

New Zealand Transport Agency

Petone to Grenada Project

Strategic Options Assessment Workshop Report

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Quality Information

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			Name/Position	Signature
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Appendix A: Assessment Spreadsheet

Appendix B: Strategic Level Cost Estimates

1. Introduction

The New Zealand Transport Agency (hereinafter referred to as the Transport Agency) is in the process of developing a preferred option for a new transportation link road between State Highway 1 (SH1) north of Ngauranga and State Highway 2 in the lower Hutt Valley. This Project now known as Petone and Grenada (P2G) results from a number of strategic planning processes that have indicated for a variety of reasons that there is a need to address severe congestion and resilience issues on the State Highway network as well as improving connectivity between the lower Hutt Valley and Porirua. These previous strategic processes have been outlined in the report entitled “Chronology of Reports and Decision Making June 2015”¹.

Previous studies identified a range of possible alignment options with the two most recent, (namely the Ngauranga Triangle Study and the Hutt Corridor Plan as part of the Regional Land Transport Plan), both containing a preference for a link road with:

- an eastern connection to SH2 at Petone; and
- a western connection to SH1 being at either Grenada or at Tawa or linking to both.

The Transport Agency subsequently carried out more detailed route development in respect of a Petone to Grenada and/or Tawa link road. As part of this process a Scoping Report was released in 2014 setting out an analysis of sub-options. The Transport Agency then engaged in consultation seeking the views of the community in respect of the sub-options assessed in the Scoping Report.

1.1 Report Purpose

Following the release of the Scoping Report and the round of consultation that followed, the Transport Agency decided to carry out a high level review and analysis of the main broad route options considered in the historical reports and processes identified in the Chronology of Reports and Decision Making that covers various studies and decision making processes from 1975 to the present.

The intention was to consider whether the decisions made through the Ngauranga Triangle Study and the Hutt Corridor Plan (and following previous studies) to prefer a Petone to Grenada and/or Tawa link remains appropriate in light of current circumstances, and what the Transport Agency is now seeking to achieve by pursuing the new east – west link. It should be stressed that capacity improvements north of Tawa were not included in the strategic assessment of options considered but are to be subject to a separate and more detailed Multi Criteria Analysis process.

In order to do so, the Transport Agency Project Team compiled a list of broad route options that have been previously considered. A comparative assessment of those options against the current Project Objectives was then carried out in a workshop setting.

This report summarises that process and the conclusions (including in respect of the scoring system adopted) that the Project Team reached.

The next step will be for the Transport Agency to select broad route options for more detailed comparative assessment. It is envisaged that this next step will include various sub-options, reflecting refinements in each broad route in order to maximise benefits and avoid, remedy or mitigate adverse impacts.

¹ Prepared for the Transport Agency by Incite.

2. Options

In considering the options the Project team was aware that a number of these options had only been investigated conceptually. However the broad alignments have been shown in previous reports so there was, at a high level, sufficient information to make informed assessments.

2.1 Assumptions

In all cases the Project team also assumed that the following committed projects would be in place and these would be part of the do-minimum:

- Committed passenger transport improvements and the key network priorities included in Figure 49 of the Regional Land Transport Plan 2015 (RLTP)². These include improving the rail fleet and implementing real time information systems.
- Committed roading projects in the Wellington region, including the Ngauranga to Aotea Quay project, SH2/58 grade separation, SH58 safety improvements and Transmission Gully.
- Committed improvements to walking and cycling as outlined in the RLTP. The Project team were of the view that this should include the Hutt Valley to Wellington Cycling Link; acknowledging that funding has not been committed at this time; and
- The ongoing development and implementation of various committed travel demand management programmes such as improvements to active and safe school travel, workplace travel planning, travel; awareness activities, optimisation of the use of existing network, and other policy initiatives that promote integrated land use and transport planning.

This process did not consider the merits or otherwise of options for wider network of capacity improvements; for example, north of Tawa which may include motorway widening or an additional link through the Takapu Valley to Transmission Gully. Wider network improvements for north of Tawa options, (including a do nothing or wait and see option), will be considered through a more refined and detailed Multi Criteria Analysis (MCA) process, depending on the overall route option selected.

In relation to other non-committed improvements such as at existing SH2 connections, capacity improvements or safety projects none have been considered as part of the do-minimum. However the relevant connections have been included in the strategic level costings for the relevant option as all options have assumed that there would be a grade separated interchange at their respective SH2 meeting point.

The options below have therefore been identified to address the defined strategic east west linkage issue between the lower Hutt Valley and the Ngauranga to Porirua communities rather than on wider network considerations.

2.2 Assessed Options

Option 1: Do Minimum: This option does not provide an east west link but includes all relevant committed projects in the National Land Transport Programme. In terms of State Highway improvements these are:

- Transmission Gully now under construction;
- SH1 Ngauranga to Aotea now under construction;

² <http://www.gw.govt.nz/assets/Transport/Regional-transport/Wgtn-RLTP-2015.pdf> p146 & 147

- SH2/SH58 Grade Separation where funding has been committed; and
- SH58 Safety Improvements where funding has been committed.

Option 2: Horokiwi to Grenada: This option proposes a grade separation of SH2 at Horokiwi including a coastal reclamation and a grade separated interchange with the alignment then heading up the Horokiwi Stream valley to the crest before descending towards SH1 at Westchester Drive (Grenada). This was first identified in the Hutt Valley – Porirua Link Initial Appraisals of Possible Links.³

Option 3: Petone to Grenada: This option includes a grade separation of SH2 at Petone with the link road rising from sea level up to the crest then through Lincolnshire Farm towards Grenada at the Westchester Drive Interchange. This option has been the subject of many of the previous related studies with the first being the 1975 Wellington Region Land Use and Transport Study with more detail being investigated in the SH1 Inland Route Review of Southern Section Report 2 – Petone to Grenada North Link.⁴

Option 4: Petone to Tawa: This follows the same alignment as Option 3 but instead of linking to Westchester Drive at Grenada it links to the SH1 Takapu Road interchange at Tawa. The 1991 SH1 Inland Route Review of Southern Section Report 2 – Petone to Grenada North Link also identified this alignment as an option.

Option 5 Dowse to Grenada: This option has the SH2 interchange at the current Dowse Interchange with the alignment then passing through either the Western Hill suburb of Maungaraki or Percy's Reserve and through the Belmont Regional Park to the crest before moving through to the Westchester Drive interchange at Grenada. This option was raised and considered in the Hutt and Western Corridor Plan investigations in 2003 and 2006 as it provided more direct access to the alignment of the possible Cross Valley Link to Seaview/ Gracefield. The Cross Valley Link is included in the RLTP as a non-prioritised activity. As a non-committed activity, the project concept provides context but is not directly considered in the do minimum assumptions for this assessment.

Option 6 Dowse to Tawa: A sub alternative is also available to have the SH1 connection at the Takapu Road or Tawa interchange with the SH2 interchange and alignment to the crest being the same as Option 5. This was similarly part of the Hutt and Western Corridor Plan considerations.

Option 7 Melling to Transmission Gully: The SH2 interchange for this option is at Melling with the alignment then moving between the Western Hills Suburbs of Harbour View and Tirohanga, through the Belmont Regional Park then linking to the Transmission Gully alignment south of Cannons Creek. This option was first considered in the Hutt Valley – Porirua Link Initial Appraisal of Possible Links.⁵ Even though the option relied on a connection to Transmission Gully at Cannons Creek (see Option 9 below) the Project team assessed the option as it provided an analysis of a SH2 connection point at Melling.

Option 8 Belmont at Kennedy Good Bridge to Transmission Gully at James Cook Drive: This option assumes grade separation of SH2 at Kennedy Good Bridge then proceeds northwards between the suburbs of Kelson and Belmont presumably along the Speedy's Stream valley through Belmont Regional Park up to the crest before linking to the James Cook Drive Interchange being constructed as part of the Transmission Gully Project. As with Option 7 this option was included in the Hutt Valley – Porirua Link Initial Appraisal of Possible Links.

