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**Ōtaki to North of Levin  
Taylors Road to Ohau River Four Laning  
Further Options Report**

Prepared for NZ Transport Agency  
September 2015

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# NZ Transport Agency

## Otaki to North of Levin

### Taylors Road to Ohau River Four Laning

### Further Options Report

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## PART ONE

# 1 Introduction and Background

This report provides information on further consideration and analysis of route options for a potential future four lane highway between Taylors Road (to the north of Otaki) and the Ohau River. It effectively updates the work which was undertaken in mid to late 2014 and early 2015 relating to this area. The earlier work was described in an earlier report entitled “Otaki to North of Levin – Taylors Road to Ohau Four Laning, Preliminary Options Report and Addendum”, November 2014, Addendum added April 2015 (the Preliminary Options Report). This report described investigations of a number of possible broad routes that a new four lane expressway could follow as a continuation of the proposed Peka Peka to Otaki expressway.

The New Zealand Transport Agency (the Transport Agency) has been investigating a package of improvements to the existing state highways between Ōtaki and north of Levin as part of its strategic approach to achieving safety and efficiency benefits in the short to medium term, while retaining a long-term option to achieve a four lane highway in the project area.

Since 2011 the project has proceeded through investigation of the opportunities and constraints of an expressway within the wider project area, to investigations to identify feasible targeted improvement projects, and through several stages of consultation. Some of the specific projects have required further consideration following consultation in 2013.

In developing some of these projects, it became clear that further analysis and consideration was needed to ensure that the projects would be compatible with a long term route for the highway (particularly as a four-lane highway), between the Peka Peka to Otaki project at Taylors Road and the Ohau River<sup>1</sup>.

The work has proceeded on the basis of an iterative process of identification and investigation of preliminary route options, followed by further refinement of the options and further investigation and analysis.

The preliminary options investigations and analysis, described in the Preliminary Options Report, investigated seven possible route options<sup>2</sup> in the southern part of the area between Taylors Road and the Ohau River, and seven possible route options in the northern part of this area. It was possible to link the northern and southern sections in numerous ways, resulting in well in excess of seven possible routes. Three possible main locations for an expressway interchange in this area were also investigated. These investigations were based on broad lines on maps with no design consideration beyond very broad parameters.

The evaluation of these options included a multi-criteria analysis<sup>3</sup> (MCA), a preliminary economic analysis, and a commentary on staging. From the MCA analysis four overall routes, combining southern and northern route sections, were identified as options which justified further investigation and analysis. A number of other route options, including an eastern option which lay between Manakau township and the foothills, and some central routes, were found to be less favoured and it was recommended that they should not be pursued (based on the various analyses). There was no clearly favoured interchange location, based on the level of information available.

Following receipt, some months later, of preliminary cultural impact reports (CIAs), the scoring for tāngata whenua values used in the MCA was reviewed. This altered the preferences by bringing them closer together<sup>4</sup>. Thus it was determined that a slightly increased number of possible north/south combinations were worthy of further evaluation.

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<sup>1</sup> This analysis does not detract from the identification of the need for safety improvement projects that are proposed or currently under way for some areas (e.g. through Manakau and Ohau villages).

<sup>2</sup> These avoided major known constraints.

<sup>3</sup> The methodology for this is discussed later in this report.

<sup>4</sup> See Addendum to the Preliminary Options Report.



The paragraphs above set the scene for the further work undertaken which is described in the remainder of this report. The further work described has been undertaken in two stages, with additional consultation with the two directly affected tangata whenua groups taking place between the two stages of investigation and analysis. This resulted in the identification and evaluation of three additional route options which are described in the second part of the analysis in this report.

The identification and consideration of options is an important component of the necessary investigations before notices of requirement for designations under the Resource Management Act (the RMA) can be lodged. This process also ensures that a robust and well-considered choice is made. The processes set out in this report, and the findings, will contribute to this choice, and to future statutory processes to secure the preferred route and gain RMA approvals.

This report will become a further appendix to the SH1-SH57 Connection Detailed Business Case. The structure of the remainder of this report is as follows:

- a description of the area and the options evaluated at this stage (section 2)
- a brief description of the further studies undertaken (section 3)
- a description of the multi-criteria process and outcomes (section 4)
- a description of the identification of additional options (section 5)
- a description of the further multi-criteria analysis and outcome (section 6)
- a conclusion (section 7).

It is important to note that the work undertaken to date has not been to a level of detail that enables an exact route to be confirmed. The outcomes of the work reported here will contribute to further development of a preferred option (or options) and further consultation in the area prior to refinement of a preferred option.

## 1.1 Project Objectives

The objectives of the Wellington Northern Corridor RoNS, which runs from Wellington Airport to north of Levin, are:

- to enhance inter regional and national economic growth and productivity;
- to improve access to Wellington's CBD, key industrial and employment centres, port, airport and hospital;
- to provide relief from severe congestion on the state highway and local road networks;
- to improve the journey time reliability of travel on the section of SH1 between Levin and the Wellington Airport; and
- to improve the safety of travel on state highways.

For the Ōtaki to north of Levin section the objectives<sup>5</sup> are:

- enhance inter-regional and national economic growth and productivity;
- improve journey times on the state highway network;
- enhance safety of travel on the state highway network; and
- achieve the above objectives through a staged approach that allows for the longer term transport needs in a cost effective manner.

Specific objectives apply to the north of Ōtaki to Levin section (including the connections to SH1 and SH57). These are:

- enhance inter-regional and national economic growth and productivity;
- improve journey times on the state highway network;
- enhance safety of travel on the state highway network;
- appropriately balance the needs of both interregional traffic and local road users; and
- to achieve the above objectives in a cost effective manner.

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<sup>5</sup> These were revised in early 2015 as a result of the change in project scope.

## 1.2 Location

Figure 1.1 is repeated from the Preliminary Options Report and outlines the projects that have been investigated in the Project Feasibility Report stage of the project. More particularly, it shows the area to which this report applies.



**Figure 1-1: Location Plan**



### 1.3 The Two-Stage Process

The identification and evaluation of alternatives described in this report has followed a two-stage process.

The first stage followed shortly after the analysis described in the Addendum to the Preliminary Options Report was completed. In the first stage work was undertaken to analyse the five options<sup>6</sup>, each with the same variant at the southern end (the “A” variants), which had been identified in the Addendum to the Preliminary Options Report. This resulted in 10 options to analyse.

The options and the analysis undertaken in late April and May 2015 are described in Part Two of this report (comprising sections 2 to 4). This analysis identified three options which were proposed to be progressed further.

As a preliminary step in progressing this work, and given the significant amount of Maori land affected by the three route options, their associated interchanges and the local roading system which would need to be developed, further discussions were held with Ngati Tukorehe and Ngati Wehi Wehi<sup>7</sup>. Following those meetings, the Transport Agency decided to investigate whether there were other routes (including routes which may have been rejected earlier) which would have less effects on Maori land and on the values associated with land in the vicinity of the NIMT and the existing State Highway 1. This process and the evaluation of the further options along with those already evaluated was carried out in July and August 2015, and is described in Part Three of this report (sections 5 and 6 to this report). Part Four of the report (section 7) provides a conclusion.

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<sup>6</sup> Prior to the additional work and rescoring of tangata whenua values following receipt of the draft Cultural Impact reports from Te Iwi O Ngati Tukorehe and Te Iwi O Ngati Wehi Wehi, three route options had been identified for further investigation. The re-evaluation described in the Addendum to the Preliminary Options Report indicated that the options were more similar in terms of attributes than anticipated. This led to the review and larger number of options for further evaluation described in this report.

<sup>7</sup> Meetings/hui held at the marae on 14<sup>th</sup> June and 3<sup>rd</sup> and 13<sup>th</sup> of August.

## PART TWO

### 2 Options Analysed in the First Stage

#### 2.1 Introduction

The area for evaluation is the same as described in the previous Preliminary Options Report and encompasses land that lies between Otaki in the south and Ohau in the north. The present state highway system within this area incorporates various features and characteristics which require improvement or alternative resolution. The problems have been fully documented in earlier reports<sup>8</sup> and the various options considered for each section.

The intersection of Taylors Road and SH1 (the northern extent of the approved Peka Peka to Otaki RoNS project) is the southern extent of the area within which the options evaluated in this report lie. The northern end is the Ohau River with options either converging on the crossing point determined as part of the preferred SH1-SH57 Connection option (Option 5A), or involving alignments which could join Option 5A further north (south of Ohau on SH1 and the northern parts of the alignment of Option 5A).

#### 2.2 Generating the Options

The options analysed in this part of the report were developed from those which were preferred options (northern and southern sections) identified from the analysis reported in the Preliminary Options Report and its Addendum. This analysis showed that route combinations of the following north and south sections were preferred and should be progressed further<sup>9</sup>:

- Grey and Purple/Light Blue
- Red and Purple/Light Blue
- Magenta (or Blue) and Light Blue
- Dashed Orange and Light Blue.

The results of this exercise contributed to further consideration and generation of ten route options. Basically these options involved five options over most of their lengths, combined with two options at the southern end. At the northern end, the options approximately followed the four options identified above but a fifth option was added swinging out to the west of all of these options at the northern end to avoid the residential development along Kuku Beach Road west of the North Island Main Trunk (NIMT) railway line. These options are shown in Appendix 1 to this report.

#### 2.3 Description of Options

The plan in Appendix 1 retains the colours from the earlier evaluation, but each route option is given a letter/number identifier in preference to a colour description<sup>10</sup>. The distinction between northern and southern sections has been removed.

Possible interchange locations were also identified for all options and are shown in Appendix 1 as “worst-case” preliminary land requirement areas only.

As with the previous analysis it is important to note that the lines of the routes in Appendix 1 indicate broad potential areas for alignments which have not been developed to any stage of design. They are able to be adjusted to reduce effects, and further consideration would be necessary prior to any final decision on a preferred option.

The table on the following page outlines the key characteristics of the route options in Appendix 1.

<sup>8</sup> E.g. Scoping Report for Otaki to North of Levin in July 2012, Project Feasibility Reports for the Transport Agency early 2013 addressing Forest Lakes (Report 1), Manakau Settlement (Report 2), Manakau Ohau Bridge (Report 3), Ohau Settlement (Report 4), and SH1-SH57 & Arapaepae Curve (Report 5), and also SH1-SH57 Scoping Report November 2013. All MWH NZ Ltd.

<sup>9</sup> These routes can be seen in Appendix A of the Preliminary Route Options Report.

<sup>10</sup> The reference TO signifies Taylors Road to Ohau. The variants identified with an A follow a western alignment at the southern end.

**Table 2-1: Description of First Stage Route Options**

Route Option	Description and Key Features (from south to north)
TO1	This option lies to the east of the current SH1 at the southern end, running roughly parallel to the existing highway from Taylors Road to past Pukehou NIMT overbridge. It then swings west to cross the highway in the vicinity of the Forest Lakes Road. It continues on a straight alignment to cross Waikawa Beach Road to the west of the recent residential subdivision along that road. It then swings slightly east to skirt the southernmost protected bush area west of the NIMT and joins the NIMT alignment east of the northernmost protected bush area. It crosses Kuku Beach Road close to the railway line and follows the 5A alignment to Muhunua East Road.
TO1A	This option commences at Taylors Road and runs north in a straight line west of the existing SH1 and NIMT to merge with TO1 south of Manakau. It then follows the TO1 route north.
TO2	This option is the same as TO1 as far as a point west of the Waikawa Beach Road subdivision. From there it swings more sharply east to parallel the NIMT alignment from about 500m north of Whakaharo Road, skirting the southernmost protected bush area to the south. From here it follows the line of TO1 to the north.
TO2A	The southern part of this route is the same as for Option TO1A. It then merges with the route of TO2A to the north.
TO3	This option is one of two (the other being TO3A) which were not generated from earlier work reported in the Preliminary Options Report. Rather it was added to the options following receipt of the draft Cultural Impact Assessments in an effort to recognise concerns held particularly by Tukorehe iwi relating to the settlement area to the west of the NIMT along Kuku Beach Road. The route follows TO1 and TO2 to the point where they diverge. TO3 then continues to the north-northwest on a straight alignment, crossing Kuku Beach Road to the west of the houses as far north as the Ohau River. Once the river is crossed, it swings to the east to join with SH1 and the 5A alignment.
TO3A	The southern part of this option is the same as for Option TO1A, and from the point of convergence with TO1, TO2 and TO3, it follows the TO3 route.
TO4	The southernmost part of TO4 is the same for TO1 and TO3. However, it diverges from these routes at the point where they cross existing SH1 keeping more to the east (although well west of the existing State highway). The route bisects the recent residential subdivision on Waikawa Beach Road, passing just west of the Manakau Domain. It then parallels the existing SH1 and NIMT route, swinging east to join the route of TO2 south of the southernmost protected beach area and following it to the north.
TO4A	Part of the southern part of this option is the same as for TO1A, TO2A and TO3A. However, from the point of the conjunction of that section with options TO1 to TO3, route Option TO4A follows a straight line to the south of the residential subdivision on Waikawa Beach Road. At this point it joins Option TO4 and follows it to the north.
TO5	The southern part of this option is the same as for TO4. From just north of the Manakau Domain, the route swings east, crossing the NIMT and existing SH1 at approximately the location of the existing SH1 overbridge on the NIMT. It then rejoins the existing SH1, following its alignment to a

Route Option	Description and Key Features (from south to north)
	point some 400m north of where SH1 swings east. At this point it bifurcates, with the “SH1 route” connecting to the existing SH1 south of the vineyard. The “SH57 route” follows a straight alignment, crossing the Ohau River some 500m to the east of the “SH1 route” crossing and joining the alignment of Option 5A in the vicinity of Muhunoa East Road.
TO5A	The southern part of this route option follows the same route as Option 4A. It then follows route option TO5.

These options formed the basis for the further investigations described in the next section, and the MCA that was carried out as described in section 4 of this report.

## 3 Additional Information

### 3.1 Background

Information on the range of constraints that may apply in terms of any route within the area of the Ōtaki to North of Levin RoNS project had been collected early in the project investigations. This information had been added to through consultation processes, and as part of the Project Feasibility Reports. However, it was identified that more detailed information would be needed across a range of aspects in order to undertake an adequate evaluation of the identified options.

The MCA undertaken and described in the Preliminary Options Report was based on information available at that time. The Addendum to the report took into account the information from the draft CIAs provided by Tukorehe and Wehi Wehi iwi.

Aspects where further information was considered to be necessary for the MCA to be carried out on the ten route options for this report included:

- archaeological values
- landscape and visual impacts
- terrestrial and aquatic ecological values
- productive land values
- tāngata whenua values.

The assessment of tāngata whenua values took into account the draft CIAs<sup>11</sup>.

Technical specialists who had been involved in earlier studies on the project (including the SH1 to SH57 Connection) were engaged for the further investigations. They were asked to consider the implications of each of the ten route options described above in terms of their areas of expertise, to prepare for involvement in a multi-criteria analysis workshop process. Each was to prepare a report. The advice and briefing note for the preparation of the report is provided in Appendix 2 to this report.

In addition, project team members with appropriate technical backgrounds were selected and asked to consider information relevant to other aspects of the project which would be applicable to the analysis. This included social and community impacts, district and regional plan provisions and consentability, landowner impacts and implications in terms of engineering and construction.

### 3.2 Scope, Analysis and Reporting

Following a briefing session, each expert developed their own scope of work for approval by MWH and the Transport Agency. The evaluations were to be undertaken on the basis of a broad route, rather than a narrow alignment, taking into account effects on nearby areas.

Field work as necessary was carried out in April and May 2014. However, most experts were sufficiently familiar with the area to consider this was not necessary, due to their earlier involvement in the area and the fact that they had prepared earlier reports in relation to the Otaki to North of Levin SH1-SH57 connection evaluation.

The analysis was requested to be completed at a relatively high level, with any scoring of route qualities undertaken by a technical specialist using a “+” and “-” based scale. It was explained that this was because the workshop process may reach a different scoring. The approach is set out in Appendix 2, and has been followed in the reports.

The reports produced are provided as Appendices to this report<sup>12</sup> as follows:

- Appendix 4 – Otaki to Levin Road of National Significance – Taylors Road to Ohau Alternatives, Urban Design + Landscape + Visual, Isthmus

<sup>11</sup> These still require further work, including more detail on the southern part of the route options, so were not relied on for the assessment described in this report. However, further information became available through consultation as described in Part Three of this report.

<sup>12</sup> Note that the report dates in the Appendices are for the final versions. Draft versions were available for the MCA analysis in late April 2015.



- Appendix 5 – New Zealand Transport Agency RoNS, Otaki to Levin – Possible Future Route Options between Taylors Road and South of Ohau/Arapaepae Road, letter report, Forbes Ecology
- Appendix 6 – An Assessment of the Archaeological Risks Associated with Potential Route Options for the State Highway, between North of Otaki and South of Levin, inSite Archaeology Ltd
- Appendix 7 – Otaki to Levin Road of National Significance – Otaki – Taylors Road to Ohau/SH57 Roding Alternative – Cultural Assessment, Raukura Consultants
- Appendix 8 – Taylors Road to Ohau Road Realignment Proposals: Land Resources Assessment, LandVision Ltd
- Appendix 9 – Otaki to North of Levin: Taylors Road to Ohau (South Levin, BC). MCA Analysis – Engineering Degree of Difficulty, MWH NZ Ltd

All reports need to be read alongside the more comprehensive reports provided for and attached to the MCA Report for the SH1-SH57 connection<sup>13</sup>. Note that these include a comprehensive hydrology report relating to the Ohau River, which is the main river crossed by the route options.

