ŌTAKI TO NORTH OF LEVIN DBC

DRAFT MULTI CRITERIA ANALYSIS REPORT: ASSESSMENT OF NEW HIGHWAY ALIGNMENT, INTERCHANGE AND LOCAL ROAD OPTIONS

PREPARED FOR WAKA KOTAHI

JULY 2020

This document has been prepared for the benefit of Waka Kotahi. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

QUALITY STATEMENT

PROJECT MANAGER

Jon England

PROJECT TECHNICAL LEAD

Phil Peet

PREPARED BY

Selwyn Blackmore

CHECKED BY

Phil Peet

REVIEWED BY

Phil Peet

APPROVED FOR ISSUE BY

Jon England

WELLINGTON
Level 13, 80 The Terrace, Wellington 6011
PO Box 13-052, Armagh, Christchurch 8141
TEL +64 4 381 6700

REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
1	24/6/20	Draft for Client	S Blackmore	P Peet	P Peet	P Peet
2	11/8/20	Version 2 for Client	S Blackmore	P Peet	P Peet	P Peet
3	24/8/20	FINAL DRAFT	S Blackmore	P Peet	P Peet	P Peet

Ōtaki to North of Levin

Assessment of New Highway Alignment, Interchange and Local Road Options

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. Executive summary

This report sets out the outcomes of the initial investigation of the Waka Kotahi NZ Transport Agency (Waka Kotahi) multi-criteria analysis (MCA) process for the Ōtaki to North Levin New Highway's (Ō2NL) detailed business case (DBC). This Project is part of the NZ Upgrade Programme to "*improve safety and access, support economic growth, provide greater route resilience, and better access to walking and cycling facilities*".

In 2018, Waka Kotahi endorsed an Indicative Business Case, which included endorsement for a new offline highway and a 300m corridor for further investigation (the preferred corridor). It is now undertaking a DBC in order to refine the new highway within this 300m corridor, undertake scheme design and to obtain funding approvals prior to seeking the required statutory authorisations under the Resource Management Act 1991.

Delivering the MCA process in stages

The Multi Criteria Analysis (MCA) process is being staged as follows:

- Stage 1 – Long to short list assessment processes in order to identify a short list of emerging preferred alignments and interchange locations (and supporting interchange form) for detailed MCA evaluation
- Stage 2 – Short list of emerging preferred alignments and interchange MCAs, including MCA Workshops 1 (Alignment) and 2 (Interchanges)
- Stage 3A – Iwi engagement on emerging preferred alignment and interchange options and Iwi MCA scoring (July to September 2020)
- Stage 3B – Public engagement on draft preferred alignment and interchange (August / September 2020)
- Stage 4 – Preferred alignment and interchange MCA to be held in October 2020 (with Iwi to be fully involved), and
- Stage 5 – Recommendation of the preferred alignment and interchange locations to Waka Kotahi for final decision-making processes in late 2020.

This report focuses on the outcomes of Stages 1 and 2 – that is, identification of a short list of emerging preferred alignments and interchange options. A long list of local road options has also been identified in this report. The identification of these options was based on the technical assessments undertaken of the emerging preferred alignments and interchange options. It does not yet take into account scoring from affected Iwi (although Iwi representatives observed the MCA workshops) and the outcomes of community engagement.

The MCA process to identify the preferred local road configuration to integrate with the new highway will be further developed following completion of the August / September 2020 public engagement programme.

Short listed new highway emerging preferred alignments

Following a long to short listing evaluation process, and a comprehensive MCA evaluation of the short listed options (acknowledging that Iwi scoring is expected at the end of Stage 3A), the following emerging preferred alignment options were identified:

Zone	Draft preferred alignment in each New Highway zone
A	Green Alignment (only)
B	White Alignment (only)
C	White Alignment (only)
D	Dark Blue Alignment (only)
E	Green Alignment (only)
F	Both Orange and White Alignments
G	Purple Alignment (only)
H	Cyan Alignment (only)
K	Both Yellow and Dark Blue Alignments
L	Both Orange and Black Alignments

Short listed interchange location / form options

Following a long to short listing technical and MCA evaluation process, the following interchange location / form options were identified as being technically preferred (noting that scoring from affected Iwi and the outcomes of community feedback is yet to be taken into account):

Location	Draft preferred interchange options
Manakau / Kuku	No connection, but future proofing for an interchange at South Kuku (form undecided)
Kimberley or Tararua	Tararua only, noting a preference for grade separation
"SH1 / SH57 Split"	All interchange options
North Levin	Roundabout (only)

Long list of local road options

Using a simplified process, the Project Team identified a long list of local road options that would ensure local connectivity was retained throughout the corridor. This process involved producing schematic plans for each option at each relevant location, which was then assessed through a "traffic signal" evaluation process by the MCA assessors. These high level assessments will be reviewed during Stage 4.

Ongoing Iwi engagement

The detailed MCA processes to identify the above alignment, interchange and local road options has been undertaken alongside ongoing discussions with representatives from Muaūpoko and Raukawa regarding these options. However, as explained above neither Iwi have yet evaluated or scored any of the options (although both Iwi did participate in the weightings discussions at each MCA workshop). Waka Kotahi will continue to engage with both Iwi during Stage 3A, and Iwi will be fully involved during the Stage 4 process outlined above.

Post new highway MCA

Following completion of the MCA and based on the detailed feedback from the MCA assessors, the Project Team has undertaken further design refinements for some of the emerging preferred alignments, interchange location / form options and local road options. This work principally involved:

- Design refinements to the emerging preferred alignments in each zone to ensure they connected efficiently to the alignments in the adjacent zones and to the emerging preferred interchange options
- Design refinements to the emerging preferred interchange and local road options, and
- Minor design updates to the emerging preferred options in order to respond to the recommendations made by the MCA assessors at the MCA Workshops.

The design refinement changes are documented in the *Post MCA Update Report (August 2020)*.

Next Steps

The next key step is for Waka Kotahi to undertake public engagement on the emerging preferred options for the highway alignment, interchanges, and local roads. Following public engagement, a final MCA process will be undertaken in October / November 2020. Following completion of the MCA, the preferred options will be recommended and presented to Waka Kotahi for final decision-making processes, which is expected to occur in late 2020.

Waka Kotahi has commenced engagement with Iwi on the emerging preferred options and will obtain Iwi scoring by the end of Stage 3A. This will feed into Stage 4, during which Iwi will be fully involved in the MCA process.

It is important to note that the MCA outcomes of Stages 1 to 5 (as set out above) are not the only factor that will be used in determining the options for consultation and the preferred alignment, interchange and local road options. These decisions will be made by Waka Kotahi who must also take into account cost and funding availability, risk and opportunities, and the desired outcomes of Iwi, the community and key stakeholders.

2. Introduction

State Highway 1 (SH1) is New Zealand's premier highway, but the section between Ōtaki and Levin is afflicted by a number of serious safety, efficiency and resilience problems. The importance of this section of SH1 is characterised by its function in connecting Wellington to the upper North Island, where no other resilient route exists. It also provides an essential economic connection to Palmerston North, the largest freight node in central New Zealand.

Therefore, Waka Kotahi NZ Transport Agency (Waka Kotahi) has been investigating potential upgrades and new alignment options to address the issues with the existing SH1 route. In 2018, an Indicative Business Case (IBC) was endorsed, which included endorsement for an offline highway from Taylors Road in the south to north of Levin (the Project or Ō2NL Highway), and a 300m corridor (the preferred corridor) for further investigation. This Project was subsequently included in the NZ Upgrade Programme to *"improve safety and access, support economic growth, provide greater route resilience, and better access to walking and cycling facilities"*.

Waka Kotahi is now undertaking a Detailed Business Case (DBC) to refine the new highway alignment, interchange locations / options, and local road connections for the preferred corridor plus undertake scheme design and obtain funding approvals.

As set out in Figure 1 below, the preferred corridor is located to the east of State Highway 1 (SH1) and State Highway 57 (SH57). In summary, heading north, the proposed new highway will extend from the northern end of the Peka Peka to Ōtaki Expressway (which is located approximately 2km north of the Ōtaki township) and will re-connect into SH1 and SH57 to the north of Levin (the New Highway).

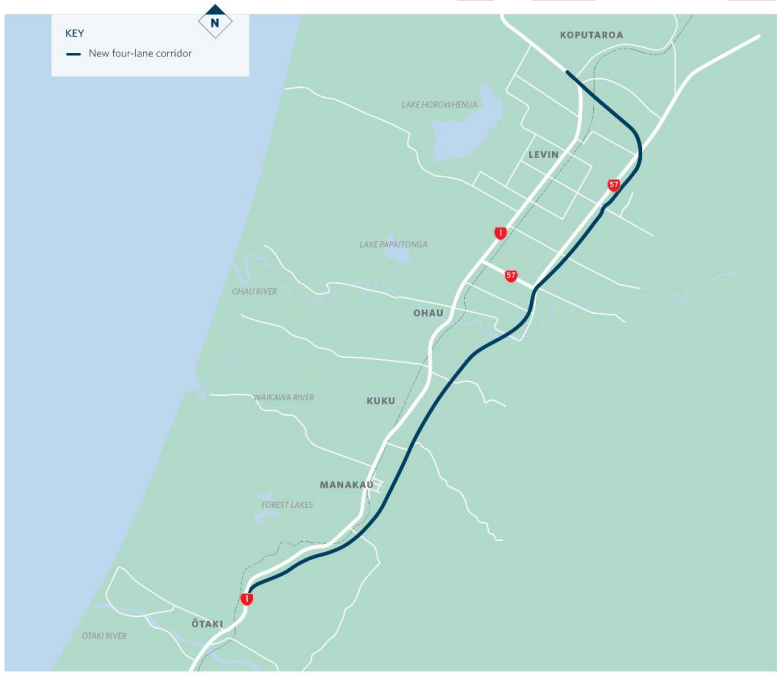


Figure 1 – Preferred 300m corridor for the Ōtaki to North Levin New Highway

At the completion of the IBC it was identified that one of the first key activities to be undertaken to inform the DBC was to undertake multi criteria analysis (MCA) processes to help identify a preferred alignment within the 300m corridor, the preferred location for the New Highway's interchanges and to identify the local road re-configuration and connections.

3. Purpose

The purpose of this report is to set out the MCA processes undertaken to date by the Ō2NL New Highway's Project Team, its partners and technical specialists in order to identify the emerging preferred alignments and interchange locations (and forms) for further consideration and public consultation.

It is noted that an investigation into local road reconfiguration options to accommodate the New Highway has also been undertaken. This report documents the long listing processes, including the Project Team's initial assessments of the local road options.

3.1 Iwi engagement

Both Muaūpoko and Raukawa have been observers of the MCA processes undertaken to date, however formal evaluations or scoring of the emerging preferred alignments, interchange, and local road options by these affected Iwi is yet to come (although Iwi did participate in the discussions at each MCA workshop). Rather, both will complete the Stage 3A process and be fully involved in the Stage 4 of the MCA process (see below).

4. Indicative business case MCA processes

In summary, the MCA undertaken to inform the IBC comprised the following:

- A long list corridor MCA process undertaken in 2017 (which is documented in "*Identification and assessment of possible route options – multi criteria analysis with community involvement*"),[1] and
- A long to short list corridor process undertaken in 2018 to identify a preferred corridor option (as documented in the IBC itself).

Ultimately, the MCA processes undertaken for the IBC identified the preferred corridor, being a 300m corridor consisting of Waka Kotahi's preferred S6 (for the southern section) and N4 (for the northern section) corridor alignments. The preferred corridor is set out in Figure 1 above.

Following completion of the IBC, and after considering its recommendations, the Waka Kotahi Board formally endorsed the preferred corridor at its Board meeting in December 2018.[2]

5. MCA developmental stages

The MCA processes to identify emerging preferred alignments and interchange locations (and supporting forms) are being undertaken in accordance with the following stages:

- Stage 1 – Long to short list assessment processes in order to identify a short list of emerging preferred alignments and interchange locations (and supporting form) for detailed MCA evaluation
- Stage 2 – Short list of emerging preferred alignments and interchange MCAs, including MCA Workshops 1 (Alignment) and 2 (Interchanges)

[1] See - https://www.nzta.govt.nz/assets/projects/otaki-to-north-of-levin/docs/technical-reports/mca-reports/O2NL-Community-MCA-Report-September-2017-Front-only.pdf. It is noted that this report was peer reviewed by Mitchell Daysh (see - See - https://www.nzta.govt.nz/assets/projects/otaki-to-north-of-levin/docs/technical-reports/ibc/Otaki-to-North-of-Levin-IBC-20181128.pdf)

[2] See Board Meeting minutes from Friday 14 December 2018 (i.e. Resolution 2): https://www.nzta.govt.nz/assets/About-us-2/docs/board-meeting-minutes-2017/minutes-20181214.pdf

- Stage 3A – Iwi engagement on emerging preferred alignment and interchange options and Iwi MCA scoring (July to September 2020)
- Stage 3B – Public engagement on draft preferred alignment and interchange (August / September 2020)
- Stage 4 – Preferred alignment and interchange MCA to be held in October 2020 (with Iwi to be fully involved), and
- Stage 5 – Recommendation of the preferred alignment and interchange locations to Waka Kotahi for final decision-making processes in late 2020.

Section 6 of this report describes the MCA methodology and evaluation results that have led to the identification of the emerging preferred alignments.

Section 7 of this report details the MCA methodology and evaluation results that have led to the identification of recommended interchange location and form options.

As noted above, the Project Team has undertaken a local road long listing process. Section 8 of this report documents the long listing processes, including the Project Team's initial assessments of each long listed option.

6. New Highway alignment MCA

6.1 Stage 1 - Long to short listing processes

In order to identify a short list of emerging preferred alignment options for detailed MCA evaluation the following steps were undertaken.

6.1.1 Step 1: Identification of fixed points

The Project Team firstly identified / mapped key fixed points along the preferred corridor. Such points included the preferred corridor's start and finish points, the location of known Resource Management Act 1991 (RMA) Section 6 "factors" (e.g. significant ecological or heritage areas), areas with significant property (e.g. Maori land) as well as key engineering constraints (e.g. topography). These locations were identified primarily from the IBC's constraints and opportunities maps and topographical data collected by the Project Team.

6.1.2 Step 2: Identification of New Highway alignment zones

Following identification of the fixed points, the Project Team divided the preferred corridor into zones (ranging from ~1.5km to ~4.5km in length) in order to identify a long list of emerging preferred alignment options for each zone.

The identification of each zone's location was based on engineering / environmental considerations (e.g. topography, preliminary interchange location and waterway locations).

From this process a total of 10 alignment zones were identified and assigned a letter (e.g. A, B, C). Some modification to these zones occurred, but it is noted that the original zone letters were retained (hence some zone lettering not been in alphabetical order).

6.1.3 Step 3: Generating New Highway alignment options

Next, up to six 80m wide alignments were identified for each zone. Each 80m alignment option was predicated on horizontal geometry standards, property information and topographical information plus a review of the IBC constraints and opportunities maps. Each alignment route mapped was two dimensional (i.e. no vertical alignment aspects were considered at this point).

It is noted that the Project Team identified that an 80m width for a New Highway alignment was enough to contain the road carriageway (e.g. four lanes and road shoulders), a shared path, landscaping, drainage and earthworks in most places.[3]

An example of a long list of emerging preferred alignment options for Zone D is set out in Figure 2 below.

Alignments were identified outside the preferred corridor in two locations:

- Zone F, where there was an identified opportunity to miss the Kimberley / Arapaepae Road intersection and a cluster of dwellings by having the alignment further to the east of the preferred corridor, and
- Zone L, where landowner feedback had identified an option of running further south of the current alignment to keep Sorensons Road intact.

These options were added to the long list and evaluated through the process, noting that they may have additional adverse landowner impacts that would need to be very carefully considered before proceeding.

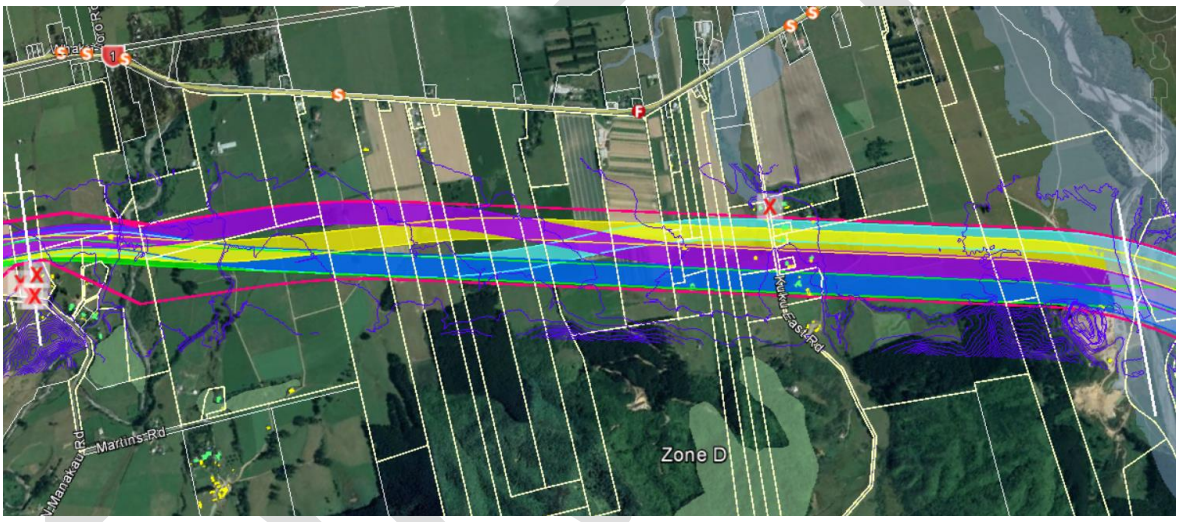


Figure 2 – Zone D's long listed alignment options

6.1.4 Step 4: Screening the long list of alignment options

The Project Team[4] met in mid-March to determine whether any of the long listed 80m alignment options could be removed or could be adapted to a more optimal alignment. This "screening process" was undertaken at a Project Team workshop (held in mid-March) in two parts as follows:

- **Part 1** – comprised reviewing the IBC's constraints and opportunities maps for the preferred corridor in order to identify any alignment options that were obviously fatally flawed (ultimately no alignment options were removed as a consequence of this review), and
- **Part 2** – comprised the Project Team considering the 80m alignments for each zone and asking itself the following questions:
    - Does any alignment impact on a residential dwelling(s)?
    - Does any alignment impact on any known community/Iwi assets (including future Horowhenua District Council (HDC) growth areas)?

[3] It is noted that future design stages and designation processes will result in the 80m width being narrowed in the most part. However, in some areas, the 80m width may increase around interchanges, areas of cut/fill, drainage and stormwater treatment, parallel service roads and mitigation such as bunding and planting

[4] The attendees at the Design Team workshop were: Selwyn Blackmore (Transport Planning Lead), Jamie Povall (Design Manager), Phil Peet (Team Leader), Keith Weale (Geometrics Lead), April Peckham (Resource Planner), and Chris Hansen (Lead Resource Planner)

- Does an alignment make reconnecting the local road network more complex?
- Is an alignment located within a flood zone, if so, will it make it more complex to construct?
- Does the alignment impact on a known/significant ecological area?
- Does the alignment impact on high quality productive land?
- Does an alignment optimise (or compromise) preferred bridge crossing locations?
- Does the alignment make connecting the alignment in the zones to the south and/or north more complex to implement?
- Will the local topography for the alignment make constructability more complex?
- Will the alignment result in sub-optimal property parcel outcomes?
- Will the alignment impact on a special amenity area [as defined by the Kāpiti Coast District Council's (KCDC) District Plan]?

