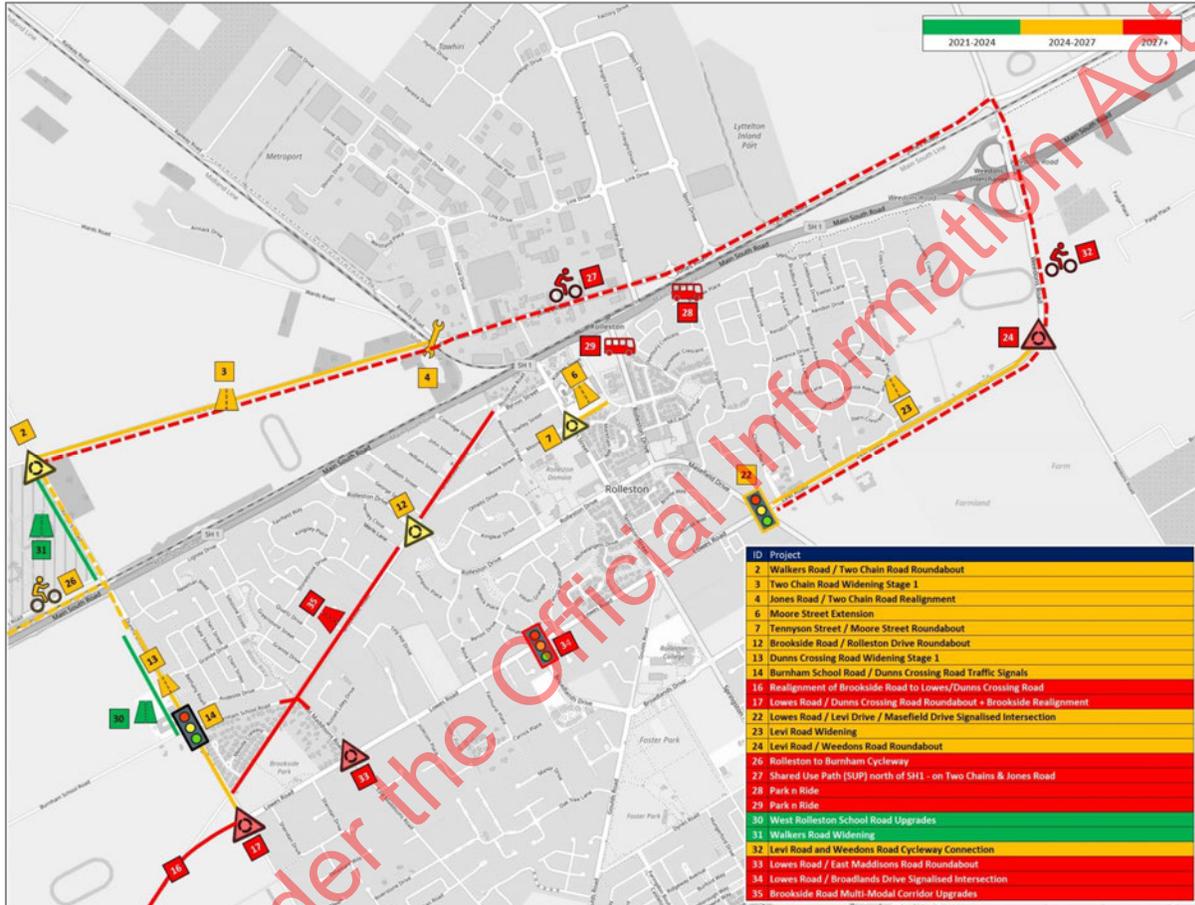
Figure 65: Indicative construction programme

34.3 Local road upgrades

The local road projects identified (described in Section 3.6.3) are expected to enhance the benefits of the Rolleston Transport Improvements Project. These benefits relate primarily to safety and provision of a more resilient network with alternative routes.

The upgrades along Two Chain Road to complete the southern access to the industrial area will be important to enable detour routing during construction works, such as during Phase 3 of the project sequence above. Therefore, the key arterial projects listed below should ideally be programmed and finished before the beginning of construction works associated with Phase 3.

The location of the SDC local road project, with the indicative timeframes, is shown in Figure 66.



66 Local road upgrades

Note that none of the local road projects are subject to NZUP funding. These are dependent on SDC Long Term Planning and Waka Kotahi co-investment through the NLTP.

34.4 Constructability

An initial consideration of constructability risks and challenges has been assessed during the business case.

The Constructability Report is provided within **Appendix V**. This will form the basis for ongoing development during the next Pre-implementation phase of the project.

PART C: READINESS AND ASSURANCE

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35 RISK REVIEW

The risks for the project have been considered through the duration of the business case as part of optioneering, effects assessment, design philosophy, consenting and constructability. This chapter includes the risk management strategy for the Project that will evolve as the project continues.

This chapter outlines the risks that are categorised as either 'Extreme' or 'High' risk, as these have the greatest impact on the successful delivery of the Project. The project's Risk Register is in **Appendix W** and the project's Risk Assessment Report (including Quantitative Risk Assessment Reporting elements) is included in **Appendix X**. It should be noted that the estimate reconciliation reporting is also relevant to the Quantitative Risk Assessment, and the Parallel Reviewer's report is in **Appendix R**, and Cost Estimator's Report is **Appendix Q**.

35.1 Risk Management Strategy

Table 50 provides a summary of the critical risks and the proposed risk management strategy to effectively control the identified risk. The risks are considered in two streams – those with the highest quantitative impact and those with the highest remaining residual risk down from the initial risk rating of extreme.

Table 50 Risk mitigation strategy

Significant risk summary – quantitative cost risk		
Name	Causes	Treatment Approach
Design Development	Uncertainties in the design process, including: <ul style="list-style-type: none"> Tight site requiring design to manage constructability issues. Additional design requirements from consenting, cultural or other elements. Current design may turn out to be inadequate for other site issues/ constraints. 	Mitigation options include further peer review including value engineering, splitting scope and/options for reduced scope
Contractor Resources	Potential lack of contractor resources, driving prices higher to obtain construction over other alternatives for contractors	Mitigation through active early engagement with the market, and price in delay, workshop with market
Estimation	Inherent risk within the estimation process at this stage of the process	Management through peer review and comparisons as best as practical
Steep flyover grade departure not accepted	Flyover has been designed with steeper gradients than standard to fit space constraints. Potential redesign becomes cost risk	Mitigation is to compare gradients with currently acceptable and used bridges with similar gradients within Canterbury
Escalations	Current market seeing unprecedented cost escalations due to inflation and supply chain impacts.	Mitigation through value engineering, early supply chain orders, and pricing into risk estimates.
Significant risk summary – Qualitative assessment		
Name	Causes	Treatment Approach
Land Acquisition Process (Crown/Public)	Land required from multiple crown and public sources, including Selwyn District, Corrections, KiwiRail, with limited mechanisms to force outcomes	Mitigation through on-going and persuasive dialogue with property stakeholders
Consenting delayed or declined	Failure to submit consent to required timing; failure to prove mitigation of effects, or predict impacts; multiple submission parties and inability to obtain affected party approvals	Mitigation through early start on engagement process, peer review and appropriate engagement with stakeholders
Pavements	Pavements require more of work (time and cost impacts), due to unexpected existing conditions	Mitigation through testing programme as early as possible, and costing provision in contingencies
Steep flyover grade departure not accepted	Flyover has been designed with steeper gradients than standard to fit space constraints. If departure not accepted, redesign will have timing, property and fit risk – may even not be possible to modify	Mitigation is to compare gradients with currently acceptable and used bridges with similar gradients within Canterbury
Ground conditions	Unexpected ground conditions require redesign of elements, causing delay	Mitigation through testing programme as early as possible, and costing provision in contingencies, and timing provision

35.2 Safety in Design (SiD)

A SiD review was completed to understand and accommodate best practice SiD methods for construction and maintenance phases of the project. A summary of the key risks is presented in Table 51, categorised by general and project specific SiD risks. The SiD register is provided as **Appendix Y**.