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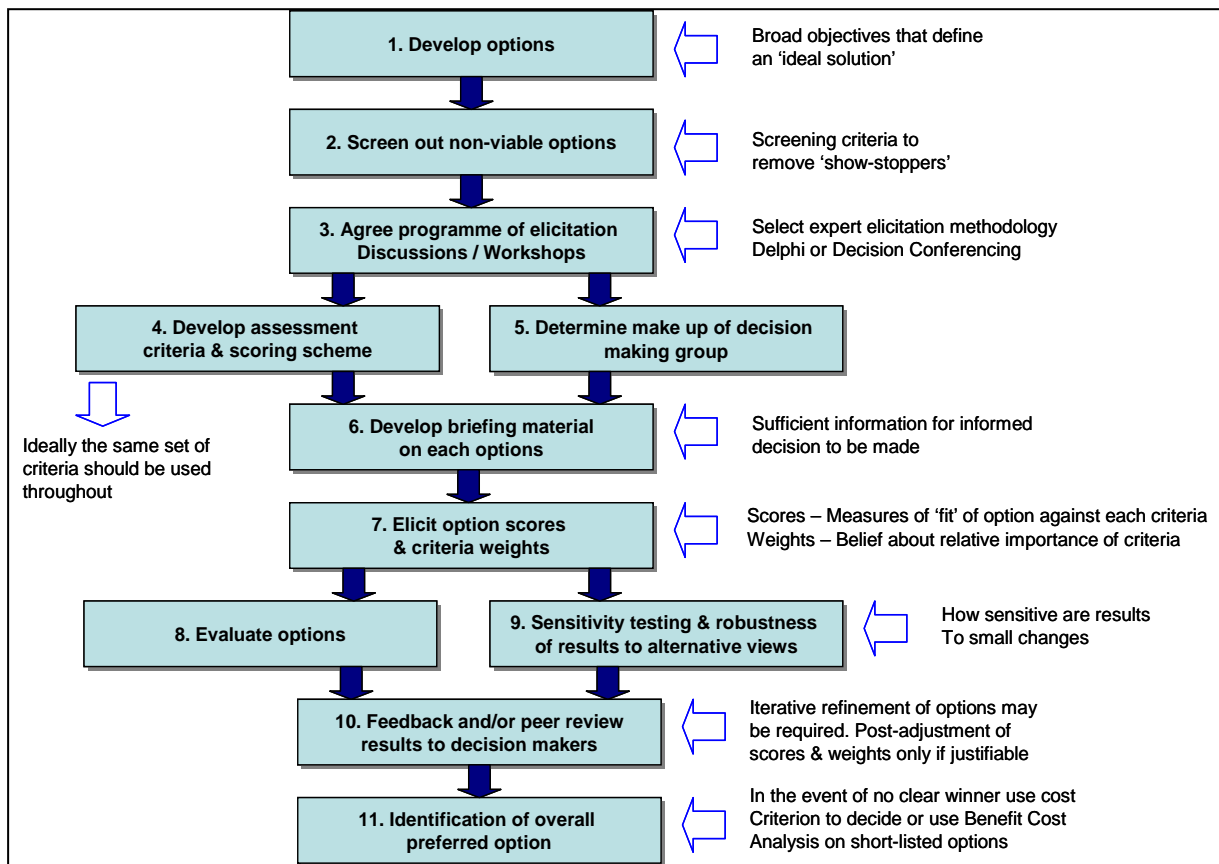
<sup>13</sup> Allan Planning and Research Ltd, Otaki to North of Levin SH1-SH57 Connection: Report on Multi-Criteria Analysis of Options, November 2013, Appendices 3 to 8.

## 4 First Stage of Route Options Analysis

### 4.1 Background and Methodology

Figure 4-1 sets out a schematic representation of the context within which MCA is applied, particularly in relation to significant infrastructure projects.

In the circumstances of the Taylors Road to Ohau/State Highway 57 options which are the subject of this report, Steps 1 and 2 in Figure 4-1 had been developed as discussed in Section 2 above, producing options that were considered able to contribute to the achievement of the Transport Agency's objectives for the Ōtaki to North of Levin RoNS project. With the addition of a step which involved collection of more detailed environmental material (described in section 3 of this report), these two steps set the scene for the remainder of the steps set out in Figure 4-1.



**Figure 4-1: MCA Process**

The MCA methodology is a key element of analysis, and a useful aid to decision-making. MCA is particularly applicable when there are several options to choose between, and where there are numerous complex considerations involved. A MCA process is thus commonly used in assessments of options for infrastructure. It is a useful tool for evaluations, including those under the RMA and Local Government Act (LGA), to compare and assess alternative proposals where there are multiple objectives, and where there are a range of diverse potential adverse and beneficial effects affecting different areas and/or communities<sup>14</sup>. The range of attributes that are relevant to a decision between

<sup>14</sup> The use of multi-criteria analysis is recommended by the NAMS (the New Zealand National Asset Managers Support organisation) and is a key element of the Optimised Decision Making Guidelines promoted by that organisation. It also finds favour (used in conjunction with CBA) in "Decision-making on Mega-projects: Cost-benefit Analysis, Planning and Innovation", Priemus, H; Flybrjerg, B and van Wee, I, Eds – 2008.

options can be numerous and varied, and it is necessary in such circumstances to bring together the information in a reliable and credible way.

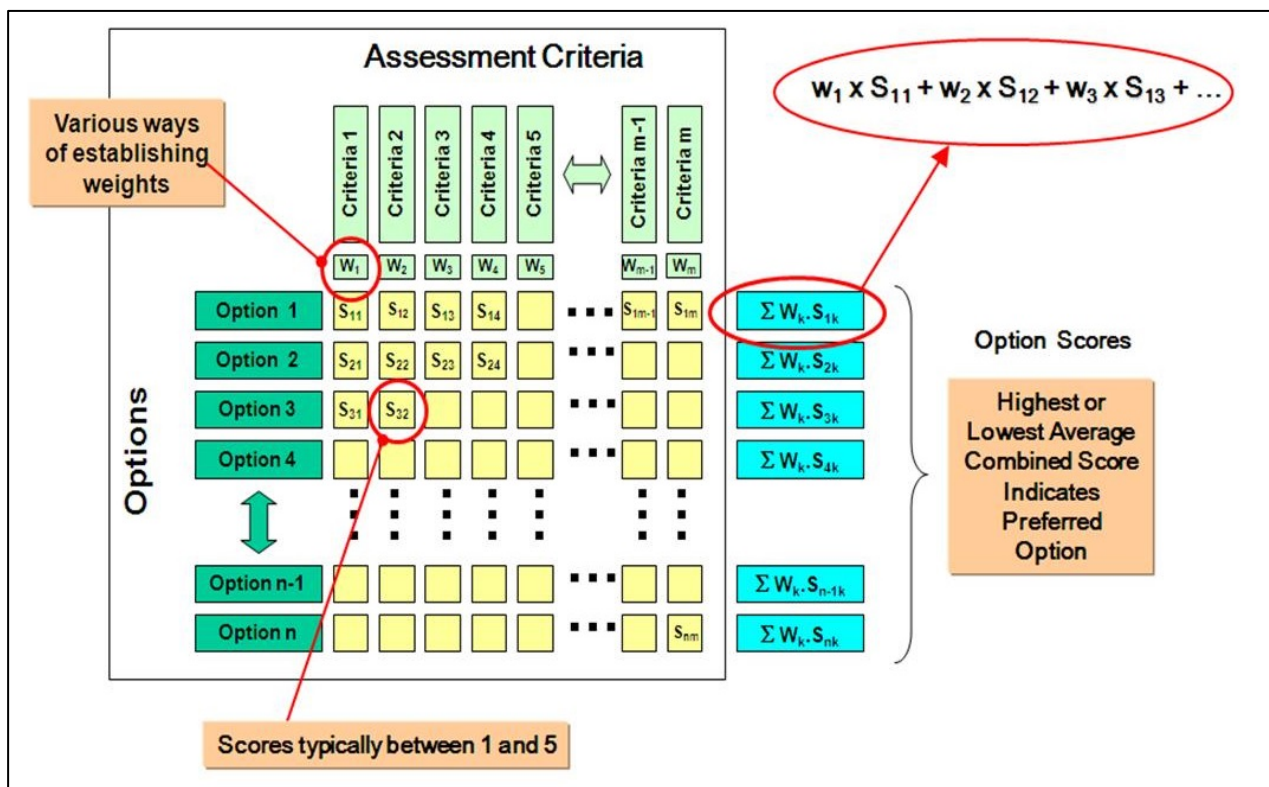
Figure 4-2 shows how a MCA process is applied. Key aspects to be taken into account in the decision making process are identified, defined, and scored on a consistent basis. Once scored, they can then be weighted as appropriate and combined into a single option score. In MCA processes, the scores can be seen as surrogates for measures of value for an aspect (allowing for the effects of diverse criteria, with different units, to be combined). The weights represent beliefs or assumptions about what is important in a particular situation or to a particular group of decision makers.

It is possible to strengthen the analysis by applying a range of different weightings to see whether the preference changes due to weighting systems. It is also appropriate to test the sensitivity of the process by carefully reviewing the scoring and identifying the extent to which scoring would need to change to result in a difference preference.

#### 4.1.1 Decision-making in the Multi-criteria Framework

Decisions on criteria, scoring and weighting are ideally made by a group of informed people through a process that allows for testing through discussion, questions and answers.

When the criteria are diverse and areas of specialist judgment are involved, the preferred method is through a “decision conference” or facilitated workshop session, at which a participating group of specialists and generalists share information and work through the issues, finally deciding on the score for each criterion<sup>15</sup>. Ideally consensus is reached on the scores. This reduces individual bias and keeps the process transparent<sup>16</sup>.



**Figure 4-2: Multi-criteria Analysis Scoring and Weighting**

<sup>15</sup> The method is based on the demonstrated hypothesis (from international research in the early 1990s on roading projects) that groups of people, given the same information and the opportunity to test the information, will make similar decisions on preferences, regardless of their backgrounds.

<sup>16</sup> An alternative method to the decision conferencing method is the Delphi method, described in earlier reports. This was used in the second stage of the work described in this report.

## 4.2 Application of the Multi-Criteria Analysis

### 4.2.1 Background Information

Background information referred to for this MCA included:

- Otaki to North of Levin Scoping Report, MWH, July 2012, including the constraint maps in Appendix D
- Landscape and Urban Design Baseline Report, Isthmus, April 2011.
- Otaki to North of Levin PFRs (Reports 1 to 12), MWH, February 2013
- Otaki to North of Levin SH1 - SH57 Connection Scoping Report, MWH, November 2013, including the MCA Report with its specialist reports in Appendix J
- Manakau Bypass Constraint Maps, MWH, 12-05-2014, based on constraints identified during previous phases
- Otaki to North of Levin – Taylors Road to Ohau River Four Laning Preliminary Options Report and Addendum dated April 2015.

In addition, drafts of the specialist reports referred to in section 3 of this report were available for discussion.

The composite map of the routes in Appendix 1 was the basis of the evaluation. However, more detailed maps of each route option were also provided, overlaid on an aerial photograph and cadastral plan. These showed the theoretical extent of works associated with each option including potential interchange and land disturbance for cut and fill. The potential vertical alignment was also provided, along with topographic information. The purpose of this mapping was to assist with an understanding of the potential effects of a realistic expressway (4-lane) alignment approximating the route options which had been identified for analysis. However, as explained below, this did not limit the evaluation of effects, which was undertaken at a more general level.

### 4.2.2 Choice of Attributes or Criteria

It was decided to apply the same criteria as had been used earlier in the MCA for the SH1 to SH57 connection evaluation.

Reasons to use the same criteria that had been applied in the earlier analysis which had led to the identification of Option 5A as the Transport Agency's preferred option for the SH1 to SH57 connection route included the following considerations:

- The level of detail of the routes being evaluated. The level of detail was similar, so the application of the same criteria provided for consistency in approach.
- The fact that the intersections were considered to be part of the routes in the analysis. It was noted that the intersections for local roads with the expressway for the SH1 to SH57 connection had been developed and analysed separately subsequently at a greater level of detail. In that analysis, local considerations were assigned greater importance, leading to a range of criteria that differed in some respects to those for the earlier MCA<sup>17</sup>.
- A decision that staging should not be a separate criterion<sup>18</sup>. This was on the basis that the ability to stage the project could be achieved in several ways and should be seen as a consideration in terms of RMA approvals for the project as a whole, rather than a basis for differentiation between route options.
- Whether the two criteria used in the MCA on the SH1 to SH57 connection evaluation but not used for the analysis in the Preliminary Options Report should be introduced. These criteria were "productive land uses" and "specific land owner/land use effects". It was decided that these could be relevant considerations and should be included<sup>19</sup>.
- The number of criteria involved. In this case there were proposed to be 11, which is within the 8 to 12 range normally considered appropriate for MCA analysis.

<sup>17</sup> See Otaki to North of Levin – SH1-SH57 Connection – SH57 Intersections Options Assessment Report, MWH, February 2015.

<sup>18</sup> The Preliminary Options Analysis had included staging as one of the considerations within the "Fit to Project Objectives" criterion. The report also includes a separate discussion on staging.

<sup>19</sup> They were not included in the Preliminary Options analysis because of the general homogeneity in land uses in the area and lack of detail on specific activities (beyond the areas already excluded as constraints from earlier analyses).

- That there had not been any changes in Transport Agency thinking or practice (despite the modification in project objectives) that would require or justify additional or modified criteria.

The attributes for assessment, or assessment criteria, are therefore the same as those identified for investigation of the SH1 to SH57 connection. These were discussed amongst the project team and confirmed at the MCA Workshop. The criteria are relatively broadly-based, as is appropriate for the stage of project development, the scale of the project and the nature of the route options being evaluated.

The assessment criteria need to reflect matters that are important within the RMA, and the Land Transport Management Act 2003 and its amendments<sup>20</sup>, taking into account the decision criteria that will eventually be brought to bear through RMA processes. They should also be able to be categorized across all of the “four well-being” considerations – social, environmental, cultural and economic, which are part of the sustainable development principles in the Local Government Act 2002. They should also reflect the most recent statement of national policy on land transport<sup>21</sup>. This assessment is shown in Table 4-1. A brief description of the scope of each of the criteria follows in section 4.2.3.

**Table 4-1: Assignment of Criteria to Generic Evaluation Frameworks**

Criterion	GPSLT Objective	Examples of relevant RMA Aspects	LGA Sustainable Development Principle (S14)
• Landscape/Visual Impacts	Mitigating Adverse Environmental Effects	S5, S6(b), S7(c) and (f)	Environmental
• Ecology	Mitigating Adverse Environmental Effects	S5, S6(a) and (c), S7(d)	Environmental
• Archaeology/Heritage	Mitigating Adverse Environmental Effects	S5, S6(f)	Cultural
• Tāngata Whenua Values	All Objectives	S5, S6(e) and (g), S7(a), S8	Cultural
• Productive Land Uses	Mitigating Adverse Environmental Effects/Economic Growth and Productivity	S5, S7(b), S104	Economic
• Social/Community Impacts	Mitigating Adverse Environmental Effects/Transport Choice/Economic and Social Opportunities/Resilience/Safety	S5, S7(c)	Social
• District/Regional Plan Fit/Consentability	Mitigating Adverse Environmental Effects/Economic Growth and Productivity	S5, S104, S171	All aspects
• Fit to Project Objectives	All Objectives	S5, S7(b), S171	Social/Economic

<sup>20</sup> The LTMA includes an overall objective and requires that the Transport Agency exhibits a sense of social and environmental responsibility and acts in a transparent manner (section 96), and incorporates the Crown's responsibility to take appropriate account of the principles of the Treaty of Waitangi (section 4).

<sup>21</sup> Government Policy Statement on Land Transport 2015/16-2024/25 (July 2015) – the GPSLT in the table above. The focus is on strategic priorities of economic growth and productivity, road safety and value for money.



Criterion	GPSLT Objective	Examples of relevant RMA Aspects	LGA Sustainable Development Principle (S14)
<ul style="list-style-type: none"> <li>Specific Land Owner/Land Use Effects</li> </ul>	Economic and Social opportunities	S5, S7(b)	Social/Economic
<ul style="list-style-type: none"> <li>Engineering Degree of Difficulty</li> </ul>	Economic Growth and Productivity/Resilience	S5	Environmental/ Economic
<ul style="list-style-type: none"> <li>Cost</li> </ul>	Economic Growth and Productivity/Value for Money/the Right Infrastructure at the Best Cost	S5, S7(b)	Economic

### 4.2.3 Description of Criteria

As noted above, the criteria identified were similar to those which had been applied to the earlier analysis reported in the Preliminary Options Report.

The workshop process however involved a wider range of technical specialists, including people who had been involved in the MCA process for the SH1 to SH57 connection. These experts had undertaken further investigations as noted in section 3 of this report.

The scope and extent of each criterion was reconsidered and confirmed by the specialist, or person who had investigated the aspect, and fully discussed and reviewed at the workshop. A brief description follows.

1. **Landscape/Visual** – This took into account existing landscape character (including degree of modification and presence of structures), route length and presence of dwellings nearby, any outstanding landscape or natural character components, and important landscape/natural features. It also considered urban design type effects where a route was close to settlements.
2. **Ecology** – This criterion focused on terrestrial ecology values<sup>22</sup>, particularly those relating to patches of indigenous vegetation which are nationally, regionally or locally significant in terms of habitat values and presence of known species.
3. **Archaeology/Heritage** – This criterion took into account presence of known archaeological and heritage sites and features, and also archaeological risks (i.e. the likelihood of encountering archaeological sites).
4. **Tāngata Whenua Values** – This took into account Maori owned land and the range of cultural values including values relating to the natural environment (waterways and wetlands, areas of indigenous vegetation), key areas of settlement (marae, papakainga) and use (food gathering areas), and known wāhi tapu.
5. **Productive Land Uses** – As reported and discussed at the workshop, this criterion took into account soils and the New Zealand Land Use Capability Classification, in particular classes 1 to 4 (productive land), the current productive landuse pattern, and potential severance effects on productive units.

<sup>22</sup> While aquatic ecological values were considered, it was determined that effects would be localised and similar between all options. They would be largely mitigated through design and managed through the construction stage.

