

PART E: CONSIDERATION OF ALTERNATIVES

9 Consideration of alternatives

Overview

Under the RMA a requiring authority needs to consider alternative sites, routes and methods of undertaking a work when lodging a notice of requirement (NoR) if it does not have an interest in the land sufficient for undertaking the work or the work is likely to have a significant adverse effect on the environment. The Act also requires an applicant to consider alternative methods and locations for resource consents relating to any activity that may have significant adverse effects on the environment or, when an activity involves the discharge of a contaminant, alternative methods of discharge.

This Chapter outlines the alternatives that were identified and assessed as part of the process to determine the selected alignment and design of the proposed MacKays to Peka Peka Expressway. This included a detailed analysis of 4 principal route options (i.e. an Expressway alignment within one of the four principal corridor options between MacKays Crossing and Peka Peka: the Western Link Road Corridor, the Western Corridor, the Eastern Corridor and the Existing State Highway Corridor), 12 connectivity options (i.e. number, location and orientation of ramps and interchanges) and 24 alignment sub-options (i.e. local road tie-ins and location).

The assessment of alternatives demonstrates that the NZTA, in developing the proposed route, alignment, design, and methodology for the proposed Expressway has considered:

- alternative routes (as appropriate);
- alternative alignments and interchanges/connections to the transport network;
- alternative designs, including construction methods and alternative measures to avoid, remedy and mitigate identified adverse effects on the environment; and
- alternative methods of discharging contaminants.

The assessment process applied was highly iterative, and involved ongoing refinement of the Project on the basis of information derived from desk top studies, field work, community and stakeholder engagement and detailed technical investigations. The process was also informed by the requirements of Part 2 of the RMA, the objectives of the Project and relevant national policy directives. The process satisfies the requirements of section 171 and Schedule 4 of the RMA.

9.1 Introduction

This Chapter provides a summary of the key aspects of the alternatives assessment process undertaken during the development of the Project, including that undertaken in 2009 to inform the NZTA Board's choice of the Western Link Road as its preferred route.

The process focused on identifying the most appropriate route and alignment for the Project. It commenced at a broad scale and systematically narrowed the geographic area of assessment to identified route and alignment options. At each stage of this process, the existing natural and built environment was taken into account, as well as social and cultural values.

The initial assessment was primarily based on desk top analysis and the outcomes of previous and preliminary consultation. Subsequently, the options assessment was supplemented by more detailed field investigations and targeted stakeholder and community engagement (for example, community expos and feedback). The information derived from this process was fully considered and incorporated into the decision-making process during the development of the final project scheme.

This Chapter summarises the decision-making process involved in the evaluation of alternative routes, sites and methods, with reference to the relevant statutory requirements, and the key steps involved in the assessment process, which were as follows:

- Route Options Assessment;
- Alignment and Interchange Options Assessment; and
- Design and Mitigation Options Assessment.

Further detail regarding alternatives to address specific or potential environmental effects associated with the project is provided in the Technical Reports in Volume 3 of the AEE.

9.2 Statutory requirement to consider alternatives

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

- In relation to Notices of Requirement, one of the matters to which particular regard must be given 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));
- In relation to resource consent applications, the Fourth Schedule requires an AEE to 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));
- 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”; and
- The RMA specifies a “best practicable option” regime in relation to noise, and implies consideration of options.

9.2.1 Section 171(1)(b) - NOR

With respect to section 171(1)(b), the NZTA does not have an interest in all of the land required for the Project. While the Crown will continue to acquire the necessary property interests after the NOR has been lodged, it will not have completed the property acquisition process prior to the NOR being determined. Consequently, consideration of alternative sites, route and methods needs to be undertaken. 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.

Section 171(1)(b) also requires the NZTA to demonstrate that its investigation of alternatives has not been carried out in an arbitrary or cursory way.⁷⁴ However, this does not mean that it is required to consider the full suite of alternatives available, or to select the best option in assessing the relative merits of the alternatives identified.⁷⁵

Under section 167 of the RMA the NZTA is an approved requiring authority for the:

construction and operation (including the maintenance, improvement, enhancement, expansion, realignment and alteration) of any State highway or motorway, pursuant to the [Transit New Zealand Act 1989].⁷⁶

Improvements in public transport between Wellington City and the Kāpiti Coast were not considered as an alternative in relation to this project as the provision of public transport is outside the scope of NZTA's statutory powers under the Land Transport Management Act 2003 (LTMA) and the Government Rooding Powers Act 1989. However, public transport improvements along this corridor have been identified by Greater Wellington Regional Council as part of a package of transport measures outlined in the Western Corridor Plan (2006), and which are contained with the current Wellington Regional Land Transport Strategy (RLTS) 2010-2040.

9.2.2 Resource consent applications

For the resource consent applications (including discharge permit applications), the available choice of locations or methods is constrained by the Project for which the designation is sought. That is, locations or methods that will not enable the work for which the designation is sought are not "possible"

⁷⁴ Refer *Environmental Defence Society v Mangonui County Council* HC Auckland M101/81, 23 October 1981, *Waimairi District Council v Christchurch City Council* EC 030/82 and *Villages of NZ (Mt Wellington) Ltd v Auckland City Council* EC A023/09.

⁷⁵ Refer *Beda Family Trust v Transit New Zealand* A139/04.

⁷⁶ Resource Management (Approval of Transit New Zealand as Requiring Authority) Notice 1994, notified in the Government Gazette on 3 March 1994. Under clause 29 of Schedule 2 of the Land Transport Management Amendment Act 2008, the NZTA replaced Transit New Zealand as the requiring authority approved under this Gazette Notice. Under section 47(1)(c) of the Land Transport Management Amendment Act 2008, from 1 July 2008 the Transit New Zealand Act 1989 is to be called the Government Rooding Powers Act 1989.

alternatives. In this sense, the alternatives to be considered in relation to both the designations and resource consents must align.

9.2.3 Mitigation

See discussion in Section 9.8.

9.3 Base information - constraints analysis

To inform the scoping of alternative routes a study was undertaken to identify and map specific features within the Project area that could act as a potential constraint to constructing the proposed Expressway.⁷⁷ The constraints mapping included reviewing previous transport studies relating to the Project area,⁷⁸ examining the existing environment in the vicinity of the proposed Expressway routes, preparing relevant technical desktop studies, undertaking traffic modelling (where appropriate), ground photography and site visits.

The examination of the existing environment highlighted a number of constraints that were relevant to the consideration of route alternatives and the development of project options. These constraints fell into the following areas:

- Cultural and archaeological (for example, potential for unknown archaeological sites; sites and localities of cultural importance to Iwi);
- Environmental (for example, air quality; wetlands; habitat severance; indigenous vegetation);
- Land use (for example, zoning; existing land uses; designations);
- Urban design (for example, urban form; accessibility; east-west connectivity);
- Social and community (for example, proximity to residential areas; property acquisition and associated displacement costs);
- Landscape and visual (for example, dune system; Raumati Escarpment);
- Geology and ground conditions (for example, peat deposits; sand dunes); and
- Stormwater and Hydrology (for example, flood levels; secondary flow paths).

The results of the constraints mapping are documented in Table 19 of the *M2PP Scoping Report* (2010), and were used as the basis for generating and assessing the alignment options.

⁷⁷ For the purposes of this study a constraint was considered to comprise any feature that needed to be taken into account when considering alignment options. Depending on the significance of the constraint (compared with other constraints) alignment options generally sought to avoid key constraints as far as practicable.

⁷⁸ For example, the *Transit NZ SH1 Kāpiti Strategic Study: Scoping Report* prepared by Opus in 2008.

9.4 Assessment of alternative route options

9.4.1 Project context

Construction of some form of roadway in the corridor occupied by the current Western Link Road (WLR) designation is an outcome that has been anticipated for more than 50 years. In 1949 the Governor-General authorised a motorway to be constructed between Wellington and Foxton, and an associated middle line proclamation was issued in 1956.

From that time onwards there has been a consistent preference for this corridor over other options (although corridor options have been re-appraised from time to time) and, until 1995, for it to be used for motorway purposes (refer to Appendix K – Chronology of Proposed Kāpiti Coast Arterial Route in the *M2PP Alternative Route Options Report* (2011)). After that date the preference shifted to an arterial road comprising two and four lane sections and at-grade intersections with local roads.

A more detailed account of the historical context of the project, along with associated investigations that have been carried out on the future of SH1 which have been used to inform option identification, is included in Chapter 2, Part A, Volume 2 of the AEE.

9.4.2 NZTA – options assessment

In 2009, following extensive consultation and engagement with the Kāpiti community on three route options – the WLR (Sandhills) option, the Western option and the Eastern option (refer to Chapter 10, Part F, Volume 2 of the AEE) – the NZTA undertook an assessment against the statutory requirements of the LTMA. As part of this analysis, a series of papers relevant to option selection were prepared by NZTA staff and supplied to the NZTA Board for consideration. The papers included:⁷⁹

- Workshop paper 09/12/0300 – SH1 Kāpiti Expressway, MacKay's Crossing to Peka Peka – Workshop Briefing, 8 December 2009;
- Workshop paper 09/12/0306 – MacKay's Crossing to Peka Peka Expressway options consultation analysis, 8 December 2009;
- Board paper 09/12/0326 – Kāpiti Board workshop additional information, 11 December 2009; and
- Board paper 09/12/0327 – SH1 Kāpiti Expressway: MacKay's Crossing to Peka Peka option selection, 11 December 2009.

In addition to these papers, associated NZTA workshops were undertaken (in which the Board participated) and the Board received advice from an independent panel of urban design specialists.

