

Chapter 9
Part E
VOLUME 2

Consideration of Alternatives

Overview

The NZTA and its predecessors carried out (or commissioned) numerous historical assessments of alternative State highway routes through the Kāpiti district, including between Peka Peka and Ōtaki.

In developing the Project, that historical work was examined and brought up to date. The updated assessment involved detailed multi-criteria analysis of four alternative routes, a western route, a central route closely following the existing SH1 (which was ultimately preferred for the Expressway), and two routes to the east, the 'eastern plains' and 'eastern foothills' routes.

The NZTA's conclusion (in late 2011) was that the central route, which had previously been presented to and discussed with the local communities as the NZTA's preferred option, was confirmed to achieve the best fit with the NZTA's Project objectives and statutory obligations. In large part this is because the route chosen for the Expressway allows ready access between the Expressway and Ōtaki (including the Ōtaki Railway Retail area), and best integrates the Project with the Kāpiti district's existing infrastructure and land use planning framework.

Parallel processes for defining the Expressway route were conducted during 2010 and 2011. These processes focused on the location of interchanges and cross-corridor local connections, and specific Expressway route choices. The processes were informed by specialist inputs from a multi-disciplinary expert team. Public consultation and meetings with key stakeholders provided valuable feedback that was factored into the NZTA's decisions on options.

As a result of these processes, the Project design incorporates:

- Half-interchanges to the north and south of Ōtaki, providing full access from the Expressway to the Ōtaki Railway Retail area and vice versa;
- The following cross-corridor local connections:
 - At Te Horo, a local road bridge over the Expressway, NIMT, and the existing SH1, connecting residences and businesses to the east and west of the transport corridor – a more northerly location was chosen because of preferences expressed by Te Horo residents during consultation;
 - Just south of Ōtaki River, new local roads and bridges across the Expressway and NIMT, connecting Ōtaki Gorge Road and Old Hautere Road with the existing SH1 to provide access to and from Ōtaki, and linking to the Expressway (heading south); and
 - At Rahui Road in Ōtaki, a local road bridge across the Expressway and realigned NIMT, linking the Ōtaki Railway Retail area with residential areas to the east;
- Specific provision for cyclists and pedestrians on all cross-corridor local connections;
- An alignment at Mary Crest that avoids significant indigenous vegetation remnants and sites/areas of cultural significance; and
- An alignment at Te Horo that facilitates the benefits of the Mary Crest alignment, and enhances safety and urban design outcomes.

Overview (cont)

KiwiRail has also considered alternatives in relation to the realignment of the short section of the NIMT through Ōtaki, necessitated by the route of the Expressway.

The realigned NIMT largely runs parallel and immediately to the west of the Expressway, which minimises the inaccessible land between the two. The chosen alignment also enables the continued use of the historic Ōtaki Railway Station in its current setting, with the Station building and platform adjusted to remain parallel to the realigned railway track.

9 Consideration of Alternatives

9.1 Introduction

This chapter summarises the key aspects of the processes by which the NZTA and KiwiRail have considered alternatives in the development of the Project. The detailed assessment of route alternatives can be found in Technical Report 3 (Route Options Review), in Volume 3 of this AEE report.

The types of alternatives considered include:

- Alternatives relating to the Expressway route;
- Alternative roading alignments within the proposed route;
- Potential alternative interchanges to provide access across the Expressway in its proposed route; and
- Alternatives in respect of the rail aspects of the Project.

The statutory requirement to consider alternatives is outlined in relation to both notices of requirement and resource consents. The process that has led to the development of the Project and the alternatives that have been considered in depth are then covered in more detail in the following sections of this Chapter.

In terms of routes for the Expressway, various alternatives have historically been considered over a long period and across various reports. In developing the Project, the NZTA commissioned an expert in alternatives assessment to review the historical work, update it as necessary, and bring it together in a comprehensive report. A separate Route Options Review was carried out, which documents the range of feasible routes considered. The results of these reviews are appended to this application as Technical Report 3 in Volume 3.

The NZTA's consideration of alternatives has benefited from the consultation process, which has helped identify the factors that the stakeholders and the community consider important in the Project area. Submitters also put forward suggestions for the corridor itself during consultation. These suggestions and values, combined with expert assessment of other aspects such as ecology, transport, noise, geology, and hydrology, have all formed part of the NZTA's overall process for assessing alternatives.

The finalised Expressway route chosen by the NZTA necessitates realignment of a section of the NIMT, which is the subject of a separate NoR. In terms of the alternatives considered in respect of KiwiRail's NoR, the short length of the realigned NIMT and the significant environmental constraints on the design meant that a limited range of alternatives were able to be assessed from a technical feasibility perspective, or acceptable in environmental terms. Alternatives that were identified were assessed as part of the design process.

9.2 Statutory Context for Consideration of Alternatives

Under the RMA, a consideration of alternative sites, routes, and methods is relevant in certain specific respects, including:

- In relation to an NoR, one of the matters to which particular regard must be had is to whether adequate consideration has been given to alternative sites, routes and methods of undertaking the work (where a requiring authority does not have an interest in the land sufficient for undertaking the work, or it is likely that work will have a significant adverse effect on the environment) – section 171(1)(b); and
- In relation to resource consent applications, the Fourth Schedule states that an AEE should include a description of possible alternative locations or methods for undertaking the activity where it is likely that the activity will have a significant adverse effect on the environment, Schedule 4 clause 1(b).

The requirements of those provisions specifically relevant to both NoRs and resource consents are briefly described below.

Moreover, in relation to applications for discharge permits, section 105 requires decision-makers to have regard to various matters including "any possible alternative methods of discharge, including discharge into any other receiving environment". This is addressed in the Stormwater Technical Report, number 10 in Volume 3 and an assessment is provided in Chapter 33.9 of this AEE report.

The RMA also specifies a "best practicable option" regime in relation to noise (section 16) and this is addressed in the Noise Technical Report, numbers 14 and 15, in Volume 3.

9.2.1 Section 171(1)(b) - NoR

Section 171(1) outlines how a territorial authority must consider effects on the environment, with subsection (b) addressing the issue of whether or not adequate consideration has been given by the requiring authority to alternative sites, routes, or methods of undertaking the work if:

The requiring authority does not have an interest in the land sufficient for undertaking the work; or

It is likely that the work will have a significant adverse effect on the environment.

The NZTA and KiwiRail do not have an interest in all of the land required for the Project. While in many cases negotiations are well underway, the Crown will continue to seek to acquire the necessary property interests after the NoR has been lodged. Property acquisitions will likely not be completed by the time the NoR has been determined, and therefore a consideration of alternative sites, routes and methods is required under s171(1)(a).

In respect of the Expressway, the alternatives considered by the NZTA are those that are within its powers to undertake and that will assist it to achieve its objectives for the Project. This means that, for example, improvements in public transport between Wellington City and the Kāpiti Coast were not considered as an alternative the Project, as the provision of public transport is outside the scope of NZTA's statutory powers under the LTMA and the GRPA. However, the potential effects that the Project may have on public transport for travelling in to or out of, as well as within, the Project area have been considered.

9.2.2 Resource Consent Applications

Schedule 4 of the RMA requires that alternative locations or methods of undertaking an activity be described where the proposed activity is likely to have any significant adverse effects on the environment. In respect of the Project, this exercise is intertwined with the consideration of alternative route, sites, and methods undertaken for the NoRs.

9.3 Base Information – Constraint Analysis

To adequately identify and refine each of the alternative corridors and alternative alignments within the proposed corridor, a study was undertaken to map specific features within the Project area that could act as a potential constraint to the Project. Constraint information has been considered over time across the various investigations and reports. For the recent (2011) Route Options Review, the constraints information was updated. These included:

- Further site visits and ground photography to examine the existing environment in respect of the possible alternative locations of the route;
- Reviewing previous transport studies, and collecting transport data;
- Preparing relevant desktop studies, including a district plan review; and
- Considering consultation feedback.

There were a number of constraints that were identified through this process and that have relevance in the consideration of alternatives. These constraints generally fell into the following areas:

- Environmental/ecological constraints (for example: indigenous vegetation, wetlands, aquatic wildlife);
- Cultural/heritage constraints (for example: areas of cultural importance to iwi);
- Archaeological constraints (for example: known archaeological sites, and the potential for unknown archaeological sites to be found);
- Land use constraints (for example: existing land uses);
- Social and community constraints (for example: property acquisitions, proximity, displacement costs, community severance);
- Landscape and visual constraints (for example: associated embankments, construction impacts);
- Geology and ground conditions (for example: the presence of peat deposits and sand dunes);
- Hydrology and stormwater constraints (for example: flood levels); and
- Urban design constraints (for example: urban form and connectivity between the eastern and western sides of the alternative corridors).

These constraints were assessed in the analysis of the proposal and fed into the development and overall decision of the preferred route. The scheme plan set in Volume 5 shows some of the constraints identified through the process.