Table 51 Safety in Design register

Phase	SiD element	Description	Severity	Treatment Strategy
General				
Pre-Implementation	Psychological Health	Risk of harm to health and wellbeing	High	Waka Kotahi, Council and Suppliers Health and Safety Management plans. PSG to own risk.
Implementation	Interfaces external to the project	Risk of injury working on rail corridor and road corridor	High	Waka Kotahi and KiwiRail guidelines
Operation and Maintenance	Injury	Poor traffic management	High	Waka Kotahi guidelines
	Injury	Encountering existing underground services	High	Waka Kotahi guidelines
	Access	Public/pedestrian issues (e.g., public accessing the site, not adhering to traffic management, being hit while crossing the road)	High	Waka Kotahi guidelines, particularly care around planning for pedestrians and cyclists through the site
	Speed	Speed environment / approach speed to traffic signals	High	Waka Kotahi design guidelines, set appropriate speed limit, consider mast arms at signals, install "new road layout" sign
	Bus access	Impact on bus stops and routes	High	Discuss with ECan and move bus stops to safer locations
	Access	Uncontrolled pedestrian / cyclist access to rail line	Medium	Restrict access to rail corridor via fencing.
	Cycle design	Cycle design at the new roundabout	Low	
Project specific				
Construction	Access	Risk to public with removal of rail crossing, moving vehicles around sites.	High	Restrict access, implement TTM/pedestrian access paths
Construction	Injury	Risk to personnel working on roads, rail corridor, and at height.	High	Reduce requirement to enter corridors. Staging for flyover to consider fall risk, temporary barriers set up.
Construction	Injury	Risk of injury lifting beams over rail and road corridors	High	Block-of-line on rail corridor, SH1 closure and detour.
Construction	Services	Risk of injury through contact with above ground electrical services	High	Consider options to divert or temporarily close lines.
Maintenance	Injury	Risk of injury accessing areas near rail corridor and at height	High	Considering access requirements, fencing maintenance area off to public.

35.3 Safe System Audit

During the business case the Road Safety Audit (RSA) process changed to be a Safe System Audit (SSA) approach. This has been undertaken for the preliminary design that has been developed for the preferred programme. The SSA's were undertaken in two stages, the first being on the initial Concept Design and the second on revised Scheme Plans developed following the SSA and subsequent value engineering cost review. The at-grade improvements at Dunns Crossing Road and Rolleston Drive South have been assessed in Report 1, while the Flyover, associated state highway works and service lane have been assessed in Report 2 and 2A.

The audit process and finding are recorded within **Appendix O**

In response to the audit some design refinements were undertaken, notably:

- Provided a shared use path underpass under SH1 and rail safety gates at the Walkers/Dunns Crossing intersection to support in providing safer crossing facilities in this location.
- Addition of raised platforms in a number of locations at the Kidman Street / Rolleston Drive North intersection to maintain lower speeds through this area and over the new flyover.
- Amended the flyover cross-section to have a single, wider shared use path on the west side of the bridge (5m wide), which reduced the number of crossings for users at the Jones Road intersection with the flyover
- Introduced two rest areas (one on each side of the flyover in the embankment areas) for cyclists / pedestrians to rest if required.
- Added a shared use path on the south side of Kidman Street to provide improved off-road facilities for cyclists in this area.
- Widened proposed crossing facilities to 4.5m for improved use for pedestrians and cyclists.
- Provided separate left turn lane off the flyover onto Jones Road to improve Pedestrian crossing protection.

35.4 Level Crossing Safety Impact Assessment

During the business case the relevant level crossings have been assessed both before and after inclusion of the recommended option (refer to **Appendix D**).

The recommended safety requirements have been incorporated into the Design Philosophy but there may be some refinement of the pedestrian facilities possible during the next phase Detailed Design.

The Level Crossing Safety Impact Assessment (LCSIA) raised some concerns about the Hoskyns Road level crossing and suggested that all movements must be grade separated. The assessment scoring was very close to not requiring this and Waka Kotahi have initiated a "so far as is reasonably practicable" (SFAIRP) review with Kiwirail. The recommended option with grade separation of most movements, removes the SH traffic signals and associated short stacking risks and only retains a left-out movement control by barrier arms.

This has been reviewed by Waka Kotahi safety engineers and rail safety regulator who believe the residual risk is acceptable. The impacts of not having the left out from Hoskyns is that there would be substantially more traffic using the Weedons Ross Road level crossing that would lead to a worse safety outcome. The SFAIRP review will be completed before commencement of the next phase.

36 FINANCIAL CASE

This DBC has identified a programme of works that address the investment objectives for Rolleston at a P50 cost of \$ s 9(2)(g)(i). It is therefore seeking a full endorsement from the Waka Kotahi board of the recommended programme and additional funding to address the s 9(2)(g)(i) between the NZUP allocation of s 9(2)(g) and the P95 cost estimate for the project s 9(2)(g)(i). The funding options to address this gap are discussed in this Financial Case.

The overall recommendation of the DBC is to progress the project through to pre-implementation. The Waka Kotahi board will confirm both the funding and scope for this next phase of the project.

36.1 Project costs and committed funding

As the project progressed through consultation and technical assessments, the design requirements became clearer as did the technical risks for geotechnical, pavement, storm water and property. Further cost escalations post Covid also impacted the emerging Expected Cost Estimate for the project. Based on the technical preferred option following the second round of consultation, the base estimate was around s 9(2)(g) including s 9(2)(g)(i) for property. This exceeded the approved NZUP funding and hence further option review, and value engineering was undertaken. For adjacent local road project SDC has some commitments in their current Long-Term Plan (2021-24) and are looking to amend timeframes and funding in their 2024-27 LTP.

Two committed funding sources have been identified for the project, having approved funding allocations for the 2021-24 period.

Table 52 Committed funding sources

Name	Indicative allocation	Description
New Zealand Upgrade Programme (Canterbury Package)	s 9(2)(g)(i)	This Crown funding allocation is being managed at both project and programme levels: <ul style="list-style-type: none"> Project level (P50) = s 9(2)(g)(i) Programme level contingency = s 9(2)(g)(i) Ministerial approval is required in order to access the P95 contingency. Note that the funding covers not only future construction, design and property but also any incurred costs (such as the DBC phase).
Council Long Term Plan (LTP) 2021-24	TBC	Council's LTP has committed funding allocations for several projects between 2021-24. Allocations for capital improvements beyond 2024 are yet to be confirmed.

The NZUP Governance Group has requested a further budget increase for the Canterbury Package but is awaiting confirmation of the outcome. It is understood that there are cost escalation pressures across the NZUP programme nationally and it is expected that any additional funding will have strong conditions imposed.

Through the business case rigorous scope review and value engineering exercises have been undertaken. A review has been undertaken against the safety and connectivity problems and the desired outcomes. Some of these align well with other potential funding sources, namely Road to Zero for safety initiatives and Transport Choices and Walking and Cycling for active mode provision. Hence scope, staging and cost share options have been explored to close the funding gap. Other options to reduce the project scope have also been explored but these fail to deliver on the desired outcomes. These options are summarised in the table below. While initial discussions with Sponsors for these programmes has begun it is not possible to confirm acceptance of these at this time. It is recommended that the recommended options are progressed through Pre-Implementation and the final scope of work for Implementation is confirmed at the earliest possible time.

The options are outlined in Table 53.

Table 53 Funding options

	P50 Estimate	P95 Estimate	Comment
NZUP Establishment Report	s 9(2)(g)(i)		There has been some increase for the Canterbury Package but quantum unconfirmed
DBC Preferred Programme			
Funding gap			
Potential funding share			
Possible Road to Zero (SIP) funding - co-invest @ Dunns Crossing Road/Walkers Road	s 9(2)(g)(i)	-	Full cost of roundabout

	P50 Estimate	P95 Estimate	Comment
Possible SDC walk/cycle co-invest @ Dunns Crossing Road/Walkers Road	s 9(2)(g)(i)	-	Part of cycle subway s 9(2)(g)(i)
Road to Zero (SIP) to deliver median barrier between Dunns Crossing Road and Rolleston Drive North that will create left in left out at Rolleston Drive South, Brookside and Tennyson Street		-	Saving of Rolleston Drive South s 9(2)(g)(i) and part service lane s 9(2)(g)(i)
Total potential SIP and SDC funding			
Remaining Funding Gap			
Deferments / KiwiRail funding sources			
Rail yard improvements	s 9(2)(g)(i)	-	Potential funding sources: • Rail Network Improvement Plan (RNIP).
Remaining Funding gap	s 9(2)		

The summary shows that some savings are possible, but to respond to the critical problems and deliver expected outcomes, there is still a **funding gap** s 9(2) that needs to be explored across the whole of the NZUP Canterbury Package. The other funding sources that could be explored are a top up from the National Land Transport Fund (NLTF), from Transport Options (shared path components) or CERF (walking/cycling components). These discussions would need to be initiated as soon as possible but it is understood that funding availability is equally constrained and further clarity may not be possible until the 2024 financial year.