If the Project Team's collective answer was "yes" to any of the above questions, it then used its professional technical expertise to identify whether alignment option(s) should be removed from further consideration or adapted to a more optimal alignment.

It is noted that the Project Team acknowledged at the start of the workshop that its long to short listing recommendations may need to be revisited following completion of Stages 1 and 2.

6.1.5 Step 5: Documenting the long to short list alignment process

Following completion of the Project Team workshop, a short list of emerging preferred alignments for each zone were identified for further assessment in the MCA process.

Further information on the long to short list process can be found in the *Ōtaki to North of Levin Detailed Business Case: Initial Alignment Review (12 May 2018)* attached as Appendix A.

6.2 Stage 2 - Identifying the emerging preferred alignment options

The first step in the short listing of the emerging preferred alignments process was to identify the relevant MCA assessment criteria for the New Highway alignment (which will also be used for the interchange location and supporting form), and then to select the MCA assessors to undertake each assessment.

6.2.1 MCA assessment areas

In conjunction with Waka Kotahi, the Project Team selected the assessment areas as set out in Table 1 below.

Table 1: Assessment areas and summary descriptions (applying to the alignment and interchange options)

Assessment Criteria	Summary of assessment criteria
Fit with Project Objectives	This assessment criterion involves a high-level assessment of the overall contribution each alignment and interchange option will make to the following project / RMA objectives: • Enhance the safety of the State highway network by delivering a four lane State highway between Ōtaki and North of Levin • Improve the resilience of the State highway network • Support intra and inter-regional economic growth and productivity through improved movement of people and freight • Provide integration between the State highway network and the local road network including supporting access to multi-modal connections and Levin, and • Enhance efficiency and journey time reliability along the State highway network.
Environmental / social impacts	
Iwi Cultural Values (Raukawa)	This assessment criterion considers the impacts on the Tangata Whenua values associated with the alignment, interchange and local road options, including past and present associations, key areas of settlement (marae and papakianga), waahi tapu (if known) and other cultural values, areas of use (e.g. food gathering), current ownership, and important elements of the natural environment such as waterways and wetlands.[5]
Iwi Cultural Values (Muaūpoko)	This assessment criterion considers the impacts on the Tangata Whenua values associated with the alignment, interchange and local road options, including past and present associations, key areas of settlement (marae and papakianga), waahi tapu (if known) and other cultural values, areas of use (e.g. food gathering), current ownership, and important elements of the natural environment such as waterways and wetlands. [6]

[5] This criterion has not yet been scored and therefore this summary may change
[6] This criterion has not yet been scored and therefore this summary may change

Landscape/Visual	This assessment criterion considers natural and landscape character impacts (including degree of modification and presence of structures) of the alignment, interchange and local road options. It includes considering potential landscape and urban design impacts of the alignment on nearby townships or notable lifestyle areas.
Ecology (both terrestrial and freshwater / wetland)	This assessment criterion considers the terrestrial and freshwater / wetland impacts. For terrestrial impacts, the criterion considers terrestrial ecological values such as indigenous vegetation areas that are nationally, regionally or locally significant in terms of habitat values and the presence of species. For freshwater / wetland impacts, the criterion considers the potential effects on waterways (e.g. lakes, rivers and streams) and wetlands.
Heritage	This assessment criterion considers the impacts on known heritage buildings.
Archaeology	This assessment criterion considers the impacts on known archaeological sites and features, and the risks of encountering archaeological features, or new areas of significance.
Noise and vibration	This assessment criterion considers the noise and vibration impacts on dwellings and other community buildings (sensitive receptors) located within 300m of the alignment, interchange and local road options (which don't require removal).
Productive Land Values	This assessment criterion considers the impacts on productive values of Classes I to III soils.
Social / community / recreation[7]	This assessment criterion considers the social / community and recreational impacts on local communities, including community severance / opportunities, and construction phase impacts.
Horowhenua District Development (applying to Horowhenua Only)	This assessment criterion considers the impacts on the approved Horowhenua District Plan's provisions and the confirmed future growth plans for the Horowhenua District.

[7] At the time of writing the draft report, engagement work with the affected communities was still being conducted, resulting in these scores remaining 'provisional'

Kāpiti Coast District Development (applying to the Kāpiti District Only, and alignment only)	This assessment criterion considers the impacts on the provisions of the approved KCDC District Plan and the confirmed future growth plans for the Kāpiti Coast District.
Implementability impacts	
Fit with local road system	This assessment criterion considers the contribution of the alignment and interchange options to the management of the local road network, including the opportunities to update or integrate effectively with the existing roading hierarchy in the Horowhenua district. This criterion differs from the transport benefits criteria, as it focuses on the local network as a system in its own right (i.e. receiving and dispatching traffic in the Horowhenua district).
Engineering degree of difficulty	This assessment criterion considers the physical components of the alignment, interchange and local road options, including: volume and balance of earthworks, structures, complexity of programming and temporary works, traffic and access management during construction, risks around "unknowns", any necessary additional provisions to address natural hazards, and general degree of difficulty in construction.
Property degree of difficulty	This assessment criterion considers the number of properties, extent of severance of existing properties, the general ability to align an option with property boundaries, potential for effects on farming/business operations, Maori land, and any known land tenure issues that may create difficulties.

6.2.2 MCA assessors

In order to ensure consistency of this MCA process with the MCA assessments undertaken for the IBC in 2017 and 2018, the Project Team selected the same MCA assessors where it was possible to secure their services.

The MCA assessors selected to undertake the assessments set out in Table 1 above are as follows:

- Stantec - Fit with Project Objectives
- Raukawa - Iwi Cultural Values (Raukawa)
- Muaūpoko - Iwi Cultural Values (Muaūpoko)
- Isthmus - Landscape / Visual
- Forbes Ecology Limited - Ecology
- Ian Bowman, architect and conservator - Heritage (Built)
- Daniel Parker, Insite Archaeology - Archaeology
- Chiles Ltd - Noise / Vibration
- Land Vision - Productive Land Values
- BECA - Social / Community / Recreation
- Horowhenua District Council - Horowhenua District Development
- Kāpiti Coast District Council - Kāpiti Coast District Development
- Horowhenua District Council - Fit with Local Road System
- Stantec - Engineering Degree of Difficulty
- The Property Group - Property Degree of Difficulty

6.2.3 MCA assessment instructions

Various briefings for the MCA assessors for the New Highway alignment and interchange options were undertaken between 9 April and 25 May 2020.

The first technical briefing (#1), which was held on 9 April 2020, provided the MCA assessors with an update on the Project, and an opportunity for them to identify what additional information they would need to undertake their evaluations.

In early May, the MCA assessors were then issued with further instructions on the MCA process. These instructions outlined the following:

- There would be two MCA workshops. MCA Workshop 1 would consider the emerging preferred alignment options, and MCA Workshop 2 would consider the interchange options (and long list of local roads)
- The key requirements that needed to be delivered by each MCA Assessor for Stage 2 of the MCA process (e.g. participation and presentations in the MCA workshops, and production of detailed MCA reports)
- The essential information that would need to be identified in the detailed MCA reports to be delivered for Stage 2, including key background / baseline information, key assumptions applied[8] to the MCA assessors scoring as well as

[8] It was noted in the instructions that each MCA assessor was to base their assessments on an assumption of reasonable mitigation measures being applied to the effects

identifying what additional information might be needed to complete scoring for the final MCA to be held in Stage 4, and

- The location of the Project sharepoint for sharing and storing MCA evaluation information.

The second technical briefing (#2) was held on 12 May, at this briefing it was confirmed:

- that the MCA would be undertaken to inform both the DBC and subsequent RMA processes
- that the following project / RMA objectives would be evaluated:
    - Enhance the safety of the State highway network by delivering a four lane State highway between Ōtaki and North of Levin
    - Improve the resilience of the State highway network
    - Support intra and inter-regional economic growth and productivity through improved movement of people and freight
    - Provide integration between the State highway network and the local road network including supporting access to multi-modal connections and Levin, and
    - Enhance efficiency and journey time reliability along the State highway network.
- the approach for the MCA workshop would be predicated on the *Decision Conferencing* approach (i.e. where scoring and weightings are identified through discussion and consensus, but informed by expert views)
- a 6 point scoring system was to be used for the MCA evaluation as set out in Table 2 below:

Table 2: 6 point scoring system for the MCA evaluations

Score	Description
1	The option presents few difficulties on the basis of the criterion being evaluated and may provide significant benefits in terms of the attribute
2	The option presents only minor aspects of difficulty on the basis of the criterion being evaluated, and may provide some benefits in terms of the criterion
3	The option presents some aspects of reasonable difficulty in terms of the criterion being evaluated and problems cannot be completely avoided. There are few apparent benefits in terms of the criterion
4	The option includes clear aspects of difficulty in terms of the criterion being evaluated, and very limited perceived benefits
5	The option includes significant difficulties or problems in terms of the criterion being evaluated and no apparent benefits
F	The option will result in completely unacceptable adverse effects that cannot be appropriately avoided, remedied or mitigated (including offsetting)

- that all scoring should be absolute (that is, no artificial distinctions should be made between the options)

- that all MCA assessors were to base their evaluations on existing information and to use their professional expert judgment (but to advise if additional information would be needed to complete their final MCA evaluations in Stage 4)
- that a workshop weighting would be agreed for the emerging preferred alignments and interchange options at MCA Workshops 1 and 2 respectively. Other weightings for RMA Section 6 matters and the quadruple bottom line (i.e. social, environmental, cultural and economic) would be developed for sensitivity testing purposes, and
- that 3D google earth design files would be provided to provide detail information on the New Highway alignments (and interchange locations / forms).

6.2.4 Evaluating the New Highway alignments

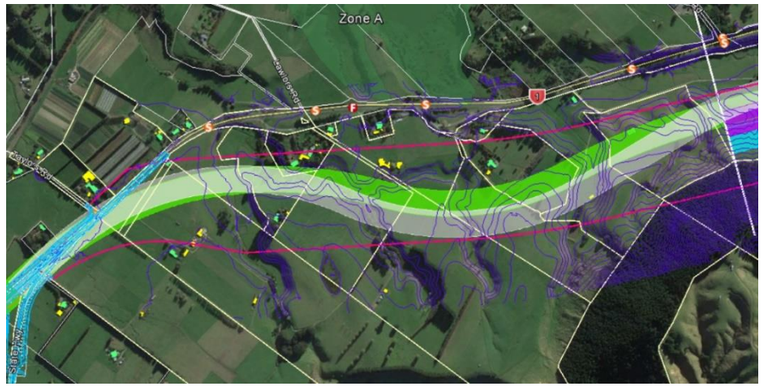
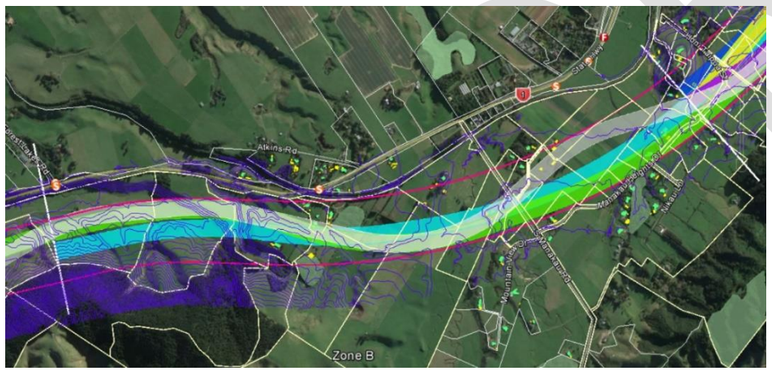
MCA Workshop 1 for the New Highway alignment was held on 25 May 2020. The workshop was attended by the MCA assessors, key members of the Project Team, observers from Waka Kotahi as well as representatives from Raukawa and Muaūpoko. The names of those who took part in MCA Workshop 1 are provided in Appendix B (which also includes a list of the attendees that participated in MCA Workshop 2).

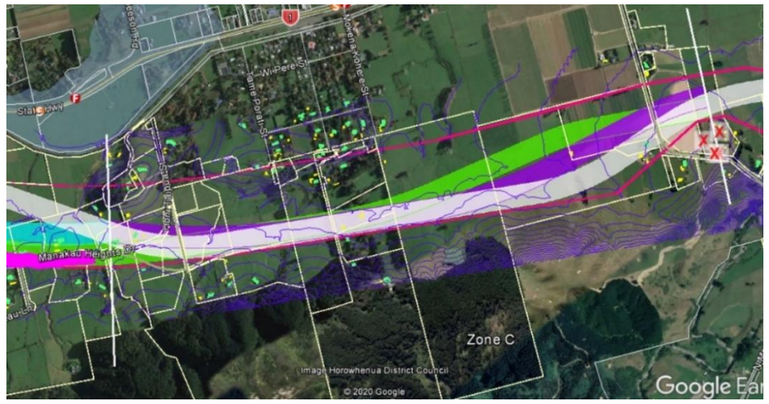
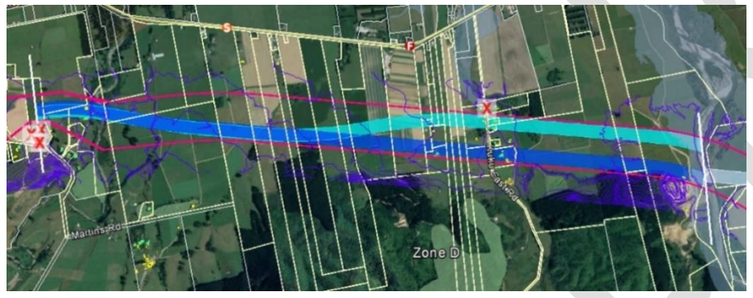
The outcomes of the MCA assessors unweighted (i.e. raw) scores for each New Highway alignment are set out in Table 3 below. Each MCA assessor's individual unweighted scores are discussed in the commentary that follows these tables.

As noted above, Iwi did not record scores for the emerging preferred alignment options (and interchange options). As such no scores were recorded for the Iwi Cultural Values (Raukawa) and Iwi Cultural Values (Muaūpoko) assessment criterions. No scores have been recorded in the tables below (as highlighted in yellow).

It is also noted that the MCA assessor for the Kāpiti Coast District Development assessment criterion only evaluated the emerging preferred alignment options in Zones A and B. Similarly, the MCA assessor for the Horowhenua District Development assessment criterion evaluated all New Highway alignment options, except for Zone A. Accordingly, no scores were recorded in the tables below for the respective columns.

Table 3 – MCA assessor unweighted scores for New Highway alignment

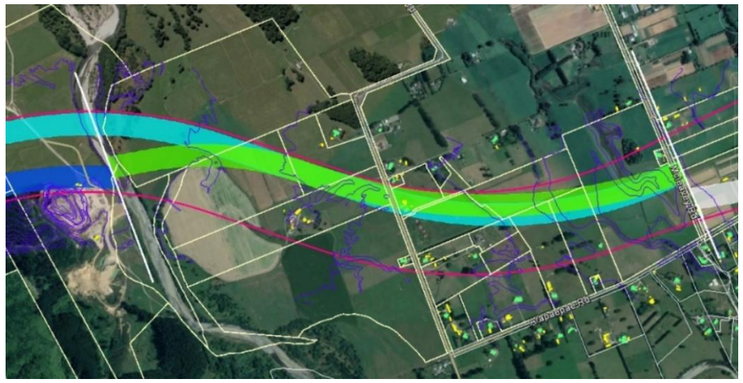
<table>
<tr><th>Zone</th><th>Short listed options</th><th>Short listed option locations</th><th>MCA assessors evaluation scores (unweighted)</th></tr>
<tr><td>A</td><td>A -Green
B - White</td><td> 
</td><td>
<table>
<tr><th>Zone</th><th>01 - PO - Enhanced movement</th><th>01 - PO - Safety</th><th>01 - PO - Resilience</th><th>01 - PO - Connections</th><th>02 - Iwi Raukawa</th><th>03 - Iwi Muaupoko</th><th>04 - Landscape/visual</th><th>05a - Ecology Terrestrial</th><th>05b - Ecology freshwater and wetlands</th><th>06 - Heritage</th><th>07 - Archaeology</th><th>08 - Noise and vibration</th><th>09 - Productive land values</th><th>10 - Social/community/recreation</th><th>11 - Horowhenua District development</th><th>12 - Kapiti Coast District development</th><th>13 - Fit with local road system</th><th>14 - Engineering degree of difficulty</th><th>15 - Property degree of difficulty</th><th>Final Score (unweighted)</th><th>Final Ranking (unweighted)</th></tr>
<tr><td>A - Green</td><td>1</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td>3</td><td>1</td><td>3</td><td>1</td><td>3</td><td>3</td><td>3</td><td>2</td><td>-</td><td>2</td><td>-</td><td>3</td><td>5</td><td>34</td><td>1</td></tr>
<tr><td>A - White</td><td>1</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td>2</td><td>1</td><td>3</td><td>1</td><td>3</td><td>3</td><td>3</td><td>2</td><td>-</td><td>4</td><td>-</td><td>4</td><td>5</td><td>36</td><td>2</td></tr>
</table>
</td></tr>
<tr><td>B</td><td>B - Green
B - White
B -Cyan</td><td> 
</td><td>
<table>
<tr><th>Zone</th><th>01 - PO - Enhanced movement</th><th>01 - PO - Safety</th><th>01 - PO - Resilience</th><th>01 - PO - Connections</th><th>02 - Iwi (Raukawa)</th><th>03 - Iwi Muaupoko</th><th>04 - Landscape/visual</th><th>05a - Ecology Terrestrial</th><th>05b - Ecology freshwater and wetlands</th><th>06 - Heritage</th><th>07 - Archaeology</th><th>08 - Noise and vibration</th><th>09 - Productive land values</th><th>10 - Social/community/recreation</th><th>11 - Horowhenua District development</th><th>12 - Kapiti Coast District development</th><th>13 - Fit with local road system</th><th>14 - Engineering degree of difficulty</th><th>15 - Property degree of difficulty</th><th>Final Score (unweighted)</th><th>Final Rankings (unweighted)</th></tr>
<tr><td>B - Cyan</td><td>1</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td>3</td><td>4</td><td>2</td><td>1</td><td>2</td><td>4</td><td>3</td><td>3</td><td>1</td><td>3</td><td>3</td><td>3</td><td>4</td><td>40</td><td>2</td></tr>
<tr><td>B - Green</td><td>1</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td>5</td><td>2</td><td>2</td><td>1</td><td>2</td><td>4</td><td>3</td><td>4</td><td>1</td><td>2</td><td>3</td><td>4</td><td>4</td><td>41</td><td>3</td></tr>
<tr><td>B - White</td><td>1</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td>2</td><td>4</td><td>2</td><td>1</td><td>2</td><td>4</td><td>3</td><td>2</td><td>1</td><td>3</td><td>3</td><td>3</td><td>3</td><td>38</td><td>1</td></tr>
</table>
</td></tr>
</table>

