

under: the Resource Management Act 1991

in the matter of: Direct referral of applications for resource consents and notices of requirement to alter designations, for activities associated with the State Highway 1 / State Highway 29 Intersection Upgrade Project

between: **Waka Kotahi NZ Transport Agency**
Requiring Authority / Applicant

and: **Waikato Regional Council**
Consent Authority

and: **Matamata-Piako District Council**
Territorial Authority

and: **South Waikato District Council**
Territorial Authority

and: **Thistlehurst Dairy Limited**
Section 274 Party

and: **John Hansen**
Section 274 Party

Statement of Evidence of **Tony Innes** (Alternatives) for Waka Kotahi NZ Transport Agency

Dated: 6 July 2022

Reference: Paula Brosnahan (paula.brosnahan@chapmantripp.com)
Hadleigh Pedler (hadleigh.pedler@chapmantripp.com)

STATEMENT OF EVIDENCE OF TONY INNES FOR WAKA KOTAHI NZ TRANSPORT AGENCY

INTRODUCTION

- 1 My full name is Tony Brett Innes.
- 2 I am a Director of Commute Transportation Consultants.
- 3 I hold a Bachelor of Engineering degree with first class honours in Civil Engineering from Auckland University. I have also undertaken post graduate transportation studies at Auckland University. I have over 24 years' experience in the fields of traffic and transport engineering. This has included leading and undertaking option selection and alternative assessments for a number of transport projects.
- 4 More recently I have been involved in the development of a number of option and alternative selection processes, including:
 - 4.1 Economic Case lead for Auckland Light Rail project: I led the development of the option assessment process as well as the implementation of that process for this business case that identified the preferred option.
 - 4.2 Business Case Lead for Supporting Growth Alliance: I currently lead the development of business cases for the transport infrastructure required to support Greenfields growth identified in the NorthWest, South Auckland, North Auckland and Warkworth areas. This Alliance is seeking route protection for the transport infrastructure as well and I have been heavily involved in the development (and application) of the option and alternatives assessment process adopted by the Alliance during the business case and designation phases.
 - 4.3 Peka Peka Interchange Project Director: I led the development of the approved business case for this project including the development and implementation of the interchange option selection process.
 - 4.4 Puhoi to Warkworth Alliance, Alliance Manager: I led the Planning Alliance that sought and obtained the designation for this project through the Board of Inquiry process.
- 5 I also developed the Waka Kotahi Multi Criteria Analysis guidance document in 2016 for business case option development and selection that included consideration of the Alternative Assessment requirements of the Resource Management Act 1991 (*RMA*) in the development of this guidance.
- 6 My evidence is given in support of Waka Kotahi NZ Transport Agency's (*Waka Kotahi*) notices of requirement (*NoRs*) to alter

designations and applications for resource consents (*Application*), for the construction, operation and maintenance of the State Highway / State Highway 29 Intersection Upgrade Project (*the Project*).

- 7 I have read the Assessment of Environmental Effects (*AEE*) and technical reports that accompanied the Application, and all statements of evidence of Waka Kotahi witnesses as relevant for preparing my evidence. I have also read the public submissions lodged in relation to the Project and the Councils' section 87F and 198D report, jointly prepared by Matamata-Piako District Council, South Waikato District Council and Waikato Regional Councils (together referred to as *the Councils*).

CODE OF CONDUCT

- 8 I have read the Environment Court's Code of Conduct for Expert Witnesses in its Environment Court Practice Note 2014 and I agree to comply with it. My qualifications as an expert are set out above. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

- 9 My evidence addresses:
- 9.1 My review of the assessment of alternatives that has been undertaken for the Project (*Alternatives Assessment*) and the conclusions I make on the adequacy of that assessment.
- 9.2 Comments on submitter and Council points raised in relation to the Alternatives Assessment undertaken for the Project.
- 10 I then provide a summary of my overall conclusions as they relate to the Alternatives Assessment.

MY ROLE IN THE PROJECT

- 11 I have been involved in this Project since April 2022. I was asked by Waka Kotahi to undertake an independent review of the Alternatives Assessment process and consider the robustness of that process.
- 12 I am familiar with the Project area and undertook a site visit on 25 April 2022. I also note that I drive through the SH1 / 29 intersection over 30 times a year and know it well.