6. **Social/Community Impacts** – This incorporated a range of considerations including severance effects, access to and from settlement areas and townships, general urban amenity, connectivity to community services and facilities, recreational effects, and construction impacts. (Note direct effects on land including dwellings were included under specific land ownership effects).
7. **District and Regional Plans and Consentability** – This criterion includes consideration of both zoning and plan objectives and policies, and any major impediments through the plans to a route location. It also considered regional consent requirements.
8. **Fit to Project Objectives** – This criterion covered levels of service, and efficiency and effectiveness (in terms of best value solutions). The assessment took into account the local network and the various state highway components.
9. **Specific Land Owner/Land Use Effects** – This criterion considered impacts on areas which could potentially pose difficulties for the location of an option – including Crown Land, Māori multiple-owned land and QEII Trust conservation land, as well as particular land uses.
10. **Engineering Degree of Difficulty** – This was assessed on the basis of physical components such as volume and balance of earthworks (cut and fill suitability / issues with materials), structures, temporary works, access management, risks around “unknowns”, additional provisions to address natural hazards such as hydrological impact, flooding, geology and general degree of difficulty in construction.
11. **Costs** – Costs took into account the actual capital construction costs, including the range of matters identified under constructability, plus contingencies.

In assessing options, reasonable mitigation was taken into account. It was also assumed that all options would include adequate provision for property access and local connectivity (to allow for reasonable continuation of established patterns such as journeys to school and other local services).

There are 11 assessment criteria, which is an acceptable number<sup>23</sup>. The number and scopes of the criteria were confirmed by the workshop.

It was noted at the workshop that there was some potential for double counting, particularly with constructability and cost, aspects of social assessment (e.g. visual impact and social impacts), and archaeology/heritage and tāngata whenua values. It was decided that these issues could best be handled during the scoring and weighting discussions. It was also noted that in some cases, the same aspects could justifiably be assessed under two criteria (such as the separate heritage and cultural values associated with some marae and urupa, and the separate ecological and cultural values of streams, waterways and bush). The possibility of removing cost from the analysis and considering it as a separate item was also raised. This could be undertaken later in the analysis.

Additional criteria were also briefly considered at the workshop as follows:

- Natural hazards (this was subsumed in Engineering Degree of Difficulty)
- Lifelines (there was no basis to distinguish alternatives in terms of lifelines)
- Noise (considered to be capable of mitigation to accepted standards – also part of amenity)
- Air quality (considered to be able to be addressed later – also part of amenity).

For the reasons in the bullet-points above, none of these were included as separate criteria.

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<sup>23</sup> Eight to twelve criteria is the ideal. With an increasing number of criteria, each criterion reduces in importance and it can become difficult to distinguish between options.

#### 4.2.4 Scoring System

For the multi-criteria analysis, the scoring system moved from the provisional assessment provided by the specialists, to a five-point numerical system, as set out in Table 4-2.

**Table 4-2: Basis for Scoring Used in the Multi-criteria Analysis**

Score	Description
1	The option presents few difficulties on the basis of the criterion being evaluated, taking into account reasonable mitigation proposals. There may be significant benefits in terms of the attribute.
2	The option presents only minor areas of difficulties on the basis of the criterion being evaluated, taking into account reasonable mitigation proposals. There may be some benefits in terms of the attribute.
3	The option presents some areas of reasonable difficulty in terms of the criterion being evaluated. Effects cannot be completely avoided. Mitigation is not readily achievable at reasonable cost, and there are few or no apparent benefits.
4	The option includes extensive areas of difficulty in terms of the criterion being evaluated, which outweigh perceived benefits. Mitigation is not readily achievable.
5	The option includes extreme difficulties in terms of achieving the project on the basis of the criterion being evaluated.

Where scores of 5 were identified, it was also considered whether these were also “fatal flaws” for the option.

#### 4.2.5 Decision Process

The structured workshop proceeded in accordance with the process set out in this report and the background information provided in Appendix 2. The workshop results and analysis are further outlined in section 4.3 of this report.

### 4.3 Analysis and Outcomes

#### 4.3.1 Scoring Process

The scoring process was undertaken on the basis of a structured workshop involving the participants listed below<sup>24</sup>:

- Greg Lee                      The Transport Agency
- Jo Draper                      The Transport Agency
- James Hughes              The Transport Agency
- Graham Taylor              The Transport Agency
- Caroline Horrox              The Transport Agency
- Kevin Peel                      HDC
- Daniel Haigh                  HDC
- David McCorkindale        HDC
- Francis Norku                KCDC
- Phil Peet                        MWH
- Marten Oppenhuis          MWH
- Steve Kerr                      MWH

<sup>24</sup> This contrasts with the MCA analysis undertaken for the Preliminary Options Report, which involved only six participants and none of the specialist technical experts.

- Jamie Povall MWH
- Amanda Fountain MWH
- Sylvia Allan Allan Planning and Research
- Daniel Parker inSite Archaeology
- Lachie Grant LandVision Ltd
- Adam Forbes Forbes Ecology
- Thad Ryan Buddle Findlay (observing)

The necessary protocols were followed to ensure that the outcome would be as reliable as possible.

Following preliminary discussion<sup>25</sup>, the route options were considered. Each criterion was described and discussed by the relevant presenter<sup>26</sup>, identifying issues relating to each option. This was followed by questions and discussion.

The workshop then proceeded to the evaluation stage, giving each option a specific score for each aspect. Each aspect was evaluated for all options in turn. This was to encourage a balanced view of the relative merits of each option for each aspect before moving to the next aspect. To avoid patterning, the order of scoring options was varied each time a new aspect was evaluated. Although it was decided that any differences of opinion in scoring would be recorded and used for later sensitivity analysis, the workshop achieved an agreed single score for each criterion for each option.

Morrie Love of Ruakura Consultants and Gavin Lister of Isthmus attended a later meeting to review the cultural and landscape/visual scores, which resulted in a small number of minor changes in initial scores for those criteria.

The outcomes are presented in Table 4-3 with key points from the discussions outlined below.

**Table 4-3: Scoring of Route Options**

Option	Landscape Visual	Ecology	Archaeology/Heritage	Tangata Whenua Values	Productive Land Values	Social/Community	District & Regional Plan Fit/Consentability	Project Objectives	Specific Landowner Effects	Engineering Degree of Difficulty	Cost
<b>TO1</b>	4	3	3	4	2	2	2	1	2	2	2
<b>TO1A</b>	4	5	4	4	2	2	4	1	2	3	2
<b>TO2</b>	4	3	3	4	2	2	2	1	2	2	2
<b>TO2A</b>	4	5	4	4	2	2	4	1	2	3	2
<b>TO3</b>	4	4	3	4	2	2	3	1	2	2	2
<b>TO3A</b>	4	5	4	4	2	2	4	1	2	3	2
<b>TO4</b>	3	3	3	4	2	3	3	1	2	3	3
<b>TO4A</b>	3	5	4	4	2	3	4	1	2	4	3
<b>TO5</b>	5	4	3	5	2	4	3	1	2	3	4
<b>TO5A</b>	5	5	4	5	2	4	4	1	2	4	4

<sup>25</sup> This included an outline of the options proposed, a discussion of the multi-criteria analysis methodology to be applied for those who were new to the method, and a discussion which confirmed the appropriateness and content of the various criteria.

<sup>26</sup> Note that for the criteria of social/community impacts, district and regional plan fit/consentability, fit to project objectives, and specific landowner effects specialist reports were not prepared. Rather, one person familiar with the criterion provided background and led the discussion on that aspect. The cost criterion was evaluated on the basis of preliminary cost estimates.

- **Landscape/Visual** – all options lie within a level rural landscape with scattered housing. The range of scores varied from 5 to 3, with 5 being awarded to Options TO5 and TO5A, due to multiple effects, including impacts on the small settlements around Waikawa Beach Road, and Kuku where the route follows the existing SH1 alignment. The scores of 3 were awarded to Options TO4 and TO4A as they avoided areas of settlement. The remaining options scored similarly, at 4, although their visual and landscape effects varied. In the relatively flat landscape of the area it is not possible to conceal an expressway, and there would also be a number of elevated structures associated with crossing the expressway (or the local roads) and the NIMT.
- **Ecology** – Options TO1, TO2 and TO4 scored the best with a 3, but all had some impacts due to proximity to small areas of bush and the need for river and stream crossings. All the “A” options scored a 5 due to the need to cross areas of wetland and small bush patches at the southern end. The ability to modify the route location in this area was considered, but any relocation would affect other areas of wetland or bush. While not a fatal flaw, extensive mitigation would be likely to be needed for any of these options.
- **Archaeology/Heritage** – there are highly likely to be various archaeological sites in the area, but they are not sufficiently defined to confirm impacts. Mitigation is also considered to be reasonably possible. Risks of encountering such sites are greatest at the southern end, particularly around the wetland areas, meaning that the “A” options are less favoured in terms of this criterion. Elsewhere the risks are moderate. TO4 and TO5 are partly within the original treeline to the east and are therefore marginally better, but not to the extent of varying the score down to a 2.
- **Tangata Whenua Values** – all options affect Maori land held in multiple (or individual) ownership. The two marae in the area are affected to the greatest extent by Option TO5. Cultural values around the wetlands at the southern end on the “A” routes are likely to be higher but these values are not sufficiently differentiated to change the score. Overall, cultural values will be adversely impact by any option to the extent that all scores awarded were 4 or 5.
- **Productive Land Use Values** – the whole area is productive with at least half of the land being Class I or II. It was not possible to distinguish between the route options on this basis and all were awarded a 2, indicating that effects are not expected to be significant.
- **Social/Community** – Option TO5 and TO5A were considered as having the greater effects, justifying a score of 4, closely followed by Options TO4 and TO4A which were determined to be a 3. These scores were particularly influenced by proximity to settlements on existing SH1 (TO5 and TO5A) and at Waikawa Beach Road (including the Manakau Domain), and by local road connectivity. The “A” options were considered to have the same extent of effects as the options which followed the route to the east at the southern end, so were scored consistently with them.
- **District/Regional Plan Fit and Consentability** – the “Pritchard Swamp” in the vicinity of the “A” options is identified as an area of value in the Kapiti Coast District Plan. All “A” options were scored a 4 because of this. Although other routes came close to protected features (bush areas) they are able to avoid them, although there would be associated effects such as noise. Parts of the Ohau River are identified in the Horizons One Plan as needing to be managed for ecological purposes. However, this involves all options, so is a neutral effect. Options TO1 and TO2 were considered to be the most consentable, so were scored 2. Options TO3, TO4 and TO5 were scored 3. There are no fatal flaws in terms of RMA plans, and no major inconsistencies with plan provisions other than as noted above.
- **Project Objectives** – all options were considered a good fit to the project objectives, so all scored 1.
- **Specific Land Owner Effects** – such effects were considered to be equal between the options, although the effects are different between options. All options involve Maori land. Potential effects on Tatum Park were also noted but did not influence any scores. All options were scored 2.
- **Engineering Degree of Difficulty** – a range of factors were taken into account including the benefits of being able to construct the expressway for the off-SH1 options (options TO1, TO1A, TO2, TO2A, TO3 and TO3A), and the ground condition difficulties for the “A” options at the



southern end (which added one point to the respective scores compared to the non-“A” options). TO4 and TO5 had a greater degree of difficulty because of the double crossing of the railway line and river. Scores ranged from 2 to 4, with TO1, TO2 and TO3 considered to be the most straight-forward in terms of construction.

- **Costs** – preliminary cost estimates were available at the time of the workshop. The capital cost range (pre-mitigation) was estimated to be \$300M-\$400M between options, and the cost per km range between \$16M and \$20M. TO5 and TO5A would be the most costly and were scored a 4, with TO4 and TO4A a 3. The remaining options all were scored at 2.

As can be seen from the analysis, three of the criteria were eventually found to be indistinguishable between options (productive land values, fit to project objectives and specific landowner effects).

This could only be established from undertaking the analysis, and it was considered they should remain part of the record. Of the eight remaining criteria all were quite closely grouped, with no single criterion resulting in scores which were separated by more than two. This demonstrates the homogeneity of the area and means that there is unlikely to be one route which is clearly “better” than the others.

### 4.3.2 Weighting

After reviewing the scoring, the workshop discussed the weighting system to apply. The weights arrived at are presented in the top line of Table 4-4 below. This can be regarded as the agreed view of the key technical and specialist advisors involved in the project. The workshop was aware that additional analyses would be undertaken as a later stage, along with sensitivity analysis applying the different scores elicited at the workshop.

Excepting for those criteria which had been scored identically across all options, all criteria were considered important enough to be given substantial weight. The most important aspects were considered to be tangata whenua values, consentability and cost. Significant weight was given to the environmental and social criteria, with engineering degree of difficulty weighted somewhat less.

Weighting systems are usually much more challengeable than scoring, as they can be readily developed from a range of different perspectives. Thus a single result is always vulnerable to criticism that the weighting system is wrong. An alternative means of investigating the robustness of a preference is to subject the scoring to a range of weightings and review the outcomes in terms of their consistency and range of differences.

To analyse the route option preferences, a range of weighting systems was developed subsequently. These are also shown on Table 4-4 and are described in general terms below. Note that the first weighting system is the only one subject to discussion by a group. The other five systems have been developed by Allan Planning and Research on the basis of understanding a range of possible relevant considerations<sup>27</sup>. For this analysis, the weightings applied in the SH1 to SH57 connection analysis were applied again<sup>28</sup>.

<sup>27</sup> This type of process has been applied in similar analyses for major infrastructure in the past, to ensure robustness in analysis.

<sup>28</sup> This provided consistency with that earlier MCA analysis and was possible because of the use of the same criteria.

**Table 4-4: Weighting of Aspects**

Weighting Option	Landscape/Visual	Ecology	Archaeology/Heritage	Tangata Whenua Values	Productive Land Values	Social/Community	District & Regional Plan Fit/Consentability	Project Objectives	Specific Landowner Effects	Engineering Degree of Difficulty	Cost
<b>Workshop Participants</b>	7	8	8	10	0	7	10	0	0	5	10
<b>RMA(S6)</b>	6	10	10	10	3	3	5	2	2	2	2
<b>Social</b>	5	5	8	8	5	10	8	5	8	3	5
<b>Environmental</b>	5	10	3	3	3	0	0	0	0	0	0
<b>Cultural</b>	5	3	10	10	0	5	0	0	0	0	0
<b>Economic</b>	0	0	0	0	8	5	0	5	5	5	10

- **Workshop Weighting** – this weighting was developed in discussion and agreement at the workshop and could be described as the technical view of the Agency’s project advisors. See discussion above.
- **RMA Section 6 Emphasis Weighting** – this places maximum weight on three of the four section 6 RMA aspects potentially at play in respect of the project (ecology, heritage and tāngata whenua values). Landscape values have not been elevated to the same level in this analysis, as “outstanding” qualities and elements were not identified in the area affected by the route options by the specialist involved, and it would thus be inappropriate to elevate them to a very high weight. Some weight is placed on the district plan analysis in this case, as this can be considered reflective of section 6 matters, but other criteria are left at low levels.

The remaining weighting systems are related to quadruple bottom line considerations. The analysis on this basis is relevant to matters to be taken into account under the LTMA and other national infrastructure policy approaches. It is also pertinent to RMA and LGA considerations.

- **Social** – all criteria have a social component, so all are given some weight. The highest weighting is given to social and community impacts, followed by tāngata whenua and archaeological risk aspects which have a high social component in this area, ownership effects and district plan considerations. All other criteria have some social relevance in this productive rural area, with engineering aspects least relevant.
- **Environment** – this places the highest weight on the physical environmental element of ecology, with other criteria which integrate physical environmental considerations with social/community values also given some weighting. Criteria without a physical environment component are omitted.
- **Cultural** – this highly weights tāngata whenua cultural values and archaeology/heritage, followed by ecological and social/community impacts but also acknowledged cultural significance in the established rural landscape and its settlement pattern, and its remaining ecological values, which have a cultural dimension through their protected status.

- **Economic** – this excludes a number of criteria which have little or no direct economic bearing on the project or the local economy. It emphasises cost and productive land uses, but applies some weighting to other criteria with an economic component<sup>29</sup>.

These alternative weighting systems provide a sensitivity analysis for the robustness of the outcome. In this case there were no alternative scores to test, as consensus had been reached on all scores.

### 4.3.3 Analysis

The six weighting systems have been applied to the workshop scores set out in Section 4.3.1, and are shown tabulated in Tables 4-5 below. Lowest scores indicate the most favourable option(s) under each weighting system. The results can be seen graphically in Appendix 3.

The same analysis was performed without the cost scores included and are shown in Table 4-6. This did not change the preferences in the tables below. Results are also shown graphically in Appendix 3.

**Table 4-5: Analysis of Route Options (Scores x Weights for Different Weighting Systems) Costs Included**

Route Option	Workshop Participants	RMA(\$6)	Social	Environmental	Cultural	Economic
TO1	2.77	2.91	2.49	3.21	3.30	1.87
TO1A	3.52	3.67	3.01	4.17	3.79	2.00
TO2	2.77	2.91	2.49	3.21	3.30	1.87
TO2A	3.52	3.67	3.01	4.17	3.79	2.00
TO3	3.05	3.18	2.67	3.63	3.39	1.87
TO3A	3.52	3.67	3.01	4.17	3.79	2.00
TO4	3.15	3.02	2.79	3.00	3.30	2.39
TO4A	3.75	3.69	3.20	3.96	3.79	2.53
TO5	3.91	3.69	3.33	3.96	4.15	2.79
TO5A	4.38	4.18	3.67	4.50	4.55	2.92

**Table 4-6: Analysis of Route Options (Scores x Weights for Different Weighting Systems) Costs Excluded**

Route Option	Workshop Participants	RMA(\$6)	Social	Environmental	Cultural	Economic
TO1	2.46	2.84	2.34	3.21	3.30	1.34
TO1A	3.22	3.60	2.87	4.17	3.79	1.47
TO2	2.46	2.84	2.34	3.21	3.30	1.34
TO2A	3.22	3.60	2.87	4.17	3.79	1.47

<sup>29</sup> This quadruple bottom-line weighting is a different type of evaluation from the Benefit Cost Ratio (BCR) evaluation normally undertaken by the Transport Agency.