³ Works Consultancy Services 1996

⁴ Works Consultancy Services 1991

⁵ Works Consultancy Services 1996

Option 9 Belmont at Kennedy Good Bridge to Transmission Gully at Cannons Creek then through eastern Porirua to link with SH1 at Whitford Brown Avenue: At the SH2 end this option is the same as Option 8 but the alignment veers westward through the Regional Park to connect with Transmission Gully at Cannons Creek. The alignment then travels through eastern Porirua to Ascot Park to link in with Whitford Brown Avenue. . As with Options 7 & 8 this option was included in the Hutt Valley – Porirua Link Initial Appraisal of Possible Links.

This option (as well as the Melling option) relied on what was known as the Warspite Avenue connection to Transmission Gully that was previously designated but now no longer forms part of the Transmission Gully Project. The primary designated and consented connection is to James Cook Drive which services both Waitangirua and Whitby. In addition previous designations for connections through eastern Porirua to Whitford Brown were uplifted in the intervening time since the production of the report. For these reasons the Project team considered that the option should not be assessed further as the context for the option has changed.

Option 10 SH58 Upgrade: This option assumes that SH58 is upgraded to four lanes from the Transmission Gully connection to SH2 at Haywards. This option was investigated in detail in 1999 -2000 but only safety related improvements were designated and progressed⁶.

Option 11 Petone to Transmission Gully

This option was not originally assessed at the workshop but was identified after the workshop was completed when reviewing previous documents. It was contained in an earlier technical report relating to the Petone to Grenada Link as part of the SH1 Inland Route Review of Southern Section⁷. That report recognised the challenges of a route that went up the Korokoro Stream Valley to Transmission Gully along a stream valley and was an option never assessed again presumably as the option has a probable environmental fatal flaw.

It should be noted that the Scoping Report⁸ identifies variants to the Petone – Grenada / Tawa options that would provide for an additional link to TG through the Takapu Valley, rather than via a direct route through the Korokoro Stream Valley. This will allow the Transport Agency through the detailed MCA process to assess an option that links Petone through to TG (as well as to Grenada / Tawa) while avoiding the potentially fatal environmental effects of the route up the Korokoro Stream Valley.

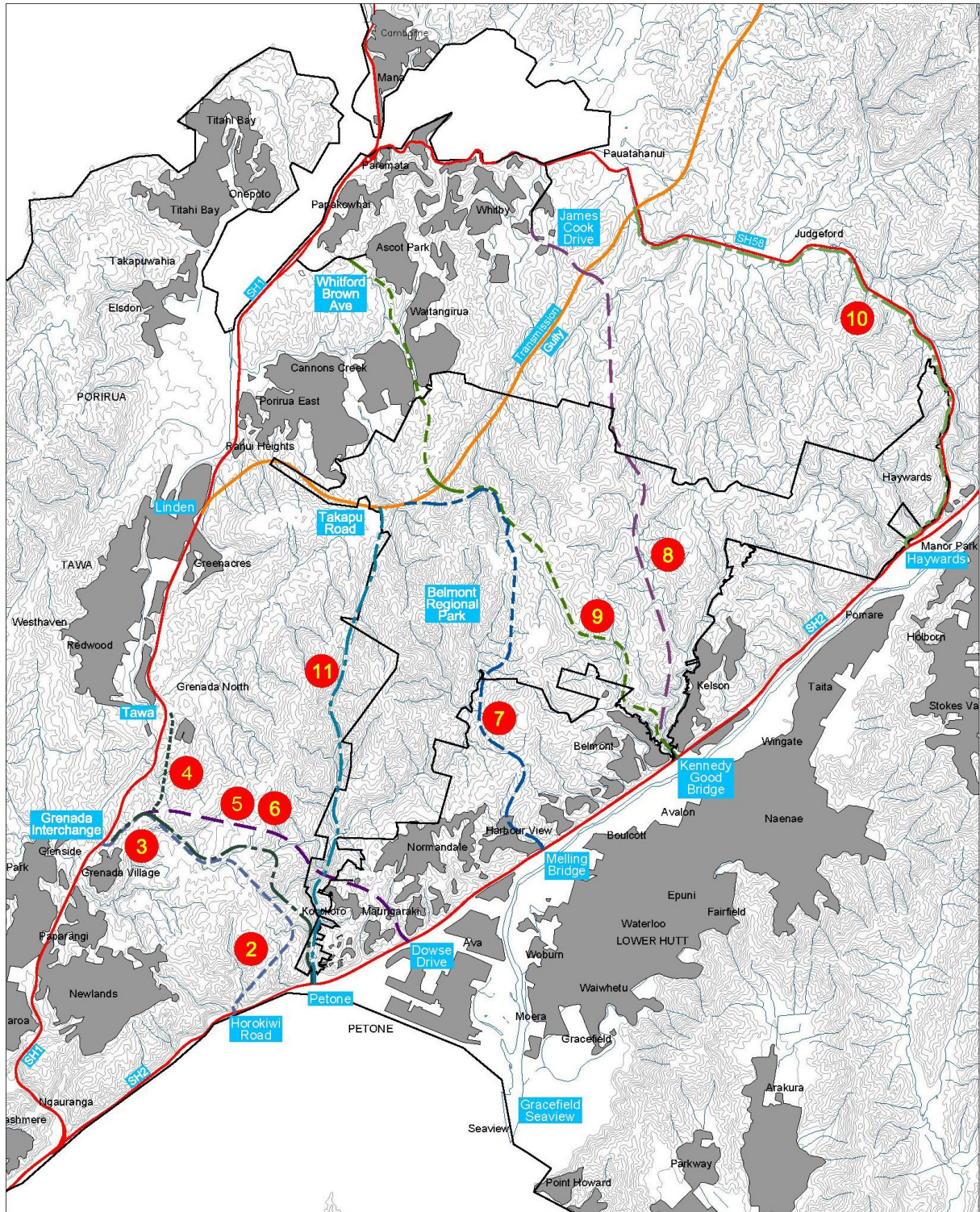
This option is shown on the Plan below but it was agreed that it should not be assessed further as the interchange at Warspite Avenue no longer exists in the plans for Transmission Gully and the option appears to reclaim much of the Korokoro Stream Valley.

These options are shown graphically on the following map.

⁶ Meritec Ltd SH58 (Haywards Hill) Safety Improvements Assessment of Environmental Effects November 2000.

⁷ Works Consultancy Services August 1991.

⁸ Opus 2014 Petone to Grenada Scoping Report



LEGEND

- | | | | |
|---|----------------------------|----|-----------------------------------|
| 2 | --- Horokiwi to Grenada IC | 7 | --- Melling to TG(Cannons Ck) |
| 3 | --- Petone to Grenada IC | 8 | --- KGB to TG (James Cook Dr) |
| 4 | --- Petone to Tawa | 9 | --- KGB to TG (Cannons Ck) |
| 5 | --- Dowse to Grenada IC | 10 | --- SH58 Upgrade (Haywards to TG) |
| 6 | --- Dowse to Tawa | 11 | --- Petone to TG (Takapu Rd) |

Figure 1: Study Area and Strategic Options

3. Other Alternatives Considered but not Assessed

Prior to the assessment the Project team discussed whether there were other feasible options that should be assessed.

These included two tunnelling options, a road tunnel link and a rail tunnel both of which it was assumed would directly link Petone and Grenada Village, and a public transport improvements only option. It was agreed that these were not feasible and were discounted for the following reasons.

It was noted that a road tunnel option was examined briefly at an early stage of the Scoping Options Stage project investigations. In short the cost would be in the range of \$1.2 – 2.5 billion as opposed to \$250m for a surface road, so historically it was never developed further since it would not offer value for money.

In addition other factors were taken into account including the fact that there could be no connectivity at the Mark Avenue interchange east of Grenada Village with a tunnelled link because of the depth of the tunnel below the surface at that point, therefore losing many of the project benefits of regional economic growth and connectivity in this location.

In respect of a possible rail tunnel link in addition to the same high project costs encountered with a road tunnel, the severe gradients were not amenable to a traditional rail option.

