
**INDICATIVE BUSINESS CASE OPTIONS REPORT
SH1 CAMBRIDGE TO PIARERE (C2P) LONG TERM
IMPROVEMENTS**

Contract Number 2/15-011/501

Date: 12 May 2017
Ref: 232633.00
Status: FINAL

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- Creating what matters for future generations

Executive Summary

This report describes the option development and evaluation phase of the Cambridge to Piarere (C2P) Indicative Business Case (IBC). The IBC is part of the Cambridge to Piarere Long Term Improvements Project (the Project) which seeks to develop a long term preferred option for the State Highway 1 (SH1) from the end of the Cambridge Section of the Waikato Expressway to a 'tie-in' point on State Highway 29 (SH29)(Figure 1.1).

The process included ongoing engagement with a range of stakeholders and the community to develop a preferred corridor option. Specifically the process to date has involved:

1. Gathering evidence on a wider project area to determine constraints and issues
2. Using evidence to validate the problems, benefits and targets used to help develop the investment objectives
3. Developing a range of ideas and alternatives to form option development
4. Evaluating those ideas/alternatives and options with a three-stage multi criteria assessment (MCA) and are:
 - a. Stage 1: The investment objectives,
 - b. Stage 2: Technical complexity and risk; and
 - c. Stage 3: The effects.
5. Confirming the preferred corridor option for further consideration.

This report largely focuses on the points 3 to 5 above. Problems, benefits and constraint information (points 1 and 2) are provided within the separately completed C2P Strategic Activity Case and Constraints and Opportunity reports.

OPTION IDENTIFICATION AND METHODOLOGY APPROACH

In developing the business case for the project, the process has also considered how the optioneering process satisfies the considerations of alternatives in respect to the Resource Management Act (RMA). Part of the process of meeting the RMA requirements has been met through the use of a staged approach to corridor and route selection (ACRE approach). Each of the corridor options (at the IBC phase) were assessed using a MCA analysis, and based on consensus agreement by key stakeholders.

LONG LIST OF OPTIONS AND EVALUATION

A number of alternatives were developed from a stakeholder led 'idea generation' workshop and included a wide range of transport user demand, infrastructure supply and productivity ideas to address the problems. This included options such as: land use changes, speed management, enforcement, reductions or increases to traffic volumes, modifications to the existing corridor and building a completely new corridor, on or away from the existing highway.

Those ideas/alternatives were assessed against the stage one investment objectives and whether there were any fatal flaws before being grouped into a 'primary' alternative and 'sub option' alternatives matrix. As a result, 21 options were chosen to proceed as the long-list of options.

The 21 long-list options still included a range of potential solutions and were assessed against stages 1 and 2 of the MCA criteria, which included how well they aligned to the investment objectives and what level of technical complexity and risk would there be.

In summary, after the two-stage assessment, the long-list options that were discarded were largely due to the fact that they did not meet the investment benefits, needed major policy shifts (outside the remit of this project), did not align to the expectations of a National Strategic Route, or were similar to another option that had superior benefits and less risks.

The outcome of the long list assessment identified six options (one of which was a sub-option) to proceed to the short-list stage for further assessment. These options included a range of treatments/alternatives within each of those options with a variety of benefits and having a range of cost implications.

SHORT-LIST OF OPTIONS AND EVALUATION

The six short-list of options included:

1. Option A: ONLINE: Builds on the short-term improvements. Wide (1.5m) centreline with some additional central and roadside barrier and minor intersection improvements where there is risk
2. Option B: ONLINE: Provides alternating passing lanes and central and roadside barrier through the entire route. More access rationalisation than Option A. Provision of turn around facilities at at-grade intersections
3. Option C: ONLINE: Provides alternating passing lanes and central and roadside barrier through the entire route with parallel local roads and turn around facilities. No direct access for properties onto SH1 except at discrete positions. Provision of turn around facilities at at-grade intersections
4. Option D: ONLINE: Four lane expressway standard corridor with parallel local roads with no direct access on to SH1. Includes interchange style intersections at 2-3 (yet to be determined) locations
5. Option E1: OFFLINE NEW corridor: Four lane expressway standard corridor with parallel local roads with no direct access on to SH1. Includes interchange style intersections at 2-3 (yet to be determined) locations
6. Option E2: OFFLINE NEW corridor: Four lane expressway standard corridor with parallel local roads with no direct access on to SH1. Includes interchange style intersections at 2-3 (yet to be determined) locations

The short-list of options were assessed against all three stages of the MCA criteria. The corridor short-list options were presented to the community (via project updates, social media, public information day, and information kiosks) and were also part of an online survey, used to gather feedback. In addition, the specific three-staged evaluation of the short-list was presented to the stakeholder group (at a workshop) with the intention of confirming the evaluation undertaken to date and ultimately agreeing on a preferred corridor option.

As a result of the evaluation and discussion, there was agreement from the stakeholder group that Option E2 was the preferred option which closely aligned with the feedback received from the general public.

RECOMMENDATION

It is recommended that Corridor E2 be progressed in to the next stage of assessment (Detailed Business Case) to develop a preferred route within this defined corridor.

1 Introduction

This report describes the option development and evaluation phase of the Cambridge to Piarere (C2P) Indicative Business Case (IBC). The IBC is part of the delivery mechanism for investigating solutions for the Cambridge to Piarere Long Term Improvements Project (the Project). This report is informed by the Strategic Activity Case and Constraints, Issues and Opportunities Report and will inform the Business Case Report (to be prepared).

1.1 Purpose

The purpose of the C2P IBC is to develop a long-term preferred option for State Highway 1 (SH1) from the end of the Cambridge Section of the Waikato Expressway to a 'tie-in' point on State Highway 29 (SH29) (Figure 1.1), which meets the agreed investment objectives, has fully considered the risks and effects in accordance with the NZ Transport Agency's (Transport Agency's) Business Case Approach (BCA), and the principles of the Resource Management Act 1991 (RMA). A key part of the IBC is to present the keys steps of the option development process, for which this report presents this information in detail.

The purpose of this C2P Options Report is to:

- Outline the Stakeholder Engagement and inputs in to the process (Section 2)
- Summarise the evidence gathered that informed the development of the problems and benefits (Section 3)
- Document the methodology undertaken to develop and evaluate options for C2P (Section 4)
- Summarise the long-list and short-list of options (Sections 6 and 7), and
- Recommend the preferred way forward. (Section 9)

A summary of this report will be included in the final IBC report.



FIGURE 1-1: C2P STUDY AREA

1.2 Background

The key reference documents for the C2P project are summarised in Table 1-1.

These documents are referred to in order to ensure consistency with previous strategic needs and outcomes throughout the business case process.

DOCUMENT	SUMMARY
SH1/29 Hamilton to Tauranga Strategic Case	<p>Investment was confirmed for SH1 and SH29 due to the following issues:</p> <ul style="list-style-type: none"> ▪ SH1 - road safety and efficiency; ▪ SH29 – economic growth, wider transport network, mode shift and road safety
SH1 Cambridge to Piarere Programme Business Case	<ul style="list-style-type: none"> ▪ Problems identified related to safety, accessibility, and future capacity ▪ Preferred programme includes short-term online safety improvements, improvements to the SH1/29 intersection in the medium-term and longer-term efficiency improvements
SH1 Cambridge to Piarere (Short-Term Project)	<ul style="list-style-type: none"> ▪ Single Stage Business Case Approved in February 2017 ▪ Project addresses some short-term safety issues and recommends corridor wide centre line, some roadside barrier and minor intersection improvements ▪ Construction due to start in mid-2017, and be complete within 12 months.
SH1 Cambridge to Piarere Data and Evidence Collection Scoping Report	<ul style="list-style-type: none"> ▪ Collection of latest data and evidence used to support and/or update the problem statement and set up investment targets ▪ Used to inform Stakeholder Workshop # 1
SH1 Cambridge to Piarere Constraints, Issues and Opportunities Report	<ul style="list-style-type: none"> ▪ Mapping of constraints and opportunities gathered from technical specialists ▪ Used to inform Stakeholder Workshop # 2, by identifying constraints within the study area.
SH1 Cambridge to Piarere Strategic (Activity) Case	<ul style="list-style-type: none"> ▪ Confirmed the long-term problems of safety, accessibility, and future capacity after the short-term works have been completed (2026) ▪ Assessment includes the intersection of SH1/SH29
SH1 Cambridge to Piarere Indicative Business Case	<ul style="list-style-type: none"> ▪ To be prepared
SH1 Cambridge to Piarere Stakeholder and Community Engagement Plan	<ul style="list-style-type: none"> ▪ High-level identification of why we are engaging, who the engagement partners are and how we are going to engage with them. ▪ Engagement undertaken in accordance with this Plan is to inform the Business Case process and any subsequent RMA approval processes. ▪ This is a 'live' document that is to be updated throughout the Business Case process.

TABLE 1-1: SUMMARY OF KEY DOCUMENTS

1.3 Process to Date

Figure 1.2 describes the development of where this Option Report fits within the overall development of the IBC. The Scoping, Problems Opportunities and Constraints and Strategic Activity Case reports have already been completed.

This Options Report describes the work completed in developing and evaluating the options as part of the IBC.

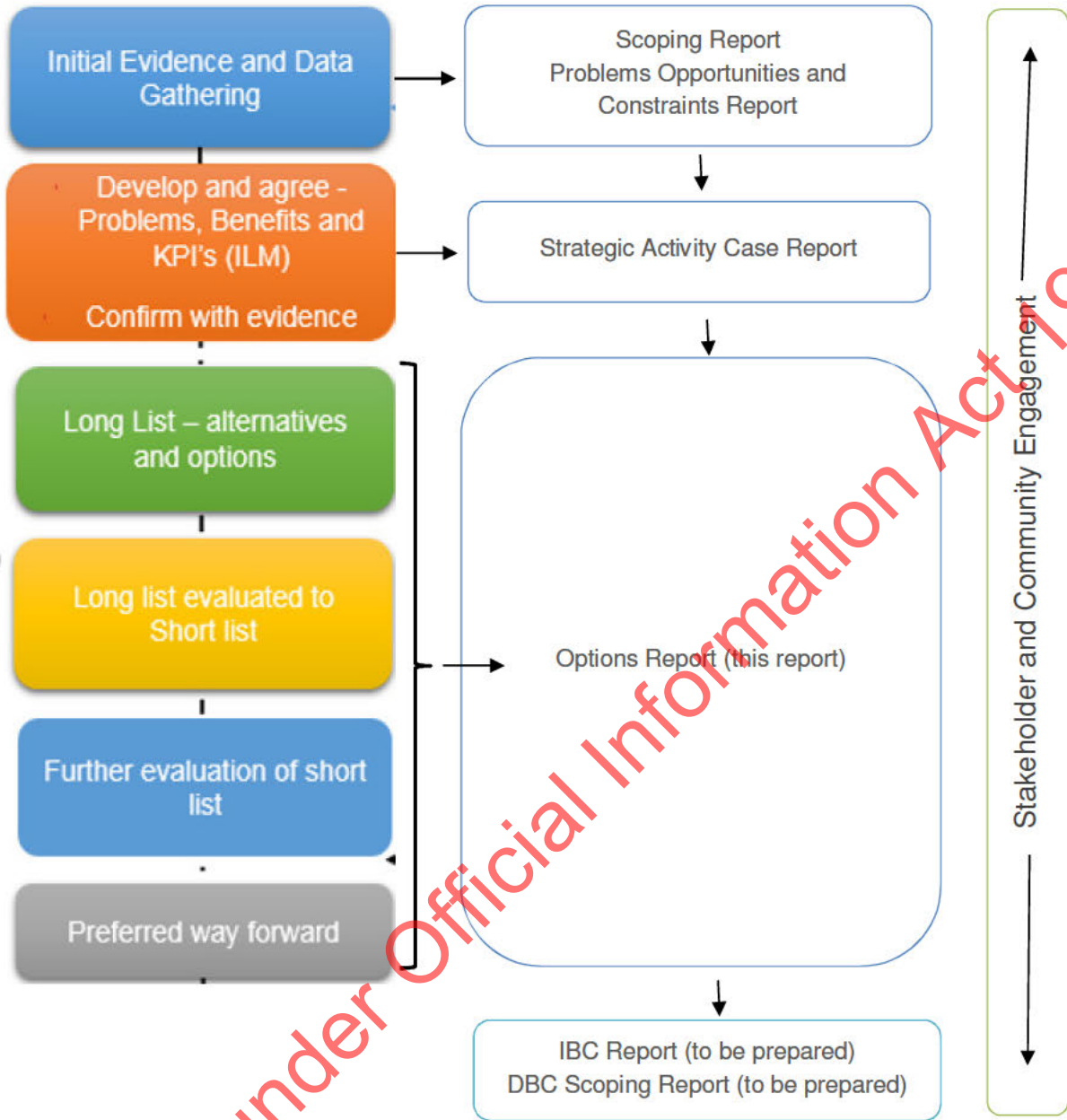


FIGURE 1-2: IBC PROCESS AND OUTPUT DOCUMENTS

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2 Stakeholder and Community Engagement Overview

Stakeholder and Community engagement has helped the project team develop the corridor issues, constraints and opportunities, problems, benefits, idea generation, alternatives and options development. As Figure 1-2 demonstrates, stakeholder and community engagement has played an important role throughout the IBC process.

The engagement process being applied to C2P will not only inform the IBC and DBC phases, but will also form an integral part of any subsequent approval processes required under the RMA. Accordingly, accurate records of all engagement during the IBC and DBC phases will be kept so that it is easily fed into the post DBC phase of the project.

In order to maximise reach, our approach has been to use a mixture of tried and true engagement methods along with more innovative techniques including:

- Stakeholder workshops
- One-on-One Meetings
- Project Updates (Newsletters)
- Maptionnaire
- Social Media
- Public Information Days
- Information Kiosks
- Letter Drops and electronic mailing lists

Engagement to date has been very successful in terms of the breadth of people being informed and also the high level of responses when feedback has been requested. Section 8 further outlines the engagement methods, the feedback provided via these engagement methods and how this has influenced the IBC process.

In terms of the options development process the key engagement methods used include stakeholder workshopping process and hui with Mana Whenua.

2.1.1 Stakeholder Workshops

Three stakeholder workshops have been held to date. The stakeholders represented at these workshops included: NZ Transport Agency, Waikato Regional Council, Waipa, Matamata-Piako, South Waikato district councils, mana whenua, NZ Police, Dept. of Conservation, Heritage NZ, and freight industry representatives.

- Workshop 1 (2 November 2016). The purpose of that workshop was to test the validity of the existing Investment Logic Map (ILM) and to create a more detailed picture of the problems and benefits of the Project. A key outcome was for stakeholders to help inform the ILM and ensure what they considered to be the key issues with this stretch of SH1 were understood by the project team.
- Workshop 2: the purpose of this workshop was to provide stakeholders with a greater understanding of the constraints present in the wider area (e.g. waterways, archaeological sites, areas of ecological value) and seek ideas/ alternatives to help build the options development. Feedback from the community regarding the first Maptionnaire survey (section 8.2.8) was presented at this workshop to help understand what is important to the community about the wider area the project sits within.
- Workshop 3: The purpose of this workshop was to provide feedback to the stakeholders on work done to date in getting to the short-list of six options. Feedback from the community regarding the short-list of options was also presented at this workshop to help stakeholders understand the community viewpoint. The stakeholder group was then asked to review the short-list of options before they and the project team agreed on a favoured option.

2.1.2 Mana Whenua

Whilst also being a part of the stakeholder workshop group, mana whenua represented by Ngaati Koroki Kahukura, Ngaati Hauaa and Raukawa have been engaged with from the outset, with NZ Transport Agency leading the engagement and Opus providing support as required. A number of hui (separate to the workshops) have been undertaken to date, including a hui with wider members of mana whenua invited to learn more about the short-list options being considered.

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3 Problems, Benefits, and Evidence

3.1 Context

Analysis of the study area characteristics and issues (and evidence to support the agreed problems) are provided within the Strategic Activity Case Report¹. A summary of the context, problems, and benefits is presented here.

The Study Area is largely based on the outcome from the SH1 Cambridge to Piarere Programme Business Case (PBC), which includes the area along and adjacent to SH1 (Figure 1.1). The initial study area was updated and reconfirmed in accordance with the ACRE approach, described in Section 4.1.

The study area starts at the southern end of the Cambridge section of the Waikato Expressway (WEX) on SH1, approximately 15km south of Hamilton. The project terminates at (and is inclusive of) the junction of SH1 and SH29 (Piarere). The section of highway is approximately 17km long.

SH1 is classified as a National High volume route under the Transport Agency's One Network Road Classification (ONRC). The highway is primarily a two lane two way road with two passing lanes in each direction. There are a number of at-grade priority controlled intersections on the corridor with the key intersections of Hydro Road, Karapiro Road, and SH29. The existing SH1 alignment is relatively straight with a posted speed limit of 100 km/h.

3.2 Problems and Benefits (Investment Logic Map)

The development of the benefit statements and investment objectives are fully described in the Strategic Activity Case report. The problem, benefits and targets were developed and agreed to by the workshop stakeholder group and are summarised below.

3.2.1 Problems

The two problem statements are:

1. Competing priorities between local access and high volumes of SH1 traffic is contributing to crashes and harm (40%)
2. In future, unacceptable levels of service discourages customers from choosing the SH1/SH29 corridor as the preferred route (60%)

3.2.2 Investment Objectives

The following benefits, measures and targets (investment objectives) and weightings were agreed:

1. Improve the corridor Level of Service (50%) by:
 - » Reducing the travel time by achieving an average 100km/h travel speed on SH1 at 2026 through to 2041
 - » Improving resilience by reducing risk or consequence of unplanned road disruptions
2. Improve local access and distance travelled to key community features² by all transport modes by 2026 (20%)
3. Improve Safety (30%) by:
 - » Reducing the number of DSI's by 70% by 2026
 - » Reducing the Collective risk rating to no more than Medium by 2026
 - » Maintaining a low personal risk rating from 2026 to 2041

¹ State Highway 1: Cambridge to Piarere Long Term Improvements Strategic (Activity) Case 2017

² Key features have been determined as a result of feedback from the community as part of the online Maptionnaire survey process.

The problems and benefits were used in the development of ideas and alternatives at the start of the optioneering process. It is important to note that although targets are shown above for each of the benefits, during the 'idea generation process' for development of the options, the stakeholders were asked to consider a range of ideas (demand, supply and productivity as described in Section 5) that would address the problems and benefits and that would likely achieve a range of outcomes, from low to high. This ensured that the ideas were not limited to just those that achieved a high alignment to the benefits. A more detailed description of the idea generation and option development process is provided in Section 5.

The Problem Statements and Investment Objectives were approved by the NZ Transport Agency on 9 March 2017 (refer to the VAC National Land Transport Plan Action Group meeting decisions 9 March 2017).

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4 Option Identification and Evaluation Approach

4.1 Methodology

Sections 171(1)(b) and 168A(3)(b) of the RMA require adequate consideration of alternatives; including sites, routes, or methods, when making a recommendation in any subsequent Notice of Requirement (assuming an option seeks a designation or alteration to an existing designation).

The process that has been undertaken and reported within this document was established to show how the Indicative Business Case (IBC) process and outputs (preferred corridor) has met the requirements of the Transport Agency (in terms of satisfying the business case approach) but also how the optioneering process satisfies the identification and analysis of alternatives under the RMA.

Part of the process of meeting the RMA requirements has been met through the use of the ACRE approach, which provides a staged approach to corridor and route selection and associated evaluation processes (section 4.1.1). ACRE is an acronym for Area, Corridor, Route, and Easement, which are four stages of increasingly refined geographical area that are assessed in increasing detail throughout the ACRE process. Key decisions are made at each stage using appropriate decision making techniques, taking into account the information relevant to that particular stage. Options were assessed using a Multi-Criteria Analysis (MCA) within each stage (Section 4.1.2). The MCA is a useful tool to assist in decision making in uncertain situations, and is particularly helpful when both tangible (for example cost) and intangible (for example cultural and environmental) factors are involved. The range of aspects that are relevant to the decision at each stage are numerous and varied, and it is necessary to bring together (and present) the information in a reliable and credible way.

Decisions were made using a consensus approach and followed a robust discussion with key stakeholders. The methods used recognise that the preferred solution is generally a compromise between achieving the greatest benefit, in the presence of some uncertainty, within the constraints and limits of the options available.

Application of this process to the C2P project will result in a defensible preferred route, appropriately connected to existing road networks, which can then be further evaluated and tested through the RMA statutory processes.

4.1.1 The ACRE Approach

The Transport Agency has adopted the four staged ACRE approach to identifying a suitable route for the C2P project. This approach lies across the IBC, DBC and pre-implementation phases of the Project and ensures that a staged process in option selection through refinement of the study area, development of wide study corridors, route (or alignment) selection and ultimately the final designation of that alignment (if needed).

The four stages are described as:

- Area Stage** This stage defines a feasible area for investigation and constraints mapping, for this IBC the area is shown in Figure 1-1.
- Corridor Stage** Typically this stage identifies a number of corridors to connect two points on a map. These should avoid the constraints identified in the Area stage, as best as possible. In the case of the C2P project, because the Project is aimed at developing a transportation system, this stage identified a number of potential corridors between three key connection points on a map (as identified as being important connection points during early investigation and engagement phases), and with a range of potential features within those corridors. A typical width of 1km was developed for the corridor options.

Route Stage Typically this stage identifies a few alignments within the preferred corridor, and for the C2P Project, a number of alternative connections. A typical width of 100m to 200m is expected to be used at the route option stage.

Easement Stage This stage involves the refinement of the preferred route, including further review of options arising from consultation and submissions to identify a designation easement (typically 100 metres wide). The limits of the designation width will incorporate the carriageway and associated elements. For example, the footprint may be wider for intersections, embankments, or stormwater treatment ponds.

The ACRE approach is an internationally recognised tool for systematically identifying and securing the most suitable route for linear based projects. The method involves progressively detailed investigation and filtering of information to identify, select, and confirm a final route for the Project. It ensures that information from the relevant disciplines (engineering, environmental planning, and property etc.) is well integrated and coordinated within the optioneering process, in order to achieve the most appropriate outcome.

The process starts with the broadest feasible area and systematically and progressively narrows the area of interest down to a single preferred route through increasingly detailed information collection and analysis of potential effects at each stage.

Within the IBC phase, the project team identified (and sought agreement from the stakeholders for) a wide study area adjacent to the existing state highway corridor to assess those wider area problems, constraints and opportunities. Once the constraints were mapped (refer to C2P Constraints Issues & Opportunities Report) this information assisted the key stakeholder group in workshopping the initial idea generation and development of the demand, productivity and supply alternatives. The project team used those ideas and the area wide constraint mapping to help form a variety of options (the long-list of options). The supply (or road based) options were formed in to a series of 1km wide corridors for further assessment. Options were then systematically compared using the Multi-Criteria Assessment (MCA) (Section 4.1.2) to ultimately identify a preferred (corridor) option.

ACRE is an iterative process and some overlap between stages may occur throughout the project phases in testing the suitability of proposed solutions. The ACRE process, with its progressive refinement of options and geographical extent, lends itself well to one of the aims of community/stakeholder engagement on the C2P project, which was to progressively build certainty for the affected communities as to the potential location of any final network solution.

This report only covers the optioneering process related to the Area and Corridor Stages of the ACRE process. A subsequent DBC Options Report will be developed at the DBC stage to cover the Route and Easement phases.

4.1.2 Multi Criteria Assessment Approach (MCA)

MCA is widely accepted as a formal method to assist in presenting a range of competing information, in a clear and logical manner, and ultimately assist in identifying what is favourable and unfavourable about a particular option so a decision can be made about any preferred option.

The MCA involves assigning scores to a set of chosen criteria or attributes for each option. Criteria or aspects are chosen at the start of the Project phase (prior to option development) and cover attributes relevant to the Project and expected options. The Transport Agency has developed an organisational guideline (in draft form) for application of MCA processes in Business case projects. However there remains no standard legislative or regulatory evaluation criteria. Regardless of the source of guidance, it is considered good practice to ensure the criteria takes into account matters described in Part 2, and Sections 6 and 7 of the RMA. Specifically, this includes Social, Economic, Cultural, and Environmental factors that underpin the purpose of these (and other relevant legislative) Acts. Ultimately, the MCA

provides a framework to ensure consideration opportunities to avoid, remedy, or mitigate any potential adverse effects, whilst ensuring the options achieves the Project objectives being sought.

The MCA is only one of the decision making tools to be used in selecting a preferred option. The project team has applied professional judgement by use of technical experts and sought feedback to inform the decisions via a robust engagement process with key stakeholders and the community throughout the process. In addition, Project Investors³ may have other factors they consider alongside the option MCA when deciding on a preferred option, such as option cost and ensuring a solution maximises benefits for the investment being made. In this way, any option that has been chosen as being preferred still has to seek endorsement by the Transport Agency Board, as being the final decision makers.

The MCA has been used in both the option development (Idea generation –Section 4.2) and option evaluation phase in various forms. The MCA considers three stages of assessment throughout the optioneering process (as shown in Table 4-1 below), including alignment to and/or assessment against:

- Stage 1: Investment Objectives
- Stage 2: Technical complexity and risk; and
- Stage 3: Effects

Each progressive phase of the optioneering process (as described in Section 4.1.3 below) involved consideration of increasingly detailed assessment criteria, as shown in Table 4-3 below.