<table>
<tr>
<th>Zone</th>
<th>Short listed options</th>
<th>Short listed option locations</th>
<th>MCA assessors evaluation scores (unweighted)</th>
</tr>
<tr>
<td>C</td>
<td>C – Green
C - Purple
C - White</td>
<td> 
</td>
<td>
<table>
<tr><th>Zone</th><th>01 - PO - Enhanced movement</th><th>01 - PO - Safety</th><th>01 - PO - Resilience</th><th>01 - PO - Connections</th><th>02 - Iwi (Raukawa)</th><th>03 - Iwi Muaupoko</th><th>04 - Landscape/visual</th><th>05a - Ecology Terrestrial</th><th>05b - Ecology freshwater and wetlands</th><th>06 - Heritage</th><th>07 - Archaeology</th><th>08 - Noise and vibration</th><th>09 - Productive land values</th><th>10 - Social/community/recreation</th><th>11 - Horowhenua District development</th><th>12 - Kapiti Coast District development</th><th>13 - Fit with local road system</th><th>14 - Engineering degree of difficulty</th><th>15 - Property degree of difficulty</th><th>Final Score (unweighted)</th><th>Final Rankings (unweighted)</th></tr>
<tr><td>C - Green</td><td>1</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td>3</td><td>1</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>2</td><td>1</td><td>-</td><td>3</td><td>2</td><td>4</td><td>40</td><td>3</td></tr>
<tr><td>C - Purple</td><td>1</td><td>1</td><td>1</td><td>1</td><td></td><td></td><td>2</td><td>1</td><td>4</td><td>4</td><td>4</td><td>3</td><td>4</td><td>2</td><td>1</td><td>-</td><td>3</td><td>3</td><td>4</td><td>39</td><td>2</td></tr>
<tr><td>C - White</td><td>1</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td>3</td><td>1</td><td>2</td><td>4</td><td>5</td><td>3</td><td>3</td><td>2</td><td>1</td><td>-</td><td>3</td><td>2</td><td>4</td><td>38</td><td>1</td></tr>
</table>
</td>
</tr>
<tr>
<td>D</td>
<td>D - Dark Blue
D - Cyan</td>
<td> 
</td>
<td>
<table>
<tr><th>Zone</th><th>01 - PO - Enhanced movement</th><th>01 - PO - Safety</th><th>01 - PO - Resilience</th><th>01 - PO - Connections</th><th>02 - Iwi (Raukawa)</th><th>03 - Iwi Muaupoko</th><th>04 - Landscape/visual</th><th>05a - Ecology Terrestrial</th><th>05b - Ecology freshwater and wetlands</th><th>06 - Heritage</th><th>07 - Archaeology</th><th>08 - Noise and vibration</th><th>09 - Productive land values</th><th>10 - Social/community/recreation</th><th>11 - Horowhenua District development</th><th>12 - Kapiti Coast District development</th><th>13 - Fit with local road system</th><th>14 - Engineering degree of difficulty</th><th>15 - Property degree of difficulty</th><th>Final Score (unweighted)</th><th>Final Rankings (unweighted)</th></tr>
<tr><td>D - Cyan</td><td>1</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td>3</td><td>3</td><td>4</td><td>1</td><td>2</td><td>3</td><td>4</td><td>2</td><td>3</td><td>-</td><td>3</td><td>2</td><td>5</td><td>40</td><td>2</td></tr>
<tr><td>D - Dark Blue</td><td>1</td><td>1</td><td>2</td><td>1</td><td></td><td></td><td>3</td><td>1</td><td>4</td><td>1</td><td>3</td><td>3</td><td>3</td><td>1</td><td>2</td><td>-</td><td>3</td><td>3</td><td>5</td><td>37</td><td>1</td></tr>
</table>
</td>
</tr>
</table>

Zone	Short listed options	Short listed option locations	MCA assessors evaluation scores (unweighted)

E

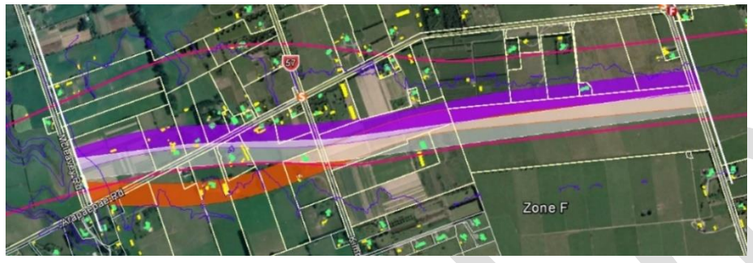
E - Green
E - Cyan



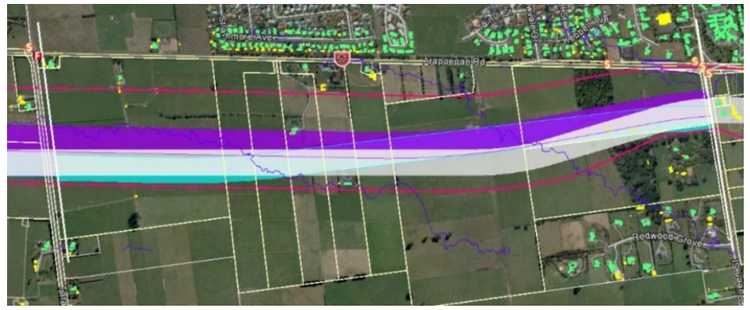
Zone	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty	Final Score (unweighted)	Final Rankings (unweighted)
E - Cyan	1	1	2	1			3	1	2	1	2	3	3	3	3	-	3	2	3	**34**	**1=**
E - Green	1	1	2	1			3	1	2	1	2	3	3	3	2	-	3	3	3	**34**	**1=**

F

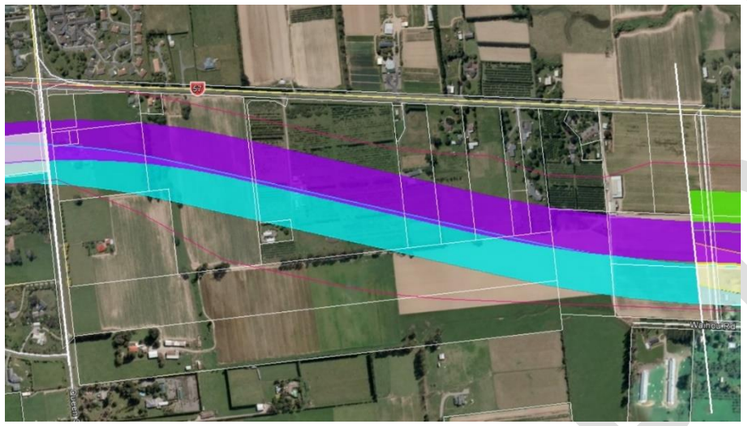
F - Orange
F – Purple
F - white



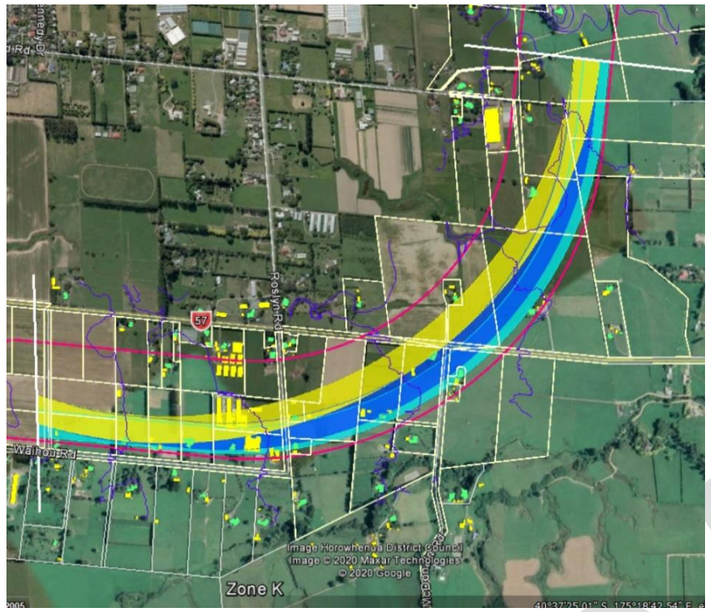
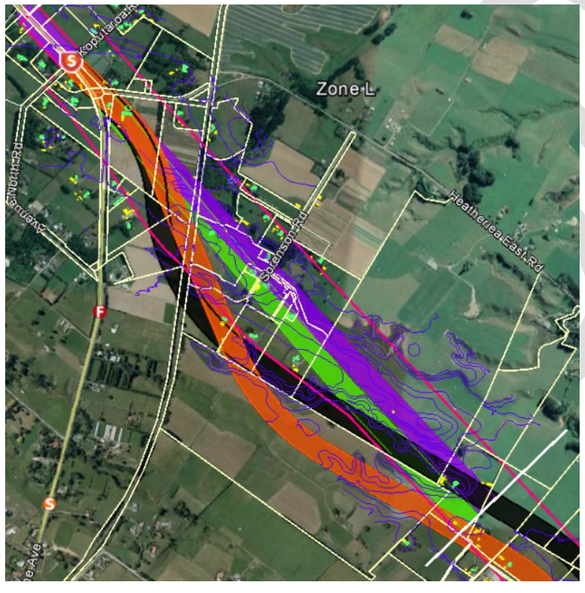
Zone	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty	Final Score (unweighted)	Final Rankings (unweighted)
F - Orange	1	1	1	1			3	1	1	2	3	3	4	3	3	-	3	2	3	**35**	**1**
F - Purple	1	1	1	1			5	1	1	2	3	4	4	3	3	-	3	2	4	**39**	**3**
F - White	1	1	1	1			5	1	1	2	3	3	4	3	3	-	3	2	4	**38**	**2**

Zone	Short listed options	Short listed option locations	MCA assessors evaluation scores (unweighted)
G	G - Purple, G - White G - Cyan		

Zone	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty	Final Score (unweighted)	Final Rankings (unweighted)
G - Cyan	1	1	1	1			3	1	1	2	3	2	3	2	4	-	3	1	3	**32**	**2**
G - Purple	1	1	1	1			3	1	1	2	2	2	3	2	4	-	3	1	3	**31**	**1**
G - White	1	1	1	1			3	1	1	2	3	3	3	2	4	-	3	2	3	**34**	**3**

Zone	Short listed options	Short listed option locations
H	H - Purple H - Cyan	

Zone	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty	Final Score (unweighted)	Final Rankings (unweighted)
H - Cyan	1	1	1	1			3	1	1	2	1	3	5	2	2	-	3	1	3	**31**	**1**
H - Purple	1	1	1	1			3	1	1	2	1	3	5	2	2	-	3	1	4	**32**	**2**

Zone	Short listed options	Short listed option locations	MCA assessors evaluation scores (unweighted)
K[9]	K - Yellow K- Dark Blue K - Cyan		
L	L – Purple L - Green L – Orange L - Black		

Zone	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty	Final Score (unweighted)	Final Rankings (unweighted)
K - Cyan	1	1	1	1			4	1	2	1	3	4	5	4	2	-	3	2	5	**40**	**1=**
K - Dark Blue	1	1	1	1			4	1	2	1	3	3	5	4	3	-	3	2	5	**40**	**1=**
K - Yellow	1	1	1	1			4	1	2	1	3	3	5	4	3	-	3	2	5	**40**	**1=**

Zone	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty	Final Score (unweighted)	Final Rankings (unweighted)
L - Black	1	1	1	1			3	1	2	1	3	3	5	3	3	-	3	3	4	**38**	**2**
L - Green	1	1	1	1			5	1	2	1	3	3	5	4	2	-	3	4	4	**41**	**3=**
L - Orange	1	1	1	1			3	1	2	1	3	3	5	3	3	-	3	3	3	**37**	**1**
L - Purple	1	1	1	1			5	1	2	1	3	3	5	4	2	-	3	4	4	**41**	**3=**

[9] It is noted that the zone descriptors (i.e. letters) are not always sequential due to the initial zone allocations requiring some zones to be combined

6.2.5 Overall unweighted evaluation summary

Table 4 sets out the overall summary of the unweighted MCA evaluation scores.

Table 4 – Summary of MCA assessor unweighted evaluation scores for the emerging preferred alignments

Zone	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty	Final Score (unweighted)	Final Rankings (unweighted)
A - Green	1	1	2	1			3	1	3	1	3	3	3	2	-	2	-	3	5	**34**	**1**
A - White	1	1	2	1			2	1	3	1	3	3	3	2	-	4	-	4	5	**36**	**2**
B - Cyan	1	1	1	1			3	4	2	1	2	4	3	3	1	3	3	3	4	**40**	**2**
B - Green	1	1	1	1			5	2	2	1	2	4	3	4	1	2	3	4	4	**41**	**3**
B - White	1	1	2	1			2	4	2	1	2	4	3	2	1	3	3	3	3	**38**	**1**
C - Green	1	1	1	1			3	1	4	4	4	4	4	2	1	-	3	2	4	**40**	**3**
C - Purple	1	1	1	1			2	1	4	4	4	3	4	2	1	-	3	3	4	**39**	**2**
C - White	1	1	2	1			3	1	2	4	5	3	3	2	1	-	3	2	4	**38**	**1**
D - Cyan	1	1	2	1			3	3	4	1	2	3	4	2	3	-	3	2	5	**40**	**2**
D - Dark Blue	1	1	2	1			3	1	4	1	3	3	3	1	2	-	3	3	5	**37**	**1**
E - Cyan	1	1	2	1			3	1	2	1	2	3	3	3	3	-	3	2	3	**34**	**1=**
E - Green	1	1	2	1			3	1	2	1	2	3	3	3	2	-	3	3	3	**34**	**1=**

Zone	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty	Final Score (unweighted)	Final Rankings (unweighted)
F - Orange	1	1	1	1			3	1	1	2	3	3	4	3	3	-	3	2	3	**35**	**1**
F - Purple	1	1	1	1			5	1	1	2	3	4	4	3	3	-	3	2	4	**39**	**3**
F - White	1	1	1	1			5	1	1	2	3	3	4	3	3	-	3	2	4	**38**	**2**
G - Cyan	1	1	1	1			3	1	1	2	3	2	3	2	4	-	3	1	3	**32**	**2**
G - Purple	1	1	1	1			3	1	1	2	2	2	3	2	4	-	3	1	3	**31**	**1**
G - White	1	1	1	1			3	1	1	2	3	3	3	2	4	-	3	2	3	**34**	**3**
H - Cyan	1	1	1	1			3	1	1	2	1	3	5	2	2	-	3	1	3	**31**	**1**
H - Purple	1	1	1	1			3	1	1	2	1	3	5	2	2	-	3	1	4	**32**	**2**
K - Cyan	1	1	1	1			4	1	2	1	3	4	5	4	2	-	3	2	5	**40**	**1=**
K - Dark Blue	1	1	1	1			4	1	2	1	3	3	5	4	3	-	3	2	5	**40**	**1=**
K - Yellow	1	1	1	1			4	1	2	1	3	3	5	4	3	-	3	2	5	**40**	**1=**
L - Black	1	1	1	1			3	1	2	1	3	3	5	3	3	-	3	3	4	**38**	**2**
L - Green	1	1	1	1			5	1	2	1	3	3	5	4	2	-	3	4	4	**41**	**3=**
L - Orange	1	1	1	1			3	1	2	1	3	3	5	3	3	-	3	3	3	**37**	**1**
L - Purple	1	1	1	1			5	1	2	1	3	3	5	4	2	-	3	4	4	**41**	**3=**

6.2.6 MCA assessor evaluation summaries

This section of the report summarises the MCA assessor's evaluations of the alignment options as set out in Table 4 above. The commentary below focuses on each evaluator's poorer scores (i.e. the fours and fives) rather than canvassing all of their better scores in detail. Further information on each MCA assessor's evaluation scores (and reasoning) can be found in the relevant appendices as identified below.

6.2.6.1 Fit with project objectives

The MCA assessors confirmed that their assessment was undertaken against the project / RMA objectives that had been put in place to guide the development of the Project's DBC as well as the future notice of requirement.

For all zones, all the alignment options scored ones for the enhanced movement[10] and safety objectives.[11] For the resilience objective[12], all alignment options recorded scores of ones or twos.

The connectivity objective was identified as a function of interchanges and local roads, rather than the alignments. Accordingly, all options were scored a 1.

For resilience, all of the emerging preferred alignments recorded scores of ones or twos (as set out above in Table 4), as some alignments run close to steep slopes or traverse liquefiable soils. Nevertheless, the design will take these into consideration and the overall increase in resilience in having a new route outweighs these minor considerations. No distinguishable emerging preferred alignments were identified for the "Fit with Project Objectives" criterion for any of the zones.

See Appendix C (Fit with Project Objectives Report) for the MCA assessor's detailed evaluation report.

6.2.6.2 Landscape and visual

The MCA assessor advised that there were two key components to the landscape and visual assessment as follows:

- 'Landscape' assessment, which is an assessment of the overall "fit" of the alignment. For example, its fit with topography, landmarks, river crossings, stands of bush, human "grain" (e.g. pattern of roads, cadastral layout), settlements / clusters of houses and planned urban development, and
- 'Visual' assessment, which is an assessment of the effects on views, principally from houses, considering factors such as orientation, distance, screening, and the nature of the highway (especially earthworks) in context.

The MCA assessor noted that their alignment scoring reflected the differences in degree of effect, calibrated to the range of effects of a highway located within the route that had already been identified as the preferred corridor(i.e. "it is now about fine-tuning the alignment").

In this context, the emerging preferred alignments proposed for Zones A, C, D, E and G were recorded scores of twos or threes (the exact landscape / visual alignment scores for these zones are identified in Table 4 above). However, for the emerging preferred alignments in Zones B, F and L, the MCA assessor recorded a mixture of four and five scores for the reasons provided below.

[10] Based on travel times across the New Highway corridor
[11] Based on the significantly improved safety of the new alignment
[12] The resilience objective was assessed against existing faultline, flooding, landside/slip and liquefaction information

Zone B

For Zone B, the Green Alignment was scored a five, and was the least preferred alignment in this zone from a landscape / visual perspective. This score was based on the impacts on the Pukehou Native Bush Area, potential for fill to "spill over" into the Waiauti Stream, severance of the Manakau Heights rural residential area and effects on views from houses. It is noted that the White Alignment was preferred for Zone B from a landscape / visual perspective.

Zone F

For Zone F, both the White and Purple Alignments recorded scores of five. The score for the Purple Alignment was based on its poor fit with local landscape and adverse impacts on the houses in the Arapaepae Road area. The White Alignment also scored a five for similar reasons but was slightly preferred to the Purple Alignment because of its more easterly alignment (which meant it would be located behind more houses).

It is noted that the Orange Alignment scored a three despite being located slightly outside of the preferred corridor. This score was based on it having the best fit with the local human "grain" (e.g. square to road and cadastral patterns), being located further away from the intersections of Arapaepae and Kimberley Roads and was likely to have less effects on views from houses.

Zone K

All emerging preferred alignments in Zone K recorded scores of four due to this being a relatively sensitive part of the route with a close pattern of settlement and the highway undertaking a 90-degree curve across the grain of the landscape.