ASSESSMENT METHODOLOGY

- 13 I adopted the following methodology in undertaking my review of the Alternatives Assessment process:
 - 13.1 Reviewed documentation related to the Alternatives Assessment (Documents reviewed are listed in **Attachment A**), including the *State Highway 1 and State Highway 29 Intersection Upgrade – Options Assessment* (27 April 2021), which is attached to this evidence as **Attachment B**;
 - 13.2 I reviewed and was able to follow the process undertaken;
 - 13.3 Met with members of the Project team on a number of occasions to understand the process and clarify the findings of my review; and
 - 13.4 Completed my review.
- 14 In completing my review as to the robustness of the Alternatives Assessment I considered whether the assessment:
 - 14.1 Meets the requirements of section 171(1)(b)(i) of the RMA; and
 - 14.2 Follows a process that follows good practise and:
 - (a) Is clear and understandable;
 - (b) Considers a range of appropriate assessment criteria; and
 - (c) Is replicable.

CONSIDERATION OF ALTERNATIVES

Project Background

- 15 The intersection of SH1 / SH29 has a poor safety record and users (particularly from SH29) experience increasing delays. The intersection is at the junction of two National (High Volume) State Highways and is a critical route for freight access to the Port of Tauranga.
- 16 There have been a number of studies over the years that have considered improvements for this intersection. These studies have included consideration of the intersection in isolation, as well as an individual element of broader improvements to the wider corridor. The studies include:
 - 16.1 *Scheme Assessment Report (2014)*: Considered a number of options including a roundabout and grade separation and recommended grade separation;

- 16.2 *Cambridge to Piarere Indicative Business Case (2017)*: Was primarily focussed on form and function of the route, rather than intersection form, but did indicate an offline route was preferred with a number of grade separated interchanges along the route;
 - 16.3 *Low Cost Low Risk Feasibility Study for Interim Improvements at SH1/29 intersection (Piarere) (2020)*: Considered interim (lower cost) solutions at the intersection in advance of the Roundabout Project, including a smaller roundabout, barrier and signage enhancement options; and
 - 16.4 *Cambridge to Piarere Detailed Business Case (2021)*: Considered detailed route alignment options and intersection forms. For SH1 / SH29 this considered roundabouts as well as partial and full grade separation, with a roundabout preferred.
- 17 While this Project is focussed on the consideration and implementation of a roundabout at the intersection of SH1 / SH29, it was previous studies and investigations that concluded a roundabout should be provided at this intersection.

Project Objectives

- 18 The Waka Kotahi objectives for the Project are:
- 18.1 Improve safety for motorists and active mode users using the State Highway 1 and 29 intersection to minimise deaths and serious injuries.
 - 18.2 Accommodate any future extension of the Waikato Expressway from Cambridge to Piarere and any future walking and cycling connections.

Process for assessing alternatives

- 19 The process undertaken to consider the alternatives for a roundabout at the intersection included:
- 19.1 Development of initial options;
 - 19.2 Initial options assessed;
 - 19.3 Further options identified;
 - 19.4 Further options assessed;
 - 19.5 Identification of a preferred option (Option C identified as the preferred option); and
 - 19.6 Development of the preferred option in more detail.

Alternatives considered

- 20 The Project team considered four alternatives, being:
- 20.1 Option A – at the existing intersection;
 - 20.2 Option B – immediately south of the existing intersection;
 - 20.3 Option C – to the north of SH1 and west of SH29; and
 - 20.4 Option D – to the north of SH1 and east of SH29.
- 21 Options A and B were disregarded for the following reasons:
- 21.1 **Option A** – Technical challenges (SH1 Piarere Slip), safety and efficiency (traffic and programme) concerns during implementation and challenges with future connections to the Cambridge to Piarere (C2P) project.