⁷⁹ These papers are publicly available and can be viewed at <http://www.nzta.govt.nz/projects/mackays-to-peka-peka/resources.html>

Having considered and weighed up the information provided, the Board resolved in December 2009 that it:⁸⁰

- a. **notes** the consultation report and key issues arising;
- b. **notes** that three options have been thoroughly investigated for the alignment of a SH1 expressway corridor through Kāpiti;
- c. **notes** that each option has strengths and weaknesses with respect to social, cultural and environmental concerns;
- d. **notes** that the Kāpiti Coast District Council supports the Eastern option;
- e. **notes** that the community consultation indicated greater support for the Sandhills option compared with the other options;
- f. **notes** that there are clear cost advantages of the Sandhills option, compared with the other options;
- g. **agrees** that the Sandhills option is the preferred Corridor for the SH1 expressway through Kāpiti, subject to further alignment development within the corridor including more detailed assessment of effects and further community consultation.

The reasons for Board selection of the WLR corridor were that, when compared with the other route options, it:

- would have the least impact on properties, least population displacement, and the fewest properties required;
- would be the least cost to construct (an estimated 25-30% lower);
- could be constructed within the shortest period, with least disruption; and
- had the greatest proportion of local community support.

9.4.3 M2PP Alliance - options assessment

Subsequent to the NZTA Board's resolution that the WLR was its preferred route, the M2PP Alliance undertook a further RMA based assessment of the principal alternative route options, using accepted methodologies for evaluating the comparative impacts of the principal options. A detailed description of the process and associated outcomes is documented in the *M2PP Alternative Route Options Report* (2011).

⁸⁰ Minutes of NZTA Board meeting, 11 December 2009, Minute 1c

The following key stages were involved in this further options assessment:

- Reviewing and confirming the principal route options for constructing an Expressway between MacKays Crossing and Peka Peka;
- Undertaking a design, transportation and environmental evaluation of the non-cost attributes of these route options;
- Undertaking a multi-criteria analysis (MCA) of the comparative non-cost attributes of the route options, including sensitivity testing of the various attributes; and
- Undertaking a cost assessment of the principal route options to inform the analysis of the comparative cost attributes.

9.4.4 Overview of alternative expressway routes

Previously proposed arrangements between MacKays Crossing and Peka Peka were identified and reviewed by the Alliance project team on behalf of the NZTA. The seven options considered were as follows:

- **Option 1: Western Link Arterial⁸¹** (this being the 'proposed road' described in the notice of requirement lodged by KCDC in December 1997) – this option involves construction of a local road that connects into the existing local roading network, the final form of which consists of a 4 lane road between Raumati Road and Te Moana Road with a two lane section south of Raumati Road and north of Te Moana Road;
- **Option 2: Western Link Road** (developed by KCDC within the Western Link Arterial designation) – this option would provide a two lane arterial with ten at-grade intersections, an urban speed posting and elements of "traffic calming" to encourage low speed;
- **Option 3: Western Link Arterial or Western Link Road as an interim option** – this option involves retaining SH1 and constructing either the Western Link Arterial or Western Link Road to divert some of the local traffic between Poplar Avenue and Peka Peka;
- **Option 4: Upgrade the Existing SH1 Alignment⁸²** – this option involves provision of a four lane Expressway on the existing alignment, including construction of new bridge structures where the proposed Expressway crosses the rail line at Paraparamu and re-crosses it south of Waikanae;

⁸¹ Options 1-3 comprise alternatives that involve KCDC as opposed to NZTA undertaking the proposed roading works. However, as these local roading projects would be significantly subsidised by NZTA and would have a major influence on the efficiency and effectiveness of the wider State Highway network they were included for consideration in the assessment of alternatives

⁸² Options 4 -7 were initially identified in the Opus (2009) Kāpiti SH1 Strategy Study – Technical Report

- **Option 5: Expressway following WLR Designation** – this option generally utilises the current designated WLR route which passes between the inland communities of Raumati, Paraparaumu, Waikanae and their associated beach settlements;
- **Option 6: Expressway following Rail Corridor** – this option involves provision of a four-lane Expressway running along the western side of the rail line between Mackays Crossing and Peka Peka, with the route utilising the existing SH1 corridor as far as Paraparaumu then following the rail line as far as Waikanae before diverting back to the existing SH1 corridor; and
- **Option 7: Expressway Avoiding Waikanae Town Centre** – this option provides a four lane Expressway on the existing SH1 alignment as far north as Otaihanga where it would then divert west to link with the WLR alignment.

In reviewing these proposed options, emphasis was placed on the extent to which they achieved the Project Objectives set out in Chapter 2, Part A, Volume 2 of the AEE and met the following design requirements:⁸³

- A 110 km/h design speed;
- Four lanes; and
- Grade separated intersections.

The outcome of the project team assessment of these options was as follows:

- Option 1 this was considered to be an unfeasible option as it did not meet the essential design requirements necessary to achieve the Project Objectives. Although the horizontal alignment of the proposal would generally permit a 110km/h design speed along the route (with the exception of the area in the vicinity of the Takamore urupā), posting such a speed was largely considered unacceptable due to safety concerns relating to closely spaced at-grade intersections;
- Option 2 this was considered to be an unfeasible option as it did not meet the essential design requirements necessary to achieve the Project Objectives (i.e. design speed and safety). In particular, the detailed design was based on a two lane arterial with at-grade intersections at ten locations, and an urban speed posting with elements of “traffic calming” to encourage low speed. This form of road was not intended to accommodate inter-regional (State Highway) traffic and would be neither adequate nor appropriate for this purpose;

⁸³ These requirements are set out in the NZTA RoNS Guidelines and the Guiding Objectives for the Project Alliance, and reflect the Level of Service criteria contained in the Austroads Guide to Traffic Management (refer also to Part A, Chapter 2 of Volume 2 of the AEE)

- Option 3 it was considered that maintaining existing SH1 and diverting local traffic onto either the Western Link Arterial or Western Link Road as an interim option would not achieve the Project Objectives. In their current form, the physical arrangements on SH1 between Poplar Avenue and Peka Peka Road would not provide the necessary physical attributes required for an Expressway (particularly meeting KiwiRAP 4 star standards⁸⁴ and reaching Level of Service (LOS) B or better) without significant roading improvements being undertaken; and
- Options 4 to 7 these routes were considered to be viable options as they generally aligned with the Project Objectives and the LOS criteria contained in the Austroads Road Engineering Guides 2009.⁸⁵

Following network analyses, the project team concluded that the most effective and beneficial locations for connections with the local roading was at Paraparaumu and Waikanae, rather than a single mid-point interchange (at Otaihanga) as was initially proposed. This arrangement was subsequently adopted in the development and analysis of the principal route options to ensure all Expressway options were comparable.

9.4.5 Principal route options identified

Based on the review of the alternative route options identified in Section 9.4.1, four principal Expressway route options were selected for further detailed analysis as follows:

- Route 1 – Expressway following WLR Corridor (equates to Option 5 in Section 9.4.1);
- Route 2 – Western Corridor (equates to Option 6 in Section 9.4.1);
- Route 3 – Eastern Corridor (equates to Option 7 in Section 9.4.1); and
- Route 4 – Existing State Highway Corridor (Option 4 in Section 9.4.1).

These routes are illustrated in Figure 9.1.

⁸⁴ KiwiRAP is an international system for road assessment which has been adopted in New Zealand. Star ratings are derived from a Road Protection Score determined from each road's design elements

⁸⁵ These comprise a series of 10 guides relating to the life cycle of a roading project and cover such matters as: asset management; bridge and pavement technology; project delivery and evaluation; road design, safety and transport planning; traffic management and tunnels

9.4.6 Assessment of principal route options

As outlined above, an assessment of the four proposed Expressway route options was undertaken in 2009 as part of NZTA's process for selecting a preferred route between MacKays Crossing and Peka Peka. However, this assessment did not take into account:

- refinements to the concept design for the proposed Expressway that were made by the NZTA in 2010;⁸⁶ and
- consequential concept design changes to the other route options that were made as a result of these refinements (particularly the number and location of interchanges).

In order to determine the relative merits of the revised route options, and which of the routes, if any, had significant advantages over the others in terms of their non-cost attributes, a further MCA of the proposed Expressway route options was undertaken by the Project team, on behalf of the NZTA. The process consisted of the following phases:

Phase 1	An initial workshop was held at which participants were briefed on the MCA process and an outline of the alternative route options provided. Participants included technical experts ⁸⁷ from the various specialist disciplines required to assess the alternative routes according to the identified cost and non-cost attributes.
Phase 2	Development of further option layouts in response to comments/requests received during Phase 1.
Phase 3	Under the guidance of lead assessors assigned to each MCA framework outcome (refer to Table 9.1), specialist technical experts familiar with roading projects and the Mackays to Peka Peka area (through sites visits and/or prior knowledge of the area) reviewed and assessed the proposed Expressway route options against the MCA outcomes appropriate to their area of expertise.
Phase 4	A second workshop was held at which lead assessors and technical experts presented their initial scores on the comparative impacts of each option to the wider team of experts for challenge and testing. A set of revised final scores were derived through the workshop.
Phase 5	The scores derived from the assessment workshop were further tested by applying different weightings to each key outcome area (sensitivity testing) to examine option responsiveness.

The MCA process provides a well established evaluative framework for comparing the environmental impacts of the route options relative to each other. The criteria used in the comparative assessment were informed by the project objectives and the environmental context of the area (i.e. to derive appropriate and relevant environmental parameters to guide the assessment). It also provided a

⁸⁶ This included minor realignment of the proposed Expressway route to avoid areas of high ecological value (e.g. Te Harakeke Wetland, Ngarara Wetland)

⁸⁷ These included experts in such areas as archaeology, ecology, landscape/visual assessment, traffic/transportation, water/air quality, cultural, noise, hydrology/stormwater, geotechnical, urban design, land contamination and vibration

structured approach to determining the respective advantages and disadvantages of each of the route options, based on a range of environmental and other attributes which reflected, amongst other considerations, the statutory tests under the RMA.