EVALUATION PHASE	TOTAL NUMBER	FATAL FLAW	STAGE 1	STAGE 2	STAGE 3
Ideas/ Alternatives	43	✓	✓		
Long-List of Options	22		✓	✓	
Short-List of Options	6		✓	✓	✓

TABLE 4-1: SUMMARY OF MCA APPROACH PROCESS

The outcomes of the MCA process and the identification of the preferred corridor is explained in more detail in Sections 6 and 7.

A table showing the connection between the BCA, ACRE, and MCA process is shown in Table 4-2.

³ Those organisations that have a financial responsibility (or contributing financially) to achieve the Investment Objectives, such as the NZ Transport Agency.

Project Phase	Business Case Approach (BCA)	ACRE stage	Multi Criteria Analysis (MCA) completed	Description of key tasks
Strategic Case	Development of problem, consequence and benefits		Does not form part of this phase	
Programme Business Case	Identification of a programme of works and/or activities that deliver on a strategic case. Area wide considerations	A	<ul style="list-style-type: none"> Consideration and evaluation of a range of alternatives to assess a preferred programme of work 	<ul style="list-style-type: none"> Alternatives and programme assessment to be developed and well documented Wide consideration of ideas from range of stakeholders
Indicative Business Case	Area Assessment for Constraint Mapping and consideration of opportunities. Ideas compiled into options and a Corridor level assessment ⁴ Option Evaluation <ul style="list-style-type: none"> Investment objectives Risks/Technical; Environmental Effects 	A	<ul style="list-style-type: none"> Three stage process (equally weighted) provides mechanism to help determine the preferred corridor/option MCA modified to suit feedback. Specialists asked to consider wider area for initial assessment Loop back phase when more detailed information has been collected. More robust assessment of options Well documented, transparent and endorsed through stakeholder workshop process Identify recommended corridor option for investigation in DBC phase 	<ul style="list-style-type: none"> Problem statements identified (Workshop # 1) and Study area confirmed Evidence and data gathered (Data & Evidence Report) Constraints identified (Constraints Mapping) MCA developed Options identified (Workshop # 2) – Long-list MCA applied Stages 1 & 2 and short-list confirmed Information Day MCA applied Stage 3 – favoured (corridor) option identified Options Report (this report) Draft Consenting Strategy
		C		
Detailed Business Case	Route Assessment - consideration of a range of alignments/options ⁵ within the preferred Corridor. More assessment (scheme level) on alignment. Assessment Profile	R	<ul style="list-style-type: none"> Uses the MCA framework from the IBC and adds additional technical assessment information to provide a more robust assessment. Will use other methods of assessment for targets if required Loop back – given the information known, would you still have got the outcomes from the previous phase (IBC) of work. 	<ul style="list-style-type: none"> Refined constraints within preferred corridor Alignment option development within preferred corridor footprint, whilst seeking to avoid corridor constraints. MCA updated MCA applied to identify preferred route alignment Updated Consenting Strategy Land Acquisition Strategy
		E	Does not form part of this phase	
Pre-implementation/Implementation	More detailed level of design and assessment completed on preferred alignment including confirmed Designation/Easement		Does not form part of this phase	<ul style="list-style-type: none"> Use of more technical assessment to firm up estimate economics, and environmental effects Preparation of designation and consenting documents Finalisation of Assessment of Environmental Effects

TABLE 4-2: ACTIVITIES DURING THE STAGES OF ACRE

⁴ Could just be options rather than corridors - depends on the scale of the project. These might have to be completed on a project by project basis.

⁵ May be just one alignment option going into the DBC depending on the project.

4.1.3 Summary of Option Development and Evaluation Process

Following confirmation of the study area and problem definition (Stakeholder Workshop # 1), the project team identified and mapped known and/or expected constraints/considerations within the study area⁶. At Workshop # 2 the stakeholders (and project team) sought to identify potential ideas that could address the problems and contribute towards the Investment Objectives (to varying extent), whilst taking regard of the presented constraints. This stage formed the idea generation phase.

The ideas were firstly tested to ensure they did not contain fatal flaws (i.e. options that do not address the problems, or have unacceptable risk/outcome) and against the Stage 1 MCA criteria. Ideas/alternatives that progressed (38 No.) were considered for potential combinations (matrix of alternatives) in order to formulate stand-alone options (Long-list options). These Long-list of options (21 No.) were tested against the Stage 1 and Stage 2 MCA criteria, with the preferable options progressing to form the short-list of options (6 No.). The short-list options were considered in greater detail in order to present the options publicly (newsletters and Information Days), and ultimately evaluated at Workshop # 3 using the Stage 1, Stage 2, and Stage 3 MCA criteria.

This process is shown in Figure 4-1 and described in more detail further in this section.

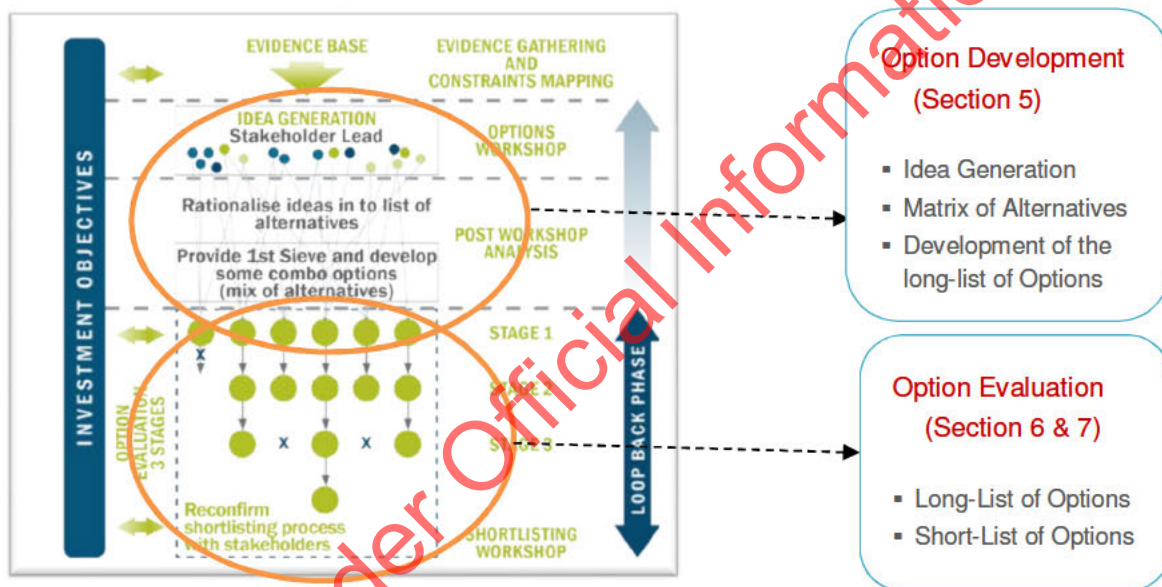


FIGURE 4-1: OPTION IDENTIFICATION METHODOLOGY

4.2 Criteria for Evaluation

4.2.1 Stage 1: Investment Objectives

The Stage 1 assessment was completed by evaluating each of the options against the five Project investment objectives (investment benefit + measure + target) as shown in Table 4-3.

Note that the objective measures (3 and 5) for improved local access and resilience were further refined in the short-list phase assessment to include a quantifiable measure rather than a “yes/no” assessment used at the earlier phases of evaluation.

⁶ Refer to C2P Constraints, Issues and Opportunities Report

INVESTMENT OBJECTIVE		MEASURES
1	Reduce the number of DSI's by 70% by 2026.	Reduced deaths and serious injuries on corridor
2	Reduce the collective risk to no more than medium and maintain a low personal risk rating from 2026 to 2041.	Crash risk ratings according to High Risk Rural Roads Guide methodology.
3	Improve local access to community features by all transport modes.	FOR LONG-LIST - Yes/No FOR SHORT-LIST : Subjective scale in comparison to existing case - based on convenience ratings from Maptionnaire Survey # 2
4	Reduce travel time by achieving an average 100km/h travel speed on SH1 at 2026 through to 2041.	Average travel speeds assessed using prediction tools.
5	Improve resilience of SH1 by reducing the risk or consequence of road disruptions.	FOR LONG-LIST - Yes/No FOR SHORT-LIST : Qualitative scale based on: 50% of score for reduction in # incidences, 50% of score based on improved alternative routes.

TABLE 4-3: STAGE 1: INVESTMENT OBJECTIVE AND MEASURE

Initial filtering of the options involved assigning a percentage of how well the option will likely achieve each of the objectives (Table 4-4). The percentage assigned was based on technical specialist input and evidence available to date. This assessment was completed at all phases of the Project, but initially helped filter and discard those options early on that had no or very poor alignment to the agreed benefits, and primarily, the core reason this Project was being considered for investment.

Whilst the Benefit Cost Ratio (BCR) and the Investment Assessment Framework (IAF) profile are shown these were not included in the initial phases of the evaluation due to limited information being available. They were however used in the short-list evaluation as an additional factor to consider in the development of the recommended option and will become increasingly important moving in to the next phase (DBC) of this Project.

Rating	None	Low	Moderate	High	Fatal Flaw
Achieving Benefit	0%	<50% of KPI	50% to 80% of KPI	80% to 100%+ of KPI	
BCR	<1	1 to 3	3 to 5	>5	
IAF	-	L__	M__	H__	

TABLE 4-4: STAGE 1 INVESTMENT OBJECTIVES

4.2.2 Stage 2: Technical Complexity and Risks

The Stage 2 assessment involves a more detailed assessment of options based on additional criteria relating to implementability/complexity/risk. Specifically, the assessment considered criteria such as risk relating to technical aspects, constructability, consenting, operations and maintenance, safety in design, financial/fundability and acceptability to key stakeholders.

Options were evaluated with various considerations shown in Table 4-5. Other documented perceived risks/dependencies were based on the evidence currently available and from feedback received from stakeholders at Workshop # 2.

CRITERIA	CONSIDERATION
Technical	How straightforward will it be to implement the option including any likely mitigation required?
	Are any novel, untried, or leading edge technologies involved?
	Are there any risks involved in developing or implementing this option?
Constructability	Are there any factors in this option that makes construction particularly difficult?
	Does the option involve significant work within live traffic lanes?
	Impact on other infrastructure – such as water service or transmission lines?
Consenting	How difficult is it anticipated to be to gain statutory approvals and how extensive is the mitigation required to address the effects?
	Is a new designation needed or alteration to an existing designation?
	Could the option include activities that are prohibited in the District or Regional Plans?
Operations and maintenance	Are there any factors that might affect the ability to operate or maintain the option over the projected life without major additional effects to the transport network (e.g. settlement remediation)?
	Do the works result in a change in operational procedures and/or techniques to undertake operational/maintenance works (e.g. solution requires new equipment or skills not part of existing service)
Safety in design	Are there any significant hazards associated with option that may pose a health and safety risk in design, construction or operation?
	Can safety risk be managed in the design process to treat/control it?
Financial/ Fundability	Can the capital costs be funded under traditional methods of funding?
	Are there potential cash flow risks associated with the option?
	Are there opportunities for tolling?
Acceptability to engagement partners	Has the option been made public, and if so, how acceptable is the option?
	Are there any real or anticipated objections from particular sections of the community or from a particular stakeholder?

TABLE 4-5: STAGE 2: KEY CONSIDERATIONS AND RISKS

Once those key considerations were assessed, the project team assigned a rating value based on a five-point assessment scale (Table 4-6) that ranged from neutral to a fatal flaw. This assessment then provided another level of filtering before undertaking a more detailed assessment (Stage 3) of the short-list of options.

RATING	DESIGN COMPLEXITY/RISK
Neutral	No risk/issue, or not required
Low	Standard or routine technical solution
Medium	Some complex elements, but achievable
High	Highly complex, non-standard solution, likelihood of significant technical difficulty and potential for cost/programme increase
Fatal Flaw	Not feasible/practicable

TABLE 4-6: STAGE 2 RISK RATINGS

4.2.3 Stage 3: Assessment of Effects

The Stage 3 assessment of effects is primarily completed on the short-list options, but any information gathered at this stage will also be taken into consideration as part of a 'loop back' phase. Specifically when more detailed information comes to hand, the project team will look back to the other options assessed and

discarded in earlier phases and determine whether (with new and updated information available) the same decisions would have been made on the options progressed.

The Stage 3 assessment involves a more detailed effects evaluation (both positive and negative) for criteria relating to Transport System Integration, Land Use Integration, Social, Ecological, Visual, Cultural, Heritage/Archaeology, Human Health (noise/ vibration/air quality/contaminated land) and Property. The assessment was largely completed by Opus specialists, with the Cultural assessment completed by mana whenua (including Ngaati Haua, Ngati Koroki Kahukura, and Raukawa). These assessments were then discussed and endorsed by the key stakeholders, as part of Workshop # 3. The short-list of options was evaluated with (but not limited to) various considerations shown in Table 4-7. Other documented perceived effects were based on evidence available and stakeholder feedback.

CRITERIA	CONSIDERATION
Transport System Integration	Are there wider transport system effects?
	How well does the option meet the forecast transport demand?
	How does the option fit within wider government policy including national transport targets?
Land Use Integration	Will the option promote or enhance land use integration and enhance opportunity for increased development (attract new jobs or help existing business)?
	Will services be able to function in a more complementary manner?
Social	Does the option affect way of life?
	Does the option affect personal wellbeing?
	Does the option impact on community cohesion/severance?
Ecological	What types of impacts on the natural environment are expected?
Visual & Landscape	Does the option affect existing landscape features?
	Can the option be mitigated or managed to avoid or reduce effects on landscape (landform, landcover, land use)?
	Can the option improve road user experience and cater for all road users?
Urban Design	Does the option impact on existing town form and community connectivity?
Cultural	Does the option impact on cultural and iwi values. Does it affect areas of cultural significance?
Heritage/ Archaeology	Does the option impact on any actual or expected areas of heritage or archaeological value?
	Does the option impact on any actual or expected areas of heritage or archaeological value?
Human Health	How does the option affect sensitive receivers (PPFs) in regards to noise, vibration, and air quality?
	Are there any specific issues with the option in relation to effects on people during construction (noise/vibration/air quality)?
	Does the option affect significant areas of contaminated land?
Property	Does the option result in land acquisition from significant number of land owners?
	Are there any complexities in the land ownership that will make acquisition difficult/complex?
	Does the option result in large areas of sterile land after construction?

TABLE 4-7: STAGE 3: KEY CONSIDERATIONS

Critical to the assessment, and in addition to those considerations, is the rating system and its context. Table 4-8 outlines a seven point rating system (-3 to +3) and the context developed by the project team, which was also endorsed by the stakeholder group.

The seven point assessment criteria was used where each option was compared against a do-nothing option. Options that had better effects than the do-nothing were scored positively and options that had an adverse effect were scored negatively. A score of zero (0) was considered to represent a negligible difference from the do-nothing. After the effects were assessed the specialist and the project team compared the effects across the options to ensure that they were still comparable to each other.

RATING	SCORE	CONTEXT
Fatal Flaw	N/A	Of such national/regional/local significance that unlikely to be consented and/or effects can't be mitigated
Major Positive	+3	Significant positive impact and/or provide significant enhancement
Medium Positive	+2	Moderate positive effect and/or effects that provide some enhancement
Minor Positive	+1	Minor positive effect
Neutral	0	No or negligible effect
Minor Negative	-1	Minor negative effect and/or easily mitigated
Medium Negative	-2	Moderate negative effect and/or effects that can be mitigated
Major Negative	-3	Significant negative impact and/or very difficult to mitigate

TABLE 4-8: STAGE 2 RATING ASSESSMENT

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5 Initial Option Development and Identification of Long-list Options

5.1.1 Idea Generation

The development of options included several different phases. Initially the stakeholder group, as part of Workshop # 2, created a number of ideas. The stakeholders were asked to consider a range of ideas:

- In a wider context and geographical area (rather than just the road corridor) - (i.e. the 'A' of the 'ACRE' approach – Section 4.1.1)).
- That would address the problems and benefits and would likely achieve a range of outcomes.
- That sought to avoid (wherever possible) the constraints/considerations identified by the technical experts
- Which could include those that modified:
 - » Transport user **demand**,
 - » Infrastructure **supply** and/or
 - » **Productivity** (or how the corridor performed)

This approach ensured that the ideas were not limited to just those that achieved a high alignment to the benefit but may include types of intervention to target specific community outcomes, crash types or crashes at specific locations, or a completely separate corridor or a specific road alignment type.

Subsequently, as result of the second stakeholder workshop, a total of 38 ideas/alternatives were grouped in to similar groups of supply, demand and productivity alternatives. The Stage 1 MCA process was introduced early to help remove those alternatives that clearly didn't align to the investment objectives or had a fatal flaw. The alternatives were initially assessed into one of the following four categories, as presented in Table 5-1 below:

1. Primary option - Alternatives that can be considered as a standalone option but can also be combined with others.
2. Sub-option - Alternatives which are well aligned to some Investment Objectives, but are not able to be a primary option. Sub-options were combined with either primary or other sub-options (refer to Section 5.1.2).
3. Opportunity – Alternatives that have the potential to enhance any option (Refer to Section 9.2 where opportunities in the DBC phase are discussed further)
4. Discard – Alternatives that are poorly aligned to investment objectives, or considered to have unacceptable levels of risk, therefore defined to be an option with a fatal flaw.

Alternatives - Number and Description		Category	Reason
1	Do-Nothing - Post short-term improvement works by SafeRoads Alliance	Discard	Does not align to investment benefits and leaves residual efficiency, safety, and access risk
2A	Local Roads: Improve local road standards to attract local traffic and tourists on to local roads and reduces traffic demand on SH1	Sub option	Included in Option 2
2B	Local Roads: Improve HoraHora Bridge to allow an alternative detour route (resilience)	Sub option	Included in Option 2
2C	Local Roads - Improved Local road western side of Karapiro with boat access. Assume good intersection connections from SH1 to the new local road	Discard	Significant cost and effect, and does not address a large portion of the investments benefits being targeted (i.e. safety and efficiency for SH1 users)
3	Improve connection between Karapiro School and Karapiro Village, including growth enabled under the Waipa 2050 growth strategy.	Opportunity	Not a primary solution on its own, but can enhance any of the options that progress and improve the outcome. Not dependent on any option progressing
4	Change land use (eliminate future growth option connections) so local roads users do not need to use SH1 for day to day commute, recreation etc	Primary	Developed into Options 1 and 2
5	Improve active mode facilities - connect the river trails to encourage increases walking and cycling for local traffic and local trips, tourist and recreational users	Opportunity	Not a primary solution on its own, but can enhance any of the options that progress and improve the outcome. Not dependent on any option progressing
6	Increase freight on to rail and coastal shipping including incorporating rail connections to inland ports. Reduces HCV traffic by 25% on SH1	Discard	Does not address a large portion of the investments benefits being targeted (i.e. safety and efficiency for SH1 users)
7	Shift Traffic to SH2 - encouraging traffic on to alternative SH2 route by doing nothing (currently preferred route by HCVs)	Discard	Does not address a large portion of the investments benefits being targeted (i.e. safety and efficiency for SH1 users), and introduces negative impacts on other corridors.
8	Container sling shot/Cable Car - Provide alternative transport system for freight containers. Assumes same reduction in HCV by 25%, as per Alternative 6	Discard	Does not address a large portion of the investments benefits being targeted (i.e. safety and efficiency for SH1 users).
9	Discourage Freight from using other SHs - use measures (such as pricing, infrastructure changes, speed management, lower level of service on other SH routes) to discourage HCV off them and on to SH1/SH29 as the preferred corridor (assume no other SH1 improvements)	Discard	Does not address a large portion of the investments benefits being targeted (i.e. safety and efficiency for SH1 users), and introduces negative impacts on other corridors.
10	Provision of Service Centers - Build good quality service Centre's along the SH1/SH29 corridor to attract traffic to the preferred corridor	Opportunity	Not a primary solution on its own, but can enhance any of the options that progress and improve the outcome. Not dependent on any option progressing
11	Speed Management (ITS at intersections): - Install RIAWS to reduce speeds on approach to high risk intersections	Discard	Does not address all of the investments benefits being targeted (i.e. introduces negative efficiency effects for SH1 users).
12	Speed Management (enforcement) - introduce point to point speed cameras	Primary	Developed into Option 3

Alternatives - Number and Description		Category	Reason
13	Speed Management (reduce speed limit) - Reduce posted speed limit to 90km/h - allows reduction in traffic variability	Discard	Does not address all of the investments benefits being targeted (i.e. introduces negative efficiency effects for SH1 users).
14	Speed Management (increase speed limit) - increase speed limit to 110km/h	Opportunity	Not a primary solution on its own, but can enhance <u>some</u> of the options that provide expressway style outcomes. Can be considered as potential enhancement to Options 14 to 21.
15	Not used refer 21B	N/A	Refer to Idea 21B
16	Construct weigh-in-motion pits - for enforcement purposes	Opportunity	Not a primary solution on its own, but can enhance any of the options that progress and improve the outcome. Not dependent on any option progressing
17	Autonomous Vehicles - includes creating environment of which autonomous cars and freight can operate i.e. will need a policy change with the Government committing to have a complete new fleet of autonomous vehicles within 10 years.	Primary	Developed into Option 4
18	Advanced Network management - Installation of ITS/VMS/Smart roads that allow messages to road users to help improve efficient, detours, network efficiencies. Right traffic on the right road	Primary	Developed into Option 5
19	Refer 2B	N/A	Refer to Idea 2B
20	Dedicated Special Vehicle Lanes - Provide dedicated lanes for HCV and autonomous vehicles (assume 4 lane road or wide shoulder and 4 star)	Discard	Does not address all of the investments benefits being targeted (i.e. introduces negative efficiency effects for SH1 users).
21A	Targeted Safety Improvements : Target Runoff Road and Head on Crashes Partial Length Central and Side Road Barrier, not addressing accesses	Primary	Developed into Option 6
21B	Targeted online safety improvements: Reduce the number of direct access on to the SH - Rationalise and reduce conflict of existing accesses ways, boat ramp access through left-in/left-out intersection arrangements and provision of larger intersection forms and service lanes connecting several properties	Primary	Developed into Option 7
21C	Targeted online safety improvements: Upgrade Hydro, Karapiro and SH29 to roundabouts	Discard	Does not address all of the investments benefits being targeted (i.e. introduces negative efficiency effects for SH1 users).
21D	Targeted online safety improvements - Intersection on - Upgrade Hydro, Karapiro and SH29 to grade separated intersections	Primary	Developed into Option 8
21E	21A+21B	Primary	Developed into Option 9

Alternatives - Number and Description		Category	Reason
22	Remove passing lanes along the route to allow a more consistent flow of traffic and remove potential merge capacity issues.	Discard	Does not address all of the investments benefits being targeted (i.e. introduces negative efficiency effects for SH1 users and leaves residual safety and access risks).
23	Online improvements (no extra lanes) with 3 barrier system + turnaround facilities (LT/LO driveway access only)	Primary	Developed into Option 10
24	Not used refer to 21C	N/A	Refer to Idea 21C
25	Not used refer to 21D	N/A	Refer to Idea 21D
26	Online improvements - 3 lanes (2 + 1) entire length with 3 barrier system + turnaround facilities	Primary	Developed into Option 11
27	Online improvements: 3 lanes (2 + 1) entire length with 3 barrier system + turnaround facilities + parallel local road	Primary	Developed into Option 12
28	Online Improvements: 4 lanes (not 4 star) entire length with limited access and roundabouts at Hydro, Karapiro and SH29 (assume central barrier but not continuous side barrier	Primary	Developed into Option 13
29	Online Improvements: 4 lanes entire length with cross section consistent with 4 star road (KiwiRAP rating) and Waikato Expressway	Primary	Developed into Option 14
30	Refer 2C	N/A	Refer to Idea 2C
31	Online/Offline Hybrid: Offline from Karapiro North. Online Karapiro South (4 star road)	Primary	Developed into Option 15
32	Online/Offline Hybrid: Offline - Kentucky North. Online - Kentucky South (4 star road)	Primary	Developed into Option 16
33	Offline (entire corridor): Complete eastern offline route from the end of the Cambridge section through to a point within 5 km of existing SH29 intersection (4 star)	Primary	Developed into Options 17A and 17B
34	Offline (entire corridor): Complete eastern offline route from the end of the Cambridge section through to a point on SH27 (4 star)	Primary	Developed into Option 18
35	Offline (entire corridor): Complete western offline route from end of the Expressway crossing Karapiro along the western side of the river (4 star on new)	Primary	Developed into Option 19
36	Offline (split routes): Offline eastern corridor from the end of the expressway splits , eastern route takes only SH29 traffic , western split takes SH1 traffic online (4 star road on both)	Primary	Developed into Option 20
37	Offline (split direction): From the end of the expressway splits, offline eastern route takes only southbound traffic, online takes northbound traffic online (4 star route on both and interchange connecting at southern point	Primary	Developed into Option 21

TABLE 5-1: GROUPED ALTERNATIVES ASSESSMENT

5.1.2 Matrix of Alternatives

Those alternatives that progressed from the Stage 1 assessment were placed into a matrix (Figure 5-1) and formed the basis of the Long-list option development. The overall summary of the results of this matrix categorisation are tabulated and provided in Figure 5-1 below.

