

New Zealand Transport Agency
**Transport Agency Investment
Proposal Re-Evaluation | SH1
Cambridge to Piarere**
Findings Report

Final | 28 November 2018

This report takes into account the particular instructions and requirements of our client

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

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Abbreviations

AADT	Annual Average Daily Traffic
BCA	Business Case Approach
C2P	(SH1) Cambridge to Piarere
CBD	Central Business District
CMP	Corridor Management Plan
DBC	Detailed Business Case
DSI	Deaths & Serious Injury
ESR	Environmental and Social Responsibility
GDP	Gross Domestic Product
GPS	Government Policy Statement (on Land Transport)
HCV	Heavy Commercial Vehicle
HOV	High Occupancy Vehicle
HPMV	High Productivity Motor Vehicle
IAF	Investment Assessment Framework
IBC	Indicative Business Case
ILM	Investment Logic Map
KPI / KPIs	Key Performance Indicator/s
LoS	Level of Service
MaaS	Mobility as a Service
MCA	Multi-Criteria Analysis
MoT	Ministry of Transport
NLTF	National Land Transport Fund
NLTP	National Land Transport Programme
ONRC	One Network Road Classification
PBC	Programme Business Case
PT	Public Transport
RLTP	Regional Land Transport Plan
RPS	Road Protection Score
SAR	Scheme Assessment Report
SH (#)	State Highway (#)
SOV	Single Occupancy Vehicle
SRA	Safe Roads Alliance
SSBC	Single Stage Business Case
TAIP	Transport Agency Investment Proposal
vpd	Vehicles Per Day

Definitions

Long term	10+ years
Medium term	3-10 years
Short term	0-3 years

Executive Summary

This evaluation report outlines the findings of a first principles review of the State Highway 1 (SH1) Cambridge to Piarere corridor investment proposal, which considers improvements to address safety, access, capacity and resilience along a section of the national strategic route within the Waikato region.

The Transport Agency is re-evaluating selected state highway projects to assess whether they achieve transport outcomes aligned with current priorities, and if they represent value-for-money prior to inclusion in the National Land Transport Programme (NLTP).

This re-evaluation finds that the existing business case appears to have been influenced by a desire to continue to deliver a logical progression of the Waikato Expressway. However, evidence suggests that capacity improvements between Cambridge and Piarere are not required for some time and an offline expressway is not warranted in the short or medium-term, although such a corridor may be justified in the long-term with the aim to provide a national strategic (high volume) route.

The evaluation therefore proposes a revised programme of options for further development through the successive phases of the project, which is outlined below.

Re-Evaluation Findings

Traffic is expected to grow along the SH1 Cambridge to Piarere corridor upon the completion of the Waikato Expressway, and the scale of growth is likely to further exacerbate safety issues on a corridor that already has a significant safety risk and crash record. Short-term safety interventions through the Safe Roads Alliance are presently being implemented, but the corridor will remain a high-risk road – falling short of its desirable ONRC outcome even after the improvements are made.

The re-evaluation concludes that uncertainties exist around about the triggers for investment on the corridor and their respective timings. Therefore, future investment into the corridor should instead be centred around reducing the number of DSIs along the corridor and providing a more resilient route.

Recommended Direction

The project should remain as scoped. In the short-term, the options analysis should be revisited to reduce the crash risk on the corridor. A clear programme of triggers and the associated timing for incremental investment should be proposed, and further off-line or incremental on-line options should be assessed against the immediate safety interventions to identify the most cost-effective medium to long-term interventions.

The SH1/29 intersection improvements should be undertaken in the medium-term. This should be based on the outcome of a revised option analysis, since the offline versus online debate has a direct impact on the placement of the future intersection. The Transport Agency should also continue to invest in additional safety improvements, while route-protecting necessary corridors based on the recommendations in the revised options analysis.

The identification of triggers for investment in the short-term will establish when state highway improvements should commence.

1 Background

The 2018-2027 TAIP sets out the 10-year programme of activities that the Transport Agency proposes for inclusion in the 2018-2027 NLTP, to give effect to the 2018-2027 GPS.

In the development of the TAIP, 16 state highway improvement proposals (subsequently consolidated into 10) were identified as needing re-evaluation including a more comprehensive assessment against the 2018 IAF. The SH1 Cambridge to Piarere project was one of the identified state highways and is the basis of this re-evaluation report.

Arup reviewed the SH1 Cambridge to Piarere investment proposal so that it is aligned with government direction, is evidence based and achieves the intended transport outcomes at optimal value-for-money.

1.1 The Investment Proposal

The SH1 Cambridge to Piarere transport improvements project is at the pre-implementation phase. Funding for property purchases and pre-implementation works was approved in October 2017 and a DBC for long-term improvements was published in April 2018.

The problems noted in the transport improvements DBC are as follows:

- *“In future, unacceptable levels of service discourage customers from choosing the SH1/29 corridor as their preferred route.”*
- *“Competing priorities between local access and high volumes of SH1 traffic is contributing to crashes and harm.”*

A \$7.5m programme of short term safety improvements is presently being implemented and comprises of roadside safety barriers in high-risk areas and a widened centreline. These interventions are intended to minimise the run-off-road risk and reduce the risk of head-on collisions respectively. Minor improvements will also be made to some intersections along the route. This work is envisaged to reduce overall DSIs by approximately 30%, and upgrade 30% of the corridor to achieve a KiwiRAP star rating of 4.0+.

1.2 Summary of the Re-Evaluation Process

This re-evaluation followed the methodology in the (draft) TAIP Re-Evaluation Guidance (July 2018) which was founded on the Transport Agency’s business case principle. The core elements of the re-evaluation process are shown in Figure 1.

The Cambridge to Piarere DBC was used as the primary source of information on the existing proposal.