Where possible, data was obtained to provide a measureable assessment of potential impacts. Otherwise, the MCA relied on an expert qualitative evaluation of the route options based on the experience and knowledge of the technical experts involved and subsequent testing at the workshops referred to above.

A detailed summary of the process and associated findings is set out in Volume 1 of the *M2PP Alternative Route Options Report* (2011).

9.4.6.1 Multi- criteria assessment framework

The MCA framework applied to the four principal route options and took into account the following:

- The Project Objectives and the Alliance Guiding Objectives (refer to Chapter 2, Part A, Volume 2 of the AEE);
- The relevant statutory requirements and the broad RMA policy context for the project (refer to Part B, Volume 2 of the AEE);
- The specific environmental context and conditions of the study area; and
- The interests of Iwi and key stakeholders, including Greater Wellington Regional Council, the Department of Conservation and the New Zealand Historic Places Trust.

The MCA criteria used to assess the proposed Expressway route options were similar to the criteria developed and applied to other recent NZTA roading projects, but adapted to ensure the criteria were 'fit for purpose' to assess the proposed Expressway route options (for example, integration of the proposed Expressway into the existing urban fabric, social disturbance, landscape and ecology).

9.4.6.2 MCA outcomes and sub- criteria

To ensure that the proposed Expressway route options were robustly assessed and relevant statutory requirements met, both cost and non-cost related outcomes were included in the MCA framework criteria. The non-cost outcomes essentially provided an assessment of the environmental, social and cultural 'effects' of the proposed Expressway route options, while the cost outcomes essentially focused on the financial aspects of the proposed Expressway route options. Together, the non-cost and cost related outcomes provided a comprehensive assessment.

Sub-criteria under each project outcome were also developed to more clearly inform the proposed Expressway route assessment.

9.4.6.3 Non- cost related outcomes

The non-cost criteria of the MCA framework essentially reflect 'effects' based criteria as presented in Table 9.1. Based on these non-cost outcomes, specific sub-criteria were developed to aid consideration of the merits of the four proposed Expressway route options and further inform the MCA process in respect of the Project and its specific environmental context. The sub-criteria and associated measures are presented in full in Table 12 of Volume 1 of the *M2PP Alternative Route Options Report* (2011).

Table 9.1: Non- Cost MCA Outcomes

	Outcome	Description
1	<i>Movement</i>	<i>The project provides for people to move efficiently, conveniently and safely throughout the Kāpiti District as pedestrians, cyclists or in vehicles.</i>
2	<i>Built Environment</i>	<i>The project provides for the integration of infrastructure in the urban environment. The design does not significantly detract from the urban form and the adverse effects on urban form and features are no more than minor.</i>
3	<i>Cultural/Heritage</i>	<i>The project traverses areas with significant heritage and cultural values. The design reduces the risk of adversely affecting known and unknown sites and areas with heritage and cultural values.</i>
4	<i>Natural Environment</i>	<i>The project integrates well with the environment and any adverse environmental effects on natural resources and systems such as land, air and water are no more than minor.</i>
5	<i>Social/Community</i>	<i>The project provides for people's well-being and health, and promotes the safe and efficient movement to and from community health and emergency services.</i>
6	<i>Economic</i>	<i>The project promotes national, regional and local economic growth.</i>
7	<i>Implementation Timeframe</i>	<i>The project is able to be consented and implemented within the project timeline.</i>

In respect of Outcomes 1- 6, the four principal route options considered were assessed relative to one another. Outcome 7 (implementation timeframe) was used to assess whether each proposed Expressway route option was able to be consented and implemented within the project timeline. Outcome 7 also took into account the time anticipated to acquire properties – generally, the greater the number of properties, the higher the probability of delays in property acquisition and hence construction commencement.

9.4.6.4 Cost related outcomes

The principal route options were also assessed according to their comparative costs and benefit/cost ratios (BCRs). Table 9.2 identifies the criteria used to assess the cost related elements of the MCA framework.

Table 9.2: Cost Related Outcomes

	Outcome	Description
8	<i>Cost</i>	<i>The relative list of options and sub-options.</i>
9	<i>BCR</i>	<i>The relative BCR for each option, calculated in accordance with the NZTA evaluation manual.</i>

The lowest cost option (Outcome 8) and best benefit–cost ratio (Outcome 9) of the four proposed Expressway route options considered were used as an assessment baseline.

9.4.6.5 Scoring rationale

Each sub-criterion was assigned a score based on whether or not the route option positively or negatively contributed to the particular outcome. In respect of Outcomes 1– 6 referred to in Section 9.4.6.3, the assessment was numerically scored as indicated in Table 9.3:

Table 9.3: MCA Scoring Rationale for Outcomes 1- 6

Score	Assessment
3	<i>Significant Positive</i>
2	<i>Moderate Positive</i>
1	<i>Minor Positive</i>
0	<i>Insignificant</i>
-1	<i>Minor Negative</i>
-2	<i>Moderate Negative</i>
-3	<i>Significant Negative</i>

In respect of Outcome 7 (implementation timeframe), the assessment was numerically scored as indicated in Table 9.4.

Table 9.4: MCA Scoring Rationale for Outcome 7

Score	Assessment
0	<i>Could be consented within project timeframe</i>
-1	<i>+0-1 year to consent</i>
-2	<i>+ 1-2 years to consent</i>
-3	<i>+2 years to consent</i>

In respect of the cost related Outcomes, the proposed Expressway route options were numerically scored relative to the lowest cost option as indicated in Table 9.5.

Table 9.5: MCA Scoring Rationale for Outcome 8

Score	Assessment
2	<i>-5.0% to -7.5%</i>
1	<i>-2.5% to -5.0%</i>
0	<i>-2.5% to +2.5%</i>
-1	<i>+2.5% to +5.0%</i>
-2	<i>+5.0% to +7.5%</i>
-3	<i>+7.5% to +10%</i>

In respect of the BCR, the principal route options were numerically scored in accordance with NZTA's Economic Evaluation Manual (2010) as illustrated in Table 9.6:

Table 9.6: MCA Scoring Rationale for Outcome 9

Score	Assessment
0	0.9 to 1.1
-1	0.7 to 0.9
-2	0.5 to 0.7
-3	0.3 to 0.5

9.4.6.6 MCA workshops

Workshop 1: 18 November 2010

An initial workshop with specialist technical experts⁸⁸ was held at which:

- the proposed Expressway route options were described and reviewed, and
- the proposed MCA framework (comprising a series of project related outcomes and associated sub criteria – refer to Table 9.1) was presented and discussed.

Recommendations for changes to the concept designs of each route option to reduce their potential environmental impacts were recorded for development prior to the next workshop. Changes to the MCA assessment were also made to ensure the assessment criteria were 'fit for purpose' – particularly that they were:

- fully relevant to the project and its environmental context; and
- consistent and non-repetitive.

Workshop 2: 8 December 2010

A second workshop was held at which the relative attributes of the four principal route options were scored by participants according to the agreed criteria.

Prior to the workshop, lead assessors were tasked with reviewing the four principal route options, and assigned initial scores to the sub-criteria associated with the particular outcome relevant to their area of expertise. The assessors undertook any necessary site visits and investigations to assist in their evaluation. The scores were generated in accordance with the scoring rationale outlined in Section 9.4.3.5.

Lead assessors called on the expertise of other relevant technical experts to assist with the generation of their initial scores for each route option and to note the reasons for the scores produced.

Lead assessors presented their initial scoring at the workshop held on 8 December 2010. The scores were then rigorously challenged and debated by workshop participants and any 'double dipping' or areas of overlap were identified.

⁸⁸ Refer Footnote 14

Workshop 3: 9 December 2010

Following the 8 December 2010 workshop, a third workshop was convened which was attended by lead assessors and a number of technical experts.

The purpose of this further workshop was to discuss and review the scores generated at the previous workshop, as well as to discuss and confirm the parameters for undertaking sensitivity testing of the scores. Table 12 of Volume 1 of the *M2PP Alternative Route Options Report* (2011) sets out the final scores derived for the sub-criteria under each outcome, while the rationale for these scores is outlined in Appendix H of this report.

9.4.6.7 Summary of overall MCA score

As the MCA framework did not include a uniform number of sub-criteria under each outcome (for example, the Movement outcome had seven sub-criteria while the Built Environment outcome had three), the total outcome score was divided by the number of sub-criteria under each particular outcome to provide a total average score which was then used to compare route options. The total average score for each outcome was then presented to 1 decimal place to more clearly distinguish the difference between the route options and avoid differences becoming blurred due to 'rounding' of scores.

Table 9.7 presents a summary of the total average scores for each of the seven environmental attributes of the four route options (i.e., excluding implementation and cost scores). Scoring was presented in this manner to assist with the comparison of the route options based on those matters of particular relevance in an RMA context (i.e., both positive and adverse environmental, social and economic effects).

By contrast, Table 9.8 includes all cost and non-cost scores. Scoring was presented in this manner to assist the LTMA assessment used to inform NZTA project funding decisions relating to the national land transport fund, including consideration of associated value for money factors.

The MCA scores do not indicate any quantitative measure of the value of the four route options, but instead offer a useful means to assist in understanding the relative attributes of one route option compared with the others. Ultimately, it is the degree of difference between the scores that is useful in distinguishing the comparative merits of the route options.