Table 54 Rolleston Transport Improvements summary against outcomes

Establishment Report Interventions:	The recommended option	Outcome delivered	Expected P50 Cost	Funding Option
A new grade separated transport link between the Rolleston town centre and Rolleston industrial zone, including improved cycling and walking facilities.	<ul style="list-style-type: none"> A straight flyover to Jones Road, with three lanes, shared use paths, includes upgraded Jones/Hoskyns traffic signals, left into Rolleston Drive North and left out from Hoskyns Road with upgraded level crossing safety. Removes SH traffic signals at RDN and Hoskyns 	<ul style="list-style-type: none"> Better connectivity with improved travel choices for all modes of travel Safer and more reliable freight connections Addresses the critical level crossing risks at Hoskyns Road 	s 9(2)(g)(i)	NZUP
SH1 Rolleston intersection safety improvements: <ul style="list-style-type: none"> SH1/Dunns Crossing Road/Walkers Road. SH1/Rolleston Drive South. SH1/Tennyson Street/Brookside Road. SH1/Rolleston Drive North 	<ul style="list-style-type: none"> Two lane roundabout at Dunns Crossing/Walkers, with additional cycle underpass and safe pedestrian/cycle level crossing (required in response to changing land use and serious safe system audit concern with increased cycle crossing use due to Burnham cycleway and shared use paths to expanding industrial area. The construction sequence requires early delivery to enable detour options to the Industrial area during construction of the flyover. 	<ul style="list-style-type: none"> Safer infrastructure (road and rail) with reduced DSI and crash risk (this is a critical high DSI site that needs urgent intervention) Additional lanes for more reliable access to SH, industrial and growth areas by all modes Provides safe SH crossing for walking and cycling 	s 9(2)(g)(i)	<ul style="list-style-type: none"> Seek funding from R2Z SIP – Templeton to Selwyn River for safety intervention Seek co-funding from SDC/WC \$1 m
	<ul style="list-style-type: none"> Left in Left out (LILO) at Rolleston Drive South This has been designed to be consistent with the Road to Zero SIP median barriers proposed between Templeton and Selwyn River and staging should be undertaken concurrently. This has been assumed as the last stage of the construction sequence. 	<ul style="list-style-type: none"> Safer infrastructure removing right turning conflicts to reduce DSI and crash risk Relatively low usage means relatively low safety DSI benefit, risk of unsafe U-turns if implemented prior 	s 9(2)(g)(i)	<ul style="list-style-type: none"> Remove from scope and deliver with R2Z SIP median barrier – Templeton to Selwyn River

Establishment Report interventions:	The recommended option	Outcome delivered	Expected P50 Cost	Funding Option
		to corridor median barriers (SIP project)		
	<p>Reduce 3 barrier design to central median only with off ramp to Rolleston Drive North and left in left out at Brookside Road and Tennyson Street from southbound SH lane, (retain existing access to adjacent businesses – McDonald, BP, Z energy)</p> <p>Add additional southbound land from CSM2 to remove 2 to 1 lane merge causing bottleneck and nose to tail crashes s 9(2)</p>	<ul style="list-style-type: none"> • Safer infrastructure removing right turning conflicts to reduce DSI and crash risk • Offramp to Rolleston Drive North eases pressure at Weedons interchange that reduces freight efficiency and adds level crossing risks at Weedons rail level crossing 	s 9(2)(g)(i)	<ul style="list-style-type: none"> • Deliver central median barrier through SIP project from Dunns Crossing to RDN/Flyover pier • Reduce Scope by removing service lane separation from RDN to Tennyson Street (assume 25% of total) • Retain SH improvement and offramp to RDN
500m rail link connection to connect the Midland line with the Main South Truck Line and reduce shunting activities.	Option required extensive signalization costs s 9(2) and revised to 3rd railyard track with turn around line east of Jones road siding (LPC)	Provides southern connectivity for all Rolleston rail lines and sidings, improves rail operation efficiency and safety, reduces train movements over Hoskyns Road	s 9(2)(g)(i)	Seek alternative rail funding through RNIP

36.2 Third-party contributions

No external funding contributions have been identified for the project. While some individual developments may be seen to benefit, the long-term planning for Rolleston has been with the collective benefits for the whole community in mind. Any development contributions taken to date are earmarked for the SDC local network improvements, that in themselves are not un-substantive.

36.3 Cashflow

Figure 67 shows the anticipated cashflows (on the anticipation that the additional funding can be sourced).

s 9(2)(g)(i)



67 Project cash flow

36.4 Summary of Financial Case

The key finding from this financial case is that a funding gap of around ^{s 9(2)} ~~(b)(1)(a)~~ has been identified to deliver the full Rolleston programme, should other identified funding sources become available. This business case will seek approval of the full programme and progression to Pre-implementation. In the meantime, the Project Steering Committee will explore options across the whole Canterbury NZUP package to close this gap to confirm the scope for Implementation. These discussions would need to be initiated as soon as possible and this is the key next step.

Released under the Official Information Act 1982

37 COMMERCIAL CASE

37.1 Implementation Strategy

37.1.1 General

This Commercial Case focuses on minimising risks during pre-implementation to ensure that the project commences and is delivered to expected timeframe set by NZUP. It also covers:

- The procurement strategy to support progression of the next phases of the project.
- Consenting strategy to cover requirements for the project.
- The extent of land requirement and property acquisition strategy, including consideration of any Crown or Māori land ownership.
- Programme management and coordination with SDC, Kiwirail and the wider Canterbury NZUP package.

37.1.2 Pre-Implementation and Detailed Design

The next phase of the project is pre-implementation and detailed design. This phase will focus on ensuring appropriate standards are met and (i) refining the design to avoid effects; and (ii) developing appropriate mitigation measures to manage any environmental effects. The detailed design will then support the lodgement of consent applications and define the final land requirements for the project.

The following considerations will shape and inform the final strategy:

- **Technical Risks.** Issues that require further consideration during the technical investigations, concepts for and decisions about geotechnical requirements, structural form, detailed design, consultation, and resource consent applications.
- **Procurement Approach.** The recommended programme may influence the procurement approach adopted to deliver the detailed design and implementation.
- **Consenting Strategy.** The final scale of effects and procurement approach will guide how the consenting will be undertaken.
- **Land acquisition.** Whilst land acquisition plans have been prepared as part of this DBC, these may be subject to minor changes during the Detailed Design stage.

37.2 Consenting strategy

37.2.1 Overview

Consenting strategies have been prepared as part of this DBC and are included as **Appendix Z**. The purpose of the strategies is to identify the likely approvals that will be required under the Resource Management Act 1991 (RMA), the consenting risks and how they can be managed, and a potential approval pathway to support the development of the DBC and to inform future design decisions. In summary:

- The Project requires Notices of Requirement (NoR) to alter the existing SH1 designation, outline plans and regional resource consents. Approvals are also required from KiwiRail and the Minister of Corrections as requiring authorities for other designations that are affected by the Project.
- It is recommended to package the RMA approvals into those required for:
 - SH1/Dunns Crossing Road/Walkers Road roundabout,
 - Flyover, service lane and Rolleston Drive south, and
 - Rail improvements.
- The approvals required for the SH1/Dunns Crossing Road/Walkers Road roundabout could be sought ahead of those required for the remainder of the Project. It is geographically separated from the remainder of the Project, and the type of approvals and the basis for an assessment of effects are not reliant on the remainder of the Project being considered at the same time. It is a discreet package that can proceed independently. This would enable its construction to occur as a priority (to enable Stage 1 of the Construction Sequence to occur as soon as possible).
- Regardless of the packaging and sequencing of approvals chosen, it is recommended to lodge these with the relevant Councils, noting the ability to request that notified applications be directly referred to the Environment Court for consideration.