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Alternative #	SUB-OPTION ALTERNATIVE ⁷											Final Long List Option
	Alternative 2A	Alternative 2B	Alternative 2C	Alternative 3	Alternative 5	Alternative 10	Alternative 11	Alternative 13	Alternative 14	Alternative 16	Alternative 21C	
Alternative 4	✓	✓	X	X	✓	X	X	X	X	✓	X	1
Alternative 12	X	X	X	✓	✓	✓	X	X	X	✓	X	2
Alternative 17	X	X	X	✓	✓	✓	X	X	X	✓	X	3
Alternative 18	X	X	X	✓	✓	✓	X	X	X	✓	X	4
Alternative 21A	X	X	X	✓	✓	✓	X	X	X	✓	X	5
Alternative 21B	X	X	X	✓	✓	✓	X	X	X	✓	X	6
Alternative 21D	X	X	X	✓	✓	✓	X	X	X	✓	X	7
Alternative 21E	X	X	X	✓	✓	✓	X	X	X	✓	X	8
Alternative 23	X	X	X	✓	✓	✓	X	X	X	✓	X	9
Alternative 26	X	X	X	✓	✓	✓	X	X	X	✓	X	10
Alternative 27	X	X	X	✓	✓	✓	X	X	X	✓	X	11
Alternative 28	X	X	X	✓	✓	✓	X	X	X	✓	X	12
Alternative 29	X	X	X	✓	✓	✓	X	X	✓	✓	X	13
Alternative 31	X	X	X	X	✓	✓	X	X	✓	✓	X	14
Alternative 32	X	X	X	✓	✓	✓	X	X	✓	✓	X	15
Alternative 34	X	X	X	X	✓	✓	X	X	✓	✓	X	16
Alternative 33	X	X	X	X	✓	✓	X	X	✓	✓	X	17
Alternative 35	X	X	X	X	✓	✓	X	X	✓	✓	X	18
Alternative 36	X	X	X	X	✓	✓	X	X	✓	✓	X	19
Alternative 37	X	X	X	X	✓	✓	X	X	✓	✓	X	20
												21

FIGURE 5-1: OPTION DEVELOPMENT MATRIX

⁷ As described in Section 5.1.1.
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6 Long List Option Evaluation

6.1 Evaluation Process and Outcomes

As a result of the option development matrix (Figure 5-1), a total of 21 options (with a range of supply, demand and productivity alternatives) were identified and made up the Long-list of options for further assessment.

The Long-list of options was then assessed against Stage 1 and Stage 2 of the three MCA criteria, as described in Section 4.1.2.

A summary of the option description, key discussion points and the outcomes of the Stage 1 and Stage 2 assessment, including the options identified to proceed to the short-list option analysis, is shown in Table 6-1. The table showing the full long list assessment is provided in Appendix A.

6.2 Summary

In summary, the five options (although one option progressed with two sub-options) recommended to proceed to the short-list stage include a range of treatments/alternatives within each of those options with a variety of benefits and having a range of cost implications (short-list options are described in Section 7). This range of options is important to enable differentiation of option outcomes at this early investigation phase and allow the investors to understand the range in costs involved to progressively address the problems.

The alternatives and options discarded at this stage will be revisited in the investigation phase to identify where elements of these options and alternatives represent an opportunity to improve outcomes for the preferred option. With regards to those groups of demand, productivity and supply options that were discarded:

- Demand
 - » All land use change options were discarded because either they did not meet the investment objectives and/or needed changes to major policy shifts (considered to be outside the remit of project) and therefore was considered a fatal flaw.
- Productivity
 - » Speed Management (point to point cameras) was discarded as it did not achieve the majority of investment objectives or meet the expectations of a National Strategic Route.
 - » Autonomous vehicles and ITS/ATMS were discarded because there was difficulty in getting perceived benefits, they required a major policy shift outside the scope of this project, or did not align well with the investment objectives.
 - » Targeted minor road improvements – most did not meet the majority of the investment objectives (one option short-listed).
- Supply
 - » Online improvements (with no extra lanes) or options with extra lanes but were not consistent with expectations of a National State highway were discarded. However, one option of this type was progressed as it was felt important to have a range of options being investigated further.
 - » Hybrid (Online/Offline). There were a number of options with this type of arrangement and some delivered similar outcomes. Therefore, the options with the best outcomes were taken through to short-list stage.
 - » Offline from end of current section of the Waikato Expressway. Included some options with split direction and split routes, and one with connection outside initial study area (connection to SH27). These options had mostly excellent alignment to all investment objectives but significant cost and risk.

OPTION	DESCRIPTION	DISCUSSION	STAGE 1	STAGE 2	PROCEED TO SHORT-LIST?
Do Nothing	This option makes no change from that proposed by the short-term project.	<ul style="list-style-type: none"> No alignment to investment objectives, residual efficiency, safety, and access risks, and reputational risks for the Agency. 	Discard	Discard	No
1	Change land use to eliminate future growth options	<ul style="list-style-type: none"> Low alignment to travel time and safety benefits and Fatal flaw as this option creates a significant conflict with the Waipa Growth Strategy. High risks for consenting and financial fundability 	Discard	Discard	No
2	Change land use to eliminate future growth options, improve local roads to attract more local journeys; and upgrade the Horahora Rd bridge to provide an alternative detour route.	<ul style="list-style-type: none"> Low alignment to travel time and safety benefits; Fatal flaw as this option creates a significant conflict with the Waipa Growth Strategy. High risks for consenting and financial fundability 	Discard	Discard	No
3	Speed management-Introduce point to point speed enforcement.	<ul style="list-style-type: none"> Negative effects on travel time Low alignment to safety benefits as the existing speeds are already quite low, which affects the effectiveness of the option; High risks for technical and consenting and acceptability to engagement partners as it provides travel times less than existing, and therefore less than desirable levels of service for this national route. 	Discard	Discard	No
4	Autonomous Vehicles: Create environment in which autonomous vehicles can operate and replace existing fleet.	<ul style="list-style-type: none"> Excellent alignment to objectives; however Fatal flaw for financial fundability High risks in terms of technical, consenting and acceptability to engagement partners The scope of this policy shift is at a national level, not a project level and change may be beyond project horizon. 	Proceed	Discard	No
5	Advanced network management-Install ITS/VMS/Smart Roads to enable better efficiency, detours, and network efficiencies by getting the right vehicles on the right road.	<ul style="list-style-type: none"> Poor alignment to investment objectives; except to resilience and access Could be retained as an opportunity to complement other options in the next phase. 	Discard	Discard	No

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OPTION	DESCRIPTION	DISCUSSION	STAGE 1	STAGE 2	PROCEED TO SHORT-LIST?
6	Targeted safety: Install partial length central and side barriers to target run-off road and head on crashes.	<ul style="list-style-type: none"> Good alignment to safety, access and resilience objectives Safety in design risks associated with on-corridor maintenance; Likely to be low acceptability to engagement partners as it is not seen to address the majority of the issues. Option 9 could achieve better outcomes at similar costs. 	Proceed	Discard	No
7	Targeted Safety-Rationalise and reduce existing access ways, and boat ramp access to left in/left out and provide larger intersection forms and service lanes.	<ul style="list-style-type: none"> Low alignment to travel time and safety benefits. Very low investment return in comparison to other options (i.e. less than 50% of benefits being achieved). Does not address corridor wide issues for future traffic growth with no extra lanes provided nor does it provide the Customer Level of Service (CLOS) desired for a national high volume highway. 	Discard	Discard	No
8	Targeted Safety-Upgrade Hydro Road, Karapiro Road and SH29 to grade separated interchanges.	<ul style="list-style-type: none"> Low alignment to travel time and safety benefits. Very low investment return in comparison to other options (i.e. less than 50% of benefits being achieved). Does not address corridor wide safety issues or accommodate future traffic growth with no extra lanes provided nor does it provide the CLOS desired for a national high volume highway. 	Discard	Discard	No
9	Targeted Safety: Rationalise and reduce existing access ways, boat ramp access to left in/left out, provide larger intersection forms/service lanes, install partial length side & central barriers.	<ul style="list-style-type: none"> Good alignment to safety, access, and resilience investment objectives Low alignment to travel time objectives Provides a mid-range option in to the next phase of assessment Medium Constructability and Safety in Design risk 	Proceed	Proceed	Proceed to short-list
10	Online Improvements: Install a full three barrier system, turn around facilities and restrict driveways to left in and left out only.	<ul style="list-style-type: none"> Good alignment to safety, access and resilience investment objectives No alignment to travel time benefits Safety in design risks due to the need for online maintenance. Option 9 achieves better outcomes at a similar cost. 	Proceed	Discard	No
11	Online Improvements-Upgrade to 2+1 lane layout and install full three barrier system and turn around facilities and restrict driveways to left in and left out only.	<ul style="list-style-type: none"> Very good alignment to safety, access and resilience objectives Moderate alignment to travel time objectives. Medium constructability and safety in design risk 	Proceed	Proceed	Proceed to short-list

OPTION	DESCRIPTION	DISCUSSION	STAGE 1	STAGE 2	PROCEED TO SHORT-LIST?
12	Online Improvements-Upgrade to 2+1 lane layout, install parallel local road, and install full three barrier system and turn around facilities and restrict driveways to left in and left out only.	<ul style="list-style-type: none"> Proceed due to good alignment to safety, access and resilience objectives Moderate alignment to travel time objectives Better safety and travel time outcomes than Option 11 but more technical, constructability and consenting risks. 	Proceed	Proceed	Proceed to short-list
13	Online Improvements-Widen to four lanes, install full length central barrier, partial length side barriers, restrict driveways to left in and left out only, provide roundabouts at Hydro Road, Karapiro Road, and SH29.	<ul style="list-style-type: none"> Very good alignment to safety, access, and resilience investment objectives No alignment to travel time objectives Medium technical, constructability and consenting risk. Unlikely to be acceptable to engagement partners as does not provide the travel time benefits nor the CLOS desired for a national high volume highway 	Proceed	Discard	No
14	Online Improvements-Widen to four lanes with layout consistent with the Waikato Expressway.	<ul style="list-style-type: none"> Excellent alignment to all investment objectives. Medium technical, constructability and consenting risk. 	Proceed	Proceed	Proceed to short-list
15	Hybrid Alignment-Construct offline 4 lane, 4 star road north of Karapiro and upgrade existing alignment to 4 lane, 4 star layout south of Karapiro.	<ul style="list-style-type: none"> Excellent alignment to all investment objectives. Medium technical, constructability, consenting and safety in design risk. higher maintenance requirement and limited additional benefit compared to option 14 	Proceed	Discard	No
16	Hybrid Alignment-Construct offline 4 lane, 4 star road north of Kentucky Road and upgrade existing alignment to 4 lane, 4 star layout south of Kentucky Road.	<ul style="list-style-type: none"> Excellent alignment to all investment objectives Medium technical, constructability, consenting and safety in design risk. Higher maintenance requirements and limited additional benefit compared to option 14 	Proceed	Discard	No
17	Offline Alignment-Construct new 4 star route from end of Cambridge Section to a point within 5 km of SH1/29 intersection.	<ul style="list-style-type: none"> Excellent alignment to all investment objectives Medium technical, consenting and safety in design risk. Medium risk for acceptability to engagement partners if this option follows the E1 route as it likely increases the journey distance for SH1 customers 	Proceed	Proceed	Proceed to short-list
18	Offline Alignment-Construct new 4 star route from end of Cambridge Section to a point on SH27.	<ul style="list-style-type: none"> Excellent alignment to all investment objectives High risks for constructability, consenting, financial fundability and acceptability engagement partners. Medium risk for Technical and safety in design 	Proceed	Discard	No

OPTION	DESCRIPTION	DISCUSSION	STAGE 1	STAGE 2	PROCEED TO SHORT-LIST?
19	Offline Alignment-Construct new 4 star route from end of Cambridge Section on the western side of the river.	<ul style="list-style-type: none"> ▪ Excellent alignment to all investment objectives ▪ Highest risk for all of the options across the stage 2 assessment. ▪ High risk for consenting, financial fundability and acceptability to engagement partners, particularly Iwi due to the effects on Te Awa. Medium risks for technical and safety in design. 	Proceed	Discard	No
20	Offline Alignment-Construct new 4 star route from end of Cambridge Section to take SH29 traffic and upgrade existing alignment the 4 star standard.	<ul style="list-style-type: none"> ▪ Excellent alignment to all investment objectives ▪ High risk for unacceptability to engagement partners due to costs of having to upgrade two separate routes to 4 star standard and undertake consenting issues on both. ▪ Medium technical, consenting, safety in design and financial fundability risk 	Proceed	Discard	No
21	Offline Alignment-Construct new route to east of existing alignment for southbound traffic and use existing alignment only for westbound traffic with both routes at 4 star level.	<ul style="list-style-type: none"> ▪ Excellent alignment to all of the investment objectives except for 50% alignment to reduction in travel time (only half traffic gets benefit). ▪ High risk for unacceptability to engagement partners due to costs of having to upgrade two separate routes to 4 star standard, two sets of consents and increases journey time for one direction of travel ▪ Medium technical, consenting, safety in design and financial fundability risk ▪ Higher risk and lower alignment to objectives than option 20 	Proceed	Discard	No

TABLE 6.4: LONG LIST OF OPTIONS

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6.3 Recommended Short-list of Options

Five options were recommended to be advanced to the short-list, these are; Options 9, 11, 12, 14, and 17. Option 17 was split into two sub-options that provide two different corridors through the Karapiro Hill Country.

Therefore, a total of six options were shortlisted and, for simplicity and engagement purposes, have been renamed to Options A to E2 (Table 6-2). A more detailed evaluation of the short-list of options is provided in section 7.

Option Number	Revised Option name ⁸
Option 9	A
Option 11	B
Option 12	C
Option 14	D
Option 17a	E1
Option 17b	E2

TABLE 6-2: SHORT-LIST OF OPTIONS

The six options were agreed to by the key stakeholders and approved by the Transport Agency (refer to the VAC National Land Transport Plan Action Group meeting decision 9 March 2017) for further assessment.

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⁸ Numbering has been updated to improve clarity in the description of the shortlisting process.

7 Short-List Option Evaluation

7.1 Short-list options

As a result of the Long-list option evaluation a total of six options were identified (Table 6-2) to proceed to the short-list phase and subject to further assessment. Those are:

5. Option A: ONLINE: Builds on the short-term improvements. Wide (1.5m) centreline with some additional central and roadside barrier and minor intersection improvements where there is risk
6. Option B: ONLINE: Provides alternating passing lanes and central and roadside barrier through the entire route. More access rationalisation than Option A. Provision of turn around facilities at at-grade intersections
7. Option C: ONLINE: Provides alternating passing lanes and central and roadside barrier through the entire route with parallel local roads and turn around facilities. No direct access for properties onto SH1 except at discrete positions. Provision of turn around facilities at at-grade intersections
8. Option D: ONLINE: Four lane expressway standard corridor with parallel local roads with no direct access on to SH1. Includes interchange style intersections at 2-3 (yet to be determined) locations
9. Option E1: OFFLINE NEW corridor: Four lane expressway standard corridor with parallel local roads with no direct access on to SH1. Includes interchange style intersections at 2-3 (yet to be determined) locations
10. Option E2: OFFLINE NEW corridor: Four lane expressway standard corridor with parallel local roads with no direct access on to SH1. Includes interchange style intersections at 2-3 (yet to be determined) locations

Each of these options are briefly described in Sections 7.1.1 to 7.1.6 below. More detailed description of the option characteristics and performance outcomes are presented in Appendix B.

As described in Section 4.1.2, the short-list of options were assessed against Stage 1, Stage 2 and Stage 3 of the three MCA criteria, and these assessments are summarised in Table 7-1 to Table 7-18.

The complete option MCA comparison is provided in Section 7.2.1.

7.1.1 Option A

Option A is ONLINE: This option builds on the short-term improvements⁹ and includes:

- A wide (1.5m) centreline with some additional central and roadside barrier and minor intersection improvements where there is risk. Actual locations are still to be determined
- All at-grade intersections (no reduction in the existing number of 10 intersections)
- No change to the existing number of passing lanes; two in each direction

The cross section profile is likely to resemble that shown in Figure 7-1.

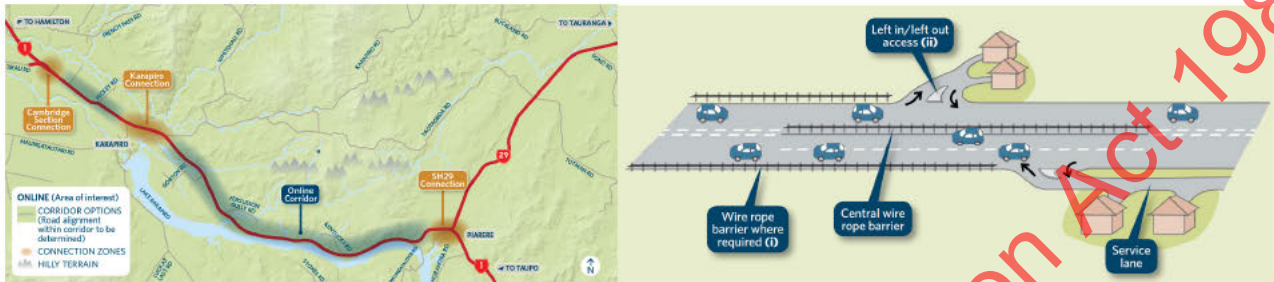


FIGURE 7-1: OPTION A – CONCEPT

The assessment of this option against the 3 stages the outcomes are shown in Table 7-1, Table 7-2, and Table 7-3.

This option has an expected investment assessment framework (IAF) profile of H/L<1 with an estimated PV cost range of \$25 Million to \$40 Million.

Stage 1: Alignment to Objectives ¹⁰	
Safety	Reduce DSI's from 14 to 9.2, but does not meet the agreed target of 70% reduction
Safety	Collective Risk = M3. Still residual risk for head on, run off road and intersection crashes (star rating approx. 3.3). Target for ONRC = 4 star
Access	Some improvements to access but does not consider accesses to key features identified as important by the community. Intersections and other accesses are still at grade with the potential for safety risk. Reduces the overall number of intersections and accesses by approx. 5-10%
Travel Time and Speeds	Does not reduce travel time. Current = 12.9min, predicted = 12.9min. Predicted Speed = 79km/h; target = 100 km/h.
Network Resilience	Some improvements. Reduces the number of closures by 25% through improved safety Does not provide any improvements to the alternative routes

TABLE 7-1: OPTION A - ALIGNMENT TO OBJECTIVES

⁹ The short-term improvements include a wide 1.5m centreline and some road side barrier in high risk locations

¹⁰ Refer Section 4.2 for ratings definitions

Stage 2: Risks ¹⁰	
Technical	Widening is required for the rationalisation of intersections, will also require extensions or alterations to existing local roads and accesses.
Constructability	Logistics needed to maintain access while undertaking construction. May require temporary diversions during construction.
Consentability	Works within the existing designation, outline plan of works required. Potential regional consents for culvert extensions etc.
Maintenance/Operation	Will increase local road network, longer private/public accesses to maintain.
Safety in Design (SID)	Construction and Maintenance requires work on or near live lanes.
Fundability	Lower cost than other options and moderate alignment to investment objectives.
Acceptability to Engagement Partners	Overall poorly viewed by all engagement partners. Whilst some minor improvements to through traffic safety, safety and access considered a major issue and are not addressed to a satisfactory level. Seen by the wider community as being a half measure.

TABLE 7-2: OPTION A – ASSESSMENT OF RISKS

Stage 3: Effects ¹⁰			
Transport System Integration	No realisable change		
Land Use Integration	No realisable change		
Social	Some minor improvements to way of life and wellbeing as a result of minor improvements to some intersections, but this may make it slightly more disruptive to the community.		
A ¹¹	B ¹²	C ¹³	
Ecological	Minor effects to adjoining foliage and waterways with associated minor widening works.		
Visual/Landscape	No realisable change		
Urban Design	Minor adverse effect from disruption to local connectivity along urban edge.		
Cultural	No real change from existing SH1		
Heritage/Arch	No realisable change		
Human Health	No realisable change		
Property	<2 properties - Approx. 800k		

TABLE 7-3: OPTION A – ASSESSMENT OF EFFECTS

¹¹ Way of life.

¹² Wellbeing.

¹³ Community.

7.1.2 Option B

Option B is ONLINE: This option includes:

- A wide (1.5m) centreline with full corridor central and roadside barrier and minor intersection improvements.
- 2 + 1 lane layout to provide for alternating passing lanes over full project length.
- All at-grade intersections (no reduction in the existing number of 10 intersections)

The cross section profile is likely to resemble that shown in Figure 7-2.



FIGURE 7-2: OPTION B – CONCEPT

The assessment of this option against the 3 stages the outcomes are shown in Table 7-4, Table 7-5, and Table 7-6.

This option has an expected IAF profile of H/L/1-3 with an estimated PV cost range of \$80 Million to \$130 Million.

Stage 1: Alignment to Objectives ¹⁰	
Safety	Reduce DSI from 14.2 to 5.8 – does not quite meet the agreed target of 70% reduction
Safety	Collective Risk = M. Significantly reduces head on and run off road risk. Still intersection crash risk (star rating approx. 3.3 - 3.5). ONRC target = 4 star
Access	Improvements to access and includes more rationalisation than Option A but does not address accesses to key features identified as important by the community. Intersections & other accesses are still at grade with the potential for safety risk. U – Turn facilities provided. Reduces the overall number of intersections and accesses by approx. 5%
Travel Time and Speeds	Some reductions in travel time. Current = 12.9 min predicted = 11.6min. Predicted Speed = 88 km/h; target = 100 km/h.
Network Resilience	Some improvements – reduction in safety and some increased carriageway width. Reduces the number of closures by 55%. Does not provide any improvements to the alternative routes

TABLE 7-4: OPTION B - ALIGNMENT TO OBJECTIVES

Stage 2: Risks ¹⁰	
Technical	Limited width south of Fergusson Gully Road due to embankment and lake adjacent to highway increase complexity of widening
Constructability	Logistics of online construction, narrow sections inhibiting ability to widen
Consentability	Potential effects on access to 50-55 properties and reserves. Alterations required to the existing designation. Regional consents required for culvert extensions etc.
Maintenance/Operation	Increased maintenance required for barrier strikes and additional paved area. [note this rating increased from low to medium risk based on discussion at Workshop 3]
Safety in Design (SID)	Construction and maintenance requires work on or near live lanes. Extended periods working on or in live lanes
Fundability	Good alignment with investment objectives.
Acceptability to Engagement Partners	Slight improvement on Option A, but some concerns remain. Seen by the wider community as a half measure.

TABLE 7-5: OPTION B – ASSESSMENT OF RISKS

Stage 3: Effects ¹⁰			
Transport System Integration		Some minor improvement in network capacity to cope with future traffic demands, but little other system integration.	
Land Use Integration		Slightly adverse effects as access to adjoining land may be more convoluted and therefore reduced attractiveness for development potential.	
Social		Some adverse community impacts relating to how access is retained and during construction. Minor positive outcomes with improved safety and improvements to local intersections.	
A ¹¹	B ¹²	C ¹³	
Ecological		Minor effects to adjoining foliage and waterways with associated minor widening works.	
Visual/Landscape		Expected loss of some vegetation screening from widening works, with impact in sensitive landscape (Lake Karapiro)	
Urban Design		Minor adverse effect from disruption to local connectivity along urban edge.	
Cultural		Some widened works on SH1 that could affect adjacent garden soils	
Heritage/Arch		Widening works may impact on local archaeological features that are more common near the Lake. Although noted that these features are typically less significant.	
Human Health		Minor effects relating to increased emissions and noise from improved travel speeds.	
Property		50-55 properties potentially affected approx. \$4.5 M	

TABLE 7-6: OPTION B – ASSESSMENT OF EFFECTS

7.1.3 Option C

Option C is ONLINE: This option includes:

- A wide (1.5m) centreline with full corridor central and roadside barrier and minor intersection improvements.
- 2 + 1 lane layout to provide for alternating passing lanes over full project length.
- Parallel local roads and turn around facilities at existing intersections
- No direct access for properties onto SH1 except at discrete locations (being existing intersections).
- All at-grade Intersections (no reduction in the existing number of 10 intersections)

The cross section profile is likely to resemble that shown in Figure 7-3.

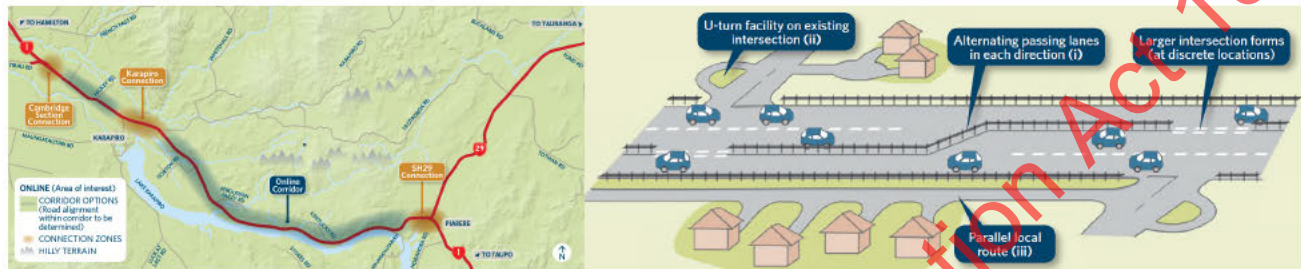


FIGURE 7-3: OPTION C – CONCEPT

The assessment of this option against the 3 stages the outcomes are shown in Table 7-7, Table 7-8, and Table 7-9.

This option has an expected IAF profile of H/H/<1 with an estimated PV cost range of \$90 Million to \$150 Million.

