

Memorandum

To	9(2)(a) Rob Napier
CC	
From	9(2)(a)
Date	17 September 2017
Subject	Summary of Alternatives Assessment Process

Rob 9(2)(a)

This memo sets out my summary of the process undertaken by the Mt Messenger Alliance in assessing alternative options for the SH3 Mt Messenger highway upgrade project.

Previous options assessment work completed by others

Alternative routes were originally considered in 2002, and in 2016. Public consultation on three corridors occurred from November 2016 to January 2017, following a high-level Multi-Criteria Analysis (MCA) process in 2016.

Longlist assessment of options

24 new long-listed options were developed by the Mt Messenger Alliance in 2017 (11 offline and 1 online corridor, with an 'earthworks' and 'structures' option for each corridor), to a significantly greater level of detail than for the 2016 MCA.

These 24 options were assessed through an MCA process devised and led by myself, as the lead Project planner / alternatives expert (MCA1). The options are shown on Figure 1 below.

Nine assessment criteria were used, covering key environmental and transport issues:

- Constructability
- Transport
- Resilience
- Landscape
- Historic Heritage
- Community
- Property
- Ecology
- Cultural Heritage

Technical experts assessed and scored the options against the nine criteria, including at a two-day MCA workshop. Ngāti Tama representatives attended and provided scores for the 'cultural heritage' criterion. The technical experts provided reports providing the detail of their assessments of, and scores for, each option.

I then tallied the scores for each option, and applied weightings as a sensitivity test in analysing option performance. I prepared an overall "Longlist Report" on the MCA1 process, which sets out the detailed results and scores received for each option. Figure 2 below shows the relative rankings of each option when the raw scores from the workshop are added, alongside the rankings when each of the three weightings used by the alternatives expert are applied.

