

Ngauranga Triangle Strategy Study



LONG LIST OPTIONS ASSESSMENT REPORT

- 6 November 2009



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- 9 November 2009
- Final

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The Ngauranga Triangle Strategic Study is a technical report, outlining potential long-term transport solutions for the Ngauranga Triangle transport network. The public release of the document means it is now available as an input into the Hutt and Western Corridor Plan reviews, which are scheduled to be undertaken by Greater Wellington Regional Council over the coming year. As a technical report, the study has not been presented to the NZTA Board for its support, endorsement or approval. Accordingly, publication of the report does not constitute any form of commitment by NZTA to the recommendations contained in this report.

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1. Introduction

The purpose of the Ngauranga Triangle Strategy Study is to develop a multimodal integrated long-term transport plan for the area forming a triangle between Ngauranga – Tawa, Ngauranga – Dowse and across from SH2 to Gracefield. The Plan looks to:

- Improve safety, access and mobility;
- Increase integration between the transport system and surrounding land uses; and
- Sustainably ease peak congestion on state highways and local roads.

The study will consider integration of the existing local road network, public transport services, walking and cycling. This will include how the benefits gained from reducing congestion in the Ngauranga Gorge and on SH2 between Petone and Ngauranga can be locked in or protected.

The preferred long term plan for Ngauranga/Tawa – Ngauranga/Dowse – Grenada – Gracefield will satisfy NZTA’s statutory responsibilities under the Land Transport Management Act 2008 (LTMA), contribute towards the objectives of the New Zealand Transport Strategy (NZTS), and take account of the Wellington Regional Land Transport Strategy (RLTS) and corridor plans. In doing this, the study will provide a plan that will:

- Assist safety and personal security;
- Improve access and mobility;
- Assist in economic and regional development;
- Protect and promote public health; and
- Ensure environmental sustainability.

This report provides an assessment of the long list options and details those which will form the “short list” for further, more detailed assessment as a result of the “long list client workshop” held on the 7 April 2009.

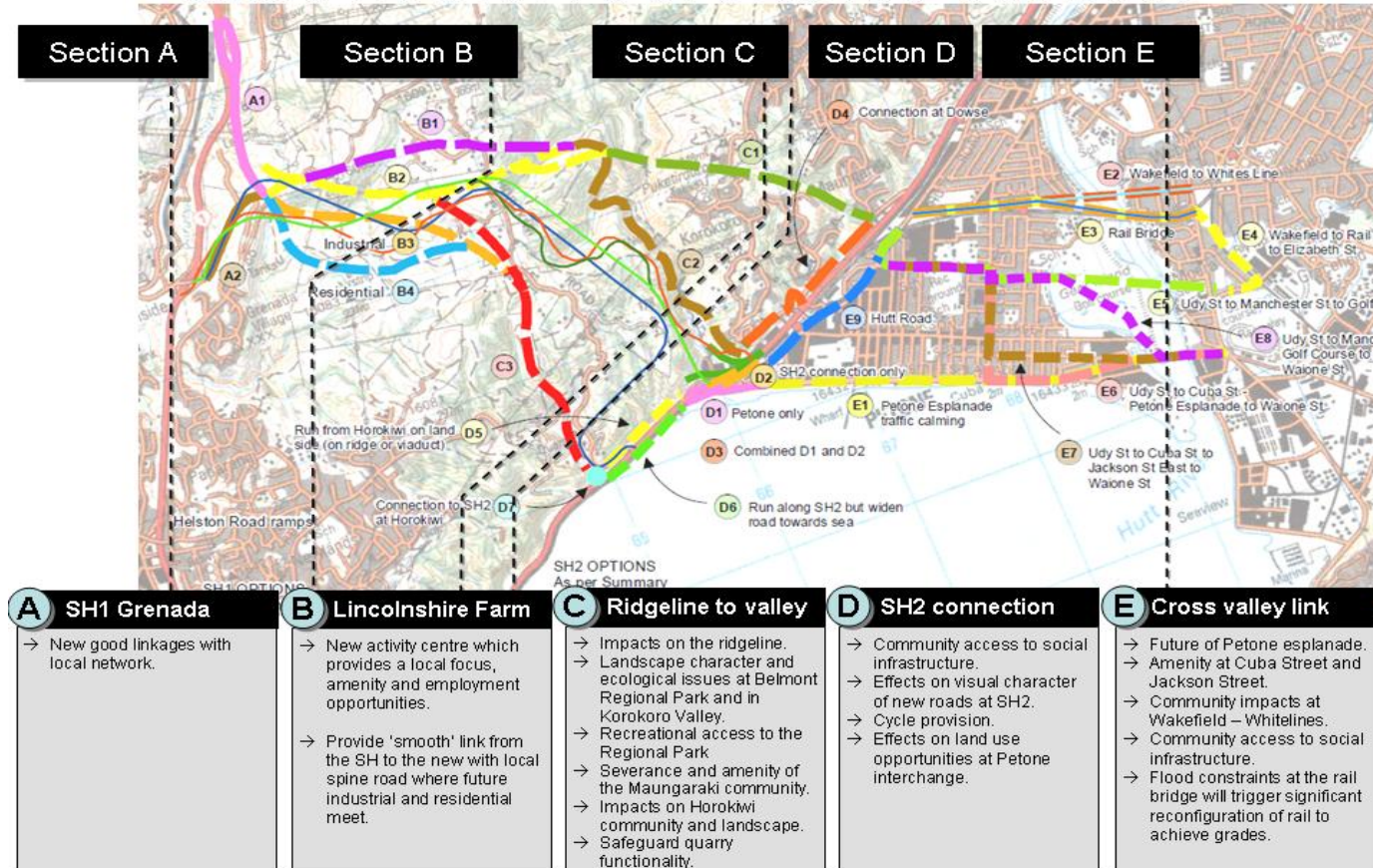


2. Options Assessment Background

2.1. Key issues to take into account in option selection

At a high level the urban design contextual summary shown in Figure 2-1 and key environmental constraints in Figure 2-2 provide an overview of what needs to be considered through long list option development. A full list of issues is provided in the Constraints Plan.

URBAN DESIGN CONTEXTUAL SUMMARY



■ **Figure 2-1: Urban Design Contextual Summary**

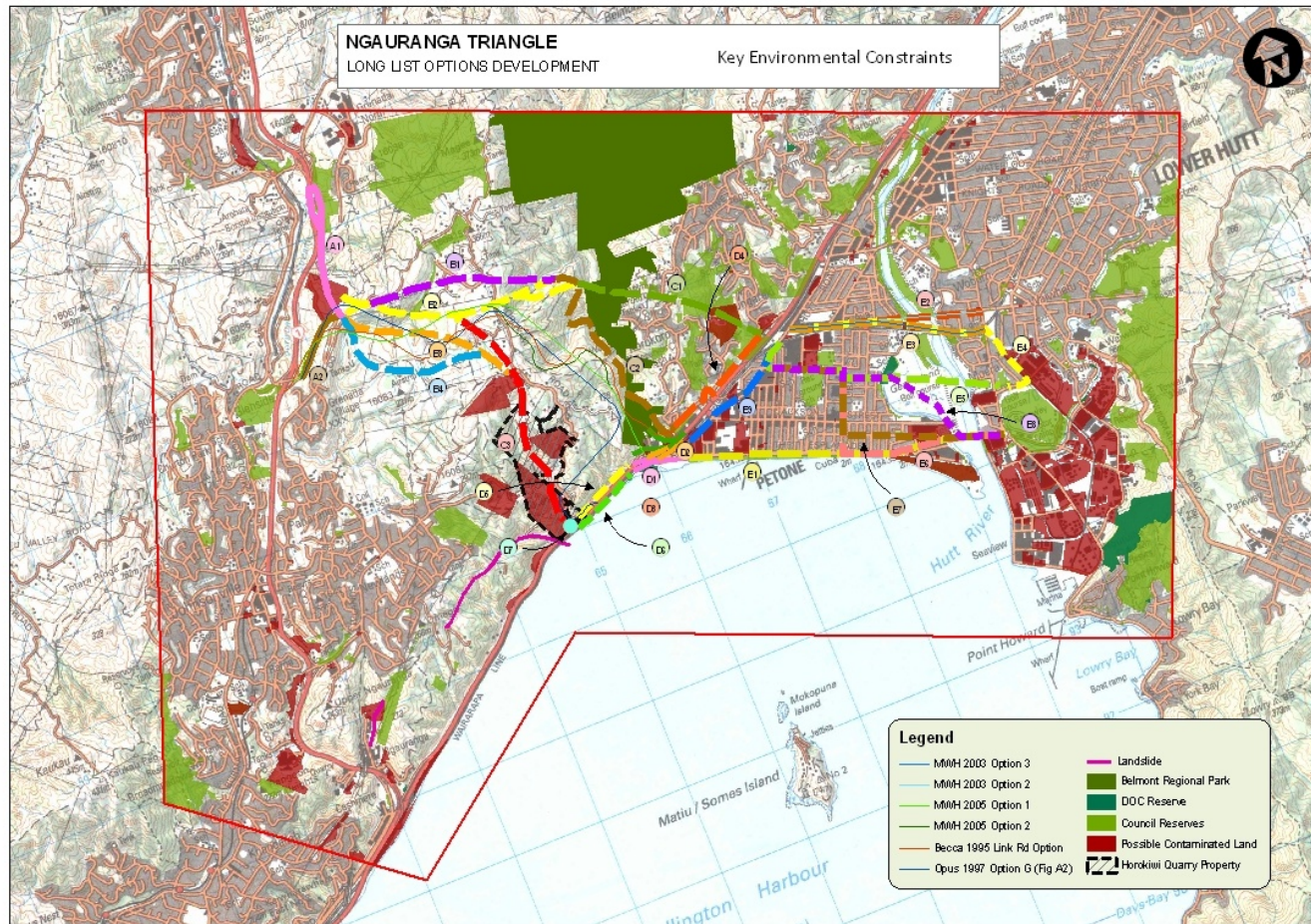


Figure 1 - Map of Current Options

■ **Figure 2-2: Key Environmental Constraints**

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2.2. Assessment Outline

A high-level evaluation framework was developed, based on the project objectives and functional goals. Specific site constraints were also taken into account in the evaluation process, for example, a Key Performance Indicator (KPI) was developed addressing the potential effect on Belmont Regional Park.

Each of the long list options has been rated against the Key Performance Indicators (KPI) using the assessment weightings as set out in Table 2-1 and input into tabular format for analysis (a typical example of the table used is shown below in Figure 2-3. The full analysis tables are contained in Appendix A).