Stage 1: Alignment to Objectives ¹⁰	
Safety	Reduce DSI from 14 to 4.8 and almost meets the agreed target of 70% reduction.
Safety	LM Collective and L Personal Risk. There is still residual risk for intersection crashes as they are at-grade (star rating approx. 3.4-3.6). Risk has been reduced as overall no. of accesses have been closed/rationalised however still same number of at grade intersections as current. ONRC target = 4 star
Access	Some improvements to access but minor and only addresses a small proportion of the accesses to key features identified as important by the community. Intersections and other accesses are still at grade with the potential for safety risk but reduced number. Reduces the overall number of intersections and accesses by 50%
Travel Time and Speeds	Slightly better than Option B. Reduces travel time. Current = 12.9 min, predicted = 11.3 min. Predicted Speed = 90km/h; target = 100 km/h.
Network Resilience	Reduces the number of closures by 80%. Provides parallel local roads which could be used as alternative routes, however they may not be as of a standard that can accommodate HPMV's.

TABLE 7-7: OPTION C - ALIGNMENT TO INVESTMENT OBJECTIVES

Stage 2: Risks ¹⁰	
Technical	Limited width travelling south of Fergusson Gully Road, where embankment on one side and lake on other. Limited room to improve reserve access. Bridge solutions likely to be needed.
Constructability	Some complex elements and disruptive to both SH1 and local traffic. Physical limitation in some places due to Lake Karapiro and bluffs
Consentability	50-55 properties/reserve access to consider. Large changes to how people access their properties. Alterations to the designation and regional consents are expected to be required.
Maintenance	Increased maintenance required for barrier strikes and additional paved area. [note this ratings increased from low to medium risk based on discussion at Workshop 3]
Safety in Design (SID)	Construction and Maintenance requires work on or near live lanes.
Fundability	Good alignment with Investment objectives
Acceptability to Engagement Partners	A mixed community response with some seeing it no better than options A/B and others thought it was a marked improvement.

TABLE 7-8: OPTION C - ASSESSMENT OF RISKS

Stage 3: Effects ¹⁰	
Transport System Integration	Some minor improvement in network capacity to cope with future traffic demands, but little other system integration.
Land Use Integration	Minor improvement to land use development potential through introduction of parallel roads and improved access.
Social	Some positives for Way of life and Well-being. Some potential impacts to the community
A ¹¹ B ¹² C ¹³	
Ecological	Minor effects to adjoining foliage and waterways with associated minor widening works.
Visual/Landscape	Expected loss of some vegetation screening from widening works, with impact in sensitive landscape (Lake Karapiro). Expected to introduce additional bridge structures under/over state highway.
Urban Design	Modifying an already impacted environment. Solution is focused around vehicle transport and not other users
Cultural	Some widened works on SH1 that could affect adjacent garden soils and result in roading footprint closer to the awa
Heritage/Arch	Widening works may impact on local archaeological features that are more common near the Lake. Although noted that these features are typically less significant.
Human Health	Minor effects relating to increased emissions and noise from improved travel speeds.
Property	50 - 55 properties potentially affected, approx. \$10M (possible Reserve land)

TABLE 7-9: OPTION C - ASSESSMENT OF EFFECTS

7.1.4 Option D

Option D is ONLINE: This option includes:

- 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 or 3 locations
- No direct access for properties onto SH1. All property access to parallel local roads.

The cross section profile is likely to resemble that shown in Figure 7-4.



FIGURE 7-4: OPTION D – CONCEPT

The assessment of this option against the 3 stages the outcomes are shown in Table 7-10, Table 7-11, and Table 7-12.

This option has an expected IAF profile of H/H<1 with an estimated PV cost range of \$440 Million to \$710 Million.

Stage 1: Alignment to Objectives ¹⁰	
Safety	Reduce DSI from 14 to 3.8 and exceeds the agreed target of 70% reduction
Safety	LM Collective and L Personal Risk. Significantly reduced future crash risk (star rating approx. 4.6-4.8). ONRC target = 4 star
Access	Major improvements. Intersections and other accesses off parallel local roads and major interchanges. Reduces the overall number of intersections and key accesses by 100%
Travel Time and Speeds	Excellent. Current = 12.9 min, predicted = 10.2 min. Predicted Speed = 100 km/h; target = 100 km/h.
Network Resilience	Reduces the number of closures by 90% Provides parallel local roads or other side roads which could be used as alternative routes, however they may not be of a standard that can accommodate HPMV's.

TABLE 7-10: OPTION D - ALIGNMENT TO INVESTMENT OBJECTIVES

Stage 2: Risks ¹⁰	
Technical	Curve straightening needed, plus additional structures for access under/over/along reserve areas. Limited width travelling south of Fergusson Gully Rd, where embankment on one side and lake on other. Limited room to improve reserve access
Constructability	Highly complex and disruptive to both SH1 & local traffic. Physical limitation in some places due to Lake Karapiro and bluffs
Consentability	Density of (59+) Properties & reserves. Large changes to access and intersection form. Large alterations to designation and regional council consents are expected to be required
Maintenance/Operation	Increased maintenance due to barrier strikes and increased paved surface area.
Safety in Design (SID)	Construction and Maintenance requires work on or near live lanes
Fundability	Good alignment to investment objectives but may need economic case similar to WeX to justify investment.
Acceptability to Engagement Partners	Meets all the objectives but there are some large disruptions to property along corridor and length of construction

TABLE 7-11: OPTION D - ASSESSMENT OF RISKS

Stage 3: Effects ¹⁰		
Transport System Integration	Significant network capacity improvements to cope with all projected traffic demands. Excellent integration with existing SH network and enables local roads and SH's to function independently but complementary.	
Land Use Integration	Minor improvement to land use development potential through introduction of parallel roads and improved access.	
Social	Positives for way of life and wellbeing but major potential impact on community	
A	B	C ¹⁰
Ecological	The extent of the footprint at key ecological pinch points would need to be assessed.	
Visual/Landscape	Steep cuts, limited space, impact on significant landscapes (river/mountains). Landscape already compromised by highway environment	
Urban Design	Solution focused around vehicle transport and not other users	
Cultural	Substantial widened works on SH1 that could affect adjacent garden soils, reserves, and result in roading footprint closer to the awa	
Heritage/Arch	Numerous recorded sites in close proximity to river	
Human Health	Wide road, high speeds, potentially moving the highway closer to residences, potentially resulting in more noise and vibration.	
Property	55-60 properties potentially affected approx. \$24M (including Reserve land)	

TABLE 7-12: OPTION D - ASSESSMENT OF EFFECTS

7.1.5 Option E1

Option E1 runs parallel to the existing SH1 corridor from the end of the Waikato Expressway to an area in the vicinity of Hydro and Karapiro Roads. It then forms a new OFFLINE corridor to a point approximately 2-3km north (along SH29) of the existing SH1/SH29 intersection. This option includes:

- 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 or 3 locations
- No direct access for properties onto SH1. All property access to parallel local roads or from existing SH1 corridor.
- A longer distance and journey time for the SH1 south route and route shortening for the SH1/29 journey

The cross section profile is likely to resemble that shown in Figure 7-5



FIGURE 7-5: OPTION E1 – CONCEPT

The assessment of this option against the 3 stages the outcomes are shown in Table 7-13, Table 7-14, and Table 7-15.

This option has an expected IAF profile of H/L<1 with an estimated PV cost range of \$370 Million to \$580 Million.

Stage 1: Alignment to Objectives ¹⁰	
Safety	Reduce DSI from 14 to 3.8 and exceeds the agreed target of 70% reduction
Safety	LM Collective and L Personal Risk. Significantly reduced future crash risk (star rating approx. 4.6-4.8). ONRC target = 4 star
Access	Major improvements Intersections and other accesses off parallel local roads and major interchanges Reduces the overall number of intersection and key accesses by 100%
Travel Time and Speeds	Excellent. Current = 12.9 min, predicted = 8.2 min for SH29 and 11.4 min for SH1 South. Predicted Speed = 100 km/h; target = 100 km/h.
Network Resilience	Reduces the number of closures by 90% and there is potential to use new parallel routes (such as the existing state highway) as alternatives

TABLE 7-13: OPTION E1 ALIGNMENT TO INVESTMENT OBJECTIVES

Stage 2: Risks ¹⁰	
Technical	Greater uncertainty given lack of information available, therefore, greater risk that the Project will include more technically challenging solutions
Constructability	Although scale is larger, the offline works make it relatively simple to construct what is expected to be a "business as usual" expressway construction similar to other local expressway sections. Significant benefits over an online solution due to less interaction with live traffic.
Consentability	New effects and new affected parties. Large change to existing environment. Large changes to access and intersection form as well as offline effects. Large alterations to the designation and regional consents required.
Maintenance/Operation	Business as Usual
Safety in Design(SID)	Although offline, likely moderate risks to mitigate
Fundability	Good alignment to investment objectives but may need economic case similar to WeX to justify investment.
Acceptability to Engagement Partners	The community raised concerns about impacts an offline option would have on the local community. The stakeholders raised concerns how this option fits in with the wider transport network.

TABLE 7-14: OPTION E1 - ASSESSMENT OF RISKS

Stage 3: Effects ¹⁰		
Transport System Integration	Excellent improvement to network capacity to cater for future traffic demands, but this option may not fit within the SH system. Significant disadvantages SH1 south traffic & risks having SH1 traffic continue to use the existing SH1 route to avoid the additional trip length, undermining the strategic intent of the project. Significant work needed on the old SH1 route to encourage use of new route, and/or significant (unknown) investment may be needed for an extension of SH1 south – e.g. link to SH27 and around Tirau.	
Land Use Integration	Separation of SH from local roads enables excellent development potential between river and community	
Social	Positives for way of life and wellbeing but major potential impact on community	
A ¹¹	B ¹²	C ¹³
Ecological	Adverse impacts on sensitive areas & river catchments	
Visual/Landscape	Offline retains views to landscape features, including distant views of lake and river environment. Will improve landscape and visual effects around lake and river, but likely to increase opportunity for development. Given significant change in land use from rural/rural residential to highway, and overall minor negative effect.	
Urban Design	Opportunities to grow & connect communities. Better than E2	
Cultural	Moves alignment away from the awa, and maximises opportunities to enhance water quality. Some risk of encountering pā sites	
Heritage/Arch	Option is likely to disturb more undisturbed/unmapped archaeological sites, although there are expected to be fewer sites of interest the further the option is away from the River, however, such features are likely to be more significant (e.g. pā sites).	
Human Health	Wide road, High speeds and gradient. Big change in noise environment for some receivers on new corridor	
Property	60-65 properties potentially affected, approx. \$33M	

TABLE 7-15: OPTION E1 - ASSESSMENT OF EFFECTS

7.1.6 Option E2

Option E2 runs parallel to the existing SH1 route from the end of the Waikato Expressway to an area in the vicinity of Hydro and Karapiro Roads. It then shifts to a new OFFLINE corridor (on north side of existing SH1 corridor) to a point near to the current location of SH1 intersection with SH29. This option includes:

- 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 or 3 locations
- No direct access for properties onto SH1. All property access to parallel local roads or from existing SH1 corridor.
- Shorter distance and journey times for both SH29 and SH1 south routes

The cross section profile is likely to resemble that shown in Figure 7-6

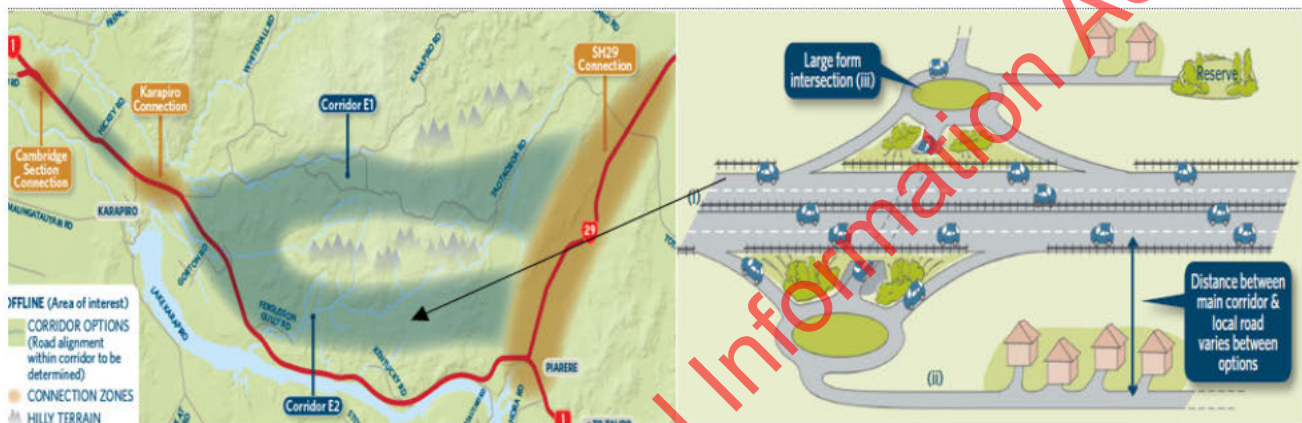


FIGURE 7-6: OPTION E2 – CONCEPT

The assessment of this option against the 3 stages the outcomes are shown in Table 7-16, Table 7-17, and Table 7-18.

This option has an expected IAF profile of H/H<1 with an estimated PV cost range of \$390 Million to \$620 Million.

Stage 1: Alignment to Objectives ¹⁰	
Safety	Reduce DSI from 14 to 3.8 and exceeds the agreed target of 70% reduction
Safety	LM Collective Risk and L Personal Risk. Significantly reduced future crash risk (star rating approx. 4.6-4.8). ONRC target = 4 star
Access	Major improvements Intersections and other accesses off parallel local roads and major interchanges Reduces the overall number of intersections and key accesses by 100%
Travel Time and Speeds	Excellent. Current = 12.9 min, predicted = 9.1 min for SH29 and 9.7 min for SH1 South. Predicted Speed = 100 km/h; target = 100 km/h.
Network Resilience	Reduces the number of closures by 90% and there is potential to use new parallel routes (such as the existing SH1) as alternatives

TABLE 7-16: OPTION E2 - ALIGNMENT TO INVESTMENT OBJECTIVES

Stage 2: Risks ¹⁰	
Technical	The broader the brush the greater the risk it will include more technically challenging solutions
Constructability	Although scale is larger, the offline works make it relatively simple to construct what is expected to be a “business as usual” expressway construction similar to other local expressway sections. Significant benefits over an online solution due to less interaction with live traffic.
Consentability	New effects and new affected parties. Large change to existing environment. Large changes to access and intersection form as well as offline effects. Large alterations to the designation and regional consents required.
Maintenance/Operation	Business as usual.
Safety in Design (SID)	Although offline, likely moderate risks to mitigate
Fundability	Good alignment to investment objectives but may need economic case similar to WeX to justify investment.
Acceptability to Engagement Partners	The community raised concerns about impacts an offline option would have on the local community. Stakeholders favoured this option.

TABLE 7-17: OPTION E2 - ASSESSMENT OF RISKS

Stage 3: Effects ¹⁰		
Transport System Integration	Excellent improvements to network capacity to cope with all future projected traffic demands. Excellent integration with existing SH network & enables local roads & SH's to function independently but complementary	
Land Use Integration	Allows unlimited potential on the local existing road for access and integration and removal community constraints compared to the online options	
Social	Positives for way of life and wellbeing but major potential impact on community	
A ¹¹	B ¹²	C ¹³
Ecological	Adverse impacts on sensitive areas and river catchments (provided it avoids Warrenheip Reserve)	
Visual/Landscape	Effects on streams and significant natural areas. Views to river and major structures. Potential to increase opportunities for development around the lake.	
Urban Design	Opportunities to improve and support existing Karapiro Village and community. Facilitate new development and growth. Opportunities for other modes of transport including wa king, cycling.	
Cultural	Moves alignment away from the awa, and maximises opportunities to enhance water quality. Some risk of encountering pā sites and cave/rock shelter.	
Heritage/Arch	Option is likely to disturb more undisturbed/unmapped archaeological sites. Whilst there are expected to be less sites of interest the further the option is away from the River, the more significant the features are likely to be (e.g. pā sites).	
Human Health	Wide road, high speeds and gradient. Big change in noise environment for some receivers	
Property	45-50 properties potentially affected, approx. \$23M	

TABLE 7-18: OPTION E2 - ASSESSMENT OF EFFECTS

7.2 Summary of MCA for Short-list Options

A summary of the total MCA assessment for the short-list of options is provided in Table 7-19, based on the assessment scoring described in Section 4.2. Further assessment including a sensitivity test for a range of scenarios has also been completed. This analysis is provided in Section 7.2.2

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7.2.1 Comparison and Summary of Options

		OPTION A	OPTION B	OPTION C	OPTION D	OPTION E1	OPTION E2	
Alignment with Investment Benefits and Performance Measures	Reduce the number of DSI's [70% reduction in DSI's 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
	Ecological	Minor Negative	Minor Negative	Minor Negative	Medium Negative	Medium 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	

TABLE 7-19: FULL SHORT-LIST OPTION MCA COMPARISON

¹⁴ Cost range is undiscounted and includes property, construction, and associated fees as well as a range for uncertainty in scope and costings.

7.2.2 MCA Base Scoring and Sensitivity Testing

The base MCA scoring has been applied as described in Section 4.2, with equal weighting applied to each of the three criteria stages, i.e.:

- Stage 1: Investment Objectives 33.3%
- Stage 2: Implementability/Risk 33.3%
- Stage 3: Assessment of effects 33.3%

This identifies the base ranking of options from the MCA as shown in Table 7-20 below, with E2 being the number one ranked option:

	Option					
	A	B	C	D	E1	E2
RANKING - equal weighting (1/3, 1/3, 1/3)	6	5	4	3	2	1

TABLE 7-20: BASE RANKING FROM MCA COMPARISON

A range of sensitivity tests were undertaken to understand the impact on the base scores using a number of predetermined scenarios. These sensitivity tests included:

1. Using the stakeholder weightings for Investment Objectives
2. Doubling the weighting of the Investment Objective criteria in comparison to the other criteria
3. Doubling the weighting of the Implementability/Risk criteria in comparison to the other criteria
4. Doubling the weighting of the Assessment of Effects criteria in comparison to the other criteria
5. Change in score for Transport System Integration for Option E1¹⁵

These sensitivity test outcomes are shown in Table 7-21 below. Similarly, Option E2 is shown as being the number one ranked option for all cases.

	Option					
	A	B	C	D	E1	E2
RANKING - equal weighting (1/3, 1/3, 1/3)	6	5	4	3	2	1
SENSITIVITY TESTING						
Stakeholder weighting (for benefits only)	6	5	4	3	2	1
50% Benefit weighting bias	6	5	4	3	2	1
50% Risk Weighting bias	6	5	4	3	2	1
50% Env Weighting bias	5	6	4	3	2	1
Change in Transport System integration	6	5	4	3	2	1

TABLE 7-21: SENSITIVITY TEST RANKING FROM MCA COMPARISON

¹⁵ Sensitivity test completed by changing the effect rating assigned to Transport System integration for Option E1, from a Medium Negative to a Minor Negative as a result of feedback from stakeholders in Workshop # 3

8 Stakeholder and Community Engagement

8.1 Approach to Engagement

A Stakeholder and Community Engagement Plan (SCEP) was prepared in September 2016 to guide all engagement associated with the IBC and DBC phases of the Project. The SCEP is a live document that is to be amended and updated as the Project progresses, ensuring that it remains a relevant plan to assist in the delivery of all consultation tasks.

Preparation of the SCEP was underpinned by the Transport Agency's *Public Engagement Guidelines* and more specifically the Transport Agency's six listed principles being:

1. *We know why we are engaging and we communicate this early*
2. *We know who to engage*
3. *We know the history and background*
4. *We begin early*
5. *We are genuine*
6. *We support and encourage best practice.*

The SCEP outlines all engagement partners categorising them as stakeholders or members of the wider community. Using the IAP2 Spectrum for Public Participation we were then able to determine what level of consultation would be undertaken with each of those engagement partners. Engagement partners were subsequently grouped as:

- Workshop stakeholders – those who have a direct interest in the outcome of this project (e.g. Waipa District Council).
- Non-workshop stakeholders – those who have a wider interest (but no direct interest) in the outcome of the project (e.g. Transpower).
- Wider community – those who have varying levels of interest in the project subject to their personal circumstances (e.g. general public, potentially affected landowners).

With the engagement partners identified, we were able to assign specific engagement tasks to those groups based on whether we were seeking to involve and collaborate with them, or whether informing and consulting was considered a more appropriate level of engagement. As the Project progresses the level of engagement with some of those engagement partners is likely to change. For example, all potentially affected landowners to date are grouped in the wider community, but as our focus shifts from a wide short-list of corridor options towards a road alignment (through the DBC phase), those directly affected landowners will shift into the involve and collaborate sphere of engagement.

8.2 Engagement Methods

As discussed in section 2 there has been and will continue to be a range of methods used in terms of receiving feedback and assistance with the development of the IBC and DBC projects to presenting information. A summary where those engagement methods have been used is provided in Table 8-1. More information on each of the methods is also outlined further in this section.

Engagement method used	Feedback received/assistance with development					Information Presented				
	Project Intro and updates	Problems and Benefits	Idea Generation/Long-List Options	Option Development (Short-list evaluation)	Favoured Option	Project intro and updates	Problems and Benefits	Idea Generation/Long-List Options	Option Development (Short-List evaluation)	Favoured Option
Stakeholder Workshops		✓	✓	✓	✓	✓		✓		
Project Updates (newsletter)						✓	✓	✓	✓	✓
Public Information Days				✓		✓	✓	✓	✓	
Information Kiosk				✓	✓	✓	✓	✓	✓	✓
Maptionnaire		✓		✓					✓	
Letter Drops/Electronic Mailing Lists									✓	✓
Social Media						✓			✓	✓
One on One Meetings		✓		✓		✓			✓	✓

TABLE 8-1: ENGAGEMENT METHOD AND STAGE OF PROJECT

8.2.1 Stakeholder Workshops

As per the information in section 2.

8.2.2 Mana Whenua

As per the information in section 2.

8.2.3 Letter Drops and Electronic Mailing Lists

A letter drop to all properties within the wider project catchment was sent in September 2016, advising landowners and tenants of the long-term improvements project and inviting them to sign up to email updates and one-on-one meetings if requested. A second letter drop to the same properties was issued in April 2017 advising landowners and tenants of the option favoured by stakeholders and the project team.

The intention is to utilise electronic communications rather than physical mail drops where possible as this is a quicker and more efficient way to disseminate information. However, when a physical mail drop is considered necessary we have proceeded with one. Electronic communications have been achieved using a project website, emailing list and social media updates via the NZ Transport Agency’s local Facebook page. Over 350 individuals are currently signed up to receive regular project updates by email. We also provide electronic updates by email to: non-workshop stakeholders, real estate agents, lake based sports clubs and other parties that we have met with in person who wish to be kept informed.

8.2.4 One-on-one Meetings

Numerous meetings have been undertaken to date with various stakeholders and the wider community to discuss the project and its potential impacts (positive and negative) on them. This is an open invitation to meet with anyone who wishes to discuss the project with the project team and has been widely used, especially in the earlier phases of the project.

Such meetings have been held with: local businesses (e.g. Mobil Service Station, Becks Nurseries, and Taotaoroa quarries), landowner groups such as those residing in Fergusson Gully Road, individual landowners, interest groups (e.g. Cycle Action Waikato) and Karapiro School.

One-on-one meetings will continue being used and we anticipate an increase in such meetings now that we have a favoured option and there is more certainty around who may be affected.

8.2.5 Project Updates (Newsletters)

Two project updates have been distributed to date (with one planned in May 2017) and will continue being used throughout the duration of the project as a means of informing the wider community on where the project is at and how they can become involved.

Project Update 1 (Nov 2016) – advised the public of the long-term improvements project, invited them to meet the team at the regular Information Kiosk (see below) and to participate in the first online Maptionnaire survey (see below).

Project Update2 (Feb 2017) – introduced the six short-list options for the public to consider, invited them to attend the first public Information Day (see below), and to complete the second online Maptionnaire survey (see below).

Project Update 3 (May 2017) – (to be sent out) to present the favoured option E2.

8.2.6 Information Kiosk

We have established a project information kiosk and utilised the monthly Trash n Treasure Market held in Cambridge as a venue for the kiosk. The Information Kiosk provides a public face for the project to answer questions and provide project information. To date, we have only attended two markets and will be attending the next market in May 2017. Whilst a more regular appearance at the market was initially intended, it was decided that a more effective approach was to use the kiosk at critical points during the IBC phase when there is a need to inform the public and/or seek their feedback.

8.2.7 Information Day

A public Information Day was held on 9 March 2017 at the Karapiro-Taotaoroa Settlers Hall. This was the first opportunity for the project team to discuss in person the six short-list options with the community and seek their feedback. It was also a good opportunity to demonstrate the IBC and DBC processes the project team is going through to arrive at long-term roading solution for SH1 in this area. Early engagement with the community whilst we were still looking at corridor options has created a positive relationship between the Transport Agency and the wider community. This is especially the case when compared with a more traditional approach of engaging with the community only once an alignment has been approved and the ability to be involved and potentially influence outcomes is limited.

The Information Day also provided an opportunity for Safe Roads to present their short-term safety improvements that are to be rolled out in late 2017. Given the high-level of public interest in improving the safety of this part of the network, having the Safe Roads team present at the Information Day was considered appropriate.

It was estimated that between 300-400 people attended the first public Information Day. Whilst we provided a very simple feedback form that could be completed by attendees, our strong recommendation was for them to provide their feedback via the online Maptionnaire survey (see below).