Zone L

For Zone L, both the Green and Purple Alignments scored five. These scores were recorded as both cut across the human "grain" (both cadastral and natural patterns), encroach into the Koputaroa Stream, bisect rural-residential properties on Sorensons Road, and would have adverse effects on views from local houses. It is noted that both the Black and Orange Alignments were preferred for Zone L despite being located slightly outside of the preferred corridor (both these options were scored as threes).

See Appendix D (Landscape and Visual Report) for the MCA assessor's detailed evaluation report.

6.2.6.3 Ecology

The MCA assessor advised that their assessment had separately evaluated the terrestrial and freshwater / wetland impacts of the emerging preferred alignments.

For terrestrial impacts, and except for Zone B, all emerging preferred alignments recorded scores of ones, twos and / or threes (the exact terrestrial alignment scores for each zone are identified in Table 4 above). For freshwater / wetland impacts, and except for Zones C and D, all emerging preferred alignments recorded scores of ones, twos or threes (the exact freshwater / wetland alignment scores for each zone are identified in Table 4 above).

Some of the emerging preferred alignments in Zones B, C and D recorded terrestrial and freshwater / wetland impacts scores of four. A summary of the reasons for these scores is provided below.

Zone B – terrestrial impact only

Both the White and Cyan Alignments recorded scores of four as they both potentially impacted on the Pukehou Native Bush area. It is noted that the Green Alignment was preferred for Zone B (and scored a two for terrestrial impacts).

Zone C – freshwater / wetlands impact only

Both the Purple and Green Alignments scored four due to the potential impacts on at-risk fish species (e.g. giant kokopu, longfin eel) that could be found in local waterways. It is noted that the White Alignment was preferred for Zone C (and scored a two for freshwater / wetlands impacts).

Zone D – freshwater / wetlands impact only

Both the Cyan and Dark Blue Alignments scored four due to the potential impacts on at-risk fish species (e.g. giant kokopu, longfin eel) that might be found in the Waikawa Water Race and Kuku Stream. Accordingly, there is no emerging preferred alignment for Zone D from a freshwater / wetlands impacts perspective, but Dark Blue was preferred from a terrestrial perspective.

See Appendix E (Ecology Report) for the MCA assessor's detailed evaluation report.

6.2.6.4 Heritage

The MCA assessor identified that their evaluation had considered buildings listed by both Heritage New Zealand and HDC. It also considered non-listed heritage buildings that had been identified either within the preferred corridor or located near the corridor.

With the exception of Zone C, all emerging preferred alignments in all of the zones recorded scores of ones, twos and / or threes (the exact heritage alignment scores for each zone are identified in Table 4 above). For Zone C, the emerging preferred alignments were all scored four. A summary of the reasons for the Zone C scores is provided below.

Zone C

The MCA assessor advised that all emerging preferred alignments recorded scores of four as they all had potential impacts on a non-listed property located at 76 North Manakau Road (i.e. the Robert Whiley property). The MCA assessor advised that this property's heritage values were unclear, and more investigation was required.

See Appendix F (Heritage Report) for the MCA assessor's detailed evaluation report.

6.2.6.5 Archaeology

The MCA assessor advised that their evaluation was based on assessing the quantity and quality of known and potential archaeological sites. Over 80 sites were assessed using historic aerial photographs and information provided by LINZ and through LiDAR.

With the exception of Zone C, the alignment options for all of the zones recorded scores of ones, twos or threes (the exact archaeology alignment scores for each zone are identified in Table 4 above). For Zone C, a mixture of four or five scores were recorded for the emerging preferred alignments. A summary of the reasons for these scores are provided below.

Zone C

The MCA noted that there was little difference between the emerging preferred alignments as all three would affect Robert Whiley's house (built in 1887) at 76 North Manakau Road, that served as the first Manakau School, and the local village located on Thomas Bevan Junior's land (opposite the same corner). The White Alignment was considered to have the greatest effect on the house and was scored a five. Accordingly, and notwithstanding their potential adverse effects, both the Green and Purple Alignments were preferred over the White Alignment (both recorded scores of four).

The MCA assessor noted that further research / site visits would be required at Paruauku, Waerengapoka and Pukehou, North Manakau Road and Kimberley / Arapaepae Road intersection. It was also recommended that local 19th Century voter registrations be reviewed to further understand European occupation.

See Appendix G (Archaeology Report) for the MCA assessor's detailed evaluation report.

6.2.6.6 Noise / vibration

The MCA assessor advised that their assessment considered operational and construction traffic noise effects and construction vibration effects on houses and other sensitive receivers [referred to as Protected Premises and Facilities (PPFs)] that are located within 250m of the preferred corridor.

For Zones A, D, E and L, all emerging preferred alignments recorded scores of threes. For Zones B, C, F and K, some of the emerging preferred alignments recorded scores of four for the reasons set out below.

Zone B

All three emerging preferred alignments in Zone B recorded scores of four due to there being at least 8 PPFs located within 100m of all the alignment options. There was no preferred alignment identified for this zone from a noise perspective.

Zone C

For Zone C, the Green Alignment recorded a score of four due there being 5 PPFs located within 75m of this alignment option. It is noted that both the White and Purple Alignments recorded scores of three each (due to less PPFs being affected by these alignment options). There was no preferred alignment identified for this zone from a noise perspective.

Zone F

For Zone F, the Purple Alignment recorded a score of four due to there being 14 PPFs located within 100m of the option. It is noted that both the White and Orange Alignments recorded scores of three each (due to less PPFs being affected by these alignment options). There was no preferred alignment identified for this zone from a noise perspective.

Zone K

For Zone K, the Cyan Alignment recorded a score of four due to the five PPFs located within 50m of this alignment. It is noted that both the Dark Blue and Yellow Alignments recorded scores of three each (due to less PPFs being affected by these alignment options). There was no preferred alignment identified for this zone from a noise perspective.

See Appendix H (Noise and Vibration Report) for the MCA assessor's detailed evaluation report.

6.2.6.7 Productive land values

The MCA assessor outlined that their assessment had focussed on productive land values that would be impacted by the emerging preferred alignments. In particular, the assessor advised that their assessment of the alignments was based on the Landuse Capability Classification (LUC) System, noting that land classified as LUC 1, 2 and 3 contained the highest productive land values.

All the emerging preferred alignments for Zones A, B, E and G recorded scores of three. However, the emerging preferred alignments for the other zones (i.e. C, D, F, H, K, and L) all recorded a mixture of four or five scores for the reasons provided below.

Zone C

For Zone C, the Green and Purple Alignments recorded scores of four each due to their impacts on LUC 1 land to the north of the zone. It is noted that the White Alignment recorded a score of three as it had slightly less impacts on LUC 1 land to the north of the zone. This emerging preferred alignment was preferred from a productive land impact perspective.

Zone D

For Zone D, the Cyan Alignment recorded a score of four due to its impacts on LUC 1, 2 and 3 land. It is noted that the Dark Blue alignment option recorded a score of three as it impacted on less LUC 2 and 3 land. This emerging preferred alignment was preferred from a productive land impact perspective.

Zone F

For Zone F, all alignment options recorded scores of four as each were considered to have similar impacts on LUC 1, 2 and 3 land. No preferred alignment from a productive land impact perspective was stated for this zone.

Zone H

For Zone H, all alignment options recorded scores of five due to their equal adverse impacts on LUC 1 land. No preferred alignment from a productive land impact perspective was stated for this zone.

Zone K

For Zone K, all alignment options recorded scores of five due to their equal adverse impacts on LUC 1 land. No preferred alignment from a productive land impact perspective was stated for this zone.

Zone L

For Zone L, all alignment options recorded scores of five due to their equal adverse impacts on LUC 1 and 2 land. No preferred alignment from a productive land impact perspective was stated for this zone.

See Appendix I (Productive Land Values Report) for the MCA assessor's detailed evaluation report.

6.2.6.8 Social / community / recreation

The MCA assessor advised that their evaluation had considered social, community and recreation impacts on the communities that the New Highway will interact with, which included considering community severance and construction effects. The MCA assessor noted that their MCA scores were provisional only, and that additional social impact data was required (including a social impact survey and stakeholder interviews) before final MCA scores could be confirmed.

The MCA assessor noted all emerging preferred alignments would have the following benefits:

- Way of life – provision of walking and cycling facilities, reliable commutes between towns (improved resilience of roads, management of traffic volumes and reduced crashes)
- Health and wellbeing – safer roads, reduced social consequences of death and serious injury crashes and increases in active mode travel
- Quality of environment – Less traffic or opportunity for slow traffic on existing SH1 where it travels through a village / town and opportunity to improve town centre environments
- Social cohesion – opportunity to connect town / village centres where the existing SH1 currently dissects it, and
- Sustaining oneself – more resilient roads for businesses dispatching or collecting goods from south of Levin.

All emerging preferred alignments in Zones A, C, D, E, F, G, and H recorded scores of twos or threes. However, for Zones B, K and L, the emerging preferred alignments recorded scores of four for the reasons set out below.

Zone B

For Zone B, the Green Alignment was scored a 4 as it was identified as having neighbourhood level (i.e. street communities) and community level (i.e. connections to Manakau) severance effects. Despite scoring three, the Cyan Alignment was considered to have similar severance effects to the Green Alignment but in an area which is yet to be developed. It is noted the White Alignment, which scored a two, was preferred, as it was more likely to provide opportunities to keep local "neighbourhoods in tact".

Zone K

For Zone K, all the emerging preferred alignments recorded scores of four as they would cause severance between local communities (e.g. the Waihou Road community) and Levin, create a low quality "strip of properties" between SH57 and the New Highway and result in changes to school, work and community service commutes. Accordingly, no preferred alignment from a social, community, recreational impact perspective was identified for Zone K.

Zone L

For Zone L, the Purple and Green Alignments recorded scores of four as both were considered to have community severance effects and result in "way-of-life" changes for the Sorensons Road community. Whilst both the Orange and Black Alignments were preferred for Zone L, the MCA assessor noted that both would also have community severance impacts.

See Appendix J (Social / Community / Recreation Powerpoint) for the MCA assessor's detailed evaluation report.

6.2.6.9 Horowhenua District Development

The MCA assessors outlined that as part of their scoring of the emerging preferred alignments they had considered the following:

- Updated population growth estimates (noting that Horowhenua district had grown faster than expected since Census 2013, and HDC were now planning for an additional 20,000 people by 2040)
- Horowhenua District Plan and relevant Plan Changes in preparation (e.g. Gladstone Green development)
- Horowhenua Growth Strategy 2040, and the proposed scope for its review
- Wellington Regional Growth Framework, and
- Draft Ōhau and Manakau Community Plans.

Except for the emerging preferred alignments in Zone G, all of the New Highway alignments recorded scores of ones, twos and / or threes. For Zone G, all emerging preferred alignments recorded scores of four for the reasons set out below [it is noted that Zone A was not scored by HDC (rather this zone was scored by KCDC)].

Zone G

For Zone G, all emerging preferred alignments recorded scores of four due to the uncertainty as to how each alignment would impact on the future Gladstone Green Master Plan Area. Accordingly, there was no preferred alignment identified for this zone from a Horowhenua district development perspective.

See Appendix K (Horowhenua District Development Report) for the MCA assessor's detailed evaluation report.

6.2.6.10 Kāpiti Coast District Development

The MCA assessor advised that only Zones A and B (in part) were evaluated as they were the only New Highway zones located within the Kāpiti Coast District. The assessor advised that the emerging preferred alignments were located within the Rural Hills and Rural Plains zones of KCDC's district plan, and are considered to be primary production areas (and hadn't been identified as future growth areas).

Except for the White Alignment in Zone A, all of the alignment options in both Zones A and B recorded scores of two or three. A score of four was recorded for the White Alignment in Zone A for the reasons set out below.

Zone A

For Zone A, the White Alignment recorded a score of four due to its impacts on Special Amenity Landscape No.15.[13] It is noted that the Green Alignment is preferred for Zone A from a Kāpiti Coast District Development perspective.

See Appendix L (Kāpiti Coast District Development Memo) for the MCA assessor's detailed evaluation report.

6.2.6.11 Fit with local road

The MCA assessor advised that all emerging preferred alignments would impact on the local road network, but to differing degrees (and that additional information on interchange locations and local road options would be needed to inform final scoring).

For all zones, and based on currently available information, all alignment options recorded scores of three.

See Appendix K (i.e. Horowhenua District Development Report, which includes the Fit with Local Road Assessment) for the MCA assessor's detailed evaluation report.

6.2.6.12 Engineering degree of difficulty

The MCA assessor identified that the Engineering degree of difficulty (EDoD) assessment criteria had considered the following matters:[14]

- Local Roads: Complexity of connecting
- Earthworks: Volumes and major / complex cuts, cut/fill balance, and
- Watercourses: Effects on existing water courses (not surface stormwater).

The MCA assessor noted that the above evaluations had been undertaken by a "EDoD team" comprising of a design manager, flood engineer, geotechnical engineer, geologist, bridge engineer, roading designer and engineering lead reviewer. It is also noted that each of the above matters were weighted equally when scoring the emerging preferred alignments.

For the emerging preferred alignments in Zones F, G, H and K, all alignments recorded scores of ones, twos or threes. However, some of the emerging preferred alignments in Zones A, B and L recorded scores of four for the reasons set out below.

[13] Details of this feature can be found on page [3-234]: https://www.kapiticoast.govt.nz/media/36493/chapter-3-pdp-appeals-version.pdf

[14] The MCA assessor noted that the following were important considerations, but were not assessed: structures (not assessed as there is no material difference between the options); ground conditions (no information available to undertake the assessment); temporary works (no information available to undertake this assessment, and unlikely to make a material difference between the options); and, utilities (no information available to undertake this assessment, and unlikely to make a material difference between the options)

Zone A

For Zone A, all emerging preferred alignments would face various engineering challenges primarily due to the location of local watercourses and, requirements for high earthwork volumes. Of the two emerging preferred alignments in Zone A, the White Alignment was considered slightly more challenging (and scored a four). It is noted that the Green Alignment was preferred for Zone A from an EDoD perspective.

Zone B

For Zone B, all three emerging preferred alignments would face various engineering challenges due to the location of local watercourses, requirements for high earthwork volumes and impacts on local road access. Of the three emerging preferred alignments, the Green Alignment was considered to be more challenging and recorded a score of four, due to Manakau Heights Drive and Honi Taipua Street accesses. The other two emerging preferred alignments (i.e. the Cyan and White Alignments) both recorded scores of three with no emerging preferred alignment identified.

Zone L

For Zone L, the Green and Purple Alignments would face engineering challenges due to the location of local watercourses, requirements for high earthwork volumes and impacts on Sorensons Road. For these reasons, both emerging preferred alignments recorded scores of four. It is noted that the other two alignments (i.e. Orange and Black Alignments) were scored a three with no preference between the two identified.

See Appendix M (Engineering Degree of Difficulty Report) for the MCA assessor's detailed evaluation report.

6.2.6.13 Property degree of difficulty

The MCA assessor noted that the Property degree of difficulty (PDoD) evaluation was based on effects on the following:

- Property configuration and large farming severance
- Large commercial businesses
- Farming and market garden holdings
- Lifestyle holdings,
- Māori Land.

All of the alignment options in Zones G and E recorded scores of three. For all of the other zones, the alignment options recorded a mixture of four and five scores for the reasons set out below.

Zone A

For Zone A, both the Green and White Alignments recorded scores of five each. These scores related to potentially complex property acquisitions. Accordingly, no preferred alignment was identified for this zone from a PDoD perspective.

Zone B

For Zone B, both the Cyan and Green Alignments would require several rural and lifestyle properties to be purchased, and therefore both received scores of four. It is noted that the White Alignment was preferred from a PDoD perspective (with a score of three) due to a lower property acquisition requirement.

Zone C

For Zone C, all three emerging preferred alignments, which run along the eastern side of the Manakau Village, recorded scores of four each (as they were all considered to have

similar property impacts). No preferred alignment was identified for this zone from a PDoD perspective.

Zone D

For Zone D, both the Cyan and Dark Blue Alignments require property from six Māori Freehold Land titles. Accordingly, both options were recorded scores of five each as they would be complex to acquire. No preferred alignment was identified for this zone from a PDoD perspective.

Zone F

For Zone F, both the Purple and White Alignments recorded scores of four each, due to their potential impacts on a chicken farm located near the intersection of Kimberley / Arapaepae Roads. The MCA assessor advised that it would be preferable that this property was avoided as it would be a complex property acquisition under the Public Works Act.

It is noted that the MCA assessor recorded a score of three for the Orange Alignment, but did advise that parts of the Orange Alignment were located outside of the preferred corridor, and would therefore affect new property owners.

Zone H

For Zone H, the Purple Alignment scored a four due to the need to acquire a number of businesses to enable this alignment. It is noted that the Cyan Alignment was the preferred option for this zone from a PDoD perspective (with a score of three).

Zone K

For Zone K, all emerging preferred alignments scored a five due to the likely number of residential, rural and lifestyle properties that would be impacted. It was also identified that these options could impact on a chicken farm located on Waihou Road. The assessor advised that it would be preferable that this property was avoided as it would be a complex property acquisition under the Public Works Act. No preferred alignment was identified for this zone from a PDoD perspective.

Zone L

For Zone L, both the Green and Black Alignments recorded scores of five due to their impacts on residential / lifestyle properties on Sorensons Road. The Purple Alignment was evaluated as having similar property impacts, but slightly less severance affects and therefore recorded a score of four. It was noted that the Orange Alignment (which scored a three) was preferred as it affected less dwellings and avoided Sorensons Road.

It is noted that both the Black and Orange Alignments in Zone L are located outside of the preferred corridor, and would affect new property owners.

See Appendix N (Property Degree of Difficulty Report) for the MCA assessor's detailed evaluation report.

6.3 New Highway alignment MCA weighting options

The above outlines the raw scores, which are vital to the selection process for the long and short list of the emerging preferred alignment and the draft preferred alignment. But simply adding raw scores provides a coarse approach – a weighting exercise tests sensitivities within the raw scores to matters considered, under various weightings, to be more important. Accordingly, a range of weighting systems were developed, then applied to the scores and compared with the unweighted alignment scores.

6.3.1 Workshop weighting

At the completion of the scoring component of MCA Workshop 1, the attendees, identified how important they consider the different criteria to be by assigning low

medium and high "workshop weightings" to each assessment criterion. A workshop weighting reflects the importance that the workshop attendees collectively placed on each individual assessment criterion.

The attendees identified the following assessment areas to be of high importance in the selection of the emerging preferred alignments:

- Iwi impacts (i.e. due to potential impacts on cultural values)
- Ecological impacts (i.e. particularly on freshwater / wetlands)
- Horowhenua district development (i.e. to reflect local existing and future growth pressures)
- Fit with local road system (i.e. to reflect the importance of maintaining local connectivity)
- EDoD (i.e. due to risk and cost implications), and
- PDoD (i.e. due to complexity of acquiring a number of properties).

The next most important criteria were landscape / visual, archaeology, productive land value and social / community / recreation (and were ranked as mediums). Both the fit with the Project Objectives and heritage criterion were rated low as there was little to distinguish between alignments with these criteria.

Following MCA Workshop 1, the Project Team (using its professional judgement) assigned numerical rankings out of 10 to the low, medium and high rankings. It determined that a low ranking weighting would be between one and four, a medium ranking weighting would be between five and seven and a high ranking weighting would be between eight and 10.