Objectives	Ensure Environmental Sustainability											
	Enhance and contribute to community cohesion.		Proactively limit the disturbance of significant cultural and heritage features along state highways.		No net loss of native vegetation, wetlands, critical habitat or endangered species.		Plan and design new state highways to avoid or reduce adverse noise and vibration effects.		Identify areas susceptible to erosion and sediment deposition and implement erosion and sediment control measures appropriate to each situation with particular emphasis on high-risk areas.		Manage increased hazards of climate change impacts on state highway infrastructure.	
	Score	Comments	Score	Comments	Score	Comments	Score	Comments	Score	Comments	Score	Comments
Impacts on the Ngauranga to Teape corridor if the Gravelade to Petone Link Road (GPR) works is constructed	0		0		0		0		0		0	
Peak period bus lane constructed by reallocation of lanes within existing infrastructure	4	Benefit of improved public transport services between Teape and Ngauranga. Therefore creating better connectivity for people and access to employment/community facilities.	0	Bus lane will be within the existing road corridor so will not disturb any significant features.	0	Bus lane will be on existing road reserves so there will be no net loss in vegetation etc.	0	Noise and vibration effects are likely to be neutral based on the existing high volume of traffic already using the route.	0	No new cuts will be required that could cause potential erosion or sediment deposition.	0	Provision of a bus lane will have no impact on susceptibility of infrastructure to climate change impacts, as it is not increasing any existing hazards or structures that are susceptible to hazards such as surface flooding.
Peak period bus lane constructed by reallocation of lanes within existing infrastructure and the inclusion of the Gravelade to Petone Link Road	4	Benefit of improved public transport services between Teape and Ngauranga. Therefore creating better connectivity for people and access to employment/community facilities.	0	Bus lane will be within the existing road corridor so will not disturb any significant features.	0	Bus lane will be on existing road reserves so there will be no net loss in vegetation etc.	0	Noise and vibration effects are likely to be neutral based on the existing high volume of traffic already using the route.	0	No new cuts will be required that could cause potential erosion or sediment deposition.	0	Provision of a bus lane will have no impact on susceptibility of infrastructure to climate change impacts, as it is not increasing any existing hazards or structures that are susceptible to hazards such as surface flooding.
Peak period truck way constructed by reallocation of lanes within existing infrastructure	0	N/A	0	Truck way will be on existing road reserves so will not disturb any significant features.	0	Truck way will be on existing road reserves so there will be no net loss in vegetation etc.	0	Noise and vibration effects are likely to be neutral based on the existing high volume of traffic already using the route.	0	No new cuts will be required that could cause potential erosion or sediment deposition.	0	Provision of truck way will have no impact on susceptibility of infrastructure to climate change impacts, as it is not increasing any existing hazards or structures that are susceptible to hazards such as surface flooding.
Peak period truck way constructed by reallocation of lanes within existing infrastructure and the inclusion of the Gravelade to Petone Link Road	0	N/A	0	Truck way will be on existing road reserves so will not disturb any significant features.	0	Truck way will be on existing road reserves so there will be no net loss in vegetation etc.	0	Probability that potential vibration will be increased.	0	No new cuts will be required that could cause potential erosion or sediment deposition.	0	Provision of truck lane will have no impact on susceptibility of infrastructure to climate change impacts, as it is not increasing any existing hazards or structures that are susceptible to hazards such as surface flooding.
Peak period two lanes (or greater) high occupancy vehicle lane constructed by reallocation of lanes within existing infrastructure	0	N/A	0	Will be on existing road reserves so will not disturb any significant features.	0	Will be on existing road reserves so there will be no net loss in vegetation etc.	4	Probability that potential noise and vibration will be increased. Potential for a small reduction in noise and vibration effects from reduced volumes on the state highway.	0	No new cuts will be required that could cause potential erosion or sediment deposition.	0	Provision of high occupancy lane will have no impact on susceptibility of infrastructure to climate change impacts, as it is not increasing any existing hazards or structures that are susceptible to hazards such as surface flooding.

■ Figure 2-3: Example of Assessment Table



The Greenhouse Gas Emissions KPI has not been used at this stage, as an assessment against this indicator at this stage of the project is not meaningful as it is dependent on road alignment. This indicator is recommended to be used in the short list assessment.

■ **Table 2-1: Assessment Weightings**

Very Good	++
Good	+
Negligible Impact	0
Negative	-
Very Negative	--

The rated list of options was then presented to the client group at a workshop on 7 April 2009. During the workshop all of the options were discussed, some of the options were removed from further consideration through these discussions. These options will not be carried through to the next stage of the project (i.e. they do not form part of the short list of options).

This assessment has been “broad-brush” and is intended to give an overview of which options are “realistic” and can be carried through to the next stage of the assessment. Each assessment was undertaken based on knowledge of the subject area, available from information collated through the constraints plan and other technical inputs created for this project. A more detailed assessment will be required to confirm the assumptions made during the short list options assessment. For example, confirming ecological, geotechnical, community cohesion, landscape and erosion and sediment control can be undertaken once cross sections are complete. During discussions at the workshop minor changes were made to the assessments, but on the whole the options have been considered on a “high level”. The detailed option assessment tables are presented in Appendices A.

2.3. Options Considered

The options that have been considered as part of this assessment are summarised below:

Ngauranga to Tawa options:

These options were considered both with and without a “generic” Petone to Grenada link in place. The options considered were comprised of the following:-

- Bus Lane (Peak Period) on existing infrastructure;
- Truck Way (Peak Period) on existing infrastructure;
- High occupancy vehicle (HOV) lane 2+ (peak period);
- HOV Lane 3+ (peak period);
- Combined bus lane with truck way (peak period);

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- Combined HOV 3+ , bus lane and truck way (peak period);
- Tawa Interchange safety improvements;
- Newlands Rail Project; and
- Additional southbound bus lane in Ngauranga Gorge.

Ngauranga to Dowse options:

These options were considered both with and without a “generic” Petone to Grenada link in place. The options considered were comprised of the following:-

- Additional General Purpose Reversible Lane or Shoulder;
- Peak General Purpose Reversible Lane in existing carriageway - Keep the current number of lanes but use alternate between (3 SBD 1 Northbound (NBD) - AM PEAK) (2 SBD 2NBD - INTERPEAK) (1 SBD 3NBD - PM PEAK);
- Additional Reversible Bus Lane;
- Additional Reversible Truck Way;
- Additional Reversible HOV (2+) Lane;
- Additional Reversible HOV (3+) Lane;
- Peak Time HOV (2+) Lane in existing carriageway;
- Peak Time HOV (3+) Lane in existing carriageway;
- Peak Time Bus and Truck Lane in existing carriageway;
- Peak Time Bus, Truck and HOV (2+) Lane in existing carriageway;
- Road Realignment for a 105km/h design speed;
- Road Realignment for a 120km/h design speed;
- Redesign of the Petone Interchange;
- Rail realigned for 105 km/h design speed;
- Rail realigned for 120 km/h design speed;
- No change for cycles and pedestrians;
- Cycles and pedestrians on train - banned from road;
- Cycles and pedestrians use hard shoulders;
- Existing pedestrian and cycleway completed;
- Pedestrians and cycles benched into hillside above SH2;
- Purpose built pedestrian and cycleway on seaward side of rail;
- Pedestrian and cycleway extended under Petone ramps off street between Hutt Road and rail, pedestrian and cycleway connected to facility on The Esplanade; and



- “Beach to bush” crossing of SH2.
- Six laning of SH2 between Ngauranga and Petone.

Cross Valley Link Options

The options considered were comprised of the following:-

- The Esplanade and Jackson Street west traffic calming (30kph) and posted speed limit, permit required for heavy vehicles;
- Wakefield to White Lines;
- Wakefield to rail alignment;
- Wakefield to rail alignment following Gracefield rail reserve to Elizabeth Street;
- Udy Street to Manchester Street to Golf course;
- Udy Street to Cuba Street (50km/h) to The Esplanade to Waione Street;
- Udy Street to Cuba Street (50 km/h) to Jackson Street east (50km/h) to Waione Street;
- Udy Street to Manchester Street to Golf Course to Halford Place to Waione Street
- A two lane upgraded The Esplanade; and
- A four lane upgraded The Esplanade Link;

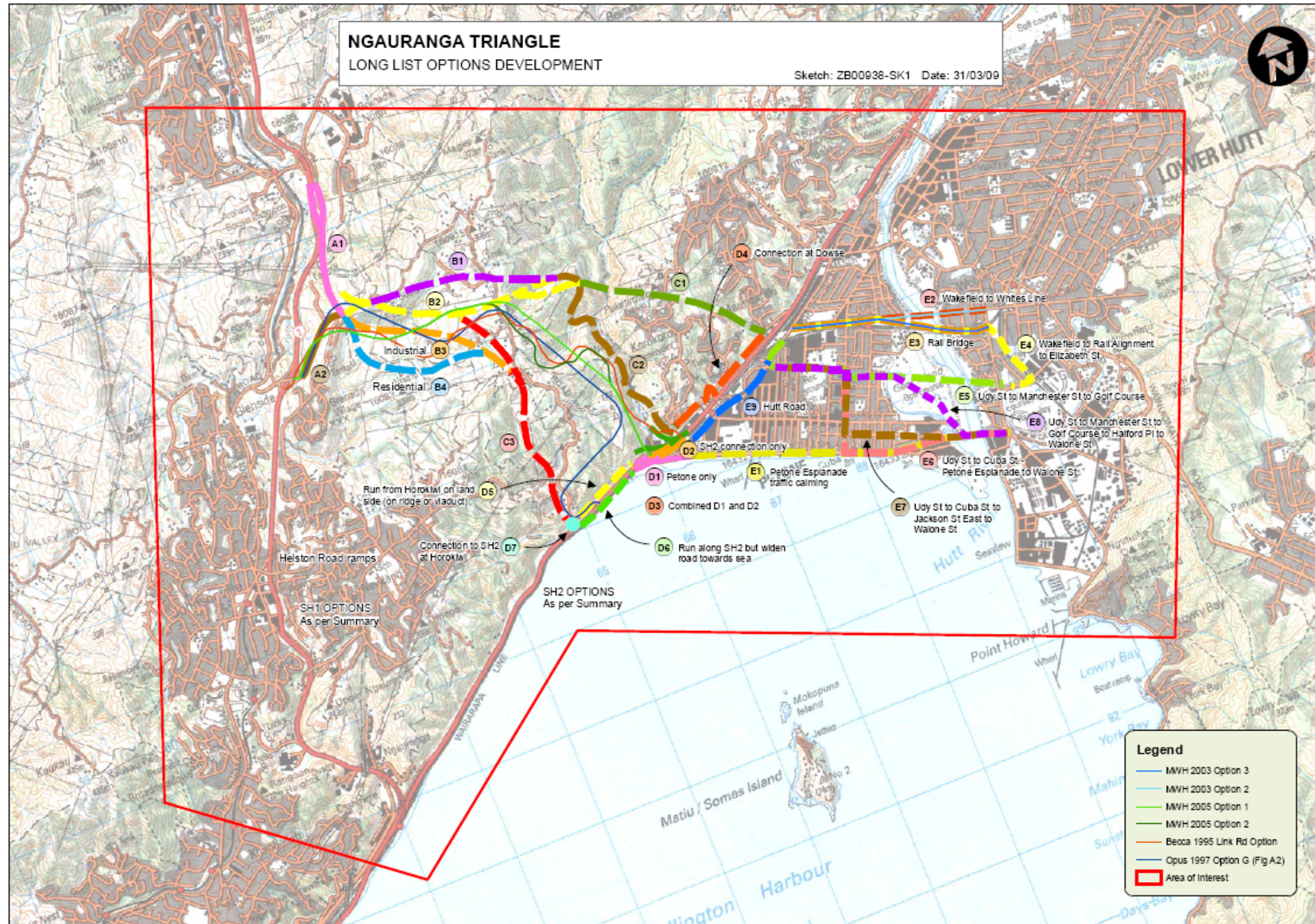
Further options include:

- Reopening the Gracefield line for freight with an integrated multimodal logistics hub.

Figure 2-4 shows the extent of each of these options and their exact location.

Petone to Grenada Area Link Options

This has been considered as a number of “segments” to make one complete link between Petone and Grenada. Refer to Figure 2-4 for the segments used for this link option.



■ **Figure 2-4: Overview of the Options**



3. Modelling

As part of this options assessment, high level modelling was carried out to give an overview of the impacts that each option will have on the performance of the network.

The 2016 base model with the agreed list of implemented projects was used for the Do Minimum scenario (Test 1) and as the basis for the other 13 tests carried out.

Tests 2 and 3 reduce the available road space on SH1 to general traffic by one lane in each direction between the Ngauranga Interchange and the southern Johnsonville ramps by including a bus lane in Test 2 and an HCV only lane in Test 3. Appropriately configured speed flows curves are applied to these lanes to reflect the steep nature of this section of SH1.

Test 4 makes use of the existing carriageway between Ngauranga and Petone by introducing a tidal flow configuration, with the 4 available lanes split in the following way to allow improved capacity in the peak direction:

- AM peak period – 3 southbound lanes, 1 northbound lane;
- Inter peak period – 2 lanes in each direction; this is the same as the Do Minimum scenario ;
- PM peak period – 3 northbound lanes, 1 southbound lane.

Test 5 introduces a peak reversible lane in addition to the existing 4 lanes between Ngauranga and Petone, meaning 5 lanes are available in the AM and PM peak periods. This allows the following lane configurations to be achieved:

- AM peak period – 3 southbound lanes, 2 northbound lanes;
- Inter peak period – 2 lanes in each direction; this is the same as the Do Minimum scenario;
- PM peak period – 3 northbound lanes, 2 southbound lanes.

Test 6 is similar to Test 5, but only HCVs are permitted to use the additional lane and it is retained for the inter peak period in the same configuration as for the AM period. In all periods there are two lanes in each direction, available to all other traffic.

Test 7 introduces a 4 lane (2 in each direction) link from Grenada to Petone, which has been tested with a 70 kph speed limit. A new motorway interchange is included on SH1 to allow access to and from the Petone - Grenada link between the Grenada and Grenada North interchanges. It links into the Petone ramps on SH2 at the southern end. Tests 8 – 12 are repeats of Tests 2 – 6, but with the Petone - Grenada link in place. Tests 13 and 14 are based on Test 7, but includes a new link between Wakefield Street and Whites Line across the Hutt River. This link has an assumed speed



limit of 70 kph and is 4 lanes (2 in each direction). Both Tests 13 and 14 include this link, with Test 14 introducing traffic calming measures on The Esplanade and Jackson St west, which have been modelled by reducing the speed limit on The Esplanade between Hutt Road and Waione Street to 30 kph.

Trip matrices were produced from Wellington Transport Strategy Model (WTSM) for a Petone – Grenada (PG), Cross Valley Link (CVL) and PG+CVL. In this respect we have four sets of rudimentary variable trip matrices in SATURN:-

- Do minimum
- PG
- CVL
- PG + CVL.

The following table describes the tests that were used in the SATURN Modelling element of the long list assessment.

■ **Table 3-1: Summary of Long Options Modelling**

Test	Commentary
1	Agreed Do Minimum
2	Reduction of available lanes on SH1 (by one in each direction) to model bus lane
3	Reduction of available lanes on SH1 (by one in each direction) to model HCV lane
4	Introduction of Tidal flow along SH2 within the current carriageway
5	Introduction of an additional peak reversible lane along SH2
6	Introduction of an additional peak reversible lane along SH2 for HCV's
7	Four Lane Link between Grenada and Petone
8	Repeat of the Test 7 incorporating Test 2
9	Repeat of the Test 7 incorporating Test 3
10	Repeat of the Test 7 incorporating Test 4
11	Repeat of the Test 7 incorporating Test 5
12	Repeat of the Test 7 incorporating Test 6
13	Test 7 with a the addition of a 70km/h four lane link between Wakefield Street and Whites Line
14	Test 7 with a the addition of a 70km/h four lane link between Wakefield Street and Whites Line with traffic calming along The Esplanade to a speed of 30km/h



4. Options Assessment

The options considered under the various routes within the Study Area are detailed in the following section of the report. The sections that follow also detail and summarise the assessment and analysis undertaken for each option and present the results in a visual format. In these diagrams a point radially further from the centre indicates an improved performance against the relevant objective¹. Table 4-1 provides a summary of the weightings given to the projects under each of the high level evaluation criteria and the corresponding scale on the radar diagram.

■ Table 4-1: Performance of Projects

Very Negative (--)	0
Negative (-)	1
Negligible (0)	2
Good (+)	3
Very Good (++)	4

4.1. Ngauranga to Tawa Options

4.1.1. Options taken through to Short List

Tawa Interchange Safety Improvements

The Tawa Interchange safety improvements project will be developed as part of the process of improving the safety and efficiency of State Highway 1. Table 4-2 summarises the impact that this project will have on the evaluation objectives.

■ Table 4-2: Objectives met with Development of Tawa Interchange Safety Improvements project

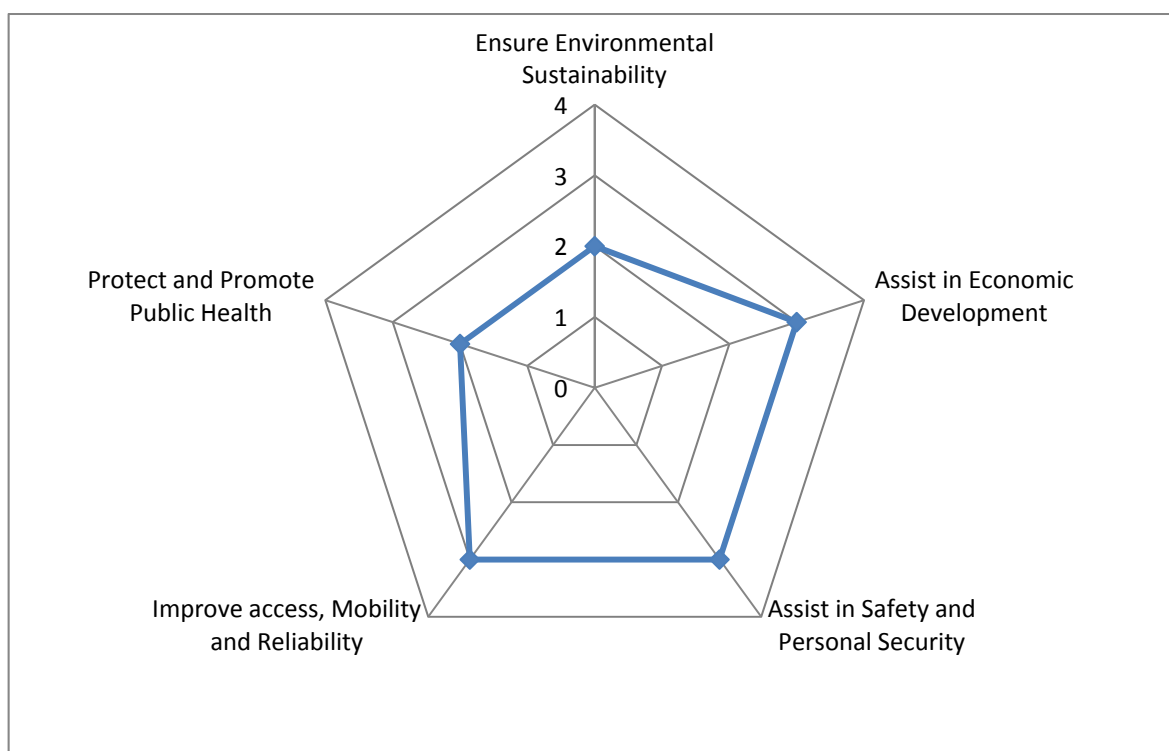
Objective	Summary
Ensure Environmental Sustainability	The project may increase access to the local area and therefore assist in providing community cohesion. There could be some noise effects on the surrounding residential community, where the realigned highway moves closer to houses.
Assist in Economic and Regional Development	May improve access to areas such as Lincolnshire Farm and Horokiwi, although these benefits will be minimal. There may be some improvements to the “throughput” of vehicles in the immediate area.
Assist in Safety and Personal Security	Likely to improve the safety of those within the immediate area and those accessing areas on either side of the highway.

¹ Note: Diagrams show how each project performs under the project objectives and cannot be compared across the objectives.



Objective	Summary
Improve Access, Mobility and Reliability	May accommodate cyclists and pedestrians and encourage alternative forms of transport.
Protect and Promote Public Health	May improve options for walkers and cyclists.