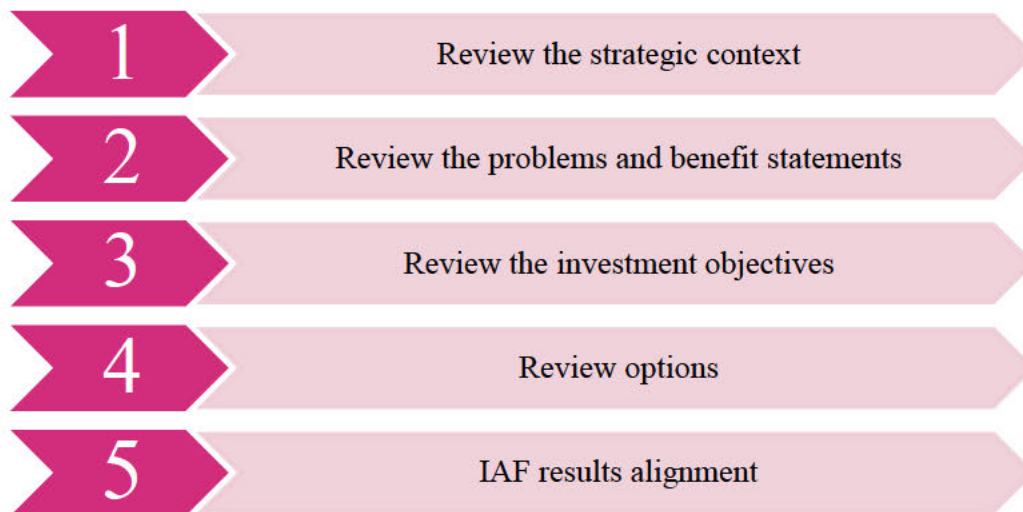


Figure 1 - Re-evaluation approach

1.3 Further Inputs into the Re-Evaluation

There are several inputs that are referred to throughout the re-evaluation process that are used when planning Transport Agency investments. These are introduced and outlined in sections 1.3.1 to 1.3.3.

1.3.1 KiwiRAP

The New Zealand Road Assessment Programme (KiwiRAP) analyses the road safety of the state highway network by providing a systematic and internationally recognised method of measuring the actual and predicted safety performance of roads. KiwiRAP risk ratings provide NZ Police, road planners, engineers and investors with benchmarking information to show how well a road performs in comparison to other roads. KiwiRAP uses a 1.0 to 5.0 star rating system from highest to lowest risk carriageways, which is determined by evaluating each of the road’s design elements.

1.3.2 Transport Agency System Approach

The Transport Agency applies a system approach to planning and investing in its transport system. The system approach involves:

- Providing for the different modes of walking, cycling, public transport, Mobility as a service (MaaS), rapid transit, road and rail in each place to extract the best from the overall network for customers and deliver on priority outcomes.
- Considering the full range of possible responses to an issue – land use planning, regulation, policy, pricing, investment in physical and digital infrastructure, behaviour change and use of technology.

- Using the Transport Agency’s Intervention Hierarchy to guide planning and investment efforts:

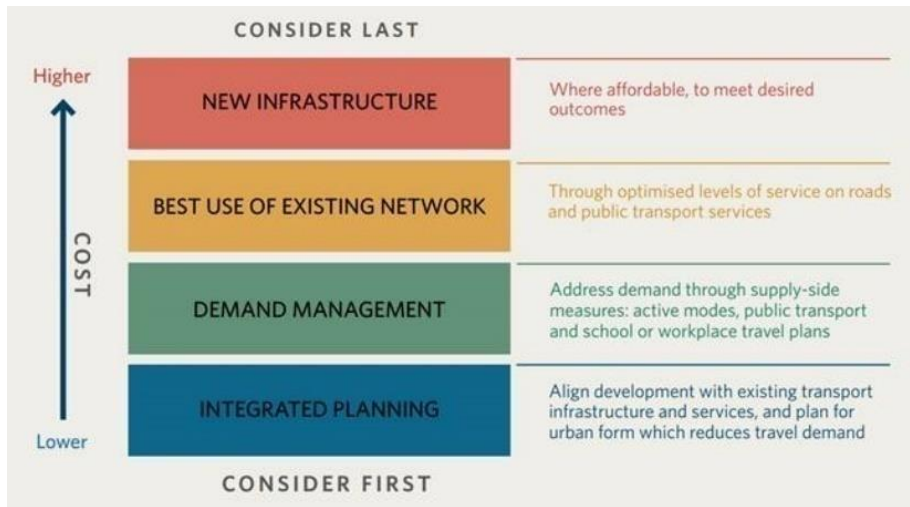


Figure 2 – Transport Agency Intervention Hierarchy

1.3.3 One Network Road Classification (ONRC)

The ONRC identifies different categories of road within the network as well as the customer levels of service appropriate for each classification. Generally, higher road classifications mean a higher level of service, including safety, as well as a greater expectation that the corridor will be available to customers more often.

2 Strategic Context

2.1 Government Priorities

The Government Policy Statement (GPS) and the Transport Outcomes Framework provide direction on the outcomes and objectives sought from the transport system. The investment narrative of the existing proposal was reviewed against this direction to assess whether the investment is likely to deliver on the Government objectives.

2.1.1 Government Policy Statement on Land Transport

The GPS outlines the Government's strategy to guide land transport investment over the next 10 years. It influences how the Transport Agency allocates resources from the National Land Transport Fund (NLTF) across New Zealand's transport system.

As shown in Figure 3, the key strategic priorities include:

- Creating a transport system that is free of death and injuries
- Ensuring there is better access to social and economic opportunities, better access to a range of transport choices and that our transport system is resilient

These priorities are supported by a strong focus on environment and delivering value for money services and infrastructure.



Figure 3 - Government Policy Statement on Land Transport 2018-19 (MoT, 2018)

Section 2.6 of the GPS also introduces three core themes to provide guidance on *how to effectively deliver on the priorities* and provide *the best transport solutions*. These themes are used in Section 6 of this report where the options and solutions proposed are reviewed.

2.1.2 Transport Outcomes Framework

The Ministry of Transport (MoT) Transport Outcomes Framework has five core outcomes, illustrated in Figure 4, that the Government will be seeking from the transport system, to shape *highly liveable places in thriving regions*. The Transport Outcomes Framework aligns with Treasury Living Standards Framework as well as the Transport Agency’s Investment Assessment Framework.

The Transport Outcomes Framework has been adopted for this re-evaluation to help assess whether the proposed outcomes for the project align with Government priorities.