9.4.6.8 RMA context: environmental, social and economic outcomes

The four principal route options scored as follows in a RMA 'effects based' statutory context:

Table 9.7: Effects Outcomes

Outcome	Route			
	1	2	3	4
Movement	2.6	1.7	1.4	1.4
Built Environment	-1.3	-1.7	-2.3	-2.3
Cultural / Heritage	-3.0	-2.3	-1.3	-0.3
Natural Environment	-1.6	-1.8	-1.2	-1.6
Social	0.3	-0.3	-1.7	-2.0
Economic	1.5	1.5	1.5	1.5
Overall scores	-1.5	-2.9	-3.6	-3.3
Ranking	1	2	4	3

In overall terms, Route 1 (Expressway following the WLR) ranked highest when assessed against the RMA 'effects' related outcomes. Furthermore, there was a clear margin between Route 1 (Expressway following the WLR) and the second ranked option (Western Route), indicating that there is a definite difference between this option and the other route options in terms of the nature and extent of the anticipated impact.

The 'effects' outcome scoring demonstrates a minimal difference between all other route options which are separated by a score of 0.7 points.

In summary, the scoring indicates that, compared with the other options, Route 1 is:

- least preferred in terms of its potential effects on cultural and heritage values;
- comparable to the other three options in terms of the potential impact on the natural environment; and
- similar to the other three options regarding the economic benefits that would be derived for the District and the wider region.

However, Route 1 offers significantly greater overall benefit over the other route options in terms of promoting the efficient, convenient and safe movement of pedestrians, cyclists and vehicles throughout the District. It would also have the least impact on the built environment as it involves less physical disruption to the existing form of the residential areas and the Paraparaumu and/or Waikanae town centres than the other options. The lesser degree of disruption and consequential social impact were also factors behind the higher social outcome score for Route 1 relative to the other options.

9.4.6.9 LTMA context outcomes

The four principal route options scored as follows when cost and implementation timeframe are taken into account:

Table 9.8: Environmental, Implementation and Cost Factors

Outcome	Route			
	1	2	3	4
Movement	2.6	1.7	1.4	1.4
Built Environment	-1.3	-1.7	-2.3	-2.3
Cultural / Heritage	-3.0	-2.3	-1.3	-0.3
Natural Environment	-1.6	-1.8	-1.2	-1.6
Social	0.3	-0.3	-1.7	-2.0
Economic	1.5	1.5	1.5	1.5
Implementation Timeframe	0	-2	-2.5	-2.5
Cost	0	-3	-3	-3
Benefit / Cost Ratio	0	-2	-2	-2
Overall scores	-1.5	-9.9	-11.1	-10.8
Ranking	1	2	4	3

The results in the above table illustrate that Route 1 (Expressway following the WLR option) ranked highest when assessed against all the outcomes considered. It also illustrates that there is a significant margin (8.4 points) between Route 1 and the second ranked option (Route 2 - Western Route), with minimal separation between the second and fourth ranked options (a 1.2 point spread).

In addition to those factors affecting the non-cost attributes, the difference in scoring between Route 1 and Routes 2 to 4 is largely attributable to the increased comparative cost associated with property acquisition, construction and securing the necessary access and local road connections for these latter routes. It also reflects the fact that the increased level of property acquisition associated with Routes 2 to 4 significantly increases the risk of consenting and construction delays.

9.4.6.10 MCA weighting analysis: sensitivity testing

To determine whether the outcomes would be affected if greater weight was assigned to particular attributes, the MCA scoring of the four proposed Expressway route options was subjected to further sensitivity testing.

Sensitivity testing and weighting selection was discussed at the third workshop on 9 December 2010 and an agreement reached to test the scores derived from the MCA process according to the following weighting methodology:

- Transportation – increased weight given to traffic safety, travel efficiency and multi-modal opportunities;
- Community – increased weight given to the effects on the urban form, town centres and areas of community open space and values;

- Environmental – increased weight given to the effects on the natural environment and amenity values;
- Social – increased weight given the social impact of the options; and
- Cultural/Heritage – increased weight given to the effects on cultural/heritage values.

Sensitivity testing was carried out by assigning an increased percentage weighting (50%) to particular MCA outcomes. In addition, sub-criteria under each outcome were enhanced to reflect particular stakeholder interests. A breakdown of the sensitivity weightings applied to each outcome and associated sub-criteria is included in Appendix G of Volume 1 of the *M2PP Alternative Route Options Report* (2011).

As the primary purpose of the testing was to assess the sensitivity of the non-cost related outcomes, implementation and project cost related factors were excluded from consideration.

The outcomes of the sensitivity testing are as follows:

- Transportation – Under this weighting scenario Route 1 (Expressway following the WLR) was the highest ranked route option, reflecting the benefits that it offers in terms of safety and movement efficiency;
- Community – Under this weighting scenario Route 1 (Expressway following the WLR) was the highest ranked route option. This is largely attributable to the significant divisive impact and associated visual effects that the other options would generate as a result of constructing an Expressway through existing town centres and residential areas;
- Environmental – The sensitivity testing identified little difference between the route options if increased weight is applied to potential effects on the natural environment. Under this weighting scenario Route 1 (Expressway following the WLR) and Route 3 (Eastern Corridor) ranked first equal;
- Social – Under this weighting scenario Route 1 (Expressway following the WLR) was the highest ranked route option taking potential social effects such as safe and efficient movement to and from community health and emergency services into account; and
- Cultural/Heritage – Under this weighting scenario the highest ranked option is Route 4 (Existing State Highway Corridor), with Route 1 (Expressway following the WLR) being lowest ranked. The result for Route 4 largely reflects the fact that as this option follows the existing, albeit widened, SH1 alignment and accordingly the likely impact on sites and places of cultural and heritage value is significantly reduced. By contrast, the result for Route 1 reflects the increased probability of likely cultural/heritage impacts given the large areas of unmodified ground surface included in the proposed alignment, and its location relative to recorded archaeological sites and places of cultural and historic heritage value and the coastal dune system.

A full summary of the sensitivity testing results is presented in Section 4.5 of Volume 1 of the *M2PP Alternative Route Options Report* (2011).

9.4.7 Route selected for the proposed MacKays to Peka Peka Expressway

The MCA process identified that Route 1 (Expressway following the WLR) was the preferred proposed Expressway route option when assessed against the other three principal alternatives.

In particular, the assessment confirmed Route 1 as the highest overall ranked option when non-cost and cost related outcomes are equally weighted. Furthermore, the route was confirmed as being insensitive to variable weight being applied to a number of interest/stakeholder related factors (for example, noise and visual impacts). Given that Route 1 largely follows a corridor that has been kept clear of development for future roading purposes since the 1950s, this finding is not surprising.

However, Route 1 did not rank highest when greater weight was applied to natural environmental and cultural/heritage factors, ranking first equal with Route 3 (Eastern) with respect to the former and fourth with respect to the latter. Again, given the largely undeveloped nature of this corridor, this finding is not surprising.

Under the LTMA the NZTA is required to seek value for money in the use of its funds. The cost assessment of the four principal route options confirmed that the costs of constructing Route 1 are significantly less than any of the other three route options: the P95 cost estimates⁸⁹ indicate that the other route options would be between 32% and 57% more costly to construct. Furthermore, the property acquisition costs of the other route options would be two to three times that for Route 1.

The economic assessment concluded that Route 1 would have a significantly higher benefit-cost ratio than the other route options, with an estimated BCR of 0.95 compared with ratios of between 0.57 and 0.66 for the other route options.

9.5 Assessment of alternative alignments and interchanges – phase one

A broad range of connectivity and alignment options within the preferred route corridor (i.e. Route 1) were identified (through environmental constraints analysis) and developed and evaluated, using MCA. A detailed description of the process is set out in the *M2PP Scoping Report* (2010).

On completion of the scoping process, a shortlist comprising three connectivity options and seven alignment options was compiled.

9.5.1 Option identification workshops

A series of workshops were held with the project team to develop and refine viable options along the route. Participants at these workshops included members of the project team representing the various specialist and technical disciplines involved in the project (including ecology, landscape and urban design, social impact assessment, archaeology, air quality, traffic engineering, stormwater design).

⁸⁹ These estimates represent a 95 percentile prediction that the probability of the final outcome cost exceeding the P95 value is 5%. The cost estimates were undertaken in November 2010.

To assist the identification and assessment of options, the project area was divided into the following sectors in recognition of their differing community and environmental characteristics:

- Sector 1 – Raumati South: from MacKays Crossing to just north of Raumati Road;
- Sector 2 – Raumati/Paraparaumu: from north of Raumati Road to north of Mazengarb Road;
- Sector 3 – Otaihanga/Waikanae: from north of Mazengarb Road to north of Te Moana Road; and
- Sector 4 – Waikanae North: from north of Te Moana Road to Peka Peka.

The sectors are illustrated in Section 3, Chapter 6, Part A, Volume 2 of the AEE.

The corresponding options identified within each of these sectors were developed on the following basis:

- Base Options – high level options that detailed the number and geographical location of interchanges and key connections over the length of the route; and
- Sub-Option alignments – sector specific options that detailed the actual alignment of the route, based on the identified constraints associated with each sector.

9.5.1.1 Workshop 1: 14 July 2010

The initial workshop involved participants from all of the project disciplines. The purpose of the workshop was to identify and assess the relative constraints that required consideration across the project area and to introduce the project team to the various features of the proposed route. Following the constraints' identification, the project team identified potential sub-options for each of the sectors.

9.5.1.2 Workshop 2: 3 August 2010

At the second workshop, schematic drawings of the options derived from the initial workshop were presented to the project team. The purpose of the workshop was to provide the project team with an opportunity to review the options, to challenge their feasibility and to identify any additional options for consideration.

The initial results of the traffic modelling were also presented at this workshop, along with further constraints that had been identified. The outcome of the workshop was the development of a long-list of options.