FIGURE 8-1: PUBLIC INFORMATION DAY – 9 MARCH 2017

8.2.8 Maptionnaire Surveys

Maptionnaire combines an interactive online mapping tool with a survey function, allowing participants to ‘show’, rather than simply describe features or places of interest. For example, they can point on a map a specific location and describe safety concerns they may have about it. The tool allows data, previously collected qualitatively, to be quantified through geospatial referencing, allowing it to be quickly displayed and analysed visually. Two online Maptionnaire surveys have been completed to date to inform the IBC process and it is anticipated that it will continue being used during the DBC phase to seek feedback on alignment options within the E2 corridor, assuming that the Board supports this option going forward.

Survey 1 (Nov 2016) - introduced the long-term improvements project to the wider community and allowed the project team to ascertain how people feel using this stretch of SH1, and what is important to them about the wider area. A total of 489 surveys were completed and over 1,400 geospatial reference points were mapped. The average time for completing the survey was just seven minutes. The high number of responses means we can be confident that the feedback provided is an accurate representation of the community viewpoint.

Survey 2 (Feb 2017) - introduced the six short-list options to the wider community and sought community feedback on those options in terms of perceived safety and convenience. The survey went live at the same time that Project Update 2 was circulated, meaning the community had at hand a detailed description of each of the six short-list options to provide feedback on. Two weeks later, the Information Day was held as described above and the online survey remained live for a further two weeks after that, providing plenty of time for people to complete the survey after discussing it further at the Information Day. A total of 330 surveys were completed and like Survey 1, the high number of responses means we can be confident that the feedback provided accurately depicts community sentiment.

8.3 Partner Feedback

The engagement tasks (described in Section 2) have had a role of: informing engagement partners at critical points during the IBC phase, seeking feedback from those engagement partners, or both. The following is a summary of the feedback provided by the engagement partners based on the engagement task used and how that feedback has been fed into the IBC process.

8.3.1 Stakeholder Workshops

- Workshop 1 – the objectives from the PBC phase were largely agreed by the stakeholders with some minor tweaks, but an additional objective regarding the improvement of local access to public amenities was added.
- Workshop 2: - the workshopping exercise with the stakeholders produced 38 broad ideas on how to address the identified issues for this stretch of SH1. The project team was able to distil those ideas into a long-list of 21 options for further investigation via an MCA, before further distilling those options down to a short-list of six.
- Workshop 3: - in light of the information presented including the MCA process and community feedback, the stakeholders and project team reached a consensus on a favoured option. The outcomes from this workshop are discussed further in Section 8.4.

8.3.2 Mana Whenua

Engagement to date with mana whenua has provided a broad understanding of the cultural values of the wider project area from the very outset. This has greatly assisted the project team to map constraints that in turn have informed the long-list consideration of options and in particular areas that should be avoided. These generally include Lake Karapiro and its northern shoreline where there are significant areas of known archaeology given this was a well-travelled route for Maori. A number of pa sites and traditional horticultural sites have also been identified in the wider area and it is recognised that the location of pa often indicates a high likelihood of encountering further archaeological sites in the surrounding area. It transpired that as a general requirement mana whenua prefer options located further away from Lake Karapiro, and those which minimise potential impacts on known pa sites.

As a requirement (from a cultural perspective) mana whenua prefer options that protect the sanctity, spiritual qualities, and water quality of their awa, thereby preferring those options located further away from their traditional waterways such as the Waikato River, Lake Karapiro and tributaries, which minimise potential impacts on known pā sites and traditional horticultural sites. A summary of the feedback is outlined below:

- For this project, the awa and connections to the awa are the greatest consideration for mana whenua
- Awa is most affected by the options that follow the existing SH1
- Several pā sites and traditional horticultural sites are located along and are likely to be affected by changes to the existing SH1
- There may be four pā sites and possibly rock shelter/caves affected by the new roads in offline corridors (options E1 & E2), but potential for alignments to reflect these constraints within those corridors.
- On balance the historic and spiritual values of mana whenua are expected to be less affected by options following new corridors E1 and E2 than options that follow the existing SH1.
- Potential benefits may be realised by moving the road corridor away from the awa
- Archaeological finds during construction would also provide some benefits in terms of educational knowledge of pre-European activities, unknown at the time when making this response.

As such, there is a general preference from mana whenua for the offline options – provided that the final alignments recognise potential effects to recorded pā sites and cave/rock shelter. The following provides a summary of the effects rating for each option (as rated from context table described below):

Another important outcome of engagement with mana whenua during the IBC phase is an enhanced relationship with the Transport Agency by involving them at this early stage in the process. A more traditional approach is to only engage once an alignment has been determined, at which point the ability of mana whenua to influence decisions is greatly reduced. We have received very positive feedback from Mana Whenua about this new approach.

8.3.3 One-on-one Meetings and Information Kiosk

The nature of such engagement generally leads to more specific issues unique to an individual being raised. It therefore provides a good opportunity for the engagement partner to voice that concern and have it

addressed by the Transport Agency. By way of a summary the following feedback has been obtained via one-on one meetings and the Information Kiosk.

Concerns around the level of uncertainty created by the project especially when landowners either have plans to sell their property or develop it further. Similar concerns were raised by those residing along SH1 about property access. A common response has been ‘why can’t you make a decision in order to remove the uncertainty’. This may be seen as a negative response to early engagement, but overall there are much greater benefits to engaging early for the wider community, compared with the more traditional approach of only engaging once an alignment has been selected. Community buy-in to a project is much greater when they feel they are a part of the process. This is evident in the responses to date following public announcement of the favoured option. Landowners in E2 are asking questions around what the next steps are, rather than ‘why have I not been consulted on this project that will directly affect me?’.

A number of businesses are located along SH1 and in the wider area and again the uncertainty created by the project was of concern for some, whilst others could see an opportunity for them, subject to the final alignment. For example, the owner of a pet lodge which access direct access to SH1 was concerned about the impact any changes to the road would have on their ability to attract business. Whilst the Mobil service station at Karapiro is looking to redevelop their site, but are keen to understand what the final alignment will be and whether their development aspirations can be incorporated into that alignment.

People are concerned about severance issues especially between those living in the Karapiro Village and how they will gain access to Karapiro School, which is currently located on the opposite side of SH1.

The project team recognises that the issues raised above are genuine concerns for the community and will need to be carefully considered during the DBC phase. What was difficult for many of them to accept and also for the project team to address is the time required to arrive at a decision and the anxiety this creates for them. The project team has been transparent about timeframes and our desire to keep them informed throughout the process, although acknowledging there is little more we can do for them at this time.

A significant amount of feedback via the one-on-one meetings and the Information kiosk was centred around fixing the current safety issues with urgency, especially in regard to intersections for those roads adjoining SH1. These concerns raised at the Information Kiosk resulted in a meeting being convened with residents in Fergusson Gully Road and making a connection to the work Safe Roads will be undertaking later this year to create some short-term safety improvements.

8.3.4 Information Day and Maptionnaire Surveys

Feedback from Maptionnaire Survey 1 (November 2016) told us that overall the wider community doesn’t consider this stretch of SH1 to be particularly bad to drive along, but they feel quite unsafe using it. Recreation reserves and the lake were overwhelmingly considered as important features to the community and having good access to them is important. This is particularly the case given the popularity of water sports in this area and safety concerns associated with cars towing boats trying to enter/exit the lakeside reserves directly from SH1. Reference was also made to Karapiro School as being a focal point for the wider Karapiro community. The survey asked people to list the top three improvements they would like to see made and the question was not restricted to roading improvements. Nevertheless, the top three things respondents want to see improved were:

1. Safety at intersections,
2. Less congestion and better traffic flow; and
3. Better safety along the road corridor itself.

The feedback from Survey 1 validated the issues identified to date by the project team and the objectives the Transport Agency is aiming to achieve with the long-term improvements. The top three things that the community want to see improved also helped shape the questions for Maptionnaire Survey 2, with safety and convenience being at the forefront of what needs to be addressed.

The feedback we were seeking from Maptionnaire Survey 2 (date) was centred on how well respondents thought each of the six short-list options would improve safety and convenience. Importantly, we did not ask them to simply rank the options from most to least favoured as without context for their ranking this would be a fruitless exercise. However, by couching the questions in regard to how well each option would perform in terms of safety and convenience a preferred option could still be determined.

Options A - C (all online upgrades of the existing SH) were generally considered by respondents as not going far enough in terms of improving safety, whilst still creating inconvenience at the local level (i.e. significant disruption to residents ability to access properties off SH1). Option D (online Expressway) was considered a superior option in terms of safety and convenience, but the same concerns were raised around the impact on existing properties located on SH1 and the significant disruption that would be created during construction. Option E (Offline Expressway with two sub-options E1 and E2) was also considered a superior option in terms of safety and convenience, but concerns were raised around the impact on the community of having an expressway through areas where no such road currently exists. For example, option E1 generally followed the alignment of Taotaoroa Road where a number of rural lifestyle residents are located. Having an expressway built through this area would create a significant change to its rural character.

Feedback from the Information Day largely reflected the views expressed by the responses found in Maptionnaire Survey 2.

Feedback from Maptionnaire Survey 2 was presented to the stakeholders at Workshop 3 to provide them with an insight to what to wider community thought of the short-list options. This feedback was also very useful for the project team in terms of providing an alternative viewpoint on the short-list options in terms of arriving at a favoured option.

8.4 Discussion and Alignment on Favoured Option (Stakeholder Workshop # 3)

An MCA workshop was held on Tuesday 11 April 2017, with invitation to key stakeholders:

- Waipa, Matamata-Piako and South Waikato district councils
- Waikato Regional Council
- Department of Conservation
- Mana whenua
- NZ Police
- Heritage NZ
- Heavy Haulage Association and Road Transport Authority

The workshop sought to identify a transport improvement option or options for the Cambridge to Piarere transportation corridor to progress in future phases of the project. Much of the workshop involved summarising the conclusions from previous workshops, explaining the assessment work completed so far and checking for understanding. The workshop also involved breakout sessions in which participants could ask detailed questions of some of the technical specialists involved in the assessment of alternatives.

Discussion about a preferred option initially focused on generating **agreement on the options that should not be pursued further** and why. Participants quickly agreed that options A and B should not be progressed because they are not expected to effectively deliver on the investment objectives.

Although Option C was seen to perform better against the investment objectives, participants agreed that it should not be considered further. Options A, B and C were discounted by workshop participants because:

- They do not effectively deliver on the agreed investment objectives;
- They are all considered to be short-term (options A and B) or medium-term (option C) options that do little but “buy time”;
- The Transport Agency is already delivering short-term safety improvements;

- Options A, B or C risk locking future transport investment into the existing SH1 corridor (i.e. leading us down a path towards option D); and
- The next step should be a long-term improvement or solution which these options do not provide.

Latter focus was on comparing options D, E1 and E2. Participants considered there was little difference between the potential for these options to deliver on the investment objectives. The three options were scored similarly for other criteria within the MCA. The main factors participants agreed would differentiate the options were:

- Cost and risk - option D is riskier and more expensive than either option E1 or E2 due to the constrained physical environment and requirement to keep the highway open throughout construction and is expected to take longer to build; and
- Network fit - option E1 does not fit with the existing network as well as option E2 due to the additional trip length for SH1 traffic to or from the south.

Participants agreed that other than network fit, there was little or no difference between options E1 and E2. They agreed that both E1 and E2 were better than option D. On this basis and because of option E1's poor network fit, participants agreed that option E2 should be considered the favoured option.

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9 Preferred Way forward

9.1 Recommended Option E2

A comprehensive assessment process has been undertaken whereby a consensus has been reached between the Project team and key stakeholders for Option E2 being the favoured option. This is the option that will be recommended by the Project team to the NZ Transport Agency for progression into the DBC phase.

Option E2 was selected as it best strikes the balance between delivering the outcomes sought for the C2P corridor, in a way that has an acceptable level of risk and complexity, whilst ensuring a solution can be developed that minimises potential adverse environmental effects.

Option E2 offers a solution that is expected to achieve value for money that can be implemented within 10 years (construction expected to commence in 2020). This option will provide a transportation system solution that is socially cohesive with a manageable impact on the environment and culturally sensitive areas.

Option E2 will deliver the following outcomes:

INVESTMENT OUTCOMES OF OPTION E2:

- 3.2 minute travel time saving for SH1 South users, and 3.8 minute travel time saving for SH29 users, by shortening the route compared to the existing route (thereby contributing to make the SH1 and SH29 corridor the preferred route for travel between Auckland, Waikato and Bay of Plenty).
- Ensuring the journey time for all customers is the same; whatever time of day or time of year they travel along the route.
- 90% reduction in unplanned road disruptions, and always having a suitable alternative route available for State highway users.
- Improved access to local community features, and maximising the opportunity for future growth in the community and increased local tourism.
- 10.2 fewer deaths and serious injuries (5 years)
- \$390M to \$620M cost¹⁶, with construction expected over a 3.5 – 4 year period.

There were a number of recommendations made that will further support Option E2 as being the preferred option. These include:

- Undertaking further review of cost estimate by seeking to refine the range of expected construction costs
- Evaluate the economic performance of Option E2 as part of the Waikato Expressway package of works
- Further review of the potential ecological, landscape, and cultural effects and risks of Option E2 to ensure that alignment options are able to be developed which minimise the potential adverse impacts; particularly the potential impacts on the Warrenheip Reserve.
- Continuation of the engagement process to ensure community aspirations are understood and where possible, incorporated into the final solution. In particular, further engagement with potentially affected landowners needs to be undertaken in order to develop alignment solutions that seek to reduce potential adverse effects on landowners, wherever practicable.

The outcomes of this Options Report, and the recommendation to support Option E2 as the preferred corridor option for this project, will be used as one of the inputs into the IBC Report.

9.2 Opportunities

The optioneering process has identified a number of potential opportunities that should be investigated further during the DBC phase, which could enhance the outcome of the Option E2 solution.

¹⁶ Cost range is undiscounted and includes property, construction, and associated fees as well as a range for uncertainty in scope and costings.

The listing of these opportunities does not commit the Transport Agency to progressing any of these items, but identifies a number of ideas that were raised by the stakeholder group as potential ways to enhance the benefits being achieved by the project. In no order of preference, these opportunities (as taken from Table 5-1) include:

- Relocation of Karapiro School to other side of SH1 to be closer to Karapiro Village
- Provision of a service centre somewhere along the SH1/SH29 corridor
- Use of speed management tools – such as increase in speed limit to 110km/h
- Installation of weigh-in-motion pits, with potential for enforcement purposes
- Advanced network management, through use of ITS/VMS/Smart Road enablers
- Extension of the Te Awa cycleway
- Gateway treatment to signal any changes in level of service for customers

9.3 Next Engagement Steps

The next engagement tasks to be undertaken in the foreseeable future are listed below, although they are still subject to further consideration by the project team. It is important to note that the engagement methods listed in Section 2 above will continue being used in the latter stages of the IBC phase and indeed during the DBC phase as required.

- Advise the public in regard to the recommendation of the stakeholders, noting that this is not a final decision, rather it simply represents the stakeholder's viewpoint (done).
- Provide feedback on community responses to Maptionnaire Survey 2).
- Undertake one-on-one meetings with landowners located within the E2 corridor to explain the next steps and potential implications for them (second half of 2017)
- Set up the Information Kiosk for the next Trash n Treasure Market (14 May 2017)
- Project Update 3 – which will advise on the favoured option, feedback from Maptionnaire Survey 2, update the short-term safety works, and update the project timeline (late May 2017).
- Second Information Day to elicit further detail from the community on the recommended option (after September 2017).
- A third Maptionnaire survey to consider road alignments within the E2 corridor
- Undertake one-on-one meetings with the community and stakeholders who request them (as required).

Appendices

- Appendix A – Long-list Option MCA Assessment
- Appendix B – Short-list Option Outcomes and Characteristics
- Appendix C – Short-list Cost Estimate Summary Sheets
- Appendix D – Short-list Economic Summary Sheet
- Appendix E – Short-list Environmental and Social Responsibility (ESR) Screens

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Appendix A: Long-list MCA Assessment

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		Land use		Targeted Safety Improvements							Online full length improvements				Hybrid		Offline							
		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9	Option 10	Option 11	Option 12	Option 13	Option 14	Option 15	Option 16	Option 17 a	Option 17 b	Option 18	Option 19	Option 20	Option 21	
Alignment with Investment Benefits and Performance Measures	Reduce the number of DSIs [70% reduction in DSIs by 2026]	20%	20%	20%	100%	10%	50%	30%	10%	50%	80%	80%	90%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
	Reduce Collective Risk to no more than a medium and maintain a low personal risk from 2026 until 2041	20%	20%	20%	100%	10%	50%	30%	10%	50%	100%	100%	100%	80%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
	Improve local access to community features by all transport modes [Subjective scale in comparison to existing case - yes/no]	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Reduce travel time by achieving an average 100km/h travel speed on SH1 at 2026 through to 2041	0%	10%	-50%	100%	10%	0%	10%	0%	10%	0%	30%	50%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%
	Improve resilience by reduction in risk or consequence of road disruptions [Qualitative scale in comparison to existing case - yes/no]	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Overall Weighted		26%	46%	26%	100%	43%	52%	49%	40%	55%	64%	74%	82%	61%	100%	100%	100%	100%	100%	100%	100%	100%	83%	
Implementability/ Complexity/ Risk of Options	Technical (Geometric, Bridging, Geotech, Stormwater, Pavement)	Neutral	Low	Medium	High	Medium	Low	Low	Medium	Low	Low	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	
	Constructability	Neutral	Low	Low	Neutral	Low	Low	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low	Medium	High	Low	Low	
	Consentability/Policy	High	High	High	High	Low	Low	Low	Low	Low	Low	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	High	High	Medium	Medium	
	Operation/ Maintenance	Neutral	Low	Medium	Medium	Medium	Low	Low	Low	Low	Low	Medium	Medium	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
	Safety in Design	Neutral	Medium	Low	Neutral	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	High	Medium	Medium
	Financial/Fundability	High	High	Low	Fatal Flaw	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	High	Medium	Medium	Medium
	Acceptability to engagement partners	Fatal Flaw	Fatal Flaw	High	High	Medium	High	Medium	Medium	Medium	High	Medium	Low	Medium	Low	Low	Low	Medium	Low	High	High	High	High	
Option Progressed or Discard as primary solution		Discard	Discard	Discarded	Discard	Discard	Discard	Discard	Discard	Progress	Discard	Progress	Progress	Discard	Progress	Discard	Discard	Progress	Progress	Discard	Discard	Discard	Discard	

Appendix B: Short-list Option Outcomes and Characteristics

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Criteria	Measures	Base (Do-Nothing)	Option A	Option B	Option C	Option D	Option E1	Option E2
OUTCOMES								
SAFETY	DSIs	14	9.2	5.8	5.4	3.8	3.8	3.8
	Collective Risk	MH	MH	M	LM	LM	LM	LM
(APPROX) (AT OPENING)	Personal Risk	L	L	L	L	L	L	L
	Star Rating (estimate)	3.22	3.3-3.4	3.4-3.5	3.4-3.6	4.6-4.8	4.6-4.8	4.6-4.8
ACCESS	No. of Property Accesses	-	-5-10%	-5-10%	-20%	-100%	-100%	-100%
TRAVEL TIME AND SPEED (2041)	Travel Time (mins)	12.9	12.9	11.6	11.3	10.2	11.4 (SH 1 Sth) 8.2 (SH 29)	9.7 (SH 1 Sth) 9.1 (SH 29)
	Speed (km/h)	79	79	88	90	100	100	100
NETWORK RESILIENCE	Number of Closures	Annual Closures	- 25%	-55%	-80%	- 90%	- 90%	- 90%
	Alternative routes	Alternatives up to 50 km detour, not for HPMVs	No improvement to alternatives	No improvement to alternatives	Potential to use new parallel routes as alternatives	Potential to use new parallel routes as alternatives	Potential to use new parallel routes as alternatives	Potential to use new parallel routes as alternatives
CORRIDOR CHARACTERISTICS								
TOTAL JOURNEY	SH1 – South	16.6 km	16.6 km	16.6 km	16.6 km	16.6 km	19 km (2.4 km longer)	16.2 km (0.4 km shorter)
	SH 29						13.6km (3 km shorter)	15.2 km (1.4 km shorter)
BARRIERS	Barrier	At high risk roadside locations (short-term works)	Central and side barrier based on risk.	Central and side (full corridor)	Central and side (full corridor)	Central and side (full corridor)	Central and side (full corridor)	Central and side (full corridor)
NO OF LANES (SH ONLY)	Number and Passing	2, with 2 passing lanes each direction	2, with 2 passing lanes each direction	2+1; passing lane alternates - corridor	2+1; passing lane alternates - corridor	4 lanes	4 lanes	4 lanes
INTERSECTIONS	Number of Intersections and Type	10 ¹⁷ - at grade	10 ¹² - at grade	10 ¹² - at grade	10 ¹² - at grade	3 – Grade Separated	3 – Grade Separated	3 – Grade Separated
ROAD GEOMETRY	Alignment	Straight-curved alignment	No change	No change	No major changes but could be some minor re-alignment	Major modification to online alignment	Major partial online modification and new offline alignment	Major partial online modification and new off line alignment
ACTIVE ROAD USERS	Cyclists	Limited sealed shoulder	Some shoulder improvements	Some shoulder improvements	Some shoulder improvements & local road alternative	Full shoulder provided online and local road alternative	Full shoulder provided online and local road alternative	Full shoulder provided online and local road alternative
MAJOR STRUCTURES	Bridges	-	None	None	None	>5	>5	3 - 5
EARTHWORKS	Approx. scale (m3)	-	Minor	< 200,000	< 200,000	<2,000,000	< 3,000,000	>3,000,000
COST	Million (\$)	-	25-40	80-130	90-150	440-710	370-580	390-620
CONSTRUCTION TIMEFRAME	Years	-	2	2.5	3	4.5	3.5	3.5

TABLE 9-1: SHORT-LIST OUTCOMES AND CHARACTERISTICS

¹⁷ Hickey, Hydro, Karapiro, Gorton, Tunakawa, Fergusson Gully, Kentucky, Moana Road, Maungatautari, SH29

Appendix C: Short-list Option Cost Estimate Summary Sheets

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Project Estimate - Form C		Indicative Business Case Estimate		
Cambridge to Piarere, Option A, None, RAB		IBE		
Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Nett Project Property Cost	600,000	200,000	200,000
B	Project Development Phase			
	- Consultancy Fees	597,000	644,000	1,288,000
	- NZTA Managed Costs	199,000	41,000	81,000
B	Total Project Development	796,000	685,000	1,369,000
C	Pre-implementation Phase			
	- Consultancy Fees	1,789,000	232,000	464,000
	- NZTA Managed Costs	497,000	63,000	124,000
C	Total Pre-implementation	2,286,000	295,000	588,000
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	994,000	237,000	474,000
	- NZTA Managed Costs	497,000	69,000	137,000
	- Consent Monitoring Fees	100,000	21,000	41,000
	Sub Total Base Implementation Fees	1,591,000	327,000	652,000
	Physical Works			
	1 Environmental Compliance	167,000	34,000	67,000
	2 Earthworks and Site Clearance	607,000	122,000	243,000
	3 Ground Improvements	0	0	0
	4 Drainage	170,000	34,000	68,000
	5 Pavement and Surfacing	4,300,000	604,000	951,000
	6 Bridges and Structures	0	0	0
	7 Retaining Walls	0	0	0
8 Traffic Services	4,086,000	818,000	1,635,000	
9 Service Relocations	0	0	0	
10 Landscaping	493,000	100,000	198,000	
11 Traffic Management and Temporary Works	4,370,000	874,000	1,748,000	
12 Preliminary and General	5,676,000	929,000	1,856,000	
13 Extraordinary Construction Costs	0	0	0	
Sub Total Base Physical works	19,869,000	3,515,000	6,766,000	
D	Total for Implementation Phase	21,460,000	3,842,000	7,418,000
E	Project Base Estimate (A+C+D)	25,142,000		
F	Contingency (Assessed/Analysed) (A+B+C+D)		5,022,000	
G	Project Expected Estimate (E+F)		30,164,000	
	Nett Project Property Cost Expected Estimate		800,000	
	Project Development Phase Expected Estimate		1,481,000	
	Pre-implementation Phase Expected Estimate		2,581,000	
	Implementation Phase Expected Estimate		25,302,000	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			9,575,000
I	95th percentile Project Estimate (G+H)			39,739,000
	Nett Project Property Cost 95th percentile Estimate			1,000,000
	Project Development Phase 95th percentile Estimate			2,850,000
	Pre-implementation Phase 95th percentile Estimate			3,169,000
	Implementation Phase 95th percentile Estimate			32,720,000
Date of Estimate: 08 March 2017		Cost Index (Qtr/Year): 01/16		
Estimate prepared by s 9(2)(a)		Signed		
Estimate internal peer review by s 9(2)(a)		Signed		
Estimate external peer review by		Signed		
Estimate accepted by NZTA		Signed		

Note: (1) These estimates are exclusive of escalation and GST.