9.4 Option and Evaluation Process

9.4.1 Introduction

A structured process was followed to identify, assess, screen, and develop the various alternatives relating to the Project. This section of the AEE report provides an overview which outlines the broad processes that have been undertaken in assessing alternatives and reaching final decisions regarding the alignment, interchanges, and other aspects of the Project design. These elements are then discussed in further depth and the results given in the following sections.

9.4.2 Overall Process

The process in determining and evaluating the overall corridors and routes that were considered went through the following steps:

- Screening of historical route options considered;

- Identifying any further options requiring consideration;
- Scoping of technical review and feasibility of options;
- Review and preliminary evaluation by specialist experts;
- Multi-Criteria analysis; and
- Reporting.

Potential route, alignment, interchanges and cross-connection alternatives were identified and then assessed, to determine if they were technically feasible from an engineering and transportation perspective. Those identified as feasible were then assessed by the specialists and the appropriate weightings applied to each alternative. In the case of the alternative routes, interchanges and cross-connections, to facilitate an overall assessment a Multi-Criteria Analysis Tool (MCAT) processes were used. The interchanges and cross-connections were also subject to public and stakeholder engagement.

9.4.3 Multi-Criteria Analysis

MCATs were used for options analyses. These methodologies can assist in highlighting the key differences between alternatives in respect of transport, social/community, environmental and economic values. The methodologies are particularly useful when there are several alternatives to choose from and numerous complex considerations involved. The methodologies were adopted for both the route alternatives and the interchange and cross-connection alternatives.

Workshops involving individual technical and specialist experts were undertaken to develop the criteria, scoring and weighting for the MCAT. For the assessment of alternative routes, primary criteria were developed and applied. In relation to the assessment of the interchanges and cross-connections, for each of the primary criteria areas, secondary criteria were identified that were known to provide the key points of differentiation between alternatives. These points of differentiation were also tested and agreed at the relevant MCAT workshops. This focused the assessment on matters critical to comparing and screening the alternatives, rather than matters that are common across the alternatives.

The benefits of carrying out the MCAT in a workshop format included drawing out the detail of the various assessments through discussion and questioning, and the involvement of the Project leaders who were particularly familiar with the Project and the area, as well as examination and testing of the information through the shared scoring process.

The MCAT process for the consideration of alternative routes and interchanges adopted separate processes to ensure the outcomes were robust. The alternative routes assessment was at a macro level, while the alternative interchanges and cross-connections were focused at the micro level.

9.4.4 MCAT Assessment for Alternative Routes:

The assessment criteria developed were:

- *Landscape/Visual* – this took into account topography and existing landscape character (including degree of modification and presence of structures), route length and presence of dwellings nearby, any outstanding landscape or natural character components, and important landscape/natural features.
- *Ecology* – this criterion focused on terrestrial ecology values, particularly those relating to patches of bush and wetlands which are nationally, regionally or locally significant in terms of habitat values and presence of known species.
- *Archaeology/Heritage* – this criterion took into account presence of known archaeological sites and heritage buildings.

- *Cultural Values* – this took into account the range of cultural values including values relating to the natural environment (waterways and wetlands, areas of indigenous vegetation), key areas of settlement (marae, papakainga) and use (food gathering areas), and known wāhi tapu relating to the different hapū and iwi of the area.
- *Social/Community Impacts* – this incorporated a range of considerations including severance effects, accessibility to townships (relating to business activity), support for urban land uses, connectivity to community services and facilities, recreational effects, and construction impacts. Amenity effects were not included. (Note – direct effects on land including dwellings were included under specific land ownership effects.)
- *District Plan* – this criterion included consideration of both zoning and Plan objectives and policies, and the "strategic fit" of a major transport route within the urban and rural context (note – urban growth was included under social and community impacts).
- *Transport Effectiveness/Fit to Objectives* – this criterion covered traffic efficiency, active travel (pedestrian and cycle opportunities), traffic safety and severance and access. The assessment took into account the local network and the various State highway components.
- *Effects on Lifelines* – this criterion provided a preliminary transport-based risk assessment taking into account risks associated with the number, separation, location and configuration of the main transport routes through the area for each of the alternatives. Other lifelines were not addressed as they were not considered to be affected by any of the alternatives.
- *Natural Hazard Effects* – this took into account flood hazard (including ponding areas) and tsunami exposure. This also included potential earthquake resilience.
- *Productive Land Uses* – this criterion took into account the NZ Land Use Capability Classification, in particular classes 1 to 4 (productive land), the presence of land parcels greater than 4 hectares in area, and potential severance effects on productive units.
- *Specific Land Ownership Effects* – this criterion identified types of land ownership which would potentially pose difficulties for the location of an expressway route – specifically Crown Land, designated land, Māori multiple-owned land and QEII Trust covenanted land, as well as estimating numbers of potentially affected parcels and dwellings.
- *Constructability* – constructability was assessed on the basis of physical components such as volume and balance of earthworks (cut and fill suitability of/issues with material), structures, temporary works, access management, risks around "unknowns", and general degree of difficulty in construction.
- *Costs* – costs took into account the actual capital construction costs, including the range of matters identified under constructability, plus contingencies.

There was some potential for double-counting recognised, particularly with constructability and cost, hazards and lifelines, aspects of social assessment (i.e. the community vision) and the KCDP criterion, and archaeology/heritage and culture. It was also noted that in some cases the same aspects could justifiably be assessed under two criteria (such as the separate heritage and cultural values associated with some marae and urupā, and the separate ecological and cultural values of streams, waterways and bush areas). The scoring and weighting resulting after the MCAT process was designed to address these potential issues.

For the assessment of alternative routes, the scoring system outlined in Table 9-1 was applied to the thirteen criteria described above, and then discussed and debated in a workshop process with various specialists in attendance. In all but a few circumstances consensus was reached. Where it was not, dissenting views were noted to be addressed in the sensitivity analysis. The workshop process generally confirmed the initial analysis carried out by the specialists.

Table 9-1: Scoring System (Routes)

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

9.4.5 MCAT Assessment for Alternative Interchanges and Cross-Connections

For the assessment of alternative interchanges and cross-connections, MCAT criteria were developed to ensure the outcomes reflected the intention of the process, and to enable differences between the alternatives to be identified and assessed. The MCAT for interchanges and cross-connections therefore had four Primary Criteria (Transport Outcomes, Social / Community Outcomes, Environmental Outcomes and Economic Value). Each of the Primary Criteria had a number of Secondary Criteria e.g. for Environmental Outcomes these are areas such as Urban Form, Flood Risk, Noise etc.

Table 9-2 below summarises the primary and secondary criteria adopted for the screening process.

Table 9-2: MCAT Primary and Secondary Criteria

Primary Criteria	Secondary Criteria	Criteria explained
Transport Outcomes	Road user safety	Level of safety provided by alternative including consideration of emergency response times (includes SH1 Expressway and local roads).
	Traffic level of service	Significance of effect on congestion, trip reliability, travel times
	Integration with others modes	Significance of effect on public transport users, cyclist and pedestrian trips
	Strategic fit with RoNS	Significance of fit with RoNS objectives and consistency / integration with neighbouring RoNS Projects
	SH / Local Road integration (Ōtaki Inter-regional access)	Significance of ability to achieve the optimal balance between utilisation of the SH infrastructure; and keeping local trips off the SH.

Social/Community Outcomes	Severance	Significance of effect of physical severance and legibility of alternatives on community connectivity and access to community services.
	Economic effects / business activity	Significance of effect on local economy / business activity particularly as related to KCDC plans / strategies including the Greater Ōtaki Vision document.
	Support for current and future land use	Significance of effect on support for current and future land use plans - including consideration of strategic growth management, effect on productive land use, and retention of rural character.
	Improve connectivity to key regional services / facilities	Significance of effect on connectivity to key regional services and facilities for both local community and for those in communities north and south of Project.
	Recreational activity	Significance of effect on amenities and public areas available for recreation, including access.
	Disturbance to community during construction	Significance of effect on the local community and road users during construction.
Environmental Outcomes	Urban form	Significance of effects on the local urban form and on urban design aspects such as connectivity, context and character, with emphasis on Ōtaki township and Te Horo and on the Ōtaki Railway Hub in particular.
	Landscape and visual	Significance of the effects on the local landscape, being landform, land cover and land use and the extent of change the Project/Expressway will bring to these. The extent to which the visual effects of the Expressway, its earthworks construction, road form, structures and noise and landscape mitigation measures will impact upon the local community and the travelling public.
	Flood risk	Significance and extent of the effects on flood plain patterns and pathways.
	Heritage	Significance of effects on identified heritage including buildings, structures and features.
	Archaeology	Significance of the effect on archaeological sites.
	Iwi / cultural	Significance of the effect on matters of importance to iwi including but not limited to cultural sites.
	Ecology (terrestrial and aquatic)	Significance and extent of the effects on wildlife and habitat and natural processes and systems.
	Water quality	Significance and extent of effects on surface water resources, and on ground water and underground aquifers.
	Air quality	Significance and extent of effects on air quality from changes in fuel consumption levels.
	Noise	Significance and extent of effects on noise levels in relation to urban villages, residential and public amenity locations.
Economic Value	Capital investment	Significance of effect on capital required for Project implementation (including constructability considerations and property acquisition).
	Whole of life costs	Significance of effect on the whole of life costs of the infrastructure asset.
	Achieving RMA approval	Significance of effect on ability to achieve RMA approvals i.e. consentability of alternative.