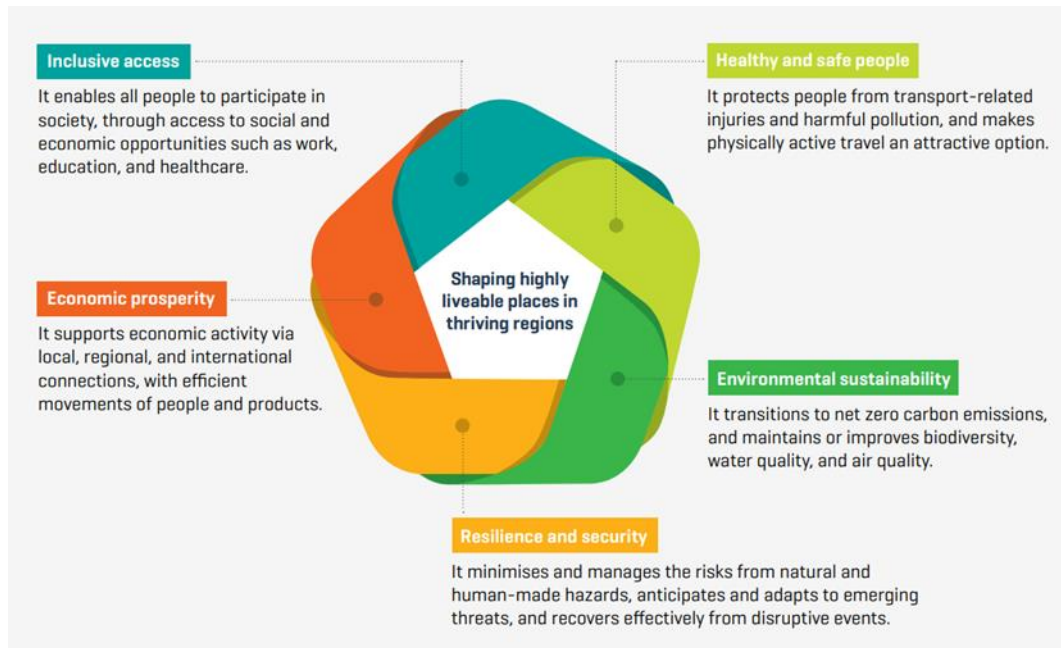


Figure 4 - Transport Outcomes Framework (MoT, 2018)

2.2 Project Context

The 15km SH1 Cambridge to Piarere corridor runs alongside the northern banks of Lake Karapiro and sees 19,000 vehicle movements per day (11% HCVs). It connects to the existing southern end of the Waikato Expressway, with the townships of Cambridge (population of 20,200 – June 2017, Statistics NZ) and Karapiro Village (population of 2,628 – Census 2013) both significant influences on the corridor use. The southern end of the corridor includes the SH1/29 intersection at Piarere. The ONRC classifies it as a national high-volume highway due to its role in a number of key journeys linking Auckland and Hamilton with Tauranga – specifically the Port of Tauranga via SH29 – as well as the central and

lower North Island via SH1. Presently, 40% of traffic on the corridor connects to the SH29 route towards Tauranga at the SH1/29 junction at Piarere and the remainder travel south on SH1 towards Tirau.

The SH1 and SH29 corridors are the preferred strategic route (over SH2) for freight and transport movements between Auckland, Waikato, and Bay of Plenty (referred to as the upper north island's 'golden triangle' – contributing to almost 50% of the national GDP). The aim of this is to reduce the pressure on the SH2 corridor by enhancing the SH1/29 corridor such that it attracts greater demand than the SH2 route. The SH1/SH29 journey is approximately 26km longer than the SH2 alternative, taking an extra 35 minutes by car and up to 60 minutes longer by truck. Once the remaining parts of the Waikato Expressway is open, it will help achieve similar travel times by car on the two routes. Strategic considerations for the inter-regional traffic movements across the upper north island are a valid driver for investment into the corridor, but the DBC indicates that any changes made to the Cambridge to Piarere portion of the network are unlikely to make the SH1/SH29 route quicker than the alternative.

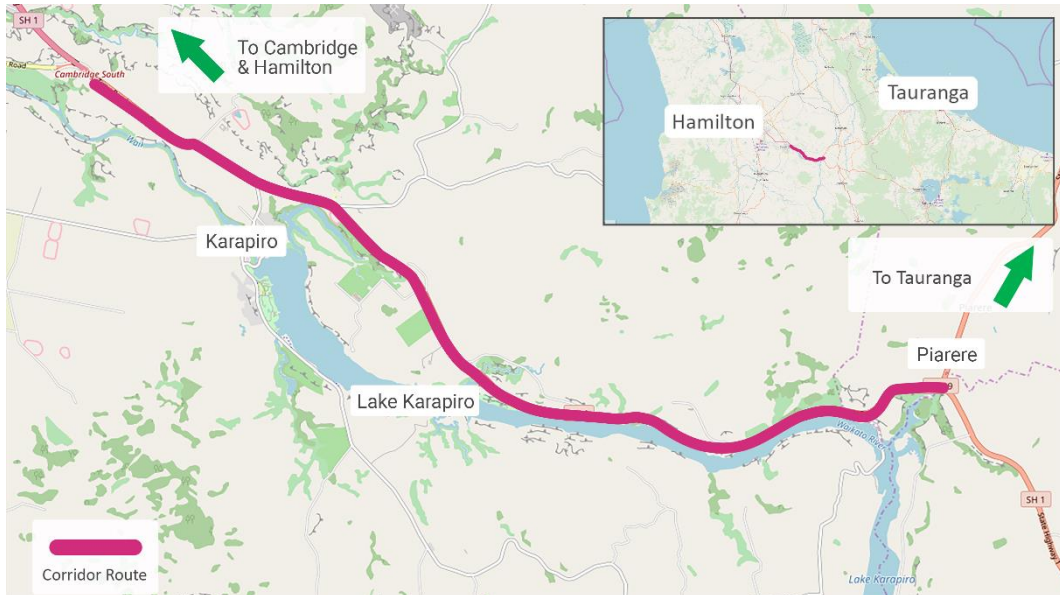


Figure 5 - Project Map

2.2.1 Pre-Evaluation Investment Logic Map

Figure 6 shows the Investment Logic Map (ILM) that was developed during the Cambridge to Piarere Detailed Business Case.