9.5.1.3 Workshop 3: 18 August 2010

At the closing workshop the final long list of options, along with supplementary technical information, from various technical disciplines, was presented to the project team. Information presented included additional geometric design work that more clearly identified the 'footprint' required for several of the options – this work provided the technical disciplines with further detail to assist with identifying and assessing the likely impacts associated with each of the options.

A preliminary evaluation of the options (excluding cost or BCR information) was also carried out as part of developing appropriate and robust assessment criteria.

9.5.2 Long list of options identified

A total of 12 base-options and 24 sub-options were included in the final long-list and are briefly outlined below.

9.5.2.1 Base- options (connectivity options)

The base-options were developed to consider connectivity options along the full length of the route. These options fell into three general categories:

- Option 1 – north and south connections to the existing SH1 but no intermediate interchanges;
- Option 2 – north and south connections to SH1 plus one intermediate interchange; and
- Option 3 – north and south connections to SH1 plus two intermediate interchanges.

In addition, a scenario comprising a local road crossing of the Waikanae River was included with each base-option.

The twelve identified base-options provided a range of connectivity to the local street network and were modelled to assess their relative effectiveness. The list of base-options considered is set out in Figure 9.2 and a description is provided in Appendix C of the *M2PP Scoping Report* (2010).

Options	Poplar Ave	Raumati Rd	Ihakara St	Kapiti Rd	Otaihanga Rd	River Crossing (Weggey Dr)	Te Moana Rd	Peka Peka Rd
1								→
1A								→
2					⊕			→
2A					⊕			→
2B								→
3							⊕	→
3A							⊕	→
3B			⊕				⊕	→
3C			←≡	≡→			⊕	→
3D		←≡		≡→			⊕	→
3E	→			⊕			⊕	→
3F	→			⊕			⊕	⊕

M2PP-AEE-GPH-ZZ-GE-293 - Base-option Diagram (10/1/2012)



Figure 9.2: Base- option Diagram

9.5.2.2 Sector sub- options (alignment options)

There were 24 alignment sub-options included on the long-list for the route (refer Appendix C of the M2PP Scoping Report (2010)). The sub-options identified within the four sectors along the route (refer to Section 3, Chapter 6, Part A of the AEE) are as follows:

- a. Sector 1 – Raumati South: from MacKays Crossing to just north of Raumati Road

The sub-options included four basic alignments with interchanges/local road connections in a range of locations. A section of three of these alignments would pass through QE Park (sub-options A - C), while the fourth ties into existing SH1 just north of Poplar Ave (sub option D). Interchange configurations were considered for each of the alignments, with some requiring additional work on local roads such as Poplar Ave. The western most alignment linking the existing designation directly to MacKays Crossing through QE Park did not progress past the 2nd workshop due to the significant severance and environmental and cultural/heritage impacts it would have on the Park. The option that tied in north of Poplar Ave also required an additional local road connection to allow convenient access to and from Raumati and the existing SH1north.

- b. Sector 2 – Raumati/Paraparaumu: from north of Raumati Road to north of Mazengarb Road

The four sub-options identified in this sector focused on interchange locations, a split versus full single interchange and a slight alignment shift east of the WLR designation mid-way between Raumati Road and Kāpiti Road (adjacent to the potential Ihakara Street Extension). With regard to the interchange options, KCDC intends to extend Ihakara Street through to link with Waikare Road to create an additional east-west link to ease traffic congestion on Kāpiti Road. This would provide an opportunity to use Ihakara Street for the purposes of either a single full interchange or a split interchange with access/egress onto Kāpiti Road. It was recognised that the sub-options would also need to integrate, where possible, with KCDC's town centre plans which are yet to be finalised.

- c. Sector 3 – Otaihanga/Waikanae: from north of Mazengarb Road to north of Te Moana Road

The identified sub-options in this sector focused on alternative route alignments to minimise impacts on the New Zealand Historic Places Trust registered Takamore Wāhi Tapu Area and on private property. Five routes were identified: three passing through the wāhi tapu area, one passing over the eastern corner of the wāhi tapu area, and one to the east of the wāhi tapu area through residential properties. A sub-option consisting of a near straight line from Otaihanga Road to Peka Peka was discarded as the impact on private property and ecological areas was considered to be too significant.

- d. Sector 4 – Waikanae North: from north of Te Moana Road to Peka Peka

The identified sub-options in this sector focused on avoiding ecological areas, particularly significant wetlands and sites subject to QE II covenants. Six options were developed, with some discarded early as they severed properties and derived no additional benefit. As there was negligible Crown ownership of property in this sector, options outside the existing WLR designation were also considered.

9.5.3 Long list option assessment and evaluation

Consistent with the assessment of alternative route options, a MCA was also applied to the base options and sector sub-options identified during the scoping stage. For the purposes of this stage of the investigation the MCA process was used to determine the 'high-level' merits of each option and to identify key positive or negative differentiators between the options. The outcomes of the MCA were then used to derive a shortlist of options.

9.5.3.1 Options assessment and ranking workshop: 15 September 2010

An evaluation workshop was convened to enable the Project team to undertake a final assessment, comparison and ranking of the options using a MCA process consistent with that outlined in Sections 9.4.3.2 to 9.4.3.4 and Section 9.4.3.7 of this Chapter of the AEE.

Key inputs to the workshop were the preliminary outcomes of the non-cost assessment derived from the 18 August 2010 workshop, together with base-option/sub-option costs and benefit cost ratios (BCR) for the base-options. New alignment information was also presented identifying option foot prints in more detail.

Prior to the workshop, the lead assessors re-evaluated and scored their relevant MCA outcome areas, noting their reasons. The outcome of this exercise was presented to the project team at the evaluation workshop where the scoring was challenged and debated.

Once the marking of the base-options and sub-options was completed, the results were tabulated and sensitivity testing carried out. This process confirmed Options 3, 3B and 3C as the highest ranking base-options for 'non-cost' outcomes. A comparative analysis of the non-cost, cost and BCR outcomes of each base option further confirmed Options 3, 3B and 3C (refer Figure 9.1) to be the highest ranked route options and on this basis they were carried forward to the shortlist (refer to Table 26 and Figures 10 and 11 in the *M2PP Scoping Report* (2010)).

The project team also evaluated the sub-options against the non-cost and cost related MCA outcomes. The sub-options that were carried forward to the shortlist following this evaluation included:

- Two sub-options at the southern tie-in in Sector 1 (sub-options S1Ciii and S1Dii – refer to Table 9.9);
- One sub-option in Sector 2 to move the alignment slightly east of the current designation near Ihakara Street Extension;
- Two sub-options between Otaihanga Road and Te Moana Road in Sector 3 (sub-options S3D and S3E – refer to Table 9.9); and
- Two sub-options in Sector 4, one within the designation north of Smithfield Road and one located outside the designation away from some wetlands (sub-options S4Ai and S4F – refer to Table 9.9).

For the two sub-options in Sector 1, sub-option S1Dii (south connection north of Poplar Avenue) scored highest in non-cost terms but scored lower when assessed against cost (i.e. had a higher cost), due to the expenditure that would be incurred as a result of the additional properties that would need to be purchased. However, both sub-options for the southern connection were included on the shortlist.

In Sector 3, sub option S3D (the western option) scored highest in non-cost terms and is the least expensive option. By contrast, sub-option S3E (the eastern option) impacts on more properties and therefore would incur a higher cost.

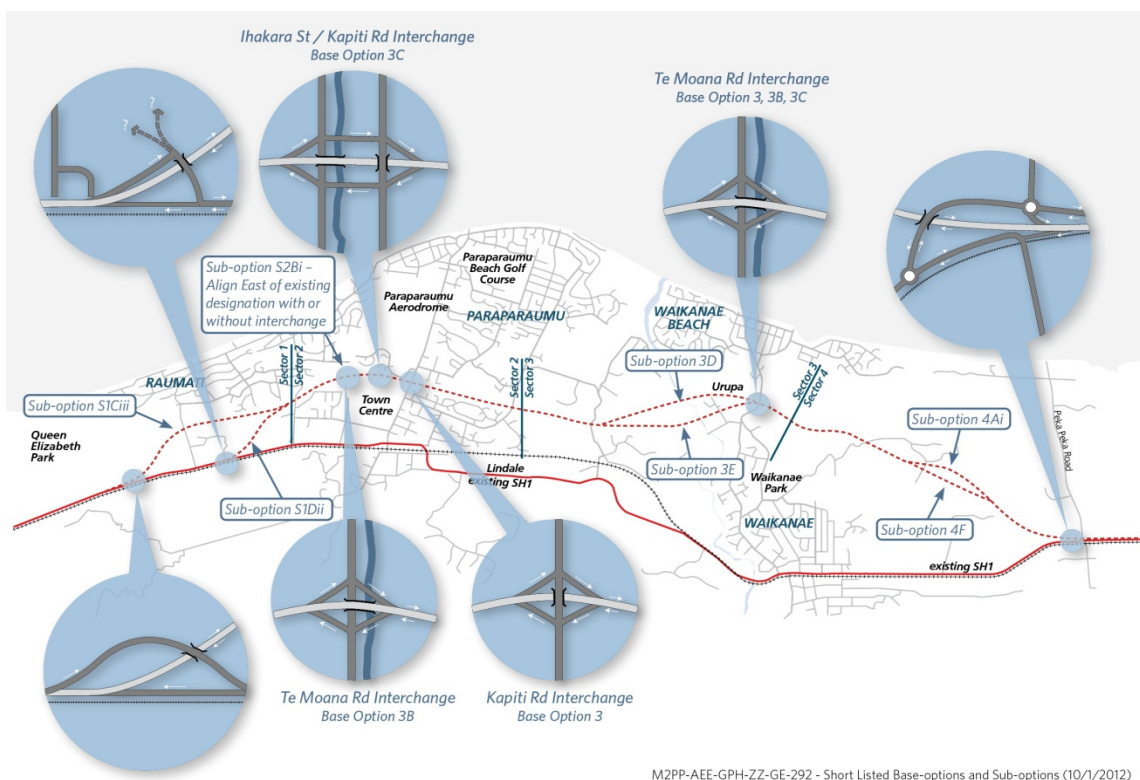
9.5.4 Shortlist of options identified

The output of the MCA process was a shortlist comprising three connectivity options and seven alignment options. These options are briefly outlined in Table 9.9.