The project team also considered that an option of increasing passenger transport supply on its own (a public transport only option) would not be worthwhile assessing as it would not meet the Transport Agency's objectives for a Petone to Grenada Link Road. In particular a public transport only option does not provide a new link enhancing connectivity, does not provide for the enhanced movement of freight and therefore does not on its own support regional economic growth.

Finally the project team discounted other options beyond connecting to SH1 or SH2 at the existing connection points for example between Petone and Dowse and between Dowse and Melling. At the very least these would be problematic to add further SH2 interchanges for safety reasons let alone the need to provide for connections to the existing local arterial network.

4. Project Objectives

The following are the Project Objectives for the Petone to Grenada Project. These were formulated by the Project Team and endorsed by the Transport Agency's Regional Management Team in April 2015 as being appropriate as the requiring authority's objectives for the purpose of the RMA. These are:-

- *To enhance local, regional and national economic growth and productivity for people and freight;*
- *To improve connectivity between the lower Hutt Valley and Johnsonville and Porirua;*
- *To reduce journey times and improve journey time reliability between the lower Hutt Valley, Ngauranga and Porirua, and on the Wellington state highway network;*
- *To enhance safety of travel on the Wellington state highway network;*
- *To enhance resilience of the Wellington state highway network; and*
- *To manage the immediate and long term social, cultural, land use and other environmental impacts of the Project on the Wellington region and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, expressway design and conditions;*

- *By developing and constructing a cost efficient new road alignment to expressway standards between SH2 in the lower Hutt Valley and SH1 north of Ngauranga.*

These have been used as the assessment criteria for the strategic level assessment of options identified in previous reports.

5. Outline of Objectives

- **To enhance local, regional and national economic growth and productivity for people and freight;**

This objective includes wider economic benefits. It does not relate specifically to the local area, because the Project has wider economic benefits to the region and the nation. The focus is on productivity both for people and freight.

- **To improve connectivity between the lower Hutt Valley and Johnsonville and Porirua;**

This objective stresses connectivity which is a particular purpose of the Project since it is a new rather than improved link. The connectivity objective focusses on the area served, i.e. the commercial activities and residential populations of the lower Hutt Valley, the key employment and industrial location of Seaview/Gracefield plus the suburbs accessed off SH1 between Johnsonville and Porirua. The SH network is specifically not mentioned in this objective, since connectivity benefits are to areas and communities, not roads.

- **To reduce journey times and improve journey time reliability between the lower Hutt Valley, Ngauranga and Porirua, and on the Wellington State Highway network;**

The focus of this objective is on journey time improvements and journey time reliability in the Ngauranga Triangle Area as described by the phrase “lower Hutt Valley, Ngauranga and Porirua”. This describes journeys between the Lower Hutt/Petone area to Ngauranga, and on the SH1 corridor between Ngauranga and the Porirua area, as well as direct journeys between the lower Hutt Valley and the Wellington northern suburbs to Porirua area.

- **To enhance safety of travel on the Wellington state highway network;**

This objective has a specific focus on safety in line with Government Policy Statement on Land Transport goals.

- **To enhance resilience of the Wellington State Highway network; and**

This objective recognises that the Wellington State Highway Network will be the main beneficiary of the resilience improvements associated with the Project. Other regional resilience benefits (e.g. potential to use the fill from P2G to strengthen the coastal edge on SH2 and improve multi modal rail resilience) may be delivered but are not the specific focus of the project. Resilience means that a route or alignment provides overall benefits to the region by providing an alternative to the existing state highway network in the case of seismic or weather related events. This objective also takes into account how quickly the network can be returned to full service in the event of major crash incidents.

- **To manage the immediate and long term social, cultural, land use and other environmental impacts of the Project on the Wellington region and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, expressway design and conditions;**

This objective seeks to ensure that the adverse effects of the project that would be considered under the RMA are minimised as far as practicable. Assessment of each option under this objective took into account, at a high level and based on the knowledge and experience of the Project team, the extent to which each option would be consentable under the RMA. It should be noted that this is a very broad and multifaceted objective and should an option go forward this would be subject to detailed assessment against relevant RMA considerations.

By developing and constructing a cost efficient new road alignment to expressway standards between SH2 in the lower Hutt Valley and SH1 north of Ngauranga.

This is more a method of achieving the other objectives than a standalone objective per se. Nevertheless it was used as a criterion in the process as it allows each option to be comparatively assessed in terms of cost effectiveness and affordability.

6. Assessment Methodology

The Project Team was provided with the methodology prior to the workshop. After some discussion and debate largely focused on whether the western (SH1) and eastern (SH2) connection points should be assessed separately it was agreed that analysing the alignments against the Project Objectives was the most appropriate way of defining what the differentiation between the options was.

The assessment workshop took place over two sessions on Wednesday 22 April and on Thursday 30 April.

6.1 Participants:

- Josephine Draper - NZTA Project Manager
- Stewart McKenzie - NZTA Principal Planner
- Nick Sargent – Greater Wellington Regional Council Team Leader Data & Analysis
- Ben Holland – Opus Acting Consultant Team Leader
- Nick Aiken – Opus Principal Planner
- Leonard Wiles - Opus Deputy Team Leader and Design Manager
- Lindsay Daysh – Incite Strategic Planning Adviser and member of NZTA's Planning Reference Group

Also in attendance was David Randal from the Transport Agency's legal advisers Buddle Findlay in an observer capacity.

6.2 Scoring

Based upon the knowledge of the network and the geography of the project area the team collectively considered each option and gave it a score for each relevant Project Objective. The scoring was based in terms of the impact of each option has on achieving the individual objective also taking into account the do-minimum which was assessed as the base case. This was on the basis of a 7 point scoring system i.e. how the option ranks against the relevant Project Objective.

+3 - Significant positive

+2 - Moderate positive

+1 - Minor positive

0 - Neutral or de minimus

-1 - Minor negative

-2 - Moderate negative

-3 - Significant negative

F – Fatal Flaw was also added to indicate largely on RMA grounds that an option should not proceed.

It should be noted that at the first session a 5 point scoring system was used. On reflection after that session it was agreed that a 7 point system would in this case allow identifiable, but not necessarily large, differences to be more readily reflected in the scores. The reconvened workshop then used a 7 point scoring system as it provided a greater level of differentiation. Scores were then adjusted.

6.3 Notes on Process

- There was no express weighting between the options with the aggregated score being included for raw comparative purposes only. However weighting could be applied as a sensitivity test if required. However, as discussed below, comparative scores for each objective can be isolated in order to assess which options are most desirable in respect of each objective.
- Care was taken to avoid double counting of scores. For example between the economic growth objective and the journey times savings and reliability objective; the first relates to wider economic benefits to the nation, region and locally while the second has a focus on individual journey time savings as well as reliability of traffic movement. While they are related in some respects they define two different things.

The Project Team therefore used reasoned judgement to make the assessments based on:-

- Knowledge of the transport network in the project area;
- Experience in options assessment and evaluation processes;
- Local knowledge of land use and topography;
- Knowledge of engineering constraints and opportunities; and
- Knowledge of previous reports and decisions made.

The spreadsheet that was completed at the workshop and sets out the assigned scores is included as **Appendix A**. Each cell has a comment that outlines the project team's reasons for assessing the project against the relevant Project Objective.

Upon completion of the workshop this report also went through two draft stages. More information on possible costs for each item (see Strategic Level Cost Estimates in **Appendix B**) and a small number of the scoring points adjusted to more accurately reflect additional levels of information received prior to finalisation of this report.

7. Options Assessment

Option 1 - Do minimum

This received an aggregate raw score of **-8**. The do minimum scored poorly against the wider economic objective and the reducing journey time and reliability objective with minor negative scores relating to connectivity, resilience and cost efficiency. The straightforward consensus was that doing something is better than doing the minimum in terms of the Objectives.