Further contextual information relating to three of the five most relevant outcomes in the Transport Outcomes Framework are provided in sections 2.2.2 to 2.2.4. This approach has been taken to understand how the current transport system supports the delivery of these outcomes prior to assessing the specific problems that the investment proposal seeks to resolve. The information provided below was used when assessing the supporting evidence for the identified problems in Section 3.

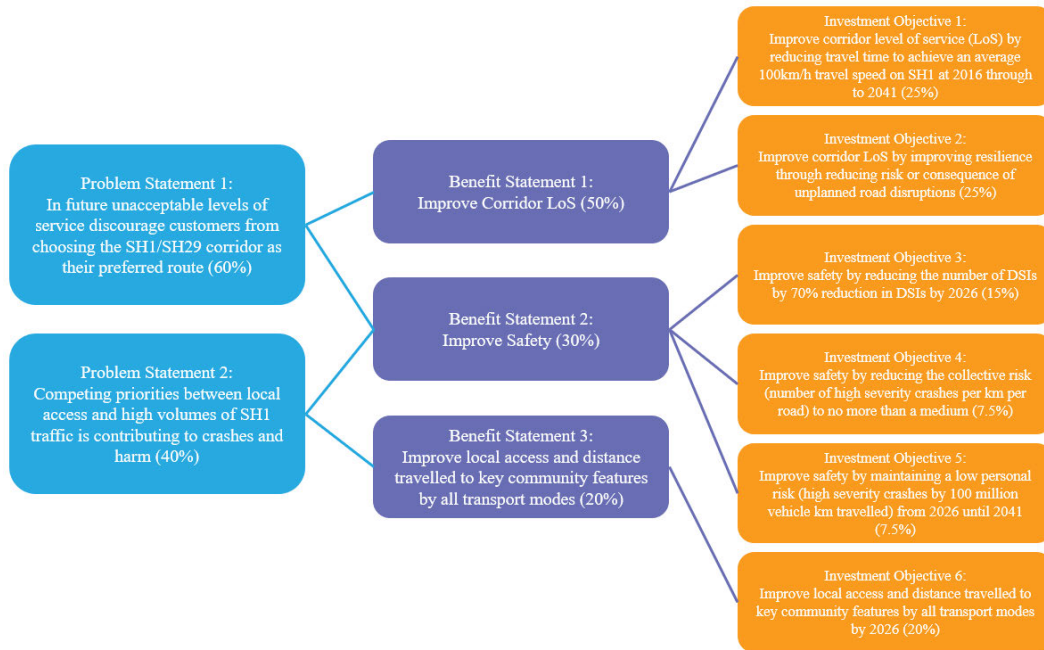


Figure 6 - SH1 Cambridge to Piarere ILM

2.2.2 Inclusive Access

The land-use along the corridor is predominantly agricultural and recreational, with increased traffic activity near the Karapiro village intersection and close to Karapiro school. There are 86 known access points along the existing SH1 corridor comprising of nine minor at-grade tee-intersections with local roads and one major intersection (with SH29). Corresponding traffic volumes on the side roads range between 57 vpd and 5,900 vpd. In addition to these formal intersections, there are 76 direct access points with adjoining properties, recognised rest areas and formal boat access points to Lake Karapiro.

Karapiro Road and Hydro Road are two of the busier roads connecting to the project corridor, experiencing 1,500 vpd and 1,800 vpd respectively. Hydro Road is the primary connection to Karapiro Village and the Hydro Power Station, and experiences occasional traffic peaks during events held at the National Rowing Academy. The corridor is purportedly a source of severance between Karapiro school and Karapiro village, as the school is located on the other side of SH1 to the Village and approximately 1.3km southwards from Hydro Road intersection.

The Karapiro Telemetry site on the corridor has indicated an average daily flow of 19,000 vpd and an underlying growth rate of 2.2% between year 2006 and 2017, which also accounts for step-changes as sections of the Waikato Expressway have been opening. Flow predictions have been undertaken based on a future linear growth rate of 2%, which estimate the corridor will reach 90% of the capacity of a rural road (37,500 vpd) by year 2066.

2.2.3 Healthy and Safe People

There have been 121 crashes from 2013 to 2017, with 22 DSIs observed within that period. The number of total crashes has steadily been increasing since 2013. Intersection, head-on and run-off-road crashes accounted for a significant majority of incidents, with the proportion of intersection crashes significantly higher than the national average. Table 1 presents a summary of the total observed crash data from 2013 to 2017, where the shaded cells highlight a statistic on the corridor that is higher than the national average.

Table 1 - Summary of observed crash data (2013-2017)

Crash Theme	Crash Data	NZ Average	C2P
Run off Road Crashes	All Crashes	55%	32%
	High Severity	46%	31%
Intersection	All Crashes	12%	24%
	High Severity	14%	26%
Head On	All Crashes	8%	8%
	High Severity	26%	14%
Alcohol	All Crashes	9%	6%
	High Severity	23%	38%
Speed	All Crashes	18%	10%
	High Severity	21%	7%
Poor Observation	All Crashes	26%	32%
Poor Handling	All Crashes	34%	28%
Failed to Give Way	All Crashes	8%	17%
Fatigue	All Crashes	12%	10%
Vehicles	Cars - All Crashes	74%	80%
	Vans/Utes - All Crashes	18%	23%
	Trucks - All Crashes	13%	17%
	Motorcycles - All Crashes	5%	2%

Short-term safety improvements are being implemented by the Safe Roads Alliance (SRA) to address run-off-road and head-on crash risks along the corridor, with minor measures to address the intersection crash risk. These interventions are aimed at providing an interim safety solution for 10 years till 2026. However, the corridor will remain a high-risk road (KiwiRAP 3.22 rating across the corridor, including the 30% of the corridor being improved to 4.0+ by SRA) upon their

implementation, falling short of its desirable ONRC outcome even after the improvements are made.