The benefits of the project are shown graphically in Figure 4-1 as follows. This figure gives a visual representation of the benefits the project offers to each of the study objectives. As the point moves out from the centre, the more likely the project is to meet these objectives.



■ **Figure 4-1: Benefits of Tawa Interchange Safety Improvements**

Additional Southbound Bus Shoulder (Ngauranga Gorge SH1)

There is sufficient room between the Hutt Road intersection and the Newlands Ramps to create a southbound bus lane. The current northbound motorway carriageway could be widened towards the quarry and the carriageway moved to allow construction of a southbound bus lane linking onto the bus lane proposed along Hutt Road. Table 4-3 summarises the impact that this project will have on the evaluation objectives.

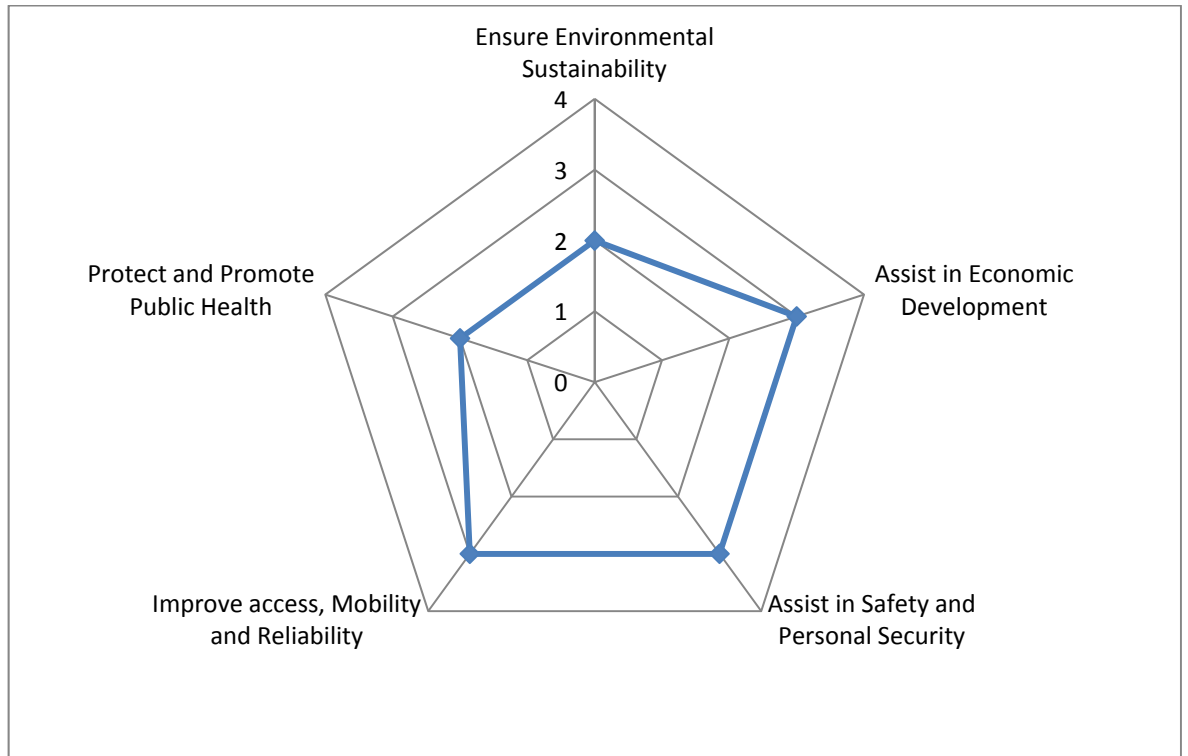


■ **Table 4-3: Objectives met with Development of Additional Bus Shoulder (SH1)**

Objective	Summary
Ensure Environmental Sustainability	Improves the access between the communities along SH1 and Wellington City. Improved travel times on buses are likely to attract patrons and reduce the number of private vehicles and assist in reducing emissions.
Assist in Economic and Regional Development	Providing this facility will improve the public transport travel times along the motorway and this is likely to attract patrons from private vehicles; this may reduce travel times for all road users along this section of SH1. Reduced travel times and improved travel time reliability may attract development and encourage travel to outlying areas for employment.
Assist in Safety and Personal Security	Increasing public transport users is likely to reduce the overall VKT of the network. Buses have a lower accident rate per pax-km. Improving patronage on buses may improve the overall accident rate on the network.
Improve Access, Mobility and Reliability	Will provide a more reliable and efficient bus service along SH1 (and Hutt Road) into Wellington City. May attract public transport users from private vehicles and may reduce travel times for public transport and other vehicles on the network.
Protect and Promote Public Health	Walking trips may improve as people make the journey to and from the bus stops.



The benefits of the project are shown graphically in Figure 4-2 as follows.



■ **Figure 4-2: Benefits of Southbound Bus Shoulder (SH1)**



4.1.2. Options Rejected from Long List

Bus Lane (AM/PM peak period northbound and southbound) on existing carriageway

Although this project will greatly improve the travel times and options for public transport along the state highway corridor it will have a significant impact on travel times and travel time reliability for all other road users. This section of the motorway is already heavily congested during the peak times and reallocating a lane (for use as a bus lane) will reduce the capacity by over 30%. This will have a significant impact on the travel times and will cause long delays. These delays are considered unacceptable and this project should not be considered any further.

Truck Way (AM/PM peak period northbound and southbound) on existing carriageway

Although this project will greatly improve the travel times and options for HCV's along the state highway corridor it will have a significant impact on travel times and travel time reliability for all other road users. This section of the motorway is already heavily congested during peak periods and eliminating a lane (for use as a truck way) will reduce the capacity by over 30%. This will have a significant impact on the travel times and will cause long delays. These delays are considered unacceptable and this project should not be considered any further.

HOV 2+ lane on existing carriageway (AM/PM peak period northbound and southbound)

Estimates² of multiple occupancies, within motor vehicles, has shown that approximately 30% of vehicles on the network may have two or more occupants per vehicle. On this basis, providing a HOV 2+ lane will not have a significant impact on the number of vehicles on the network but will redistribute the vehicles into different lanes. Enforcement of HOV lanes is difficult to police, especially during peak times. It is considered that due to the small benefits generated and the difficulties in enforcement of HOV lanes, this option would not be a sensible use of the existing infrastructure. On this basis this project will not be investigated any further.

HOV3+ lane on existing carriageway (AM/PM peak period northbound and southbound)

Estimates² of multiple occupancies, within motor vehicles, has shown that approximately 6% of vehicles on the network that have three or more occupants in a vehicle. The introduction of an HOV 3+ lane will mean that although "ride-sharing" and multiple occupancy vehicles will be promoted, there will be significant congestion and deterioration of travel times and travel time reliability for the remaining vehicles. These delays are considered unacceptable and this project should not be considered any further.

² Calculations carried out by SKM with data provided from Greater Wellington Regional Council.



Combined bus lane with truck way (AM/PM peak period northbound and southbound) on existing carriageway

Although this project will greatly improve the travel times and options for public transport and trucks along the state highway corridor it will have a significant impact on travel times and travel time reliability for all other road users. Buses and HCV's make up approximately 15% of the total traffic on this section of road. Creating a bus and truck only lane will mean general traffic normally on the road will be redistributed over the remaining two lanes. This will have a significant impact on the travel times and cause long delays. These delays are considered unacceptable and for this reason this project should not be considered any further.

Combined HOV (3+), bus lane and truck way (AM/PM peak period northbound and southbound) on existing carriageway

As has been previously stated, the bus and HCV vehicles make up approximately 15% of vehicles on this section of the network and HOV 3+ make up an additional 6%¹ of vehicles. Having this 21% of the current traffic in a designated lane will mean the remaining other vehicles will be redistributed over the remaining two lanes. This will increase the travel times and travel time variability along the network for all other vehicles. It is expected that due to the steep grades along SH1 between Tawa and Ngauranga, HCV's and buses will have slow travel times in the gorge; and as a result there will be minimal benefits for HOV's using these lanes. Enforcement of vehicles using the lane will also be difficult. These issues are considered unacceptable for the project to progress any further.

Newlands Rail Project

This project would see the construction of a shaft to a new station in the existing rail tunnel so the residents of Newlands have access to a local Rail Station. The proposed cost of the project was \$150 million in 2001. The cost of construction to provide one additional Rail Station is considered uneconomic and as such this option will not be considered any further. An additional rail stop in this location will also add delay for rail patrons travelling to and from settlements north of the proposed station.



4.2. Ngauranga to Dowse Options

4.2.1. Options taken through to Short List

120 km /h road and rail realignment and seaward side cycleway

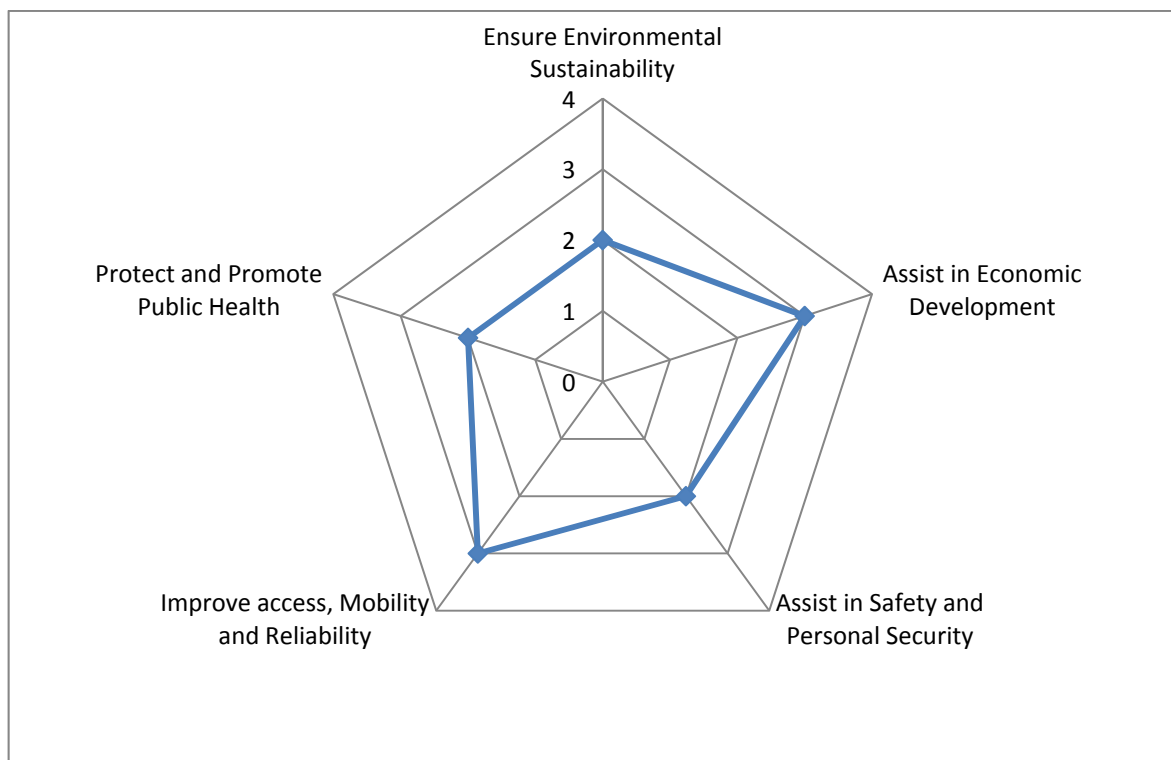
This project would realign State Highway 2 and the railway between the Ngauranga Interchange and the Petone Interchange to a 120km/h design speed. A high quality cycleway would be built on the seaward side of the railway line as part of this project. Table 4-4 identifies the objectives contributed to with the development of this project.