Option 2 – Horokiwi to Grenada

This option scored an aggregate raw score of **+8**. It scores well on reducing journey times and reliability, and moderately well on connectivity, and economic growth but less well on resilience. This is because the option relies on a short section of SH2 between Petone and Ngauranga which is vulnerable to a range of natural hazards. Because of the high sector demand between Tawa/Porirua and the lower Hutt Valley, Horokiwi represents a less direct connection to the lower Hutt Valley than Petone resulting in slightly lower economic benefits. Therefore this option did not score as well as Petone options for connectivity and economic benefits.

In addition there are significant environmental effects from a large harbour reclamation, the potential very significant visual adverse effects of a prominent grade separated interchange in a coastal location and potential effects on the residential population at Horokiwi. While the team was reluctant to give the option a fatal flaw score against the environmental objective there are significant adverse environmental effects associated with this option.

Option 3 – Petone to Grenada

This option received an aggregate raw score of **+13**. As with Option 2 it scores well on journey times and reliability but also significantly positive on economic growth, connectivity and cost efficiency. A moderate negative is given to environmental effects recognising the scale of any option but this option does avoid the Western Hills communities and Belmont Regional Park. There is also more detailed knowledge of the range of effects of the Petone alignments from the previous studies carried out. This option as well as the Dowse and Horokiwi options recognises the significant impact on the Cornish Street Industrial Area. However the option has significant economic, connectivity, and cost efficiency benefits associated with the creation of the Link Road itself which in the view of the Project Team can ameliorate this adverse impact.

Option 4 – Petone to Tawa

As with Option 3 this option also scored **+13** as a raw aggregate. At the strategic level the Project team could not identify any differences from Option 3 and the above comments on that option apply equally to Option 4. It was noted that a more detailed MCA process would assist in defining the differences between Option 3 and Option 4.

Option 5 – Dowse to Grenada

Like the Petone options this scores well on connectivity, reduction in journey times and resilience. It scores less well for economic growth due to its connection at Dowse, rather than at Petone, as transportation modelling found that even with a cross valley link option an interchange at Petone is desirable. However the option was given a **Fatal Flaw** ranking for the social and environmental objective. This is due to the

likely significant impacts on part of the Western Hills residential area, upon the Korokoro Stream and the Belmont Regional Park in this location.

Option 6 - Dowse to Tawa

The option has the same **Fatal Flaw** as Dowse to Grenada and in terms of all other objectives the scoring is the same as Option 5.

Option 7 - Melling to Transmission Gully

This option received an aggregate raw score of **+6**. It scores moderately well on economic growth, reducing journey times and resilience but the likely significant adverse effects on Harbour View and Tirohanga as well as the Belmont Regional Park means that a significant negative score is given beside the environmental objective.

Option 8 - Belmont at Kennedy Good Bridge to Transmission Gully at James Cook Drive

This option was scored as **+3** as a raw aggregate. It achieves minor positives for most assessment criteria but a significant negative against the social and environmental objective. As is common with all the SH2 connection points with the exception of Petone and Horokiwi the existence of established residential areas and the Belmont Regional Park including Speedy's Reserve make achieving the social and environmental objective at the least very challenging. As the SH2 connection point is further north than other options it does not score as highly as more southerly options particularly for accessing the key industrial areas of Gracefield/ Seaview. A further key point for this option is that it is quite long and represents a significant footprint to be mitigated against and maintained. By the very nature of its length and the terrain, it is also more vulnerable to slips and failures relative to some shorter options.

Option 9 - Belmont at Kennedy Good Bridge to Transmission Gully at Cannons Creek then through eastern Porirua to link with SH1 at Whitford Brown Avenue

As stated this option was not scored as it is now no longer an option realistically available to the NZTA. The original Transmission Gully designation had a link to Warspite Avenue but that was removed in favour of both a James Cook and Waitangirua Link as part of the approved Transmission Gully project now under construction.

Option 10 – SH58 Upgrade

This option received an aggregate raw score of **+1**. The option has neutral or de minimus effects on economic growth, connectivity, journey times and reliability and resilience. This is because it doesn't enable significant economic growth in Porirua or the Lower Hutt Valley and it doesn't provide a new connection. Journey times will be minimally better although many users would still continue to use the Ngauranga interchange. In essence SH58 is too far north to significantly benefit travel from the Johnsonville to Porirua corridor to the lower Hutt Valley.

As it is upgrading an existing route environmental effects have been only assessed as minor negative particularly as part of the route has been designated for safety related widening previously.

Option 11 – Petone to Transmission Gully

This option was not assessed for the same reasons as Option 9 in addition to the likely fatal flaw of the alignment up the Korokoro Stream Valley. As noted previously this option was not considered at the Workshop.

8. Assessments against Objectives

To enhance local, regional and national economic growth and productivity for people and freight;

Apart from the do minimum option the Petone and Dowse options, (with the Petone options better than Dowse due to direct linkages to the Seaview/Gracefield industrial area), have been assessed as better than the Horokiwi and Melling options which in turn are better than the Kennedy Good Bridge or SH58 options. This is because the wider economic benefits diminish with distance of the link from the southern part of the lower Hutt Valley, and in particular the Seaview and Gracefield industrial / employment centres. Similarly, economic benefits also diminish with increased distance to Porirua.

To improve connectivity between the lower Hutt Valley and Johnsonville and Porirua;

As with economic growth the southern options that connect on SH2 are assessed as being better than the northern options when considering connectivity alone. If there is a trip from Porirua to Seaview connectivity benefits reduce with distance from the desire line although any of the options except the SH58 Upgrade or the Do Minimum provide positive connectivity.

To reduce journey times and improve journey time reliability between the lower Hutt Valley, Ngauranga and Porirua, and on the Wellington State Highway network;

Journey time is a function of a closeness to the majority desire line with the reliability criteria being a function of the amount of time that would need to be spent on the existing congested network under each option. As with economic growth and connectivity improvements in travel times and journey time reliability between the lower Hutt Valley and the SH1 corridor between Ngauranga and Porirua are assessed as being better for the Horokiwi, Petone and Dowse options with the journey times and journey reliability benefits reducing the further the link is from the southern Hutt Valley in particular, and settlements along SH1 particularly Porirua.

To enhance safety of travel on the Wellington State Highway network;

The Project team noted that all routes would be built to modern design standards and hence will be safe. The assessments record how the options enhance the existing network at Horokiwi interchange, Petone interchange and the curves on SH1 immediately north of the Tawa Interchange. The project team assessed all options excluding the do minimum as having positive safety benefits. The Horokiwi connection option has the additional advantage of replacing the Horokiwi left in and left out intersection but the safety benefits of this alone are not enough to improve its assigned safety score. In contrast, the Dowse options do not necessitate replacement of the Petone Interchange which is considered an ongoing safety risk and therefore did not score as well as the Petone options for this objective.

To enhance resilience of the Wellington State Highway network;

All options that provide a new route provide resilience benefits. The Petone options are moderately positive due to the existence of the fault lines while Melling and Kennedy Good Bridges options are not as positive as Dowse options due to the proximity to the Hutt River. Additionally the Horokiwi to Grenada option still relies on a short section of SH2 option so has further reduced resilience benefits as a result.

To manage the immediate and long term social, cultural, land use and other environmental impacts of the Project on the Wellington region and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, expressway design and conditions;

In the view of the assessment team the Dowse options are fatally flawed due to the need to traverse through established Maungaraki Residential Area as well as proximity to the Korokoro Stream within the Belmont Regional Park. The Horokiwi, Melling and Kennedy Good Bridge options all have similar issues due to a combination of established residential areas, the Belmont Regional Park and the terrain required to get from the valley floor to the crest of the hill. The Project Team were reluctant to score these options as a fatal flaw due to the lack of the recent assessment of these alignments but each are scored -3 as a significant adverse effect. The effects of the Petone options are considered to be able to be remedied and mitigated as opposed to other options which have not had the benefit of the more detailed considerations and methods of mitigation. This is the part of the reason which contributes to the better score assigned.

It should be noted that in respect of any chosen alignment the NZTA would seek to minimise environmental effects to the greatest extent possible. However this is a very broad objective and should an option go forward there would need to be a more detailed assessment of the precise scope and effects of each alignment option.