Route Option	Workshop Participants	RMA(\$6)	Social	Environmental	Cultural	Economic
<b>TO3</b>	2.74	3.11	2.53	3.63	3.39	1.34
<b>TO3A</b>	3.22	3.60	2.87	4.17	3.79	1.47
<b>TO4</b>	2.69	2.91	2.57	3.00	3.30	1.61
<b>TO4A</b>	3.29	3.58	2.99	3.96	3.79	1.74
<b>TO5</b>	3.29	3.55	3.04	3.96	4.15	1.74
<b>TO5A</b>	3.77	4.04	3.39	4.50	4.55	1.87

The analysis clearly shows that all “A” options are less favourable than their non-“A” counterpart routes. When all criteria are considered, Options TO1 and TO2 come out as most favourable under all but the environmental weighting, where TO4 is best. However, under the cultural weighting system, TO4 is equally favoured to TO1 and TO2, and under the economic weighting system TO3 is equally favoured. Summary findings from the analysis are:

- In the environmental weighting system, Option TO4 is the clear preference and with the economic weighting, TO3 is scored identically to TO1 and TO2.
- Option TO3 is the third preference in two of the weighting systems (workshop participants and social) and third equal under the economic weighting.
- Option TO4 is the third preference under the RMA (section 6) and cultural weighting systems and the most favoured under the environmental weighting system.
- Option TO5 scores poorly under all systems (largely due to its impacts on the Kuku area and the Ngati Wehi Wehi Marae which are reflected in a number of criteria).
- Overall the outcomes are quite close. Options TO1 and TO2 cannot be distinguished one from the other and would need to be progressed further before a decision on the more favoured could be made.

The analysis with costs excluded shows that Options TO1 and TO2 are again most favoured under all but the environmental weighting system, but are equal with Option TO4 under the cultural weighting system and Option TO3 under the economic weighting system. Summary findings are:

- Option TO4 is the most favoured option under the environmental weighting and is equal to options TO1 and TO2 under the cultural weighting. It is third or third equal under three weighting systems.
- Option TO3 is equal to Options TO1 and TO2 under the economic and cultural weighting systems. It is third under the social weighting. Otherwise it is always fourth.
- Option TO5 scores poorly under all systems.

This analysis shows that costs are not a major differentiator between options, causing no change in preferences under the various weighting systems, and only a slight shift in differentials under some weighting systems.

#### 4.3.4 Discussion

Overall, Options TO1 and TO2 are very similar, and clearly favoured ahead of the other three options. Both were however scored quite poorly in terms of the landscape/visual impact criterion and also under the tangata whenua values criterion. This is reflected in the environmental weighting system, where Option TO4 was most favoured, and in the cultural weighting system, where TO4 was equal to TO1 and TO2. To a lesser extent it is reflected in the RMA (section 6) weighting system where Option TO4 was marginally less favoured than Options TO1 and TO2 (and not significantly different).

On the basis of this analysis it was proposed that further investigations should be undertaken into Options TO1, TO2 and TO4. This should include more detail of alignments and specific efforts to

minimise and mitigate visual effects on Maori-owned land and other areas of cultural value as well as on dwellings across the area.

Interchange locations were not specifically investigated as part of this analysis. They were taken into account as part of the route options but it was recognised that considerable design refinement would be needed to minimise land take, particularly in more sensitive areas and especially where Maori-owned land is involved.

The Preliminary Options Report had found that an interchange south of Kuku Beach Road was to be preferred, but the report also acknowledged that the analysis had not taken into account the overall separation of interchanges or access to specific local communities. A location further to the south would be favoured if it could avoid Maori-owned land. The interchange locations and land requirements should be further investigated as part of the refinement of all three route options.

#### **4.3.5 Summary and Conclusion of First Stage of Route Options Analysis**

The first stage of the processes described in this report followed on from that described in the Preliminary Options Report, which had involved analysis of northern and southern route sections and potential interchange locations. In the further analysis described in this section, continuous route options were able to be considered. Further technical investigations were undertaken as inputs into a more comprehensive MCA process, involving the techniques of decision conferencing through a facilitated workshop. This involved a wider range of participants sharing and testing information about the options. The outcomes have been analysed on the basis of a range of weighting systems.

Based on the analyses, it was identified that Route Options TO1, TO2 and TO4 should be retained for further investigation. All these routes utilise much of Option 5A from the SH1 to SH57 Connection project and keep the overall route west of the existing SH1.

All three routes have potentially significant visual and landscape impacts, and impacts on Maori multiple-owned land which may be complex to mitigate but which cannot be avoided. They also affect a range of dwellings. It was considered that further investigations should be undertaken in an endeavour to minimise and mitigate these potential effects prior to public consultation on them.

It was also noted that the CIAs that the Transport Agency had commissioned are still in draft form and at present do not extend further south than approximately the SH1 and NIMT overbridge north of Manakau. It was noted that the findings of this report may need to be reviewed once the CIAs are completed.

## PART THREE

# 5 Options Analysed in Second Stage

## 5.1 Introduction

Following the identification of TO1, TO2 and TO4 as options which should be investigated further, hui were held with Ngati Wehi Wehi and Ngati Tukorehe<sup>30</sup>. The purpose of the hui were to discuss the continuing work on the CIAs and also to brief the people on the wider area over which routes were being evaluated and to seek preliminary response on the options considered<sup>31</sup>.

At these meetings, Iwi recorded significant concerns as to the extent of potential effects on property held in multiple ownership under the Te Ture Whenua Māori Act, and land that was traditionally Māori and now held as general land by individual families within the Iwi. It was explained that not only were there strong cultural links to the land, passed down through generations, but that the land ownership was key to the economic and social wellbeing of the families and thus the Iwi as a whole. Where land was not occupied and farmed by local people, it was leased for productive use, generating income for families. All of the options which had been retained for further consideration affected large areas of such land. As well as directly requiring the taking of Māori land and in some cases directly or indirectly affecting dwellings, the routes all severed the long and sometimes thin parcels that at present run between the highway and the coast. This would result in reduced access and reduced utility in terms of the use of the land. In addition, both Wehi Wehi and Tukorehe representatives expressed concern about all options in relation to land holdings immediately west of the NIMT. For Wehi Wehi, that was compounded by the presence of the Marae and Urupa, relatively close to route options TO1 and TO4, which are on land parcels which would be severed by these options.

Both Iwi recognised and accepted the need for a long-term roading solution in the area but were resistant to proposals that would result in a two-stage development which could rely on continuing use of upgraded parts of State Highway 1 for some time, followed by a second stage of land purchase and redevelopment to take the highway route away from the current SH1. This was a possibility with all three favoured options. The preference expressed by Iwi was for a decision which would lead to a permanent route through the area. The strong preference was that such a route should be to the west of the current highway (where there are fewer areas with cultural significance) where it would be possible to keep cultural effects and effects on Māori land to a minimum<sup>32</sup>.

As a result of this consultation, the Transport Agency undertook to review the situation and explore opportunities for routes through the area which would substantially reduce impacts on Māori landholdings and other cultural values. Three possible options were identified in June 2015 and developed to the same level of detail that had been developed for the other options.

## 5.2 Description of Options

The three further options were given the names TO15, TO16 and TO17. These are shown in Appendix 10. Initially TO17 was shown as a preliminary line on a map, but it was later developed to equivalence with Option TO1 and TO5.

As with the earlier options, possible interchange locations were also identified. Unlike the earlier options, where two potential interchange locations would serve any route option, each of these options could be served from only one interchange location. Details of intersection arrangements and local roading connections have been considered in only a preliminary way.

As with all previous analyses, it is important to note that the lines of the routes in Appendix 10 indicate broad potential areas, and the detail of the plans should be ignored. It is also possible that

<sup>30</sup> Dates were 14<sup>th</sup> June and 13<sup>th</sup> August 2015 with Ngati Tukorehe and 3<sup>rd</sup> August 2015 with Ngati Wehi Wehi. Richard Orzecki, who had convened earlier hui with Wehi Wehi, had died, making an earlier meeting with that Iwi difficult.

<sup>31</sup> Sections 4 and 18H of the Land Transport Management Act, require that the Transport Agency pay particular attention to consultation with Māori. Section 18G provides requirements for Auckland which are considered to be good practice and relevant to all Transport Agency projects.

<sup>32</sup> This view is consistent with earlier advice which had been expressed before.



improvements could be achieved and adverse effects reduced through refinement. The routes simply provide a basis for understanding potential impacts as a preliminary stage.

Table 5-1 sets out the three route options with a brief description.

**Table 5-1: Description of Second Stage Route Options**

Route Option	Description and Key Features (from south to north)
TO15	This option lies to the east of the current SH1 at the southern end, running roughly parallel to the existing highway from Taylors Road to past Pukehou NIMT overbridge. It then swings west to cross the highway in the vicinity of the Forest Lakes Road. It continues in a straight alignment to cross Gleeson Road and then swings east to cross SH1 and the NIMT between the main Manakau township and the extension of Manakau on Waikawa Beach Road. From here it trends east and north, paralleling SH1 approximately 500m to the east and bifurcating in the vicinity of Kuku East Road to connect with SH1 north of Ohau River west of the totara forest, and with the connection to SH57 in the vicinity of Mukunoa East Road. An interchange would need to be in the vicinity of Gleesons Road.
TO16	The southern origin of this option is similar to option TO1, passing to the west of the new settlement area on Waikawa Beach Road and then swinging sharply to the east to cross SH1 just north of Wehi Wehi Marae and Urupa. It then connects with the route of TO15 as described above. A possible variant of this option would lie to the south of Wehi Wehi Marae. This option would have an interchange in the vicinity of Waikawa Beach Road and an extension of Gleeson Road.
TO17	This option commences as for TO15 at the southern end, but instead of crossing the NIMT and SH1, it remains on their east side, skirting Pukehou. It then passes through the lifestyle block area south of Manakau. It continues to the east of Manakau township, with an interchange south of the Waikawa Stream and joins the route of TO15 at approximately this point.

These options formed the basis for the investigations and analysis described in the next section.

## 6 Second Stage of Route Options Analysis

### 6.1 Initial Review

Prior to undertaking a MCA of these options, it was decided to undertake an initial review of them and to ascertain:

- whether there were options that may have been overlooked which might result in an equivalent or better outcome;
- whether the options should be progressed, given their additional length and the stage of investigation of other options<sup>33</sup>; and
- the means by which the investigation should be undertaken.

This review took place on 9<sup>th</sup> July 2015 by teleconference and involved:

- Greg Lee, Project Manager, the Transport Agency
- Sylvia Allan, Planner, Allan Planning and Research Ltd
- Marten Oppenhuis, Transport and Roading Manager, MWH
- Jamie Povall, Transport Engineer, MWH

All participants were familiar with the background to the current stage of work and with the area potentially affected by the options. The notes of the discussion and the various materials referred to are included in Appendix 11 to this report.

In summary, the outcome of this process determined the following in respect of the points above:

- i. In terms of other options, it was decided that the TO17 option, only in sketch at that stage, should be developed to a similar extent as the others and all three should be subject to further analysis so that they were brought to the same level of understanding as the ten options described earlier in this report. In terms of minimising effects on Māori land, the TO17 option was as potentially suitable as TO15 and TO16, and in reality likely to be better than TO16.
- ii. Other potential options including those which made use of more of existing SH1 (for example those shown in Appendix 11, Attachment 3) had been considered and had not been pursued for a range of reasons which were still valid.
- iii. While there were problems and issues with the new options, similar problems and issues were associated with all other options and would need to be resolved later in the design phase.
- iv. The MCA undertaken for TO1 to TO5 should be extended to cover the three additional route options.

### 6.2 Multi-Criteria Analysis of Second Stage Route Options

The information in Section 4 of this report provides background for this second stage. It was decided that options TO15, TO16 and TO17 should be evaluated on an equivalent basis to options TO1 to TO5 and TO1A to TO5A to ensure consistency of approach. However, it was also considered that it was not necessary to have a workshop in this case, as the methodology including scoring was familiar to participants and the earlier workshop had addressed other key considerations such as the range and scope of attributes and the weighting system. Instead, the Delphi method could be used in this case.

#### 6.2.1 The Delphi Method

The Delphi method was noted as an alternative means of eliciting scores to the decision conferencing workshop-based approach earlier in this report.

The Delphi method relies on one person (the facilitator) seeking input from a range of people on a particular matter, and combining the inputs to achieve an agreed outcome. Where there are differences, there are a range of ways of moving towards consensus, if consensus is necessary. This may include

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<sup>33</sup> It is noted that an option to the east of SH1 had been identified, evaluated and not pursued earlier as part of the Preliminary Options analysis.

the facilitator checking the understanding of those whose responses are out-of-line with the majority. Some other attributes of the Delphi method are a developed level of expertise and understanding, clear information on which to make a decision, anonymity and management of the process by a “neutral” facilitator.

While the Delphi method is regarded as slightly less reliable than the decision conferencing method for MCAs, it has some benefits such as the elimination of risk of dominant personalities which can occur at a workshop.

The Delphi method was considered suitable in this case because the same criteria, scoring system and analysis methodology was to be applied, and because of the expertise of all those involved. All participants had indicated familiarity with the area at the earlier workshop, and some were able to do further site visits for any parts of the area they were not so familiar with.

## 6.2.2 Application of the Delphi Method

Once the plans of options TO15 to TO17 had been developed to the requisite level, they were provided to all those who had taken part in the first stage analysis workshop in April 2015 (see Section 4.3.1 of this report)<sup>34</sup>. The information which had been provided for the workshop relating to criteria, scope, and scoring was provided again along with the additional plans. In addition the scoring and commentary from the first stage options was also provided.

The technical experts<sup>35</sup> were asked to focus on their areas of expertise and to provide notes on their reasons for scoring as many of the criteria as they felt comfortable scoring. Any criteria they did score were to be scored for all options.

It was clarified for both sets of respondents that the green line on Option TO15 was not to be assessed as it had been replaced by Option TO17, and that the red dotted line on TO16 was the one to be evaluated. Appendix 10 sets out the instructions.

Four of the technical experts provided short reports containing their analysis. These are provided in Appendix 12 and address landscape, visual and urban design commentary, ecological assessment comments, and an archaeological and cultural assessment. The fifth expert, on productive land, advised that all options should be of an equivalent score to earlier options<sup>36</sup>. These participants chose not to score the other criteria.

The other eight participants who responded<sup>37</sup> in detail provided scores and commentary on the range of criteria they felt appropriate to respond to. One provided scores and commentary on only one criterion; two on three criteria; one on four criteria; and three provided scores and commentary on all criteria. Two additional participants did not provide specific scores but responded expressing strong preferences for Option TO17<sup>38</sup>.

The scores were tabulated and moderated through a process whereby the technical experts' views were considered for the relevant criteria first, and the views of other participants added. In a small number of circumstances, scores were discussed with participants to understand the basis for divergent views<sup>39</sup>. Generally, scores were well-aligned for each criterion. In a few circumstances, the variation in scores could not be completely reconciled and two scores were allocated. This was to be used later in sensitivity analysis.

The scoring for Options TO15 to TO17 which resulted from the Delphi method of analysis can be seen as consistent with the earlier scoring from the MCA Workshop. This is likely to be due largely to the participants' familiarity with the area and options and their involvement in that earlier process. The scoring is shown in Table 6-1 below, alongside the scores from the earlier options. This then formed the basis for analysis of preferences for Options TO15 and TO17 within the context of the wider analysis as discussed in the next section of this report.

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<sup>34</sup> Sylvia Allan was the facilitator of the Delphi process.

<sup>35</sup> Morrie Love (cultural), Daniel Parker (archaeology), Gavin Lister (landscape and urban design), Adam Forbes (ecology) and Lauchie Grant (land quality and productive use).

<sup>36</sup> It was identified earlier that productive land was not a distinguishing criterion.

<sup>37</sup> The KCDC representative had left the organisation, so only 15 of the 16 who were asked to participate were able to.

<sup>38</sup> These participants were not included in the Delphi analysis. Their views are noted.

<sup>39</sup> This includes confirmation of the scores assigned to the Tangata Whenua Values criterion in discussion with the cultural advisor.

**Table 6-1: Scoring of Additional Route Options in Context of Scores for Other Options**

Option	Landscape Visual	Ecology	Archaeology/Heritage	Tangata Whenua Values	Productive Land Values	Social/Community	District & Regional Plan Fit/Consentability	Project Objectives	Specific Landowner Effects	Engineering Degree of Difficulty	Cost
TO1	4	3	3	4	2	2	2	1	2	2	2
TO1A	4	5	4	4	2	2	4	1	2	3	2
TO2	4	3	3	4	2	2	2	1	2	2	2
TO2A	4	5	4	4	2	2	4	1	2	3	2
TO3	4	4	3	4	2	2	3	1	2	2	2
TO3A	4	5	4	4	2	2	4	1	2	3	2
TO4	3	3	3	4	2	3	3	1	2	3	3
TO4A	3	5	4	4	2	3	4	1	2	4	3
TO5	5	4	3	5	2	4	3	1	2	3	4
TO5A	5	5	4	5	2	4	4	1	2	4	4
TO15	5	3	3	2	2	4	2	1	2	3	3
TO16	4/5	4	3	3/4	2	3	3	1	2	3	4
TO17	4	4	2	1	2	3/4	3	1	2	2	2

Key points from the allocation of scores are set out below.