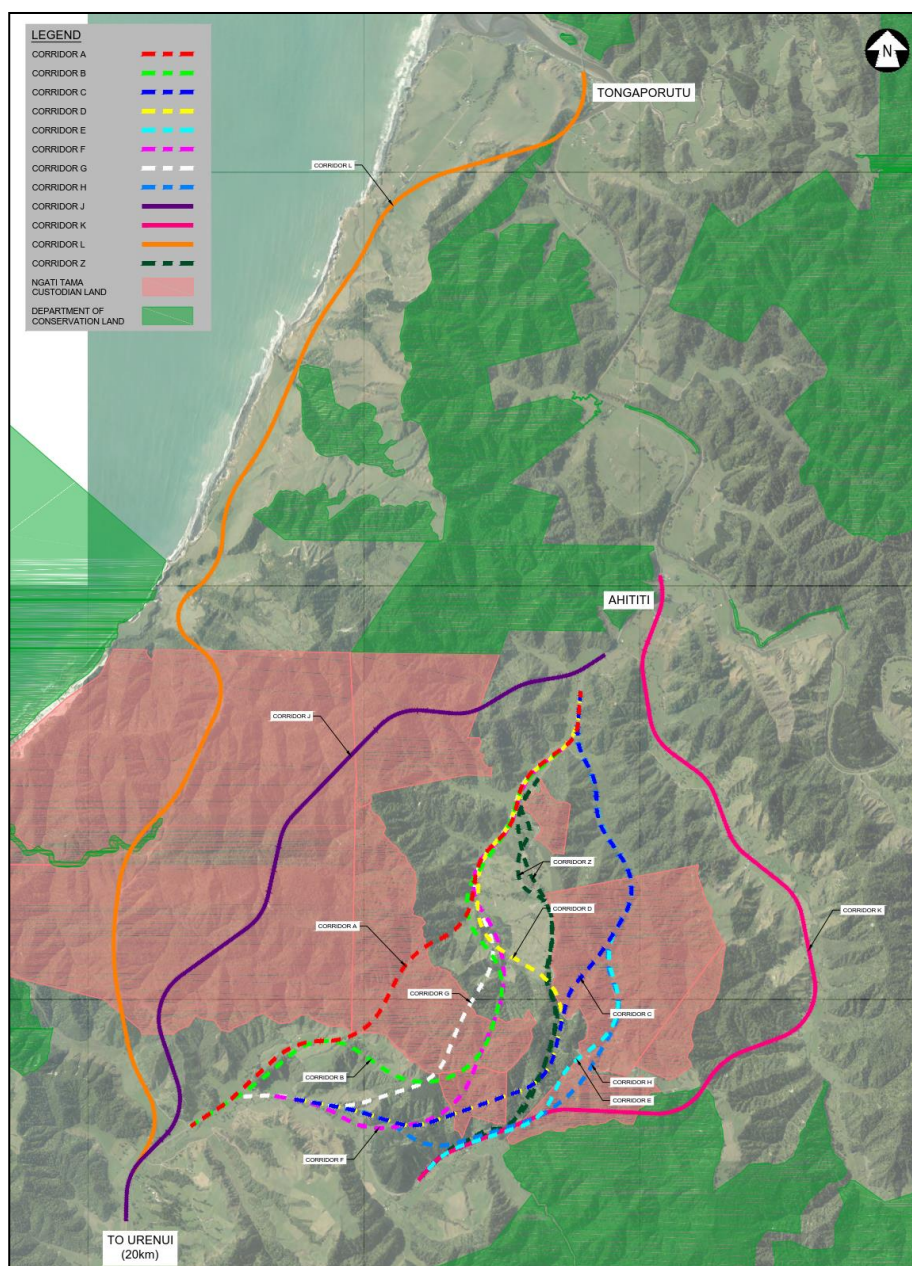


Figure 1: Map of longlist options considered at MCA1

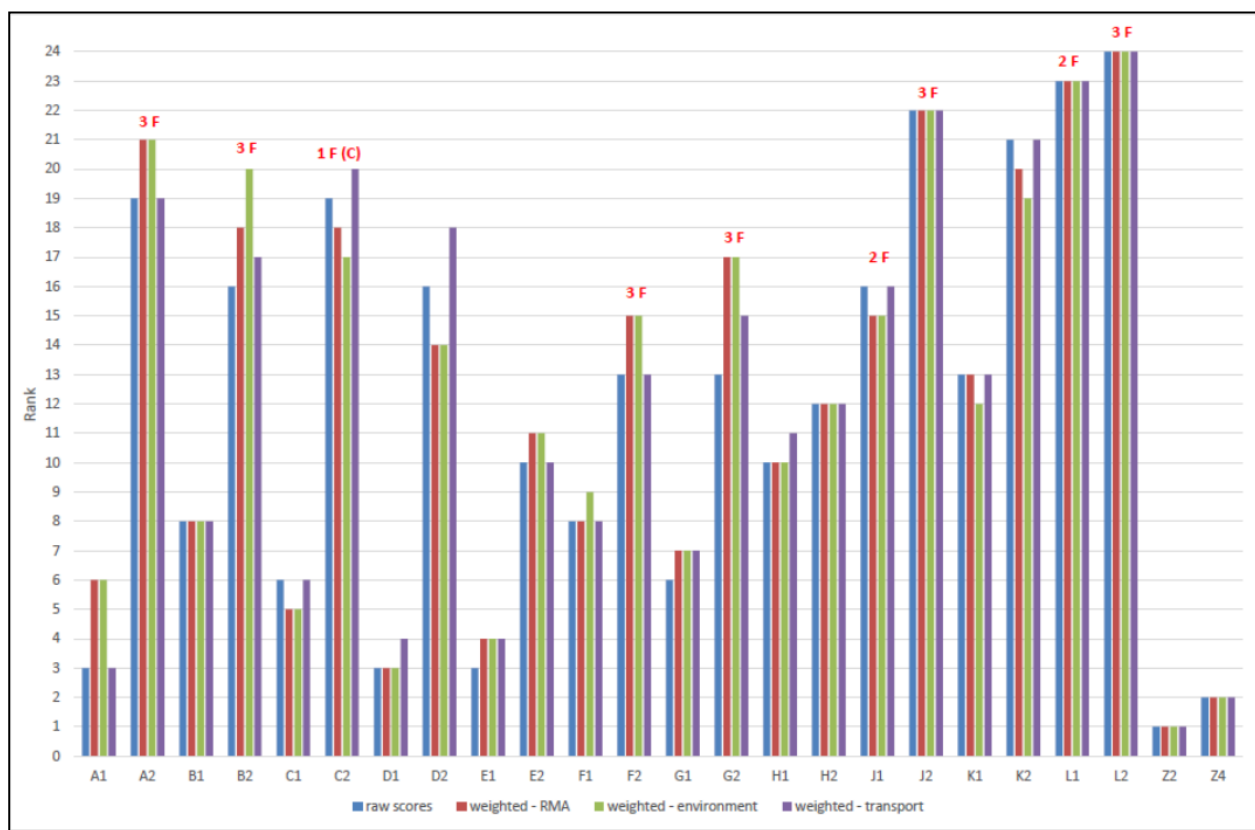


Figure 2: MCA1 ranking of the 24 options

Selecting and refining options for the shortlist

The Project team's memorandum to the Alliance Board dated 15 May 2017 summarised the outcomes of the MCA1 process. Rough order cost estimates for each of the longlisted options were also provided (noting that costs were not directly considered through the MCA1 process).