Table 9.9: Shortlisted Base- options and Sub- options

Base-option	Description
3	South-facing ramps south of Poplar Ave, north-facing ramps at Peka Peka. Interchanges at Kāpiti Road and Te Moana Road.
3B	South-facing ramps south of Poplar Ave, north-facing ramps at Peka Peka. Full interchanges at Ihakara Street extension and Te Moana Road.
3C	South-facing ramps south of Poplar Ave, north-facing ramps at Peka Peka. Full interchange at Te Moana Road. Split interchange, with south facing ramps at Ihakara Street extension and north facing ramps at Kāpiti Road with one way auxiliary lanes between Kāpiti Road and Ihakara Street.
Sub-option	Description
S1Ciii	South facing ramps, south of Poplar Road, including local road over bridge in QE park. Alignment located east of Steiner school.
S1Dii	Ties in North of Poplar Ave, (approx.200 Main Road). North bound off ramp on local road between Main Road and possibly Poplar Ave.
S2Bi	Alignment east of existing designation. With or without Interchange at extended Ihakara Street.
S3D	Crosses Waikanae River near existing designation - east of urupā, west of Maketu tree (straighter north/south alignment), crosses corner of wāhi tapu area.
S3E	Crosses Waikanae River east of current designation, straighter north/south alignment. East of the wāhi tapu area (including urupā/Maketu tree) but severs Puriri Road.
S4F	Alignment avoids QEII covenant sites and other wetland areas. Crosses additional property north of Maypole boundary on Ngarara Road.
S4Ai	Alignment within designation north of Smithfield Road.

The shortlisted base-options and sub-options are also illustrated in Figure 9.3.



M2PP-AEE-GPH-ZZ-GE-292 - Short Listed Base-options and Sub-options (10/1/2012)

Figure 9.3: Shortlisted Base- options and Sub- options

9.6 Assessment of alternative alignments and interchanges – phase two

Following confirmation of the route option shortlist, a more detailed assessment was undertaken to identify an overall preferred scheme option. This process is documented in detail in the *M2PP Options Report* (2011).

9.6.1 Options investigation

To inform the process of assessing and selecting a preferred option from the shortlist of options compiled during the preceding scoping stage, further work was undertaken by a wide range of technical specialists in the project team (for example, noise, urban design, ecology, social impact assessment, archaeology, landscape and visual assessment, geotechnical engineering, air quality, cultural impact assessment, traffic engineering, stormwater management). This work included:

- Consultation with the local community in November 2010 and May 2011 – this included eight Expo’s in the Kāpiti community along with public meetings and property visits;
- Ongoing engagement with local iwi, including a hui held at Whakarongotai Marae on 8 – 9 October 2010 regarding the impacts on the Takamore urupā and surrounding wāhi tapu area;
- Design work to progress the options to a level that enabled a more detailed technical assessment of the options for the MCA process and for options to be priced;
- Continued data gathering from environmental field work (for example, ecology);
- Air quality monitoring and contaminated land investigations;
- Geotechnical and hydrological sampling and monitoring to inform the design process;
- Social and community investigations in the form of surveys and observations, including a walking and cycling survey to determine existing routes used;
- Preparation of visual simulations of the short-listed options to illustrate their potential impact on the surrounding landscape; and
- Noise modelling of the shortlisted options to assess potential noise effects.

9.6.2 Option development workshops

Workshops were convened throughout the period between preparation of the *M2PP Scoping Report* in October 2010 and the final MCA workshops in February and March 2011 to review and assess further refinements to the shortlisted base options and sub-options. The workshops were as follows:

9.6.2.1 Workshop 1: 21 October 2010

An initial workshop was convened with technical specialists involved in the Project to identify key issues for consideration in the options phase and in developing a preferred option. These included issues that were generic to the overall alignment as well as issues relating to specific connection points.

9.6.2.2 Workshop 2: 8 November 2010

A MCA workshop was held to evaluate options at the southern connection and the section between Waikanae River and Te Moana Road. Preferred options relating to each of these locations were identified for further evaluation and consideration at two further MCA workshops scheduled in February/March 2011.

9.6.2.3 Workshop 3: 24 November 2010

A further options phase workshop was held to review progress on options investigations that had been undertaken subsequent to the initial 21 October 2010 workshop.

9.6.2.4 Workshop 4: 15 December 2010

A 'Challenge Workshop' was convened at which members of the project team, along with several external participants, critiqued the shortlisted options and sub-options. Proposed overbridges and underbridges at Kāpiti Road, Otaihanga Road, Te Moana Road, Ngarara Road and options at Peka Peka were also considered. Decisions on preferred options relating to some of these crossings were also made.

9.6.3 Final shortlist

Based on the outcomes of the option development workshops, and further developed design work carried out following the Scoping Report, a final shortlist was compiled, comprising the following:

- one base option (Scoping Report Base Option 3, with south-facing ramps south of Poplar Ave, north-facing ramps at Peka Peka and interchanges at Kāpiti Road and Te Moana Road); and
- twelve sub-options, two each at six locations along the route.

The 12 sub-options are summarised in Table 9.11. This final option shortlist was subsequently carried forward for evaluation at two further MCA workshops scheduled for February/March 2011.

In addition to the shortlisted options, five connection options were developed in the vicinity of Smithfield Road to address potential property severance issues in this vicinity and access to the Nga Manu Nature Reserve. These were also carried forward for evaluation at the final MCA workshop held in March 2011.

Table 9.10: Final Shortlisted Options

Option No.	Option Title	Description
1	Raumati Straight⁹⁰	Two widening options for Raumati Straight.
1A	Four metre wide median	<ul style="list-style-type: none"> ■ 4 metre median. ■ Traffic lanes and shoulder constructed outside the existing QE Park, with some encroachment into the park for wetland swale and cycleway/walkway.
1B	Six metre wide median	<ul style="list-style-type: none"> ■ 6 metre median. ■ Shoulder and all or part of the northbound traffic lanes encroach into QE Park, together with the wetland swale and cycleway/walkway.
2	Southern Connection	Two options for Southern Connection
2A	Alignment through QE Park (sub-option S1Ciii in Table 9.10)	<ul style="list-style-type: none"> ■ North bound off ramp in QE Park, over proposed Expressway tying back into existing highway. ■ Southbound on ramp on existing highway south of Poplar Avenue. ■ Poplar Avenue realigned to the south and raised over proposed Expressway, for property access on northern side and to allow construction "offline". ■ Te Ra School relocated for proposed Expressway to pass through and therefore reduce impact on wetland area.
2B	Alignment option through 200 Main Road (sub-option S1Diii in Table 9.10)	<ul style="list-style-type: none"> ■ Proposed Expressway passes over Poplar Avenue, just west of existing highway. ■ Leinster Avenue closed at proposed Expressway. ■ New accessway for severed properties off Leinster Avenue. ■ North bound off ramp exits onto Poplar Avenue, at new roundabout.
3	Kāpiti Road Interchange	Two Options for Crossing Kāpiti Road
3A	Kāpiti Road under proposed Expressway.	<ul style="list-style-type: none"> ■ Proposed Expressway passes over Kāpiti Road, with Kāpiti Road left at existing level. ■ Kāpiti Road widened to provide through lanes and turning lanes with signalised intersections.
3B	Kāpiti Road over proposed Expressway.	<ul style="list-style-type: none"> ■ Proposed Expressway passes under Kāpiti Road, with the proposed Expressway lowered approximately 1.5 m below existing ground level. ■ Kāpiti Road widened as for Option 3A, with elevated signalised intersections.
4	Otaihanga Road Crossing	Two Options for Crossing Otaihanga Road
4A	Proposed Expressway over Otaihanga Road.	<ul style="list-style-type: none"> ■ Proposed Expressway passes over Otaihanga Road, with Otaihanga Road remaining on current alignment.
4B	Proposed Expressway under Otaihanga Road	<ul style="list-style-type: none"> ■ Proposed Expressway under Otaihanga Road. ■ Local road realigned to form ramp and bridge over proposed Expressway.

⁹⁰ The works associated with the Raumati Straight options were subsequently modified and deemed to comprise upgrade activities within the scope of the existing SH1 designation

Option No.	Option Title	Description
5	Waikanae River to Te Moana Road	Two Options, a western and an eastern option
5A	Western option (sub-option S3D in Table 9.10)	<ul style="list-style-type: none"> ■ Passes west of the Maketu Tree and east of the Urupā. ■ Passes over a corner of the registered wāhi tapu area. ■ Encroaches on El Rancho property.
5B	Eastern option (option 3H, which replaces option S3E in Table 9.10)	<ul style="list-style-type: none"> ■ Passes east of the Maketu tree and east of the Urupā. ■ Does not cross the registered wāhi tapu area. ■ Passes through historic house. ■ Further from El Rancho facilities.
6	Northern Connection	
6A	Option 1 Rail crossing at grade	<ul style="list-style-type: none"> ■ Proposed Expressway under local road. ■ Roundabout at Peka Peka Road. ■ Roundabout just south of bridge over proposed Expressway. ■ At grade railway crossing retained at Hadfield Road.
6B	Option 2 (Dog bone)	<ul style="list-style-type: none"> ■ Proposed Expressway under local road. ■ Hadfield Road passes over the railway line. ■ Elevated roundabouts provided at both Hadfield Road and Peka Peka Road.