The scale of the overlap with the existing intersection is shown in Figure 1 below. The scale of the overlap shows the level of challenge and impact of implementation on the safety and efficiency of existing users at this intersection of two National (High Volume) State Highways. This option would also still require land on both the western and eastern side of SH29.
 - 21.2 **Option B** – Discounted for the same reasons as Option A plus impacts on property. I also note Option B would be closer to the tributary to Lake Karapiro, and would likely encroach on the gully area to the south of SH1, which is identified as bat habitat.

Figure 1: Option A – Roundabout Option in location of existing intersection



Alternatives Assessment

- 22 The assessment of Options C and D included specialist assessment against specific criteria (i.e. the options proceeded through a multi-criteria analysis (MCA)), namely:
- 22.1 Heritage and archaeology;
 - 22.2 Ecology;
 - 22.3 Landscape and visual;
 - 22.4 Noise;
 - 22.5 Road traffic vibration;
 - 22.6 Land contamination;
 - 22.7 Social;
 - 22.8 Stormwater;
 - 22.9 Safety;
 - 22.10 Proximity to waahi tapu;
 - 22.11 Impact on Waikato River;
 - 22.12 Mauri o te Wai;
 - 22.13 Farming operations;
 - 22.14 Construction cost; and
 - 22.15 Projected benefits.
- 23 The conclusion of this assessment was that Option C was the preferred option and was taken forward for implementation.
- 24 I was able to follow the MCA scoring (and conclusion) due to the clarity of the information provided.
- 25 As an independent reviewer of the MCA process, the outcome appears to be a sound and appropriate conclusion given Option C was assessed as having less effects (or a more positive effect) than Option D on 9 of the 13 assessment criteria and of the other four criteria had similar effects (ie. not worse or better). Option C is also forecast to be cheaper to implement with more economic benefits whilst requiring less property than Option D.

- 26 I consider this conclusion to be sound and based on an appropriately robust assessment of alternatives for the following reasons:
- 26.1 The assessment follows good practice when considering alternatives including:
- (a) Considering a sufficiently broad scope of alternatives given the Project 'work';
 - (b) A clear and transparent process including:
 - (i) Clear assessment criteria;
 - (ii) Consideration of multiple criteria when selecting the preferred option;
 - (iii) Clear and consistent scoring of criteria;
 - (iv) Clear briefing to appropriate experts in each criteria;
 - (c) Appropriate level of assessment for options considered;
 - (d) Clearly documented assessment by expert assessors with clear rationale for the scoring; and
- 26.2 I was able to replicate the results from the assessment based on the information provided.

RESPONSE TO MATTERS RAISED IN SUBMISSIONS

- 27 I have read submissions lodged on the Project that raise issues about the Alternatives Assessment, and in this section of my evidence, I address these issues to the extent not already covered in my evidence.
- John Hansen**
- 28 Mr Hansen suggests that an at grade interchange solution should be provided at this location given the significance of both SH1 and SH29.
- 29 A number of studies over the years have considered improvements for the SH1 / 29 intersection, including full and partial grade separated options. As a grade separated intersection would have more effects and a larger footprint, and would not provide significant investment benefits over and above roundabout options,¹ I consider it was appropriate that it was not considered further in the Alternatives Assessment.

¹ Detailed Business Case Options Report SH1 Cambridge to Piarere (C2P) Long Term Improvements, Page 4-46.

Thistlehurst Dairy Limited (TDL)

- 30 TDL raised a number of issues on the alternatives process, which I summarise as:
- 30.1 The NOR is premature (should wait for the C2P project to be decided) and should be consolidated with the C2P application when this is made;
 - 30.2 The assessment of alternatives is not adequate; and
 - 30.3 The location and extent of the Project are not reasonably necessary to meet the objectives.
- 31 I comment on these from an alternatives perspective.
- Assessment of alternatives is not adequate*
- 32 As outlined above I consider the Alternatives Assessment is adequate, has considered alternative sites appropriately, and undertaken a robust assessment. The assessment has focussed on alternative roundabout options due to the confirmation from previous work that a roundabout was the appropriate form for the upgrade of the SH1 / 29 intersection. That process is discussed below.
- 33 In its submission, TDL states that alternatives “that could be implemented quickly and at a lower cost, such as speed limits and wire barriers, were not adequately considered”. I do not agree.
- 34 The previous (business case work) considered a wide range of options, including a number of infrastructure ‘light’ options, and, through a robust assessment process, confirmed the need for a roundabout at this location as the most appropriate solution.
- 35 On that basis, the scope of this Project is a roundabout, and I consider the focus of the Alternatives Assessment on locations of roundabouts within the vicinity of the SH1 / 29 intersection was appropriate.
- 36 TDL’s submission also queries whether a lesser value, (either an ‘interim’ solution until the C2P project is ready for construction or a long term solution) would be more appropriate. I have two observations (in addition to the fact that the Project is a roundabout) on this suggestion:
- 36.1 The current safety problem at the SH1 / SH29 intersection would not be addressed appropriately by an ‘interim’ solution, and in the meantime, a known high priority safety problem would be allowed to continue.
 - 36.2 There is a known future project planned in this area and this project provides an opportunity to implement an intersection upgrade that allows for this, at the same time as addressing