Timeliness of Project completion	Significance of effect on Project completion and hence timeliness of releasing the economic benefits of the Project to the community.
----------------------------------	---

For the assessment of the interchanges and cross-connections, a different scoring system was developed to provide a result that was specific for that MCAT. As with the alternative route alignments however, this was discussed and debated through the workshop format to address sensitivities. KCDC, as a key stakeholder, was involved in this MCAT process.

The following subjective rating system, shown in Table 9-3 below, was then developed and discussed with specialists to assess the performance of the alternatives. Ratings for each factor in the alternative assessment exercise were assessed with reasonable mitigation applied and with clear justification for the rating identified. Specialists were asked to assess effects on an absolute basis, rather than a relative basis e.g. effects were considered on their own, not relative to any other effects of the Project. Knowledge of other similar projects assisted in rating potential effects.

Table 9-3: Effects Ratings Adopted for MCAT Assessment

Rating	Explanation / Thresholds
+3 Highly Significant Positive	Of <i>significant</i> local, regional or national benefit
+2 Moderate Positive	Of local and/or regional benefit
+1 Minor	Of local benefit only
0 Neutral	No or negligible effects
-1 Minor	Of a local impact only - <u>easily mitigated</u>
-2 Moderate Negative	Moderate negative local and/or regional negative <u>effects that can be mitigated</u>
-3 Highly Significant	Of local, regional or national negative <i>significance</i> . <u>Very difficult to mitigate</u> .
FATAL FLAW (FF)	Will <i>stop</i> the project - of such national/regional/local significance, or technical constraint that it cannot be consented, as it cannot be appropriately avoided, remedied, or mitigated.

9.4.6 Further Analysis

Scores from the MCAT workshop process provided the raw data for further analysis and to support the decision process.

As weighting systems can be developed from a range of different perspectives it was important that this was reflected in the overall process. Seven areas were identified for the alternative route review that form part of the overall analysis and results assessment for the route alternatives arising out of the MCAT process. These placed different importance on various aspects of the alternatives, and combined they provide an overall assessment of alternatives. The eight systems are:

- Workshop Weighting – this weighting was developed in discussion and agreement at the workshop and could be described as the technical view of NZTA's Project advisors.
- RMA Section 6 Emphasis Weighting – this places maximum weight on three of the four section 6 RMA matters potentially at play in respect of the Project (ecology, archaeology and cultural values). Landscape values have not been elevated to the same level in this analysis, as "outstanding" qualities and elements were not identified in the area affected by the route alternatives by the specialist involved, and it would thus be inappropriate to elevate them to a very high weight. This is notwithstanding that part of the Ōtaki River is identified in the KCDCP as an Outstanding Landscape, as all alternatives at some point cross this river (although not the part identified as Outstanding, which is the Ōtaki Forks area). Some weight is placed on the KCDCP

analysis in this case, as reflective of section 6 matters, but other criteria are left at a very low level.

- RMA Part 2 Balanced Weighting – this provides a more even weighting system (the most even of all the weighting systems applied). This reflects that the criteria are all relevant considerations in a Part 2 RMA analysis, particularly section 5.
- Community Weighting – this system has been developed on the basis of placing the highest weights on the range of issues that are most likely to be of general interest and concern to the wider community in the area, recognising that there will be some diversity of views and that all aspects are important to a range of sections of the community.
- Environment – this places the highest weight on the physical environmental element of ecology, with other criteria which integrate physical environmental considerations with social/community values also given some weighting. Criteria without a physical environment component are omitted.
- Social – all criteria have a social component, so all are given some weight. The highest weighting is given to social and community impacts, followed by lifelines, ownership effects and district plan considerations.
- Cultural – this highly weights cultural values, but also places weight on archaeology/heritage followed by ecological and social/community impacts.
- Economic – this excludes a number of criteria which have little or no economic bearing on the Project or the local economy. It emphasises cost and transportation objectives, but applies some weighting to other criteria with an economic component

9.5 Assessment of Alternative Route Options

9.5.1 Preliminary Review of Route Options

Initially a review of previous route alternatives was undertaken, which identified all the various descriptions and proposals for roads throughout the area. This was important as it identified many of the benefits and drawbacks of the various motorways, expressways or arterials considered in the past that cumulatively provided input into the alternatives considered.

Many of these previous proposals have been outlined in chapter 2.2 in Part A, relating to the history of the Project. Further studies, such as the "Himatangi to Waikanae Study" commissioned in 1998, highlighted many of the issues associated with the proposed routes. Transit NZ (as it was at that time) decided upon a route equivalent to the 'central' route, rejecting a coastal route configuration.

A Scheme Assessment in 2001 and 2002 outlined various possible alternative alignments relating to this 'central route', both to the east and west of the current SH1 alignment. An addendum to this report in 2002 and 2003 identified other routes such as one equivalent to the western / Te Waka route. Both of these routes form part of the alternative route alternatives discussed in this chapter.

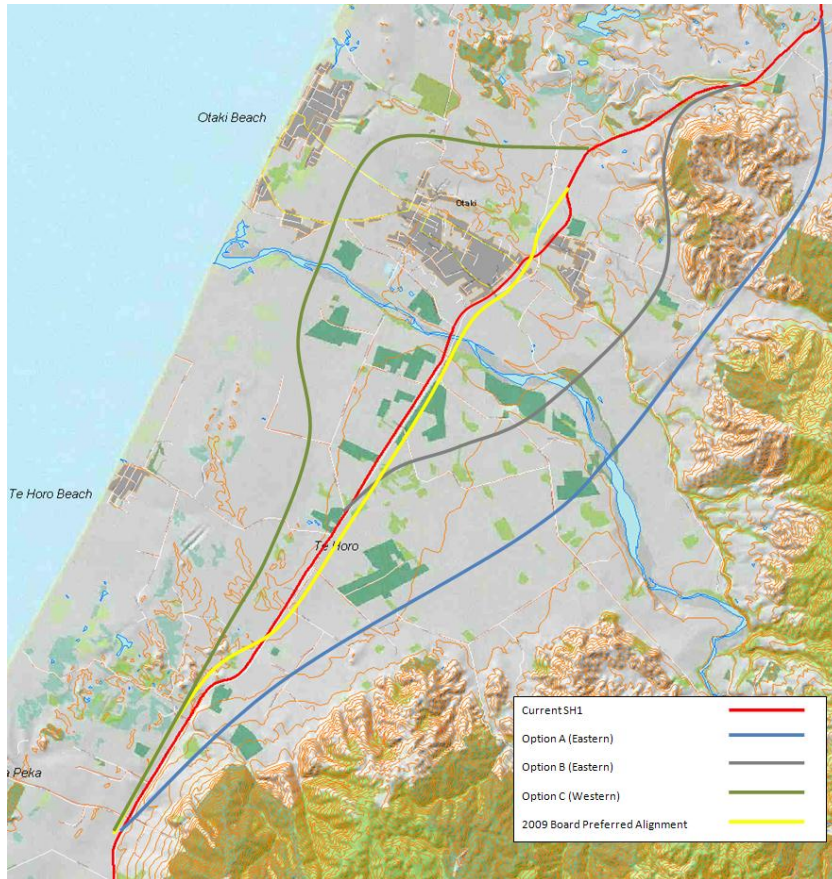


Figure 9-1: The Principal Alternative Routes that were Investigated

9.5.2 Route Options Identified and Assessed

Based on the review of initial alternatives, four principal expressway route options were selected for further analysis. These were:

- Option A: Eastern Foothills Route;
- Option B: Eastern Plains Route;
- Option C: Western Route¹⁵; and
- Option D: 2009 Board Preferred Alignment / Central Route (follows the current SH1 and NIMT corridor)¹⁶.

These alternatives depart from the existing SH1 alignment at different points and comprise different lengths and components of new expressway or modified existing State highway. However to ensure a fair comparison, each alternative had to be considered as having the same starting and completion points – i.e. between the southern take-off point of all options and the point where route Option A joined the existing SH1.

Option A: Eastern Foothills Route

Option A would have extended from Hadfield/Peka Peka Road in the south, to link with the proposed northern interchange of the SH1 M2PP section of the Kāpiti Expressway, through

¹⁵ This follows a western route adopted by the project team to represent a 'best' western route.