Project Estimate - Form C		Indicative Business Case Estimate			
Cambridge to Piarere, Option B, None, RAB		IBE			
Item	Description	Base Estimate	Contingency	Funding Risk Contingency	
A	Nett Project Property Cost	3,360,000	1,165,000	897,000	
B	Project Development Phase				
	- Consultancy Fees	1,807,000	644,000	1,288,000	
	- NZTA Managed Costs	603,000	121,000	242,000	
	Total Project Development	2,410,000	765,000	1,530,000	
C	Pre-implementation Phase				
	- Consultancy Fees	5,420,000	555,000	1,110,000	
	- NZTA Managed Costs	1,506,000	143,000	285,000	
	Total Pre-implementation	6,926,000	698,000	1,395,000	
D	Implementation Phase				
	Implementation Fees				
	- Consultancy Fees	3,012,000	762,000	1,524,000	
	- NZTA Managed Costs	1,506,000	170,000	339,000	
	- Consent Monitoring Fees	302,000	61,000	121,000	
		Sub Total Base Implementation Fees	4,820,000	993,000	1,984,000
	Physical Works				
	1 Environmental Compliance	1,786,000	358,000	715,000	
	2 Earthworks and Site Clearance	3,470,000	694,000	1,388,000	
	3 Ground Improvements	0	0	0	
	4 Drainage	1,460,000	292,000	584,000	
	5 Pavement and Surfacing	1,156,000	2,776,000	1,517,000	
	6 Bridges and Structures	0	0	0	
	7 Retaining Walls	4,750,000	950,000	1,900,000	
8 Traffic Services	6,719,000	1,344,000	2,688,000		
9 Service Relocations	2,250,000	2,250,000	9,000,000		
10 Landscaping	2,370,000	475,000	949,000		
11 Traffic Management and Temporary Works	5,055,000	1,011,000	2,022,000		
12 Preliminary and General	17,206,000	3,235,000	6,468,000		
13 Extraordinary Construction Costs	0	0	0		
	Sub Total Base Physical works	60,222,000	13,385,000	27,231,000	
	Total for Implementation Phase	65,042,000	14,378,000	29,215,000	
E	Project Base Estimate (A+C+D)	77,738,000			
F	Contingency (Assessed/Analysed)	(A+B+C+D)	17,006,000		
G	Project Expected Estimate (E+F)		94,744,000		
	Nett Project Property Cost Expected Estimate		4,525,000		
	Project Development Phase Expected Estimate		3,175,000		
	Pre-implementation Phase Expected Estimate		7,624,000		
	Implementation Phase Expected Estimate		79,420,000		
H	Funding Risk Contingency (Assessed/Analysed)	(A+B+C+D)		33,037,000	
I	95th percentile Project Estimate (G+H)			127,781,000	
	Nett Project Property Cost 95th percentile Estimate			5,422,000	
	Project Development Phase 95th percentile Estimate			4,705,000	
	Pre-implementation Phase 95th percentile Estimate			9,019,000	
	Implementation Phase 95th percentile Estimate			108,635,000	

Date of Estimate: 08 March 2017	Cost Index (Qtr/Year): 01/16
Estimate prepared by s 9(2)(a)	Signed
Estimate internal peer review by s 9(2)(a)	Signed
Estimate external peer review by	Signed
Estimate accepted by NZTA	Signed

Note: (1) These estimates are exclusive of escalation and GST.

Project Estimate - Form C		Indicative Business Case Estimate		
Cambridge to Piarere, Option C, None, RAB		IBE		
Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Nett Project Property Cost	7,396,000	2,579,000	1,904,000
	Project Development Phase			
	- Consultancy Fees	2,062,000	644,000	1,288,000
	- NZTA Managed Costs	688,000	138,000	276,000
B	Total Project Development	2,750,000	782,000	1,564,000
	Pre-implementation Phase			
	- Consultancy Fees	6,186,000	623,000	1,246,000
	- NZTA Managed Costs	1,719,000	160,000	319,000
C	Total Pre-implementation	7,905,000	783,000	1,565,000
	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	3,437,000	873,000	1,745,000
	- NZTA Managed Costs	1,719,000	191,000	381,000
	- Consent Monitoring Fees	344,000	70,000	139,000
	Sub Total Base Implementation Fees	5,500,000	1,134,000	2,265,000
	Physical Works			
1	Environmental Compliance	2,786,000	558,000	1,115,000
2	Earthworks and Site Clearance	4,120,000	824,000	1,648,000
3	Ground Improvements	0	0	0
4	Drainage	1,550,000	310,000	620,000
5	Pavement and Surfacing	20,047,000	3,754,000	2,006,000
6	Bridges and Structures	0	0	0
7	Retaining Walls	4,750,000	950,000	1,900,000
8	Traffic Services	5,266,000	1,054,000	2,107,000
9	Service Relocations	2,250,000	2,250,000	9,000,000
10	Landscaping	2,679,000	537,000	1,073,000
11	Traffic Management and Temporary Works	5,645,000	1,129,000	2,258,000
12	Preliminary and General	19,637,000	3,721,000	7,441,000
13	Extraordinary Construction Costs	0	0	0
	Sub Total Base Physical works	68,730,000	15,087,000	29,168,000
D	Total for Implementation Phase	74,230,000	16,221,000	31,433,000
E	Project Base Estimate (A+C+D)	92,281,000		
F	Contingency (Assessed/Analysed) (A+B+C+D)		20,365,000	
G	Project Expected Estimate (E+F)		112,646,000	
	Nett Project Property Cost Expected Estimate		9,975,000	
	Project Development Phase Expected Estimate		3,532,000	
	Pre-implementation Phase Expected Estimate		8,688,000	
	Implementation Phase Expected Estimate		90,451,000	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			36,466,000
I	95th percentile Project Estimate (G+H)			149,112,000
	Nett Project Property Cost 95th percentile Estimate			11,879,000
	Project Development Phase 95th percentile Estimate			5,096,000
	Pre-implementation Phase 95th percentile Estimate			10,253,000
	Implementation Phase 95th percentile Estimate			121,884,000
Date of Estimate: 08 March 2017		Cost Index (Qtr/Year): 01/16		
Estimate prepared by s 9(2)(a)		Signed		
Estimate internal peer review by s 9(2)(a)		Signed		
Estimate external peer review by		Signed		
Estimate accepted by NZTA		Signed		

Note: (1) These estimates are exclusive of escalation and GST.

Project Estimate - Form C		Indicative Business Case Estimate		
Cambridge to Piarere, Option D, GSI, RAB		IBE		
Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Nett Project Property Cost	24,068,000	7,302,000	6,278,000
B	Project Development Phase			
	- Consultancy Fees	10,136,000	789,000	1,578,000
	- NZTA Managed Costs	3,379,000	677,000	1,353,000
B	Total Project Development	13,515,000	1,466,000	2,931,000
C	Pre-implementation Phase			
	- Consultancy Fees	30,408,000	3,018,000	6,036,000
	- NZTA Managed Costs	8,447,000	771,000	1,541,000
C	Total Pre-implementation	38,855,000	3,789,000	7,577,000
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	16,894,000	4,299,000	8,598,000
	- NZTA Managed Costs	8,447,000	925,000	1,848,000
	- Consent Monitoring Fees	1,690,000	340,000	678,000
	Sub Total Base Implementation Fees	27,031,000	5,564,000	11,124,000
	Physical Works			
	1 Environmental Compliance	15,235,000	5,964,000	3,179,000
	2 Earthworks and Site Clearance	36,824,000	13,101,000	8,994,000
	3 Ground Improvements	6,775,000	7,865,000	12,200,000
	4 Drainage	5,141,000	1,768,000	1,318,000
	5 Pavement and Surfacing	82,019,000	10,303,000	8,203,000
	6 Bridges and Structures	49,140,000	19,236,000	10,248,000
7 Retaining Walls	9,580,000	3,832,000	1,916,000	
8 Traffic Services	11,772,000	4,268,000	2,798,000	
9 Service Relocations	2,250,000	2,250,000	9,000,000	
10 Landscaping	8,024,000	2,986,000	1,831,000	
11 Traffic Management and Temporary Works	14,570,000	5,448,000	3,294,000	
12 Preliminary and General	96,531,000	9,654,000	19,307,000	
13 Extraordinary Construction Costs	0	0	12,000,000	
Sub Total Base Physical works	337,861,000	86,675,000	94,288,000	
D	Total for Implementation Phase	364,892,000	92,239,000	105,412,000
E	Project Base Estimate (A+C+D)	441,330,000		
F	Contingency (Assessed/Analysed) (A+B+C+D)		104,796,000	
G	Project Expected Estimate (E+F)		546,126,000	
	Nett Project Property Cost Expected Estimate		31,370,000	
	Project Development Phase Expected Estimate		14,981,000	
	Pre-implementation Phase Expected Estimate		42,644,000	
	Implementation Phase Expected Estimate		457,131,000	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)		122,198,000	
I	95th percentile Project Estimate (G+H)		668,324,000	
	Nett Project Property Cost 95th percentile Estimate		37,648,000	
	Project Development Phase 95th percentile Estimate		17,912,000	
	Pre-implementation Phase 95th percentile Estimate		50,221,000	
	Implementation Phase 95th percentile Estimate		562,543,000	
Date of Estimate: 08 March 2017		Cost Index (Qtr/Year): 01/16		
Estimate prepared by s 9(2)(a)		Signed		
Estimate internal peer review by s 9(2)(a)		Signed		
Estimate external peer review by		Signed		
Estimate accepted by NZTA		Signed		

Note: (1) These estimates are exclusive of escalation and GST.

Project Estimate - Form C		Indicative Business Case Estimate		
Cambridge to Piarere, Option D, GSI, Trumpet		IBE		
Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Nett Project Property Cost	24,668,000	7,502,000	6,378,000
B	Project Development Phase			
	- Consultancy Fees	10,648,000	891,000	1,782,000
	- NZTA Managed Costs	3,550,000	711,000	1,421,000
B	Total Project Development	14,198,000	1,602,000	3,203,000
C	Pre-implementation Phase			
	- Consultancy Fees	31,943,000	3,325,000	6,650,000
	- NZTA Managed Costs	8,873,000	856,000	1,712,000
C	Total Pre-implementation	40,816,000	4,181,000	8,362,000
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	17,746,000	4,470,000	8,939,000
	- NZTA Managed Costs	8,873,000	1,010,000	2,019,000
	- Consent Monitoring Fees	1,775,000	357,000	712,000
	Sub Total Base Implementation Fees	28,394,000	5,837,000	11,670,000
	Physical Works			
	1 Environmental Compliance	15,618,000	6,041,000	3,333,000
	2 Earthworks and Site Clearance	42,491,000	14,235,000	11,261,000
	3 Ground Improvements	7,250,000	8,210,000	13,140,000
	4 Drainage	6,041,000	1,948,000	1,678,000
	5 Pavement and Surfacing	81,604,000	10,261,000	8,161,000
	6 Bridges and Structures	31,660,000	19,740,000	11,256,000
7 Retaining Walls	9,580,000	3,832,000	1,916,000	
8 Traffic Services	12,635,000	4,441,000	3,144,000	
9 Service Relocations	2,250,000	2,250,000	9,000,000	
10 Landscaping	8,238,000	3,029,000	1,917,000	
11 Traffic Management and Temporary Works	16,145,000	5,763,000	3,924,000	
12 Preliminary and General	101,404,000	10,141,000	20,282,000	
13 Extraordinary Construction Costs	0	0	12,000,000	
	Sub Total Base Physical Works	354,916,000	89,891,000	101,012,000
D	Total for Implementation Phase	383,310,000	95,728,000	112,682,000
E	Project Base Estimate (A+C+D)	462,992,000		
F	Contingency (Assessed/Analysed) (A+B+C+D)		109,013,000	
G	Project Expected Estimate (E+F)		572,005,000	
	Nett Project Property Cost Expected Estimate		32,170,000	
	Project Development Phase Expected Estimate		15,800,000	
	Pre-implementation Phase Expected Estimate		44,997,000	
	Implementation Phase Expected Estimate		479,038,000	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			130,625,000
I	95th percentile Project Estimate (G+H)			702,630,000
	Nett Project Property Cost 95th percentile Estimate			38,548,000
	Project Development Phase 95th percentile Estimate			19,003,000
	Pre-implementation Phase 95th percentile Estimate			53,359,000
	Implementation Phase 95th percentile Estimate			591,720,000
Date of Estimate: 08 March 2017		Cost Index (Qtr/Year): 01/16		
Estimate prepared by s 9(2)(a)		Signed		
Estimate internal peer review by s 9(2)(a)		Signed		
Estimate external peer review by		Signed		
Estimate accepted by NZTA		Signed		

Note: (1) These estimates are exclusive of escalation and GST.

Project Estimate - Form C		Indicative Business Case Estimate		
Cambridge to Piarere, Option E1, GSI, RAB		IBE		
Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Nett Project Property Cost	32,877,000	9,398,000	6,165,000
B	Project Development Phase			
	- Consultancy Fees	8,218,000	789,000	1,578,000
	- NZTA Managed Costs	2,740,000	556,000	1,110,000
B	Total Project Development	10,958,000	1,345,000	2,688,000
C	Pre-implementation Phase			
	- Consultancy Fees	24,652,000	2,531,000	5,081,000
	- NZTA Managed Costs	6,848,000	650,000	1,298,000
C	Total Pre-implementation	31,500,000	3,181,000	6,379,000
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	13,696,000	3,507,000	7,014,000
	- NZTA Managed Costs	6,848,000	772,000	1,543,000
	- Consent Monitoring Fees	1,370,000	279,000	556,000
	Sub Total Base Implementation Fees	21,914,000	4,558,000	9,113,000
	Physical Works			
	1 Environmental Compliance	9,942,000	1,989,000	3,978,000
	2 Earthworks and Site Clearance	46,804,000	9,361,000	18,722,000
	3 Ground Improvements	1,450,000	1,540,000	2,330,000
	4 Drainage	10,774,000	2,156,000	4,311,000
	5 Pavement and Surfacing	79,148,000	7,916,000	7,916,000
	6 Bridges and Structures	8,690,000	2,238,000	4,476,000
7 Retaining Walls	8,780,000	1,756,000	3,512,000	
8 Traffic Services	9,528,000	1,907,000	3,813,000	
9 Service Relocations	1,125,000	1,125,000	4,500,000	
10 Landscaping	7,375,000	1,476,000	2,951,000	
11 Traffic Management and Temporary Works	8,100,000	1,620,000	3,240,000	
12 Preliminary and General	77,186,000	7,770,000	15,538,000	
13 Extraordinary Construction Costs	5,000,000	4,000,000	6,000,000	
Sub Total Base Physical works	273,902,000	44,854,000	81,287,000	
D	Total for Implementation Phase	295,816,000	49,412,000	90,400,000
E	Project Base Estimate (A+C+D)	371,151,000		
F	Contingency (Assessed/Analysed) (A+B+C+D)		63,336,000	
G	Project Expected Estimate (E+F)		434,487,000	
	Nett Project Property Cost Expected Estimate		42,275,000	
	Project Development Phase Expected Estimate		12,303,000	
	Pre-implementation Phase Expected Estimate		34,681,000	
	Implementation Phase Expected Estimate		345,228,000	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			105,612,000
I	95th percentile Project Estimate (G+H)			540,099,000
	Nett Project Property Cost 95th percentile Estimate			48,440,000
	Project Development Phase 95th percentile Estimate			14,991,000
	Pre-implementation Phase 95th percentile Estimate			41,040,000
	Implementation Phase 95th percentile Estimate			435,628,000
	Date of Estimate: 08 March 2017	Cost Index (Qtr/Year): 01/16		
	Estimate prepared by s 9(2)(a)	Signed		
	Estimate internal peer review by s 9(2)(a)	Signed		
	Estimate external peer review by	Signed		
	Estimate accepted by NZTA	Signed		

Note: (1) These estimates are exclusive of escalation and GST.

Project Estimate - Form C		Indicative Business Case Estimate		
Cambridge to Piarere, Option E1, GSI, Trumpet		IBE		
Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Nett Project Property Cost	33,477,000	9,598,000	6,265,000
B	Project Development Phase			
	- Consultancy Fees	8,729,000	891,000	1,782,000
	- NZTA Managed Costs	2,910,000	590,000	1,178,000
B	Total Project Development	11,639,000	1,481,000	2,960,000
C	Pre-implementation Phase			
	- Consultancy Fees	26,187,000	2,838,000	5,675,000
	- NZTA Managed Costs	7,274,000	735,000	1,469,000
C	Total Pre-implementation	33,461,000	3,573,000	7,144,000
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	14,548,000	3,678,000	7,355,000
	- NZTA Managed Costs	7,274,000	857,000	1,714,000
	- Consent Monitoring Fees	1,455,000	298,000	590,000
	Sub Total Base Implementation Fees	23,277,000	4,833,000	9,659,000
	Physical Works			
	1 Environmental Compliance	10,325,000	2,066,000	4,132,000
	2 Earthworks and Site Clearance	52,471,000	10,495,000	20,989,000
	3 Ground Improvements	1,925,000	1,885,000	3,270,000
	4 Drainage	11,674,000	2,336,000	4,671,000
	5 Pavement and Surfacing	78,733,000	7,874,000	7,874,000
	6 Bridges and Structures	1,210,000	2,742,000	5,484,000
7 Retaining Walls	8,780,000	1,756,000	3,512,000	
8 Traffic Services	10,392,000	2,080,000	4,159,000	
9 Service Relocations	1,125,000	1,125,000	4,500,000	
10 Landscaping	7,589,000	1,519,000	3,037,000	
11 Traffic Management and Temporary Works	9,675,000	1,935,000	3,870,000	
12 Preliminary and General	82,059,000	8,257,000	16,513,000	
13 Extraordinary Construction Costs	5,000,000	4,000,000	6,000,000	
Sub Total Base Physical works	290,958,000	48,070,000	88,011,000	
D	Total for Implementation Phase	314,235,000	52,901,000	97,670,000
E	Project Base Estimate (A+C+D)	392,812,000		
F	Contingency (Assessed/Analysed) (A+B+C+D)		67,553,000	
G	Project Expected Estimate (E+F)		460,365,000	
	Nett Project Property Cost Expected Estimate		43,075,000	
	Project Development Phase Expected Estimate		13,120,000	
	Pre-implementation Phase Expected Estimate		37,034,000	
	Implementation Phase Expected Estimate		367,136,000	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			114,039,000
I	95th percentile Project Estimate (G+H)			574,404,000
	Nett Project Property Cost 95th percentile Estimate			49,340,000
	Project Development Phase 95th percentile Estimate			16,080,000
	Pre-implementation Phase 95th percentile Estimate			44,178,000
	Implementation Phase 95th percentile Estimate			464,806,000
Date of Estimate: 08 March 2017		Cost Index (Qtr/Year): 01/16		
Estimate prepared by s 9(2)(a)		Signed		
Estimate internal peer review by s 9(2)(a)		Signed		
Estimate external peer review by		Signed		
Estimate accepted by NZTA		Signed		

Note: (1) These estimates are exclusive of escalation and GST.

Project Estimate - Form C		Indicative Business Case Estimate		
Cambridge to Piarere, Option E2, GSI, RAB		IBE		
Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Nett Project Property Cost	22,689,000	6,831,000	6,052,000
B	Project Development Phase			
	- Consultancy Fees	9,067,000	789,000	1,578,000
	- NZTA Managed Costs	3,023,000	612,000	1,223,000
B	Total Project Development	12,090,000	1,401,000	2,801,000
C	Pre-implementation Phase			
	- Consultancy Fees	27,199,000	2,758,000	5,516,000
	- NZTA Managed Costs	7,556,000	706,000	1,411,000
C	Total Pre-implementation	34,755,000	3,464,000	6,927,000
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	15,111,000	3,877,000	7,753,000
	- NZTA Managed Costs	7,556,000	843,000	1,685,000
	- Consent Monitoring Fees	1,512,000	307,000	612,000
	Sub Total Base Implementation Fees	24,179,000	5,027,000	10,050,000
	Physical Works			
	1 Environmental Compliance	10,442,000	2,089,000	4,178,000
	2 Earthworks and Site Clearance	55,028,000	11,006,000	22,012,000
	3 Ground Improvements	3,025,000	2,855,000	3,960,000
	4 Drainage	10,701,000	2,141,000	4,281,000
	5 Pavement and Surfacing	73,305,000	7,731,000	7,731,000
	6 Bridges and Structures	21,850,000	4,890,000	9,780,000
	7 Retaining Walls	8,780,000	1,756,000	3,512,000
8 Traffic Services	8,893,000	1,780,000	3,558,000	
9 Service Relocations	1,125,000	1,125,000	4,500,000	
10 Landscaping	8,863,000	1,774,000	3,547,000	
11 Traffic Management and Temporary Works	9,480,000	1,896,000	3,792,000	
12 Preliminary and General	86,716,000	8,725,000	17,448,000	
13 Extraordinary Construction Costs	0	0	12,000,000	
Sub Total Base Physical works	302,208,000	47,768,000	100,299,000	
D	Total for Implementation Phase	326,387,000	52,795,000	110,349,000
E	Project Base Estimate (A+C+D)	395,921,000		
F	Contingency (Assessed/Analysed) (A+B+C+D)		64,491,000	
G	Project Expected Estimate (E+F)		460,412,000	
	Nett Project Property Cost Expected Estimate		29,520,000	
	Project Development Phase Expected Estimate		13,491,000	
	Pre-implementation Phase Expected Estimate		38,219,000	
	Implementation Phase Expected Estimate		379,182,000	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			126,129,000
I	95th percentile Project Estimate (G+H)			586,541,000
	Nett Project Property Cost 95th percentile Estimate			35,572,000
	Project Development Phase 95th percentile Estimate			16,292,000
	Pre-implementation Phase 95th percentile Estimate			45,146,000
	Implementation Phase 95th percentile Estimate			489,531,000

Date of Estimate: 08 March 2017	Cost Index (Qtr/Year): 01/16
Estimate prepared by s 9(2)(a)	Signed
Estimate internal peer review by s 9(2)(a)	Signed
Estimate external peer review by	Signed
Estimate accepted by NZTA	Signed

Note: (1) These estimates are exclusive of escalation and GST.

Project Estimate - Form C		Indicative Business Case Estimate		
Cambridge to Piarere, Option E2, GSI, Trumpet		IBE		
Item	Description	Base Estimate	Contingency	Funding Risk Contingency
A	Nett Project Property Cost	23,289,000	7,031,000	6,152,000
B	Project Development Phase			
	- Consultancy Fees	9,578,000	891,000	1,782,000
	- NZTA Managed Costs	3,193,000	646,000	1,291,000
B	Total Project Development	12,771,000	1,537,000	3,073,000
C	Pre-implementation Phase			
	- Consultancy Fees	28,734,000	3,065,000	6,130,000
	- NZTA Managed Costs	7,982,000	791,000	1,582,000
C	Total Pre-implementation	36,716,000	3,856,000	7,712,000
D	Implementation Phase			
	Implementation Fees			
	- Consultancy Fees	15,964,000	4,048,000	8,094,000
	- NZTA Managed Costs	7,982,000	828,000	1,856,000
	- Consent Monitoring Fees	1,597,000	324,000	646,000
	Sub Total Base Implementation Fees	25,543,000	5,300,000	10,596,000
	Physical Works			
	1 Environmental Compliance	10,825,000	2,166,000	4,332,000
	2 Earthworks and Site Clearance	60,695,000	12,140,000	24,279,000
	3 Ground Improvements	3,500,000	3,200,000	4,900,000
	4 Drainage	11,601,000	2,321,000	4,641,000
	5 Pavement and Surfacing	76,890,000	7,689,000	7,689,000
	6 Bridges and Structures	24,370,000	5,394,000	10,788,000
	7 Retaining Walls	8,780,000	1,756,000	3,512,000
8 Traffic Services	9,756,000	1,953,000	3,904,000	
9 Service Relocations	1,125,000	1,125,000	4,500,000	
10 Landscaping	9,078,000	1,817,000	3,633,000	
11 Traffic Management and Temporary Works	11,055,000	2,211,000	4,422,000	
12 Preliminary and General	91,589,000	9,212,000	18,423,000	
13 Extraordinary Construction Costs	0	0	12,000,000	
Sub Total Base Physical works	319,264,000	50,984,000	107,023,000	
D	Total for Implementation Phase	344,807,000	56,284,000	117,619,000
E	Project Base Estimate (A+C+D)	417,583,000		
F	Contingency (Assessed/Analysed) (A+B+C+D)		68,708,000	
G	Project Expected Estimate (E+F)		486,291,000	
	Nett Project Property Cost Expected Estimate		30,320,000	
	Project Development Phase Expected Estimate		14,308,000	
	Pre-implementation Phase Expected Estimate		40,572,000	
	Implementation Phase Expected Estimate		401,091,000	
H	Funding Risk Contingency (Assessed/Analysed) (A+B+C+D)			134,556,000
I	95th percentile Project Estimate (G+H)			620,847,000
	Nett Project Property Cost 95th percentile Estimate			36,472,000
	Project Development Phase 95th percentile Estimate			17,381,000
	Pre-implementation Phase 95th percentile Estimate			48,284,000
	Implementation Phase 95th percentile Estimate			518,710,000
Date of Estimate: 08 March 2017		Cost Index (Qtr/Year): 01/16		
Estimate prepared by s 9(2)(a)		Signed		
Estimate internal peer review by s 9(2)(a)		Signed		
Estimate external peer review by		Signed		
Estimate accepted by NZTA		Signed		

Note: (1) These estimates are exclusive of escalation and GST.