The 15 May 2017 memo records the following recommendation to the Alliance Board in respect of options to be included in a shortlist, for further consideration through MCA2:

"Based on the outcome from the MCA1 process and affordability considerations, the options, or associated hybrids of these which optimise earthworks but minimise environmental impacts, recommended to be taken forward into the short list for further consideration are:

- Option A1;
- Option E1 / E2;
- Option F1;
- A hybrid option, which focuses on a combination of the B, F and G corridors;
- On-line Option (taking in D1, D2, Z2 and Z4)."

The Alliance Board endorsed this recommendation. Five shortlisted options were subsequently assessed through the MCA2 process.

During the period between the MCA1 and MCA2 workshop, design investigation and refinement / optimisation work continued on the shortlisted options. By way of brief summary, the five options assessed at the MCA2 workshop were:

- Option A: this option is a refined version of longlist Option A1 (which was one of the best performing offline options in MCA1). Between the MCA1 and MCA2 workshops, refinements to this option were carried out, including to take into account constructability (noting a significant area of instability was identified) and cost issues.
- Option E: this option is a refined version of longlist Option E1 (which again was one of the best performing offline options in MCA1). Of particular note is that a bridge structure was added in response to comments from the ecologists, to remove earthworks elements from the southern high-value wetland. As signalled in the 15 May memo to the Alliance board, some of the earthworks (fill) elements of E2 were incorporated in the shortlisted option.
- Option F: this option is a refined version of longlist Option F1 (which performed relatively well in MCA1). Between the MCA1 and MCA2 workshops, the design team carried out further refinements to this option.
- Option P: this is the "hybrid option", focussing on "a combination of the B, F and G corridors". It is based primarily on the 'structures' (B1, F1 and G1) rather than 'fill' (B2, F2 and G2) versions of those corridors. These three options performed relatively well in the MCA1 assessment, and traverse similar routes. The option is described in the report to the Alliance Board dated 1 July 2017 as follows:

"Option P is effectively the hybrid option noted above, however the indicative alignment was established after a walk over of the potential route by a Ngati Tama runanga member (Conrad O'Carroll), followed by an assessment from the Design team. While close to Option F, it avoids the southern gulley with its technically challenging sidling fill or curved bridge, and hence was deemed worthy of further consideration."

In addition, the Option P route avoids a stand of podocarps on the southern ridgeline.

- Option Z: this option is the 'online' option for the shortlist assessment. Option Z2, Z4, and the D corridor (primarily option D1, which was one of the best performing options in MCA1) are represented in the shortlist through this option. Work was carried out to develop this refined online option during the period between the MCA1 workshop and the MCA2 workshop.

The best eight performing options in the MCA1 process are all represented in the shortlisted options, whether through a refined version of the option being carried through to the shortlist, or through a hybrid shortlist option. The shortlisted options also provide for a geographic spread of the longlisted options, while

omitting the far western (J, L) and far eastern (K) corridors which performed poorly in MCA1. Figure 3 below shows the location of the five shortlisted options considered at MCA2.

The shortlisted options were subject to an MCA process (MCA2), which was carried out on a similar basis to the longlist MCA1 process. Ngāti Tama representatives attended the workshop and provided scores for the 'cultural heritage' criterion. Representatives from DoC attended the MCA2 workshop as observers.