¹⁶ In early investigations the central route was referred to as the "Eastern Improved Route" or "Board Preferred Eastern Route" – this is because at this stage there were not any routes further to the east.

to just south of Manakau (in the north), a total distance of approximately 19km. The route is up to 2.7km east of the existing SH1 at Ōtaki and partly follows the transmission line corridor before swinging back to join the State highway at Manakau. This route had the potential to continue north following the transmission line corridor and connecting to SH57 to the east of Levin, with the link to Manakau reverting to a local connection.

Option B: Eastern Plains Route

Option B would have connected in the south with the Option D route in the vicinity of School Road, Te Horo to SH1 (in the north) approximately 3km south of Manakau, a total distance of approximately 12km. This route is up to 2km east of the existing SH1 at Ōtaki.

Option B had two sub-alternatives for the northern end tie-in, B1 and B2. Alternative B1 followed a valley through an outcrop of the Tararua foothills, avoiding the lifestyle blocks further to the west and tied in just to the south of the existing Pukehou Rail Bridge. Alternative B2 passed to the west of the foothills outcrop and through the lifestyle block properties. Option B2 had reduced effects in relation to earthworks compared with B1; however it has far greater effect on property.

Following initial investigations and design of Alternative B it was decided to proceed with Alternative B1 and eliminate Alternative B2 due to the following considerations:

- Alternative B2 created significant severance issues for properties adjacent to it;
- It was considered feasible to construct the Expressway along the valley Alternative B1 follows without incurring significant engineering risk or cut heights; and
- Alternative B2 has significantly greater risk relating to property acquisition issues.

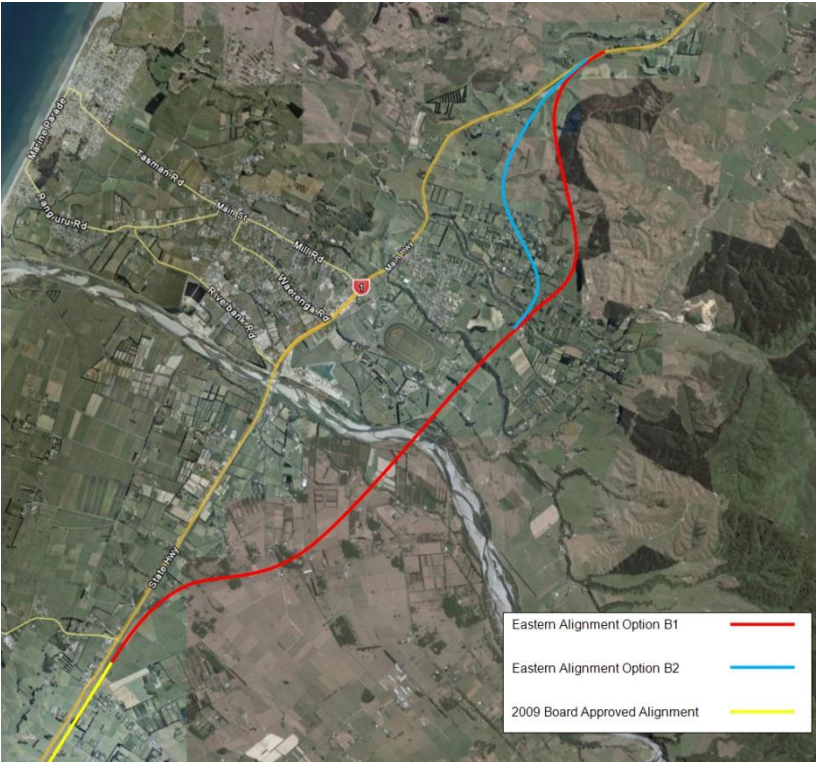


Figure 9-2: Alternatives B1 and B2, the Eastern Foothills and Central Options are also shown

Option C: Western Alternative

The western route alternative would have run parallel with the existing SH1, separated by approximately 600m, to connect in with the Option D just south of Mary Crest, aligned parallel with Te Waka Road, swung to the west of Ōtaki Township crossing the Ōtaki River approximately 2.5km downstream of the existing State highway river bridge and extended to a straight on SH1 approximately 1km north of Taylors Road. The length of the western route alternative is approximately 1.9 km longer than Option D.

Option C is similar to but slightly different from the Te Waka Options investigated as part of the 2002 Scheme Assessment Report prepared by Meritec and also the route suggested by the Te Horo Road Action Committee (THRAC) in a 2009 submission. It differs from earlier western route proposals due to the geometric constraint imposed by the RoNS design criteria and a fresh consideration of the alignment drawing on current knowledge.

Option D: Central Route

The central route generally follows the current SH1 corridor throughout the extent of the area. It follows the western side of the NIMT from Peka Peka north to Mary Crest where north of which it crosses to the eastern side of the NIMT. It then remains on the eastern side of the NIMT and involves the re-alignment of approximately 1.2km of the NIMT through Ōtaki township, before connecting with the current SH1 just north of Taylors Road.

9.5.3 Other Options Discounted

Several routes were discounted during the prior screening process, for various reasons:

- The Historic Sandhills Route or those that followed a similar route; and
 - A range of coastal (or Sandhills) route alternatives had previously been sufficiently investigated and rejected for RMA-based reasons, including a range of section 6 RMA matters.
- The upgrading of the existing SH1 was considered, particularly through Ōtaki. This included measures such as:
 - Creating 2 lanes of southbound traffic on SH1 between the Mill Road roundabout and Waerenga Road, during peak periods and holidays;
 - Restricting parking southbound on SH1 between the Mill Road roundabout and Waerenga Road, during peak periods and holidays;
 - Removing the central median and replacing it with a hatched area for vehicles manoeuvring in and out of parking spaces in a southbound direction;
 - Increased enforcement of parking restrictions; and
 - Increased side road parking provision.

The objectives of the Project are inter-related to the total Wellington Northern Corridor RoNS and as such those alternatives relating to the upgrading of SH1 identified above would not facilitate the provision of a high quality, safe and effective route between Levin and Wellington.

9.5.4 Technical Feasibility of Options

To provide a comparative assessment of technical feasibility and cost, the routes were developed from a 'corridor' stage to that of an 'alignment'. Considerations taken into account in determining the alignment for the four options included ground conditions, gradient, earthworks volumes, river, road and rail crossings, and property impacts including connectivity. The development of these routes to this stage enabled the technical engineering and transportation assessments to be carried out, cost estimates to

be prepared and an economic analysis to be undertaken. Importantly, the options were assessed on the same common basis.

The technical studies found that all alternatives were technically feasible, and all were within a similar cost range. These studies also found that the potential transport benefits of Options A to C were less than those associated with Option D. This was largely because of the continued use of SH1 by vehicles with origins or destinations within Ōtaki. All alternatives were found to be effective in terms of through traffic. There was therefore no technical, cost, or cost-benefit reason to reject any of the alternatives at this stage, and no basis to not subject any of the alternatives to further investigations.

9.5.5 Scoping and Undertaking of Specialist Investigations

The technical assessments of the route options were followed by investigations of their potential environmental impacts through specialist investigations of a range of environmental and social aspects of the routes. The specialist assessments were determined to be best based on a nominal 200 metre wide route, based around the centreline of the routes which had been the subject of technical review. The exception was Option D, where sufficient design work had been undertaken to define the route and flexibility was not required. The 200m wide corridor within which the other routes were based enabled flexibility, and allowed for refinement in detail and opportunity to avoid or mitigate localised constraints and issues. Effects that would occur beyond the 200m corridor were also taken into consideration. The extent of property effects (affected land parcels and dwellings) was however based on a 100 metre wide typical route within the 200 metre wide route.

9.5.6 MCAT Analysis

The MCAT process outlined under 9.4.4 was applied to each of the four routes through a workshop process. The workshop scored each of the criteria for each of the four routes using the scoring schedule in Table 9-1. In all but a few circumstances consensus was reached. Where it was not, dissenting views were noted and were addressed through the sensitivity analysis. Table 9-4 shows the scores awarded at the workshop which provided the raw data for the further analysis.

Table 9-4: Scores for Each of the Alternatives from the Workshops

Route Option	Landscape/Visual	Ecology	Archaeology/Heritage	Cultural Values	Social/Community Impacts	District Plan	Transport Eff/Fit to Objectives	Effect on Lifelines	Natural Hazards Effects	Productive Land Use Effects	Specific Ownership	Constructability	Costs
A Eastern Foothills	4 (5)	5	1	1	2	3	4	2	2	4	3	2	3
B Eastern Plains	4	(3) 4	3	(2) 3	2	3	3	2	2	3	3	1	2
C Western	3	2	5	5	2	2	3	3	5	3	4	3	3 (4)
D Central	2	3	4	4	2	1	2	2	3	(2) 3	4	3	3

Note: numbers in brackets represent minority views on aspects where consensus was not reached. These are later used for sensitivity analysis.