the immediate (and ongoing) safety concerns at this location (as identified by the project objectives).

RESPONSE TO COUNCILS' REPORT

- 37 I have read the Councils' section 87F and 198D Report prepared by Michael Parsonson on behalf of Matamata-Piako District Council, South Waikato District Council and Waikato Regional Council dated 15 March 2022, and the *SH1/29 Piarere Roundabout: Transportation Review* prepared by Isa Ravenscroft and Alasdair Gray dated 21 February 2022.

Council Report

- 38 I note and agree with the Councils' Report in relation to the adequacy of the alternatives assessment (section 8.1.3), which states "*I am satisfied that Waka Kotahi has undertaken an appropriate assessment of alternatives, not just for the design and specific location of the roundabout as proposed, but in determining its location in relation to the likely future C2P roading proposal.*" Mr Parsonson goes on to conclude "*I consider that Waka Kotahi has undertaken an appropriate assessment of alternatives that satisfies s171(1)(b) of the RMA.*"

Transportation Review

- 39 A transportation review undertaken as part of the Councils' Report considered the adequacy of the alternatives assessment. I note and agree with the Transportation Review (section 4.3.4), which states:

We are satisfied that the processes undertaken to date have been appropriate and robust and has adequately considered alternative options and methods in including Project locations and intersection forms.

- 40 I also note that this review considered the case for the necessity for the work and concluded:

The C2B business case and subsequent SH1/29 options assessment have evaluated alternative intersection forms and locations for the project. As summarised in Section 4.3 of this report, options for both intersection type and location have undergone a robust evaluation process by independent specialists, considering a wide range of criteria.

- 41 Mr Parsonson, Ms Ravenscroft and Mr Gray have come to the same conclusion as me, which is that the Alternatives Assessment is robust and appropriate for this Project.

CONCLUSION

- 42 I have undertaken a review of the Alternatives Assessment for the Project. This has included a review of the process and documentation, and a meeting with the team that undertook the assessment.

- 43 My review has concluded that the Alternatives Assessment is robust and appropriate for the following reasons:
- 43.1 It considered a sufficiently broad number of alternatives given the Project 'work';
 - 43.2 It had a clear and transparent process including:
 - (a) An appropriate level of assessment for options considered;
 - (b) Clearly documented assessment by expert assessors with clear rationale for the scoring; and
 - (c) A replicable process.

Tony Innes
6 July 2022

ATTACHMENT A – DOCUMENTS CONSIDERED

1. *Scheme Assessment Report (2014)*
2. *Cambridge to Piarere Indicative Business Case (2017)*
3. *NZ UPGRADE PROGRAMME – TRANSPORT ESTABLISHMENT REPORT (March 2020)*
4. *Low Cost Low Risk Feasibility Study for Interim Improvements at SH1/29 intersection (Piarere) (2020)*
5. *Cambridge to Piarere Detailed Business Case (2021)*
6. *State Highway 1 and State Highway 29 Intersection Upgrade Options Assessment (April 2021)*
7. *State Highway 1 and State Highway 29 Intersection Upgrade – Assessment of Effects on the Environment (November 2021)*
8. *Detailed Business Case Options Report SH1 Cambridge to Piarere (C2P) Long Term Improvements*