The SH1/29 junction is also a high-risk intersection, with a safety record that places it on the national Top 200 High Risk Intersection list. While the SRA considered addressing the risk at the intersection within a number of options in the SSBC, the recommended short-term safety interventions ultimately do not mitigate the safety issues at the intersection as improvements were expected to be delivered by the long-term scheme.

2.2.4 Resilience

The SH1 Cambridge to Piarere corridor experienced 44 unplanned events resulting in delays between July 2016 and February 2018 at an average rate of one per fortnight. Four full road closures occurred during this period with an average duration of 5.5 hours (ranging from 2 to 9.4 hours). Alternative routes can add between 10km and 50km to the initial 15km journey between Cambridge and Piarere based on the location of the closure, representing an increase in journey time of up to 60 minutes. There is also no viable detour route available for HCVs, which may force them to wait for the entire duration of the road disruption before re-commencing their journey.

Re-evaluation finding: There is evidence to support both safety and resilience issues being the primary drivers for transport interventions, but many of the current resilience issues occur due to the frequent crashes on the corridor.

3 Review of the Investment Logic Map

A review of the Investment Logic Map (ILM) was carried out to assess whether there is clarity of intent, clear cause and effect between the problem and benefit statements, and reasonable supporting evidence for the case for investment. Furthermore, Arup considered whether a change in the problem prioritisation or weighting was appropriate given the change in strategic policy context.

3.1 Review of Problem Statements

This section presents the reasoning for the problem statements provided in the DBC. Given the changes to the strategic context of the project, consideration is given to the fit of the original problem statements and their relative weightings.

Problem statement one: “In future unacceptable levels of service discourage customers from choosing the SH1/29 corridor as their preferred route (60%).”

Evaluation points:

- The statement is referring to trips between Auckland, Waikato and Bay of Plenty. Currently, it is 26km and up to 35min longer to travel by car between Auckland and Tauranga on the SH1/29 route than the SH2 route.
- The intent of the statement is valid if the ‘golden-triangle’ strategy to attract traffic onto SH1/SH29 and away from competing routes including SH2 is continued. To provide a truly competitive route, major investment is required on SH29 across the Kaimai Range, or tools such as road pricing should be applied on alternate routes. If the strategy is not being followed, levels of service are unlikely to be an issue.
- The statement contains an implicit driver to attain increased levels of service by extending the form of the Waikato Expressway across the corridor.
- It is noted that the corridor is expected to see traffic growth at a rate of 2.2% (underlying growth over the past 11 years), with 30,000vpd experienced in 2044. However, there is reasonable uncertainty about the nature and timing of the level of service reduction mentioned in the problem statement, and therefore it is unclear as to precisely when the level of service is projected to be considered unacceptable.

Problem statement two: “Competing priorities between local access and high volumes of SH1 traffic is contributing to crashes and harm (40%).”

Evaluation points:

- Safety is a key priority within the current strategic context. The project area has seen 22 DSIs between 2013 and 2017, with 64% of all crashes (121 total – including non-DSI incidents) either head-on, run-off-road or intersection crashes. The number of intersection crashes are also noted to be significantly higher than the national average.

- Discrete points exist along the corridor where the KiwiRAP star rating is observed to be 1.0 (high risk), with many of these located at intersections.
- Short-term safety improvements are being undertaken by the Safe Roads Alliance, but the corridor will remain a ‘high-risk rural road’ after the interventions are implemented.

Re-evaluation finding: There is a strong driver to extend the levels of service provided by the Waikato Expressway to the point in the transport system where traffic flows split at Piarere. There is also valid acknowledgment that users of the corridor will experience a loss of service as traffic volumes grow over time. However, uncertainties exist around the degree and timing of the reduction in level of service.

The identification of safety issues on the corridor remains valid and appropriate. If the ILM is revised, the problem statements should be revisited to provide a greater understanding of when an “unacceptable” level of service reduction is experienced. Based on the remaining timeframe of acceptable levels of service, the relative weighting should also be revised to suit.

3.2 Review of Benefit Statements

This section examines the benefit statements provided in the DBC and considers the impact of the revised strategic context on their validity and relative priority. Any potential impacts for the business case are then highlighted.

Benefit statement one: *“Improve corridor LoS (50%).”*

Evaluation points:

- The benefit corresponds to the problems.
- However, like the corresponding problem statement, this benefit is valid in the present policy context if the ‘golden triangle’ strategy is valid.

Benefit statement two: *“Improve Safety (30%).”*

Evaluation points:

- The benefit statement is clear and relates to the problems. There is also sufficient evidence to indicate that safety is a primary issue along the corridor.

Benefit statement three: *“Improve local access and distance travelled to key community features by all transport modes (20%).”*

Evaluation points:

- Improving local access is a key priority within the present strategic context.
- However, there is a lack of clarity around what local access may mean in the context of the corridor.

- The aim to reduce the distance travelled between community features may constrain the consideration of a range of outcomes.

3.3 Review of Investment Objectives

The investment objectives were reviewed to assess how they relate to the problem and benefit statements and to identify whether the change in the strategic context might impact the objectives of the investor.

Investment objective one: “Improve corridor level of service (LoS) by reducing travel time to achieve an average 100km/h travel speed on SH1 at 2016 through to 2041 (25%).”

Evaluation points:

- An average 100km/h travel speed can only be achieved if the speed limit is greater than 100km/h. Such a speed limit can only be applied on an expressway, meaning the statement is likely to preclude otherwise reasonable solutions from being progressed.
- There is little indication that the corridor presently experiences deficient levels of service, hence the objective could be revised to maintain a sufficient LoS as traffic volumes grow.

Investment objective two: “Improve corridor LoS by improving resilience through reducing risk or consequence of unplanned road disruptions (25%).”

Evaluation points:

- The frequency of unplanned events causing delays between July 2016 and February 2018 has been observed at an average rate of 1 per fortnight.
- There is acknowledgement that many of the resilience issues can be attributed to events related to a lack of safety.
- The objective is valid as the length of alternative routes vary between 10km and 50km, which is significant for a 15km corridor. Nevertheless, only four full closures in 21 months were recorded, suggesting the issue is not critical.

Investment objective three: “Improve safety by reducing the number of DSIs by 70% reduction in DSIs by 2026 (15%).”