The workshop process generally confirmed the initial analysis carried out by the specialists by awarding similar scores. The main differences that arose were:

- For landscape assessment, Option A (the Eastern Foothills) was scored 4 by consensus, with some considering it should be a 5 due to the degree of change to an existing landscape which is relatively natural and currently entirely rural.
- The ecological criterion was scored for Options B and D (the Eastern Plains and Central alternatives) lower than the initial specialist's assessment. This took into account the ability to avoid or mitigate effects on regionally significant bush remnants at Mary Crest.
- The archaeological and heritage scores reflected the expert evaluation of alternatives, but drew a slightly greater distinction between Option D (the Central option), where built heritage sites are known to be affected but mitigation is possible, and Option C (the Western option) where there are potentially direct and indirect effects on known and potentially numerous unknown sites.
- On cultural values the highest negative score was awarded to Option C (the Western route option) on the basis of knowledge of the past (such as battle sites in this area) and present values, including those values ascertained from previous consultation and engagement, with respectively lower values for Option D (Central Option) next, followed by Option B (Eastern Plains option). Some considered that Option B should be a 2 rather than a 3, as adverse cultural effects would be considered even lower than the 4 scored for Option D.
- The analysis of the social criterion had been undertaken on the basis of five sub-considerations. The specialist advisors informed the workshop that, on three of these (severance, current and future land uses, and disturbance) there were many variations across the four options, to the extent that all routes were roughly equivalent.

- There were no prior scores for the KCDP criterion. The scores awarded mirrored the advice and discussion at the workshop, that the KCDP seeks to retain rural and productive character in the district's rural areas, and roading (such as the proposed expressway) would be characterised as urban infrastructure.
- Productive land use effects had not been subject to prior assessments. On the basis of advice from the relevant specialist, Option A, the Eastern Foothills option, was scored worst at 4, with the remaining alternatives scored at 3. Some felt that Option D, the Central route, should be scored a 2 because of the degree of existing land fragmentation.
- Cost and constructability had been evaluated together, but were discussed as separate criteria at the workshop. In cost terms, Options A, C and D were considered similar (i.e. all alternatives except the Eastern Plain route option) although some considered the additional costs associated with more uncertain ground conditions and flood management design aspects would justify a score of 4 rather than a 3. Option B was most straight-forward and therefore estimated as least cost and a lower score. In terms of constructability, similar conclusions were reached, although the better ground conditions and less closely settled nature of Options A and B (the two Eastern options) led to lower scores than for the other two routes).

To increase the robustness of the analysis the scoring was subjected to a range of weightings and the outcomes reviewed in terms of their consistency and range of differences. A total of 8 weighting systems were utilised, including the workshop weighting. The weightings applied are outlined in Figure 9-3 below.

10													
9													
8													
7													
6													
5													
4													
3													
2													
1													
0													
Attributes	Landscape / Visual	Ecology	Archaeology / Heritage	Cultural Values	Social / Community Impacts	District Plan / Urban Growth	Transport Eff / Fit to Objectives	Effect on Lifelines	Natural Hazards Effects	Productive Land Use Effect	Specific Ownership Effects	Constructability	Costs
Weight:	6	9	9	10	7	8	10	7	8	7	3	3	5

Figure 9-3: The Weighting System Derived through the Workshop Process

9.5.7 Conclusions From the MCAT Process

Once the final weightings had been attributed, an outcome was obtained that ranked each of the four alternatives considered. The outcome for the alternative routes that had been assessed is as follows:

Table 9-5: Analysis of Route Options

Weighting System	A. Eastern Foothills	B. Eastern Plains	C. Western	D. Central
Workshop	2.76*	2.80*	3.36	2.74*
RMA Section 6	2.67	3.05*	3.48	2.98*
RMA Part 2	2.75*	2.69*	3.33	2.79*
Community	2.72*	2.64	3.30	2.73*
Environment	3.00	3.18	3.36	2.90
Social	2.66*	2.64*	3.27	2.72*
Cultural	2.35	3.02*	3.60	3.05*
Economic	2.83	2.24	3.02	2.56

Notes:

- The asterisk (*) denotes where the difference between alternatives is not, or is only marginally, significant.
- Preferred alternative highlighted in blue.

The outcome was not particularly clear-cut in terms of three of the four route alternatives evaluated (Alternatives A, B and D). The full evaluation of the outcomes and the various strengths and weaknesses of each alternative is contained in Technical Report 3 in Volume 3.

9.5.8 Route Decision

The NZTA's conclusion (in late 2011) was that Option D, which had previously been presented to and discussed with the local communities as the NZTA's preferred option, was confirmed to achieve the best fit with the NZTA's Project objectives and statutory obligations. In large part this is because the route chosen for the Expressway allows ready access between the Expressway and Ōtaki (including the Ōtaki Railway Retail area), and best integrates the Project with the Kāpiti district's existing infrastructure and land use planning framework.

9.6 Assessment of Alternative Interchange Options

Separate from the alternative route analysis, a broad range of connectivity and interchange alternatives within the central expressway route were identified, developed, assessed and evaluated using a further MCAT analysis.

A number of expressway connectivity scenarios and interchange/connection alternatives were identified, assessed and screened during the scoping phase of the investigations. Shortlisted alternatives for interchanges and cross-corridor connections were then taken to a public consultation process in February 2011 to obtain feedback and provide input for consideration in the alternative refinement and assessment during the scheme assessment phase.

9.6.1 Connectivity Options

A key focus of the scoping assessment was an in-depth review and assessment of the location and form of interchanges and connections along the Expressway route, with consideration of previous consultation feedback and a focus on improving legibility of access for Ōtaki.

Seven network connectivity scenarios were considered along the route. These scenarios included those resulting from the 2002 and 2009 consultation processes. The scenarios considered are outlined in Table 9-6 below:

Table 9-6: Connectivity Scenarios

Connectivity Scenario	Description
2002 Scheme	Expressway on-ramps on north side of Ōtaki, off-ramps split to the north and south of Ōtaki, no connection at Rahui Road. Full interchange at Te Horo. Full Interchange at Peka Peka.
2009 Scheme	Expressway on-ramps on north side of Ōtaki, off-ramps split to the north and south of Ōtaki, no connection at Rahui Road.
Scenario 1	Half interchanges each side of Ōtaki and pedestrian/cycle link at Rahui Road
Scenario 2A	Half interchanges each side of Ōtaki, southern interchange at Ōtaki Gorge Road and vehicle link at Rahui Road
Scenario 2B	Half interchanges each side of Ōtaki, southern interchange north of Ōtaki River and vehicle link at Rahui Road
Scenario 3	Full interchange south of Ōtaki River (with pedestrian/cycle or road link at Rahui Road)
Scenario 4	Full interchange north of Ōtaki (with pedestrian/cycle or road link at Rahui Road)

Additional options were identified but they were either assessed as not being technically viable, or were not supported by the key stakeholders, and therefore were not included in a connectivity scenario. These additional option concepts included:

- A full interchange on the north side of the Ōtaki River, and
- A north-facing half diamond interchange north of the Ōtaki River that utilised the existing flood prone access under the Ōtaki Bridge to provide for potential heavy commercial vehicle (HCV) access.

All options provide for a full range of movements to and from the expressway to Ōtaki. However, in some cases, these connections are provided in one focused location and in other scenarios they are split between two locations. Traffic volumes and value for money criteria do not justify the provision of two full interchanges either side of Ōtaki.

As an outcome of the scoping phase process the scenarios depicted in Figure 9-4 were recommended and adopted to be taken forward to public consultation and the scheme assessment addendum phase.

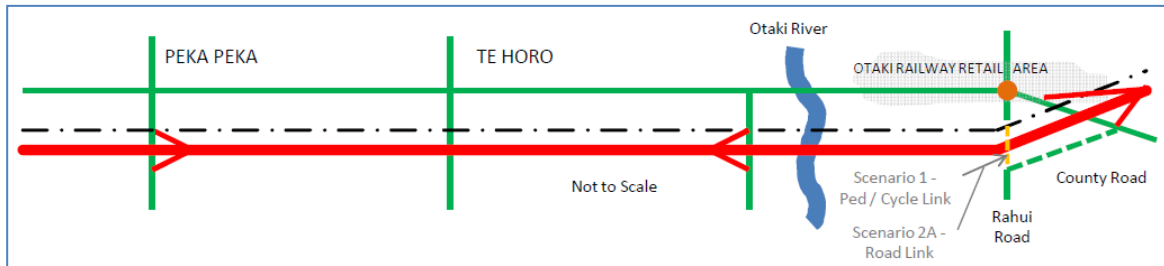


Figure 9-4: Shortlisted Connectivity Scenarios (1 and 2A)

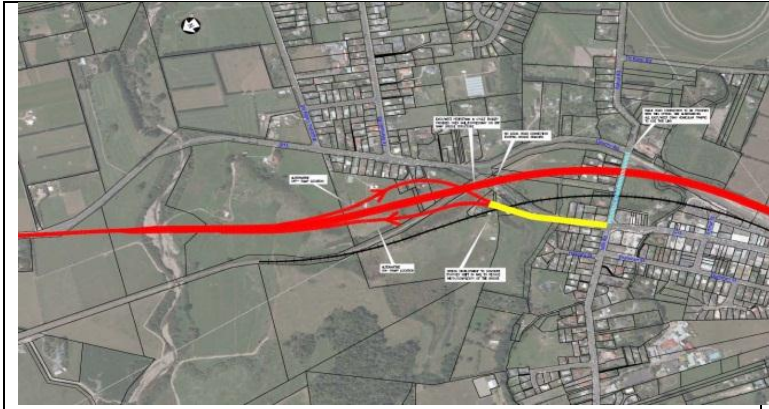
The above scenarios provide a split interchange to the north and south of Ōtaki with either a pedestrian/cycle link (Scenario 1), or road link (Scenario 2A) at Rahui Road. These connectivity scenarios were shortlisted because they were considered to provide the best balance between improved transport outcomes, social, environmental and economic value. The provision of a split interchange on either side of Ōtaki also provides for legible and intuitive access to and from the township, while supporting the GOV for future growth to be focused within the Ōtaki Township.