**ATTACHMENT B – SH1/SH29 INTERSECTION UPGRADE
OPTIONS ASSESSMENT**

Project Number: 2-A0011.04

State Highway 1 and State Highway 29 Intersection Upgrade

Options Assessment – Final Version 0

27 April 2021



New Zealand Government



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Disclaimers and Limitations

This report (**Report**) has been prepared by WSP exclusively for NZ Transport Agency Waka Kotahi (**Client**) in relation to an application for a notice of requirements and regional resource consents (**Purpose**) and in accordance with our contract with the Client dated May 2020. The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

1 Executive Summary

The existing State Highway 1 (SH1) and State Highway 29 (SH29) intersection has significant safety issues and is noted as a key safety project for the NZ Transport Agency Waka Kotahi (Waka Kotahi). The current form of the existing intersection at Piarere does not align to the function of these nationally significant freight corridors. The intersection experiences delays on the right turn movement from SH29 southbound to SH1 westbound which impacts on efficient freight movements.

A proposed roundabout upgrade for this intersection has now been included and funded by the Government's New Zealand Upgrade Programme – Transport (NZUP), with a construction start date set for 2022. The new roundabout will significantly improve safety and access and is to be designed to cater for walking and cycling connections, while allowing connection with a potential future expressway extension from Cambridge to Piarere.

This options assessment report outlines the process involved in assessing four alternative locations for a new roundabout in the vicinity of the existing SH1/SH29 intersection and how those alternatives have been assessed, with input from Mana Whenua.

Two of the options assessed (Option A directly over the existing intersection, and Option B to the immediate south of the intersection) were eliminated at an early stage in the assessment, given technical feasibility challenges and difficulty in retrofitting for any potential future expressway extension from Cambridge to Piarere. The following two options remained for further assessment:

- Option C a roundabout located to the north of SH1 and to the west of SH29.
- Option D a roundabout located to the north of SH1 and to the east of SH29.

These two options are designed to connect to a potential future expressway alignment.

As part of a Multi Criteria Assessment (MCA) the Project's independent technical specialists and Mana Whenua assessed and scored the remaining two roundabout options together, with a short description of potential mitigation (if any) that supported their MCA scoring.

The specialists undertook a site visit to the land on the eastern side of SH29 and this is reflected in their MCA assessments. However, land access has not been available on the western side of SH29 and technical specialists made observations from the road boundary.

Where the two options scored differently for specific criteria, it is noted that that Option C performed consistently better than Option D. Although not assessed as part of the MCA, it is noted that Option C is better located to connect to the existing State Highway 1 network than Option D. Waka Kotahi must also consider a solution that maximises benefits for the investment being made.

Based on this options assessment, Option C (the western side of SH29), is considered to perform better than Option D and the project team therefore recommends that Waka Kotahi selects Option C as shown in the figure below.



Recommended Option C - The proposed roundabout on the western side of SH29

2 Introduction

2.1 Purpose and scope

The purpose of this report is to document the process undertaken to determine the preferred location of a new roundabout which would replace the existing State Highway 1 (SH1) and State Highway 29 (SH29) intersection at Piarere (the Project).

The existing intersection has safety issues, and is considered one of the most dangerous intersections on the New Zealand roading network. Between 1 December 2015 and 30 November 2020 there have been 35 crashes resulting in one fatality and 12 injury crashes. This intersection also experiences delays on the right turn movement from SH29 southbound to SH1 westbound, which impacts on efficient freight movements.

The existing intersection is an at-grade T-Intersection at the junction of two national state highways with SH1 having priority over SH29. This intersection form does not align to the function of the corridors. Both state highways are nationally significant freight corridors and SH1 has tourism links¹. These links are important for connecting the three largest urban centres in the upper North Island, two ports and the Auckland International Airport.

The proposed roundabout has now been included in and funded by the Government's New Zealand Upgrade Programme – Transport (NZUP), with a construction start date set for 2022, which Waka Kotahi have been tasked to deliver. The new roundabout will significantly improve safety and access and is to be designed to cater for walking and cycling connections, and would allow a connection with a potential future expressway extension from Cambridge to Piarere, being the Cambridge to Piarere project (C2P Project).