- Landscape/Visual** – Option TO15 scores worst at 5 because of the visual impact on Manakau township from the substantial overbridge crossing the NIMT and SH1. Option TO17 was scored 4 because the adverse visual and landscape impacts were more diffuse although some localities would be significantly affected, particularly the lifestyle area south of Manakau. Option TO16 drew a variety of scores, so was allocated 4/5 (4 or 5), with both scores to be included in the sensitivity analysis.
- Ecology** – A score of 3 was awarded to Option TO15 as it avoided all but small areas of native bush, between Gleasons Road and Waikawa Beach Road, and near Kuku Road East. These should be avoided if possible. The other two options were scored a 4 due to proximity to bush areas, and the various stream and river crossings.
- Archaeology/Heritage** – The archaeological risks associated with these options were considered to be equal to those for the options evaluated earlier, with the exception of TO17

which, being closer to the east throughout, was considered to have a lower risk. It was awarded a score of 2 with the others being awarded a 3.

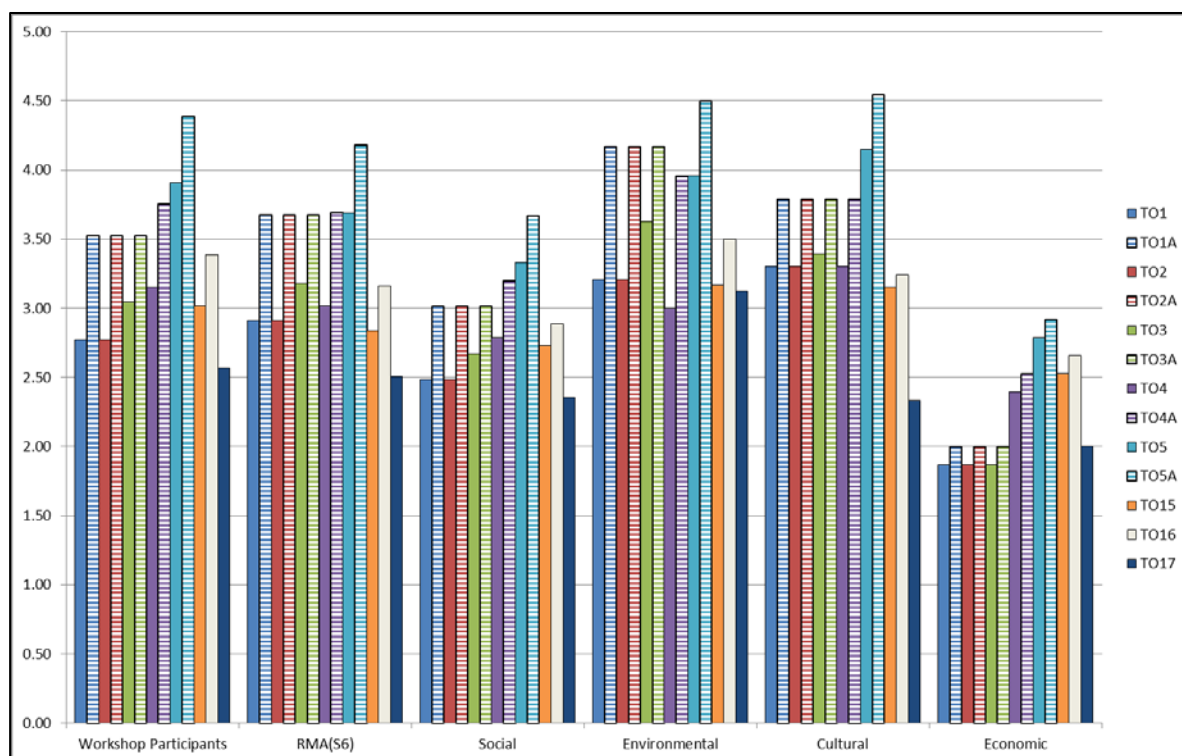
- **Tangata Whenua Values** – All options were felt to have lesser effects than the options evaluated earlier, with Option TO17 being the best and scored as a 1. Option TO15 was scored a 2, and Option TO16 a 3/4 (3 or 4) due to its proximity to Wehi Wehi Marae and effect on nearby landholdings. Again, both scores would be applied in a sensitivity analysis.
- **Productive Land Use Values** – As with all options, this criterion was consistently scored as a 2 due to the homogeneity of the land and its use.
- **Social/Community** – Option TO15 scored a 4 due to adverse impact on Manakau settlement, with TO17 scoring a 3/4 (3 or 4) due to effects on Manakau and the lifestyle block area to the south of the settlement. Option TO16 was considered to have the least impact and was scored a 3.
- **District/Regional Plan Fit and Consentability** – Options scored in the range of 2 to 3, with both TO16 and TO17 scoring 3. TO17 was noted to affect an area identified for lifestyle subdivision, and being in proximity to an identified Hill County landscape area, and was scored a 3. Proximity to Wehi Wehi Marae, identified on the District Plan, led to the same score for Option TO16. Option TO15 was considered to be less problematic in terms of the plan although it crosses a flood hazard area and is close to listed trees. All options will require numerous regional consents.
- **Project Objectives** – As with all other options, these three options were a good fit and all scored a 1.
- **Specific Land Owner Effects** – As with all other options, there were winners and losers with these options, with reduced effects on Māori land but greater effects on other landowners/landuses including the Manakau shop for TO15 and lifestyle blocks for TO17. The differences were considered to be approximately equivalent and all options were scored a 2, in line with earlier analysis.
- **Engineering Degree of Difficulty** – Options TO15 and TO16 involve significant overbridge structures crossing the NIMT and SH1, as well as river bridges. TO17 avoids the need for double crossing of these transport routes, so was scored a 2. The other two options were scored a 3.
- **Costs** – The extent of structures noted in the criterion above also led to higher scores for TO15 and TO16 in this criterion, at a 3 and a 4 respectively. TO17 was scored a 2 being a similar order of magnitude in cost terms to TO1 to TO3.

## 6.3 Analysis and Discussion

The analysis in the second stage was undertaken using the same weighting systems as applied to TO1 and TO5 and their A variants (see Section 4.3.3).

The graph in Figure 6-2 and Tables 6-2 and 6-3 below show the outcomes of the analysis across all options, applying the lowest (most favourable) scorings when more than one score was allocated. The shortest graphs and the lowest figures indicate the favoured options in each analysis<sup>40</sup>.

<sup>40</sup> The graph without costs is incorporated in Appendix 14.



**Figure 6-1: All Options Analysed Under All Weighting Systems (scores x weights)**

**Table 6-2: All Options Analysed Under All Weighting Systems (scores x weights)  
Costs Included**

Route Option	Workshop Participants	RMA(\$6)	Social	Environmental	Cultural	Economic
TO1	2.77	2.91	2.49	3.21	3.30	1.87
TO1A	3.52	3.67	3.01	4.17	3.79	2.00
TO2	2.77	2.91	2.49	3.21	3.30	1.87
TO2A	3.52	3.67	3.01	4.17	3.79	2.00
TO3	3.05	3.18	2.67	3.63	3.39	1.87
TO3A	3.52	3.67	3.01	4.17	3.79	2.00
TO4	3.15	3.02	2.79	3.00	3.30	2.39
TO4A	3.75	3.69	3.20	3.96	3.79	2.53
TO5	3.91	3.69	3.33	3.96	4.15	2.79
TO5A	4.38	4.18	3.67	4.50	4.55	2.92
TO15	3.02	2.84	2.73	3.17	3.15	2.53
TO16	3.38	3.16	2.89	3.50	3.24	2.66
TO17	2.57	2.51	2.35	3.13	2.33	2.00



**Table 6-3: All Options Analysed Under All Weighting Systems (scores x weights)  
 Costs Excluded**

Route Option	Workshop Participants	RMA(\$6)	Social	Environmental	Cultural	Economic
TO1	2.46	2.84	2.34	3.21	3.30	1.34
TO1A	3.22	3.60	2.87	4.17	3.79	1.47
TO2	2.46	2.84	2.34	3.21	3.30	1.34
TO2A	3.22	3.60	2.87	4.17	3.79	1.47
TO3	2.74	3.11	2.53	3.63	3.39	1.34
TO3A	3.22	3.60	2.87	4.17	3.79	1.47
TO4	2.69	2.91	2.57	3.00	3.30	1.61
TO4A	3.29	3.58	2.99	3.96	3.79	1.74
TO5	3.29	3.55	3.04	3.96	4.15	1.74
TO5A	3.77	4.04	3.39	4.50	4.55	1.87
TO15	2.55	2.73	2.51	3.17	3.15	1.74
TO16	2.77	3.02	2.60	3.50	3.24	1.61
TO17	2.26	2.44	2.21	3.13	2.33	1.47

Commentary relating to Options TO1 to TO5, and to the associated “A” options, is provided in Section 4.3.3 of this report. The comments below refer to the context where the additional options are set alongside that earlier analysis:

- Option TO17 was favoured under four of the six weighting systems, although under the environmental weighting system (which focused on the natural environment), Option TO4 was best and under the economic weighting system the preference is tied between TO1, TO2 and TO3, closely followed by TO17.
- The outcome for the Section 6 RM and cultural weighting systems show TO17 as clearly most favoured, whereas the workshop and social weightings result in closer outcomes in relation to TO1 and TO2, but with TO17 still as the most favoured.
- Removing the cost criterion from the analysis does not alter the preferences overall, although TO17 becomes closer to TO1 to TO3 in the analysis.
- Of the three options added in an endeavour to address tangata whenua value concerns, only one, TO17, performs particularly well when assessed across all criteria.
- Option TO17 scores well overall, with slightly higher scores in relation to landscape/visual and ecology than some other options, leading to its lower ranking under the environmental weighting system, and it has a mid-range standing in terms of the economic evaluation.
- Option TO15 has a significant landscape/visual and social effect due to its proximity and the major overbridge structure near to Manakau township. It does not score well overall, although it is reasonably close to TO1 and TO2 in the workshop and social weighting analyses and slightly better than those options under the RMA Section 6, environmental and cultural weightings.
- Option TO16 scored poorly across all weightings due to its proximity to Wehi Wehi Marae and its longer length and engineering difficulty.

A further analysis was undertaken with the three scores where there had not been complete consensus through the Delphi method to adopting the higher (worst case) scores. The outcomes are included in Appendix 14. Again no changes in preferences were recorded with this change, with or without costs, although TO1 and TO2 are most favoured alongside TO17 under the social weighting system.

To further test the sensitivity of the preferences, it was decided to revisit options TO1 and TO5 and their "A" variants with all tangata whenua values set at 5. This would be more in line with the advice from recent consultation with Ngati Tukorehe and Ngati Wehi Wehi than the scores of 4 for all but Option TO5 and TO5A (which had already been allocated a score of 5 due to direct effects on the two marae)<sup>41</sup>. This analysis is provided in Appendix 14 and shows Option TO17 as most favoured under all weightings except for the economic weighting.

## 6.4 Additional Potential Effects

No fatal flaws had been identified in any of the analyses of options. It had also been identified in the discussion of criteria (see Section 4.2.3 of this report) that there were a number of potential effects which had been considered to be amenity issues and able to be satisfactorily mitigated on the largely flat terrain of the Horowhenua. They were not included as specific criteria as they were unlikely to assist in differentiating between options.

With the introduction of Option TO17, and the proximity of this route option to more variable topography, it was considered that noise and air quality should be given some preliminary consideration. This should be at a screening level, to ensure that neither effect would pose a fatal flaw for development of an expressway in the locations proposed. Two further expert advisors were engaged to investigate and report on potential noise and air quality impacts. Their reports are included in Appendix 15.

In brief neither investigation has identified potential effects that would make Option TO17 untenable. Negligible impacts are assessed in terms of air quality in relation to all sensitive receptors. In terms of noise, impacts are assessed as minor or less, with a range of mitigation options available.

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<sup>41</sup> It is noted that these scores were applied without the benefit of a completed CIA.

## PART FOUR

### 7 Summary and Conclusion

This report has set out and described the processes of identification and evaluation of possible routes for the part of the Wellington Northern Corridor RoNS in the part of the Otaki to North of Levin section between Taylors Road in the south and the vicinity of Ohau in the north. The report covers the period from April to August 2015 during which a number of separate processes and evaluations were carried out.

These processes and evaluations are an essential step in the evolution and development of an appropriate State highway network in this area. They have followed on from earlier investigations, and have involved inputs from a range of experts and from consultation with tangata whenua, in accordance with the Land Transport Management Act 2013.

There have been two stages to the process, effectively involving three processes, as follows:

- development and analysis of 10 options identified from the wider range of options described in the Preliminary Options Report (November 2014) applying a MCA process using a decision-making conference process;
- a review of options in the light of concerns expressed by local tangata whenua in relation to all 10 options, with the specific intent of identifying additional options which may have been overlooked, including options which minimised effects on land in tangata whenua ownership. This resulted in three additional options for evaluation; and
- evaluation of these additional options and an analysis applying a MCA process using the Delphi process.

The overall outcome is a preference for Option TO17 as described in Section 6.3 of this report. However, the outcome is relatively sensitive to small changes in scoring of criteria and Options TO1, TO2 and TO3 are always most favoured in the economic weighting analysis, and in the cost criterion scoring. Similarly TO4 is always favoured under the environmental weighting, given its emphasis on the natural environment.

Whichever route is identified as the preference, there are effects which will require to be addressed through design and refinement of the alignment as investigations proceed.

Thus, while TO1, TO2 and TO4 were identified as appropriate for further consideration in the first stage of the analysis in this report, with no clear preference, TO17 has emerged in the second stage of the assessment, on the basis of further information including information from ongoing consultation with local Iwi, as generally more favoured than any of the other options. It is open now for the Transport Agency to either:

- continue to develop the first three options along with TO17, and undertake a further evaluation, or
- determine a single preference, most realistically Option TO17.

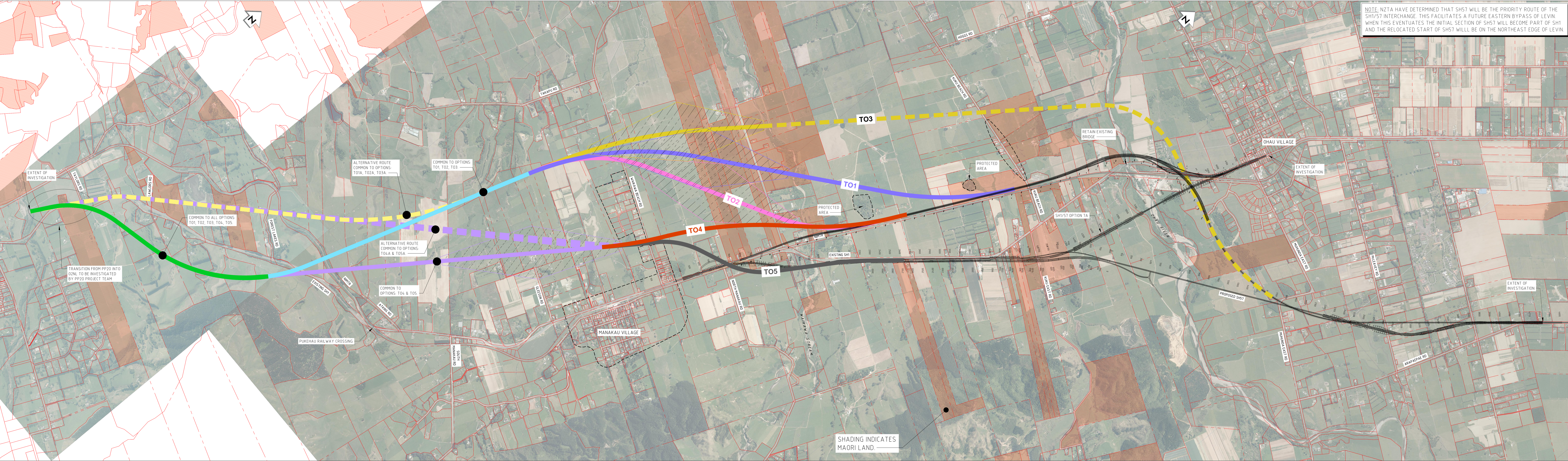
Whichever option the Transport Agency determines to follow, considerable further design development will be needed and public and stakeholder consultation should be carried out prior to seeking statutory approvals for the highway project.

MCA processes and outcomes identify preferences from the analysis. However, they do not make the decision. Figure 4-1 sets out two final stages of the process where further work may be necessary. Should options be very close or indistinguishable, it is appropriate for decision-makers to draw on other considerations to make a final decision on a preferred option.

## **APPENDIX 1 – ROUTE OPTIONS IN FIRST STAGE ANALYSIS**



NOTE: NZTA HAVE DETERMINED THAT SH57 WILL BE THE PRIORITY ROUTE OF THE SH1/57 INTERCHANGE. THIS FACILITATES A FUTURE EASTERN BYPASS OF LEVIN. WHEN THIS EVENTUATES THE INITIAL SECTION OF SH57 WILL BECOME PART OF SH1 AND THE RELOCATED START OF SH57 WILL BE ON THE NORTHEAST EDGE OF LEVIN.



250 0 250 500m  
 SCALE 1:10,000  
 (PLOT SIZE IS - 1600mm x 541mm)

**OTAKI TO NORTH LEVIN (RONS)  
 TAYLORS ROAD TO OHAU SECTION  
 (MANAKAU BYPASS) COMBINED  
 SCALE 1:10,000**



## **APPENDIX 2 – NOTES FOR TECHNICAL INVESTIGATIONS AND WORKSHOP MATERIAL**



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## NOTES ON TECHNICAL EXPERTS' WORK AND BACKGROUND REPORTS – O2L: Taylors Road to Ohau

These notes are just to clarify the work you are undertaking in preparation for our Multi Criteria Analysis (MCA) Workshop on 29<sup>th</sup> April 2015.

The individual studies you are all engaged in will contribute to an overall evaluation of the implications of the ten options we are going to analyse (Options TO1(A) – TO5(A)). This will be via a structured workshop process, and we will send out more notes on this prior to the Workshop.