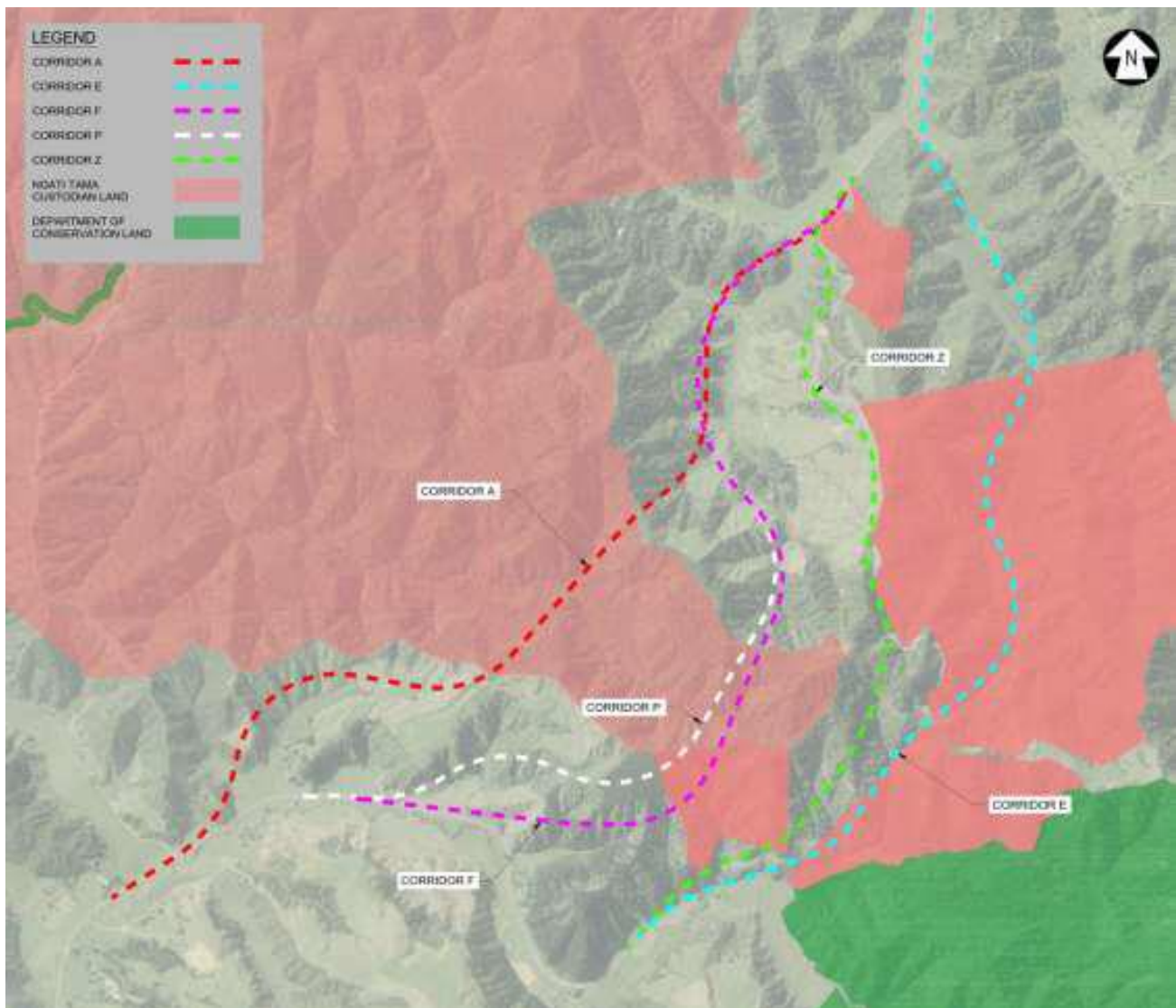


Figure 3: Map of shortlisted options considered at MCA2

Following the MCA2 workshop, the scores assigned were analysed, again along with other factors including cost.

In respect of the overall MCA2 performance of the 5 shortlisted options:

- Option A was the worst performing option

- Option F was a similar route to Option P, but performed worse through the MCA process, meaning there was no need to consider Option F in further detail.
- Option P (a western option), Option E (an eastern option) and Option Z (the online option) all received broadly similar MCA scores.

All options present technical and environmental challenges, including in respect of effects on ecological, landscape and cultural values.

An initial report was provided to the Alliance Board on 1 July 2017, summarising the results of the MCA2 process and adding in the costs of the options at that stage. The relative strengths and weaknesses of the options were summarised in that report.

Further work was subsequently done to refine Options A, P, E and Z (F was discarded).¹ A modified, shorter Option Z option, tying back into the existing road at the northern tunnel portal was developed for comparison purposes. Less significant modifications were made to the other three options.

The costs of the four options following that refinement process are estimated as follows:

Option	A	E	P	F	Z (online)
Base	\$228.0M	\$174.5M	\$211.4M	\$209.1M	\$364.4M
Expected	\$251.3M	\$199.6M	\$231.3M	\$234.9M	\$382.5M
P ₉₅	\$293.3M	\$218.7M	\$274.2M	\$276.4M	\$430.1M

The above cost estimate for Option Z is for the full option, considered at the MCA2 workshop. The expected cost of the shorter Option Z developed subsequently is \$151.8m.²

Following a recommendation by the Project team that Option E should be taken forward, the Alliance Board endorsed Option E as the preferred option on 9 August 2017, resolving that it:

"...endorse the assessment of alternatives completed by the Alliance and conclude that Option E represents the preferred option for taking forward into the RMA consenting process."

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Planning & Environmental Manager

¹ A was retained for comparison purposes – it was the worst performing option in the MCA2 process.

² With a Base cost of \$134.6m; and a P₉₅ of \$170.7m.