37.2.2 Consenting risk management

The key consenting risks that will need to be addressed in the next stage of the project are outlined below.

Table 55: Key consenting risks

Potential risk	Proposed risk management
Community opposition	Ongoing engagement with the wider community (not just directly affected landowners) will ensure they are aware of the Project and are provided an avenue for finding information and expressing concerns. A first round of public consultation occurred in July and August 2021. A second round of consultation was held in August 2022 that led to refinement of options to deliver better community outcomes. The Communication Plan for next phase needs to be clear on objectives and community outcomes, having analysed other options.
Climate change	The passing of the Climate Change Response (Zero Carbon) Amendment Act in 2019, commits NZ to Net Zero Carbon by 2050 (excluding biogenic methane), has led to a focus on understanding and prioritising climate change mitigation and adaptation and for the transport sector. The Preliminary Infrastructure Sustainability Management Plan (provided as Appendix T) outlines potential means of implementing the flyover in a sustainable manner that will be explored further during detailed design. Section 32 of the DBC presents further opportunities to reduce the embodied carbon impact of the project.
Completion of technical assessments is contingent on the progression of detailed design.	Careful programme management and strong project communications, with input from a planning lead, will be required.
Road noise effects	<ul style="list-style-type: none"> Road noise has been a consideration for existing surrounding residential development with noise bunds and fences being constructed in several places (east of the skewed and straight flyover options, either side of the Rolleston Drive South intersection, and east of the Dunns Crossing Road intersection) and potentially houses being designed with materials to reduce noise internally. These have been requirements for developers at the request of Waka Kotahi through plan changes. Waka Kotahi has sought early advice from a noise specialist. An acoustic consultant will undertake an assessment of noise resulting from realigning roads, physical modifications to noise bunds, and the flyover and determine any mitigation required. This should occur during the next Detailed Design phase.
Visual effects	<ul style="list-style-type: none"> The flyover will likely have a similar form and appearance to several local road bridges that cross SH1 on the Christchurch Southern Motorway Stage 2 (CSM2) on the northern approach to Rolleston. However, there is still the potential for wider visual and landscape effects as well as glare and visual dominance effects on nearby residents. Engaging a suitable landscape, lighting and visual effects consultant will help guide the design to minimise these potential effects, as well as inform consultation with the community.
Stormwater discharges are not authorised under the global stormwater consents	<ul style="list-style-type: none"> Develop the proposed stormwater management early and with reference to the consent conditions (CRC111005 – for stormwater from new areas of road within the SH1 corridor, noting this consent will be renewed soon), and CRC132527 – for stormwater from new areas of road outside the SH1 corridor). If the conditions are unable to be complied with, then seek any necessary resource consent in combination with the other consents required for the Project.
Notification and/or appeals on the proposed Selwyn District Plan	<ul style="list-style-type: none"> The packaging and sequencing of applications should consider how notification or appeals relating to certain activities may delay the Project or parts of the Project. Effective consultation and engagement to address matters that would otherwise be brought up in submissions. The programming of the Project should take into account the potential timeframe associated with notified applications and resolving appeals.
Difficulties acquiring land required for the works which could affect the detailed design and consequently the progression of technical assessments and the consent applications	<ul style="list-style-type: none"> Land requirements have been identified in the business case and highly affected parties have been engaged with. An initial property acquisition strategy has been developed to enable engagement. Enter discussions with adjoining landowners early as surrounding land is in different stages of being developed.

The Consenting Strategy recommends:

- A comprehensive application approach where the Notice of Requirement for a Designation (NOR) and regional consents are applied for at the same time is preferred.
- A collaborative design approach, working closely with iwi partners, communities and stakeholders and Council to seek agreement on proposed design, the effects and how those effects are managed and addressed – this approach allows for consenting risks to be resolved/minimised ahead of lodgment with Council and the Environment Court hearings process.
- Working closely with technical specialists and partners to ensure the documentation is fit for purpose, correctly scoped and provides clear information to consider the NOR/consent applications.
- Permits and approvals likely to be required (required under the Wildlife Act, Conservation Act and Heritage NZPTA) would be sought later with an option to bring forward Heritage NZPTA Authorisations in advance or parallel to RMA approvals remaining open.

37.2.3 Site specific considerations

SH1/Dunns Crossing/Walkers Roads roundabout

It is assumed that all alterations/reconnections to local roads will be included in the altered Waka Kotahi SH1 designation. The noise issues associated with the roundabout should be localised and should not require quantitative analysis or any early studies/fieldwork ahead of engagement of the NOR consultant team. However, early discussions with the Department of Corrections have raised this as a concern and early acoustic advice has been sought.

When the consultant team preparing the NOR is engaged, an acoustics specialist should be part of that team and should make a qualitative assessment. This should include:

- Consideration of road features to encourage gradual acceleration and braking associated with the RAB, and
- Practicability of extending the length of the existing bund and height of the fence on that bund.

Concerns have been raised by the Department of Corrections and the Ministry of Education with respect to increased local traffic noise (including heavy vehicles) affecting Rolleston Prison (Walkers Road) and traffic effects past West Rolleston Primary School (Dunns Crossing Road).

There is substantial planned growth occurring in Rolleston. Walkers Road and Dunns Crossing Road are both arterial roads and are expected to have increasing traffic volumes, including heavy vehicles, commensurate with the function of roads with an arterial classification. This increase in traffic will have a noise effect at the Prison and School. However, this noise effect is due to the overall spatial planning of Rolleston and the function of these roads. This does not directly relate to the proposed RAB, and it is recommended that the effect should not be considered in the noise assessment for the RAB.

New service lane

The service lane should have negligible noise effects, and potentially there will be positive noise effects from improved traffic flow in the area. It is recommended that when the NOR consultant team is engaged, an acoustics specialist should review this area and make a brief qualitative assessment. No early studies are recommended.

Flyover

A noise assessment will be required for the flyover (to occur during the Detailed Design stage), primarily in relation to potential effects on receivers in the east quadrant (e.g. Wyndham Mews, Milton Court). There are no known noise sensitive activities on the Jones Road side of SH1, but this should be confirmed. Likewise, assessment should not be required in relation to the undeveloped land by the SDC offices, but this will need confirmation. No early work ahead of engagement of the NOR consultant team is recommended.

Quantitative analysis (e.g. noise modelling) and assessment should be undertaken at the appropriate time (but no early work is recommended at this stage). This should include formal evaluation of noise mitigation options in this area⁵⁷. This process will allow for evaluation of bridge safety barrier height (acting as a noise barrier), extension of the safety barrier south as a concrete barrier on the embankment (rather than transitioning to guardrail or wire rope), and the height, alignment and form of a noise barrier (wall) between Rolleston Drive and the residential area from the ramp and extending past the Kidman Street intersection. There will also need to be qualitative assessment of noise effects associated with the ramp gradients, signalised intersection, and any mechanical bridge joints.

It is not expected that a future Park and Ride or cycleway would form part of the NOR.

⁵⁷ In accordance with the Waka Kotahi guide - <https://nzta.govt.nz/resources/guide-to-assessing-road-traffic-noise/>.

37.2.4 Resource Management Reform

In February 2021, the Government signalled that the Resource Management Act 1991 would be repealed and replaced with three new Acts, substantially changing the resource management system in New Zealand. Little consideration was given to the reform in the consent strategies as at the time they were prepared, there was still significant uncertainty over the nature of the reform and its timelines. A significant amount of uncertainty as to how the changes will impact resource management and planning approvals, and the timing of those changes remains.

On 15 November 2022, the Spatial Planning Bill and the Natural and Environment Bill were introduced to Parliament. The third bill, the Climate Change Adaptation Bill is yet to be introduced. At this stage, there is uncertainty of the final form and content of the legislation that will result from these bills, and the content of the resulting new planning documents and the types of approvals that will be required. Similarly, the resource consent process and timeframes under the new system are not yet known. It is our view however that the new framework will be substantially similar to key elements of the current one. We do expect that there will be a substantial transition period where approval processes change from the current RMA planning process to the new framework. Based on what is currently known, we would expect that if the Project were to be considered under the new system, the approvals needed, the process and the key environmental considerations will fundamentally be the same. Until the bills are passed and plans are developed under the new system (which we expect will take several years) the Project will be subject to the approval processes under the current system. The potential implications of the reform will be managed through ongoing discussions with Waka Kotahi's Environment team during the detailed design phase.