In the meantime, please take into account the following in your current investigations and report preparation:

1. A key aspect in the statutory decision-making for any proposal under the RMA which may have significant adverse effects is a demonstration that alternatives have been considered. For designations, this includes “routes and methods” for achieving the Transport Agency’s objectives. The current process will contribute to the documentation of the overall process and the options considered.
2. The MCA process which we will be using to bring all the considerations together relies on sharing information and as far as possible, undertaking the evaluation through consensus. The individual studies will involve investigation by technical experts who will share their knowledge at the Workshop. It is important that the expert studies and reports do not undertake the final evaluation – rather they are a step on the way.
3. The criteria<sup>42</sup> you are individually working on will broadly encompass:
  - ecological implications (terrestrial and aquatic)
  - landscape/visual implications
  - archaeological/heritage values
  - tāngata whenua impacts
  - impacts in terms of soils/land quality, plus rural production implications.

Your work will need to include a description of all the aspects that are encompassed within your criterion, and a single criterion above may be broken into several sub-criteria (if there is a potential for overlap between criteria, e.g. tāngata whenua values and heritage, don’t worry too much as we will address that at the Workshop).

4. While we are looking at the routes provided, take into account the implications of each route on the aspect you are considering, which may extend some distance beyond the actual draft alignment. The extent of the receiving environment will differ depending on your particular specialization (i.e. probably greater for social and cultural effects than for effects on ecological values).
5. Please note that, to be comparable, the routes will need to all be assessed as covering the same equivalent “length”. This means that each assessment will need to cover the

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<sup>42</sup> Please note we will also include criteria encompassing engineering degree of difficulty/constructability (including river crossings), social implications, planning/consentability, property implications, alignment with the Transport Agency’s objectives and cost.

complete route from south of Taylors Road at the south to the SH1 and SH57 intersection with Muhunua East Road.

6. We will also be looking for “fatal flaws”. When considering major impediments or fatal flaws, it is important to note that there is still some room to move with the route options. A true fatal flaw would probably have to stretch right across the route and be unavoidable.
7. In carrying out your work, please can you undertake a coarse evaluation of the options (we suggest a scale ++, +, 0, -, --) with descriptions as below, identifying the key considerations that lead to your conclusion.

<b>Notation</b>	<b>Interpretation</b>
++	Route option is, on average, very good in terms of this attribute
+	Route option is, on average, good in terms of this attribute
0	Route option is neutral, or neither good or problematic, on average, in terms of this attribute
-	Route option includes, on average, minor or intermediate issues or concerns in terms of this attribute
--	Route option includes, on average, major or intermediate issues or concerns in terms of this attribute

If you reach an overall conclusion by first evaluating different sub-sections of options, or by considering different aspects within your area of expertise, please briefly record your method.

This is a coarse assessment method which is just to help us gain an overview of the individual experts’ first-cut relative evaluation of the options. Don’t get too worried about this assessment – just apply your best judgment.

8. The attribute is to be defined in terms of your area of expertise, taking into account all the aspects that you would normally take into account when doing an assessment of effects on the environment. In your report, can you explain what you have taken into account, and the particular considerations that have led you to the score that you have give for each option.
9. We will do a more comprehensive MCA at the Workshop. Your assistance will be needed in refining the attributes, scoring them and looking at possible weighting systems.

It will not be necessary to have completed your reports before the Workshop, but they will be needed by mid May. The reports need to reflect your work before the Workshop and your own opinions, regardless of where the Workshop process gets to. Your work will need to be sufficiently advanced for each person to make a short presentation about each of the options in terms of the subject at the Workshop and to contribute to an overall MCA evaluation.

## NOTES FOR OPTIONS WORKSHOP

### OTAKI TO LEVIN RONS

### TAYLORS ROAD TO OHAU FURTHER ANALYSIS

**Wednesday 29<sup>th</sup> April 2015, 9am to 1pm, Venue: MWH, 80 The Terrace, Wellington**

1. These notes provide background for the workshop. At the start of the workshop there will be a chance to talk through the purpose of the workshop and the process. It is important that we come with open minds and work collaboratively with questioning and testing of the values and issues around all the options we are looking at.
2. The workshop is intended to develop and apply a multi-criteria analysis (MCA) on the ten options that have been developed from earlier in this process last year. Background to the choice of options will be presented at the start of the session.
3. The attributes the workshop is looking at are the advantages and disadvantages, or positive and negative effects, for the criteria listed in the Agenda. We will discuss the list early in the workshop to decide whether all criteria are appropriate and meaningful for an assessment of alternatives; whether some should be split into more than one, or whether some should be combined.

Note that it is ideal to have 10 to 12 criteria in an MCA, so we have about the right number. Also, we will be weighting the criteria later in the process, so if some seem less important, they can be given a lower weighting.

4. In terms of “scoping” the criteria and what needs to be taken into account under each heading, we are relying on the expert advisor to guide the workshop on that, and there will be an opportunity to discuss the scope of each criterion during the workshop (i.e. during the presentation session). We may want to break down and analyse a criterion under several headings (for example, using some secondary criteria) or by section of route, and recombine them with a single overall score per route alternative. We will document the scope of each criterion as part of the workshop record.
5. We are asking each expert (initials on the agenda) to come prepared to explain their aspect and discuss their preliminary scoring for each corridor. There will be a maximum of 5 to 10 minutes for each presentation, followed by discussion and scoring (or we can leave all scoring until the end). Presentations (simple power-point) would be good, but there will be maps, aerials; etc available for people to refer/talk to for those who haven't organised that.
6. We will score each attribute as a group, on a 1 to 5 scale as set out below (note: cost is not amenable to this scale and will be scored on a relative basis). The preliminary (++) to (-) scoring that experts have done will be a guide, but the workshop (rather than the expert alone) should do the scoring. Ideally we will reach consensus on a score for each attribute, but if we can't, we will note the different views and use that for sensitivity analysis at a later stage. We will review the scores at the end of the session to make sure that we are all comfortable with them.

SCORE	DESCRIPTION
1	The option presents few difficulties on the basis of the criterion being evaluated, taking into account reasonable mitigation proposals. There may be significant benefits in terms of the criterion.
2	The option presents only minor areas of difficulties on the basis of the criterion being evaluated, taking into account reasonable mitigation proposals. There may be some benefits in terms of the aspect.
3	The option presents some areas of reasonable difficulty in terms of the criterion being evaluated. Effects cannot be completely avoided. Mitigation is not readily achievable at reasonable cost, and there are few or no apparent benefits.
4	The option includes extensive areas of difficulty in terms of the criterion being evaluated, which outweigh perceived benefits. Mitigation is not readily achievable.
5	The option includes extreme difficulties in terms of achieving the project on the basis of the criterion being evaluated.

7. We will be endeavouring to develop a “workshop-agreed” weighting system for the criteria towards the end of the workshop. This will be complemented in later analyses by other weighting systems to make sure we have a robust outcome.

**DRAFT AGENDA  
OTAKI TO LEVIN RONS**

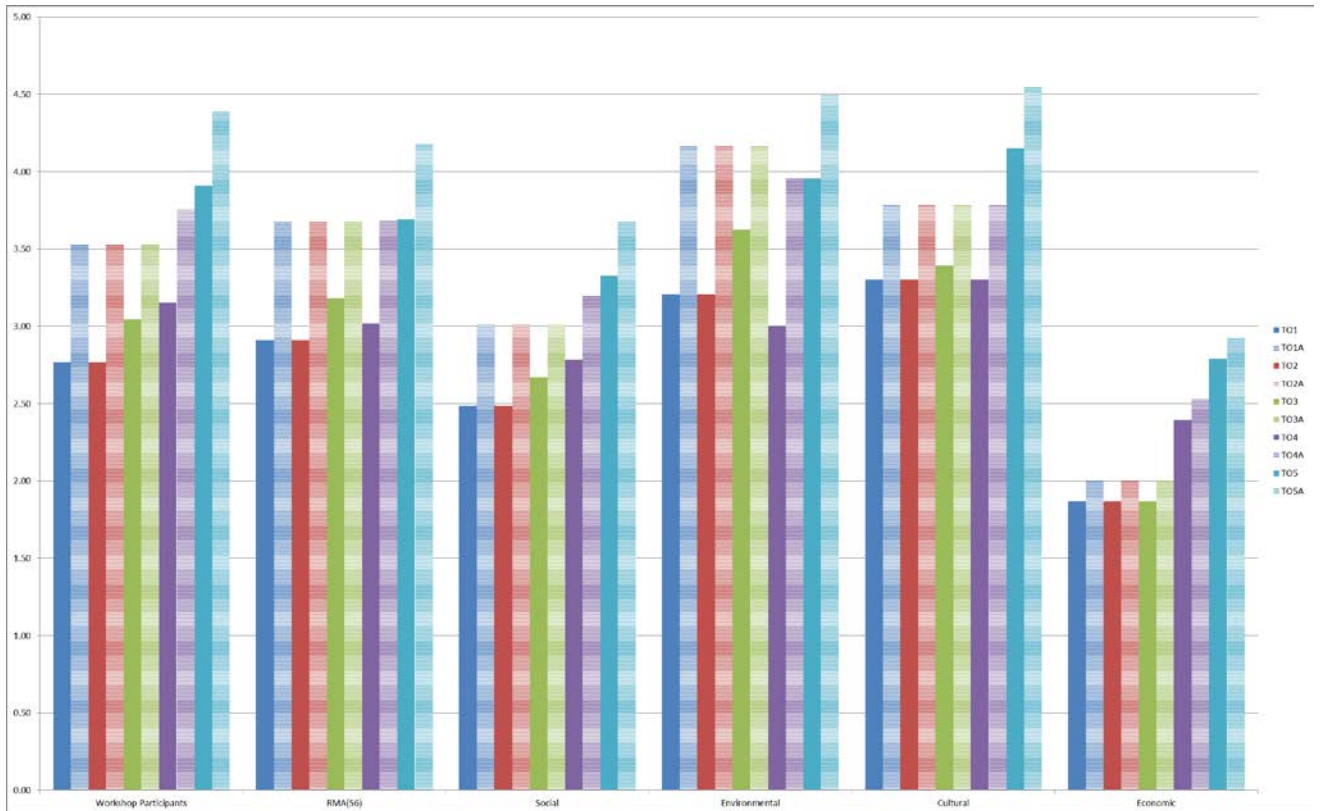
**TAYLORS ROAD TO OHAU FURTHER ANALYSIS**

**Wednesday 29<sup>th</sup> April 2015, 9am to 1pm, Venue: MWH, 80 The Terrace, Wellington**

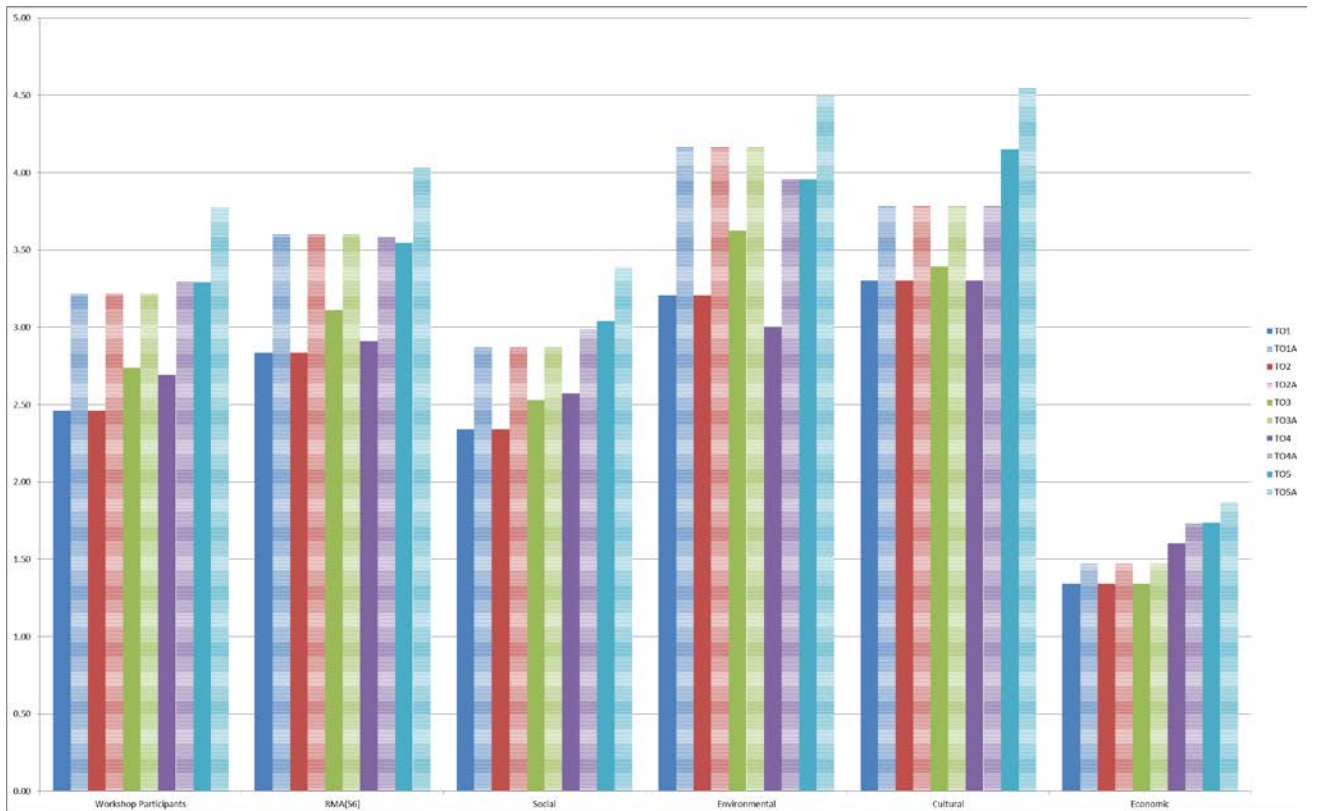
<b>Person</b>	<b>Item</b>
GL	Welcome and reason for Workshop
All	Introductions, housekeeping
SA	Purpose of session (confirm agenda, background to MCA, discussion of criteria and scoring system)
PP	Description and explanation of options (how we got them and what they're like)
As listed	<p>Presentations/discussions about criteria and scoring (order to be determined)</p> <ul style="list-style-type: none"> <li>• landscape/visual implications (Isthmus)</li> <li>• ecological implications (AF)</li> <li>• archaeology/heritage aspects (DP)</li> <li>• tāngata whenua implications (ML)</li> <li>• productive landuse aspects (LG)</li> <li>• social/community impacts (SK)</li> <li>• District Plan/consentability (SK)</li> <li>• transport effectiveness/fit with project transport objectives (PP)</li> <li>• specific land ownership effects (SK)</li> <li>• engineering degree of difficulty/constructability (PP)</li> <li>• cost (PP)</li> </ul> <p>Review of scores</p>
SA/PP	Weighting of criteria and next steps

## **APPENDIX 3 – GRAPHIC REPRESENTATION OF MCA OUTCOMES (SCORES X WEIGHTINGS) WITH AND WITHOUT COSTS**





**MCA Outputs for Taylors Road to Levin May 2015 Workshop – Includes Costs**



**MCA Outputs for Taylors Road to Levin May 2015 Workshop – Excludes Costs**

## **APPENDIX 4 – LANDSCAPE, VISUAL AND URBAN DESIGN REPORT**

isthmus

OTAKI TO LEVIN ROAD OF NATIONAL SIGNIFICANCE

TAYORS ROAD TO OHAU ALTERNATIVES

URBAN DESIGN + LANDSCAPE + VISUAL

Client: MWH on behalf of NZTA  
Project: Otaki to Levin RoNS: Alternatives Taylors Road to Ohau  
Code: 2923  
Report: Landscape + Visual + Urban Design  
Status: Final  
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No.	Date	Details	Author	QA
1	06/05/15	Draft to MWH	Gavin Lister	GL
2	25/05/15	Draft 2	Gavin Lister	GL
3	22/06/15	Final	Gavin Lister	GL

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## 1 SUMMARY

- 1.1 This landscape + visual + urban design report assesses five main alternative routes (TO1-TO5) between Taylors Road and Ohau. Each of the main alternatives has a variant (TO1A-TO5A) which is also considered.
- 1.2 The differences between the five main routes are summarised as follows:
- (a) **TO4** will have the least effects on natural character and rural amenity, because it largely parallels the existing transport corridor of the NIMT railway. However, it would bisect the scattered settlements at Waikawa Beach Road and Whakahoro Road and affect a greater number of individual houses.
  - (b) **TO3**, conversely, will have the least effects on settlements, connectivity and individual houses, but would affect a 'greenfields' rural area, including crossing the Waikawa Stream and Ohau River at locations that are not currently affected by infrastructure. TO3 would also provide the most attractive experience for future travellers.
  - (c) **TO1 and TO2** are hybrids of TO3 and TO4. They share some of the drawbacks and advantages of both, but on balance, from a visual/landscape perspective, it would be preferable to select either option TO3 or TO4 rather than the hybrid alternatives. Of the two hybrids, TO1 is somewhat better than TO2.
  - (d) **TO5** is least preferable. While it will confine effects in part to the existing SH1 corridor, it will require an additional crossing of Ohau River, have significant effects on rural character on the south bank of Ohau River, the overbridge near the intersection of SH1 and North Manakau Road will dominate Wehi Wehi Marae, it will impact significant number of houses on SH1, and have effects on local connectivity.
- 1.3 To put the differences in perspective, there are (at most) only moderate differences between the most preferable (TO3 or TO4) and least preferable (TO5) alternative (in landscape terms).
- 1.4 The **TO1A-TO5A variants** are all slightly worse than the main options due to differences at the southern end of the routes. TO1A-TO5A would impact on a small picturesque rural valley, and a large wetland, and interrupt Forest Lakes Road. They would likely impact on a greater number of houses. TO1-TO5 on the other hand would be on more robust scale terraces below Pukehou hill. The differences, however, are small.
- 1.5 **In conclusion**, TO3 and TO4 are the preferable routes in landscape terms, but for contrasting reasons. TO3 minimises effects on settlements, houses and connectivity, but affects a greenfields rural landscape. TO4 minimises effects on rural areas but at the cost of greater effects on settlements, houses and connectivity.