■ Table 4-4 Objectives contributed to with Development of Road and Rail Realignment

Objective	Summary
Ensure Environmental Sustainability	There are potential impacts from sea level rise/storm surge if a new route is developed. Potential reclamation of the harbour could also have a significant effect.
Assist in Economic and Regional Development	There is a significant number of accidents along this route, providing improved and safer access to and from Wellington along this route may reduce travel costs in Wellington City and surrounding areas.
Assist in Safety and Personal Security	This project will improve the safety of the route. This route has poor road geometry and a history of accidents. An improved alignment may significantly reduce the number of accidents. May also reduce crashes as rail has a lower crash rate per pax-km. There may be an increase in walking/cycling through provision of good quality pedestrian/cycle infrastructure.
Improve Access, Mobility and Reliability	There may be slight decreases in travel times as a result of the improved alignment along the road. The trains will be able to travel faster along this section of the network, leading to reduced public transport travel times. The provision of the seaward pedestrian/cycle facility will provide protection at Ngauranga for rail which experiences unreliability issues in the event of storm surge.
Protect and Promote Public Health	There may be an increase in walking and cycling as a consequence of a high quality pedestrian/cycle track and faster and more reliable train services.



The benefits of the project are shown graphically in Figure 4-3 as follows.



■ **Figure 4-3: Benefits of Road and Rail Alignment with Seaward side cycleway**

Redesign of the Petone Interchange

The Petone Interchange redesign project will be developed as part of the process of improving the safety and efficiency of State Highway 2. Table 4-5 summarises the impact that this project will have on the evaluation objectives.

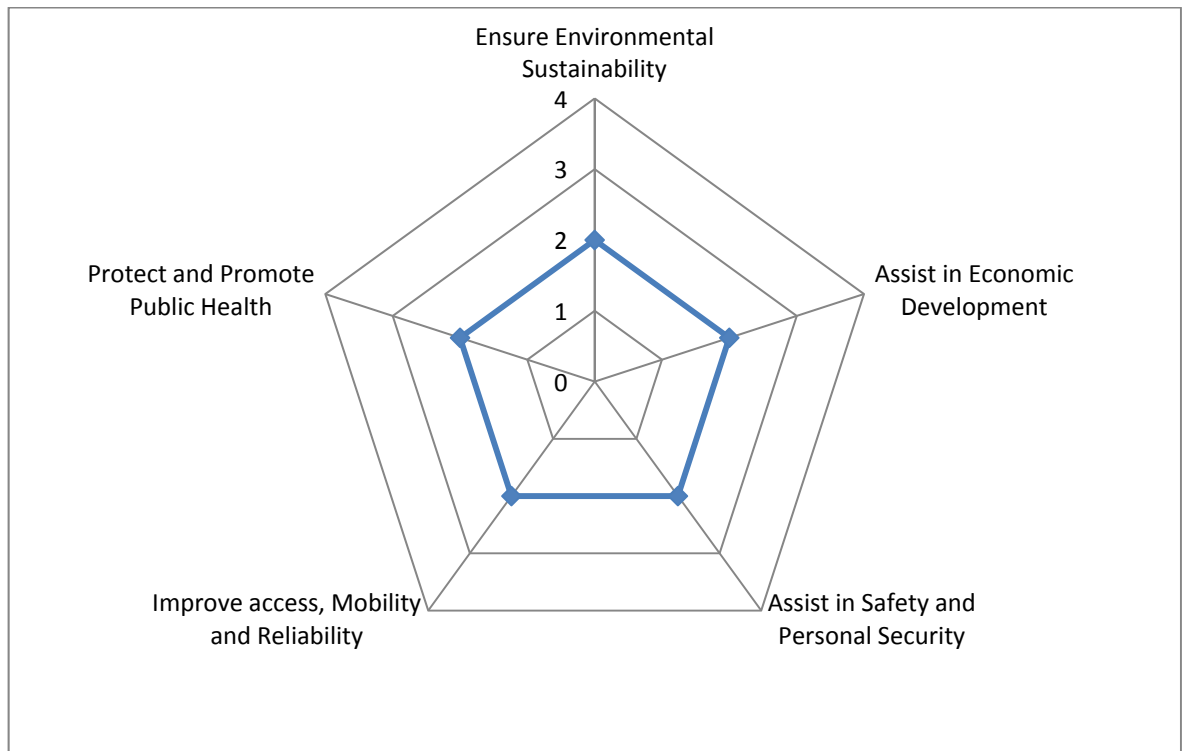
■ **Table 4-5 Objectives with Development of Petone Interchange**

Objective	Summary
Ensure Environmental Sustainability	There is potentially contaminated land in the area that may need to be remediated; however, overall the adverse effects on the environment are limited. Depending on the final design, it could potentially improve the surrounding environment, particularly the foreshore and Korokoro stream.
Assist in Economic and Regional Development	If the number of lanes (SH2) is increased and the double bend removed road capacity in the immediate area will be improved and may decrease travel times and improve travel time



Objective	Summary
	reliability. There is a major bottle neck at the Petone Onramp during peak times and careful design may help ease this. Improving access in this area and easing the congestion will improve travel time reliability and may attract business to the area and employment in Petone.
Assist in Safety and Personal Security	This project will improve the safety of those using the immediate area and also accessing areas on either side of the highway. The current design has an "S-Bend" and has a history of accidents.
Improve Access, Mobility and Reliability	This project will accommodate cyclists and pedestrians and encourage alternative forms of transport. As well as enabling highway traffic to move more efficiently
Protect and Promote Public Health	This project will improve options for walkers and cyclists.

The benefits of the project are shown graphically in Figure 4-4 as follows.



■ **Figure 4-4: Benefits of Petone Interchange Project**



Existing pedestrian and cycleway completed

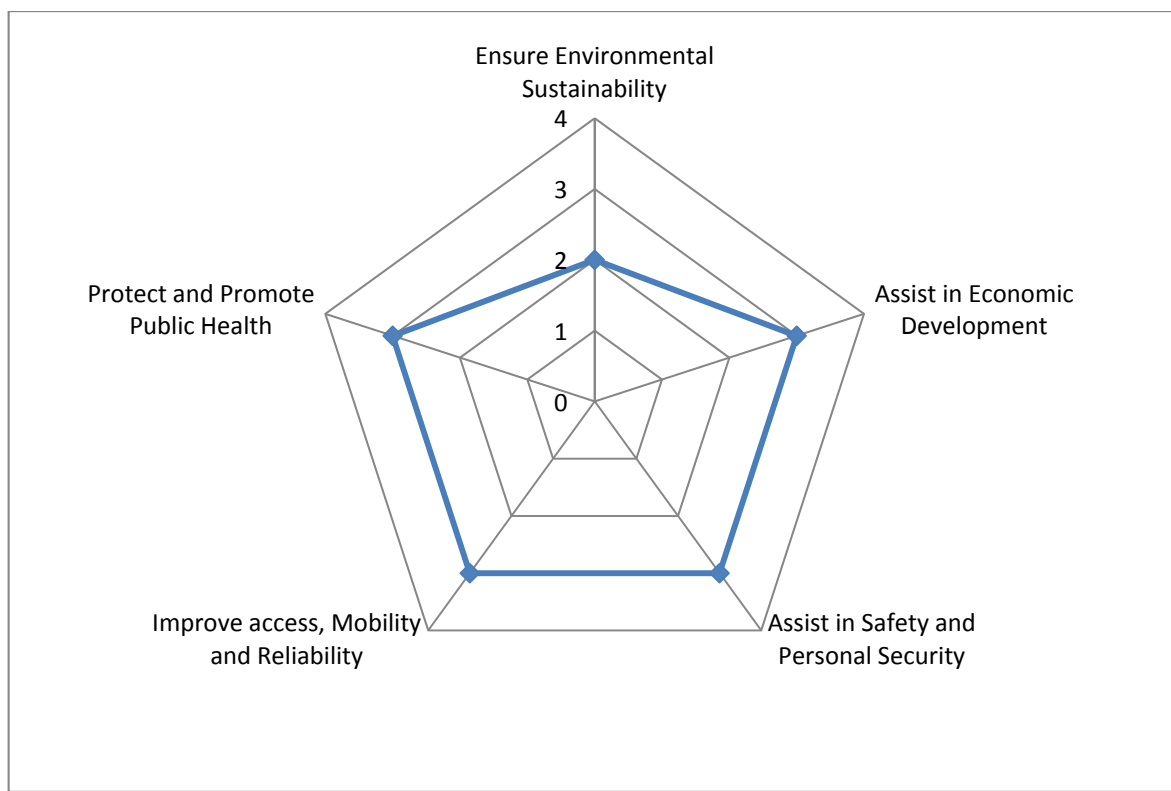
This project will complete the current cycleway along SH2 (it currently ends approximately 1km south of the Petone Interchange) and improve the quality of the riding surface and drainage. As a result of this project, there will be a completed cycleway between Thorndon (on the outskirts of the CBD) and Petone. Table 4-6 shows how the proposed project will meet the evaluation criteria.