37.3 Procurement strategy

37.3.1 Strategic context

As this project is being funded through the NZUP, the procurement approach will be consistent with the objectives and principles outlined in the NZUP procurement strategy. In particular, the procurement approach will give specific effect to NZUP Delivery Improvement initiatives. In this regard, Waka Kotahi has identified six outcomes/focus areas that will now guide all NZUP projects including the Rolleston Transport Improvements project. These outcomes are:

- Zero harm
- Customer at the heart
- Best value solutions
- Enduring partnership
- Sustainability
- Living our project values and behaviours

The tender documents will be developed by Waka Kotahi and will have a focus on areas to incentivize and drive efficient delivery of these outcomes. A number of the themes above have already been considered during the development of the business case through engagement with the community customers to understand their needs and to ensure that safe, sustainable and value for money solution is proposed. Aspects from the IS Essentials framework (refer to **Appendix T**) will be brought into the Tender Documents. The relationships and partnerships established will be retained into the pre-implementation phase. A Delivery Improvement Champion will be identified to drive the focus of these areas.

The Rolleston Transport Improvements is also part of the wider NZUP Canterbury package, and the procurement approach will also align with the NZUP Canterbury overarching procurement plan that was approved in 2020. This procurement plan made an initial recommendation for the use of a traditional delivery model for this project. It also looks at ensuring the procurement of the NZUP Canterbury programme's projects complement each and that competition for professional services within the marketplace is optimised and finite resources within the region are managed. s 9(2)(g)(i)

[Redacted text]

s 9(2)(g)(i)
[Redacted text]

37.3.2 Approach to tendering for consenting and construction

s 9(2)(g)(i)



37.3.3 Considerations

The Waka Kotahi Procurement Manual⁵⁸ and infrastructure procurement strategy indicate potential procurement models for this project. Key procurement considerations for this project are:

- The need to maximise value-for-money.
- Optimising procurement methods based on scale and complexity.
- Supporting opportunities to combine elements of pre-implementation and implementation phases to maximise efficiency, time and cost.
- Exploring ways to align procurement methods with those used in other programmes of work, such as the NZUP or Road to Zero Speed and Infrastructure Programme (SIP).

In addition to this, the following elements are also considered important in terms of the commercial approach:

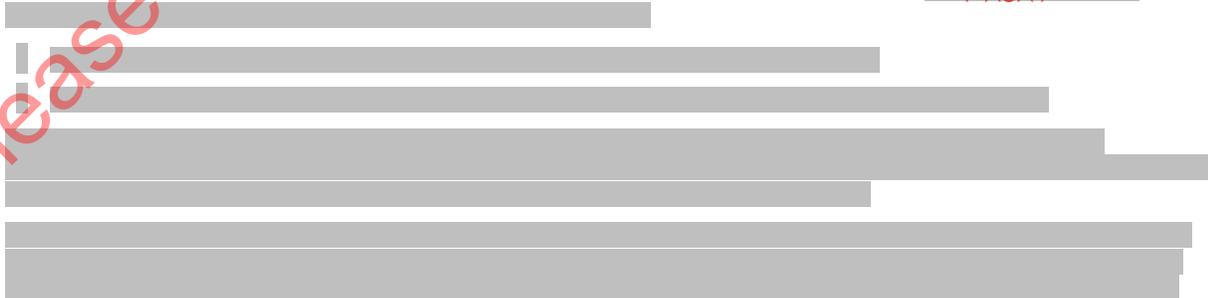
- Programme constraints and risks:
 - The overall programme to finish construction in 2027 (NZUP Establishment report) is challenging given the current stage of development of the project, and the complexities associated with design, consenting (assuming appeals), procurement and property.
- Interface with SDC:
 - There are dependencies requiring SDC road improvements to be delivered concurrently and hence there are possibilities for co-ordination with SDC in relation to coordinating construction efforts (and disruption) around the district.
- Interface with KiwiRail:
 - Ongoing coordination with Kiwirail will be required as construction will have both a direct and indirect impact on Kiwirail operations (for flyover and level crossing works and rail yard work).

37.3.4 Procurement approach

When looking at potential delivery models for the projects, several options are available to Waka Kotahi: the traditional staged form of contract; design and construct, early contractor involvement and alliances.

The determination of a preferred delivery model for a project is based on an assessment of the scale of the project versus its complexity, risk, potential for innovation, flexibility required, client involvement, suppliers' market, and programme constraints.

A procurement plan is being developed in light of these considerations and to reconfirm the delivery model for the project. This procurement plan will also be submitted to the Board for approval. s 9(2)(g)(i)



⁵⁸ www.nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/procurement/

s 9(2)(g)(i)

s 9(2)(g)(i)

37.3.5 Market assessment

Supply chain issues, workload, and cost escalation are placing pressure on the construction market at the moment. However, there is a strong supplier market for both professional services and contractors in the Canterbury region, and it is anticipated that there will be strong interest from both professional services and physical works providers on this project, ensuring competition and value for money. This also suits a traditional staged delivery model. It is recommended that a market sounding be undertaken to confirm the level of interest once this business case is approved.

A number of internal resources will also be required to support this project as it progresses. Waka Kotahi have an End to End operating model that allocates people to the cover various requirements of the project. These are discussed in the management case; however, it is possible that some client advisor support resources may be required from the industry. As above, the industry has the capability to deliver this range of services, however capacity may be a challenge, and this will need to be considered further. ■

37.3.6 Rail improvements

The rail improvement works will be delivered by KiwiRail who will have responsibility for design and delivering the rail yard improvement (post the business case phase).

Any level crossing upgrades adjacent to SH1 such as at Walkers Road and Hoskyns Road are considered part of the roading improvements and hence Waka Kotahi will manage the delivery of these with close liaison with Kiwirail to ensure requirements are met and Kiwirail approvals are gained in a timely manner. This has been captured as part of the indicative programme for delivery.

37.4 Land requirements and property acquisition strategy

The impacts on property have been considered throughout the project development. Initial assessments of property impacts formed part of the MCA for optioneering. As plans developed it became clear that some properties would inevitably be required, and in the case of the site on the corner of Dunns Crossing Road and the state highway that was on the market for sale, an early acquisition was initiated.

To confirm the need an accelerated assessment of options was undertaken and early purchase was agreed by the Project Steering Group.

Given the complexity of the adjacent urban environment of Rolleston there were a number of interactions before a final scheme was recommended. This involved consultation and understanding the access needs, particularly for businesses along Jones Road. A Jones Road Business Group was set up to enable direct engagement to occur, and this included the three most adjacent parties to the recommended option. Ongoing discussion has been undertaken with the directly affected parties.

37.4.1 Property Acquisition Strategy

From the outset a broad assessment of likely property impacts was undertaken and identified key landowners of Selwyn District Council (SDC), Kiwirail (flyover and service lane), businesses adjacent to the flyover, and private landowners and the Department of Corrections near the Dunns Crossing intersection. Given the long history of planning for the flyover, it is worth noting that SDC had advanced purchased key land parcels and held back any development on the land located between Kidman Street, the proposed service lane and Rolleston Drive North. This was to ensure that the flyover was futureproofed with residual land available for future development or Park n Ride sites connecting to bus stops and services. The other key party for the “skewed” flyover was the Carter Group who were engaged early on during the project, and again after the first round of consultation when it became obvious that further land would be required for refinement of the “skewed” option.

Kiwirail are partners for the NZUP project and have been involved in the working group from the onset. This ensured that both land acquisition, access agreement and operational requirements were well understood.

The key business interests for both the original Skewed option (Carter Group) and the direct option (Drummond and Etheridge, RVCentre and Taylored Energy Solutions) were all engaged early during the consultation phase of the project. This identified their access and operational needs to be able to assess the potential impacts on their businesses to ensure the best possible solution could be identified before formal land acquisition discussions commenced. These discussions were ongoing and guided the development of the final recommended option that requires land and affects business access and operations. Once a technically preferred option was identified, the property agents were brought into the engagement conversations.