By developing and constructing a cost efficient new road alignment to expressway standards between SH2 in the lower Hutt Valley and SH1 north of Ngauranga.

The Do Minimum option is negative for cost efficiency. All other options have been assessed as being positive with the Petone options being the best in terms of cost efficiency, followed by Dowse and Horokiwi options with the northern options to Transmission Gully and SH58 having only minor benefits due to their remoteness from the settlements of Johnsonville and Porirua.

Upon completion of the Workshop it was agreed that there should be strategic level cost estimates produced which are attached as **Appendix B** to this report. The project team, confirm that there is nothing in the more considered strategic level cost estimates that alter the original workshop assessments for cost efficiency which remain valid.

9. Conclusion and Recommendation

The northern options that connect to Transmission Gully and the SH58 option have been able to be discounted for a number of reasons primarily in that they do not score as well on the economic, connectivity nor travel time savings objectives. It is also the view of the Project team that Dowse options can be ruled out on the basis of being fatally flawed environmentally.

Consideration was given to include the Horokiwi option going forward as based on the raw aggregate score it scores reasonably well. However the Project team consider that this should not be progressed further. The option does not provide an exclusively new route and still relies on a section of SH2 to be utilised and

this would not be as resilient as options connecting at Petone. There are also significant matters about the scale of any reclamation, the precise effects on the residential population at Horokiwi and the likely very visible nature of the interchange that would need to be located in the coastal environment.

Based upon the above high level assessment that has been carried out it is recommended that only two of the strategic alignments should be carried through for a more detailed MCA assessment. These are Petone to Grenada and Petone to Tawa. At the same time it is also recommended that options for capacity improvements including do minimum be assessed for options north of Tawa. In coming to this conclusion the Project Team took into account the fact that there has been detailed work undertaken considering how to avoid / remedy / mitigate the effects of the Petone options, but nonetheless felt that the effects of the Petone options are inherently more amenable to be avoided / remedied / mitigated through detailed route selection than the other options considered.

This assessment is also in alignment with the intent of the Hutt Corridor Plan, the Western Corridor Plan and the outcomes of the Ngauranga Triangle Study.

Appendix A

Assessment Spreadsheet

Project Objectives	Option 1 Do Minimum	Option 2 Horokiwi To Grenada	Option 3 Petone to Grenada	Option 4 Petone to Tawa	Option 5 Dowse to Grenada	Option 6 Dowse to Tawa	Option 7 Melling to Transmission Gully	Option 8 Belmont at Kennedy Good Bridge to TG at James Cook	Option 9 Belmont at Kennedy Good Bridge to TG at Cannons Creek	Option 10 SH58 Upgrade	Option 11. Petone to TG at Cannons Creek
To enhance local, regional and national economic growth and productivity for people and freight	-2 Economic growth is constrained due to deteriorating network performance, meaning the region becomes less attractive for investment	+2 enables economic growth through more efficient linkages between centres. Acknowledging that this option involves removal of part of the established industrial area at Petone.	+3 enables economic growth through an optimised linkage to Seaview. Acknowledging that this option involves removal of part of the established industrial area at Petone.	+3 enables economic growth through an optimised linkage to Seaview. Acknowledging that this option involves removal of part of the established industrial area at Petone.	+2 enables economic growth through more efficient linkages between centres.	+2 enables economic growth through more efficient linkages between centres.	+2 links centres although economic growth is limited as it doesn't provide a direct linkage to Seaview (a key freight and employment centre) and links to Porirua are less direct.	+1 links centres although economic growth is limited as it doesn't provide a direct linkage to Porirua or Seaview.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.	0 Doesn't enable economic growth in either Porirua or the Lower Hutt Valley	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.
To improve connectivity between the lower Hutt Valley and Johnsonville and Porirua;	-1 The status quo does not improve connectivity, but doesn't make it significantly worse	+2 Connection to the Lower Hutt Valley is less direct than other options.	+3 significantly improves the connection between the Lower Hutt Valley and Johnsonville and Porirua.	+3 significantly improves the connection between the Lower Hutt Valley and Johnsonville and Porirua.	+3 significantly improves the connection between the Lower Hutt Valley and Johnsonville and Porirua.	+3 significantly improves the connection between the Lower Hutt Valley and Johnsonville and Porirua.	+1 improves the connection between the Lower Hutt Valley and Porirua. Not as direct for Johnsonville to the Lower Hutt Valley.	+1 Improves connectivity however the link to Porirua is indirect.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.	0 Does not improve connectivity	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.
To reduce journey times and improve journey time reliability between the lower Hutt Valley, Ngauranga and Porirua, and on the Wellington State Highway network	-3 LOS will become unacceptable by 2031	+3 significantly improves journey times and journey time reliability between the Lower Hutt Valley and Johnsonville and Porirua. Improves journey times on the existing SH network particularly at Ngauranga.	+3 significantly improves journey times and journey time reliability between the Lower Hutt Valley and Johnsonville and Porirua. Improves journey times on the existing SH network particularly at Ngauranga.	+3 significantly improves journey times and journey time reliability between the Lower Hutt Valley and Johnsonville and Porirua. Improves journey times on the existing SH network particularly at Ngauranga.	+3 significantly improves journey times and journey time reliability between the Lower Hutt Valley and Johnsonville and Porirua. Improves journey times on the existing SH network particularly at Ngauranga.	+3 significantly improves journey times and journey time reliability between the Lower Hutt Valley and Johnsonville and Porirua. Improves journey times on the existing SH network particularly at Ngauranga.	+2 Moderately improves journey times and journey time reliability between the Lower Hutt Valley and Johnsonville and Porirua. Improves journey times on the existing SH network particularly at Ngauranga.	+1 Improves journey times from the Lower Hutt Valley to the Kapiti Coast, however doesn't resolve the reliability issues with SH2 and SH1. Links to Porirua are less direct than other options so journey time benefits are less. Discussion around whether the benefits were positive or neutral.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.	0 Marginally improves journey times from the Lower Hutt Valley to the Kapiti Coast, however doesn't resolve the reliability issues with SH2 and SH1. Discussion around whether the benefits were positive or neutral.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.
To enhance safety of travel on the Wellington state highway network	0 Increased traffic resulting in increased crashes of low severity, although committed projects will result in major safety improvements throughout the Region.	+1 Eliminates Horokiwi intersection, requires a new Petone interchange. Moves traffic from SH1 and SH2 onto a new high quality link.	+1 Requires a new Petone interchange. Moves traffic from SH1 and SH2 onto a new high quality link.	+1 Requires a new Petone interchange and partially resolves safety issues with the Tawa Curves. Moves traffic from SH1 and SH2 onto a new high quality link.	0 Moves traffic from SH1 and SH2 onto a new high quality link but doesn't resolve safety issues with the existing Petone Interchange.	0 Moves traffic from SH1 and SH2 onto a new high quality link but doesn't resolve safety issues with the existing Petone Interchange. Partially resolves safety issues with the Tawa Curves.	+1 Resolves safety issues with the existing at grade intersection at Melling. Moves some traffic from SH1 and SH2 onto a new high quality link but doesn't resolve safety issues with the existing Petone Interchange.	+1 Resolves safety issues with the existing at grade intersection at Kennedy Good Bridge. Moves some traffic from SH1 and SH2 onto a new high quality link but doesn't resolve safety issues with the existing Petone Interchange.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.	+1 Additional safety improvements on SH58 over and above the do minimum. Moves some traffic from SH1 and SH2 onto a new high quality link but doesn't resolve safety issues with the existing Petone Interchange.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.
To enhance resilience of the Wellington State Highway network	-1 Increasing reliance placed on the existing corridor. Greater susceptibility to major and minor incidents from increased population.	+1 This section is vulnerable to a range of natural hazards, particularly landslides in earthquakes. This option does not provide an alternative route to SH2 in the event SH2 is out of action. An interchange at Horokiwi is subject to more natural hazards than one at Petone.	+2 Introduces a new alternative route although is potentially susceptible to natural hazards at Petone.	+2 Introduces a new alternative route although is potentially susceptible to natural hazards at Petone.	+3 Introduces a new alternative route	+3 Introduces a new alternative route	+2 Introduces a new alternative route although is potentially susceptible to natural hazards at Melling.	+1 Introduces a new alternative route although is potentially susceptible to natural hazards at Kennedy Good Bridge. The length of the route itself means that it becomes a less resilient route since it has a longer area to be maintained.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.	0 Does not provide an alternative route. Negligible benefits on SH58 from additional lanes.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.
To manage the immediate and long term social, cultural, land use and other environmental impacts of the Project on the Wellington region and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, expressway design and conditions	0 Likely De minimis - although increased congestion may lead to minor environmental effects.	-3 Significant adverse effects associated with the extent of coastal reclamation that will be difficult to mitigate. Major visual intrusion into the CMA.	-2 Potentially significant effects however these can be remedied and mitigated.	-2 Potentially significant effects however these can be remedied and mitigated.	F Combination of major adverse effects on Maungaraki residential area, Belmont Regional Park and the Horokiwi Stream. The significance of the adverse effects and the limited options for mitigation means that it is fatally flawed.	F Combination of major adverse effects on Maungaraki residential area, Belmont Regional Park and the Horokiwi Stream. The significance of the adverse effects and the limited options for mitigation means that it is fatally flawed.	-3 Combination of major adverse effects on Harbour View residential area, Belmont Regional Park and the Horokiwi Stream.	-3 Combination of potential major adverse effects on a residential area and Belmont Regional Park. Extensive footprint.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.	-1 Minor adverse effects. A safety widening designation has been approved for part of the route.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project.
By developing and constructing a cost efficient new road alignment to expressway standards between SH2 in the lower Hutt Valley and SH1 north of Ngauranga	-1 No cost but negative benefits over time. Most likely cost from Strategic Level Cost Estimates \$0	+2 High benefits outweighing costs. Positive BCR. Most likely cost from Strategic Level Cost Estimates \$260 million.	+3 Significant benefits outweighing costs. High BCR. Most likely cost from Strategic Level Cost Estimates \$230 million.	+3 Significant benefits outweighing costs. High BCR. Most likely cost from Strategic Level Cost Estimates \$260 million.	+2 Higher construction and mitigation costs for the same or similar benefits. Most likely cost from Strategic Level Cost Estimates \$310 million.	+2 Higher construction and mitigation costs for the same or similar benefits. Most likely cost from Strategic Level Cost Estimates \$340 million.	+1 Higher construction and mitigation costs and fewer benefits. Most likely cost from Strategic Level Cost Estimates \$300 million.	+1 Higher construction and mitigation costs and fewer benefits. Most likely cost from Strategic Level Cost Estimates \$300 million.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project. Most likely cost from Strategic Level Cost Estimates \$250 million.	+1 minor positive benefits outweighing costs. Most likely cost from Strategic Level Cost Estimates \$140 million.	Not considered further as no link to Warspite Avenue has been provided as part of the TG Project. Most likely cost from Strategic Level Cost Estimates \$270 million.
Total raw Score	-8	8	13	13	F	F	6	3	Not assessed	1	Not assessed