This report outlines the process involved in considering alternative routes (alignments), sites and methods, as required by section 171 of the Resource Management Act 1991 (RMA), and how those alternatives have been assessed, to arrive at the recommended location of the SH1/SH29 roundabout.

This report will help inform Waka Kotahi's decision on the preferred location of the SH1/SH29 roundabout.

3 Statutory requirement to consider alternatives

To implement the SH1/SH29 Project, a number of authorisations under the RMA will be needed, including notice of requirements (NoRs) for alterations to existing designations, and various regional resource consents.

Waka Kotahi will lodge NoRs for alterations to designation with South-Waikato District Council (SWDC) and Matamata-Piako District Council (MPDC) and regional resource consent applications will be lodged with Waikato Regional Council (WRC) at the same time.

Under the RMA, the consideration of alternative routes, sites and methods of achieving the SH1/SH29 Project is required as Waka Kotahi does not have an interest in the land sufficient for undertaking the work (section 171(1)(b)(i) RMA).

¹ <https://nzta.govt.nz/assets/planning-and-investment/docs/waka-kotahi-investment-proposal-2021-31-regional-summary-waikato.pdf>

4 Background

The Government identified the SH1/SH29 Intersection Project for Crown funding and acceleration through the NZUP, to be progressed as a separate and standalone project from the Cambridge to Piarere (C2P) Project. As such, in 2020 it was decoupled from the C2P Project and included in the NZUP to enable the fast tracking of the new two-lane roundabout to improve traffic safety, network resilience and access whilst allowing a connection with a potential future expressway extension.

Prior to the decoupling of the SH1/SH29 Project from the C2P Project, as part of the business case process for C2P, Waka Kotahi considered various route options and corridor options, which included the SH1/29 intersection. The C2P business case process has been ongoing since 2015. Of relevance to the SH1/29 Project, this work led to a view that the form of the SH1/SH29 intersection should be a roundabout in close vicinity of the existing SH1/SH29 intersection.

Options for the form of the intersection that were considered as part of the earlier C2P DBC Options Report (2018) included an at-grade roundabout and two variations of a grade-separated interchange (with two different route alignments for each). The intersection concepts were based on the desire to have full access and movements provided where three routes (SH1 north, SH1 south, SH29) meet, as all of the routes have the same One Network Road Classification. The two roundabout options performed better than the grade separated intersections, with less effects and good performance in terms of traffic capacity. It was considered that the grade separated interchange options did not provide significant investment benefits over the roundabout options, and those options were discarded. In including the SH1/SH29 intersection project in the NZUP, the Government decided the intersection upgrade should be a roundabout.

5 Roundabout alternatives

5.1 Roundabout location alternatives

Following the inclusion of the SH1/SH29 roundabout project in the NZUP and its decoupling from C2P, the project team considered four alternatives (A, B, C and D) for the location of the roundabout as follows:

5.1.1 Option A

Option A is to construct the roundabout directly over the existing SH1/SH29 intersection utilising the existing state highway alignments.

5.1.2 Option B

Option B is to locate the roundabout to the south of the existing SH1/SH29 intersection within the Crown owned land, to the south of the existing SH1 alignment

5.1.3 Option C

Option C is to locate the roundabout to the north of SH1 and to the west of SH29 as illustrated in Figure 5-1.



Figure 5-1: Option C - The proposed roundabout on the western side of SH29

5.1.4 Option D

Option D is to locate the roundabout to the north of SH1 and to the east of SH29 as illustrated in Figure 5-2. This roundabout option is designed to connect to a potential future expressway alignment.



Figure 5-2:: Option D - The proposed roundabout on the eastern side of SH29

5.2 Evaluation methodology

A Multi Criteria Assessment (MCA) approach was used in the assessment of Option C and Option D for the alternative roundabout locations. Option A and Option B were discarded early on the process for the reasons explained below.

MCA is a widely accepted as a useful tool to assist in evaluating a range of alternatives, and assessing what is favourable and unfavourable about a particular option. The MCA involves assigning scores to a set of chosen criteria or attributes for each alternative. 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.