Both the workshop low, medium and high weighting rankings and the Project Team's corresponding numerical rankings are set out in Table 5 below.

Table 5: Workshop low, medium and high ranking weightings (and corresponding numerical rankings)

	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Kapiti Coast District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty
Workshop ranking	L	L	L	L	H	H	M	H	H	L	M	L	M	M	H	L	H	H	H
Project Team Weighting	2	2	2	2	10	10	6	8	8	3	6	3	6	6	8	2	10	10	10

6.3.2 RMA Section 6 and quadruple bottom line weightings

Additional weighting systems were developed to further examine the sensitivity of the unweighted emerging preferred alignments results. Accordingly, RMA Section 6 matters and quadruple bottom line (i.e. social, economic, cultural and economic) weighting systems were developed by the Project Team following completion of MCA Workshop 1.

Table 6 sets out the RMA Section 6 and quadruple bottom line weightings.

Table 6: RMA Section 6 matters and quadruple bottom line weightings

	RMA Section 6	Social	Environment	Cultural	Economic
01 - PO - Enhanced movement	3	4	0	0	10
01 - PO - Safety	3	7	0	0	10
01 - PO - Resilience	8	4	0	0	10
01 - PO - Connections	3	8	0	0	10
02 - Iwi Values (Raukawa)	10	8	8	10	2
03 - Iwi Values (Muaupoko)	10	8	8	10	2
04 - Landscape/visual	8	5	6	5	0
5a - Ecological - Terrestrial	8	3	10	8	0
5b - Ecological - Freshwater & Wetlands	8	3	10	8	0
06 - Heritage	8	7	3	3	0
07 - Archaeology	8	7	3	8	0
08 - Noise and vibration	3	7	3	3	0
09 - Productive land values	3	3	0	0	5
10 - Social/community/recreation	5	10	3	8	3
11 - Horowhenua District development	5	7	0	2	7
12 - Kapiti Coast District development	5	7	0	2	7
13 - Fit with local road system	2	3	0	0	5
14 - Engineering degree of difficulty	2	3	0	0	10
15 - Property degree of difficulty	2	5	0	0	10

In terms of the above weightings:

- The RMA Section 6 weighting affords the highest ranking to the assessment criteria that is of most relevance to the matters listed under Section 6 of the RMA (i.e. Iwi values, landscape, ecology and heritage / archaeology). Iwi were afforded the highest weighting ranking of 10 in order to reflect the high importance assigned to cultural values under the RMA. Resilience, landscape, ecology and heritage / archeology values were also ranked as being high and were given a ranking of eight
- The Social weightings place the highest weighting on the social aspects of the New Highway alignments. Accordingly, the highest weighting of 10 was afforded to the social / community / recreation assessment criterion to reflect the importance of the social benefits / costs of the New Highway on the community. Enhanced connectivity, Iwi values, heritage, archaeological risk, Horowhenua and Kāpiti district development all have social dimensions and were also therefore ranked high with rankings of between seven and eight
- The Environment weightings place the highest weighting on the physical environmental elements. Ecology was afforded the highest score of 10. Iwi were also afforded a high ranking to reflect that Iwi values are closely intertwined with the

health of the environment. Criteria without a physical environment component were scored zero

- The Cultural weightings ranked Iwi values as a 10. Ecology, archaeology and social / community / recreation were also ranked high, and afforded scores of 8, as they were all considered to have important cultural dimensions. It is noted that Iwi contributed to the weightings discussions at each MCA workshop on the basis that the weighting system would be reviewed prior to completing the MCA process, and
- The Economic weightings place high weightings on the Project Objectives, EDoD and PDoD – all were ranked 10s. Horowhenua and Kapiti Coast Development were also considered high from an economic perspective and were afforded a score of 7. The other assessment criteria that have little or no direct economic bearing on the Project or the local economy were scored zero.[15]

6.3.3 Weightings evaluations

Table 7 sets out the evaluation rankings for each emerging preferred alignment (for each zone) under the various weighting systems identified above. The table also provides a comparison with the unweighted rankings.

[15] This quadruple bottom-line weighting is a different type of evaluation from the Benefit Cost Ratio (BCR) evaluation normally undertaken by Waka Kotahi

Table 7: Evaluation of the weighted and unweighted rankings

Alignment option	Workshop Weighting	RMA Sec 6	Social	Environment	Cultural	Economic	Average weightings rank	Final weightings rankings	Final unweighted rankings
A - Green	1	1	1	2	2	1	1.3	1	1
A - White	2	2	2	1	1	2	1.7	2	2
B - Cyan	2	2	2	3	2	2	2.2	2	2
B - Green	3	3	3	2	2	3	2.7	3	3
B - White	1	1	1	1	1	1	1.0	1	1
C - Green	2	3	3	3	3	1	2.5	3	3
C - Purple	3	1	1	2	2	3	2.0	2	2
C - White	1	2	2	1	1	2	1.5	1	1
D - Cyan	2	2	2	2	2	2	2.0	2	2
D - Dark Blue	1	1	1	1	1	1	1.0	1	1
E - Cyan	1	2	2	1	2	1	1.5	2	1
E - Green	2	1	1	1	1	2	1.3	1	1
F - Orange	1	1	1	1	1	1	1.0	1	1
F - Purple	3	3	3	3	3	2	2.8	3	3
F - White	2	2	2	2	2	2	2.0	2	2
G - Cyan	2	2	2	2	2	1	1.8	2	2
G - Purple	1	1	1	1	1	1	1.0	1	1
G - White	3	3	3	3	3	3	3.0	3	3
H - Cyan	1	1	1	1	1	1	1.0	1	1
H - Purple	2	2	2	1	1	2	1.7	2	2
K - Cyan	1	1	1	3	3	1	1.7	3	3
K - Dark Blue	2	2	1	1	1	2	1.5	1	1
K - Yellow	2	2	1	1	1	2	1.5	1	1
L - Black	2	2	2	1	1	2	1.7	2	2
L - Green	3	3	3	3	3	3	3.0	3	3
L - Orange	1	1	1	1	1	1	1.0	1	1
L - Purple	3	3	3	3	3	3	3.0	3	3

6.4 Summary of MCA analysis for alignment options

6.4.1 Zone A

The Green Alignment was preferred under both the weighted and unweighted assessments. In summary, it was ranked first as it was the technically better performing from both a Kāpiti Coast District Development and EDoD perspective. It is noted that Zone A does host some potential Māori land that will need further consideration before final decisions can be made on the preferred alignment.

Recommendation

It is recommended that the Green Alignment be advanced, whilst reviewing additional emerging preferred alignments that may impact less on a potential Māori land parcel.

6.4.2 Zone B

The White Alignment was considered the technically strongest alignment under both the weighted and unweighted assessments. In summary, its preference was attributed to it being preferred from a landscape / visual, social / community / recreation, EDoD and PDoD perspective. It is noted that this emerging preferred alignment did score poorly with regards to its potential impacts on the Pukehou Native Bush Area.

Recommendation

It is recommended that only the White Alignment be advanced, whilst considering how to refine the White Alignment to reduce impacts on the Pukehou Native Bush Area.

6.4.3 Zone C

The White Alignment was considered the technically strongest alignment under both the weighted and unweighted assessments. In summary, its preference was favored from a freshwater ecology, noise / vibration, productive land values and EDoD perspective.

Recommendation

It is recommended that only the White Alignment be advanced.

6.4.4 Zone D

The Dark Blue Alignment was considered the technically strongest alignment under both the weighted and unweighted assessments. It is noted that this emerging preferred alignment was favored from a terrestrial ecology, productive land value, social community and recreation and Horowhenua district development perspective.

Recommendation

It is recommended that only the Dark Blue Alignment be advanced.

6.4.5 Zone E

The Green Alignment was considered the technically strongest alignment under both the weighted and unweighted assessments. It is noted that this alignment was favored from a Horowhenua district development perspective.

Recommendation

It is recommended that only the Green Alignment be advanced.

6.4.6 Zone F

The Orange Alignment was considered the technically strongest alignment under both the weighted and unweighted assessments. In summary, it was generally preferred from a landscape / visual and noise / vibration perspective. It is noted however that parts of

the Orange Alignment are located outside of the preferred corridor resulting in new properties being impacted. As such, it is recommended the next technically strongest alignment also be advanced to consultation, which is the White Alignment (which does not affect properties outside of the preferred corridor).

Recommendation

It is recommended that the Orange and White Alignments be advanced.

6.4.7 Zone G

The Purple Alignment was considered the technically strongest alignment under both the weighted and unweighted assessments. It is noted that this alignment was generally preferred, particularly from an archaeology and EDoD perspective.

Recommendation

It is recommended that only the Purple Alignment be advanced.

6.4.8 Zone H

The Cyan Alignment was considered the technically strongest alignment under both the weighted and unweighted assessments. It is noted that this alignment was generally preferred, particularly from a PDoD perspective.

Recommendation

It is recommended that only the Cyan Alignment be advanced.

6.4.9 Zone K

The Dark Blue and Yellow Alignments were equally technically strongest under both the weighted and unweighted assessments.

It is noted that the Cyan Alignment was generally preferred from an archaeology and Horowhenua district development perspective, whilst the Dark Blue Alignment was preferred from a noise / vibration perspective.

It is also noted that the interchange form at the SH1 / SH57 split may influence the final alignment through this zone. In addition, the PDoD assessment noted the presence of a chicken farm that would be a complex property acquisition under the Public Works Act. Accordingly, avoiding the need to acquire this property would be preferable from a PDoD perspective.

Recommendation

It is recommended that both the Cyan and Dark Blue Alignments be advanced, whilst considering how the interchange may affect these emerging preferred alignments and whether there are alignments to avoid the chicken farm

6.4.10 Zone L

The Orange Alignment was considered the technically strongest alignment under both the weighted and unweighted assessments. It was generally preferred from a landscape / visual, and social / community / recreation and EDoD and PDoD perspective.

It is noted that the Orange Alignment is located outside of the preferred corridor, and will impact on new property owners. As such, it is recommended the next technically best performing alignment option be progressed as well, which is the Black Alignment. It is acknowledged however that parts of the Black Alignment are also located outside of the preferred corridor.

Recommendation

It is recommended that both Orange and Black Alignments be advanced.

6.5 Summary of the recommended emerging preferred alignments

Table 8 sets out the emerging preferred alignments recommended to be advanced.

Table 8: Emerging preferred alignments recommended for advancement

Zone	Draft preferred alignment in each New Highway zone
A	Green Alignment (only)
B	White Alignment (only)
C	White Alignment (only)
D	Dark Blue Alignment (only)
E	Green Alignment (only)
F	Both Orange and White Alignments
G	Purple Alignment (only)
H	Cyan Alignment (only)
K	Both Yellow and Dark Blue Alignments
L	Both Orange and Black Alignments

7. Interchange MCA

The purpose of the Interchange MCA was to identify preferred interchange locations and forms (i.e. connectivity, footprint sizes etc) for further consideration.

The interchange assessment followed the process outlined in Section 5 of this report.

7.1 Stage 1 - Long to short listing processes

In order to identify a short list of interchange locations and forms for evaluation at MCA Workshop 2 the following steps were undertaken.

7.1.1 Step 1: identification of interchange principles and design requirements

This step involved identifying high level interchange principles and design requirements in order to assess the long list of interchange locations and forms identified by the Project Team.

The interchange principles and design requirements are set out in the *Ōtaki to North of Levin Detailed Business Case: Interchange Options Report (15 May 2020)*.

7.1.2 Step 2: identification and assessment of a long list of interchange option locations

This step involved high level assessments of a long list of interchange location and form options by the Project Team. This assessment was undertaken using the interchange principles and design requirements identified in the *Ōtaki to North of Levin Detailed Business Case: Interchange Options Report (15 May 2020)* attached as Appendix O.

7.2 Stage 2 - Short list to emerging preferred options

7.2.1 MCA assessment instructions

As set out in Section 6 above, the MCA assessors were briefed on the requirements for the Interchange MCA (and local road MCA) in early May and at the second technical briefing (#2) held on 12 May 2020. They were also briefed at the end of MCA Workshop 1.

At the second technical briefing held on 12 May 2020, and with regards to the Interchange MCA, the following matters were confirmed:

- the workshop approach for MCA Workshop 2 would also be predicated on the *Decision Conferencing* approach used at MCA Workshop 1
- except for the Kāpiti Coast District Development, the same assessment criterion would be applied (this criterion was not required as none of the interchange locations are located in the Kāpiti Coast District)
- the same 6 point scoring system, as identified above in Table 2, would be used for scoring, and
- a low, medium and high workshop weighting would be agreed for the interchange options at the end of MCA Workshop 2. Other weightings for RMA Section 6 matters and for the quadruple bottom line would be developed by the Project Team following the workshop.

It is noted that Google Earth design files of the various interchange locations and forms were shown at the technical briefing held on 12 May 2020, and were subsequently made available on the Project's sharepoint website.

At the end of MCA Workshop 1, the evaluation requirements for the interchange options were further clarified. That is, each MCA assessor was asked to assess the following short-listed interchange options and / or forms.

7.2.1.1 Manakau / Kuku[16] interchange location and form or no connection

This evaluation comprised assessing either locating a roundabout or a grade separated interchange (i.e. service interchange) to the south of Manakau or south of Kuku. In addition, the MCA assessors were asked to assess the form (i.e. footprint size) of the roundabout and service interchange options at either location to help determine the preferred form of the interchange. Furthermore, an evaluation of the option of not providing a connection at either location was also required.

The MCA assessors were advised that the timing of the Manakau / Kuku interchange build had yet to be determined. That is, no decision had been made on whether to provide the interchange (at either location) as part of the immediate New Highway build or whether it would be provided at a later date.

7.2.1.2 Kimberley or Tararua interchange location and form

This evaluation comprised assessing either locating a roundabout or grade separated interchange (i.e. service interchange) near the Kimberley / Arapaepae Road intersection (referred to as Kimberley) or near the Tararua / Arapaepae Road intersection (referred to as Tararua).

In addition, the MCA assessors were asked to also assess the form (i.e. footprint size) of the roundabout and service interchange options at either location to help determine the preferred form of the interchange.

7.2.1.3 "SH1 / SH57 split" interchange form

It was advised by the Project Team and Waka Kotahi representatives that an interchange was needed at the "SH1 / SH57 split" to enable access between the New Highway (i.e. SH1) and SH57. Therefore, no "location evaluation" was required. Accordingly, the MCA assessors were asked to only assess the form of the interchange at this location (i.e. footprint size) to help determine the preferred form of the interchange.

However, and unlike the other locations, the MCA assessors were advised that there were three interchange forms for the SH1 / SH57 split location needing evaluation as follows:

- A grade separated bifurcation system (i.e. typically these interchanges are provided at locations where a high standard connection is required between high volume roads)
- A service interchange (i.e. grade separated interchange, providing part / full connectivity), and
- A roundabout.

7.2.1.4 North Levin interchange form

It was advised by the Project Team and Waka Kotahi representatives that an interchange was needed at North Levin to enable connectivity between the New Highway and local road network (e.g. access to Levin). Accordingly, the MCA assessors were asked to only assess the form of the interchange at this location (i.e. footprint size) to help determine the preferred form of the interchange.

7.2.1.5 Indicative interchange footprint sizes

Each MCA assessor was advised that the general footprint sizes to be applied in their evaluations were as follows:

[16] It is noted that at MCA Workshop 2, Iwi clarified that the area to the north of Waikawa Stream is considered to be Kuku rather than North Manakau

- 1500m long and 500m wide for the grade separated service and bifurcation systems, and
- 200m long and 200m wide for the roundabouts.[17]

7.2.2 Interchange option evaluations

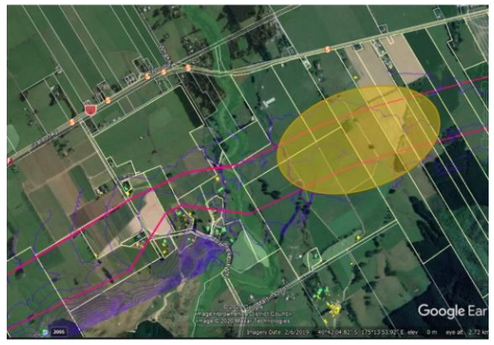
MCA Workshop 2 for the short-listed interchange options was held on 3 June 2020. The workshop was attended by the MCA assessors, members of the Project Team and observers from Waka Kotahi, Ruakawa and Muaūpoko. The names of those who took part in the scoring process are included in Appendix B.

The outcomes of the MCA assessors unweighted (or raw) scores for each interchange location and form are set out in Table 9, Table 10, Table 11 and Table 12 below. A summary of the unweighted scores for interchange locations / forms is provided in Table 13.

Each MCA assessors individual unweighted scores is discussed at a high level in the commentary that follows these tables.