Evaluation points:

- The statement provides sufficient clarity of intent, and is reasonable based on the key driver of addressing safety considerations on the corridor.
- Short-term measures should also be considered in addition to options that would achieve the objective in the specified timeframe.

Investment objective four: *“Improve safety by reducing the collective risk (number of high severity crashes per km per road) to no more than a medium (7.5%).”*

Evaluation points:

- The statement provides sufficient clarity of intent, and is reasonable based on the key driver of addressing safety considerations on the corridor.

Investment objective five: *“Improve safety by maintaining a low personal risk (high severity crashes by 100 million vehicle km travelled) from 2026 until 2041 (7.5%).”*

Evaluation points:

- Short-term measures should also be considered in addition to options that would achieve the objective in the specified timeframe.

Investment objective six: *“Improve local access and distance travelled to key community features by all transport modes by 2026 (20%).”*

Evaluation points:

- Improving local access is a key priority within the present strategic context.
- However, there is a lack of clarity around what local access may mean in the context of the corridor.
- The aim to improving the distance travelled between community features may constrain the consideration of a range of outcomes.

Re-evaluation finding: The investment objectives clearly lead from the problem and benefit statements. However, the aim to achieve outcomes by 2026 constrains the option development process into ignoring shorter term interventions that may provide better value-for-money. Based on the evidence, there is no indication that a solution is required by 2026.

Furthermore, the argument for addressing resilience issues is valid but a significant portion the issues themselves are caused by safety issues. Therefore, the key driver for investment for the project should be increasing the level of safety, and subsequent work on the corridor should reflect this.

3.4 Summary of the ILM Review

The investment objectives have a significant focus on enhancing all customer levels of service with the aim of further promoting the strategic function of the SH1/29 corridor over alternative routes. There is also an implicit aim to build on the Transport Agency’s investment in the Waikato Expressway. The DBC explored current and future levels of service. The re-evaluation confirms the following:

- The scope and timing of investment has been influenced by the strategic driver to extend the levels of service provided by the Waikato Expressway to a natural point in the transport system where traffic flows split at Piarere.
- However, there is reasonable uncertainty about the degree and timing of the LoS reduction to bring into question on the conclusions reached by the DBC and recommended solution.
- Therefore, the drivers for investment into the corridor within the short-term should instead be centred around reducing the number of DSIs along the corridor, and in turn providing a more resilient route.

4 Review of options development

With a greater emphasis on value for money and evidence-based considerations, there is now an opportunity to review the timing and need for capital intensive infrastructure investment to achieve the investment objectives.

4.1 DBC Options

The original project team adopted the ACRE (Area, Corridor, Route, and Easement) approach to progressively narrow the study area and ultimately identify the preferred route for designation. The IBC options report short-listed six different options for which the multi-criteria analysis (MCA) is displayed in Figure 8. The options were:

- A (online)
 - Wide centreline with additional centre/roadside barriers and minor intersection improvements (all at-grade).
 - No change to the existing number of passing lanes; two in each direction.
- B (online)
 - Wide centreline with full corridor centre/roadside barriers and minor intersection improvements (all at-grade).
 - 2+1 lane layout to provide for alternating passing lanes over full project length.
- C (online)
 - Wide centreline with full corridor centre/roadside barriers and minor intersection improvements (all at-grade).
 - 2+1 lane layout to provide for alternating passing lanes over full project length.
 - No direct access for properties onto SH1 except at discrete locations (being existing intersections).
- D (online)
 - Full corridor central and roadside barrier and minor intersection improvements.
 - 2+2 lane arrangement – expressway standard design with central median and wide shoulders.
 - Parallel local roads over project length as required to retain local access to adjacent properties.
 - Large-form grade-separated intersections at 2/3 locations.
 - No direct access for properties onto SH1. All property access to parallel local roads.
- E1 (online/offline)
 - Full corridor central and roadside barrier.

- 2+2 lane arrangement – expressway standard design with central median and wide shoulders.
 - Parallel local roads, north of Karapiro Road to retain local access to adjacent properties.
 - Large-form grade-separated intersections at 2/3 locations.
 - A longer distance and journey time for the SH1 south route and route shortening for the SH1/29 journey.
- E2 (online/offline)
 - Full corridor central and roadside barrier.
 - 2+2 lane arrangement – expressway standard design with central median and wide shoulders.
 - Parallel local roads, north of Karapiro Road to retain local access to adjacent properties.
 - Large-form grade-separated intersections at 2/3 locations.
 - Shorter distance and journey times for both SH29 and SH1 south routes