## 2 INTRODUCTION

- 2.1 This report is one of several landscape assessments carried out with respect to the Otaki to Levin section of the 'Roads of National Significance' ('RoNS'). It compares a short-list of alternative alignments for a possible future four lane expressway between Taylors Road in the south and the vicinity of Ohau in the north.
- 2.2 Five main alternatives are compared, each of which has a variant at the south end, making ten alternatives in total. The report analyses the options to provide information for the multi-criteria analysis (MCA) process by which the preferred route is to be selected.

## 3 CONTEXT

- 3.1 The area is described in a 'Landscape and Urban Design **Baseline Report**' (Isthmus April 2011), with further specific detail contained in subsequent reports. In summary, the area is **gently-rolling-to-flat coastal plain and river terraces**, with a backdrop of the Tararua Ranges and foothills. It is a **productive rural landscape** including dairying and other pastoral farming, substantial areas of cultivated ground, a vineyard, and more intensive uses such a stud farm, poultry farms and a nursery.
- 3.2 The main natural features are the **streams and rivers** which run generally from east to west across the plain, including:
- Ohau River;
  - Waikawa Stream; and
  - Smaller streams and watercourses such as the Manakau and Kuku Streams.
- 3.3 There are **remnant stands of totara forest** on the terraces north of Ohau River and other scattered small lowland forest remnants on the plains. The route options are aligned so as not to impact on them.
- 3.4 State highway 1 ('**SH1**') and the 'North Island Main Trunk' ('**NIMT**') railway run north-south across the coastal plain, perpendicular to the rivers and streams. Local roads typically branch off SH1 either west toward the coast or east toward the mountains.
- 3.5 **Manakau and Ohau** are historical settlements on SH1. The alternative routes all skirt Manakau and finish just short of Ohau or its vicinity. However, routes pass close to, or through, scattered rural residential houses and subdivisions near the outskirts of Manakau and Ohau.
- 3.6 There are **two maraes** with associated settlements and urupa. Ngāti Wehi Wehi Marae is between North Manakau Road and Whakahoro Road, and Tukuorehe Marae is north of Kuku Road.

## 4 DESCRIPTION OF ALTERNATIVE ROUTES

- 4.1 The alternative routes are depicted on plan 'Taylors Road to Ohau Section (Manakau Bypass) Combined' (MWH, April 2015).
- 4.2 Each alternative would entail a continuation of four-lane highway from the south to a point at which SH1 and SH57 peel away from each other by way of overpasses. The 'bifurcation' point for options TO1-TO4 is just north of the Ohau River (in the vicinity of the horse stud and concrete plant), while for TO5 it is in open country south of the Ohau River. SH1 and SH57 would each revert to two-lane highways north of the bifurcation point.
- 4.3 A full or half-diamond interchange would be required west of Manakau. The potential locations for such an interchange vary from the south-west fringes of Manakau (TO4 and TO5) to more open rural locations further to the north-west (TO1, TO2 and TO3).

## 5 COMPARISON BETWEEN ROUTES

### Approach and Method

- 5.1 The five main alternative routes were assessed taking into account potential effects on the following:
- **Natural character of the streams and river** - (including proximity of crossings to existing bridges, the extent of modification at crossing points, and in the case of TO5 the number of crossings required);
  - **Other natural features** - (there turned out to be no difference between the alternatives in this case);
  - **Rural character and amenity**- (this concerned the extent to which the proposal widened the transport corridor to greenfields route, the 'fit' with the cadastral and paddock pattern, and the prominence of the overbridges);
  - **Settlements** - (the main focus was Manakau and the associated string of houses at Waikawa Beach Road, the Ngāti Wehi Wehi marae and its associated settlement, the scattered settlement at Whakahoro Road, and Tukorehe Marae and its associated settlement along SH1);
  - **Connectivity** - (in this case the main focus was Waikawa Beach Road, Whakahoro Road, Kuku Beach Road and Kuku East Road. Also future local connections along the existing SH1); and
  - **Houses** - (direct effects (i.e. that would require purchase), and indirect visual amenity effects).

## Findings

- 5.2 **Appendix One** is a section-by-section analysis of the alternative routes. The following section of the report synthesises the analysis in terms of the landscape issues.

### Section 6 Matters

#### *Natural Character*

- 5.3 The main natural features are the river and streams, which all options by necessity must cross.
- (a) Ohau River: TO3 introduces bridge at new location, while TO1, TO2, TO4 and TO5 are close to existing SH1 and NIMT railway bridges. However, TO5 entails an additional bridge at a new location.
  - (b) Waikawa Stream: TO3 and TO1 introduce bridges at new location, while TO2, TO4 and TO5 are close to existing SH1 and NIMT railway bridges. On the other hand TO3 is in an area where there is minimal margin vegetation (offering opportunity to improve natural character at that location).
  - (c) Manakau Stream: All options cross the stream tributaries at a new location. However, the TO4 and TO5 interchanges will have large footprint over the course of the stream.
  - (d) Kuku Stream: TO1, TO2, TO4 all cross at location where the stream is substantially modified. TO5 is similarly in a modified location. TO3 crosses where there is some exotic and indigenous vegetation.
- 5.4 It is likely that one or both existing SH1 bridges would be retained for local connectivity, so there is no clear offset benefit to natural character from bridge removal.
- 5.5 In summary, **TO2, TO4** are best and **TO5** is worst in regards this attribute. However, such differences should be considered in the context of a modified landscape. Differences in bridge and riparian mitigation are likely to be more significant than bridge location.
- 5.6 The variants at the southern end (**TO1A, TO2A, TO3A, TO4A and TO5A**) will affect a large wetland. The wetland appears to be at least partly formed by the railway embankment, and is within a modified farmed landscape, but nevertheless has moderate natural character.

#### *Other Natural Features*

- 5.7 There are no outstanding natural features or landscapes. As discussed, the other main natural features are remnant forest stands. Each alternative is aligned to avoid these features. They would remain constraints for detailed design, but also provide opportunities to enhance their value by additional planting.

## Section 7 Matters

### *Rural character and amenity*

- 5.8 The existing landscape quality is similar for all options. As described above, it is a relatively flat and open rural landscape. The main natural features are the streams and Ohau River, the isolated stands of remnant forest, and backdrop hills. The human features are the historic townships, the marae settlements, the road and rail network, and individual houses.
- 5.9 **TO3** follows the most ‘greenfields’ route. It expands the footprint of the main transport corridor further to the west, and cuts diagonally across the (cadastral) pattern of paddocks. But it minimises impacts on individual houses and settlements. The TO3 interchange is also in a relatively unobtrusive location. While the route would interrupt Waikawa Beach Road and Whakahoro Road, it would not affect the scattered settlements at each location. The half-diamond option would fit in with the existing Waikawa Beach Road, and would therefore minimise disruption to local connectivity.
- 5.10 **TO4** concentrates effects adjacent to the existing NIMT corridor. It has a good fit with the (cadastral) pattern of paddocks, tending to skirt the edges rather than bisect them. The interchange is in a relatively unobtrusive location on the western fringe of Manakau. However, TO4 affects a greater number of houses (at Waikawa Beach Road, Whakahoro Road, and the south bank of the Ohau River). It will disrupt Whakahoro Road and bisect the scattered settlement at that location. It would similarly divide the string of houses along Waikawa Beach Road.
- 5.11 **TO1 and TO2** are similar to **TO4**. **TO1** avoids the string of houses at Waikawa Beach Road and the settlement at Whakahoro Road, but at the expense of a diagonal alignment across the paddock (cadastral) pattern. **TO2** shares the disadvantages of both **TO1** and **TO4**. The only difference is that it reduces impact on the string of houses at Waikawa Beach Road compared to TO4. The interchange for both TO1 and TO2 is in a more prominent location. Both alternatives disrupt Waikawa Beach Road and Whakahoro Road.
- 5.12 **TO5** concentrates effects in the existing SH1 corridor north of Manakau in part, and has a reasonably good fit with the (cadastral) paddock pattern. However, the bifurcation between SH1 and SH57 will dominate the rural character on the area south of the Ohau River. It will impact a relatively large number of existing properties on SH1, and the over-bridge (and ramps) at the intersection of SH1 and North Manakau Road will be dominant from the Ngāti Whehi Wehi marae. The interchange west of Manakau is similar to that for TO4 and is in a relatively unobtrusive location. The route will also disrupt Waikawa Beach Road and Kuku East Road.

### *Connectivity*

- 5.13 The least disruptive option is the TO3 half-diamond option. TO3 interrupts Whakahoro Road, but in a location that minimises disruption. All other options disrupt Waikawa Beach Road. TO2 and TO4 disrupt Whakahoro Road and bisect the settlement at that location. TO5 disrupts Kuku Road East.

### *Amenity of Individual Properties*

- 5.14 **TO3** minimises effects on individual properties while **TO5** has the greatest effects. **TO1, TO2 and TO4** fall in mid-range with **TO1** somewhat better than **TO2** and **TO4**.

### **Conclusion on TO1-TO5**

- 5.15 In conclusion, **TO3 and TO4** are the preferable routes in landscape terms, but for different reasons. **TO3** minimises effects on settlements, houses and connectivity (especially if a half-diamond on Waikawa Beach Road was adopted). But it spreads the transport infrastructure to a green-fields landscape and will cross the Ohau River and Waikawa Stream at locations remote from existing bridges. **TO4**, on the other hand, minimises effects on the rural landscape by paralleling (more or less) the NIMT railway. The downside is that it affects a greater number of houses, interrupts Waikawa Beach Road and Whakahoro Road and bisects the scattered settlements at those locations.
- 5.16 The conclusion is reflected in the following table:

	TO1	TO2	TO3	TO4	TO5
Natural character (s6)	0	+	0	+	-
Landscape (s7) (rural character, settlements, connectivity, amenity from houses)	+	0	++	++	--

### **Comparison between TO1-TO5 and TO1A-TO5A variants**

- 5.17 **TO1A, TO2A, TO3A, TO4A and TO5A** options pass through a small picturesque valley with a quiet rural character. The alignment will bisect the cadastral paddock pattern. Depending on design, up to 5 houses may be removed and there would be amenity effects on a further 3 houses.
- 5.18 By comparison, the equivalent section of **TO1, TO2, TO3, TO4 and TO5** are in a larger scale landscape with Pukehou Hill backdrop. The alignment will require removal of 1 house but is 'behind' several other properties on SH1. It is diagonal to the paddock (cadastral) pattern. In summary, the alignment east of SH1 is preferable in landscape terms, but the difference is small, and both are acceptable.

	TO1-TO5	TO1A-TO5A
Natural character	Slightly better	Slightly worse (will cross wetland)
Vegetation	equal	equal
Rural character	better (more robust scale landscape)	worse (will dominate small valley)
Cadastral and paddock pattern	slightly worse	slightly better
Settlements and connectivity	slightly better	slightly worse (Forest Lakes Road)
Houses	slightly better	slightly worse

## 6 ALTERNATIVE METHODS

6.1 Alternative methods to avoid, remedy or mitigate potential adverse effects include detailed design. Urban and landscape design should follow the principles set out in the Transport Agency's documents 'Bridging the Gap' and 'Landscape Guidelines'. In addition, the following section of the report describes specific **design considerations** relevant to this project.

### *River and stream crossings*

6.2 Considerations include:

- Use bridges in preference to culverts for larger streams (Ohau River, Waikawa Stream);
- Where culverts are to be used, follow 'fish friendly' practices (see NZ Transport Agency 'Fish passage guidance for state highways, August 2013');
- Use split carriageways and dual bridges in preference to wide bridges;
- Maintain informal access along banks beneath bridges;
- Use spill-through abutments to maximise openness;
- Restore riparian vegetation upstream and downstream of crossings to offset any biophysical effects, and soften appearance of bridges and abutments.

### *Local road connections*

6.3 Considerations include:

- Ideally retain local roads at grade and on their existing alignment (with the highway passing either in a cutting beneath the local road, or on a bridge above);
- It may be a sensible compromise to construct half-and-half crossings in this terrain. (It is noted that the NIMT railway complicates issues at Kuku Beach Road for options 2 and 4);
- Avoid interruptions to local roads where it will bisect a community (e.g. Waikawa Beach Road, Whakahoro Road, Kuku Beach Road); and
- Maintain local connectivity along the existing SH1.



### *Interchanges*

- 6.4 The Manakau interchange and the ‘bifurcation’ between SH1 and SH57 will be potentially prominent. Particular attention needs to be given to aesthetics of these structures and adjacent landscape design to visually anchor the ‘interchanges’.
- 6.5 It may be possible to design TO3 interchange around the existing Waikawa Beach Road (e.g. by mirroring the half-diamond design). This would minimise disruption to the local road network.

### *Integration with rural landscape*

- 6.6 Considerations include:
- Fine tune the alignment to follow **property boundaries** or to allow reasonably regular paddocks. (cropping fields require sensible proportions for machine working);
  - Continue to avoid the stands of **remnant forest**. Extend such stands with additional planting between stand and highway;
  - Design planting to be in **scale** with the broad landscape. Use bold patterns with a small number of visually dominant species to reflect natural patterns. (Avoid the ‘fruit salad’ appearance that can arise when there is not a dominant species);
  - Reinforce the streams and watercourses with **riparian planting**;
  - Extend **adjacent land use and vegetation** as close to the highway shoulder as possible consistent with road safety and practical land management of the highway margins;
  - **Contour earthworks** to tie in with adjacent topography;

Gavin Lister  
Isthmus  
22 June 2015

## APPENDIX ONE: SECTION BY SECTION ANALYSIS

<b>TO1</b>	<p>(Green) Terraces at toe of Pukehou Hill. The hill itself is reasonably distinctive local landmark, but alignment does not encroach onto hill. Modified pasture landuse. Cuts across paddock pattern. Rolling topography with incised stream gullies (mostly near heads of watercourses). Stream margins modified.</p> <p>Alignment passes through 1 house near south end, and will pass close (&lt;100m) in front of 1 house west of the alignment. Otherwise route passes moderate distance from and behind approximately 7 houses that are accessed from SH1.</p> <p>(Blue) Plain south-west of Manakau. Gently rolling to flat but with incised watercourses. Modified watercourse margins. Landuse mainly pasture (dairying) and some cropping. Low settlement density. Route is well beyond end of house cluster on Atkins Road. Crosses existing SH1 at oblique angle and NIMT Railway at right angles. Passes well to east (200m) from house on Forest Lakes Road)</p> <p>(Purple) Plain north-west of Manakau. Mainly flat, with meandering, incised watercourses and streams. Main natural feature is Waikawa Stream which has substantial tree-lined corridor. Crossing point is tree-lined, remote from existing crossings. Productive pasture landscape (mainly dairying and some cropping). Diagonal to paddock pattern. Interchange diagonal to landscape patterns, and in reasonably open location in front of outlook from houses on Waikawa Beach Road. Low settlement density. Crosses Waikawa Beach Road beyond strip of houses, and generally avoids houses at Whakaoro Road. However alignment will pass very close to and may require removal of 2 houses (53 Takapu Road, 134 Waikawa Beach Road) and moderately close (&lt;100m) to 2 others at Takapu Rd/Waikawa Beach Road. Passes between 4 houses at Whakahoro Road at distances approximately 200m. Passes close (&lt;100m) to 1 house midway between Whakahoro Road and Kuku Beach Road.</p> <p>(Black) Plain west of SH1. Mainly flat. Route is parallel with and close to NIMT railway (passes between poultry farm and railway line at Kuku Beach Road with potential impact). Overbridge on Kuku Beach Road (over NIMT and SH1) will be very prominent and affect outlook for nearby houses. Potential connectivity issues between Tukorehe Marae and scattered string of houses along Kuku Beach Road. Crosses Kuku Stream at modified location. Main natural feature is Ohau River which has substantial tree-lined corridor in the vicinity of route. Crossing point short distance (~100m) downstream of existing SH1 bridge (node also modified by rail bridge and concrete plant). Low settlement density, but passes through cluster of three houses on south bank of Ohau River and through the 'Strathcarron' horse facility north of the Ohau River. Ramps to, and bridge over, SH1 will be prominent, but could be anchored by trees at horse facility. Will also be adjacent to concrete plant. Passes close (&lt;100m) to the two nearest houses at Kuku Beach Road. There are 5 houses within 200m to west which will be affected by overbridge, and similarly 3 houses east of rail line. Passes close (&lt;100m) to 2 houses near south bank of Ohau River and removal of 1 house appears not occupied. Alignment will require removal of 3 houses (492 SH1, 8 Parakawau Road, house associated with Ohau Wines) north of Ohau River, and the interchange will be close to and prominent in the outlook from 3 others (472 SH1, 4 &amp; 6 Bishop Road)</p>
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	<p>(Yellow) Link to SH57. Terraces on north bank of Ohau River. Flat. Parallel with, but reasonably separated from, Ohau River. Prominent stands of forest which route threads between (these are a constraint). Low existing settlement density. However, route passes through vineyard and lifestyle subdivision, but 'rear' portion still to be developed.</p>
<b>TO2</b>	<p>(Green) Same as TO1</p> <p>(Blue) Same as TO1</p> <p>(Pink) Plain north-west of Manakau. Mainly flat, with meandering, incised watercourses and streams. Main natural feature is Waikawa Stream which has tree-lined corridor. Crossing point short distance downstream of NIMT rail bridge and SH1 bridge. Productive pasture landscape (mainly dairying and some cropping). Diagonal to paddock pattern. Interchange diagonal to landscape patterns. Crosses Waikawa Beach Road beyond string of houses, although interchange will be in reasonably open location in front of outlook from these houses. Low settlement density. However alignment will pass very close to and may require removal of 2 houses (53 Takapu Road, 134 Waikawa Beach Road) and moderately close (&lt;100m) to 2 others at Takapu Rd/Waikawa Beach Road. Interrupts Whakahoro Road and bisects scattered settlement at this location. Interchange would require removal of 3 houses (35, 47, 54 Whakahoro Road) and passes very close to 4 others (18, 22, 20, 75 Whakahoro Road). Route passes moderately close (~100m) to 2 houses north of Tatum Park. [Worse than TO1]</p> <p>(Black) Similar to TO1. But more closely parallels NIMT railway</p> <p>(Yellow) Same as TO1</p>
<b>TO3</b>	<p>(Green) Same as TO1</p> <p>(Blue) Same as TO1</p> <p>(Yellow to Kuku Beach Road) Plain north-west of Manakau. Mainly flat, with meandering, incised watercourses and streams. Main natural features is Waikawa Stream. Crossing point is less tree-lined compared to options TO1, TO2, TO4. Productive pasture landscape (mainly dairying and some cropping). Diagonal to paddock pattern. Interchange in open location but separated from houses, and in keeping with paddock patterns. Low settlement density. Crosses Waikawa Beach Road beyond strip of houses. However, will require removal of 2 houses (53 Takapu Road, 134 Waikawa Beach Road) and will pass reasonably close to (&lt;100) to 2 others (51 Takapu Road, 178 Waikawa Beach Road). Passes within 200m to cluster of 9 houses near end of Whakahoro Road. Interchange might require removal of 3 of these houses (171, 173, 173a Whakahoro Road) and interchange would be prominent from remaining 6 houses at this locality. Passes close (&lt;100m) to 3 houses at Kuku Beach Road (132, 137 and unnumbered Kuku Beach Road) Crosses Waikawa Stream remote from existing bridges but at location with</p>