Appendix D: Short-list Option Economic Summary Sheet

Released under Official Information Act 1982

Opus International Consultants

WORKSHEET 3

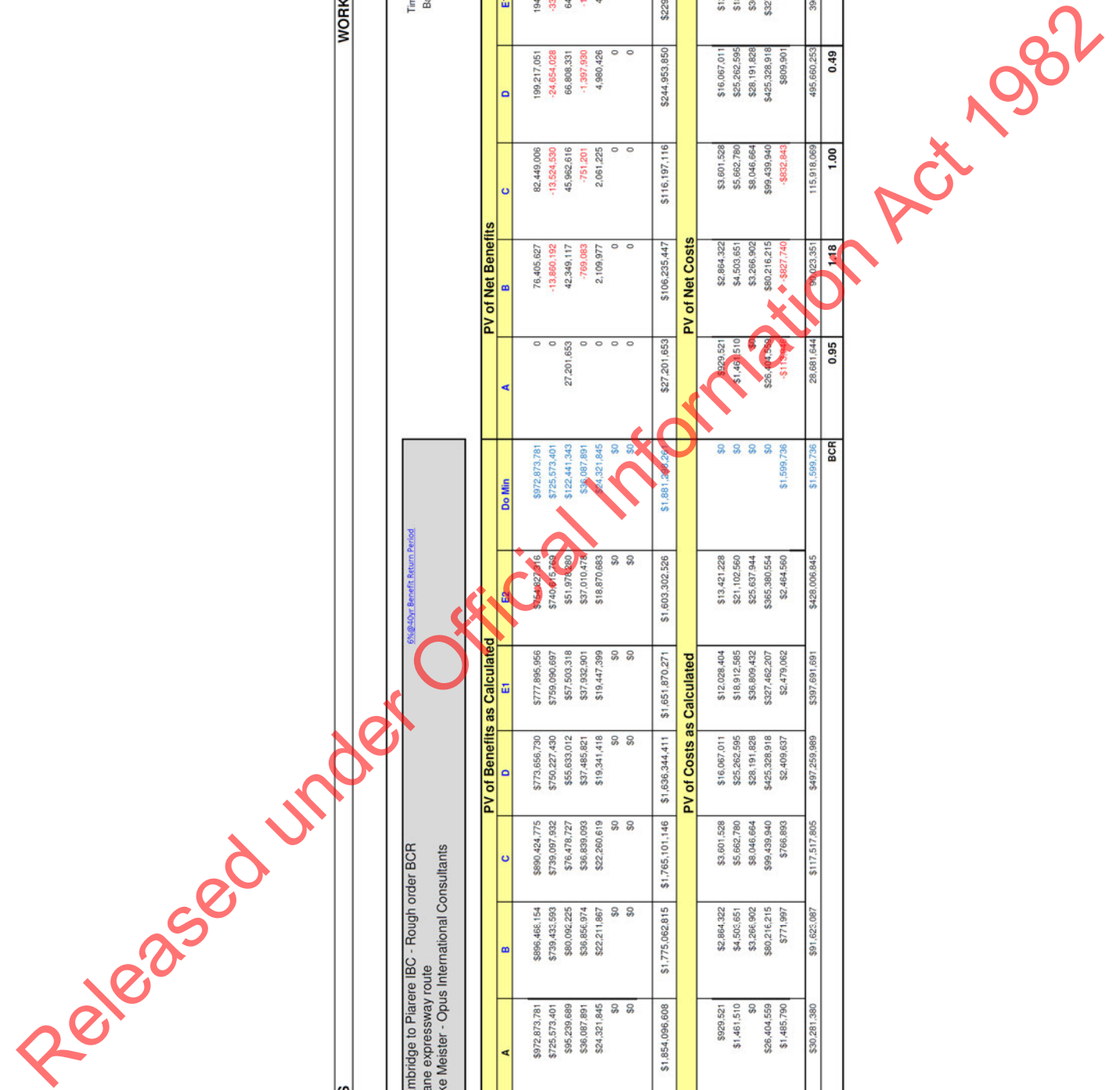
BENEFIT COST ANALYSIS

Project : Cambridge to Piarere IBC - Rough order BCR
 Description : 4 lane expressway route
 Calculated by : Mike Meister - Opus International Consultants
 Reviewed by :

5% @ 5yr Benefit Return Period

Time Zero: 1/07/2017
 Base Date: 1/07/2016

BENEFITS	PV of Benefits as Calculated							PV of Net Benefits							
	A	B	C	D	E1	E2	Do Min	A	B	C	D	E1	E2		
1. Travel Time	\$972,673,781	\$696,466,154	\$890,424,775	\$773,656,730	\$777,865,956	\$64,927,816	\$972,673,781	0	76,405,827	82,449,006	199,217,051	194,377,825	216,046,465		
2. Vehicle Oper.	\$725,673,401	\$739,433,593	\$739,097,932	\$750,227,430	\$759,090,697	\$740,615,769	\$725,673,401	0	-13,890,192	-13,524,530	-24,654,028	-33,517,295	-15,042,367		
3. Accidents	\$95,239,689	\$60,092,225	\$76,478,727	\$55,633,012	\$57,503,318	\$1,976,880	\$122,441,343	27,201,653	42,349,117	45,962,616	66,808,331	64,538,025	70,463,682		
4. Carbon dioxide	\$36,087,891	\$36,856,974	\$36,839,093	\$37,465,821	\$37,932,901	\$37,010,476	\$36,087,891	0	-769,083	-751,201	-1,397,930	-1,845,010	-922,687		
5. Reliability	\$24,321,845	\$22,211,867	\$22,260,619	\$19,341,418	\$19,447,399	\$18,870,683	\$24,321,845	0	2,109,977	2,061,225	4,360,426	4,874,446	5,451,162		
6. Agglomeration (benefit calc only)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0	0	0	0	0	0		
7. WEBS	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0	0	0	0	0	0		
PV total net benefits	\$1,854,096,608	\$1,775,062,815	\$1,765,101,146	\$1,636,344,411	\$1,651,870,271	\$1,603,302,526	\$1,681,266,236	\$27,201,653	\$106,235,447	\$116,197,116	\$244,953,850	\$229,427,990	\$277,995,735		
COSTS		PV of Costs as Calculated							PV of Net Costs						
1. Fees (invest)	\$929,521	\$2,864,322	\$3,601,528	\$16,067,011	\$12,028,404	\$13,421,228	\$0	\$929,521	\$2,864,322	\$3,601,528	\$16,067,011	\$12,028,404	\$13,421,228		
2. Fees (design)	\$1,461,510	\$4,503,651	\$5,662,780	\$25,262,595	\$18,912,585	\$21,102,560	\$0	\$1,461,510	\$4,503,651	\$5,662,780	\$25,262,595	\$18,912,585	\$21,102,560		
3. Property	\$0	\$3,286,902	\$28,191,828	\$36,809,432	\$36,809,432	\$25,637,944	\$0	\$0	\$3,286,902	\$28,191,828	\$36,809,432	\$36,809,432	\$25,637,944		
4. Construction	\$26,404,559	\$60,216,215	\$99,439,940	\$425,328,918	\$327,462,207	\$365,390,554	\$0	\$26,404,559	\$60,216,215	\$99,439,940	\$425,328,918	\$327,462,207	\$365,390,554		
5. Maintenance	\$1,485,790	\$771,997	\$766,893	\$2,409,637	\$2,479,082	\$2,464,560	\$1,599,736	-\$115,115	-\$827,740	-\$832,843	\$809,901	\$979,326	\$864,824		
PV total net costs	\$30,281,380	\$91,622,087	\$117,517,805	\$497,259,989	\$397,691,691	\$428,006,845	\$1,599,736	\$26,681,644	\$90,923,351	\$115,918,069	\$495,660,253	\$396,091,955	\$426,407,109		
							BCR	0.95	1.48	1.00	0.49	0.58	0.65		



Appendix E: Short-list Environmental and Social Responsibility Screen

Released under Official Information Act 1982

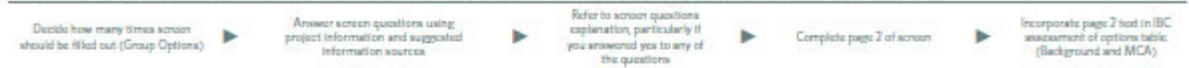
ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN V2.FEBRUARY 2016



Use to assess options in the [Indicative Business Case](#).

Use this screen to identify opportunities and risks and assess options for state highway projects. Complete the screen for each option to distinguish them from one another or bundle options where appropriate. Screen results will signal where technical assessments are required and provide a written record to support the alternatives assessment required for statutory applications. For further assistance contact the [EUD Team](#).

Additional instructions and content, including information sources, to help complete the screen can be found on the [Highways Information Portal Screen pages here](#).



PROJECT LOCATION:	PROJECT PURPOSE:	DATE:	OPTION DESCRIPTION:	
Cambridge to Piarere	Long Term Improvements	12 May 2017	Option A - Online Safety Only	
CATEGORY	QUESTION	ANSWER		USEFUL INFORMATION SOURCES
GENERAL	G1 What is the zoning of adjacent land? Are there any encumbrances on the land? e.g. Maori Reserve or other reserve/covenants	Rural <input checked="" type="checkbox"/>	Commercial <input type="checkbox"/>	District/Unitary Plan, Zoning Maps
	G2 Does the option disturb previously undisturbed land?	Industrial <input type="checkbox"/>	Residential <input type="checkbox"/>	
	G3 What is the construction timeframe?	High density residential <input type="checkbox"/>	Parks/open space <input checked="" type="checkbox"/>	
NATURAL ENVIRONMENT	NE1 Are there any outstanding/significant natural features (e.g. geological or geothermal)/landscapes?	Y <input type="checkbox"/>	N <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Natural Environment
	NE2 Will the option affect the coastal marine area, wetlands, lakes, rivers, streams or their margins?	Y <input type="checkbox"/>	N <input type="checkbox"/>	Regional Plan Maps and Schedules
	NE3 Will the option affect areas of the conservation estate, or areas of known significance for biodiversity or known habitats of uncommon or threatened species?	Y <input type="checkbox"/>	N <input checked="" type="checkbox"/>	District Plan Maps and Schedules
	NE4 Is the option in an area of potential hazard risk e.g. fault lines, significant erosion, flooding, sea level rise etc?	Y <input type="checkbox"/>	N <input checked="" type="checkbox"/>	Department of Conservation
	NE5 Will more than 0.5 hectares of vegetation be removed? What type? <u>mixed vegetation</u>	Y <input type="checkbox"/>	N <input type="checkbox"/>	
CULTURAL AND HISTORIC HERITAGE	CH1 Are there sites/areas of significance to Maori within 200m of the area of interest?	Y <input type="checkbox"/>	N <input type="checkbox"/>	Net
	CH2 Are any recorded, scheduled or listed archaeological sites within 200m of the area of interest?	Y <input type="checkbox"/>	N <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Culture and Heritage
	CH3 Are any scheduled, listed or other important heritage structures within 200m of the area of interest?	Y <input type="checkbox"/>	N <input checked="" type="checkbox"/>	Heritage New Zealand List
	CH4 Will the option affect the setting of any listed buildings/structure or archaeological site?	Y <input type="checkbox"/>	N <input type="checkbox"/>	NZ Archaeological Association
	CH5 Is a group of archaeological sites or an area of historic built environment (even partially) within 200m of the area of interest?	Y <input type="checkbox"/>	N <input type="checkbox"/>	District Plan Maps and Schedules Regional Plan Maps and Schedules IPENZ Heritage List NZTA GIS predictive models
HUMAN HEALTH	HH1 What is the One Network Zone Classification?	National <input checked="" type="checkbox"/>	Regional <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Maps- Human Health and Community which includes:
	HH2 Is the area of interest designated as a non-compliant airshed?	Arterial <input type="checkbox"/>	Collector <input type="checkbox"/>	- Designated airsheds (including one network classification)
	HH3 Are there medical sites, rest homes, schools, child care sites, residential properties, marae or other sensitive receivers located within 200m of the area of interest?	Y <input type="checkbox"/>	N <input type="checkbox"/>	- Highly sensitive receivers
	HH4 Does land use within 200m of the area of interest include industrial sites, chemical manufacturing or storage, petrol stations, vehicle maintenance, timber processing/treatment, substations, rail yards, landfills or involve other activities that may result in ground contamination? OR Are there HAIL or SLUR (contaminated) sites within 200m of the area of interest?	Y <input type="checkbox"/>	N <input type="checkbox"/>	Regional Council Contaminated sites Team
SOCIAL	S1 Does the option affect access to community facilities (i.e. libraries, open space etc (either temporarily or permanently))?	Y <input type="checkbox"/>	N <input type="checkbox"/>	NZTA MapHub Project Team
	S2 Does the option affect community cohesion and accessibility including vehicular connectivity on the local road network?	Which? Community Hall, Recreational reserves & boulevards	Y <input type="checkbox"/>	N <input type="checkbox"/>
URBAN AND LANDSCAPE DESIGN	ULD1 Are there opportunities to enhance infrastructure for, and/or improve access to, public transport and/or active modes of travel such as walking and cycling?	Y <input type="checkbox"/>	N <input checked="" type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Natural Environment (Scenic Boulevards)
	ULD2 Does the option enhance the development potential of adjacent land where appropriate?	Y <input type="checkbox"/>	N <input checked="" type="checkbox"/>	Regional Land Transport Plan Project Team
	ULD3 Is the option located on a themed highway? Is the option part of or near a national cycle or walking route?	Y <input type="checkbox"/>	N <input type="checkbox"/>	Strategies and District Plan
	ULD4 Are there opportunities to enhance the urban character, landscape character and visual amenity?	Y <input type="checkbox"/>	N <input type="checkbox"/>	

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Answers and Comments Refer to [stream questions explanation](#) to help complete this part.

1. Summarize the potential environmental and social risks/impacts associated with this option. Consider short and long term risks and impacts.

NATURAL ENVIRONMENT:

- Adjacent areas are located in the Rural and Reserve Zones. - Approx. 9 Significant Natural Areas (SNA's) adjacent to the existing road reserve.
- Adjacent to the Hydro Operating Exemption, Access Strip
- Option A located within the River & Lake Environs Areas
- Rural rules
- Reserve Rules
- High Class Soils adjacent to majority of option
- Biodiversity Corridor (River or Stream) adjacent to majority of option
- Biodiversity Corridor (Indigenous Forest) adjacent to part of option

CULTURAL AND HISTORIC HERITAGE:

- There is approx. 9 Maori horticulture sites within close proximity to the existing road reserve.
- Approx. 1 Pa site adjacent to the Option A. Pa sites typically represent extensive areas of occupation.
- It is likely unrecorded archaeological sites exist within the road reserve.

HUMAN HEALTH:

- Not located in a non-complying air-shed
- Transmission lines
- Approx. 6 potentially contaminated sites adjacent to Option A, including a petrol station, a large rural building and 4 areas of current cropland, orchard or similar

SOCIAL:

- Karapiro School
- Moana Rd Boat Ramp
- Horahora Gorge Scenic Reserve
- Bob's Landing Informal Boat Ramp
- Keesley's Recreation Reserve & Boat Ramp
- Mobil Petrol Station
- Karapiro Teceatona Settlers Hall

The responses above will be used in the IBC assessment of options summary table, MCA of the Option.

URBAN AND LANDSCAPE DESIGN:

- Approx. 9 SNA's adjacent to Option A. These include:
 - Waikato River riparian shrubland remnants
 - Lake Karapiro margin mixed vegetation
 - Horahora Gorge Scenic Reserve indigenous forest remnant
 - Kanihiki Road north-eastern indigenous forest marginal areas
 - Option A located within the River & Lake Environs Areas
- Wairuaheip restoration project
- Lake Karapiro protected margins
- Waipa district eastern boundary forest remnants
- Reserve Zones, access strips to Lake Karapiro/Waikato River
- Forest remnant vegetation adjacent to Wairuaheip
- Fergusson Gully Rd & Tiram Road hillslope remnant

Incorporate the relevant comments from above into the economy, social and geography sections of the IBC assessment of options summary table.

2. What are the environmental, social integration, landscape design or urban design benefits or opportunities presented by this option? Particularly record opportunities that could be lost if not considered early in the design process.

- Improved safe pedestrian access from Karapiro Village to Karapiro school
- Improved local road intersections

3. Are there any impacts, risks or opportunities which require preliminary technical assessments to help understand risks or opportunities? Is further information required to support the development of the detailed business case or can it be left until the detailed business case/pre-implementation?

- No additional preliminary technical assessments are required for the IBC phase, sufficient information has been gathered to identify the impacts, risks and opportunities at the IBC level
- Option A is not the preferred corridor and will not progress to the DBC phase; therefore, no further information is required

Completed by Louise Chubb - Opus International Consultants Ltd

Reviewed by NZTA Project Manager

Incorporated results into IBC assessment of options summary table? Yes No

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN: OPTION A

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN V2.FEBRUARY 2016



Use to assess options in the Indicative Business Case.

Use this screen to identify opportunities and risks and assess options for state highway projects. Complete the screen for each option to distinguish them from one another or bundle options where appropriate. Screen results will signal where technical assessments are required and provide a written record to support the alternatives assessment required for statutory applications. For further assistance contact the EUD Team.

Additional instructions and content, including information sources, to help complete the screen can be found on the Highways Information Portal Screen pages here.



PROJECT LOCATION: **Cambridge to Piarere** | PROJECT PURPOSE: **Long Term Improvements** | DATE: **12 May 2017** | OPTION DESCRIPTION: **Option B&C-Safety, Passing Lanes, Turnarounds & Parallel Roads**

CATEGORY	QUESTION	ANSWER	USEFUL INFORMATION SOURCES
GENERAL	G1: What is the zoning of adjacent land? Are there any encumbrances on the land? e.g. Maori Reserve or other reserve/covenants	Rural <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Residential <input type="checkbox"/> High density residential <input type="checkbox"/> Parks/open space <input checked="" type="checkbox"/>	District/Unitary Plan Zoning Maps
	G2: Does the option disturb previously undisturbed land?	Y <input type="checkbox"/> N <input type="checkbox"/>	
	G3: What is the construction timeframe?	>18 months <input type="checkbox"/> <18 months <input type="checkbox"/>	
NATURAL ENVIRONMENT	NE1: Are there any outstanding/significant natural features (e.g. geological or geothermal)/landscapes?	Y <input type="checkbox"/> N <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map - Natural Environment
	NE2: Will the option affect the coastal marine area, wetlands, lakes, rivers, streams or their margins?	Y <input type="checkbox"/> N <input type="checkbox"/>	Regional Plan Maps and Schedules
	NE3: Will the option affect areas of the conservation estate, or areas of known significance for biodiversity or known habitats of uncommon or threatened species?	Y <input type="checkbox"/> N <input type="checkbox"/>	District Plan Maps and Schedules
	NE4: Is the option in an area of potential hazard risk e.g. fault lines, significant erosion, flooding, sea level rise etc?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Department of Conservation
	NE5: Will more than 0.5 hectares of vegetation be removed? What type? mixed vegetation	Y <input type="checkbox"/> N <input type="checkbox"/>	
CULTURAL AND HISTORIC HERITAGE	CH1: Are there sites/areas of significance to Maori within 200m of the area of interest?	Y <input type="checkbox"/> N <input type="checkbox"/>	Net
	CH2: Are any recorded, scheduled or listed archaeological sites within 200m of the area of interest?	Y <input type="checkbox"/> N <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Culture and Heritage
	CH3: Are any scheduled, listed or other important heritage buildings/structures within 200m of the area of interest?	Y <input type="checkbox"/> N <input type="checkbox"/>	Heritage New Zealand List
	CH4: Will the option affect the setting of any historic buildings/structures or archaeological sites?	Y <input type="checkbox"/> N <input type="checkbox"/>	NZ Archaeological Association
	CH5: Is a group of archaeological sites or an area of historic built environment (even partially) within 200m of the area of interest?	Y <input type="checkbox"/> N <input type="checkbox"/>	District Plan Maps and Schedules Regional Plan Maps and Schedules IPENZ Heritage List NZTA GIS predictive models
HUMAN HEALTH	HH1: What is the One Network Road Classification?	National <input checked="" type="checkbox"/> Regional <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Maps- Human Health and Community which includes:
	HH2: Is the area of interest designated as a non-compliant airshed?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	- Designated airsheds (including one network classification) - Highly sensitive receivers
	HH3: Are there more than 1000 homes, schools, child care sites, residential care facilities, nurseries or other sensitive receivers located within 200m of the area of interest?	Y <input type="checkbox"/> N <input type="checkbox"/>	Regional Council Contaminated Sites Team
	HH4: Does land use within 200m of the area of interest include industrial uses, chemical manufacturing or storage, petrol stations, vehicle maintenance, timber processing/treatment, substations, rail yards, or involve other activities that may result in ground contamination? OR Are there HAIL or SLUR (contaminated) sites within 200m of the area of interest?	Y <input type="checkbox"/> N <input type="checkbox"/>	
SOCIAL	S1: Does the option affect access to community facilities (i.e. libraries, open space etc (either temporarily or permanently))?	Y <input type="checkbox"/> N <input type="checkbox"/> Which? Community Hall, Recreational reserves & boulevards	NZTA MapHub Project Team
	S2: Does the option affect community cohesion and accessibility including vehicular connectivity on the local road network?	Y <input type="checkbox"/> N <input type="checkbox"/>	District Plan Maps Council and Community Strategy Documents
URBAN AND LANDSCAPE DESIGN	ULD1: Are there opportunities to enhance infrastructure for, and/or improve access to, public transport and/or active modes of travel such as walking and cycling?	Y <input type="checkbox"/> N <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Natural Environment (Scenic Routes)
	ULD2: Does the option enhance the development potential of adjacent land where appropriate?	Y <input type="checkbox"/> N <input type="checkbox"/>	Regional Land Transport Plan Project Team
	ULD3: Is the option located on a themed highway? Is the option part of or near a national cycle or walking route?	Y <input type="checkbox"/> N <input type="checkbox"/>	Strategies and District Plan
	ULD4: Are there opportunities to enhance the urban character, landscape character and visual amenity?	Y <input type="checkbox"/> N <input type="checkbox"/>	

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Answers and Comments Refer to [screen questions explanation](#) to help complete this part.

1. Summarize the potential environmental and social risks/impacts associated with this option. Consider short and long term risks and impacts.

NATURAL ENVIRONMENT:

- Adjacent areas are located in the Rural and Reserve Zones. - Approx. 9 Significant Natural Areas (SNA's) adjacent/within Options B&C.
- Options B&C adjacent to the Hydro Operating Easement, Access Strip
- Options B&C located within the River & Lake Environs Areas
- Rural rules
- Reserve Rules
- High Class Soils adjacent to majority of option
- Biodiversity Corridor (River or Stream) adjacent to majority of option
- Biodiversity Corridor (Indigenous Forest) adjacent to part of option

CULTURAL AND HISTORIC HERITAGE:

- Approx. 15 Maori horticulture sites adjacent/within Options B&C.
- Approx. 1 Pa site adjacent to Options B&C. Pa sites typically represent extensive areas of occupation.
- It is likely unrecorded archaeological sites could potentially be found within Options B&C.

HUMAN HEALTH:

- Not located in a non-complying air-shed
- Transmission lines
- Approximately 6 potentially contaminated sites adjacent/within Options B&C including a petrol station, a large rural building & 4 areas of current cropland, orchard or similar

SOCIAL:

- Karapiro School
- Moana Rd Boat Ramp
- Horahora Gorge Scenic Reserve
- Bob's Landing Informal Boat Ramp
- Keeley's Recreation Reserve & Boat Ramp
- Mobil Petrol Station
- Karapiro Taoharua Settlers Hall
- Karapiro Village

The responses above will be used in the IBC assessment of options summary table: MCA of the Option.

URBAN AND LANDSCAPE DESIGN:

- Approx. 9 SNA's adjacent/within Options B&C. These include:
 - Waikato River riparian shrubland remnants
 - Lake Karapiro margin mixed vegetation
 - Horahora Gorge Scenic Reserve indigenous forest remnant.
 - Kaitiaki Road north-eastern indigenous forest marginal areas
 - Options B&C located within the River & Lake Environs Areas
 - Warrenheip restoration project
 - Lake Karapiro protected margins
 - Waipa district eastern boundary forest remnants
 - Reserve Zones, access strips to Lake Karapiro/Waikato River
 - Large Lot Residential within Karapiro Village
 - Forest remnant vegetation adjacent to Warrenheip
 - Fergusson Gully Rd & Turu Road hillslope remnant

Incorporate the relevant comments from above into the economic, social and geography sections of the IBC assessment of options summary table.

2. What are the environmental, social integration, landscape design or urban design benefits or opportunities presented by this option? Particularly record opportunities that could be lost if not considered early in the design process.

- Improved pedestrian access from Karapiro to Karapiro school
- Improved local road intersections
- Enhancements to walking and cycling
- Improved connections to community facilities
- Option C enables separation between local and regional traffic which provides for alternative active modes

3. Are there any impacts, risks or opportunities which require preliminary technical assessments to help understand risks or opportunities? Is further information required to support the development of the detailed business case or can it be left until the detailed business case/pre-implementation?

- No additional preliminary technical assessments are required for the IBC phase, sufficient information has been gathered to identify the impacts, risks and opportunities at the IBC level
- Options B and C are not the preferred corridor and will not progress to the DBC phase, therefore, no further information is required

Completed by: Louise Chanhan - Opus International Consultants Ltd

Reviewed by NZTA Project Manager: [Redacted]

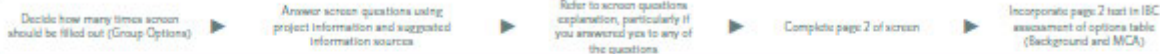
Incorporated results into IBC assessment of options summary table? Yes No

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN: OPTION B & C

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN V2.FEBRUARY 2016



Use to assess options in the [Indicative Business Case](#).
 Use this screen to identify opportunities and risks and assess options for state highway projects. Complete the screen for each option to distinguish them from one another or bundle options where appropriate. Screen results will signal where technical assessments are required and provide a written record to support the alternatives assessment required for statutory applications. For further assistance contact the [EISD Team](#).
 Additional instructions and content, including information sources, to help complete the screen can be found on the [Highways Information Portal Screen pages here](#).