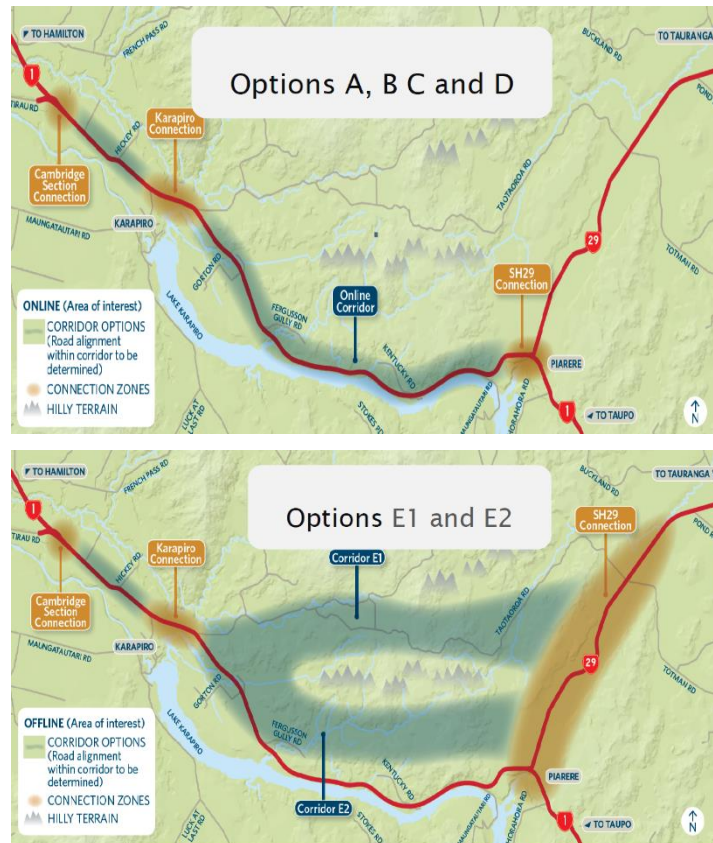


Figure 7 - Short-listed options

		OPTION A	OPTION B	OPTION C	OPTION D	OPTION E1	OPTION E2	
Alignment with Investment Benefits and Performance Measures	Reduce the number of DSIs [70% reduction in DSIs by 2026]	50%	80%	90%	100%	100%	100%	
	Reduce Collective Risk to no more than a medium and maintain a low personal risk from 2026 until 2041	50%	100%	100%	100%	100%	100%	
	Improve local access to community features by all transport modes	0%	0%	20%	90%	100%	100%	
	Reduce travel time by achieving an average 100km/h travel speed on SH1 at 2026 through to 2041	10%	30%	50%	100%	100%	100%	
	Improve resilience by reduction in risk or consequence of road disruptions	25%	55%	80%	100%	100%	100%	
	Overall weighted	23%	46%	63%	98%	100%	100%	
Implementability/Complexity/Risk of Options	Technical	Low	Low	Medium	Medium	Medium	Medium	
	Constructability	Medium	Medium	Medium	Medium	Low	Low	
	Consentability/Policy	Low	Low	Medium	Medium	Medium	Medium	
	Operation/ Maintenance	Low	Medium	Medium	Low	Low	Low	
	Safety in Design	Medium	Medium	Medium	Medium	Medium	Medium	
	Financial/Fundability	Low	Low	Low	Low	Low	Low	
	Acceptability to engagement partners	Medium	Medium	Low	Low	Medium	Low	
MCA Element	Transport System Integration	Neutral	Minor Positive	Minor Positive	Major Positive	Medium Negative	Major Positive	
	Land Use Integration	Neutral	Minor Negative	Minor Positive	Minor Positive	Medium Positive	Medium Positive	
	Social - three sub-criteria	Way of life	Minor Positive	Minor Positive	Minor Positive	Medium Positive	Medium Positive	Medium Positive
		Well being	Minor Positive	Minor Positive	Minor Positive	Medium Positive	Medium Positive	Medium Positive
	Community		Minor Negative	Minor Negative	Medium Negative	Major Negative	Major Negative	Major Negative
			Minor Negative	Minor Negative	Minor Negative	Medium Negative	Medium Negative	Medium Negative
	Ecological	Minor Negative	Minor Negative	Minor Negative	Major Negative	Minor Negative	Medium Negative	
	Visual and Landscape	Neutral	Minor Negative	Minor Negative	Major Negative	Minor Negative	Medium Negative	
	Urban Design	Minor Negative	Minor Negative	Medium Negative	Medium Negative	Medium Positive	Minor Positive	
	Cultural (TBC)	Neutral	Minor Negative	Medium Negative	Medium Negative	Medium Positive	Medium Positive	
	Heritage/Archaeology	Neutral	Minor Negative	Minor Negative	Medium Negative	Medium Negative	Medium Negative	
	Human Health (noise/vibration/ air quality/ contaminated land)	Neutral	Minor Negative	Minor Negative	Medium Negative	Medium Negative	Medium Negative	
	Property	Neutral	Minor Negative	Minor Negative	Major Negative	Medium Negative	Medium Negative	
	Cost \$M	Net property cost (\$M)	\$0.8M	\$4.5M	\$10M	\$24M	\$33M	\$23M
PV cost to NZ (\$M) 14		\$25M to \$40M	\$80M to \$130M	\$90M to \$150M	\$440M to \$710M	\$370M to \$580M	\$390M to \$620M	
IAF profile	Strategic Fit (H/M/L)	H	H	H	H	H	H	
	Effectiveness (H/M/L)	L	L	H	H	L	H	
	Efficiency (BCR range)	<1	1 to 3	<1	<1	<1	<1	

Figure 8 - Full short-listed option MCA comparison (IBC Options Report)

The recommended option as proposed in the DBC is Option E2 – an offline 4-lane expressway with construction recommended to commence in 2020 subject to statutory processes. This represents a tripling of capacity on the corridor at a cost of \$561m (cost range of \$475m to \$659m), and a return on investment of 70 cents for every dollar spent.

4.2 Key Findings

Under a ‘value-for-money’ focussed project environment, greater weight should be given to the economic returns of project options with staged, quick-win and lower cost solutions given greater consideration.

Given considerations around the timing of growth and the minor impact on customers' journey experience in the medium term, the \$561m required for the recommended option does not seem to be a value-for-money investment. However, further work is required to enhance safety in the corridor beyond the current short-term investment.

On revisiting the optioneering process, it appears that there are alternative (online) options which achieve a large degree of the intended outcomes for a significantly smaller investment. For example, Option C exhibits similar safety outcomes to the recommended option at approximately 25% of its cost. While the forecasted reduction in DSIs is lower (8.6 fewer with Option C versus 10.2 under the recommended option) the DSI reduction per dollar spent is significantly greater. Hence, there remains the potential to reduce predicted DSIs further through the design and pre-implementation phases to optimise the safety outcome.

It remains to be seen when a long-term intervention for an expressway-standard corridor between Cambridge and Piarere can be achieved incrementally through the existing corridor or a new offline route. Therefore, the two following options exist which require further consideration:

- Provide incremental safety improvements aligned to Option B/C while protecting for a long term off-line expressway.
- Provide incremental safety improvements aligned to Option B/C while futureproofing the existing corridor for transformation to an online expressway corridor at some point in the future.

Re-evaluation finding: A revised options development should be undertaken to reflect the increased emphasis on safety and resilience, and to allow for a wider range of interventions to be considered along with staged approaches.

Further analysis is required to clearly understand the trade-offs between outcomes, impacts and value for money of incremental delivery. This analysis is necessary to make an informed decision on the most appropriate long-term pathway.

5 Development of Revised Programme of Options

Following the review of the previous programme, The Transport Agency, NB Consulting and Arup developed a refined direction for the Cambridge to Piarere investment to respond to the increased emphasis on value-for-money and to take account of the GPS 2018 themes.