Appendix B

Strategic Level Cost Estimates

Strategic Level Cost Estimates (SLC) – Strategic Options Report

1 Basis of Estimate

Strategic Level Cost estimates (SLCC) have been developed on a parameter cost basis to provide a cost range for each of the strategic options. The estimates are based on a relatively low level of project definition, limited site information and general information about the scope of work and type of construction. The cost range has been provided in terms of an ‘Optimistic’, ‘Most Likely’ and ‘Pessimistic’ estimate. The ‘Optimistic’ estimate has been assessed at 75% of the ‘Most Likely’ estimate and the ‘Pessimistic’ estimate at 175% of the ‘Most Likely’ estimate. This broad range reflects the relatively low level of definition of the options.

The estimates have been prepared using similar parameter costs used to develop the rough order cost estimates (ROC) for the Petone to Grenada options identified in the Petone to Grenada Transportation Link Road Scoping Report (refer Appendix D of the Scoping Report <http://www.nzta.govt.nz/projects/petone-grenada-link-road/publications.html>). The costs are based on current rates.

The reasons for using similar parameter costs for the strategic options are as follows:

- The alignments pass through similar terrain, similar land use areas and are similar in scale; and
- The alignments have similar connections to the State Highway Network (i.e. typically grade separated interchanges).

The reason for presenting estimates for the strategic options as SLC and not ROC (as provided for the P2G Scoping Report options) is because the strategic options are based on a lower level of detail than the Scoping Report options. This is reflected in the broad cost range described above.

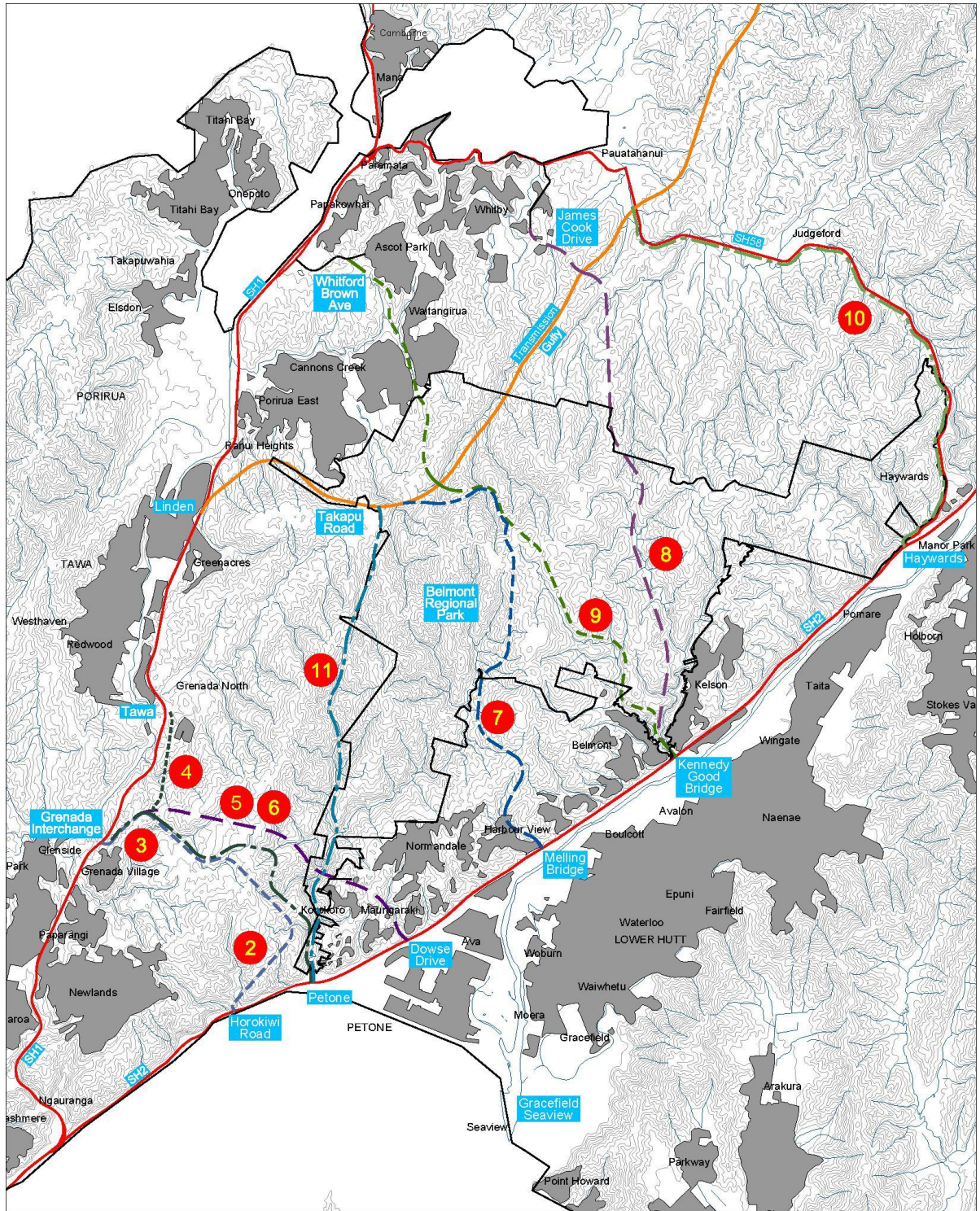
2 Assumptions

This section outlines the assumptions made to develop SLC estimates of the strategic options.