9.6.2 Interchange Options

Interchange alternatives were identified for the half diamond accesses on and off the expressway at both North Ōtaki and South Ōtaki. There are three alternatives that were considered technically feasible at each location, as described below. Diagrams relating to the original alternatives scoped are supplied.

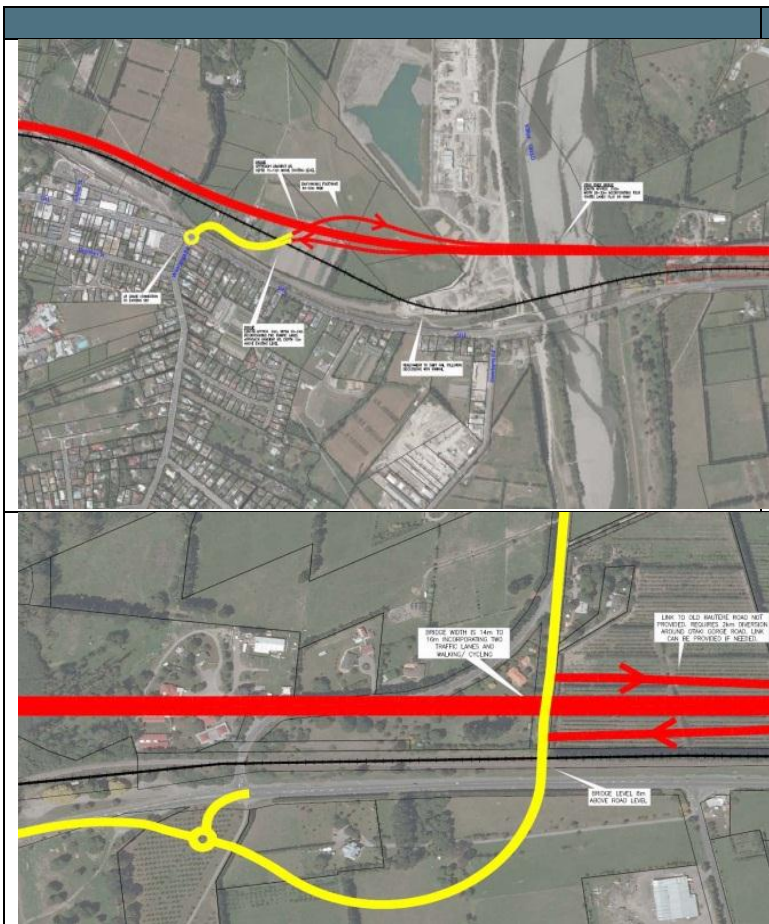
North Ōtaki Interchange

	Option Description and Key Notes
	<p>NO02. 2009 scheme option with alternative ramp locations to eliminate complex rail bridge skew and short stacking length between on-ramps in existing scheme. Southbound on-ramp removed.</p> <p>Closure of Rahui Road results in detour via County Road, for racecourse traffic also. Pedestrian/Cycle link assumed at Rahui Road.</p> <p>New bridge (adjacent to existing rail bridge) constructed over Rail corridor. Provides access to Waitohu Plateau.</p>
	<p>NO09. North facing ramps.</p> <p>Expressway crossing further north than NO02.</p> <p>Vehicle link assumed at Rahui Road.</p> <p>No alteration to County Road function</p> <p>No connection over expressway and rail corridor in location of existing SH1 rail bridge. Access to Waitohu Plateau via new interchange. Existing southbound Ōtaki entrance re-located</p>

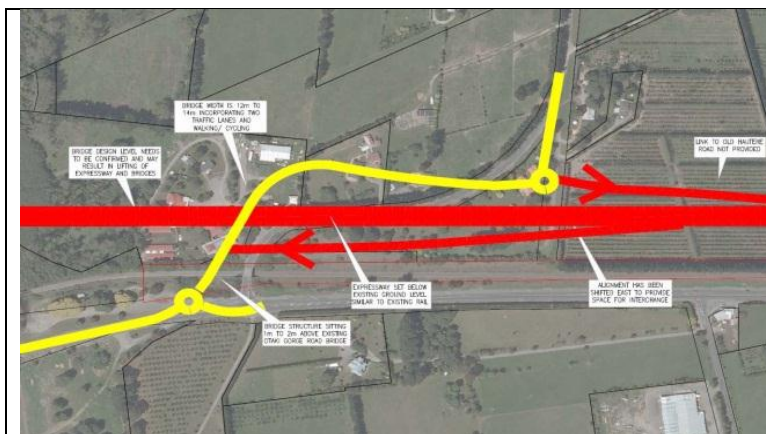


NO11. North facing ramps. North facing ramps provide direct access into Ōtaki. Vehicle link required at Rahui Road as no alternative access to Waitohu Plateau, flood prone. County Road upgraded. No connection over expressway and rail corridor in location of existing rail bridge. Pedestrian access provided on interchange bridge near to existing SH rail bridge. Rail realignment to shift further west.

South Ōtaki Interchange



Option Description and Key Notes
 SO02. South facing ramps on north side of river. Local bridge over expressway and rail corridor. Requires additional rail realignment and reduction in radius (down to 420m) off the river bridge thereby compromising rail geometry. Steep approach/exit from roundabout to existing SH1. Ramp lengths extend onto bridge requiring widening. More extensive works in flood plain. Additional local connection across expressway at Ōtaki Gorge Road.
 OG03. South facing ramps. Underpass (local bridge over expressway). Ramps raised up to meet bridge over expressway. Bridge aligned with Ōtaki Gorge Road.



OG07. South facing ramps. Local road bridge over expressway utilises topography by depressing expressway to minimise height of bridge. Bridge for crossing of expressway/rail set approximately 2-4m above existing Ōtaki Gorge Road rail crossing.

9.6.3 Alternative Cross-Corridor Connections

Various scenarios were investigated for providing east-west connections throughout the Project area. The associated assessments incorporated a range of potential effects and input through consultation and specialist and stakeholder workshops.

The primary locations where the alternative connections were investigated were:

- Te Horo;
- Ōtaki Gorge Road; and
- Rahui Road.

The alternatives that were considered further and the explanations of these are outlined below, and diagrams are provided of these alternatives where available.

Te Horo

	Option Description and Key Notes
	<p>TH01. Existing 2009 Scheme Option – Underpass, local road bridge over expressway. New Gear Road connection provided to School Road. Local road subway not considered at this location due to location and extent of flood plain.</p>
	<p>TH02. Underpass (Local Bridge over expressway) or potentially Overpass (Local Subway under expressway). New Gear Road connection provided to School Road. Both local road subway and local road bridge considered at this location. Potential for pedestrian/cyclist ramp/stairs from SH1 properties up to bridge. Subway option was considered but eliminated given flood plain issues at this location.</p>

	<p>TH03. Underpass (Local Bridge over expressway - TH03a) or potentially Overpass (Local Subway under Expressway-TH03b). New Gear Road connection provided to School Road. Both local road subway and local road bridge considered at this location. Potential for pedestrian/cyclist ramp/stairs from SH1 properties up to bridge.</p>
	<p>TH08. As per Option TH03, but with the bridge alignment skewed to the south to avoid the Red Cafe and hence reduce impacts on the western settlement. (Note - this alternative was developed following assessment of alternatives TH01 to TH04 as an improvement to Option TH03.)</p>
	<p>TH04. Underpass (Local Bridge over expressway) or potentially Overpass (Local Subway under expressway). New Gear Road connection provided to School Road. Both local road subway and local road bridge considered at this location. Potential for pedestrian/cyclist ramp/stairs from SH1 properties up to bridge.</p>

Rahui Road

This connection has already largely been described in the northern interchange description. In the February 2011 public consultation brochure two alternatives were put forward for Rahui Road, based on earlier scoping assessment work. These were a pedestrian/cycle connection and a vehicular/pedestrian bridge. Vehicular subway alternatives had been discounted on technical grounds due to flood risk in this area.