5.1 Consideration of GPS Themes

The re-evaluation process offered the opportunity to review whether the investment proposal and proposed interventions adopt the current government direction on how to deliver the best transport solutions for New Zealanders. The GPS provides three key themes to assist with the understanding of how to deliver on the priorities:

- A mode-neutral approach to transport planning and investment decisions.
- Incorporating technology and innovation into the design and delivery of land transport investment.
- Integrating land-use, transport planning and delivery.

5.1.1 Mode Neutrality

The primary function of the project corridor is to act as a regional connector – linking the Waikato, Bay of Plenty and Auckland regions along with areas to the south. Furthermore, the nature of the land-use along the corridor is not conducive to well utilised public transport options.

There is potential for a significant proportion of freight to be transferred onto a future rail corridor should this be progressed. The impact of an improved freight rail connection between Hamilton and Tauranga should be used as a sensitivity test to determine the extent of the traffic impacts and benefits that could be expected through this mode-shift, and the impact on the business case that would generate.

Re-evaluation finding: Mode-neutrality should be considered in terms of future regional rail freight connections as well as localised walk and cycle connectivity to schools etc. This opportunity should be explored further through the revision of the DBC and included in the revised programme.

5.1.2 Integrated Land-Use and Transport

There are limited opportunities to apply principles relating to the integration of land-use and transport in this corridor except to a minor degree at Karapiro given the low density and lack of urban centres along the corridor.

Re-evaluation finding: Opportunities to integrate land use and transport may be considered during the revision of the options development phase where locally appropriate but are anticipated to provide limited benefits.

5.1.3 Technology

ITS solutions were previously considered as potential supplementary measures to support the preferred option. This approach should be continued during the development of the design.

The provision of infrastructure to support electric and autonomous vehicles was previously considered. Consideration should be made during the development of the designs to support these technologies, where feasible.

Re-evaluation finding: Opportunities to integrate technology interventions should be considered during the revision of the options development phase where appropriate.

5.2 Revised Programme of Options

There remains a significant crash risk along the SH1 Cambridge to Piarere corridor following the implementation of the short-term improvements which should subsequently be addressed in the short to medium term.

The long-term option appears to have been influenced by a desire to continue to deliver a logical progression of the Waikato Expressway. However, evidence suggests that capacity improvements are not required for some time (i.e. the DBC states the corridor will reach 90% capacity by year 2066, based on a linear growth rate). Furthermore, the time when capacity interventions will be required suggests that an offline expressway is not warranted in the short or medium-term, although such a corridor may be justified in the long-term with the aim to provide a national strategic (high volume) route.

With a focus on delivery of a long-term solution, a greater understanding is needed around addressing safety issues and the timing and benefits/drawbacks of subsequent incremental improvements to provide for a long-term solution. This assessment needs to determine when early safety investment becomes obsolete with respect to a long-term online solution versus an offline option.

This work needs to be undertaken with urgency as it informs the long-term placement and safety solution for the SH1/29 intersection – a key safety risk on the network.

Short-Term Interventions (0-3 years)

- Continue with the implementation of short term safety improvements on the corridor, including speed management and enforcement.
- Revise the DBC, and refocus to:
 - Further reduce crash risk in the short/medium term.
 - Produce a clear programme of intervention triggers and timing for incremental investment.
 - Assess long-term offline versus incremental online options against short-term safety improvements to identify optimal value for money implementation strategy.
- Investigate SH1/29 intersection improvements based on the long-term recommendations in the DBC to address an urgent safety risk. This may be delivered as part of the long-term staged improvements programme or through extending the current scope of the SRA works on the corridor.

Medium-Term Interventions (3-10 years)

- Adoption of the outcomes of the revised DBC and continue to invest in additional safety improvements.
- Route protect necessary corridors based on long term recommendations in DBC.

Long-Term Interventions (10+ years)

- Implement the long-term solution as identified in the revised DBC.

5.3 Alignment to Transport Outcomes Framework and IAF

The revised programme of interventions described in Section 5.2 has been assessed in this section against the outcomes specified in the Transport Outcomes Framework to identify the degree of strategic alignment. The assessment is provided below. At a high level, the revised programme will enable the desired government outcomes to be achieved.

Activity	Timing			Key Benefits	Cost (\$m)	A transport system that improves wellbeing and liveability				
	Short (2018-2021)	Medium (2021-27)	Long (2028+)			Inclusive Access	Healthy & safe people	Economic prosperity	Resilience and security	Environmental sustainability
System Interventions										
Implement speed management and enforcement	✓			<ul style="list-style-type: none"> DSI reduction (included in online safety benefits) 	TBC	L	VH	L	L	L
State Highway Investment										
Continue with implementation of short-term safety improvements	✓			<ul style="list-style-type: none"> Reduce overall DSIs by ~30% Improve 30% of the corridor to a KiwiRAP star rating of above 4 	~\$7.5m	L	H	L	L	L
Investigate SH1/29 intersection improvements	✓			<ul style="list-style-type: none"> DSI reduction (included in online safety benefits) 	TBC	L	H	L	L	L
Complete DBC, but revisit the options analysis with a focus on: <ul style="list-style-type: none"> Reducing crash risk further in short/medium term 	✓	✓	✓	<ul style="list-style-type: none"> Reduction in five-year deaths or serious injuries by ~8-9 in 	~\$50m-\$150m (short/medium term)	M	H	M	L	L

<ul style="list-style-type: none"> Producing a clear programme of intervention triggers and timing for incremental investment Assessing long-term offline vs (incremental) online options against short term safety improvements to identify optimal value for money implementation strategy <p>On the basis of the above, the Transport Agency should continue to invest in additional safety improvements and, subject to the findings of the reconsideration of long-term options, route protect any necessary corridors for the long-term option.</p> <p>Deliver the long-term solution</p>				<p>the medium term to 10+ in the long term</p> <ul style="list-style-type: none"> Collective risk reduced from Medium/High to Low/Medium in the short term Increase in KiwiRAP safety rating from 2 to 3.5 	<p>TBC (long term – informed by revised DBC)</p>						
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