PROJECT LOCATION: **Cambridge to Piarere** PROJECT PURPOSE: **Long Term Improvements** DATE: **12 May 2017** OPTION DESCRIPTION: **Option D - Online Four Lane Expressway**

CATEGORY	QUESTION	ANSWER	USEFUL INFORMATION SOURCES
GENERAL	G1: What is the zoning of adjacent land? Are there any encumbrances on the land? e.g. Maori Reserve or other reserve/covenants	Rural <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Residential <input type="checkbox"/> High density residential <input type="checkbox"/> Parks/open space <input checked="" type="checkbox"/>	District/Unitary Plan Zoning Maps
	G2: Does the option disturb previously undisturbed land?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	
	G3: What is the construction timeframe?	>18 months <input checked="" type="checkbox"/> <18 months <input type="checkbox"/>	
NATURAL ENVIRONMENT	NE1: Are there any outstanding/significant natural features (e.g. geological or geothermal)/landscapes?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map - Natural Environment
	NE2: Will the option affect the coastal marine area, wetlands, lakes, rivers, streams or their margins?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	Regional Plan Maps and Schedules
	NE3: Will the option affect areas of the conservation estate, or areas of known significance for biodiversity or known habitats of uncommon or threatened species?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	District Plan Maps and Schedules
	NE4: Is the option in an area of potential hazard risk e.g. fault lines, significant erosion, flooding, sea level rise etc?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Department of Conservation
	NE5: Will more than 0.5 hectares of vegetation be removed? What type? <u>mixed</u> vegetation	Y <input type="checkbox"/>	
CULTURAL AND HISTORIC HERITAGE	CH1: Are there sites/areas of significance to Maori within 200m of the area of interest?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	Iwi NZTA MapHub Environmental and Social Risk Map - Culture and Heritage
	CH2: Are any recorded, scheduled or listed archaeological sites within 200m of the area of interest?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	Heritage New Zealand List
	CH3: Are any scheduled, listed or other important heritage buildings/structures within 200m of the area of interest?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	NZ Archaeological Association District Plan Maps and Schedules
	CH4: Will the option affect the setting of any historic building/structure or archaeological site?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	Regional Plan Maps and Schedules IPENZ Heritage List
	CH5: Is a group of archaeological sites or an area of historic built environment (even partially) within 200m of the area of interest?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	NZTA GIS predictive models
HUMAN HEALTH	HH1: What is the One Network Road Classification?	National <input checked="" type="checkbox"/> Regional <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Maps - Human Health and Community which includes: - Designated airsheds (including one network classification) - Highly sensitive receivers Regional Council Contaminated sites Team
	HH2: Is the area of interest designated as a non-compliant airshed?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	
	HH3: Are there medical sites, day homes, schools, child care sites, residential premises, marae or other sensitive receivers located within 200m of the area of interest?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	
	HH4: Does land use within 200m of the area of interest include industrial sites, chemical manufacturing or storage, petrol stations, vehicle repair areas, timber processing/treatment, substations, rail yards, or involve other activities that may result in ground contamination? OR Are there HAIL or SLUR (contaminated) sites within 200m of the area of interest?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	
SOCIAL	S1: Does the option affect access to community facilities i.e. libraries, open space etc (either temporarily or permanently)?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/> Which? <u>Community Hall, Recreational reserves & boulevards</u>	NZTA MapHub Project Team District Plan Maps
	S2: Does the option affect community cohesion and accessibility including vehicular connectivity on the local road network?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	Council and Community Strategy Documents
URBAN AND LANDSCAPE DESIGN	ULD1: Are there opportunities to enhance infrastructure for, and/or improve access to, public transport and/or active modes of travel such as walking and cycling?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map - Natural Environment (Scenic Routes)
	ULD2: Does the option enhance the development potential of adjacent land where appropriate?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	Regional Land Transport Plan Project Team
	ULD3: Is the option located on a themed highway? Is the option part of or near a national cycle or walking route?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	Strategies and District Plan
	ULD4: Are there opportunities to enhance the urban character, landscape character and visual amenity?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	

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Answers and Comments	refer to screen questions explanation to help complete this part.
<p>1. Summarize the potential environmental and social risks/impacts associated with this option. Consider short and long term risks and impacts.</p>	
NATURAL ENVIRONMENT:	<ul style="list-style-type: none"> - Adjacent areas are located in the Rural & Reserve Zones. - Approx. 12 Significant Natural Areas (SNA's) adjacent/within corridor. - Adjacent to the Hydro Operating Easement, Access Strip & Cultural Landscape Area Alert - Located within the River & Lake Environs Areas - Rural rules - Reserve Rules - High Class Soils adjacent to majority of option - Biodiversity Corridor (River or Stream) adjacent to majority of option - Biodiversity Corridor (Indigenous Forest) adjacent to part of option
CULTURAL AND HISTORIC HERITAGE:	<ul style="list-style-type: none"> - Approx. 22 Maori horticulture sites within adjacent to Option D. - Approx. 1 borrow pit/terrace. - Approx. 5 Pa sites adjacent/within Option D. The pa sites typically represent extensive areas of occupation. - It is likely unrecorded archaeological sites could potentially be found.
HUMAN HEALTH:	<ul style="list-style-type: none"> - Not located in a non-complying air-shed - Transmission lines - Approx. 10 potentially contaminated sites adjacent/within Option D including a petrol station, 5 sites containing large rural buildings and 4 areas of current cropland, orchard or similar
SOCIAL:	<ul style="list-style-type: none"> - Karapiro School - Moana Rd Boat Ramp - Horahora Gorge Scenic Reserve - Bob's Landing Informal Boat Ramp - Keeley's Recreation Reserve & Boat Ramp - Karapiro Village - Mobil Petrol Station - Karapiro Tachrome Sentries Hall
<p>The responses above will be used in the IBC assessment of options summary table: MCA of the Option.</p>	
URBAN AND LANDSCAPE DESIGN:	<p>Approx. 12 SNA's adjacent/within Option D. These include:</p> <ul style="list-style-type: none"> - 2 sites for Mangahouma Stream tributary scrub & riparian margins - 2 sites for warrenship restoration project - Forest vegetation adjacent to Whareroaip - Lake Karapiro margin mixed vegetation - SH1, Tiram Rd, Lake Karapiro protected margins - Fergusson Gully Road and Tiram Road hillslope remnant - Tiram Rd, Waipa District eastern boundary forest remnants - SH1 northern, tributary degraded remnant - Horahora Gorge Scenic Reserve indigenous forest remnants - Waipa district eastern boundary forest remnants & 2 sites including Kentucky Road Lake Karapiro tributary margins & north-eastern indigenous forest marginal areas - Located within the River & Lake Environs Areas - Reserve Zones, access strips to Lake Karapiro/Waikato River - Large Lot Residential within Karapiro Village
<p>Incorporate the relevant comments from above into the economic, social and geography sections of the IBC assessment of options summary table.</p>	
<p>2. What are the environmental, social integration, landscape design or urban design benefits or opportunities presented by this option? Particularly record opportunities that could be lost if not considered early in the design process.</p>	
<ul style="list-style-type: none"> - Improved safe pedestrian access from Karapiro to Karapiro school - Improved local road intersections - Enhancements to walking and cycling - Improved connections to community facilities - Highlight archaeological features & cultural elements - Improve existing Karapiro Village through development & growth - Enhancement of natural environment i.e. Waikato river, lake karapiro & gullies 	
<p>3. Are there any impacts, risks or opportunities which require preliminary technical assessments to help understand risks or opportunities? Is further information required to support the development of the detailed business case or can it be left until the detailed business case/pre-implementation?</p>	
<ul style="list-style-type: none"> - No additional preliminary technical assessments are required for the IBC phase, sufficient information has been gathered to identify the impacts, risks and opportunities at the IBC level - Option D is not the preferred corridor and will not progress to the DBC phase, therefore, no further information is required 	
Completed by	Louise Chamber - Opus International Consultants Ltd
Reviewed by NZTA Project Manager	
Incorporated results into IBC assessment of options summary table?	Yes <input type="checkbox"/> No <input type="checkbox"/>

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN: OPTION D

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN V2.FEBRUARY 2016



Use to assess options in the [indicative Business Case](#)

Use this screen to identify opportunities and risks and assess options for state Highway projects. Complete the screen for each option to distinguish them from one another or bundle options where appropriate. Screen results will signal where technical assessments are required and provide a written record to support the alternatives assessment required for statutory applications. For further assistance contact the [EJOP Team](#).

Additional instructions and content, including information sources, to help complete the screen can be found on the [Highways Information Portal](#). [Screen pages here](#).



PROJECT LOCATION: **Cambridge to Piarere** PROJECT PURPOSE: **Long Term Improvements** DATE: **12 May 2017** OPTION DESCRIPTION: **Option E1 - Offline Four Lane Expressway (Far North)**

CATEGORY	QUESTION	ANSWER	USEFUL INFORMATION SOURCES
GENERAL	G1: What is the zoning of adjacent land? Are there any encumbrances on the land? e.g. Maori Reserve or other reserves/covenants	Rural <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Residential <input type="checkbox"/> High density residential <input type="checkbox"/> Parks/open space <input type="checkbox"/>	District/Unitary Plan Zoning Maps
	G2: Does the option disturb previously undisturbed land?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	
	G3: What is the construction timeframe?	>18 months <input type="checkbox"/> <18 months <input checked="" type="checkbox"/>	
NATURAL ENVIRONMENT	NE1: Are there any outstanding/significant natural features (e.g. geological or geothermal)/landscapes?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Natural Environment
	NE2: Will the option affect the coastal marine area, wetlands, lakes, rivers, streams or their margins?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Regional Plan Maps and Schedules
	NE3: Will the option affect areas of the conservation estate, or areas of known significance for biodiversity or known habitats of uncommon or threatened species?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	District Plan Maps and Schedules
	NE4: Is the option in an area of potential hazard risk e.g. fault lines, significant erosion, flooding, sea level rise etc?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Department of Conservation
	NE5: Will more than 0.5 hectares of vegetation be removed? What type? mixed vegetation	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	
CULTURAL AND HISTORIC HERITAGE	CH1: Are there sites/areas of significance to Maori within 200m of the area of interest?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Net
	CH2: Are any recorded, scheduled or listed archaeological sites within 200m of the area of interest?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Culture and Heritage
	CH3: Are any scheduled, listed or other important heritage buildings or structures within 200m of the area of interest?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Heritage New Zealand List NZ Archaeological Association
	CH4: Will the option affect the setting of any historic buildings or archaeological sites?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	District Plan Maps and Schedules Regional Plan Maps and Schedules
	CH5: Is a group of archaeological sites or an area of historic built environment (even partially) within 200m of the area of interest?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	IPENZ Heritage List NZTA GIS predictive models
HUMAN HEALTH	HH1: What is the One Network Road Classification?	National <input checked="" type="checkbox"/> Regional <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Human Health and Community which includes:
	HH2: Is the area of interest designated as a non-compliant airshed?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	- Designated airsheds (including one network classification) - Highly sensitive receptors
	HH3: Are there medical sites, road homes, schools, child care sites, residential properties, nurseries or other sensitive receptors located within 200m of the area of interest?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Regional Council Contaminated sites Team
	HH4: Does land use within 200m of the area of interest include industrial sites, chemical manufacturing or storage, petrol stations, vehicle maintenance, timber processing/treatment, substations, rail yards, or involve other activities that may result in ground contamination? OR Are there HAIL or SLUR (contaminated) sites within 200m of the area of interest?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	
SOCIAL	S1: Does the option affect access to community facilities i.e. libraries, open space etc (either temporarily or permanently)? Which? Community Hall	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	NZTA MapHub Project Team District Plan Maps
	S2: Does the option affect community cohesion and accessibility including vehicular connectivity on the local road network?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Council and Community Strategy Documents
URBAN AND LANDSCAPE DESIGN	ULD1: Are there opportunities to enhance infrastructures for, and/or improve access to, public transport and/or active modes of travel such as walking and cycling?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	NZTA MapHub Environmental and Social Risk Map- Natural Environment (Scenic Routes)
	ULD2: Does the option enhance the development potential of adjacent land where appropriate?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Regional Land Transport Plan Project Team
	ULD3: Is the option located on a themed highway? Is the option part of or near a national cycle or walking route?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	Strategies and District Plan
	ULD4: Are there opportunities to enhance the urban character, landscape character and visual amenity?	Y <input type="checkbox"/> N <input checked="" type="checkbox"/>	

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Answers and Comments	Refer to screen questions expansion to help complete this part.
<p>1. Summarize the potential environmental and social risks/impacts associated with this option. Consider short and long term risks and impacts.</p>	
NATURAL ENVIRONMENT:	<ul style="list-style-type: none"> - Adjacent areas are located in the Rural zone. - Approx 4 protected trees or objects - Kaitiaki zone rules, Flood hazard zone rules, Rural zone rules - Waitoa River, Karapiro Stream - Mineral Extraction Area - for the purpose of overburden disposal only. - Biodiversity Corridor (Indigenous Forest) along part of corridor - High Class Soils - Approx. 13 Significant Natural Areas (SNA's) adjacent/within corridor - Cultural Landscape Area Alert - Biodiversity Corridor (River or Stream) along majority of corridor
CULTURAL AND HISTORIC HERITAGE:	<ul style="list-style-type: none"> - Heritage Site - Scotsman's Cap - Peculiar rock formation - Urupa site - Approx. 9 pa sites. The pa sites typically represent extensive areas of occupation. - Approx 2 borrow pits/terrace - Approx. 16 Maori horticulture sites - It is likely unrecorded archaeological sites could potentially be found
HUMAN HEALTH:	<ul style="list-style-type: none"> - Transmission lines - Geotechnical constraints present i.e. shallow groundwater, soft ground in low-lying areas & gully floors, slope instability and high erosion potential on steep terrain, potential for steep cuts and high embankments required through hilly terrain, groundwater seepage along spring lines - Approx. 6 Potentially contaminated land - 1 past and 1 current cropland, orchard, or similar, 1 runway, ponds, petrol station, and 1 site containing a large rural building's. - Not located in a non-complying air-shed
SOCIAL:	<ul style="list-style-type: none"> - Mobil petrol station - Karapiro School - Karapiro Village - Taotaroa Settlers Hall
<p>The responses above will be used in the IBC assessment of options summary table: MCA of the Option</p>	
URBAN AND LANDSCAPE DESIGN:	<ul style="list-style-type: none"> - 4 Protected tree or objects - Large area within SH29 Connection - Otagiti Igumireite Bluffs (Himara Stone), - Kahikatea Bush Stand, - Pin Oaks - Significant Bush Stand - 898 Taotaroa Rd - 13 SNA's - 2 within the vicinity of Taotaroa Rd & Todd Rd intersection - Mangahae Stream tributary scrub remnants - Taotaroa quarry western forest remnants - Forest remnant east of Todd - Taotaroa Rd northern indigenous forest remnant - Taotaroa Rd northern tributary marginal strip - Taotaroa Rd quarry entrance, south-eastern remnant - Taotaroa Rd quarry entrance southern riparian remnant. - Taotaroa southern indigenous forest remnants - Scrub areas at Tiram Rd opposite Karapiro township - Karapiro Stream unnamed tributary, Tiram Rd riparian remnants - Karapiro forest - Large lot residential within Karapiro Village
<p>Incorporate the relevant comments from above into the economy, social and geography sections of the IBC assessment of options summary table.</p>	
<p>2. What are the environmental, social integration, landscape design or urban design benefits or opportunities presented by this option? Particularly record opportunities that could be lost if not considered early in the design process.</p>	
<ul style="list-style-type: none"> - Improved safe pedestrian access from Karapiro to Karapiro school - Highlight cultural archaeological features and cultural elements - Protect views to significant landscape features - Enhancements to walking and cycling - Enhancement of natural environment - Improved local road intersections - Improve existing Karapiro Village through development & growth - Improved connections to community facilities 	
<p>3. Are there any impacts, risks or opportunities which require preliminary technical assessments to help understand risks or opportunities? Is further information required to support the development of the detailed business case or can it be left until the detailed business case/pre-implementation?</p>	
<ul style="list-style-type: none"> - No additional preliminary technical assessments are required for the IBC phase, sufficient information has been gathered to identify the impacts, risks and opportunities at the IBC level - Option E1 is not the preferred corridor and will not progress to the DBC phase, therefore, no further information is required 	
Completed by	Louise Charlton - Opus International Consultants Ltd
Reviewed by NZTA Project Manager	
Incorporated results into IBC assessment of options summary table?	Yes <input type="checkbox"/> No <input type="checkbox"/>

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN: OPTION E1

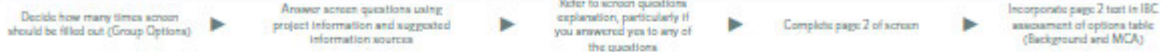
ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN V2.FEBRUARY 2016



Use to assess options in the [Indicative Business Case](#).

Use this screen to identify opportunities and risks and assess options for state Highway projects. Complete the screen for each option to distinguish them from one another or bundle options where appropriate. Screen results will signal where technical assessments are required and provide a written record to support the alternatives assessment required for statutory applications. For further assistance contact the [EUD Team](#).

Additional instructions and content, including information sources, to help complete the screen can be found on the [Highways Information Portal Screen pages here](#).



PROJECT LOCATION:		PROJECT PURPOSE:		DATE:		OPTION DESCRIPTION:	
Cambridge to Piarere		Long Term Improvements		12 May 2017		Option E2 - Offline Four Lane Expressway (North)	
CATEGORY	QUESTION	ANSWER		USEFUL INFORMATION SOURCES			
GENERAL	G1 What is the zoning of adjacent land? Are there any encumbrances on the land? e.g. Maori Reserve or other reserve/covenants?	Rural <input checked="" type="checkbox"/>	Commercial <input type="checkbox"/>	Industrial <input type="checkbox"/>	Residential <input type="checkbox"/>	District/Unitary Plan Zoning Maps	
	G2 Does the option disturb previously undisturbed land?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	High density residential <input type="checkbox"/>	Parks/open space <input checked="" type="checkbox"/>		
	G3 What is the construction timeframe?	>18 months <input checked="" type="checkbox"/>	<18 months <input type="checkbox"/>				
NATURAL ENVIRONMENT	NE1 Are there any outstanding/significant natural features (e.g. geological or geothermal)/landscapes?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>			NZTA MapHub Environmental and Social Risk Map- Natural Environment Regional Plan Maps and Schedules District Plan Maps and Schedules Department of Conservation	
	NE2 Will the option affect the coastal marine area, wetlands, lakes, rivers, streams or their margins?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
	NE3 Will the option affect areas of the conservation estate, or areas of known significance for biodiversity or known habitats of uncommon or threatened species?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
	NE4 Is the option in an area of potential hazard risk e.g. fault lines, significant erosion, flooding, sea level rise etc?	Y <input type="checkbox"/>	N <input checked="" type="checkbox"/>				
	NE5 Will more than 0.5 hectares of vegetation be removed? What type? <u>mixed vegetation</u>	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
CULTURAL AND HISTORIC HERITAGE	CH1 Are there sites/areas of significance to Maori within 200m of the area of interest?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>			Heri NZTA MapHub Environmental and Social Risk Map- Culture and Heritage Heritage New Zealand Ltd NZ Archaeological Association District Plan Maps and Schedules Regional Plan Maps and Schedules IPENZ Heritage List NZTA GIS predictive models	
	CH2 Are any recorded, scheduled or listed archaeological sites within 200m of the area of interest?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
	CH3 Are any scheduled, listed or other important heritage buildings/structures within 200m of the area of interest?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
	CH4 Will the option affect the setting of any historic buildings/structures or archaeological sites?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
	CH5 Is a group of archaeological sites or an area of historic built environment (even partially) within 200m of the area of interest?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
HUMAN HEALTH	HH1 What is the One Network Road Classification?	National <input checked="" type="checkbox"/>	Regional <input type="checkbox"/>	Arterial <input type="checkbox"/>	Collector <input type="checkbox"/>	NZTA MapHub Environmental and Social Risk Maps- Human Health and Community which includes: - Designated airsheds (including one network classification) - Highly sensitive receivers Regional Council Contaminated sites Team	
	HH2 Is the area of interest adjacent to a non-compliant airshed?	Y <input type="checkbox"/>	N <input checked="" type="checkbox"/>				
	HH3 Are there mobile, petrol, jet homes, schools, child care sites, residential petrol tanks, marae or other sensitive receivers located within 200m of the area of interest?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
	HH4 Does land use within 200m of the area of interest include industrial, chemical manufacturing or storage, petrol stations, vehicle sales/repair, timber processing/treatment, substations, rail yards, or involve other activities that may result in ground contamination? OR Are there HAIL or SLUR (contaminated) sites within 200m of the area of interest?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
SOCIAL	S1 Does the option affect access to community facilities i.e. libraries, open space etc (either temporarily or permanently)?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Which? <u>Community Hall, Recreational reserves</u>		NZTA MapHub Project Team District Plan Maps Council and Community Strategy Documents	
	S2 Does the option affect community cohesion and accessibility including vehicular connectivity on the local road network?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
URBAN AND LANDSCAPE DESIGN	ULD1 Are there opportunities to enhance infrastructure for, and/or improve access to, public transport and/or active modes of travel such as walking and cycling?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>			NZTA MapHub Environmental and Social Risk Map- Natural Environment (Scenic Routes) Regional Land Transport Plan Project Team Strategies and District Plan	
	ULD2 Does the option enhance the development potential of adjacent land where appropriate?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				
	ULD3 Is the option located on a themed highway? Is the option part of or near a national cycle or walking route?	Y <input type="checkbox"/>	N <input checked="" type="checkbox"/>				
	ULD4 Are there opportunities to enhance the urban character, landscape character and visual amenity?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>				

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Answers and Comments	Refer to screen questions explanation to help complete this part.
<p>1. Summarize the potential environmental and social risks/impacts associated with this option. Consider short and long term risks and impacts.</p>	
NATURAL ENVIRONMENT:	<ul style="list-style-type: none"> - Adjacent areas are located in the Rural & Reserve Zones. - Approx. 14 Significant Natural Areas (SNA's) adjacent/within corridor. - Karapiro Stream and other waterways - 1 Protected trees or objects - Cultural Landscape Area Alert - Located within the River & Lake Environs Areas - High Class Soils located on part of the corridor - Rural rules - Biodiversity Corridor (River or Stream) adjacent to part of option - Reserve Rules - Biodiversity Corridor (Indigenous Forest) adjacent to part of option
CULTURAL AND HISTORIC HERITAGE:	<ul style="list-style-type: none"> - Approx. 22 Maori horticulture sites - Approx. 1 borrow pit/terrace. - Approx. 5 Pa sites. The pa sites typically represent extensive areas of occupation. - Heritage site - Piarere School (Technical Institute) - It is likely unrecorded archaeological sites could potentially be found.
HUMAN HEALTH:	<ul style="list-style-type: none"> - Not located in a non-complying air-shed - Transmission lines - Approx. 10 potentially contaminated sites including a petrol station, 5 sites containing large rural buildings and 4 areas of current cropland, orchard or similar
SOCIAL:	<ul style="list-style-type: none"> - Karapiro School - Karapiro Taotoroa Settlers Hall - Horahora Gorge Scenic Reserve - Karapiro Village - Mobil Petrol Station
<p>The responses above will be used in the IBC assessment of options summary table: MCA of the Options</p>	
URBAN AND LANDSCAPE DESIGN:	<ul style="list-style-type: none"> - Approx. 14 SNA's. A selection of sites include: - Waikato River riparian shrubland remnants - 2 sites for Mangahoua Stream tributary scrub & riparian margins - 2 sites for warrenship restoration project - forest vegetation adjacent to Warrenship - Lake Karapiro margin mixed vegetation - SH1, Tuna Rd, Lake Karapiro protected margins - Fergusson Gully Road and Tuna Road hillside remnants - Tuna Rd, Waipa District eastern boundary forest remnants - Horahora Gorge Scenic Reserve indigenous forest remnant, Waipa district eastern boundary forest remnants & 2 sites incl Kentucky Road Lake Karapiro tributary margins, & north-eastern indigenous forest marginal areas - 1 protected tree or object - London Place - Large lot residential within Karapiro Village - Reserve zones - Located within the River & Lake Environs Areas
<p>Incorporate the relevant comments from above into the economy, social and geography sections of the IBC assessment of options summary table.</p>	
<p>2. What are the environmental, social integration, landscape design or urban design benefits or opportunities presented by this option? Particularly record opportunities that could be lost if not considered early in the design process.</p>	
	<ul style="list-style-type: none"> - Provision of safe pedestrian access from Karapiro to Karapiro school - Improvements to local road intersections - Enhancements to walking and cycling - Improve connections to community facilities - Highlight archaeological features & cultural elements - Improve existing Karapiro Village through development & growth - Enhancement of natural environment
<p>3. Are there any impacts, risks or opportunities which require preliminary technical assessments to help understand risks or opportunities? Is further information required to support the development of the detailed business case or can it be left until the detailed business case/pre-implementation?</p>	
	<ul style="list-style-type: none"> - No additional preliminary assessments are required for the IBC phase, sufficient information has been gathered to identify the impacts, risks and opportunities at the IBC level - Further desktop environmental and social investigations are required during the DBC phase to better understand the constraints at the corridor level and generate alignment options - Targeted site evaluations (identified during the start of the DBC) to assess the alignment options and identify a preferred alignment - Technical assessments of the preferred alignment are required for the DBC and to inform the preimplementation phase (consenting AEE's etc.)
Completed by	Louise Chamber - Opus International Consultants Ltd
Reviewed by NZTA Project Manager	
Incorporated results into IBC assessment of options summary table?	Yes <input type="checkbox"/> No <input type="checkbox"/>

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ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN: OPTION E2

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