In summary the Property Strategy is as follows:

Table 56 Property Strategy

Project stage	Land Requirement	Engagement	Property Discussions	Risk
Concept Design	<ul style="list-style-type: none"> Identified indicative land requirements Early option assessment undertaken for Dunns Crossing due to Motel Property being on the market 	<ul style="list-style-type: none"> Public consultation and selected direct engagement Jones Road Business Group plan impacts on general access to west end of Jones Road Corrections re Prison land impacts Carter Group to understand IPort and PC73 proposals and possible property impacts, indicated as willing seller 	<ul style="list-style-type: none"> Dunns Crossing Motel, was on the market, discussions for advance purchase SDC re Service Lane and Flyover, confirmed purchases for project purchases – willing seller Kiwirail are project partners and involved through design workshops 	Decision for advance purchase of the Motel
Refined Design	<ul style="list-style-type: none"> Directly affected parties on Jones Road engaged prior to Round 2 public consultation Public consultation Round 2 	<ul style="list-style-type: none"> Corrections discussion about their future Master Plan and noise impact concerns, plan further refined to minimize land requirements Jones Road Business Group re design changes for improved general access Carter Group advised of shift from Skew to straight flyover options, disappointed about shift of plans not going directly to their property 	<ul style="list-style-type: none"> Early property discussions with directly affected parties on Jones Road – RVCentre, TESL, Drummond and Etheridge Ongoing engagement with SDC, Kiwirail and Corrections re land impacts 	<ul style="list-style-type: none"> Potential impacts on business accesses, further plan amendments undertaken and discussions about business relocations Carter Group not happy about shift away from directly accessing IPort, likely to challenge, legal review of optioneering process undertaken with positive outcome
Recommended Scheme	Draft Land Requirement Plans developed for cost estimation, general and GIS layers for individual parcels	Property cost estimates based on land information and valuations	<ul style="list-style-type: none"> Injurious effects based on property discussions to date and local knowledge 	High risk properties identified in the Master Sheet
Refined Scheme	Minor land requirement changes		<ul style="list-style-type: none"> Costs based on previous discussions 	Final costs and opportunities for

Project stage	Land Requirement	Engagement	Property Discussions	Risk
	following cost review and safe system audit	Changes agreed with project Steering Group	<ul style="list-style-type: none"> IBC level cost, with good understanding of effects on key properties 	business relocation yet to be determined, allowed for in Contingencies
Post DBC Approval	Land requirement plans will be signed and issued to Property Agents to commence acquisition processes	Public will be advised of final scheme and direct engagement with key affected parties	<ul style="list-style-type: none"> Formalise Property Acquisition Strategy and approve Commence discussions with all affected parties 	Challenging conversation likely with: <ul style="list-style-type: none"> RVCentre, high affected and upset, identify relocation options asap TESL – acknowledge access difficulties and likely weigh bridge relocation, need to identify workable alternatives early Corrections – may need to escalate above current officer level Kiwirail – manage through PSC and Regional Liaison

37.4.2 Land Requirements and Property Costs

The scheme design has identified the draft land requirement plans are provided as **Appendix AA**. The *Property Strategy* has evolved during the course of the business case and included early engagement with critically affected parties. Cost was becoming a critical factor in identifying the final recommended design and hence the exercise was to confirm and Indicative Business Case level of cost (SMO14) to inform the business case option selection, that includes appropriate risk and funding contingencies. It was not considered appropriate to engage with all parties until the business case was approved.

Once the technically preferred option was agreed in principle the property cost estimation for the properties was undertaken based on the land requirement plans and identification of individual property parcels. The land acquisition costs and potential injurious effects were assessed base on the early engagement with key parties and desk top analysis and professional judgement for others.

A total of 48 land parcels were identified for Net property purchase costs, Property compensation costs, Property landowner accommodation works costs and other Crown costs (excluding acquisition and legal fees, and survey and legalisation costs).

Each land parcel is attributed to the key project elements of Dunns Crossing, Service Lane and Flyover to enable separation of costs for the various elements.

The summary of initial property costs is shown in Table 53.

Table 57 Original property acquisition costs

Property Acquisition fees (including legal fees), survey and legalisation costs, and contingency sums assessed are added to the Base Estimate as follows.

(a) Base Estimate	s 9(2)(g)(i), s 9(2)(i)
(b) Contingency (43%)	
(c) Estimated property acquisition fees (including legal fees)	
(d) Estimated survey and legalisation costs	
(e) Expected Estimate of Property Costs (P50) (a) to (d)	
(f) Funding Risk Contingency (35%)	
(g) 95 th Percentile Estimate of Total Property Costs (P95) (e) plus (f)	

The addition of the funding risk contingency to the expected estimate of property costs provides a 95% level of confidence that the final project out-turn cost will not exceed s 9(2)(g) rounded to s 9(2)(i)

37.4.3 Value engineering - implications to property costs

With cost pressures across the programme, the relatively high costs for some project elements led to a Value Engineering exercise to review options to see if both physical works and property costs could be reduced.

A summary of this led to the following recommendations to PSC which were adopted, and final Land Requirements and Costs developed (refer to **Appendix AB**) is summarised as Table 58.

Table 58 Reduction in property costs

	Initial Property Cost (Base Estimate)	Design amendment	Property cost saving	Final property cost
Dunns Crossing Road / Walkers Road roundabout	s 9(2)(g)(i)	Inclusion of cycle underpass in response to Safe System Audit, some extra Kiwirail land required, other adjustments	s 9(2)(g)(i)	
Rolleston Drive South	\$0	No change	\$0m	\$0
Service Lane, including SH merge and offramp	s 9(2)(g)(i)	Reduction in barriers to be central median only (removes road widening and additional pavement), removes Kiwirail and reduces SDC land requirements	s 9(2)(g)(i)	
Flyover		Design amendment, updated property costs		
Railyard improvements	\$0	No change	\$0	\$0
Total purchase and compensation costs	s 9(2)(g)(i)		s 9(2)(g)(i)	

37.4.4 Property Risks

s 9(2)(g)(i)

37.5 Risk allocation

The key risk types that could delay the project are:

- Technical risks where effects either lead to significant design change or cause significant cost escalation (by introducing or increasing the scope of mitigation).
- Programme risks caused by, for example, discussions with affected parties and stakeholders, staff resourcing, or hearings and appeal processes.
- Property effects type issues which cause either design change or cost escalation (by introducing or increasing the scope of mitigation).
- Reputation risks caused by strong local opposition to aspects of the project.
- Legal Challenge possible from adjacent developer who considers this does not meet their needs.

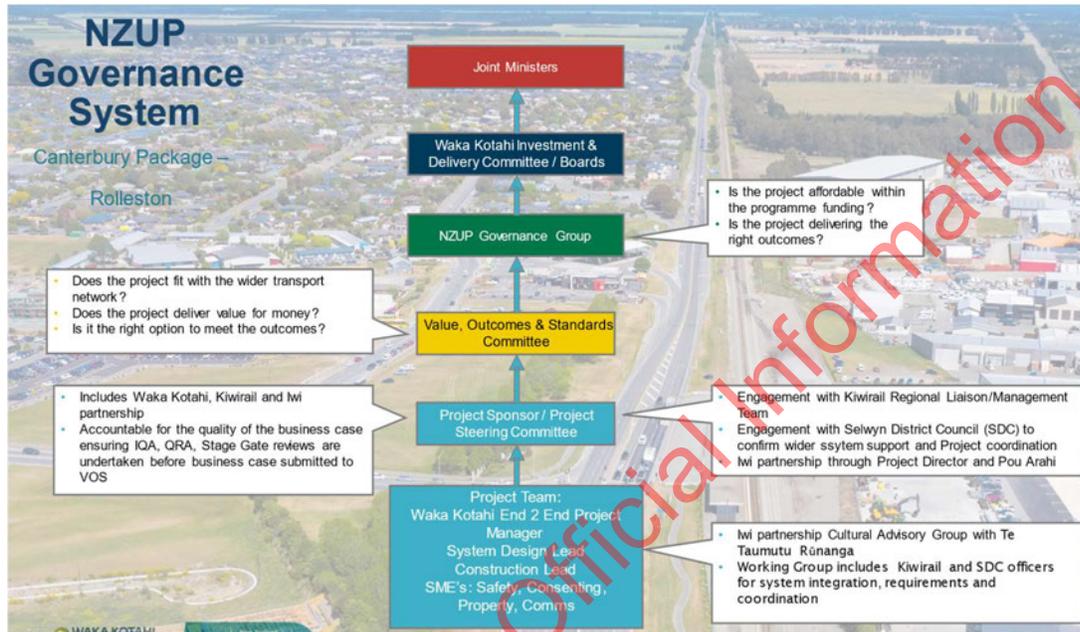
Table 59 Commercial Management Risk

Risk	Management Approach
Technical	Robust technical reviews and robust submissions for statutory approvals
Programme	Careful programme management against realistic deliverables
Property	Early engagement with potentially affected landowners
Reputational	Ensure pro-active and regular stakeholders, treaty partners and public communications to ensure people fully understand the proposal
Legal Challenge	Legal review of process has been undertaken, and ongoing reviews through consenting