- **Table 4-6 Objectives met with Development by completing the existing pedestrian and cycleway**

Objective	Summary
Ensure Environmental Sustainability	Reduced environmental impacts by potentially moving people from vehicles onto cycles.
Assist in Economic and Regional Development	More novice cyclists who currently use private vehicles may consider cycling to and from Wellington City. This may lead to a reduction in the number of motor vehicles on the network and may improve travel times. A completed cycleway may form part of a “greater” cycle facility. This could be promoted as a tourist attraction.
Assist in Safety and Personal Security	Attracting people from private motor vehicles onto cycles will reduce the overall number of VKT.
Improve Access, Mobility and Reliability	More novice cyclists, who currently use private vehicles, may consider cycling to and from Wellington City. Travel times may reduce as motorists choose to cycle rather than travel via private motor vehicle. This will reduce crash exposure to nervous or novice cyclists
Protect and Promote Public Health	A completed pedestrian and cycling link between Petone and Hutt Road may attract new cyclists (both commuter and recreational) and reduce the number of vehicles on the network.



The benefits of the project are shown graphically in Figure 4-5 as follows.



■ **Figure 4-5: Benefits of Completing Existing Cycleway**

“Beach to Bush” Crossing of SH2

This project will implement the “beach to bush” crossing which will provide a link for walkers and cyclists between the Korokoro side of SH2 and the Petone side. The key evaluation objectives met as a result of this project are summarised in Table 4-7.

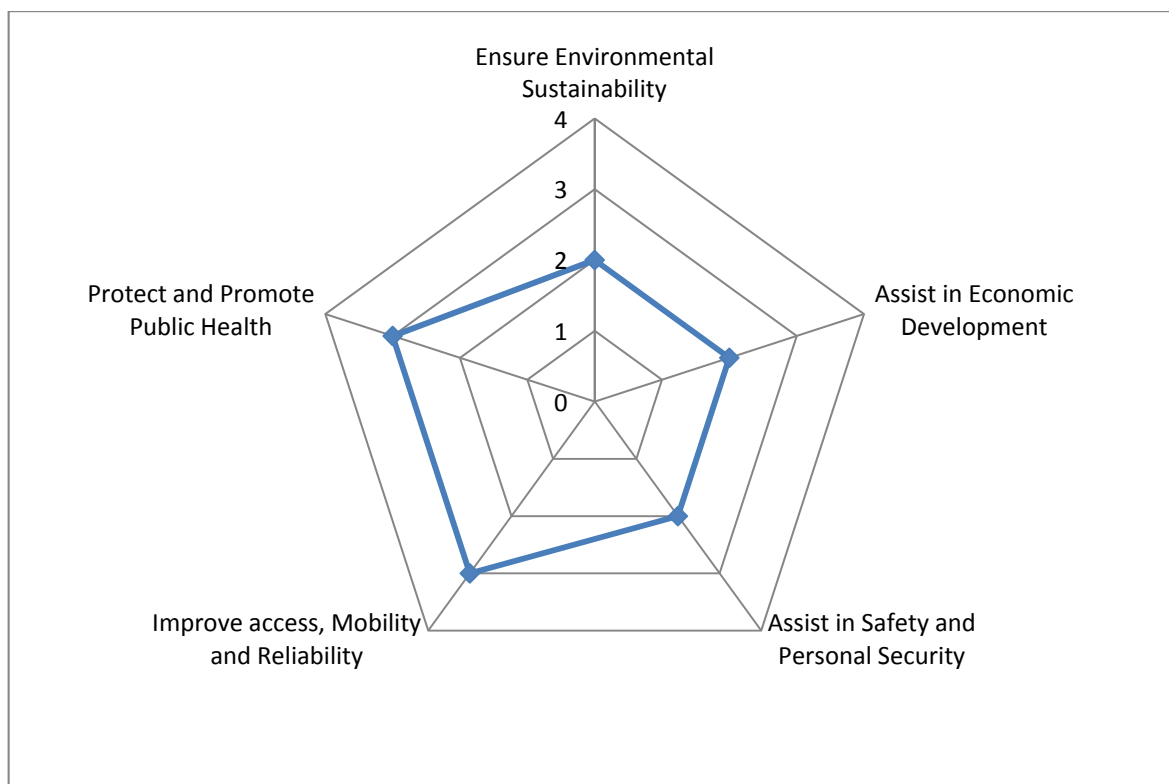
■ **Table 4-7: KPI met with Development of the Beach to Bush Crossing**

Objective	Summary
Ensure Environmental Sustainability	This crossing could promote active mode access to regional parks and improve community cohesion.
Assist in Economic and Regional Development	Negligible
Assist in Safety and Personal Security	Provide a safe route for walkers and cyclists across SH2 and will improve access to the regional park.
Improve Access, Mobility and Reliability	May attract walkers and cyclists and will give improved access to the regional park from the



Objective	Summary
	Petone side of SH2. Access will also be improved to the Korokoro community.
Protect and Promote Public Health	Will improve access to the regional park and promote walking and cycling in the region.

The benefits of the project are shown graphically in Figure 4-6 as follows.



■ **Figure 4-6: Benefits of the Beach to Bush Crossing**



4.2.2. Options Rejected from Long List

Additional General Purpose Reversible Lane or Shoulder

Previous studies have shown that a merge of three lanes with two lanes south of Ngauranga (at the intersection of SH1 and SH2) is not desirable as this will lead to significant congestion. Even if Aotea Quay is eventually upgraded to eight lanes the merging of three and two lanes into four lanes results in unacceptable congestion. As a consequence this project will not be investigated any further.

The high level assessment (in Appendix A) undertakes an evaluation for the general purpose reversible lane or shoulder and as it was immediately apparent that a reversible was not going to work, no further evaluations of the permutations listed below were undertaken.

- Peak General Purpose Reversible Lane in existing carriageway
- Additional Reversible Bus Lane
- Additional Reversible Truck Way
- Additional Reversible HOV (2+) Lane
- Additional Reversible HOV (3+) Lane

Peak Time HOV (2+) Lane in existing carriageway

Estimates³ of vehicle occupancies, within motor vehicles, has shown that approximately 30% of vehicles on the network may have two or more occupants per vehicle. Along this section of the highway there are only two lanes in each direction; making one of these lanes an HOV lane will mean that all vehicles with less than two occupants will be forced into the remaining lane. This will add significant demand to the only remaining lane resulting in increased congestion and deterioration of travel times and travel time reliability for motorists in this lane. Enforcement of this type of vehicle lane can also be expensive and difficult. Due to the substantial delays and increases in travel time this project will not be considered any further.

Peak Time HOV (3+) Lane in existing carriageway

Estimates⁴ of vehicle occupancies, within motor vehicles, has shown that approximately 6% of vehicles on the network may have three or more occupants in a vehicle. Along this section of the highway there are only two lanes in each direction; making one of these lanes an HOV lane will mean that all vehicles with less than three occupants will be forced into the remaining lane. This

³ Calculations carried out by SKM with data provided from Greater Wellington Regional Council.

⁴ Calculations carried out by SKM with data provided from Greater Wellington Regional Council.



will add significant demand to the only remaining lane resulting in increased congestion and deterioration of travel times and travel time reliability for motorists in this lane. Enforcement of this type of vehicle lane can also be expensive and difficult. Due to the substantial delays and increases in travel time this project will not be considered any further.

Peak Time Bus and Truck Way in existing carriageway

Although this project will greatly improve the travel times and options for public transport and trucks along the state highway corridor it will have a significant impact on travel times and travel time reliability for all other road users. Buses and HCV's make up approximately 15%⁵ of the total traffic on this section of road. Creating a bus and truck only lane will mean that the traffic that normally would have used this lane, will now be redistributed over the remaining lane. This will have a significant impact on the travel times and will cause significant delays. These types of delays are considered unacceptable and for this reason this project should not be considered any further.

Peak Time Bus, Truck and HOV (2+) Lane in existing carriageway

As has been previously stated, the bus and HCV vehicles make up approximately 15% of vehicles on this section of the network and HOV 2+ make up an additional 30% of vehicles. This will mean that approximately 45% of vehicles will be entitled to use the lane. Along this section of the motorway there are only 2 lanes, so by implementing this project, traffic will be redistributed with HOV, Buses and HCV's (45%) in one lane and all other vehicles (55%) in the second lane. This project will generate few benefits and will be difficult to enforce; for this reason the project will not be considered any further.

Road Realignment for a 105km/h design speed;

The road realignment will be a significant undertaking involving large scale construction works and coastal reclamation. The environmental effects created by a realignment of the road would be significant from the coastal reclamation required. Impacts from reclamation on marine ecology and the visual impact on the harbour would be significant. It is considered that if this work is to be carried out, it would be better to design the road to a higher standard (120km/h) and also incorporate the realignment of the rail and pedestrian/cycleway on the seaward side of the railway.

⁵ Data averaged from the NZTA Traffic Volumes Monthly Report March 2009 and the State Highways Traffic Volumes booklet 2003 to 2009 (averaged at various locations)



Rail realigned for 105km/h design speed;

The rail realignment will be a significant undertaking involving large scale construction works and coastal reclamation. The environmental effects created by a realignment of the rail would be significant from the coastal reclamation required. Impacts from reclamation on marine ecology and the visual impact on the harbour would be significant. It is considered that if this work is to be carried out, it would be better to design the rail to a higher standard (120km/h) and also incorporate the realignment of the road and construction of pedestrian/cycleway on the sea side of the rail.

No change for cycles and pedestrians;

The current cycleway between Petone and Ngauranga is incomplete and means that cyclists travel along the shoulder for approximately 1km. Novice cyclists are not comfortable on the shoulder and there are a range of safety issues for northbound cyclists. It is considered that the current cycleway is unsafe and, as a minimum improvement, the “missing section” should be completed. For this reason, leaving the cycleway as is will not be considered any further.

Cycles and pedestrians on train - banned from road;

Banning cyclists from this section of the highway will have impacts on the available modes of travel between Petone and Wellington City. Previous work has estimated the number of cyclists using the present facility is approximately 430⁶ per day. It is considered that banning this number of cyclists will be unacceptable and will severely reduce cycling numbers between Petone and Wellington City. This is considered unacceptable and for this reason this option will not be considered any further.

Cycles and pedestrians use hard shoulders;

Having cyclists using the shoulder presents significant safety issues for both cyclists and motorists. This is considered unacceptable and for this reason this option will not be considered any further.