Strategic Option Features

The strategic options have been identified as single line alignments as shown on the contour map below.

Strategic Level Costs - Strategic Options Report



LEGEND

- | | |
|--|--|
| <ul style="list-style-type: none"> 2 - - - - Horokiwi to Grenada IC 3 - - - - Petone to Grenada IC 4 - - - - Petone to Tawa 5 - - - - Dowse to Grenada IC 6 - - - - Dowse to Tawa | <ul style="list-style-type: none"> 7 - - - - Melling to TG (Cannons Ck) 8 - - - - KGB to TG (James Cook Dr) 9 - - - - KGB to TG (Cannons Ck) 10 - - - - SH58 Upgrade (Haywards to TG) 11 - - - - Petone to TG (Takapu Rd) |
|--|--|

The options were developed in AutoCad based on matching the alignment for each option from the historic reports.

In order to develop SLC estimates for these options specific geometric features were estimated. The length of each option was calculated in AutoCad and is presented in the table below. In addition to the length of each option the construction footprint of each option was also estimated to assist with estimating the property cost associated with each option. The strategic options pass through steep and complex terrain which will result in significant cuts and fills to form the carriageway of each option. As a result the construction footprint was estimated assuming an average construction footprint width of 120m for each alignment. This width was based on the preliminary geometric designs developed for the Scoping Report options which pass through similar terrain.

The construction footprint for SH58 Upgrade (Option 10) was estimated assuming an average road reserve width of 35m to accommodate the upgrade. This was based on upgrading the existing two lane road to an expressway standard with four lanes and a divided median.

Note that the Do Minimum Option was not costed.

Strategic Level Costs - Strategic Options Report

Strategic Option	Length (km)	Footprint (ha)
2. Horokiwi to Grenada	5.5	66*
3. Petone to Grenada	5.6	67*
4. Petone to Tawa	6.4	77*
5. Dowse to Grenada	5.9	71*
6. Dowse to Tawa	6.5	78*
7. Melling to TG	8.1	97*
8. KGB to TG (James Cook)	8.2	98*
9. KGB to TG (Cannons Creek)	6.6	79*
10. SH58 Upgrade (SH2 to TG)	8.6	30**
11. Petone to TG	7.9	95*

*Estimated as 120m x Length

**Estimated as 35m x Length

Physical Works

The parameter costs identified in the table below have been developed for the physical works, on a cost per kilometre basis. The basis for these costs are described in Appendix D of the Scoping Report (<http://www.nzta.govt.nz/projects/petone-grenada-link-road/publications.html>). The cost per kilometre rates are based on a 6 lane carriageway (assuming 2 lanes in each direction for capacity and 1 crawler lane in each direction to cater for slow moving vehicles as a result of steep gradients).

Description	Cost / km (\$M)
6 lane carriageway	
Low earthworks	8.0
Medium earthworks	10.0
High earthworks	25.0
Very High earthworks	30.0
Costs to upgrade SH2/Cost to upgrade SH58	
4 lanes to 6 lanes/2 lanes to 4 lanes	8.0
Costs of Interchanges	
	Cost (\$M)
Grade-separated Simple	12.5
Grade-separated Moderate	15.0
Grade-separated Complicated	20.0

Property Costs

Property costs have been developed to provide a net property cost for each option. The property costs only include the corridor of each alignment. Property costs associated with each interchange are not included but expected to be similar for each option. The basis for these costs are described in Appendix D of the Scoping Report (<http://www.nzta.govt.nz/projects/petone-grenada-link-road/publications.html>).

The property costs adopted are shown in the table below.

Property Type	Cost / ha (\$M)
Very high value	4.0
High value	2.5
Medium high value	1.15
Medium value	0.7
Medium low value	0.2
Low value	0.05

3 Option Estimates

SLCs of the strategic options based on the above are summarised in the table below.

Strategic Option	SLC (\$M)		
	Optimistic	Most Likely	Pessimistic
2. Horokiwi to Grenada	200	260	460
3. Petone to Grenada	170	230	400
4. Petone to Tawa	200	260	460
5. Dowse to Grenada	230	310	540
6. Dowse to Tawa	260	340	600
7. Melling to TG	230	300	530
8. KGB to TG (James Cook)	230	300	530
9. KGB to TG (Cannons Creek)	190	250	440
10. SH58 Upgrade (SH2 to TG)	110	140	250
11. Petone to TG (Takapu Road)	200	270	470

Further Details on the SLC estimates for each option are provided in Appendix A.

Appendix A – SLC Estimate Details

Strategic Level Costs - Strategic Options Report

Option 2: Horokiwi to Grenada

Strategic Options Assessment: SLC Estimates							
Option 2: Horokiwi to Grenada							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					32.2	
	Very High value	Ha		4.00			
	High value	Ha		2.50			
	Medium High value	Ha	17	1.15	19.0		Alignment between Mark Ave & SH1
	Medium value	Ha	17	0.70	11.6		Alignment between The Crest & Mark Ave
	Medium Low value	Ha		0.20			
	Low value	Ha	33	0.05	1.7		Alignment between Horokiwi and The Crest
B	PROFESSIONAL SERVICES					29.9	
	I&R + D&PD + MSQA	LS	199.6	15%	29.9		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					199.6	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	5.50	25.0	137.5		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
...	Simple	ea	1.00	12.5	12.5		1 interchange at Grenada
...	Moderate	ea		15.0			
...	Complicated	ea	2.00	20.0	40.0		1 interchange at Horokiwi and 1 at Petone
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km	1.20	8.0	9.6		Section of SH2 between Horokiwi and Petone
Total Project Estimate					260.0	260.0	
Estimated Range of SLC: -25% to +75% of 'Most Likely'							
i.e. \$200 to \$460							

Strategic Level Costs - Strategic Options Report

Option 3: Petone to Grenada

Strategic Options Assessment: SLC Estimates							
Option 3: Petone to Grenada							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					32.7	
	Very High value	Ha		4.00			
	High value	Ha		2.50			
	Medium High value	Ha	17	1.15	19.3		Alignment between Mark Ave & SH1
	Medium value	Ha	17	0.70	11.7		Alignment between The Crest & Mark Ave
	Medium Low value	Ha		0.20			
	Low value	Ha	34	0.05	1.7		Alignment between Petone and The Crest
B	PROFESSIONAL SERVICES					25.9	
	I&R + D&PD + MSQA	LS	172.5	15%	25.9		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					172.5	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	5.60	25.0	140.0		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
	Simple	ea	1.00	12.5	12.5		1 interchange at Grenada
	Moderate	ea		15.0			
	Complicated	ea	1.00	20.0	20.0		1 interchange at Petone
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km		8.0			
Total Project Estimate					230.0	230.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
				i.e. \$170 to \$400			

Strategic Level Costs - Strategic Options Report

Option 4: Petone to Tawa

Strategic Options Assessment: SLC Estimates							
Option 4: Petone to Tawa							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					37.5	
	Very High value	Ha		4.00			
	High value	Ha		2.50			
	Medium High value	Ha	19	1.15	22.1		Alignment between Mark Ave & SH1
	Medium value	Ha	19	0.70	13.5		Alignment between The Crest & Mark Ave
	Medium Low value	Ha		0.20			
	Low value	Ha	39	0.05	1.9		Alignment between Petone and The Crest
B	PROFESSIONAL SERVICES					28.9	
	I&R + D&PD + MSQA	LS	192.5	15%	28.9		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					192.5	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	6.40	25.0	160.0		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
	Simple	ea	1.00	12.5	12.5		1 interchange at Tawa
	Moderate	ea		15.0			
	Complicated	ea	1.00	20.0	20.0		1 interchange at Petone
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km		8.0			
Total Project Estimate					260.0	260.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
i.e.				\$200 to \$460			