Ōtaki Gorge Road and Old Hautere Road

Ōtaki Gorge Road connections are provided for in the south Ōtaki Interchange described earlier in this section.

9.6.4 Technical Feasibility Assessment

Issues and alternative development workshops were held during the initial scoping phase of the Project. The focus of these was to identify and develop alternatives that contributed to the Project objectives and responded to the identified issues and outcomes sought. These were then designed to the level necessary to allow an assessment of whether they were technically feasible, before an initial screen/decision process was applied to the

alternatives generated to test that they were indeed feasible and did align with the key objectives.

Further alternative development and staged technical meetings were held with key technical stakeholders as alternatives were developed to ensure a staged involvement prior to a further stakeholder workshops occurring.

9.6.5 Analysis of the Interchange Options

A full-day team MCAT alternative screening workshop was held on 14th September 2010 where the specialists' assessments and ratings were combined and challenged by the core team to inform the decisions as to which alternatives should be short-listed to be taken forward for public engagement and further scheme assessment.

- *North Ōtaki* - through the MCAT analysis Option NO02 was identified as a clear alternative to be taken forward, and was assessed to provide the better overall transportation and social-environmental outcomes while providing the best capital investment outcome.

While Option NO11 outcomes were similar to Option NO09, Option NO11 relied on utilising a County Road/Rahui Road connection to provide the only local arterial connection between the north and south which would have been prone to closure during flood events. On this basis Option NO11 was dropped from further consideration.

- *South Ōtaki* - through the MCAT analysis it was found that Option OG07 clearly provided better economic, environmental and social outcomes, while transport outcomes were comparable to OG03. This was primarily due to the fact that Option OG07 better utilised the topography to reduce visual and land effects and was assessed to provide a better legibility and gateway for access to and from Ōtaki. On this basis Option OG07 was identified as a preferred alternative.
- *Te Horo* - Options TH01 and TH03A were identified as alternatives to be taken forward as they delivered the best balance between improved transport outcomes, social and environmental factors and economic value.

Other alternatives were therefore dropped from further consideration as a result of cost comparisons, the lack of transportation improvements, and that they offered similar solutions to the two preferred alternatives.

- *Rahui Road* - prior to the 2011 consultation a pedestrian / cycle link was identified as the preferred option due to issues associated with the scale and grade of a road bridge option. At the scoping stage, the interchange and Rahui assessments were combined by virtue of the close physical proximity of these two elements. Subsequent to these, the MCAT assessment highlighted that the refined Rahui Road bridge alternative (providing for road, pedestrian and cycle linkages) was more favourable than other alternatives across all primary assessment criteria, and the majority of secondary criteria.
- *Old Hautere Road / Ōtaki Gorge Road* - at the scoping stage, a cul-de-sac option was taken to the public for feedback. As a result of the 2011 community feedback and the MCAT analysis, an alternative that provided an at-grade linkage to the south Ōtaki Interchange and Ōtaki Gorge Road was identified as the preferred alternative. It was found that it would deliver slightly less connectivity than a grade separated connection but would deliver significantly better value for money. The localised visual and property effects associated with introducing a grade separated crossing at Old Hautere Road would also be addressed.

9.6.6 Outcomes from Stakeholder and Public Engagement

An Option Development and Screening Workshop was then held with Key Stakeholders (KCDC, GWRC, KiwiRail, NZHPT) on the 23rd September 2010 to workshop the alternatives developed, assessment and screening outcomes and recommendations. The aim was to seek general consensus on the outcomes being looked at for the alternatives as well as confirming which alternatives should be subject to public engagement and identifying which alternatives key stakeholders supported.

Following the identification of alternatives and stakeholder preferences, public engagement was undertaken with the community during February 2011 on two alternatives at North Ōtaki, South Ōtaki, Te Horo and Rahui Road. At this stage there was not total consensus from stakeholders around the Rahui Road options.

Feedback from consultation indicated strong support for the preferred interchange proposals at North Ōtaki (Proposal A/Option NO02) and South Ōtaki (Proposal A/Option OG07), while issues for further consideration, in relation to connectivity, were raised specifically relating to: Ōtaki east-west connectivity (Rahui Road), Old Hautere Road, and a preference for proposal B/Option TH01 at Te Horo, over the promoted preferred alternative.

Specific feedback was not sought on the form of connection at Old Hautere Road in the February 2011 public consultation brochure. However, the proposal to cul-de-sac the existing connection to SH1 was highlighted. Key issues raised in feedback included: concerns around loss of connectivity; emergency accessibility; and concerns around anti-social / boy-racer driver behaviours which provided a mixed response on connectivity desires.

As part of the Scheme Phase, further option development and assessment was completed for Rahui Road, Te Horo and the Old Hautere Road / Ōtaki Gorge Road links. The feedback from the community has been incorporated into the Project with the preferred community interchanges and cross-connections being adopted and changes being made to provide for vehicle access over the Expressway at Rahui Road. The design of Old Hautere Road has also been changed as a result of the feedback to no longer be a cul-de-sac, and the Te Horo local underpass has been provided to ensure connection between the township on both sides of the Expressway.

9.6.7 Interchanges and Cross-Connections Selected

As a result of the MCAT process and the feedback through public engagement, the following alternatives were selected:

- North Ōtaki – Option NO02;
- South Ōtaki – Option OG07;
- Rahui Road – vehicle access over the Expressway (with refined alignment);
- Te Horo – Option TH01; and
- Old Hautere Road – changed from a cul-de-sac to a link road connecting to Ōtaki Gorge Road.

9.6.8 Scheme Phase

Refinement of the alternatives selected then occurred through the scheme assessment phase.

North Ōtaki - Option NO02 was developed further through the scheme assessment phase to further mitigate potential effects. The key changes incorporated into the design after the February 2011 consultation are:

- Adoption of a vehicular and pedestrian bridge at Rahui Road. This allows for County Road to remain as a local access road, rather than being upgraded to take all of the Rahui Road and race day traffic;
- Adoption of the bridge at Rahui Road has enabled the north bound on-ramp intersection to be shifted to between the rail and the Expressway, as opposed to being on the western side of the rail (proximity to County Road is no longer a key concern). This reduced potential effects on the dunes to the west of the route and reduced bridge costs; and
- The northbound Expressway lanes are now reduced to a single lane prior to the merge with the northbound on-ramp, so as to improve safety of the transition back to a 2-lane State highway (an issue that was raised during the interim safety audit process).

South Ōtaki - through the scheme assessment Option OG07 was developed in more detail to further mitigate potential effects. The key changes incorporated into the design since the February 2011 consultation includes:

- Squaring up of the bridges over the Expressway and rail to remove skew and hence improve visibility from the Expressway ramps;
- Improving legibility and safety by creating a more conventional half-diamond interchange. This has been achieved by bringing the southbound on-ramp up to the Ōtaki Gorge Road Bridge, rather than an earlier concept that tied this into the Ōtaki Gorge Road south of the bridge;
- Removal of the roundabout at the intersection with Ōtaki Gorge Road and replacement with a conventional 'T' intersection; and
- Inclusion of an at-grade link to Old Hautere Road and Ōtaki Gorge Road.

Rahui Road - this alternative evolved through the scheme assessment and development phase to deliver significant improvements. There was also a further MCAT process undertaken for options around Rahui Road and Waerenga Road, which included workshops with key stakeholders such as KCDC during the scheme phase. The key improvements are:

- Reduction in bridge height and grades on the approaches due to a rationalisation of the Expressway and rail levels and placement beneath the bridge;
- Retention of County Road as a local access with this crossing beneath the Rahui Road bridge and then linking into Rahui Road; and
- Promotion of a slender segmental or pre-cast structure type with median pier to keep structure depths to a minimum and to assist in reducing the scale of the crossing.

Old Hautere / Ōtaki Gorge Road - a grade separated connection for Old Hautere Road was considered difficult to justify given the low demands, proximity to the south Ōtaki interchange, and the alternative of a lower effects solution that provides good value for money. The alternative developed includes an off-road footpath on the west side of the link road to provide a connection through to Ōtaki from Old Hautere Road. The options for connectivity at Old Hautere Road were also subject to a further MCAT process during the scheme phase to ensure the best outcome for the Project was achieved.

9.7 Assessment of Alternative Alignment Options

Consideration has also been given as to potential alternatives for locating the Expressway in the vicinity of the central route (i.e. Option D known as "Western Alignment 1" for the purposes of this process). Specialists' assessments of alignment alternatives were undertaken in a staged manner following the initial scoping and then consultation phase.

The main alternative alignments centred around (Figure 9-5):

- The Te Horo Alternative alignment; and

- The Mary Crest Alternative alignments.