38 MANAGEMENT CASE

38.1 Project governance and management

The Rolleston Transport Improvements, road and rail, and complementary projects that SDC will progress on the local road network, represent a programme of work of significant scale and complexity. The scale of investment, combined with high level of community and stakeholder interest, will require an effective governance strategy and close liaison between all delivery partners. While the state highway and Kiwirail components are funded by the Crown under the New Zealand Upgrade Programme (transport), the delivery is of paramount interest to Selwyn District Council and the local community to ensure safe connectivity is maintained as Rolleston experiences continued land use growth.



69: NZUP Governance System

Given the strong community interest to deliver system improvements, collaboration in the pre-implementation phase will be required to maximise timeliness, cost efficiencies and ensure consistency in delivery. This will be particularly important where alignment of design and implementation intersect, such as intersections between state highway and local road assets. The Kiwirail railyard improvements are somewhat stand alone and will be managed and delivered by Kiwirail under the governance of the NZUP PSC and Governance Group. For Pre-implementation, the detailed design for state highway and local road improvement projects will be managed and implemented separately by Waka Kotahi and SDC be delivered under the normal mechanisms within each partner organisation but coordinated through the joint Project Working group managed by the End-to-End Project Manager.

Waka Kotahi and Kiwirail will report monthly progress against time, cost and quality to the NZUP Project Steering Group. The End-to-End Project Manager will advise progress regarding the SDC adjacent activities.

38.2 Programme roles and responsibilities

38.2.1 Waka Kotahi

Waka Kotahi is responsible for managing, operating, planning for, and improving the state highway network. It is a key investor in the wider transport system through co-investment in transport projects. Its role within this programme is to:

- Lead the governance for all elements of the NZUP programme.
- Manage the Pre-implementation and Implementation of the state highway improvement aspects of the programme, including gaining approvals from third parties such as Kiwirail and SDC.
- Complete land purchase and agreements to facilitate the flyover, service lane and the Dunns Crossing Road / Walkers Road roundabout.

- Implement access restrictions along the corridor – i.e. the service lane, closure of Rolleston Drive North and entry into Hoskyns Road from SH1.
- Undertake engagement with the community and stakeholders on the proposed design of the flyover to inform the design process.
- Work in partnership with local iwi representatives of the Cultural Advisory Group who will develop the cultural narrative for the project that will guide the urban design framework.
- Undertake ongoing community engagement to ensure existing and potential new customers become aware of changes and improvements to the corridor.

38.2.2 Kiwirail

Kiwirail is responsible for managing, operating, planning for, and improving the rail network across the country. Its role within this programme is to:

- Participate on the Project Steering Group and governance structure of NZUP.
- Manage the Detailed Design and Implementation of the railyard improvements.
- Prepare monthly reporting to PSC and Governance Group as required.
- Facilitate the review and approval of rail level crossing components of the road projects in a timely manner.
- Participate in Waka Kotahi/Kiwirail regional liaison management group and escalate matters as required to ensure timely delivery of the project components.

38.2.3 Selwyn District Council

SDC is responsible for managing and improving the local road network in Rolleston. Although it doesn't have any specific responsibility for projects within the NZUP programme it is responsible for the following adjacent supporting projects (see also Figure 66):

- Dunns Crossing Road improvements. This peripheral arterial road is expected to carry more traffic past the West Rolleston Primary School, SDC and WK have jointly engaged with the school to develop an agreed mitigation plan. Council will be upgrading the existing 1.5m wide footpath on the east side of Dunns Crossing Road north of Burnham School Road to a 2.5m wide shared path in early 2023. This will end just south of Newman Road in preparation of joining up the new pedestrian and cycling facilities planned as part of the new main roundabout on SH1. It will help improve connectivity to the existing walking and cycling linkages originating from the adjoining new eastern subdivision areas and to the school. New speed limit signage near the school will also be introduced. Further upgrades, such as traffic signals at Burnham School Road will be delivered later.
- Design and implement road widening, intersection improvements, shared use path and rail level crossing improvements on Walkers Road, Two Chain Road and Jones Road. Ideally timing of opening with completions of Stage 1, Dunns Crossing Roundabout.
- Design and implement arterial road improvements on Levi Road.
- Coordinate traffic management on local roads during construction of all projects, especially use of the above as potential detour routes during construction of the Flyover and SH1 improvement work.
- Participate collaboratively in property acquisition processes.

Waka Kotahi will seek a memorandum of understanding (MoU) to confirm commitments and integration with the planned works.

SDC will also undertake ongoing community engagement for these improvements to ensure the community has a say and is updated through the implementation phase. SDC and Waka Kotahi have a Memorandum of Understanding (MoU) that SDC will deliver the projects they need to in order to have a better network overall.

38.2.4 Project Management Arrangements

Each state highway component in the programme will be managed and implemented using the Waka Kotahi *Project Management Manual (SMO11)*. It is envisaged that a Project Sponsor, Project Director, End to End Project Manager and Construction Lead will oversee implementation of each major project, in accordance with this manual.

The project is likely to be broken down into the separate delivery of:

- The Dunns Crossing Road / Walkers Road roundabouts.
- The flyover and merge of SH1.
- Rolleston Drive South intersection, coordinated with the Road to Zero Speed and Infrastructure programme delivery.

The railyard improvements and level crossing design approvals will be managed by the Kiwirail Project Management Office, with monthly reporting to the NZUP project steering committee regarding time, cost and

quality. Any issues at a project level can be escalated through the Waka Kotahi/KiwiRail regional liaison group or NZUP governance as appropriate.

The Project Managers will be responsible for regular reporting updates to the appropriate overseeing body.

38.3 Future engagement

38.3.1 General approach

As the project progresses into the detailed design, pre-implementation and construction phases, engagement activities will continue with the wider community, Iwi and stakeholder groups. One of the first steps during the detailed design phase will be an update of the Community and Stakeholder Engagement Plan., predicated on the IPA 2⁵⁹.

Iwi are a crown partner and the Cultural Advisory Group representing the local Rūnanga will drive the cultural narrative and urban design framework for the Flyover.

Future engagement is expected to follow standard engagement practices, with an initial focus on:

- Early engagement with affected landowners, schools, and other key stakeholders to build a good working relationship and highlight any issues early on.
- For engagement on local road improvements, this will be led by Council's community engagement team. Key focus areas are to seek feedback on detailed design and highlight key changes or enhancements from a design perspective.
- Preparing and finalising engagement materials for the tendering and procurement of design and construction services.

In the pre-implementation phase, engagement activities should be further developed to retain line of sight of the program, incorporating the following:

- Stakeholder engagement and consultation report outputs from engagement undertaken by Waka Kotahi and Council at detailed design and implementation stages.
- Any design elements from the Mana Whenua CAG will be incorporated into future design; and,
- Communication of the approved designs with the community and wider stakeholders.

Iwi engagement will build on the partnership work already started by the Cultural Advisory Group that oversees all Canterbury NZUP projects.