Pedestrians and cycles benched into hillside above SH2;

The difficult horizontal and vertical alignment and stability along the hillside makes it difficult to achieve a cycleway that is acceptable for commuter cyclists. There are approximately 430⁶ cyclists that travel on the existing shoulders or cycling facilities between Petone and the Ngauranga Interchange on a typical weekday, the majority of these are commuter cyclists. There are also cultural and heritage sites along the route and significant bush along the escarpment that are identified in the Wellington District Plan. There is also increased susceptibility to climate change

⁶ Ngauranga to Petone Cycleway – Scheme Assessment Report carried out by Opus dated May 2006



impacts from storms and a significant change in the visual character of the hillside. Because of these issues, this option is considered unacceptable and will not be considered any further.

Six Laning of SH2 between Ngauranga and Petone

This project would involve the widening of the State Highway on both sides to provide an additional lane in both directions between Ngauranga and Petone. Extensive reclamation works on the seaward side of the State Highway and significant engineering to cut into the rock face on the opposite side on parts of the highway would be required. The costs for this would be prohibitively expensive. There could also be significant effects on regenerating native bush on the land side of the route, marine ecology and landscape effects. Because of the above it could be difficult to gain resource consent. Finally, the effects of weaving and merging movements to and from the inside lanes of the road would be to such an extent that it would negate any capacity benefits sought by the provision of the extra lanes. For these reasons this project will not be considered any further.



4.3. Cross Valley Link

4.3.1. Options taken through to Short List

The Esplanade and Jackson Street West 30 kph traffic calming and posted speed limit, permit required for heavy vehicles

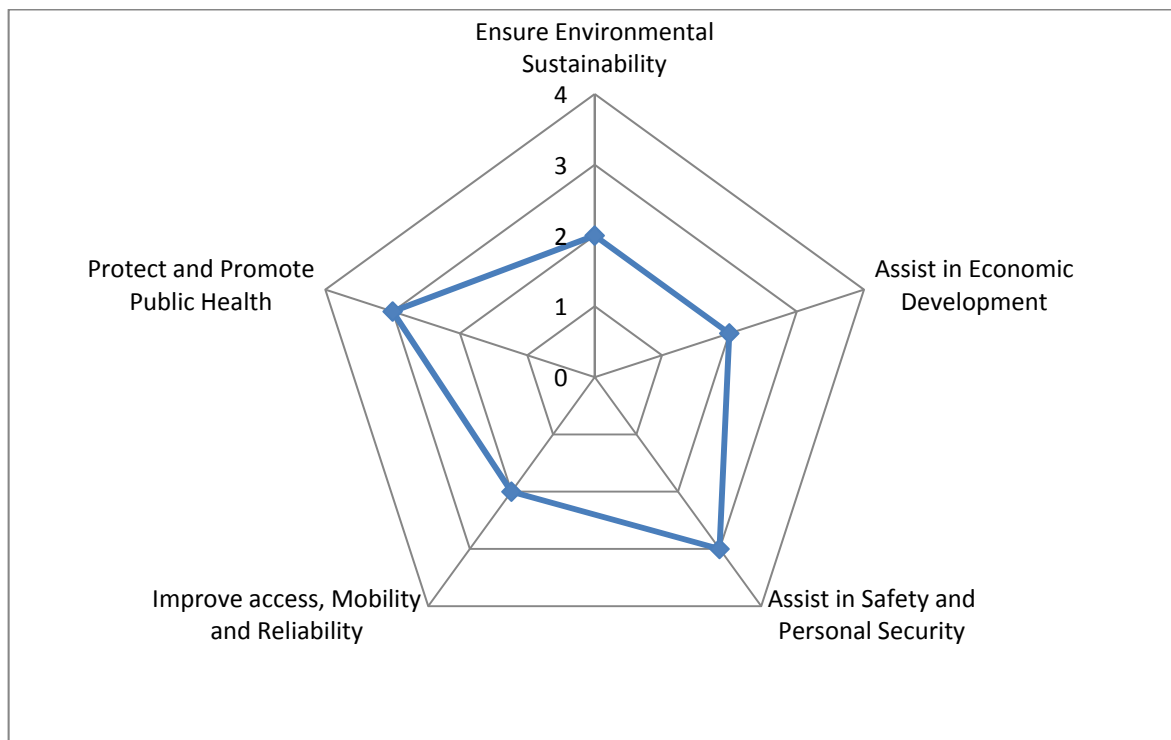
This project would implement traffic management measures (such as speed calming features) and regulate access for HCV's along The Esplanade (between the Hutt Road/The Esplanade/SH2 roundabout and Cuba Street) as well as traffic calming along Jackson Street West. It is expected that this work will create a time penalty and discourage motorists for using this as their preferred route of travel; improving the amenity of The Esplanade. This project could be implemented independently or in combination with one of the projects below. Table 4-8 summarises the benefits this project will provide.

■ **Table 4-8: Objectives met with Development of Traffic Calming along The Esplanade and Jackson Street**

Objective	Summary
Ensure Environmental Sustainability	This option may be able to improve community cohesion and provide improved access to the Petone foreshore. There is also a possibility to improve the existing environment through specimen planting along the route and improving planning controls over time to allow for redevelopment of the land uses.
Assist in Economic and Regional Development	May assist in reducing the number of HCV's and commuter vehicles travelling along The Esplanade west of Cuba Street. This will allow the redevelopment and integration of the foreshore; and could attract additional tourist and recreational activity which will make this area more productive.
Assist in Safety and Personal Security	Reducing the number of HCV's travelling along The Esplanade will improve safety for those accessing and using the foreshore area. This traffic will be diverted down other routes within Petone and this may lead to a reduction in safety in these areas. Additionally, routing HCVs along a purpose built road improves safety for trucks.
Improve Access, Mobility and Reliability	May lead to a reduction in the number of HCV's travelling along The Esplanade, improving the safety of the area and "attractiveness" for walkers and cyclers.
Protect and Promote Public Health	Reducing the number of HCV's along The Esplanade will mean that the foreshore is more accessible to the public attracting walkers and cyclers to the area.



The benefits of the project are shown graphically in Figure 4-7 as follows.



■ **Figure 4-7: Benefits of Traffic Calming**

Wakefield to Whites Line Alignment

This project will involve improvements to the existing alignment and construction of additional road and bridge to create a link along Wakefield Street, across the Hutt River and along Whites Line connecting to Randwick Road. This route would be a 4 lane road with an operating speed of 70km/h. Table 4-9 provides a summary of the evaluation criteria met as a result of implementation of this project.

■ **Table 4-9: Objectives met with Development of the Wakefield’s to Whites Line Alignment**

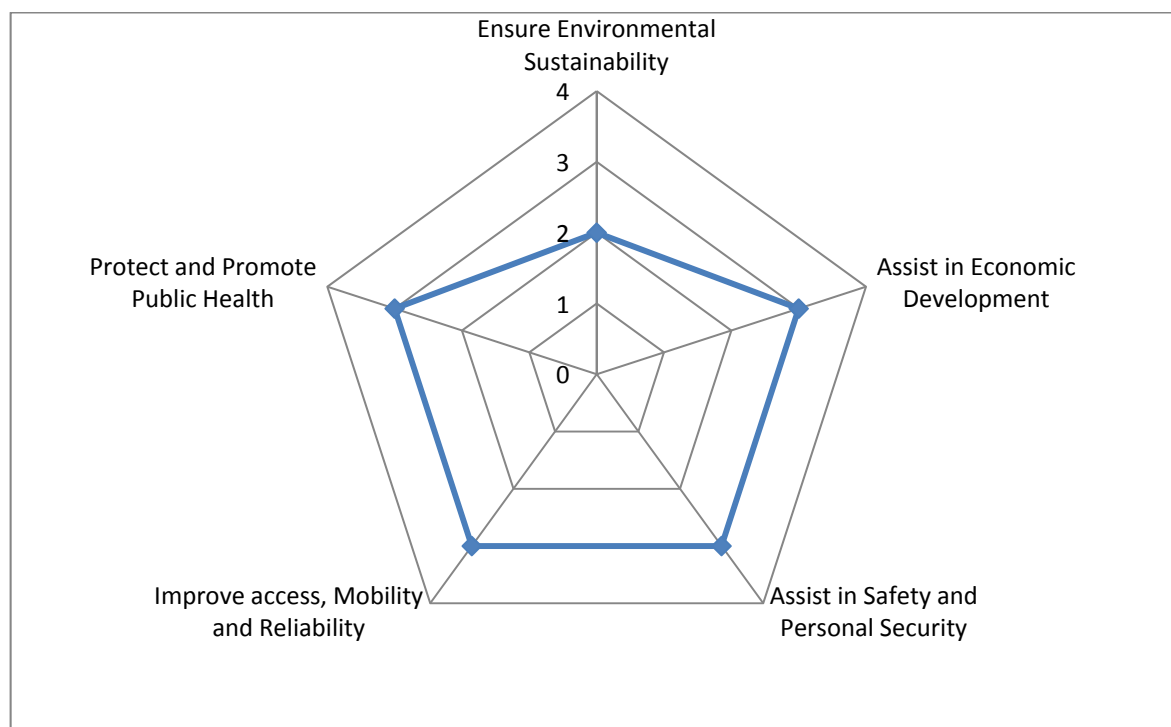
Objective	Summary
Ensure Environmental Sustainability	This project supports the Petone amenity values along Petone foreshore as traffic is moved from The Esplanade to the new link. However, negative effects may manifest such as community severance east of the bridge and noise effects for the surrounding community near the new road alignment. Schools and residential areas would be affected and the new bridge may affect river passage.



Objective	Summary
Assist in Economic and Regional Development	This project provides improved access and capacity for vehicles accessing the Seaview and Gracefield area. This will reduce the cost of transport serving Seaview/Gracefield enabling production to be more efficient. Further, this route provides for agglomeration of the Seaview/ Gracefield area into the wider region. Added road capacity and increased speed will lead to a reduction of travel time. Will provide an alternative route to using The Esplanade (especially if traffic calming is put in place) and will improve the amenity of the foreshore area, this may attract new development.
Assist in Safety and Personal Security	This project (especially if implemented in conjunction with traffic calming) will assist in removing traffic from The Esplanade, allowing safer access to the foreshore area and provide traffic with a purpose built road designed to be safe.
Improve Access, Mobility and Reliability	Removing heavy commercial vehicles from The Esplanade will improve access for those wishing to make use of the foreshore area. The new route will improve capacity and travel times to the Seaview area.
Protect and Promote Public Health	Removing vehicles from The Esplanade will make the foreshore more accessible to the community, and may encourage an increase in walking and cycling.



The benefits of the project are shown graphically in Figure 4-8 as follows.