	<p>little margin vegetation. [a little better than TO1, moderately better than TO2]</p> <p>(Yellow to SH1) Plain west of SH1. Mainly flat and open. Crosses Kuku Stream at one of few vegetated locations on its course (but opportunity to restore riparian vegetation either side). Main natural feature is Ohau River which has substantial tree-lined corridor in the vicinity of route. Crossing point remote from existing SH1 bridge in stretch of Ohau River with somewhat higher natural character, although still a substantially modified rural landscape. Productive land use (dairying and cropping). Alignment diagonal to paddock pattern. Low settlement density. Will require removal of 1 house (at Ohau Wines) and interchange will be close (&lt;100m) to 3 others (472 SH1, 4, 6 Bishops Road). Ramps to, and bridge over, SH1 will be prominent, but could be anchored by trees at the adjacent horse facility. Bridge and approach at right angle to SH1. Slightly less prominent than TO1, TO2, TO4. [Better than TO1. TO2, TO4 –but noting the higher natural character at Ohau River crossing point]</p> <p>(Yellow to SH57) Same as TO1, TO2, TO4.</p>
<b>TO4</b>	<p>(Green) Same as TO1</p> <p>(Lilac) Plain south-west of Manakau. Rolling to flat, with incised meandering watercourse gullies. May require substantial earthworks to cross gullies. Productive land uses (dairying, cropping, nursery). Reasonable fit with paddock patterns. Interchange in relatively unobtrusive location behind west outskirts of Manakau. It is in location of Manakau Stream although the stream is heavily modified. The route skirts the settled area accessed from west side of SH1. Interchange would require removal of 3 houses (48, 57, 58 Gleeson Rd). [Similar to TO1, TO2, TO3]</p> <p>(Orange) Plain north-west of Manakau. Flat. Main natural feature is Waikawa Stream which has tree-lined corridor. Productive land uses (dairying, cropping). Reasonable fit with paddock patterns Low settlement density. However, bisects the string of houses along Waikawa Beach Road. Depending on detail design may require removal of 2 houses (41, 55 Waikawa Beach Rd) and close (&lt;100m) to 4 other houses on Waikawa Beach Road and Ketemaringi Way. Depending on detail alignment, skirts edge of or encroached onto Manakau Domain. Will pass &gt;200m behind houses on SH1. Similarly &gt;200m behind Wehi Wehi Marae. Bisects scattered settlement at Whakahoro Road. Will require removal of one house (35 Whakahoro Road) and close (&lt;100m) to 4 others (18, 20, 22, 47 Whakahoro Road). Passes moderately close (~100m) to 2 houses north of Tatum Park.</p> <p>(Black) Same as TO1</p> <p>(Yellow) Same as TO1</p>

<b>TO5</b>	<p>(Green) Same as TO1</p> <p>(Lilac) Same as TO4</p> <p>(Black to Kuku East Road) Plains north of Manakau. Backdrop hills to east. Main natural feature is Waikawa Stream. Crossing point at location of broad meander, but close to existing SH1 bridge which might be removed. Also close to NIMT rail bridge. Productive land use (cropping, dairying). Route follows existing SH1 corridor. Overbridge and ramps will be reasonably prominent location opposite North Manakau Road. Relatively close pattern of settlement: Bisects the string of houses along Waikawa Beach Road. Depending on detail design may require removal of 2 houses (41, 55 Waikawa Beach Rd) and close (&lt;100m) to 4 other houses on Waikawa Beach Road and Ketemaringi Way. Crosses Manakau Domain. Overbridge and ramps will remove at 4 or 5 houses at intersection of SH1 and North Manakau Road (952, 956, 962 SH1, 5, 11 North Manukau Road) and will be close to (and prominent from) several other houses (887, 889, 891, 920, 024, 926, 944, 984 SH1). Ramps and overbridge will also be prominent from Wehi Wehi Marae. North of the Waikawa Stream the route directly would directly affect and might require removal of up to 8 houses (depending on width of designation), (675, 703, 719a, 773, 785, 797, 817, 831 SH1), would be very close to 4 others (669, 719, 809, 849 SH1) and would be prominent from 5 others on opposite side of existing SH1. The ramps and highway would be reasonably close (~100m) behind 3 others (655, 661, 663 SH1).</p> <p>(Black to SH1 near Ohau). River terrace plains. Flat. Backdrop hills to east. Main natural feature is Ohau River. Crossing point near concrete plant, short distance upstream of rail and existing SH1 bridge. Productive land use (cropping, dairying). Reasonably good fit with paddock pattern. Route behind houses accessed from SH1. Route crosses SH1 and NIMT railway at oblique angle north of Ohau River. Overbridge will be long and relatively prominent from Ohau and vineyard subdivision. (Requires two crossings of NIMT). Bifurcation point, including overbridge, will be approximately 200m behind Tukuorehe Marae. Otherwise would be &gt;200m behind houses on SH1. Would require removal of at least 2 houses at tie-in with existing SH1 north of Ohau River (at Ohau Wines, 4 Bishops Rd) and would be very close to 1 other (6 Bishops Road)</p> <p>(Black to Muhunoa East Road). River terrace plains. Backdrop hills to east. Main natural feature is Ohau River and bush stands on north bank. Bifurcation interchange in open and prominent area on south bank. Highway bifurcation will dominate character of this area. Will interrupt Kuku East Road. Requires second crossing of Ohau River. Crossing point incised – reasonably close to quarry. Route avoids bush stands, but these are a constraint. Low settlement density. No houses affected.</p>
<b>TO1A, TO2A, TO3A</b>	<p>(Dashed yellow) Terraces and rolling topography at south end of plains. Incised streams, gullies and lake/wetlands. Route crosses edge of wetland dammed by NIMT. Small scale landscape, especially south of NIMT. Small stands of bush. Land use mainly dairying. Reasonable fit with paddock pattern, but would bisect paddocks. [-] Low settlement density. Likely to require removal of 5 houses on SH1 between Taylors Road and Lawlors Road (115, 134, 139, 141, 143 SH1) depending on details of alignment. Passes close in front of outlook from 2 houses (257, 267 SH1) and ~200m from 1 other house (9 Forest Lakes Road). Overall, Green-blue is in a larger scale landscape. SH1 and rail crossing potentially prominent, but could use topography to reduce prominence]</p>

<b>TO4A, TO5A</b>	<p>(Dashed mauve) Terraces and rolling topography at south end of plains. Incised streams, gullies and lake/wetlands. Route crosses edge of wetland dammed by NIMT. Small-scale picturesque landscape south of Forest Lakes Road. Small stands of bush. Land use mainly dairying. Reasonable fit with paddock pattern at south end, diagonal at north end. Low settlement density. Likely to require removal of 5 houses on SH1 between Taylors Road and Lawlors Road (115, 134, 139, 141, 143 SH1) depending on details of alignment. Passes close in front of outlook from 2 houses (257, 267 SH1) and ~200m from 1 other house (9 Forest Lakes Road). Manakau Interchange would be close to (or might require removal of) 3 houses on western outskirts of Manakau (48, 57, 58 Gleesons Road). [Overall, Green-blue is in a larger scale landscape. SH1 and rail crossing potentially prominent, but could use topography to reduce prominence]</p>
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## **APPENDIX 5 – ECOLOGICAL LETTER REPORT**

26 May 2015  
By Email

MWH New Zealand Limited  
PO Box 9624  
Wellington 6141

**Attn: Phil Peet**



**Forbes Ecology**

Adam Forbes  
PO Box 8762  
Havelock North (4157)  
Hastings  
New Zealand

Dear Phil,

## **New Zealand Transport Agency RoNS, Otaki to Levin – Possible Future Route Options Between Taylors Road and South of Ohau/Arapaepae Road**

### **Introduction**

This report presents the results of a high-level ecology constraints assessment regarding possible future route options between Taylors Road and south of Ohau/Arapaepae Road within the North of Otaki to North of Levin RoNS project.

Aspects of this assessment were covered in an earlier report (Forbes, 2013) which assessed ecology constraints for various road alignment options through part of the area between Otaki and Levin.

This short report presents the scope and criteria used for the ecology constraints identification and ranking process. Results for each route segment (Table 2) and option (Table 3) are presented.

### **Assessment**

#### *Scope and Criteria*

The scope of ecology considerations included all wetland, freshwater streams, and indigenous vegetation features likely to be affected (either directly or indirectly) by the road alignment options.

The criteria used for ranking is shown in Table 1. These criteria are represented by 'positive through negative' notation. The criteria rank the degree of constraint faced by a given route segment/option due to the nature of the ecology features that would be encountered.

**Table 1.** Positive through negative criteria.

<b>Notation</b>	<b>Interpretation</b>
++	Route option is, on average, very good in terms of this attribute
+	Route option is, on average, good in terms of this attribute
0	Route option is neutral, or neither good or problematic, on average, in terms of this attribute
-	Route option includes, on average, minor or intermediate issues or concerns in terms of this attribute
--	Route option includes, on average, major or intermediate issues or concerns in terms of this attribute

### *Methods*

This assessment benefited from the Forbes (2013) investigations and was undertaken using the desk top methods specified in that report.

*Relevant Ecology Values – By Route Section*

**Table 2.** High-level description of ecology features directly or indirectly affected by route options regarding the Taylors Road to Ohau section of the Otaki to Levin NZTA roading project.

Mapped Colour†	Section(s)	Constraints	Comments	Rating (-/+)
Green	T01, T02, T03, T04, T05	<ul style="list-style-type: none"> <li>• Crossings of minor unnamed tributary streams.</li> </ul>	<ul style="list-style-type: none"> <li>• Crosses headwaters of a Waitohu Stream tributary.</li> </ul>	<p>–</p> <p>Minor issues or concerns</p>
Purple	T04, T05	<ul style="list-style-type: none"> <li>• Minor indigenous vegetation affected at SH1 and railway crossings.</li> <li>• Wetland/stream habitat (tributary of Manakau Stream).</li> <li>• Manakau Stream Crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• Small amount of young woody indigenous vegetation affected on south side of SH1.</li> <li>• Forest patch close on eastern side of alignment at WGS 40°44'05.25"S 175°11'41.99"E.</li> <li>• Effects to indigenous forest vegetation located in rail corridor.</li> <li>• Crosses Manakau Stream near Gleeson Road.</li> </ul>	<p>–</p> <p>Minor issues or concerns</p>
Purple dash	Alternative route T04A, T05A	<ul style="list-style-type: none"> <li>• Major wetland (contiguous with RAP 9 Pritchard's Swamp) and wild vegetation surrounding, native forest remnant on terrace to the north of wetland.</li> <li>• Effects to indigenous forest vegetation located in rail corridor.</li> <li>• Sparse mixed indigenous exotic forest remnant north of railway line directly affected.</li> <li>• Wet pasture, marginal wetland in drainage tributary of Lake Waitawa.</li> <li>• Wet pasture, marginal wetland in drainage</li> </ul>	<ul style="list-style-type: none"> <li>• Major wetland intersected, forest remnant also affected.</li> <li>• Unnamed tributary stream intersected near Forest Lakes Road.</li> <li>• Effects to indigenous forest vegetation located in rail corridor.</li> <li>• Sparse mixed indigenous exotic forest remnant north of railway line.</li> <li>• Wet pasture, marginal wetland in drainage tributary of Lake Waitawa.</li> <li>• Wet pasture, marginal wetland in drainage tributary of Manakau Stream.</li> </ul>	<p>--</p> <p>Major or intermediate issues or concerns</p>

		tributary of Manakau Stream. • Manakau Stream crossing.		
Yellow dash	Alternative route T01A, T02A, T03A	<ul style="list-style-type: none"> <li>• Major wetland (contiguous with RAP 9 Pritchard's Swamp) and wild vegetation surrounding, native forest remnant on terrace to the north of wetland.</li> <li>• Effects to indigenous forest vegetation located in rail corridor.</li> <li>• Sparse mixed indigenous exotic forest remnant north of railway line directly affected.</li> <li>• Wet pasture, marginal wetland in drainage tributary of Manakau Stream.</li> </ul>	<ul style="list-style-type: none"> <li>• Major wetland intersected, forest remnant also affected.</li> <li>• Unnamed tributary stream intersected near Forest Lakes Road.</li> <li>• Effects to indigenous forest vegetation located in rail corridor.</li> <li>• Sparse mixed indigenous exotic forest remnant north of railway line.</li> <li>• Wet pasture, marginal wetland in drainage tributary of Manakau Stream.</li> </ul>	<p>– –</p> <p>Major or intermediate issues or concerns</p>
Grey	T05	<ul style="list-style-type: none"> <li>• Clips small native forest patch located at end of Ketemaringi Way.</li> <li>• Waikawa Stream crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• Small native forest patch at end of Ketemaringi Way WGS 40°42'34.90"S 175°12'48.86"E.</li> <li>• Vegetation within Waikawa terraces predominantly exotic would require field visit to confirm absence of native trees.</li> </ul>	<p>–</p> <p>Minor issues or concerns</p>
Red	T04	<ul style="list-style-type: none"> <li>• Clips small native forest patch located at end of Ketemaringi Way.</li> <li>• Waikawa Stream crossing north of Whakahoro Road.</li> </ul>	<ul style="list-style-type: none"> <li>• Small native forest patch at end of Ketemaringi Way WGS 40°42'34.90"S 175°12'48.86"E.</li> <li>• Crosses several Manakau Stream tributaries.</li> <li>• Crosses Waikawa Stream.</li> </ul>	<p>–</p> <p>Minor issues or concerns</p>
Light blue	T01, T02, T03	<ul style="list-style-type: none"> <li>• Minor indigenous vegetation affected at SH1 and railway crossings.</li> <li>• Wet pasture, marginal wetland in drainage tributaries of Lake Waitawa and Manakau Stream.</li> </ul>	<ul style="list-style-type: none"> <li>• Small amount of young woody indigenous vegetation affected on south side of SH1.</li> <li>• Wet pasture, marginal wetland in drainage tributary of Lake Waitawa.</li> <li>• Wet pasture, marginal wetland in drainage tributary</li> </ul>	<p>–</p> <p>Minor issues or concerns</p>

		of Manakau Stream.		
Pink	T02	<ul style="list-style-type: none"> <li>• Manakau Stream crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• Manakau Stream crossing.</li> </ul>	<p>–</p> <p>Minor issues or concerns</p>
Dark blue	T01	<ul style="list-style-type: none"> <li>• Manakau Stream crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• Manakau Stream crossing.</li> <li>• Vegetation within Waikawa terraces predominantly exotic would require field visit to confirm absence of native trees.</li> </ul>	<p>–</p> <p>Minor issues or concerns</p>
Yellow	T03	<ul style="list-style-type: none"> <li>• Clips sparse indigenous treeland in paddocks</li> <li>• Clips small forest fragment on bend in race</li> <li>• Intersects</li> <li>• Crosses Kuku Stream tributary</li> <li>• Intersects indigenous forest fragment on TR bank of Kuku Stream</li> <li>• Ohau River crossing</li> <li>• Clips and close to Muhunua totara stands</li> </ul>	<ul style="list-style-type: none"> <li>• Sparse indigenous treeland in paddocks (40°41'08.34"S 175°13'12.49E &amp; 40°40'47.42"S 175°13'31.16"E) and small forest fragment on bend in race (40°41'.21.82"S 175°12'54.13")</li> <li>• Clips and close to Muhunua totara stands</li> </ul>	<p>– –</p> <p>Major or intermediate issues or concerns</p>

Note: † refers to the 1:10,000 scale map of route options, titled "Otaki to North Levin (RONS) Taylors Road to Ohau Section (Manakau Bypass) combined".

*Overall Route Option Scores*

**Table 3.** Overall route option scores regarding ecology constraints of the Taylors Road to Ohau section of the Otaki to Levin NZTA roading project.

Route Option	Score (- 0 +)
T1	- (Minor Issues)
T1A	-- (Major or Intermediate Issues)
T2	- (Minor Issues)
T2A	-- (Major or Intermediate Issues)
T3	-- (Major or Intermediate Issues)
T4	- (Minor Issues)
T4A	-- (Major or Intermediate Issues)
T5	-- (Major or Intermediate Issues)
T5A	-- (Major or Intermediate Issues)

I trust this provides the necessary record of my assessment. Please do not hesitate to contact me should you require any further information.

Yours sincerely

A handwritten signature in blue ink that reads "A Forbes". The signature is stylized with a large, vertical "A" and a cursive "Forbes" written across it.

**Adam Forbes**  
**Principal Ecologist** (MSc)  
**Forbes Ecology**

**References:**

Forbes, A. (2013). Otaki to Levin Route Options: Ecology Constraints. Consultant report prepared by Forbes Ecology for the New Zealand Transport Agency.