38.3.2 Formal consultation under Section 22AD of the Land Transport Act

The removal of existing, and installation of new, bus stops and other traffic control devices such as cycle lanes, shared pedestrian/cycle paths, stopping restrictions, and turning restrictions must be gazetted under the Agency's Traffic Controls on State Highway Bylaw. The purpose of this is to stop other vehicles from using these facilities and to allow infringements to be issued. A component of the bylaw process is the completion of the formal consultation under Section 22AD of the Land Transport Act. This states that the road controlling authority must give notice in writing to the following, and provide them with reasonable time to make submissions on the proposal:

- The occupiers of any properties adjoining the road to which the proposed bylaw would apply.
- Any affected road controlling authorities that are responsible for roads that join, or are located near, the road to which the proposed bylaw would apply.
- The territorial authority for the area where the road is located.
- Any affected local community.
- The Commissioner of Police.
- Any other organisation or road user group that the road controlling authority considers affected.
- Internal engagement with the necessary teams within Waka Kotahi.

This formal consultation should be factored into the Communications and Engagement plan and completed during pre-implementation/ prior to construction commencing so that any changes resulting from the consultation process can be incorporated into the design.

⁵⁹ <https://www.iap2.org/>

38.4 Change control and issues management

Accountability for scope changes and other issues that arise will lie with the relevant lead agency for the individual project being delivered. It is proposed that a Change Control and Issues Register is established at the beginning of the implementation phase, which should act as an extension to the Risk Register and track any issues as they arise. Any escalation triggers will be undertaken in accordance with Waka Kotahi's Significance Policy, Corporate Risk Management Policy, and Council's Treasury Risk Management Policy.

The End-to-End Project Manager will report risks and issues monthly through Planview Reporting and Dashboard summaries to the PSC. This will focus on time, cost and quality but also cover communication and engagement, consenting and property risks.

38.5 Cost management

The Project Steering Group is accountable for the day-to-day management of the project. The project managers will report costs monthly by way of Dashboard summary to PSC and highlight any emerging risks in a timely manner.

The governance arrangements under the NZ Upgrade Programme will track project expenditure as business as usual across the programme a six-monthly basis. It is proposed that each contractor will use its own business systems to capture the relevant financial information and report this to the governance group prior to the completion of the six-monthly report.

One of the key requirements for this report will be to report on the monthly costs accrued for each individual project. This shall be undertaken in accordance with the relevant Waka Kotahi and Council procedures. As a minimum, suppliers/contractors should provide the following information in each month of the respective contract to the Waka Kotahi and Council Project Managers:

- Budgeted cashflow (budgeted and risk adjusted baseline).
- Value of work completed in the preceding month and contract to date (including rates and quantities for all items within the contract).
- Forecast value of work completed and revised cashflow through to project completion.
- Exemption reports outlining reasons for not meeting any financial targets.

38.5.1 Assurance & Acceptance

As noted throughout this document, several peer reviews have been completed through the development of this DBC and have informed the recommended programme. Furthermore, there has been engagement with subject matter expertise especially regarding bridge design, cycle design and safety reviews. External and internal peer reviews have been completed specifically on the following:

- Traffic modelling (Appendix R)
- Economics (Appendix R)
- Cost estimate parallel review (Appendix R)
- Safe System Audit (Appendix O)
- The DBC (Appendix R).

In addition to the Independent Reviews, the draft DBC went through a Waka Kotahi/NZUP Phase Readiness Review to identify areas that could be enhanced during the finalisation of the Business Case.

It is expected that detailed design will be subject to the normal project review processes, including those outlined in Table 26-2.

Table 60 Commercial Management

Item	Detail
Design review	<ul style="list-style-type: none"> • Lighting design peer review (if relevant); and • Safe system audit (for the scheme/detailed design).
Cost review	<ul style="list-style-type: none"> • The costs produced at the next stage will be reviewed internally, against the cost estimates provided in this DBC. • An independent peer review of the costs is not expected to be required at the next stage as a Parallel Estimate has already occurred of the scheme design as part of this DBC. However, if the design cost estimate changes considerably from the DBC estimate, a parallel cost estimate should be sought.
Road Safety Audit	<ul style="list-style-type: none"> • An internal road safety audit will be completed on the detailed design.
Economics review	<ul style="list-style-type: none"> • An internal review against the project economics will be completed.

Item	Detail
RMA and other statutory documentation	<ul style="list-style-type: none"> As noted in the Consenting Strategy, the technical assessments to support consent applications will be confirmed in consultation with Waka Kotahi's Environment's team as part of the detailed design phase. Waka Kotahi's legal team will also review consenting applications and other statutory documentation to be produced during the next phase.
Physical works document review	<ul style="list-style-type: none"> The project manager and Waka Kotahi procurement expert will review the tender documentation to ensure completeness, accuracy and currency.

38.6 Benefits realisation and performance monitoring

Waka Kotahi, Kiwirail and Council are accountable bodies responsible for monitoring and reporting on future project progress. It is anticipated that data will be collected through normal business processes. They should be reported on annual basis to ensure effective monitoring.

Refer to Table 44 for more details regarding the monitoring for each of the KPIs. The high-level indicators will become the key measures reported for the project.

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39 NEXT STEPS

39.1 Summary

This DBC has demonstrated the need for investment in the Rolleston transport network, with a recommended programme of interventions that are each justifiable on their own merit and come together to deliver offer significant benefit for the community and value for money to the Government.

The recommend programme will strongly resolve the identified safety and connectivity problems, whilst supporting Rolleston to become a self-sustaining and vibrant place to live and work.

The project has been assessed as having a Very High GPS results alignment against Waka Kotahi's IPM, meaning it represents an extremely attractive investment to deliver the land transport objectives sought by the Government.

39.2 Next Steps

This business case has several next steps that will be required to ensure successful funding and implementation. These are outlined below.

Business Case Approval

- Waka Kotahi to undertake the formal Internal Quality Assurance (IQA) assessment required by Waka Kotahi funding and prioritisation processes to confirm funding commitment.
- Finalise DBC for Waka Kotahi endorsement of the DBC via Project Steering Committee, Values, Outcomes and Standards Committee, the Investment and Delivery Committee and Waka Kotahi Board.
- Seek endorsement of the Programme and funding for delivery of Rolleston projects through the NZUP Governance Group.
- Confirmation of funding allocation through PSC.
- Discussions with SIP and SDC regarding funding sources and timing of interventions.

Engagement

- Public consultation to inform outcome of DBC.
- Continue engagement and communication with affected landowners, identified through the preliminary land requirement plans.
- Undertake engagement with the Selwyn District Council to develop Memorandum of Understanding for associated activities and throughout the detailed design process and prior to implementation.
- Undertake targeted engagement with KiwiRail and the Rolleston Prison.
- Undertake engagement with the wider community and stakeholders prior to construction phase.

Procurement

- Further refinement of the procurement approach/model to enable the procurement of detailed design and construction contractors.
- Preparation of the necessary tender documents prior to engaging with the supplier market for professional design services.
- Engagement with the supplier market for professional services to undertake detailed design.
- Following statutory approval for consents and land requirements, appointment of a construction supplier.

Governance

- Establish a dedicated governance and project management team to provide oversight and other responsibilities including scope management, risk, procurement, finances, and quality assurance.

Property acquisition

- Property Strategy approved.
- Property Team engage with all Owners.
- Commencement property acquisition.

Technical investigations ahead of detailed design

- Undertake geotechnical investigations.
- Potholing for existing utilities and engagement with utilities suppliers.

- Urban design framework.
- Road Safety Audit addendum completed for service lane/merge alteration and underpass at the Dunns Crossing Road / Walkers Road roundabout.

Level crossings

- Ahead of detailed design
 - Discussions with Kiwirail/Waka Kotahi about the SFAIRP acceptability of level crossings at Hoskyns Road and Walkers following the recommendations in the LCSIA report.
 - Discussions with SDC/Kiwirail in regard to responsibility for any changes at Two Chain Road/Jones Road level crossing.
- During detailed design
 - Design refinements to the Walkers Road crossing
- During implementation
 - Vegetation clearance
 - Construction monitoring / safety reviews
- Confirmation that the residual risks at Hoskyns Road and Weedons Ross Road level crossing are as low as reasonably possible for Kiwirail.

Detailed design

- Preparation of Consenting documentation.
- Lodge and gain resource consents.
- Prepare Implementation tender documentation.
- Supporting local road improvements will need to be investigated through SDC.

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