[17] It was noted that these footprint sizes excluded any local road realignments needed at each location, and the design footprint requirements for the shared use path and for stormwater capture

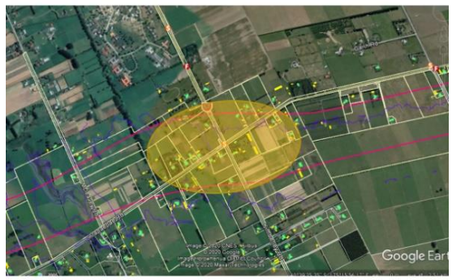
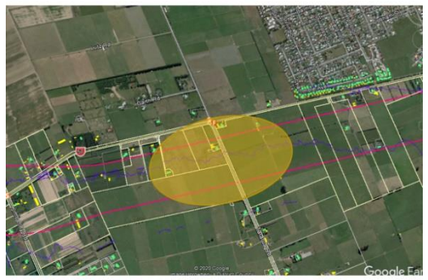
Table 9: South Manakau and Kuku interchange location / form and no connection options

Interchange locations	Interchange form options	MCA evaluation (unweighted) – location, form and no connection
South Manakau  **OR** **South Kuku** 	**South Manakau** Option A: Roundabout **or** Option B: Grade separation (i.e. Service Interchange) **or** **Kuku** Option C: Roundabout **or** Option D: Grade separation Grade separation (i.e. Service Interchange) **or** **No connection** Option E: No connection[18]	

Interchange Location and Form	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi (Muaupoko)	04 - Landscape/visual	05a Terrestrial ecology	05b Freshwater & wetland ecology	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Fit with local road system	13 - Engineering degree of difficulty	14 - Property degree of difficulty	Final Score (unweighted)	Final rankings (unweighted)
Option A: South Manakau Roundabout	2	3	2	4			3	1	3	1	2	5	3	4	3	3	2	2	44	**=4**
Option B: South Manakau Grade Separation	1	2	1	1			5	1	4	1	2	4	4	4	3	3	4	3	43	**=4**
Option C: Kuku Roundabout	2	3	2	4			2	1	1	1	2	3	4	3	3	3	2	1	36	**2**
Option D: Kuku Grade Separation	1	2	1	1			3	1	4	1	2	3	5	3	3	3	3	2	37	**3**
Option E: No Connection	1	1	2	1			3	1	1	1	1	1	1	3	3	3	1	1	25	**1**

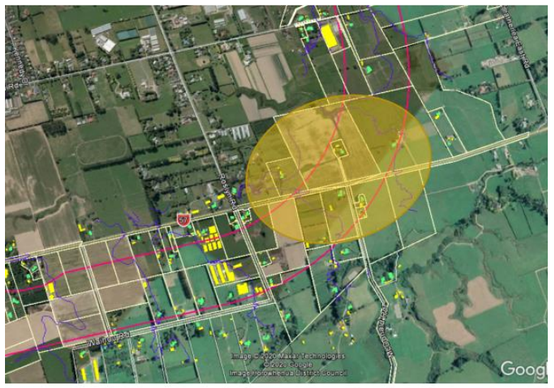
[18] Refers to assessing a no interchange / connection scenario at the Manakau / Kuku locations

Table 10: Kimberley or Tararua interchange location / form

Interchange locations	Interchange form options	MCA evaluation (unweighted) – location and form
Kimberley  **OR** **Tararua** 	**Kimberley** Option A: Roundabout at Kimberley or Option B: Grade separation at Kimberley **Tararua** Option C: Roundabout at Tararua or Option D: Grade separation at Tararua	

Interchange Location and Form	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi (Muaupoko)	04 - Landscape/visual	05a Terrestrial ecology	05b Freshwater & wetland ecology	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District [illegible]	12 - Fit with local road system	13 - Engineering degree of difficulty	14 - Properly degree of difficulty	Final Score (unweighted)	Final rankings (unweighted)
Option A: Roundabout at Kimberley	2	3	2	3			4	1	1	1	2	5	4	4	3	3	2	2	42	**4**
Option B: Grade Separation at Kimberley	1	1	1	1			5	1	1	1	3	5	5	4	3	2	2	4	40	**3**
Option C Roundabout at Tararua	2	3	2	3			2	1	1	1	1	5	3	3	1	2	1	2	32	**2**
Option D Grade Separation at Tararua	1	1	1	1			3	1	1	1	1	4	3	2	1	1	2	2	25	**1**

Table 11: "SH1/SH57 Split" interchange form

Interchange location	Interchange form options	MCA evaluation (unweighted) – form
	Option A Bifurcation (i.e. System Interchange **or** Option B Roundabout at SH57 **or** Option C Grade Separation (i.e. Service interchange)	

Interchange Location and Form	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi (Muaupoko)	04 - Landscape/visual	05a Terrestrial ecology	05b Freshwater & wetland ecology	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Fit with local road system	13 - Engineering degree of difficulty	14 - Property degree of difficulty	Final Score (unweighted)	Final rankings (unweighted)
Option A: Bifurcation	1	3	1	2			4	2	1	1	3	3	5	2	2	3	3	2	**38**	**2**
Option B: Roundabout	2	1	2	1			4	2	1	1	2	5	5	4	1	2	2	2	**37**	**1**
Split: Grade Separation	1	1	1	1			4	2	1	1	3	4	5	4	2	3	3	3	**39**	**3**

Table 12: North Levin interchange form

Interchange location	Interchange form options	MCA evaluation (unweighted) – form
	Option A: Roundabout at SH1 **or** Option B: Grade separation (i.e. Service Interchange)	

Interchange Location and Form	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi (Muaupoko)	04 - Landscape/visual	05a Terrestrial ecology	05b Freshwater & wetland ecology	06 - Heritage	07 - archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Fit with local road system	13 - Engineering degree of difficulty	14 - Property degree of difficulty	Final Score (unweighted)	Final rankings (unweighted)
Option A: Roundabout	2	1	2	1			1	1	1	1	1	5	4	3	1	1	1	2	**28**	**1**
Option B: Grade Separation	1	1	1	1			1	1	1	1	1	4	5	3	3	3	1	2	**30**	**2**

Table 13: Summary of the MCA evaluation scores for all interchange options

Interchange Location and Form Options	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi (Muaupoko)	04 - Landscape/visual	Terrestrial ecology	Freshwater & wetland ecology	06 - Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	12 - Fit with local road system	13 - Engineering degree of difficulty	14 - Property degree of difficulty	Final Score (unweighted)	Final rankings (unweighted)
Manakau/Kuku Interchange Location and Form Options																				
Option A: South Manakau Roundabout	2	3	2	4			3	1	3	1	2	5	3	4	3	3	2	2	**43**	**=4**
Option B: South Manakau Grade Separation	1	2	1	1			5	1	4	1	2	4	4	4	3	3	4	3	**43**	**=4**
Option C: Kuku Roundabout	2	3	2	4			2	1	1	1	2	3	4	3	3	3	2	1	**37**	**2**
Option D: Kuku Grade Separation	1	2	1	1			3	1	4	1	2	3	5	3	3	3	3	2	**38**	**3**
Option E: No Connection	1	1	2	1			3	1	1	1	1	1	1	3	3	3	1	1	**25**	**1**
Kimberley or Tararua Interchange Location and Form Options																				
Option A: Roundabout at Kimberley	2	3	2	3			4	1	1	1	2	5	4	4	3	3	2	2	**42**	**4**
Option B: Grade Separation at Kimberley	1	1	1	1			5	1	1	1	3	5	5	4	3	2	2	4	**40**	**3**
Option C Roundabout at Tararua	2	3	2	3			2	1	1	1	1	5	3	3	1	2	1	2	**33**	**2**
Option D Grade Separation at Tararua	1	1	1	1			3	1	1	1	1	4	3	2	1	1	2	2	**26**	**1**
SH1/SH57 Split Interchange Form Options																				
Option A: Bifurcation	1	3	1	2			4	2	1	1	3	3	5	2	2	3	3	2	**38**	**2**
Option B: Roundabout	2	1	2	1			4	2	1	1	2	5	5	4	1	2	2	2	**37**	**1**
Split: Grade Separation	1	1	1	1			4	2	1	1	3	4	5	4	2	3	3	3	**39**	**3**
North of Levin Interchange Form Options																				
Option A: Roundabout	2	1	2	1			1	1	1	1	1	5	4	3	1	1	1	2	**28**	**1**
Option B: Grade Separation	1	1	1	1			1	1	1	1	1	4	5	3	3	3	1	2	**30**	**2**

7.2.3 Interchange option MCA evaluation summaries

This section of this report summarises the MCA assessor's evaluations of the interchange options (as set out above in Table 13). The commentary below focuses on each evaluator's poorer scores (i.e. the fours and fives) rather than discussing their better scores (i.e. the ones, twos and threes). Further information on each MCA assessor's evaluations can be found in their relevant reports, which are attached as appendices to this report (and as identified above and below).

7.2.3.1 Fit with project objectives

The MCA assessors confirmed that their assessment was undertaken against the project / RMA objectives that had been put in place to guide the development of the Project's DBC as well as the future notice of requirement.

For the enhanced movement objective[19], all interchange options recorded scores of ones or twos. The MCA assessor noted that a roundabout was expected to perform worse than a grade separated interchange from an efficiency perspective, particularly for straight through traffic, but not significantly worse. It was also noted that an interchange at Tararua was likely to perform better than one at Kimberley as it was a more direct connection for people / freight movements accessing Levin.

For the safety objective, all interchange options (including the option to not have a Manakau / Kuku connection) scored a mixture of ones, twos and threes. The MCA assessor noted that a roundabout option could be expected to perform worst from a safety perspective as most drivers would not expect to have to navigate roundabouts in highway-type environments. The assessor also noted that the option to not have a Manakau connection was likely to encourage more traffic to remain on the existing SH1 rather than to transfer to the New Highway (which would be an inferior safety outcome).

For the resilience objective, the ability of the interchange to facilitate travel on the alternative route (i.e. existing or old SH1) if a crash at an interchange was to occur, was evaluated. The scores recorded included ones and twos, noting that a crash at a roundabout was more likely to close all highway lanes (compared to a grade separated option). Also not having a connection at Manakau or Kuku option would require a 12km detour if a crash was to occur between Ōtaki and Manakau (but that this is still a significant improvement on the existing detour situation for parts of the existing network).

For the connectivity objective, the MCA assessor explained that the focus of the assessment was on providing appropriate connections to the local road network. Assessment of appropriateness was based on the Waka Kotahi's One Network Road Classification (ONRC) system. The assessor noted that the New Highway was highly likely to be classified as a National Strategic Route, although its southern section was likely to receive the highest classification of a National Strategic High Volume Route. The assessor explained that the standards / requirements for a National Strategic Route meant that State Highway (through) traffic was afforded priority over all other traffic at interchanges.

Based on the ONRC criteria, the MCA assessor noted that a potential roundabout at the Kimberley and Tararua locations recorded scores of three on the basis that they both would be located at the end of the National Strategic High Volume section of the New Highway. However, the roundabout options for South Manakau or Kuku recorded scores of four on the basis that they would be located prior to the northern end of the National Strategic High Volume section of the New Highway and before significant traffic volumes leave the highway to Levin or SH57.

[19] Based on travel time across the New Highway corridor

See Appendix C (Fit with Project Objectives Report) for further information on the MCA assessor's interchange option evaluations.

7.2.3.2 Landscape and visual

The MCA assessor advised that their landscape / visual evaluation of the interchange options considered:

- the landscape effects on natural features and the human "grain" (e.g. roads, cadastral and settlement patterns), and
- the visual effects, principally on views from houses.

The MCA assessor noted that their interchange scoring reflected that the New Highway route had already been identified as the best landscape option, and therefore "one might accept a highway interchange within this location".

The MCA assessor recorded scores of ones, twos and threes for the Kuku and North Levin interchange options. For Kuku, the assessor advised that a roundabout was slightly preferred to a grade separated interchange (due to its smaller footprint, better fit with local cropping patterns and would have fewer visual effects). Similarly, for the North Levin location, the roundabout was also slightly preferred as it would have fewer visual effects and fit better with the local landscape when compared to the grade separated option.

The remaining interchange locations / forms proposed all recorded scores of fours and fives for the reasons set out below.

South Manakau

For South Manakau, both the grade separation option recorded a score of five.

The MCA assessor initially evaluated grade separation as a Fatal Flaw (F), but later rescored this option as a five, acknowledging that a small footprint option on a good alignment is feasible, albeit with significant impacts. The MCA assessor was concerned that the footprint and nature of a grade separated interchange in the South Manakau location would overly dominate the local valley floor, have adverse visual effects on views from houses, cut through terraces and necessitate an inferior New Highway alignment. Overall, the MCA assessor preferred the roundabout option for the South Manakau location.

The MCA assessor advised that although a roundabout at South Manakau was feasible, it would be preferable that if a "Manakau interchange" was to be provided, it would be in Kuku.

Kimberley or Tararua

The roundabout and grade separated options at Kimberley recorded scores of four and five respectively, whereas the Tararua interchange options recorded scores of two and three respectively.

The MCA Assessor noted that a interchange at Kimberley was less preferred as it would have more direct and visual impacts on houses, fit more "awkwardly" with local landscape, require more local road re-connections to made and would force the New Highway alignment to cut across the human "grain" (i.e. road and cadastral patterns). Accordingly, and interchange at Tararua was preferred.

SH1 / SH57 Split

The MCA assessor noted that the proposed location for an interchange at the "split" was set in a "challenging landscape / visual context". That is, all of the New Highway alignment options identified for this location ran oblique to SH57, and therefore cut across established landscape patterns. Given the complexity of this context all interchange options recorded scores of four. The roundabout was least preferred due to

its "awkward fit" with the existing local landscape and direct impacts on residential dwellings.

See Appendix D (Landscape and Visual Report) for further information on the MCA assessor's interchange option evaluations.

7.2.3.3 Ecology

The MCA assessor explained that terrestrial and freshwater / wetlands impacts had been evaluated separately. For terrestrial impacts, all interchange options recorded scores of one. For freshwater ecology, and with the exception of the Manakau and Kuku interchange options, all interchange options recorded a scores of one.

All of the South Manakau / Kuku interchange options (except the no connection option) recorded scores of fours and fives for the reasons summarised below.

South Manakau

For South Manakau, the grade separation option scored four due to its potential impacts on the Waiauti Stream. In comparison, the roundabout option scored a one as its impacts on this stream was expected to be negligible. Therefore, the roundabout was the preferred form from a freshwater / wetland perspective.

From a terrestrial ecology perspective, both options scored a one.

Kuku

Similar to South Manakau, the grade separation option at Kuku South scored a four due to its potential impacts on the Waikawa Stream and Waterway 12. In comparison, the roundabout option and no connections options both recorded scores of ones. Both of these options were the preferred interchange options at Kuku from a freshwater / wetlands perspective.

From a terrestrial ecology perspective both options at South Kuku were noted as potentially affecting forest remnants, however the design team advised that these could be avoided therefore allowing the scores to be ones.

See Appendix E (Ecology Report) for further information on the MCA assessor's interchange option evaluations.

7.2.3.4 Heritage

The MCA assessor identified that their assessment had considered the buildings listed by Heritage New Zealand and HDC. It also considered non-listed heritage buildings that are located within, or located near, the preferred corridor. As there were no listed or non-listed buildings considered as being impacted by any of the interchange options, all options received scores of one.

See Appendix F (Heritage Report) for further information on the MCA assessor's interchange option evaluations.

7.2.3.5 Archaeology

The MCA assessor identified that the archaeological values of known and potential archaeological sites were evaluated. All interchange options recorded scores of ones, twos or threes, but the MCA assessor did note that further information was required in order to provide more definitive preferences (particularly at the Kimberley and McDonald Road locations). The assessor also noted that roundabouts were generally preferable as they had smaller footprint impacts.

See Appendix G (Archaeology Report) for further information on the MCA assessor's interchange option evaluations.

7.2.3.6 Noise / vibration

The MCA assessor advised that their evaluation had considered the noise / vibration impacts (including the braking / accelerating of traffic) of each interchange option on nearby PPFs. Traffic increases / turning movements on local roads as a consequence of the interchange options / forms was also evaluated.

With the exception of both Kuku interchange options[20], all interchange options recorded scores of fours or fives for the reasons summarised below.

South Manakau

For South Manakau, the grade separation and roundabout options recorded scores of four and five respectively due to their potential adverse noise / vibration impacts on nearby PPFs at this location.

Kimberley vs Tararua

Except for the Tararua grade separation option, all interchange options scored fives due to their potential adverse noise / vibration effects on nearby PPFs. The Tararua grade separation option was slightly preferred with a score of four and it was noted by the assessor that there is likely to be greater scope for mitigation in this location.

SH1 / SH57 Split

For the SH1/57 split the roundabout option scored a five due to its potential adverse noise / vibration impacts on nearby PPFs. The grade separation option was scored a four, and therefore slightly preferred. There is a potential for the roundabout score to be reduced if the roundabout location was adjusted.

North Levin

For North Levin, the roundabout option scored five due to the likely adverse noise / vibration impacts on nearby PPFs. The grade separation option was scored a four, as it removed some of the sensitive receivers, and therefore is slightly preferred.

See Appendix H (Noise and Vibration Report) for further information on the MCA assessor's interchange option evaluations.

7.2.3.7 Productive land values

The MCA assessor outlined that their assessment had focussed on productive land values that would be impacted by each interchange and associated form options. In particular, the assessor advised that their assessment of the options was based on the Landuse Capability Classification (LUC) System, noting that land classified as LUC 1, 2 and 3 contained the highest productive land values.

All interchange options were recorded scores of threes, fours or fives for the reasons set out below.

South Manakau / Kuku

For South Manakau and Kuku, all interchange options would impact on LUC 1, 2 and 3 land to varying degrees. Grade separated options scored fours or fives as they require more productive land to be taken (with the Kuku grade separated option scoring a five). For both locations, the MCA assessor had an overall preference for a no connection, which was scored a one.

Kimberley or Tararua

The interchange options at Kimberley scored fours or fives (the grade separation option scored a five) due to impacts on LUC 1, 2 and 3 land. It was noted that the MCA assessor preferred the Tararua interchange locations as the LUC land affected at this location was

[20] It is noted there was a preference for no connection

mostly LUC 3 land (both the roundabout and grade separated interchange options scored threes at this location).

SH1 / SH57 Split

All the interchange form options at the SH1 / SH57 split location recorded scores of five due to all options impacting on LUC 1 and 2 land equally.

North Levin

All the interchange form options at North Levin would impact on LUC 1 and 2 land. The roundabout option recorded a score of four whereas the service interchange option scored a five. The difference in scoring was attributed to the smaller footprint size of the roundabout.

See Appendix I (Productive Land Values Report) for further information on the MCA assessor's interchange option evaluations.

7.2.3.8 Social / community / recreation

The MCA assessor advised that their evaluation had considered social, community and recreation impacts on the communities that the interchange options will interact with, which included considering community severance and construction effects. The assessor firstly noted that there would be connectivity, economic and safety benefits for the community as a result of connections being provided to and from the future New Highway.

With the exception of the interchange locations at the Kuku and North Levin locations (with all options recording scores of three), all interchange locations had at least one option that received a score of four for the reasons outlined below.

South Manakau

For South Manakau, both interchange options recorded scores of fours as both would further impact on the Manakau Heights community (i.e. in addition to the New Highway impacts) and would not directly connect to the Manakau Village. However, grade separation was slightly preferred over a roundabout at this location as it was considered to be more supportive of walking and cycling across the highway. Overall, and if an interchange was to be provided at Manakau or Kuku, there was a preference for Kuku.

Kimberley or Tararua

The MCA assessor scored the Kimberley interchange options as fours as it was likely to cause adverse social disruption for the local community, and would provide an inferior connection to the Levin south industrial area (when compared to a interchange at Tararua). As such, the assessor preferred the interchange to be located Tararua, and had a slight preference for grade separation from a walking and cycling perspective.

SH1 / SH57 Split

For the SH1/57 split location, both the roundabout and grade separated service interchange options recorded scores of four respectively, whereas the bifurcation option recorded a score of two. Both the former options were evaluated as having more adverse social disruption impacts for the local community. Overall, the bifurcation option was preferred at this location as it was likely to result in less social disruption and provide better local road connections for the local community.

See Appendix J (Social / Community / Recreation Powerpoint) for further information on the MCA assessor's interchange option evaluations.

7.2.3.9 Horowhenua District Development

The MCA assessor recorded scores of one, two or three for all of the interchange options. The assessor also noted the following:

- A South Manakau interchange was slightly preferred to a Kuku Interchange
- A Tararua Interchange was preferred over a Kimberley interchange due to its more direct connection with the Levin Town Centre, Gladston Green and the Industrial Growth Area
- There was a preference for a small interchange at the SH1 / SH57 split from a footprint size perspective, and
- A roundabout form was preferred at the North Levin location as it is perceived to provide a better gateway to Levin and has less impact on future growth in this vicinity.

See Appendix K (Horowhenua District Development Report) for further information on the MCA Assessor's interchange option evaluations.

7.2.3.10 Fit with local road

The MCA assessor advised that their evaluation of local road connectivity was based on current and predicted land and network use, and a number of assumptions had been made in order to undertake their assessment.

The MCA assessor advised that all the interchange options recorded scores of ones, twos or threes. The assessor also noted the following:

- There was no preference between an interchange at South Manakau or at Kuku, but a roundabout form was less preferred as it was more likely to encourage additional through traffic to use the local road network
- A Tararua Interchange location was preferred over a Kimberley interchange location. At Tararua, grade separation was preferred over a roundabout as it was more likely to result in through traffic remaining on the State Highway rather than transferring to the local road network, and
- A roundabout was preferred at the SH1 / SH57 split and North Levin locations as it would provide for increased local road connectivity.