Strategic Level Costs - Strategic Options Report

Option 5: Dowse to Grenada

Strategic Options Assessment: SLC Estimates							
Option 5: Dowse to Grenada							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					104.7	
	Very High value	Ha	18	4.00	71.0		Alignment through Korokoro Residential
	High value	Ha		2.50			
	Medium High value	Ha	18	1.15	20.4		Alignment between Mark Ave & SH1
	Medium value	Ha	18	0.70	12.4		Alignment between The Crest & Mark Ave
	Medium Low value	Ha		0.20			
	Low value	Ha	18	0.05	0.9		Alignment between Korokoro and The Crest
B	PROFESSIONAL SERVICES					27.0	
	I&R + D&PD + MSQA	LS	180.0	15%	27.0		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					180.0	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	5.90	25.0	147.5		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
...	Simple	ea	1.00	12.5	12.5		1 interchange at Grenada
...	Moderate	ea		15.0			
...	Complicated	ea	1.00	20.0	20.0		1 interchange at Dowse
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km		8.0			
Total Project Estimate					310.0	310.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
i.e.				\$230	to	\$540	

Strategic Level Costs - Strategic Options Report

Option 6: Dowse to Tawa

Strategic Options Assessment: SLC Estimates							
Option 6: Dowse to Tawa							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					115.1	
	Very High value	Ha	20	4.00	78.0		Alignment through Korokoro Residential
	High value	Ha		2.50			
	Medium High value	Ha	20	1.15	22.4		Alignment between Mark Ave & SH1
	Medium value	Ha	20	0.70	13.7		Alignment between The Crest & Mark Ave
	Medium Low value	Ha		0.20			
	Low value	Ha	20	0.05	1.0		Alignment between Korokoro and The Crest
B	PROFESSIONAL SERVICES					29.3	
	I&R + D&PD + MSQA	LS	195.0	15%	29.3		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					195.0	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	6.50	25.0	162.5		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
...	Simple	ea	1.00	12.5	12.5		1 interchange at Tawa
...	Moderate	ea		15.0			
...	Complicated	ea	1.00	20.0	20.0		1 interchange at Dowse
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km		8.0			
Total Project Estimate					340.0	340.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
i.e.				\$260 to \$600			

Strategic Level Costs - Strategic Options Report

Option 7: Melling to Transmission Gully

Strategic Options Assessment: SLC Estimates							
Option 7: Melling to Transmission Gully							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					28.6	
	Very High value	Ha		4.00			
	High value	Ha	10	2.50	24.3		Alignment through Tirohanga Residential Area
	Medium High value	Ha		1.15			
	Medium value	Ha		0.70			
	Medium Low value	Ha		0.20			
	Low value	Ha	87	0.05	4.4		Alignment between Tirohanga and TG
B	PROFESSIONAL SERVICES					35.3	
	I&R + D&PD + MSQA	LS	235.0	15%	35.3		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					235.0	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	8.10	25.0	202.5		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
...	Simple	ea	1.00	12.5	12.5		1 interchange at TG
...	Moderate	ea		15.0			
...	Complicated	ea	1.00	20.0	20.0		1 interchange at Melling
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km		8.0			
Total Project Estimate					300.0	300.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
i.e.				\$230	to	\$530	

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Option 8: KGB to TG at James Cook

Strategic Options Assessment: SLC Estimates							
Option 8: KGB to TG at James Cook							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					28.9	
	Very High value	Ha		4.00			
	High value	Ha	10	2.50	24.5		Alignment through Kelson Residential Area
	Medium High value	Ha		1.15			
	Medium value	Ha		0.70			
	Medium Low value	Ha		0.20			
	Low value	Ha	88	0.05	4.4		Alignment between Kelson and TG
B	PROFESSIONAL SERVICES					35.6	
	I&R + D&PD + MSQA	LS	237.5	15%	35.6		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					237.5	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	8.20	25.0	205.0		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
	Simple	ea	1.00	12.5	12.5		1 interchange at TG
	Moderate	ea		15.0			
	Complicated	ea	1.00	20.0	20.0		1 interchange at KGB
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km		8.0			
Total Project Estimate					300.0	300.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
				i.e.	\$230	to	\$530

Option 9: KGB to TG at Cannons Creek

Strategic Options Assessment: SLC Estimates							
Option 9: KGB to TG at Cannons Creek							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					23.3	
	Very High value	Ha		4.00			
	High value	Ha	8	2.50	19.8		Alignment through Kelson Residential Area
	Medium High value	Ha		1.15			
	Medium value	Ha		0.70			
	Medium Low value	Ha		0.20			
	Low value	Ha	71	0.05	3.6		Alignment between Kelson and TG
B	PROFESSIONAL SERVICES					29.6	
	I&R + D&PD + MSQA	LS	197.5	15%	29.6		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					197.5	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	6.60	25.0	165.0		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
...	Simple	ea	1.00	12.5	12.5		1 interchange at TG
...	Moderate	ea		15.0			
...	Complicated	ea	1.00	20.0	20.0		1 interchange at KGB
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km		8.0			
Total Project Estimate					250.0	250.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
i.e.				\$190 to \$440			

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Option 10: SH58 Upgrade

Strategic Options Assessment: SLC Estimates							
Option 10: SH58 Upgrade							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					21.0	
	Very High value	Ha		4.00			
	High value	Ha		2.50			
	Medium High value	Ha		1.15			
	Medium value	Ha	30	0.70	21.0		Alignment alongside SH58
	Medium Low value	Ha		0.20			
	Low value	Ha		0.05			
B	PROFESSIONAL SERVICES					15.2	
	I&R + D&PD + MSQA	LS	101.3	15%	15.2		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					101.3	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km		25.0			
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
...	Simple	ea	1	12.5	12.5		1 interchange at TG
...	Moderate	ea		15.0			
...	Complicated	ea	1	20.0	20.0		1 interchange at SH2
	At-grade	ea		6.0			
	Upgrade Existing SH58						
	2 to 4 lanes	km	8.6	8.0	68.8		SH58 Upgrade
Total Project Estimate					140.0	140.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
i.e.				\$110 to \$250			

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Option 11: Petone to TG at Takapu Road

Strategic Options Assessment: SLC Estimates							
Option 11: Petone to TG at Takapu Road							
Date of estimate:		28-May-15		Cost Index:		Mar 2015	
Estimate prepared by:		L. Wiles		Signed:		<i>[Signature]</i>	
Estimate internal peer review by:		K. Atkinson		Signed:		<i>[Signature]</i>	
Item	Description	Unit	Quantity	Rate (\$M)	Amount (\$M)	Subtotals (\$M)	Comment/Assumptions
A	PROJECT PROPERTY COST					4.8	
	Very High value	Ha		4.00			
	High value	Ha		2.50			
	Medium High value	Ha		1.15			
	Medium value	Ha		0.70			
	Medium Low value	Ha		0.20			
	Low value	Ha	95	0.05	4.8		Entire Alignment
B	PROFESSIONAL SERVICES					34.5	
	I&R + D&PD + MSQA	LS	230	15%	34.5		Assumes 15% of physical works cost.
C	CONSTRUCTION						
	Physical Works					230.0	
	6 lane road						
	Low earthworks	km		8.0			
	Medium earthworks	km		10.0			
	High earthworks	km	8	25.0	197.5		Entire alignment
	Very High Earthworks	km		30.0			
	Interchanges						
	Grade-separated	ea					
	Simple	ea	1	12.5	12.5		1 interchange at TG
	Moderate	ea		15.0			
	Complicated	ea	1	20.0	20.0		1 interchange at Petone
	At-grade	ea		6.0			
	Upgrade Existing SH2						
	4 to 6 lanes	km		8.0			
Total Project Estimate					270.0	270.0	
				Estimated Range of SLC: -25% to +75% of 'Most Likely'			
i.e.				\$200 to \$470			