It is considered good practice to ensure the criteria take into account matters described in Part 2 of the RMA. Specifically, this includes social, economic, cultural, and environmental factors.

In this case, the MCA was based on the following assessment criteria:

- Heritage and Archaeology
- Ecology
- Landscape and visual
- Noise and vibration
- Social
- Stormwater
- Contaminated land
- Impact on farming operations

- Cultural matters (proximity to waahi tapu, impact on Waikato River, and Mauri o te Wai)
- Safety (construction and operational)
- Construction cost
- Benefits including travel time, vehicle operating costs (VoC) and crash savings

In addition, Waka Kotahi will likely consider other factors alongside the MCA when deciding on a preferred option, such as cost and ensuring a solution that maximises benefits for the investment being made.

The Project's independent technical specialists and Mana Whenua were asked to undertake a MCA assessment Options C and D. They were asked to provide scores (taking into account potential mitigation measures) for each of the roundabout options together with a short description of potential mitigation (if any) that supported that scoring. For example, noise effects may be considered minor when an acoustic fence is provided by way of mitigation. Technical specialists were asked to provide a single score for each assessment criteria relevant to their area of expertise.

Each option was assessed via a seven-point graduated scale in relation to effects, as shown below. A significant or unacceptable negative can be assigned where the adverse effects are so serious to make the option unacceptable.

- Significant Positive
- Moderate Positive
- Minor Positive
- Neutral (or des minimis)
- Minor Negative
- Moderate Negative
- Significant or Unacceptable Negative

5.3 Assessment of options

5.3.1 Option A

Option A is a new roundabout located directly over the existing SH1/SH29 intersection. It is considered that locating the new roundabout directly over the existing intersection would:

- have a considerable impact on the existing state highway traffic flows during construction. It would require significant traffic management and temporary road construction to manage traffic away from, around and/or through the construction site. The increased traffic management increases the health and safety risks to the contractors and the public as well as increasing the project costs.
- result in a 6 month extension to the currently projected 18 month construction period. This would likely be due to multiple construction staging from the need to work with and around existing state highway traffic, make access to and from the construction site difficult exposing road users and construction workers to higher safety risk.
- may be difficult and costly to retrofit and upgrade to an interchange in the future should there be a need.
- not allow for direct connection from a potential future expressway alignment due to geometry constraints.
- there is an area of known instability approximately 3m to the south of the existing SH1 carriageway. The instability area is known as the SH1 Piarere Slip and its location is shown in Figure 5-3 below. Option A would not alter the existing SH1 north alignment resulting in the SH1 north approach leg to the roundabout staying within the Piarere Slip influence area.



Figure 5-3: SH1 Piarere Slip – location of known instability

As such, this option was discarded prior to the MCA assessments.

5.3.2 Option B

Option B locates the roundabout further south west of the existing SH1/SH29 intersection within the Crown owned land. This option was also discarded due to all of the reasons identified for Option A. In addition, there is also not enough land directly to the south of the existing intersection. As such this option has been discarded and therefore no MCA assessment was undertaken for this option.

5.3.3 Options C and D

Both roundabout options are located in close proximity to the existing intersection. Figures 5-1 and 5-2 above show these locations. The MCA assessments prepared by each specialist are summarised in Table 5-1, together with notes of the key differences between the two options.

The specialists undertook a site visit to the land on the eastern side of SH29 and this is reflected in their MCA assessments. However, land access has not been available on the western side of SH29, so specialists made observations from the road boundary.