9.6.4 Option assessment and evaluation

To determine the preferred options the assessment of shortlisted options included a number of processes, both quantitative and qualitative. These included:

- Consideration of the feedback received through community consultation and engagement;
- Further technical investigations and consideration to clarify the options;
- An assessment of option costs;
- A MCA of the options; and
- Alliance Management Team review and recommendation to the Project Alliance Board.

9.6.4.1 Feedback from consultation and engagement

To inform option development during this phase the project team built on the information derived from the extensive consultation and engagement undertaken to date as part of the Project (refer to Chapter 10, Part F of the AEE).

On 18 January 2011 and 18 February 2011, meetings were held with the design team to discuss the design related issues raised in the feedback received during the consultation and engagement process. During these sessions the design team considered the points raised, identified matters requiring further investigation and highlighted matters for consideration as part of the further round of project consultation scheduled for May 2011.

9.6.4.2 Technical considerations

In addition to the information derived from the consultation process a range of technical factors were also considered in determining the final shape of the shortlisted options. These included:

- Technical Design Considerations
 - Roading design standards, including alignment with the NZTA's 'Roads of National Significance Design Standards and Guidelines';
 - Road geometrics, including application of NZTA's general Expressway design criteria and review of the options from a safety perspective;
 - Geotechnical, including the extent of peat deposits and seismic performance;
 - Structures, including the location and design of overbridges, underbridges, a Waikanae River crossing, pedestrian/cycle bridges, culverts, retaining walls and sign gantries;
 - Stormwater and flood risk management, including location relative to flood prone land, impacts on flood flow paths and stormwater discharge and the impact of a proposed bridge crossing in the Waikanae River;
 - Pavements, including differential subgrade settlement rates, noise mitigation properties and rehabilitation of existing pavements;
 - Cycleways/walkways/bridleways, including continuous provision along the length of the proposed Expressway;
 - Services, including the impact on existing gas, electricity, telecommunications and water and wastewater transmission and distribution;
 - Urban design, including the potential to integrate the proposed Expressway into the urban form and fabric of the district (for example, existing urban centres) and opportunities for urban form improvements; and
 - Noise, including the number of potentially affected noise sensitive receivers, the effects of introducing traffic noise into areas that are currently relatively quiet.
- Environmental and Social Considerations
 - Re-evaluation of the options against the constraints identified in Section 9.3.
- Construction Considerations
 - Ground conditions, including pre-loading peat in deeper peat areas and excavation and replacement in shallower areas;
 - Sources of material, including use of local quarry materials and sand from adjacent dunes;
 - Disposal of excess materials, including the potential for on-site disposal (for example, as noise mitigation bunds); and
 - Existing traffic safety and movements, including the impact on local road users and the performance of existing traffic (for example, vehicles, cyclists, pedestrians).

- Cost and Risk Considerations
- Cost, including the comparative cost of each of the options; and
 - Risks, including reviewing the identified risks and opportunities allied with the Project along with their associated probability and consequence rating.

9.6.4.3 MCA framework

Following completion of the scoping report, a review was undertaken of the MCA relating to the initial range of options that were shortlisted. The purpose of the review was to ensure that the outcome descriptions were sufficiently detailed to facilitate a robust assessment of the shortlisted options.

The resulting outcomes, criteria and measures that formed the basis for assessing the final shortlist of options are outlined in Table 9.11:

Table 9.11: MCA Outcomes, Criteria and Measures

Outcome	Criteria Heading	Measure
Movement	1.1 Travel Safety	Level of safety provided by option design and local road connectors.
	1.2 Vehicles: Through traffic benefits	Movement efficiency and user benefits for through traffic.
	1.3 Vehicle: Local traffic benefits	Movement efficiency and user benefits for local traffic.
	1.4 Integration with public transport	Ability of public transport (train, bus, rail, airport) to safely and efficiently integrate with option design.
	1.5 Integration with cycleways and pedestrian links	Ability of pedestrian links & cycleways to safely and efficiently integrate with option design.
Built Environment	2.1 Visual effects	Visual relationship with the local environment; extent of visual effects of structures and earthworks in relation to context, including town centres, residential areas, Waikanae River corridor and other public amenity locations. Ability to integrate into landscape context.
	2.2 Built form	Relationship and integration with urban form and town centres, including responding to the individual urban identities of Raumati Village, Paraparaumu, Paraparaumu Beach and Waikanae. Includes the potential for built form improvements.
	2.3 Public Areas/ Parks/ Recreational Areas	Effects on public open space areas including the (loss of) potential for park/recreational improvements.
Cultural / Heritage	3.1 Built Heritage	Effects on identified built heritage recognised in the District Plan and/or by the New Zealand Historic Places Trust (section 6(e), RMA).
	3.2 Archaeology - known	Effects on identified/recorded (NZHPT Register, District Plan or NZAA Site Records) historic heritage places affected by option, including archaeological sites, identified Māori sites and features, historic buildings and structures (section 6(e),(f), RMA)
	3.3 Archaeology - unknown	Effects on predicted unknown/unrecorded archaeological items and sites, and sites/items of significance/value to Māori (section 6(e),(f), RMA)
	3.4 Cultural health effects	Effects on the relationship of Māori and their culture and traditions and customary activities with their ancestral lands, water, sites, wāhi tapu, and other taonga, including the effects from changes to ecology and water quality (sections 6(e), (g), 7(a) and 8, RMA).

Outcome	Criteria Heading	Measure
Natural Environment	4.1 Natural landscapes and features	Effects on outstanding natural landscapes and features requiring protection, including those listed in district and regional plans (section 6(b), RMA).
	4.2 Surface water	Effects on surface water resources, including quality, quantity and flooding issues.
	4.3 Groundwater	Changes in groundwater and associated effects, including construction and operational.
	4.4 Ecology	Effects on areas of significant indigenous vegetation and habitats (section 6(c) RMA), biodiversity, and ecological processes.
Social / Community	5.1 Air Emissions	Effect of the changes of air quality on sensitive receptors, including residential areas, hospitals and schools (MfE Good Practice Guide for assessing discharges to air from land transport, section 4.4).
	5.2 Traffic noise & Vibration	Effect of noise and vibration on Protected Premises and Facilities (Traffic noise-NZS 6806:2010; Vibration-NS 8176.E: 2005).
	5.3 Displacement	Effects of displacement of households, businesses, community services and facilities
	5.4 Community Wellbeing	Effects on community wellbeing and way of life, including access, connectivity and severance.
Economic	6.1 National & Regional Economic Growth	Consistency with National & Regional economic and growth policies (for example, Government Policy Statement, Wellington Regional Strategy).
	6.2 Local Economic Growth	Consistency with local economic and growth policies, particularly the impact on local town centres.
Implementation time frame	7.1 RMA and other statutory approvals/ authorities	Risks of delay to constructing the proposed Expressway within scheduled timeframes through obtaining necessary RMA approvals and other required statutory authorisations (for example, Historic Places Act, Reserves Act).
	7.2 - Public Works Act processes and transfers	Risk of delay to constructing the proposed Expressway within scheduled timeframes through the property acquisition process, including private property acquisition process and process of transferring any Council-owned land to the Crown and changing the purpose for which Crown land is held.

The MCA process and grading scale applied to the assessment of the final shortlist of options was consistent with that used to assess the alternative Expressway route options (refer to Sections 9.4.3.2 – 9.4.3.5 of this Chapter of the AEE).

The process involved technical specialists from the project team assessing the options using the criteria included in Table 9.12 relevant to their specialist area, and generating a score and associated comments. These scores were then reviewed and challenged by the wider project team at subsequent MCA workshops and, in some cases, amended in light of these discussions to ensure a consistent approach to scoring. This approach enabled comprehensive consideration to be given to the relative costs and benefits of options, along with associated opportunities for effects' mitigation.

a. Initial MCA Workshop: 23 February 2011

An initial MCA workshop was held, at which the 12 short-listed options were presented to the wider project team. It was held as a trial run to review the process and criteria prior to the final MCA workshop on 9 and 15 March 2011. The workshop was also held ahead of any detailed costing information being available.

b. Final MCA Workshop: 9 & 15 March 2011

The final MCA workshop was held over two days in March 2011, with specialist assessors grading the various criteria, and providing comments to support the scores supplied. The wider project team challenged the assessments and a management review was held following the MCA.

c. MCA Review

Following each of the two final MCA workshop days, the outcomes of the MCA were reviewed by the Alliance Management Team (AMT)⁹¹ on behalf of the NZTA. The purpose of this review was to:

- Confirm or amend assessment scores derived from the MCA workshop;
- Sensitivity test the assessment to ensure that issues were not over or under-rated;
- Discuss the qualitative merits of each option; and
- Select options along the alignment for recommendation to the Project Alliance Board (PAB).

Following this review the AMT confirmed the final scores. In a few cases, these deviated from the scores derived from the workshop; however, this did not alter the overall outcomes.

The AMT met on 12 April 2011, at which time the northern connection recommendation was reviewed in light of further costing information. At this meeting the Smithfield Road alignment option was also considered and confirmed as the recommended option by the team.

The conclusions and recommendations derived from this review were subsequently supplied to the PAB⁹² for consideration and confirmation on behalf of the NZTA.