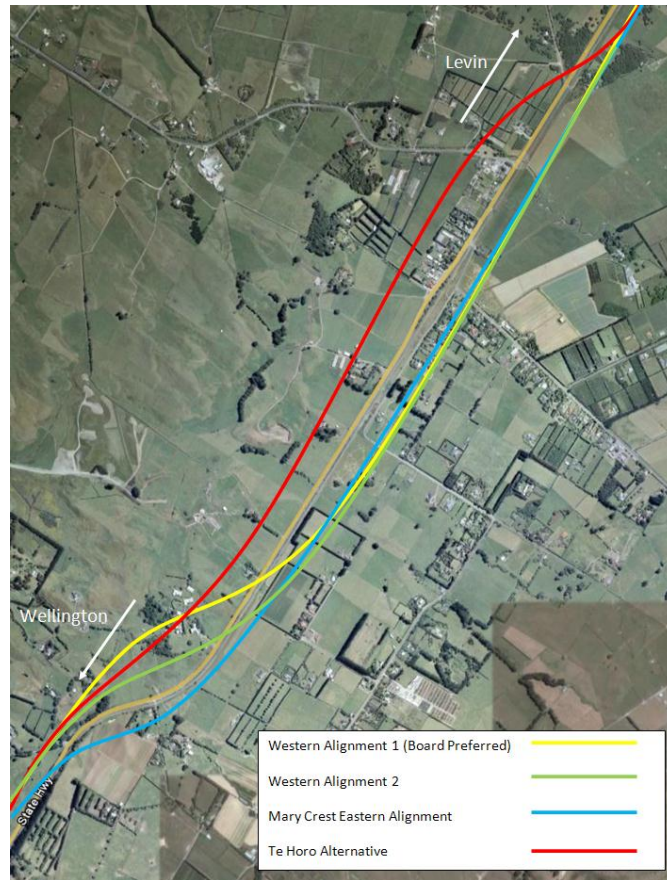


Figure 9-5: The Alternative Alignments at Te Horo and Mary Crest

9.7.1 Te Horo Alternative Alignment

This incorporated an alternative rail crossing north of Te Horo, which was suggested by the Ōtaki Community Board (OCB) in its 2009 submission. Specialist assessment of this alignment was undertaken in early 2011. The assessment found that the Western Alignment 1 delivered equal or better outcomes in relation to transport, environmental and economic criteria, while social and community outcomes were assessed as marginally better for the Te Horo Alternative due primarily to potential severance effects for the other options.

The key assessed differences between the alternatives were:

- Less favourable urban design outcomes with the Te Horo Alternative due to adverse residual land parcels and a widening of the overall transport corridor;
- Retention of the at-grade rail crossing with the Te Horo Alternative compared with grade separation in the NZTA Board-Preferred Alignment;
- Increased ecological effects on bush remnants with the Te Horo Alternative; and
- A significant difference in capital investment between the alternatives given the need for additional linkages/local bridge crossings.

The Te Horo Alternative could not occur in conjunction with alternatives developed at Mary Crest to avoid significant effects on areas of ecologically significant bush remnant, due to the nature of the alternative alignments and that these two would not connect with each other without compromising the values the alternatives sought to avoid.

On balance the conclusion was that the Western Alignment 1 delivered better overall transport and environmental outcomes while providing similar social and community outcomes. On this basis the central, NZTA Board-Preferred Alignment was confirmed at Te Horo.

9.7.2 Mary Crest Alternative Alignments

Through the scoping and consultation processes, areas of ecological and cultural/heritage significance were identified in the vicinity of Mary Crest. Specialist investigations of the alternative alignments were undertaken in conjunction with the Te Horo investigation in early 2011.

An Eastern Alternative at Mary Crest was identified, which was then subject to further detailed scheme development and assessment. Options for alignments on the western side of the railway were also further investigated, the resulting alignment being referred to as Western Alignment 2. This more in-depth investigation and assessment was subjected to a further MCAT assessment process and shared with key stakeholders at a Stakeholder Workshop held on 11th May 2011.

Through the assessment and MCAT process it was found that the Western Alignment 2 and Mary Crest Eastern Alignment alternatives were likely to deliver improved environmental and economic outcomes while delivering similar social and transport outcomes as the Board-Preferred Alignment (Western Alignment 1).

The key assessment outcomes are summarised as follows:

- Both the Western Alignment 2 and Mary Crest Eastern Alignment alternatives provide significantly improved environmental outcomes compared to the Western Alignment 1 alternative. This is primarily due to the avoidance of significant bush remnants and reduced effect on (or indeed complete avoidance of) sites of cultural significance.
- The Mary Crest Eastern Alignment alternative will affect a lower number of dwellings but a greater number of land parcels. These land parcels may be more productive than those affected in the Western Alignment 1 and this was reflected as a moderate negative effect for the alternative.
- While the MCAT indicated that the Mary Crest Eastern Alignment alternative may provide an improved environmental outcome, it involved a significant height of embankment (approximately 15m) over a reasonable length on the southern approach to the rail crossing. Despite this the landscape specialist assessed this to have a reduced landscape impact relative to Western alternatives as the northern approach was able to utilise the natural topography.

The Mary Crest Eastern Alignment alternative was assessed in the MCAT as potentially providing the best overall outcomes, especially with regard to ecology and cultural issues and value for money. However, when considering all factors a preference was identified for the Western Alignment 2 alternative in that it significantly reduced environmental impacts relative to the Western Alignment 1, avoided the very significant southern fill embankment, and had a more limited effect on properties to the east.

The outcomes from the Mary Crest MCAT and further assessment process were shared with key stakeholders at a workshop and briefing on the 11th May 2011, together with further liaison meetings with KCDC and KiwiRail. The Western Alignment 2 alternative concept was also shared with Ngāti Raukawa and Ngā Hapū o Ōtaki during a site walkover on the 29th July 2011. Feedback on the Western Alignment 2 alternative was supportive. As a result of alternative alignment investigations, the Expressway now avoids the bush and wetland at Mary Crest.

9.8 Identification of Preferred Options

The preferred route for the Expressway is approximately 13km long, stretching from Te Kowhai Road in the south to Taylors Road to the north. The Project will also include a realignment of approximately 1.2km of the NIMT through Ōtaki in order to construct the Expressway (discussed further below).

The alternatives chosen for the alignments within the corridor were:

- The Board-Preferred Alignment was chosen over the Te Horo alternative; and
- The revised Western Alignment 2 Option was chosen out of the Mary Crest alternatives.

The alternatives chosen for alternative interchanges were:

- North Ōtaki Interchange: Option NO02 was chosen with further alterations including shifting of the north-bound ramp to between the NIMT and Expressway and other improvements to improve safety; and
- South Ōtaki Interchange: OG07 was chosen as the preferred alternative with various improvements including; squaring off of the bridges, safety improvements and the removal of the roundabout at the Ōtaki Gorge Road intersection.

The Options chosen for cross-connections were:

- Te Horo: Option TH01 was identified as the preferred alignment incorporating a grade separated crossing and a link to Gear Road;
- Rahui Road: Maintaining vehicular and pedestrian crossings here as an aspect of the north Ōtaki Interchange was identified as the preferred alternative; and
- Ōtaki Gorge Road: A grade separated crossing incorporated into the south Ōtaki Interchange provides access. An at-grade link to Old Hautere Road is also incorporated.

Pedestrian and cyclists are also provided for across all local cross-corridor connections.

The route also includes a new section of existing SH1 located to the west of the proposed Expressway, in the section of the corridor from Mary Crest south to Peka Peka.

9.9 Alternatives – KiwiRail NoR

Alternatives have also been considered in relation to the realignment of the NIMT, necessitated by the route of the Expressway.

The proposed position of the NIMT realignment was preferred over other possible locations to ensure that it retains connectivity with the existing NIMT to the north and south of the realignment, and also retains connectivity with the transport corridor formed by the Expressway and the existing SH1. By retaining the NIMT within the transport corridor, the potential for inaccessible parcels of land is also reduced.

Earlier options investigating into the potential location for the NIMT considered the scale of relocation / realignment that is required for the Ōtaki Railway Station. This has been minimised with the Project to ensure that as much as possible of the existing parking on the site is retained, and the Railway Station retains its relationship with Ōtaki and the NIMT. Previous options considered full relocation of the building onto the car park area whereas now the building can be rotated on its site towards the east, with a re-built platform, retaining the car park.

The cross-connection alternatives that were considered around Rahui Road and Waerenga Road in Ōtaki have also involved consideration of the extent and end location of the NIMT required to facilitate the Expressway.

Where the MCAT process for the Expressway was undertaken, the following specialist areas also considered effects on the KiwiRail interests for the alternatives being considered:

- Alternative Routes: archaeology / heritage; social / community; transport; specific land ownership effects; and
- Alternative Interchanges and Cross-Connections: transport outcomes; social / community; environmental outcomes.

9.10 Mitigation Option Assessment

An assessment of mitigation was undertaken throughout the design and development of the Project, particularly in relation to where potentially adverse effects were identified.

Each of the technical assessments appended in Volume 3, Technical Reports, has identified the mitigation alternatives relevant for each technical area. The applicability of these alternatives have been determined and assessed by the relevant specialists.