See Appendix K (i.e. Horowhenua District Development Report, which includes the Fit with Local Road Assessment) for the MCA assessor's detailed evaluation report.

7.2.3.11 Engineering degree of difficulty

The MCA assessor noted the importance of EDoD assessment from a design complexity, cost and risk perspective. The assessor also noted that its assessment was supported by a "EDoD team" comprising of a design manager, flood engineer, geotech engineer, geologist, bridge engineer, roading designer and engineering lead reviewer.

In terms of arriving at the EDoD MCA scores, the EDoD assessment considered the following matters:

- Geometry and local road tie-ins: mainline and existing local roads
- Earthworks: topography, geological age and anticipated volumes, and
- Watercourses: effects on existing water courses.

After considering weighting options for the about matters, the EDoD Team decided that a weighting system was not required. Accordingly, each matter was weighted evenly at 33.3 per cent each.

With the exception of the Manakau interchange options, all options recorded scores of ones, twos or threes, and there was little to differentiate between them from an EDoD perspective.

In summary, roundabouts were preferred over grade separated options, but there were only slight differences in locational options.

For the Manakau and Kuku interchange options, the recorded scores ranged from one to four with the grade separated option at South Manakau scoring a 4 for the reasons summarised below.

South Manakau – Grade separation

Grade separation at South Manakau was less preferred to a roundabout option. This was because existing incised valleys, water courses (e.g. Waikawa Stream) and likely earthwork volumes would make a grade separated interchange option complex to construct. It is noted that the EDoD preference at the "Manakau location" is for a no connection option (which scored a one).

See Appendix M (Engineering Degree of Difficulty Report) for further information on the MCA assessor's interchange option evaluations.

7.2.3.12 Property degree of difficulty

The MCA assessor noted that the PDoD evaluation was based on the same factors used to undertake the alignment assessment. With the exception of grade separation at Kimberley, all interchange options recorded scores of twos or threes.

The grade separation option at Kimberley scored a four for the reasons summarised below.

Kimberley

It was noted that a grade separated service interchange at this location scored a four due to its likely impacts on new properties, including its potential impacts on a chicken farm located near the Kimberley and Arapaepae intersection (which would be a complex property acquisition).

See Appendix N (Property Degree of Difficulty Report) for further information on the MCA assessor's interchange option evaluations.

7.3 Interchange MCA weighting options

The above outlines the raw scores, which are vital to the selection process for the interchange options. But simply adding raw scores provides a coarse approach – a weighting exercise tests sensitivities within the raw scores to matters considered, under various weightings, to be more important. Accordingly, a range of weighting systems were developed, then applied to the scores and compared with the unweighted alignment scores.

7.3.1 Workshop weightings

At the completion of the scoring component of MCA Workshop 2, the attendees, identified how important they consider the different criteria to be by assigning low, medium and high "workshop weightings" to each assessment criterion. A workshop weighting reflects the importance that the workshop attendees collectively placed on each individual assessment criterion.

The attendees identified the following assessment areas to be of high importance in the selection of the preferred alignment options:

- Enhanced movement, safety and connectivity project objectives
- Iwi values (i.e. due to potential impacts on cultural values)
- Landscape / visual
- Noise / vibration

- Fit with Horowhenua district development (i.e. to reflect local existing and future growth pressures)
- Fit with local road system (i.e. to reflect the importance of maintaining local connectivity), and
- EDoD (i.e. due to design complexity, risk and cost implications).

The criteria considered to be of medium importance included ecology and productive land value impacts. The lowest ranking assessment criteria were the resilience project objective, heritage and archeology assessment areas.

Following MCA Workshop 2, the Project Team (using its professional judgement) assigned numerical rankings out of 10 to the low, medium, and high rankings. It determined that a low-ranking weighting would be between one and four, a medium ranking weighting would be between five and seven and a high ranking weighting would be between eight and 10.

Both the workshop low, medium and high weighting rankings and the Project Team's corresponding numerical rankings is set out in Table 14 below.

Table 14: MCA workshop 2 (interchange) weightings

	01 - PO - Enhanced movement	01 - PO - Safety	01 - PO - Resilience	01 - PO - Connections	02 - Iwi (Raukawa)	03 - Iwi Muaupoko	04 - Landscape/visual	05a - Ecology Terrestrial	05b - Ecology freshwater and wetlands	06 – Heritage	07 - Archaeology	08 - Noise and vibration	09 - Productive land values	10 - Social/community/recreation	11 - Horowhenua District development	13 - Fit with local road system	14 - Engineering degree of difficulty	15 - Property degree of difficulty
Workshop range	H	H	L	H	H	H	H	M	M	L	L	H	M	H	H	H	H	M
Project Team Weighting of Criteria	10	10	4	10	10	10	10	5	5	2	2	10	5	8	10	10	10	5

7.3.2 RMA Section 6 and quadruple bottom line weightings

Additional weighting systems were developed to further examine the sensitivity of the unweighted interchange option results. Accordingly, RMA Section 6 matters and quadruple bottom line (i.e. social, economic, cultural and economic) weightings were developed by the Project Team following completion of MCA Workshop 2.

Table 15 sets out the RMA Section 6 and quadruple bottom line weightings.

Table 15: RMA Section 6 matters and quadruple bottom line weightings

	RMA Section 6	Social	Environment	Cultural	Economic
01 - PO - Enhanced movement	3	4	0	0	10
01 - PO - Safety	3	7	0	0	10
01 - PO - Resilience	8	4	0	0	10
01 - PO - Connections	3	8	0	0	10
02 - Iwi Values (Raukawa)	10	8	8	10	2
03 - Iwi Values (Muaupoko)	10	8	8	10	2
04 - Landscape/visual	10	5	6	5	0
5a - Ecological - Terrestrial	7	3	10	8	0
5b - Ecological - Freshwater & Wetlands	7	3	10	8	0
06 - Heritage	7	7	3	3	0
07 - Archaeology	7	7	3	8	0
08 - Noise and vibration	5	7	3	3	0
09 - Productive land values	2	3	0	0	5
10 - Social/community/recreation	5	10	3	8	3
11 - Horowhenua District development	5	7	0	2	7
12- Fit with local road system	2	3	0	0	5
13 - Engineering degree of difficulty	2	3	0	0	10
14 - Property degree of difficulty	2	5	0	0	10

In terms of the above weightings:

- The RMA Section 6 weightings place higher weights on the relevant Section 6 matters (i.e. Iwi values, landscape, ecology, heritage/archaeology). Iwi and Landscape were afforded the highest weightings of 10, whilst ecology and heritage / archeology values were also afforded high weightings of eight to reflect their importance under Section 6 of the RMA
- The Social weighting places the highest weighing on the social aspects of the interchange options. The highest weighting was given to the social / community / recreation criterion to reflect the social benefit / cost impacts that the provision of the interchanges would have on the local community. The next highest-ranking social weightings were for Iwi, heritage and archaeology to also reflect the important social components of these respective assessment criterion. Horowhenua district development was also afforded a high ranking of eight to reflect its important social dimensions
- The Environment weighting places the highest value on the environmental elements of ecology. Iwi were also afforded a ranking (of 8) to reflect that cultural values are closely intertwined with the environment. Criteria without a physical environment component were not scored
- The Cultural weightings places the highest value on Iwi Cultural Values which was afforded a ranking of 10. Given their close cultural dimensions, the archaeology / heritage, ecology and social / community / recreation assessment areas were also ranked highly with eights. It is noted that Iwi contributed to the weightings discussions at each MCA workshop on the basis that the weighting system would be reviewed prior to completing the MCA process, and

- The Economic weightings places the highest values on the engineering complexity, cost and state highway and local connectivity and impacts on property. Little or no direct economic bearing is placed on the other criterion.[21]

7.3.3 Weightings evaluations

Table 16 sets out the evaluation rankings for the interchange options according to the different weighting systems described above. It also provides a comparison between the weighting and unweighted assessment rankings.

[21] This quadruple bottom-line weighting is a different type of evaluation from the Benefit Cost Ratio (BCR) evaluation normally undertaken by Waka Kotahi

Table 16: Evaluation of the interchange weighted and unweighted rankings

Interchange option	Workshop Weighting	RMA Sec 6	Social	Environment	Cultural	Economic	Average weightings rank	Final *weighted* rankings	Final *unweighted* rankings
Manakau / Kuku Interchange Location and Form Options									
Option A: South Manakau Roundabout	5	4	5	3	4	5	4.3	**5**	**4**
Option B: South Manakau Grade Separation	4	5	4	5	5	3	4.3	**4**	**4**
Option C: Kuku Roundabout	3	2	3	2	2	4	2.7	**3**	**2**
Option D: Kuku Grade Separation	2	3	2	4	3	2	2.7	**2**	**3**
Option E: No Connection	1	1	1	1	1	1	1	**1**	**1**
Kimberley or Tararua									
Option A: Roundabout at Kimberley	4	4	4	3	3	4	3.7	**4**	**4**
Option B: Grade Separation at Kimberley	3	3	3	4	4	2	3.2	**3**	**3**
Option C Roundabout at Tararua	2	2	2	1	2	3	2	**2**	**2**
Option D Grade Separation at Tararua	1	1	1	1	1	1	1	**1**	**1**
SH1/SH57 Split Interchange Form Options									
Option A: Bifurcation	2	1	1	1	1	3	1.5	**1=**	**2**
Option B: Roundabout	1	2	1	2	2	1	1.5	**1=**	**1**
Split: Grade Separation	3	3	3	2	3	2	2.7	**3**	**3**
North of Levin Interchange Form Options									
Option A: Roundabout	1	1	1	2	1	1	1.2	**1**	**1**
Option B: Grade Separation	2	1	2	1	2	2	1.7	**2**	**2**

7.4 Summary of MCA analysis for interchange options

7.4.1 Manakau / Kuku

The option of not providing a connection in the vicinity of Manakau was favored by both the average weighting and unweighted assessment rankings.

In terms of location, and if an interchange was to be provided, a Kuku was favored under both ranking assessments. This location was mostly preferred due to its superior evaluation scores for landscape / visual impacts, noise / vibration impacts, EDoD and PDoD.

In terms of form, and for both locations, a grade separated interchange was favored overall by the MCA assessors (except landscape / visual and freshwater / wetland ecology).

Recommendation

It is recommended that no connection be provided at the Manakau location, but that the New Highway be future proofed to allow for a grade separated interchange at Kuku.

7.4.2 Kimberley or Tararua

In terms of location, an interchange at Tararua was favored under both the average weighting ranking and unweighted assessment rankings.

In terms of form, grade separation was favored over a roundabout option by all MCA assessors (except for landscape / visual).

Recommendation

It is recommended that an interchange at Tararua be progressed, with a preference for grade separation.

7.4.3 SH1 / SH57 Split

There was only a small difference between the average weighted and unweighted assessment results for the SH1 / SH57 interchange form options. In summary, the overall results slightly favored the roundabout option over the grade separation options. It is noted that the key differentiators between the three options were as follows:

- The grade separated bifurcation interchange scored worst for safety as it would be providing a high speed connection from an New Highway into a significantly lower standard road (leading to crash migration risks), and some concerns were also raised from an EDoD perspective, and in particular a sub-criteria within this assessment criteria (i.e. geometric complexity) that scored this item as the worst possible score (5)
- The roundabout scored worst for noise / vibration, for community / social / recreation and landscape / visual impacts, noting that some of these impacts could be reduced by altering its location, and
- The grade separated service interchange scored moderately for all assessment criteria.

Recommendation

It is recommended that further investigation is undertaken on the roundabout option at this location. Outside of the MCA process, and noting that the MCA did not specifically consider justification or cost, discussions with Waka Kotahi identified concerns with the grade separated and bifurcation options on the basis of being significant cost items that were difficult to justify, together with not allowing sufficient long term flexibility for any potential upgrade works to SH57 that may be required in the future.

7.4.4 North Levin

A roundabout option was favored at North Levin under both the average weighting ranking and unweighted assessment rankings. In particular, it was preferred as it was considered to be a better fit with the Horowhenua district development assessment criterion (it did however score worse from an enhanced movement and resilience perspective).

Recommendation

It is recommended that a roundabout option be progressed.

7.5 Recommended interchange options

Table sets out the New Highway options recommended to be progressed.

Table 17: Interchange location / form options recommended

Location	Draft preferred interchange options
Manakau / Kuku	No connection, but if a connection was to be provided, then there is a preference for an interchange at Kuku (form undecided)
Kimberley or Tararua	Tararua only, noting a preference for grade separation
"SH1 / SH57 Split"	Roundabout (only)
North Levin	Roundabout (only)

8. Local road long list

The Project Team developed a long list of local road options that may be provided to ensure local connectivity is maintained.

8.1 Long listing processes

The processes that lead to the identification of a long list of local road options is identified in the *Ōtaki to North of Levin Detailed Business Case: Local Roads Access Long List Options Report (25 May 2020)* (referred to as the "Long List Report"), which is attached as Appendix P. In addition to the high level option assessments discussed in this report, each long listed option was reviewed by each MCA assessor at MCA Workshop 2.

8.1.1 Long list option developmental principles

In order to identify a long list of local road options to be reviewed by the MCA assessors at MCA Workshop 2, the following principles were developed.

8.1.1.1 Community severance

Some degree of community severance is inevitable. Accordingly, local road and non-motorised mobility options were included where there would be severance.

8.1.1.2 Access severance

Current motorised vehicle access is to be maintained. Where the highway would sever a local road, a replacement route must be provided. Such a route should not unreasonably increase the current journey length by more a than a few kilometres.

8.1.1.3 Private access to properties

All nearby private properties or properties impacted (and not fully required for the highway) will be provided with motorised vehicle access. Some accesses may need to be new extended driveways or rights of way.

8.1.1.4 Local road cross-section

At this long list stage, the number and width of lanes and off-road provision for walking and cycling to be adopted for each local road crossing or realignment is not considered. Therefore, for the purposes of long listing options, each local road option is assumed to have the same cross-section and is therefore equally capable of accommodating walking and cycling.

8.1.1.5 Bridges over or under highway

The long list of options generally considers crossings both over and under the highway wherever physically feasible or practicable.

8.1.1.6 Filtering and culling

The long list of options includes all viable options.

8.1.1.7 Presentation of options

All local road combinations are presented only where a highway alignment option would have a significant effect on the local road layout. Where the various highway alignment options would have little or no effect on the layout of the local road connection option, a typical layout has been shown that would apply to any of the highway alignment options.

8.1.1.8 Interdependencies between options

Options for each local road are generally presented as standalone options. However, there will necessarily be interdependencies between options. For example, it may be unreasonable to adopt all options that provide a bridge over the highway, resulting in

multiple bridges in a short length. Equally, it may be unreasonable to adopt many successive cul de sacs that would require long diversions to a crossing point.

8.1.2 Long listed local road options

Appendix Q sets out the long list of local road options as identified in the Long List Report.

It is noted that during the pre MCA workshop processes, HDC requested that the MCA assessors also consider a "Liverpool Street" local road connection as part of their local road assessments. This connection would cross SH57 from the new Taraika / Gladstone Green Master Plan area to Liverpool Street / Fuller Close on the western side of SH57. Accordingly, a Liverpool Street connection was added to the Long List Report.

8.2 MCA assessor's evaluation comments

8.2.1 MCA assessor instructions

As set out in Section 7 above, the MCA assessors were briefed at MCA Workshop 1 on the requirements for their high-level review of the long list of options, this included undertaking the following:

- Reviewing the options identified in the Long List Report, and
- Providing comments on each option, including using the following "traffic light signals" to indicate whether an assessor had low, medium or high-level concerns:
    - Green (or 1) if an option is likely to have only minor impacts or issues
    - Orange (or 2) if an option is likely to have moderate impacts or issues, and
    - Red (or 3) if an option is likely to have serious or significant negative impacts or issues.

8.2.2 MCA evaluation traffic light signals

This section of this report summarises the assessments for the local road options (grouped into specific Local Road Zones) that received red and orange through the traffic light assessment process. The commentary below also highlights the options recommended to be advanced for further consideration, and the options recommended not to be advanced any further.

Further information on each MCA assessor's evaluations can be found in their relevant reports, which are attached as appendices to this report (and as identified above).

8.2.2.1 Local Road Zone A: Existing SH1 / Taylors Road

The orange and red traffic assessments signals for each local road option for Local Zone A are set out in Table 18.

Table 18: Local Road Zone A red and orange traffic light signals

Local Option	Criteria	Score	Reason
Redirect under Waitohu Stream Bridge	P.O. Connections	Red	Forces all traffic through two significant sharp bends which is not suitable for the volume of traffic expected to use it
	Noise and vibration	Red	Has two sharp turns which creates a large amount of slowing and accelerating movements for all traffic
	Kapiti District development (see Appendix R)	Red	Safety and flooding risks
	Engineering D.o.D	Red	Working in a difficult and constrained area
	P.O. Safety	Orange	Consecutive sharp turns in a constrained area
	P.O. Resilience	Orange	Requires all traffic on old SH to go via the stream (opposed to Taylors Road only) resulting in a higher likelihood and consequence of a closure

Underpass and reconnect Taylors road to the north of the New Highway	Noise and vibration	Orange	Impacts of having a single sharp turn for traffic
	Social, community and recreation	Orange	Potential connectivity issues depending on design
	Engineering degree of difficulty	Orange	Requires new structure but likely more appropriate than going under Waitohu Stream Bridge
	Property degree of difficulty	Orange	Requires additional properties to be purchased over the first option
Underpass and reconnect Taylors road under the Waitohu Stream bridge	Noise and vibration	Orange	Impacts of having a single sharp turn for traffic
	Social, community and recreation	Orange	Potential connectivity issues depending on design
	Kapiti development	Orange	Relies on Taylors Road being in a flood prone area potentially restricting access
	Engineering degree of difficulty	Orange	Requires new structure but likely more appropriate layout for local connections
	Property degree of difficulty	Orange	Requires additional properties to be purchased over the first option

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Underpass and reconnect Taylors road to the north of the New Highway, and
- Underpass and reconnect Taylors road under the Waitohu Stream bridge.

However, the option of redirecting traffic under the Waitohu Stream Bridge recorded a number of red signals (as well as orange signals) and is not recommended to be advanced.

8.2.2.2 Local Road Zone B: South Manakau Road

The orange and red traffic assessments signals for each local road option for Local Zone B are set out in Table 19.

Table 19: Local Road Zone B red and orange traffic light signals

Option	Criteria	Score	Reason
South Manakau Road overpass	Landscape/visual	Orange	Preferred option if there needs to be a connection at South Manakau, but a connection at Honi Taipua is preferred as it provides a better connection to Manakau village
	Social, community and recreation	Orange	Prefer highway under at this location
South Manakau Road underpass	Landscape/visual	Red	The road heading over the highway is contrary to the surrounding environment.
	Engineering degree of difficulty	Orange	The highway at grade may need to be lifted due to watercourses which would result in a higher local road bridge
Sever and provide access via Honi Taipua Street	Fit with local road system	Red	Severing South Manakau Road will cause local connectivity issues
	Engineering degree of difficulty	Red	The bridge very close to curve on Manakau Heights – which will require a check as to its feasibility. Questionable whether Honi Taipua is suitable route with respect to width and grade.
	Connections	Orange	Increased travel time for vehicles impacted by the rerouting
	Noise and vibration	Orange	Increased number of slowing and accelerating for vehicles
	Social, community and recreation	Orange	Severer connections between Manakau Heights and Manakau Village

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect South Manakau Road via an underpass, and
- Reconnect South Manakau Road via an overpass.