Table 5-1: Summary of the specialist MCA assessments

Criteria	Assessment after mitigation		Notes
	Option C (West)	Option D (East)	
Heritage and Archaeology	Insignificant	Minor Negative	Two potential borrow pits created by Māori could be located near Option D.
Ecology	Minor Negative	Minor Negative	From a review of the Waikato Regional Council maps a waterway is identified in the vicinity of the roundabout in Option C. However, it appears that this waterway would not be impacted. Option D contains two ephemeral waterways that would be impacted. Option C would require the removal of 1 or 2 trees, while Option D would require 4 to 5 trees removed. While both options have minor ecological effects, Option C is located a greater distance away from potential native vegetation which may be the habitat for bats, birds and lizards.
Landscape and Visual	Moderate Negative	Moderate Negative	Option D has a slightly more negative visual effect than Option C, but not enough to impact ratings. Landscape and visual effects are comparable for both options, but could be less if roundabout is not elevated.
Noise	Minor Positive	Minor Negative	Option C lowers the noise level at 3 PPFs ² and Option D increases the noise level at 2 PPFs.
Road Traffic Vibration	Minor Positive	Minor Negative	Option C moves the road (and as such the traffic) away from 2 houses while Option D has the potential to increase the distance to 2 houses.
Land Contamination	Insignificant	Insignificant	Both options may require a cost allowance to cover excavation and disposal of contaminated soils if found.
Social	Minor Negative	Moderate Negative	Option D brings the state highway closer to a residential dwelling and so is more likely to affect the owner's amenity/enjoyment.
Stormwater	Minor Positive	Neutral	Option D scored slightly lower because of the potential effects on

² Protected Premises and Facilities (PPFs) is the NZS 680:2010 term for noise-sensitive receivers to which the Standard applies

Criteria	Assessment after mitigation		Notes
	Option C (West)	Option D (East)	
			two watercourses and the fewer options for the treatment of a stormwater discharge.
Safety	Significant Positive	Moderate Positive	Both options provide improved safety over the existing intersection. However, Option D would require a 'S Curve' alignment on approach that can be dangerous to drivers.
Proximity to Waahi Tapu	Neutral	Minor Negative	Option C is a further distance from two identified sites (T15/60 and T15/107). Option D would move closer to these two sites.
Impact on Waikato River	Minor Positive	Minor Positive	Both options locate the roundabout further from the Awa. Option C is preferable as there are better options of treatment and mitigation for stormwater.
Mauri o te Wai	Neutral	Moderate Negative	Option D impacts two ephemeral waterways. Option C avoids a potential waterway.
Farming operations	Moderate negative	Significant negative	Option D will have a higher impact on farming operations as it removes a higher percentage of the most productive farmland on the eastern side of SH29 which can result in a reduction in stock numbers, milk production and potentially labour.
Construction Cost	\$29 million	\$31 million	Option D has an overall higher cost due to the slightly longer approach legs and remediation required for of the 'S-Curve'.
Projected Benefits	\$4.2 million	\$4.0 million	Option D provides slightly more crash savings due to the S-Curve' approach alignment for Option C.

Table 5-2 below is a simplified decision matrix, which outlines the results by removing those criteria where both options have been scored the same. It is noted that Option C costs less to build and offers more economic benefits than Option D. However, due to the coarse nature of the projected costs and benefits, these criteria have been removed from Table 5-2. Although not assessed in the MCA, it is noted that the location of Options C and D performed equally in terms of connecting to any potential future extension of the Waikato Expressway from Cambridge.

Table 5-2: Simplified decision matrix

Criteria	Option C (West)	Option D (East)	Better performing alternative
Archaeology and Heritage	Insignificant	Minor Negative	C
Noise	Minor Positive	Minor Negative	C
Vibration	Minor Positive	Minor Negative	C
Social	Minor Neg	Moderate Negative	C
Stormwater	Minor Positive	Neutral	C
Safety	Significant Positive	Moderate Positive	C
Proximity to Waahi Tapu	Neutral	Minor Negative	C
Mauri o te Wai	Neutral	Moderate Negative	C
Farming operations	Moderate negative	Significant negative	C

When Option D is compared with Option C in Table 5-2, we see that Option C performs consistently better than Option D for the criteria that remain.

Although not assessed as part of this MCA, nor a deciding factor, Option C provides additional benefit in that it is better located to connect to the existing State Highway 1 alignment from Cambridge.

6 Recommendation

A number of alternatives have been assessed to progressively refine the options for the SH1/SH29 roundabout project. The evaluation framework used has involved having regard to Part 2 of the RMA. This process has been thorough and robust.

Based on this options assessment, Option C is considered to perform better than Option D and the project team recommends that Waka Kotahi selects Option C as generally shown in Figure 6-1 below.



Figure 6-1: Recommended Option C - The proposed roundabout on the western side of SH29

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