⁹¹ The AMT comprised the following members: Jim Bentley, Alliance Project Manager (Synergine); Graham Spargo, Approvals Manager (Beca); Tamsin Evans, Local Co-ordination Manager (KCDC); Noel Nancekivell, Design Manager (Beca); Bruce Little, Commercial Manager (Fletchers); Andrew Quinn, Co-ordination Manager (NZTA); Stephen Wright, Construction Manager (Fletchers); Robert Schofield, Consents & RMA Manager (Boffa Miskell); Jane Black, Consultation Manager (Incite); Geoff Brown, Structural Manager (Beca); and Richard Muggleston, Cost & Risk Manager (Fletchers)

⁹² The PAB comprised the following members: Colin Crompton (NZTA); Neil Walker (NZTA); Graham Darlow (Fletchers); Roly Frost (Beca); and Pat Dougherty (KCDC)

9.6.4.4 Options phase: assessment results

The final MCA scores resulting from the AMT review are outlined in Table 9.12 and, for presentation purposes, have been aggregated under the seven MCA outcomes. A detailed breakdown is included in Appendix H of the *M2PP Options Report* (2011).

Table 9.12: MCA Scores Resulting from the AMT Review

Outcome	Option											
	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B
Movement	0.6	0.6	2.2	2.2	2.4	2.0	2.2	2.2	2.4	2.4	1.0	1.8
Built Environment	-0.3	-0.7	-2.7	-1.3	-0.7	-1.3	-1.0	-1.7	-1.7	-1.7	-0.7	-1.0
Cultural/Heritage	-0.3	-0.3	-1.7	-1.0	-1.0	-1.0	-1.3	-1.3	-2.0	-2.0	-1.0	-1.0
Natural Environment	0	0	-2.5	-1.5	-0.8	-1.5	-0.5	-1.3	-1.8	-1.0	-0.5	-1.0
Social/Community	0	0	-1.0	-1.8	-1.0	-1.3	-0.8	-1.0	-1.5	-1.8	-0.3	-0.3
Economic ⁹³	0	0	0	0	0	0	0	0	0	0	0	0
Implementation Timeframe	-1.5	-2	-2.0	-2.0	-1.0	-1.5	0	-1.0	-3.0	-2.0	-0.5	-0.5
Total Score	-1.6	-2.4	-7.6	-5.4	-2.0	-4.6	-1.4	-4.1	-7.5	-6.0	-1.9	-2.0

During the AMT review a change was made to the measures relating to the Cultural/Heritage outcome, with known and unknown archaeology combined into a single measure. While the management team acknowledged that it was helpful to separate out these two measures, it considered that scoring them separately resulted in the archaeology score being 'double counted'.

An overview of the AMT decisions relating to the options is as follows:⁹⁴

a. Raumati Straight, Options 1A and 1B⁹⁵

The AMT confirmed the MCA workshop result and recommended the 4m median option (Option 1A) as the preferred option along Raumati Straight. The AMT also adjusted the score relating to the impact on public areas/parks/recreation areas to recognise the importance of minimising the impact on Queen Elizabeth Park.

b. Southern Connection, Options 2A and 2B

The AMT recommended Option 2B (200 Main Road) over Option 2A (through Queen Elizabeth Park) as their preferred option for the southern connection. In making this recommendation, the AMT recognised that there were a significant number of measures that attracted the maximum negative score

⁹³ This outcome was considered during the MCA process but as there was no differentiation between options a nil value was applied to all the options

⁹⁴ Further detail is contained in Appendix H of the *M2PP Options Report* (2011)

⁹⁵ Refer to footnote 17

for Option 2A, compared with only one for Option 2B (displacement). However, they considered that, while individually these measures were not as significant as the property effects of Option 2B, collectively they were more significant than the property impacts associated with this option.

c. Kāpiti Road Interchange, Options 3A and 3B

The team concurred with the MCA workshop result that Option 3A (proposed Expressway over Kāpiti Road) was the preferred option, subject to the acceptability of the final bridge design. In making this recommendation it noted that although the bridge design was an important factor to be considered, the outcome of the design process was unlikely to result in a revised score sufficient to reverse this decision.

d. Otaihanga Road Crossing, Options 4A and 4B

The AMT challenged the MCA workshop assessment on the visual impact of having the proposed Expressway cross over Otaihanga Road. However, it concluded that, regardless of the potential adverse visual impact of the proposed Expressway over Otaihanga Road (Option 4A), the balance of the other assessment measures favoured having the proposed Expressway cross over Otaihanga Road (Option 4A) and confirmed this option as the preferred option.

e. Waikanae River to Te Moana Road, Options 5A and 5B

The MCA workshop assessment of the western option (5A) resulted in a lower score than the eastern option (5B): i.e., -7.5 compared with -6.0. However, the AMT concluded that the significant heritage and social impacts associated with the eastern option outweighed the cumulative cultural, archaeological and ecological impacts of the western option. In reaching this conclusion the team acknowledged that both options traversed an area that was significant to iwi but, on balance, considered that the western option was preferable given the more significant effects that the eastern option would have on the heritage and social values of this residential neighbourhood. The western option also offered greater opportunities to mitigate the effects of the proposed Expressway on the ecology of the area and on the residential character.

f. Northern Connection, Options 6A and 6B

The MCA workshop assessment resulted in little difference in the overall score between Options 6A and 6B. The team adjusted some of the MCA scores as part of their review of these options; however, this did not result in a significant alteration to their overall scores. Qualitative factors considered by the team included safety, visual impacts and provision for future development in the area. Based on this consideration, and associated cost estimates for each of the options, the team confirmed Option 6A (Hadfield Road at grade rail crossing) as the preferred option.

9.7 Identification of a preferred alignment

Following consideration of the proposed options recommended by the AMT, the Project Alliance and NZTA Boards confirmed the following as the preferred alignment for the proposed Expressway in April 2011:

- Raumati Straight: Option 1A, Four metre wide median⁹⁶;
- Southern Connection: Option 2B, Connection through 200 Main Road;
- Kāpiti Road Interchange: Option 3A, Kāpiti Road under proposed Expressway;
- Otaihanga Road: Option 4A, proposed Expressway over Otaihanga Road;
- Waikanae Road to Te Moana Road: Option 5A, Western option; and
- Northern Connection: Option 6A, at grade rail crossing retained at Hadfield Road, local connection over proposed Expressway, at grade roundabouts at Peka Peka Road and on the east side of the proposed Expressway south of the overbridge.

In addition, it confirmed the following options for overbridges and underbridges at other locations along the route:

- Raumati Road: proposed Expressway over;
- Ihakara Street extension: proposed Expressway over;
- Mazengarb Road: proposed Expressway over, Mazengarb Road lowered;
- Te Moana Road: proposed Expressway over;
- Ngarara Road: Ngarara Road over;
- Smithfield Road: proposed Expressway over, Smithfield Road realigned.

A summary of the preferred alignment options is illustrated in Figure 9.4.

⁹⁶ Refer to footnote 17

9.8.1 Contaminants discharge

Section 105 of the RMA requires decision makers, amongst other matters, to have regard to “any possible alternative methods of discharge, including discharge into any other receiving environment”.

A number of potential options were identified to manage and treat contaminant discharges associated with the Project, and their viability assessed against such factors as:

- Topology and land gradients;
- Minimising the need for land take beyond the Project designation;
- Sustainability and ongoing maintenance costs; and
- Ability to integrate with landscape and ecological mitigation solutions.

A detailed description regarding the consideration and assessment of methodologies and alternatives to mitigate the discharge of contaminants is included in Technical Reports 13, 14, 21, 22, 23 and 26 of Volume 3 of the AEE.

9.8.2 Existing traffic safety and movements

Much of the proposed Expressway route is to be constructed off line from existing roads, and so will have few effects on existing traffic and pedestrians apart from access for plant and materials (refer to Technical Report 33, Volume 3 of the AEE). However, as the alignment crosses a number of local roads there will be some construction impacts on local traffic movement.

In locations where the proposed Expressway passes over a local road, the impact on road users and the extent and cost of relocating services could be reduced through constructing bridge abutments outside local road footprints and erecting bridge beams during times where there is minimal traffic flow.

In contrast, the impact on existing traffic movement and the scope of work required to relocate or protect services is likely to increase in locations where local roads are to be re-constructed over the proposed Expressway. In such circumstances, construction of the bridge structures and approaches will either occur adjacent to an existing local road or the local road will be temporarily diverted.

A key element of the works’ programming is isolation of construction and public traffic during the early phase of bridge construction in order to allow movement of earthworks material and plant along the proposed Expressway route rather than on local roads. Once constructed, it is anticipated that heavy construction traffic will utilise these structures to move along the length of the route, and thereby avoid or reduce the need to use local roads.

9.8.3 Noise

An assessment of noise mitigation options was undertaken for each sector of the preferred alignment. The assessment process applied was in accordance with *New Zealand Standard 6808:2010 - Acoustics (Road-traffic noise) - New and Altered Roads*, and involved a comparison of the options against a ‘do

minimum⁹⁷ scenario to identify the BPO for noise mitigation. Details of this process are outlined in Technical Report 15 of Volume 3 of the AEE.

To determine the BPO for each sector a range of noise mitigation options were assessed by the project team at a workshop on 12 July 2011 against a set of standardised criteria. These included:

- The potential impact of the options on the community, including noise effects, visual integration and coherence, safety and security, and the effect on heritage or cultural values;
- The potential impact of the options on the physical environment, including the surrounding landscape, wetlands and habitats; and
- The impact of the options on the safe operation of the proposed Expressway, constructability and technical feasibility and the value for money delivered.

Prior to the workshop the identified mitigation options were circulated to relevant project team members and individual assessment matrices for each sector completed. Discussion during the workshop helped to inform further refinements to the pre-circulated options and, based on the outcome of the workshop and the completed matrices, a BPO was derived for identified areas within each sector (refer to Technical Reports 15 and 16, Volume 3 of the AEE).

⁹⁷ Includes all permitted development and planned consented upgrades in the project area