However, the option to sever South Manakau Road recorded a number of red and orange signals and is not recommended to be advanced.

The connection at Honi Taipua is further discussed in the next zone.

8.2.2.3 Local Road Zone C: Honi Taipua Street

The orange and red traffic assessments signals for each local road option for Local Road Zone C are set out in Table 20.

Table 20: Local Road Zone C red and orange traffic light signals

Option	Criteria	Score	Reason
Sever Honi Taipua Street and access via Manakau Heights Drive	Social, community and recreation	Red	Honi Taipua is an important connection to Manakau Village, severing would result in adverse effects
	Landscape/visual	Orange	Honi Taipua is an important connection to Manakau Village.
	Fit with local road system	Orange	Partial restoration of the severed link
Reconnect Honi Taipua Street via an overbridge	Engineering degree of difficulty	Red	The bridge very close to curve on Manakau Heights – which will require a check as to its feasibility. Questionable whether Honi is suitable route with respect to width and grade.
	Connections	Orange	Increased travel time for impacted routes
Reconnect Honi Taipua via a footbridge	Social, community and recreation	Red	Honi Taipua is an important connection to Manakau Village, severing would result in adverse effects
	Landscape/visual	Orange	Bridge in this location has negative impacts to it's fit with the landscape
	Fit with local road system	Orange	Partial restoration of the severed link
Sever Honi Taipua and create a Mokena Kohere Street footbridge	Heritage	Red	Visual impacts on the St Andrews Church
	Social, community and recreation	Red	Honi Taipua is an important connection to Manakau Village, severing would result in adverse effects
	Engineering degree of difficulty	Red	Requires nearly 1km of new local road compared to other options
	Fit with local road system	Orange	Partial restoration of the severed link
	Property degree of difficulty	Orange	Requires lifestyle properties from eastern rise

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Sever Honi Taipua Street and have access only via Manakau Heights Drive
- Reconnect Honi Taipua Street via an overbridge, and
- Reconnect Honi Taipua Street via a footbridge only, with vehicle access via Manakau Heights Drive.

However, the option to sever Honi Taipua and create a Mokena Kohere Street footbridge recorded a high number of red traffic signals, and is not recommended to be advanced.

8.2.2.4 Local Road Zone D: North Manakau Road

The orange and red traffic assessments signals for each local road option for Zone D are set out in Table 21.

Table 21: Local Road Zone D red and orange traffic light signals

Option	Criteria	Score	Reason
Reconnect with overbridge	Heritage	Orange	Visual impacts to the former schoolhouse in Manakau
	Archaeology	Orange	A few sites at risk of potential archaeological value
Reconnect with underpass	Safety	Orange	Sight distance concerns and sharp bends
	Landscape/Visual	Orange	Preferred to keep local road closer to at grade
	Heritage	Orange	Visual impacts to the former schoolhouse in Manakau
	Social, community and recreation	Orange	Highway going over is less preferable for the quality of environment and cycling/walking connectivity
	Engineering degree of difficulty	Orange	Significant bridge structures and embankment works needed

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect North Manakau Road via an overbridge, and
- Reconnect North Manakau Road via and underpass.

8.2.2.5 Local Road Zone E: Kuku East Road

The orange and red traffic assessments signals for each local road option for Local Zone E are set out in Table 22.

Table 22: Local Road Zone E red and orange traffic light signals

Option	Criteria	Score	Reason
Reconnect with underpass	Social, community and recreation	Orange	Highway going over is less preferable for the quality of environment and cycling/walking connectivity
	Engineering degree of difficulty	Orange	Significant bridge structures and embankment works needed
Provide Access under the Ohau River Bridge	Engineering degree of difficulty	Orange	Needs to avoid extending the bridge structure by a significant length

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect Kuku East Road via an overbridge, and
- Reconnect Kuku East Road via an underpass.

8.2.2.6 Local Road Zone F: Muhunoa East Road

The orange and red traffic assessments signals for each local road option for Local Road Zone F are set out in Table 23.

Table 23: Local Road Zone F red and orange traffic light signals

Option	Criteria	Score	Reason
Reconnect with overbridge	Safety	Orange	Sight distance concerns and sharp bends
	Landscape/visual	Orange	A bridge leading away from the hills does not fit with the landscape
Reconnect with underpass	Social, community and recreation	Orange	Highway going over is less preferable for the quality of environment and cycling/walking connectivity
	Engineering degree of difficulty	Orange	Requires a large amount of fill for the structures
Sever and provide access via Arapaepae or McLeavey Road	Landscape/visual	Red	Does not fit with the cadastral land patterns
	Social, community and recreation	Red	Severance would reduce connectivity to Ohau, their local community
	Fit with local road system	Red	Would move traffic onto an unsafe intersection
	Horowhenua District Development	Orange	Impacts land for future housing areas and provides reduced service

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect Muhunoa East Road via an overbridge, and
- Reconnect Muhunoa East Road via an underpass.

The option to sever Muhunoa East Road and redirect traffic onto Arapaepae or McLeavey Road recorded a high number of red traffic signals and is not recommended to be advanced.

8.2.2.7 Local Road Zone G: McLeavey Road

The orange and red traffic assessments signals for each local road option for Local Road Zone G are set out in Table 24.

Table 24: Local Road Zone G red and orange traffic light signals

Option	Criteria	Score	Reason
Reconnect via an overbridge	Landscape/visual	Red	A bridge would only be appropriate if the highway was in a deep gully/cut
	Engineering degree of difficulty	Orange	Bridge sight distance and highway alignment considerations make this difficult. Also fairly poor intersection onto existing SH1
Reconnect via an underpass	Landscape/visual	Red	Would require lifting the highway a reasonable amount with a significant visual impact
	Social, community and recreation	Orange	Highway going over is less preferable for the quality of environment and cycling/walking connectivity
	Engineering degree of difficulty	Orange	Large fill requirements
Sever McLeavey Road	Social, community and recreation	Red	Severance would reduce connectivity to Ohau, their local community
	Fit with local road system	Red	No specific comment provided

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect McLeavey Road via an overbridge
- Reconnect McLeavey Road via an underpass, and

- Sever McLeavey Road and retain as a cul-de-sac.

8.2.2.8 Local Road Zone H: Arapaepae Road

The orange and red traffic assessments signals for each local road option for Local Road Zone H are set out in Table 25.

Table 25: Local Road Zone H red and orange traffic light signals

Option	Criteria	Score	Reason
Sever and provide access via Muhunoa East Road	Social, community and recreation	Red	Would disconnect the adjacent communities
	Fit with local road system	Red	Increases traffic through the Muhunoa East Road (current) SH1 intersection
Sever and provide access via McLeavey Road	Landscape/visual	Red	Not as strongly connected with Ohau as other options
	Fit with local road system	Red	Increases traffic through the McLeavey Road (current) SH1 intersection which is poor
	Social, community and recreation	Orange	Provides the least new road reducing disruption on the communities
	Engineering degree of difficulty	Orange	Bridge sight distance and highway alignment considerations. Also fairly poor intersection onto existing SH1
Sever and provide access via Kimberley Road / a new link	Noise and vibration	Red	Large number of properties impacted by the new link
	Social, community and recreation	Red	Creating a new road causes additional disruption and disconnection
	Connections	Orange	Increased travel times due to the route required
	Landscape/visual	Orange	Would sever the natural connection on the northern banks of the Ohau River
	Engineering degree of difficulty	Orange	Could be a better overall solution than bridge at Muhunoa or McLeavey, but requires over 800m new road
	Property degree of difficulty	Orange	Impacts on additional properties in alignment Zone F

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Sever Arapaepae Road and provide access via McLeavey Road, and
- Sever Arapaepae Road and provide access via Kimberley Road / a new link.

The option to sever Arapaepae Road and provide access via Muhunoa East Road recorded a high number of red traffic signals and is not recommended to be advanced.

8.2.2.9 Local Road Zone I: Muhunoa East

The orange and red traffic assessments signals for each local road option for Local Zone I are set out in Table 26.

Table 26: Local Road Zone I red and orange traffic light signals

Option	Criteria	Score	Reason
Muhunoa East, McLeavey and Kimberley severed, new connecting road built	Connections	Red	Results in a significant increase in travel time for local trips
	Landscape/visual	Red	Removes the natural connection between the Muhunoa East area and Ohau
	Social, community and recreation	Red	Creates additional barriers for east – west movements
	Engineering degree of difficulty	Red	Requires ~4.2km of new local road; however needs to be considered against the context of an additional EW bridge

	Property degree of difficulty	Red	Requires acquisition of additional properties
	Noise and vibration	Orange	Potential issues on Tararua Road with multiple roundabouts near houses giving rise to vehicles braking/accelerating.
	Productive land values	Orange	Impacts a large amount of productive land
	Fit with local road system	Orange	Causes disruption to local roads however provides alternative routes, requires understanding of impacts to flows

This option had significant adverse effects and it is not recommended that this proceed further.

Recommendation

No options are proposed to be progressed.

8.2.2.10 Local Road Zone J: Kimberley Road and Liverpool Street

Kimberley Road

The orange and red traffic assessments signals for each local road option for Local Road J (Kimberley Road) are set out in Table 27.

Table 27: Local Road (Kimberley Road) Zone J red and orange traffic light signals

Option	Criteria	Score	Reason
Reconnect via overbridge	Landscape/visual	Red	New bridge would have an adverse impact on houses on Kimberley Road
	Noise and vibration	Red	Potential issues with roundabouts on existing SH57 and connecting the new link near houses with vehicles braking/accelerating
	Connections	Orange	Moderate impacts on travel times for some routes
	Productive land values	Orange	Impacts a moderate amount of productive land
	Engineering degree of difficulty	Orange	All options at this location provide challenges, with further work required to better quantify
Reconnect via underpass	Landscape/visual	Red	Raising the highway would have an adverse impact on houses on Kimberley Road
	Noise and vibration	Red	Potential issues with roundabouts on existing SH57 and connecting the new link near houses with vehicles braking/accelerating
	Connections	Orange	Moderate impacts to travel times for some routes
	Productive land values	Orange	Impacts a moderate amount of productive land
	Social, community and recreation	Orange	Highway going over is less preferable for the quality of environment and cycling/walking connectivity
	Horowhenua district development	Orange	Impacts on planned housing areas
	Engineering degree of difficulty	Orange	All options at this location provide challenges, with further work required to better quantify
Sever and provide access via Arapaepae Road	Social, community and recreation	Red	Severance disrupts local communities on Kimberley Road
	Landscape/visual	Orange	Removes a natural connection, works well in combination with the Tararua connection option
	Productive land values	Orange	Impacts a moderate amount of productive land
	Engineering degree of difficulty	Orange	All options at this location provide challenges, with further work required to better quantify
	Social, community and recreation	Red	Severance disrupts local communities on Kimberley Road

Sever and provide access via Tararua Road	Noise and vibration	Orange	Potential issues on Tararua Road with roundabout near houses giving rise to vehicles braking/accelerating
	Productive land values	Orange	Impacts a moderate amount of productive land
	Engineering degree of difficulty	Orange	All options at this location provide challenges, with further work required to better quantify

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect Kimberley Road via an overbridge
- Reconnect Kimberley Road via an underpass
- Sever Kimberley Road and provide access via Arapaepae South and a new link, and
- Sever Kimberley Road and provide access via Tararua Road and a new link.

Liverpool Street

As noted above, during the MCA process HDC requested that a Liverpool Street local road connection be considered by the MCA assessors.

The orange and red traffic assessments signals for each local road option for Local Road J (Liverpool Street) are set out in Table 28.

Table 28: Local Road (Liverpool Street) Zone J red and orange traffic light signals

Option	Criteria	Score	Reason
Liverpool Street underpass	Noise/vibration	Red	Significant new traffic flows and corresponding noise are introduced to Fuller Close and to a lesser extent on Liverpool Street (relative to likely existing flows)
	Horowhenua District Development	Red	Potential adverse impacts associated with a raised highway
Liverpool Street bridge	Noise/vibration	Red	Significant new traffic flows and corresponding noise are introduced to Fuller Close and to a lesser extent on Liverpool Street (relative to likely existing flows)
No connection	Landscape/visual	Red	Would weaken potential connectivity between Levin and the Gladstone Green area.
	Horowhenua District Development	Red	Prevents full connectivity to a new housing area
	Fit with local road system	Red	Increased severance for new development

Recommendation

It is recommended that further engagement on the HDC proposal for a connection at Liverpool Street be undertaken.

8.2.2.11 Local Road Zone K: Queen Street

The orange and red traffic assessments signals for each local road option for Local Road K are set out in Table 29.

Table 29: Local Road Zone K red and orange traffic light signals

Option	Criteria	Score	Reason
Queen Street underpass	Horowhenua district development	Red	Provides a negative experience for people accessing the Gladstone Green development
	Landscape/visual	Orange	Highway flyover would provide adverse visual effects to houses

Option	Criteria	Score	Reason
	Heritage	Orange	Impacts to 1024 Queen Street East
	Social, community and recreation	Orange	Potential connectivity issues depending on design
	Engineering degree of difficulty	Orange	This option has been tested previously to ensure feasibility, it has some difficulty but workable
Queen Street overbridge	Engineering degree of difficulty	Red	Providing a highway below EGL: may not be possible here due to ground conditions, drainage and GW. Would add significant expense
	Heritage	Orange	Impacts to 1024 Queen Street East

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect Queen Street via an underpass, and
- Reconnect Queen Street via an overbridge (highway below ground level).

8.2.2.12 Local Road Zone L: Waihou Road

The orange and red traffic assessments signals for each local road option for Local Road L are set out in Table 30.

Table 30: Local Road Zone L red and orange traffic light signals

Option	Criteria	Score	Reason
Connect to McDonald Road	Social, community and recreation	Red	Provides poor connections for the community impacted
	Productive land values	Orange	Impacts a moderate amount of productive land
Connect to Wakefield Street	Connections	Orange	Provides a moderate increase in travel time to users
	Social, community and recreation	Orange	Provides poor connections for the community impacted, but better than the connection to McDonald Road
	Productive land values	Orange	Impacts a moderate amount of productive land

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect Waihou Road via a new link to McDonald Road, and
- Reconnect Waihou Road via a new link to Wakefield Street.

8.2.2.13 Local Road Zone N: Sorensons Road

The orange and red traffic assessments signals for each local road option for Local Road N are set out in Table 31.

Table 31: Local Road Zone N red and orange traffic light signals

Option	Criteria	Score	Reason
Connect via underpass	Social, community and recreation	Red	Potentially creates social severance
	Landscape/visual	Orange	Would require the new Highway to be on a
Connect via overbridge	Landscape/visual	Red	Would require a high bridge to cross which would appear ungainly and prominent.
	Social, community and recreation	Orange	Potentially creates social severance
	Engineering degree of difficulty	Orange	Sufficient offset from rail line to achieve, however could prove complicated to get back down to grade for local road here

Option	Criteria	Score	Reason
Retain road	Productive land values	Orange	Route would require alignment which requires use of productive land

Recommendation

Based on the above traffic signal assessments, it is recommended that the following local road options be further progressed:

- Reconnect Sorensons Road via an underpass
- Reconnect Sorensons Road via an overbridge, and
- Retain Sorensons Road status quo based on alignment selection.

8.2.2.14 Local Road Zone P: Heatherlea East Road

The orange and red traffic assessments signals for each local road option for Local Road P are set out in Table 32.

Table 32: Local Road Zone P red and orange traffic light signals

Option	Criteria	Score	Reason
Connect to Roundabout	Noise and vibration	Red	Potential issue with noise from the braking/accelerating at roundabout – primarily related to the interchange rather than the local road connection
	Fit with local road system	Orange	Provides better feel for local road connections
Connect to Interchange	Noise and vibration	Red	Potential issue with noise from braking/accelerating at roundabouts.
	Fit with local road system	Red	Creates visual severance to local road network
	Landscape/visual	Orange	Cuts across the landscape grain and would affect properties on Koputaroa Road
	Productive land values	Orange	Option requires a moderate amount of productive land
	Engineering degree of difficulty	Orange	Moderately complex to match requirements to geography
	Property degree of difficulty	Orange	Up to three new properties affected outside of 300m IBC Corridor

Recommendation

While the connection to the interchange option scored poorly, the ability to progress this option will depend on the final interchange form more than the required local road connection. As such, it is recommended that decisions on the local road option be made once a final decision has been made on the preferred interchange option at North Levin.

8.2.2.15 Local Road Zone Q: Avenue North Road

Only one option was identified for Local Road Zone Q. The orange traffic assessment for this option is presented in Table 33.

Table 33: Local Road Zone Q red and orange traffic light signals

Option	Criteria	Score	Reason
Convert to cul de sac	Social, community and recreation	Orange	Provides minor severance to the impacted community

Recommendation

It is recommended that the cul de sac local road option be further progressed.

9. Next steps

The next step is for Waka Kotahi to further consider the draft preferred alignment, interchange and local road options that have been recommended in this report (and to conclude Stage 2 of the MCA process).

Stage 3A has commenced and work with Iwi is progressing well. The next key step is to undertake public engagement on the draft preferred alignment, interchange and local road options (i.e. Stage 3B). Following public engagement, a final MCA process will be undertaken in late October 2020 utilising any new information (including from Iwi).

Following completion of Stage 4 of the MCA process, the recommendations for the draft preferred alignment, interchange and local road options will be presented to Waka Kotahi for final decision-making processes. This stage is expected to occur in late 2020.

It is important to note that the MCA outcomes are not the only factor that Waka Kotahi will consider in making decisions on the preferred alignment, interchange solutions and local road connections for the Project. Waka Kotahi may also consider a range of other matters including cost and funding availability, risk and opportunities, and the desired outcomes of Iwi and key stakeholders.

Appendices

Appendix A Ōtaki to North of Levin Detailed Business Case: Initial Alignment Review

Appendix B MCA Workshops 1 and 2 Attendees

Appendix C Fit with Project Objectives Report

Appendix D Landscape and Visual Report

Appendix E Ecology Report

Appendix F Heritage Report

Appendix G Archaeology Report

Appendix H Noise and Vibration Report

Appendix I Productive Land Values Report

Appendix J Social / Community / Recreation Powerpoint

Appendix K Horowhenua District Development Report (and Fit with Local Road)

Appendix L Kapiti District Development Memo

Appendix M Engineering Degree of Difficulty Report

Appendix N Property Degree of Difficulty Report

Appendix O Ōtaki to North of Levin Detailed Business Case: Interchange Options Report

Appendix P Ōtaki to North of Levin Detailed Business Case: Local Roads Access Long List Options Report

Appendix Q Long list of local road options

Appendix R Kapiti Coast District Local Road Assessment Memo

Wellington
Level 13, 80 The Terrace
Wellington 6011
Tel +64 4 381 6700
Fax +64 4 473 1982

www.stantec.com

Please visit **www.stantec.com** to learn more about how Stantec design with community in mind.

Stantec