■ **Figure 4-8: Benefits of the Wakefield to Whites Line Project**

Wakefield to Rail Alignment

This project increases capacity on the Wakefield Street to Cuba Street route by providing a 4 lane road with an operating speed of 70km/h. Just east of Cuba Street the proposed road continues adjacent to the rail corridor and continues along this alignment until the Hutt River. At the Hutt River crossing, improvement works would be undertaken and a new bridge constructed to allow the new road to traverse the river and continue on to connect with Randwick Road. Table 4-10 provides a summary of the evaluation criteria met as a result of implementation of this project.

■ **Table 4-10: Objectives met with Development of the Wakefield’s to Rail Alignment**

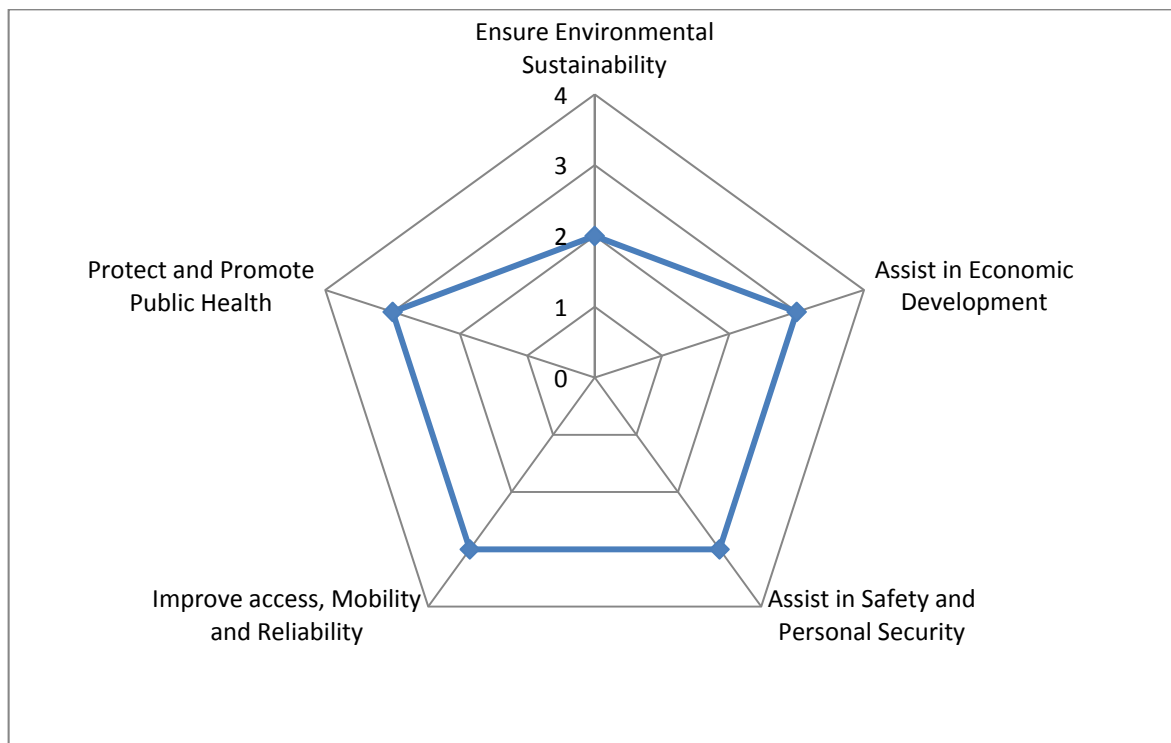
Objective	Summary
Ensure Environmental Sustainability	This road could provide for future redevelopment of the Petone foreshore. The use of the rail bridge over Whites Line also provides for reduced effects on the surrounding community past the bridge.
Assist in Economic and Regional Development	This road may improve access and capacity for vehicles accessing the Seaview/Gracefield area. Added capacity and increased speed may reduce travel times during peak periods. This road will



Objective	Summary
	provide an alternative route to The Esplanade and improve the amenity of the foreshore area, this may attract new development. This will reduce the cost of transport serving Seaview/Gracefield enabling production to be more efficient. This road provides for agglomeration of the Seaview/Gracefield area into the wider region.
Assist in Safety and Personal Security	This project (especially if implemented in conjunction with traffic calming) will assist in removing traffic from The Esplanade, allowing safer access to the foreshore area and provide traffic using Wakefield Street a purpose built road designed to be safe.
Improve Access, Mobility and Reliability	Removing HCV's from The Esplanade will improve access for those wanting to make use of the foreshore area. The route will also improve capacity and travel time to the Seaview area.
Protect and Promote Public Health	Removing vehicles from The Esplanade will mean that the foreshore is more accessible to the community, this may lead to increases in walkers and cyclists.



The benefits of the project are shown graphically in Figure 4-9 as follows.



■ **Figure 4-9: Benefits of the Wakefield to Rail Alignment Project**

Udy Street to Cuba Street to The Esplanade to Waione Street (Udy Street wiggle)

This project will provide a two-way four lane carriageway along existing streets in the Petone CBD. Vehicles will travel along Udy Street, which will have a 70 km/h operating speed, and then onto Cuba Street with a 50km/h operating speed and then along The Esplanade and Waione Street which will both have an operating speed of 60km/h. Table 4-11 provides a summary of the evaluation criteria met as a result of implementation of this project.

■ **Table 4-11: Objectives met with Development of the "Udy Street Wiggle"**

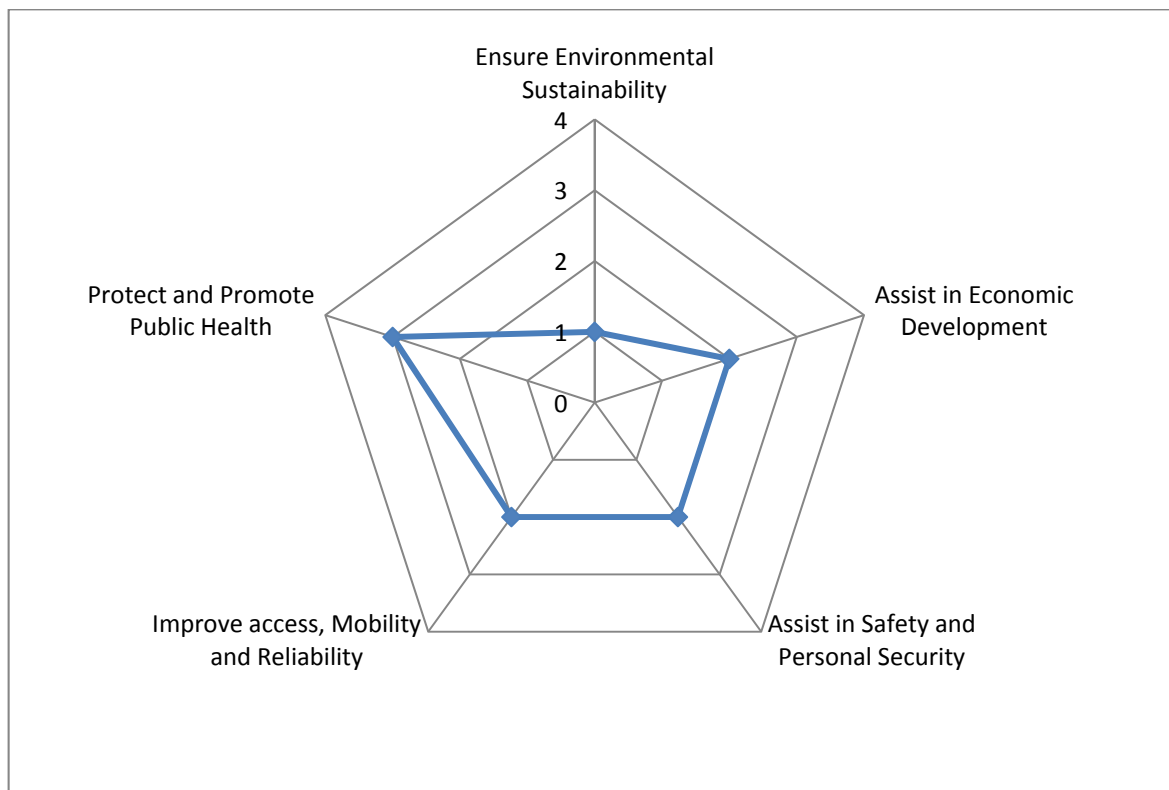
Objective	Summary
Ensure Environmental Sustainability	If this route is developed as a 4 lane option, it would have environmental impacts on the surrounding residential land uses in the area, in terms of noise, air quality and community cohesion. However there are benefits in improving amenity through street design and moving the route away from The Esplanade, reducing potential coastal hazards and allowing for redevelopment of the area.
Assist in Economic and Regional Development	The project may assist in removing Heavy Vehicles and commuter traffic from The Esplanade and



Objective	Summary
	allow development of the area. It is not expected that there will be significant changes in the travel times as the option results in a longer travel distance (when compared with The Esplanade - however Udy Street will have increased speed and additional capacity). The operating cost of transport serving Seaview/Gracefield may reduce slightly enabling production to be more efficient.
Assist in Safety and Personal Security	Removing HCV's from The Esplanade will allow safer access to the foreshore from the Petone CBD. Providing a well designed purpose built facility along this link will assist in improving the safety along the link however the new route will have traffic travelling directly through the CBD and this may present a number of safety issues.
Improve Access, Mobility and Reliability	Removing HCV's from The Esplanade will assist in making the foreshore area more accessible to the public. Increased speed and capacity along the new route may improve the accessibility of the Seaview area from SH2.
Protect and Promote Public Health	Improving access to the foreshore may attract walkers and cyclists and will improve the facility for those currently using the area. This will also mean that traffic is diverted through the town area and local streets, resulting in negative safety effects.



The benefits of the project are shown graphically in Figure 4-10 as follows.



■ **Figure 4-10: Benefits of the "Udy Street Wiggle" Project**

Wakefield to Rail Alignment with connection to Elizabeth Street

This project would increase capacity on the Wakefield Street to Cuba Street route by providing a 4 lane road with an operating speed of 70km/h. Just east of Cuba Street the proposed road would continue adjacent to the rail corridor and continue along this alignment. At the Hutt River crossing, improvement works would be undertaken or a new bridge constructed to allow the new road to traverse the river. The new road would then pass Randwick Road (most likely on a viaduct structure) and connect with Elizabeth Street. Table 4-12 provides a summary of the evaluation criteria met as a result of implementation of this project.

■ **Table 4-12: Objectives met with Development of Wakefield to rail alignment with connection to Elizabeth Street**

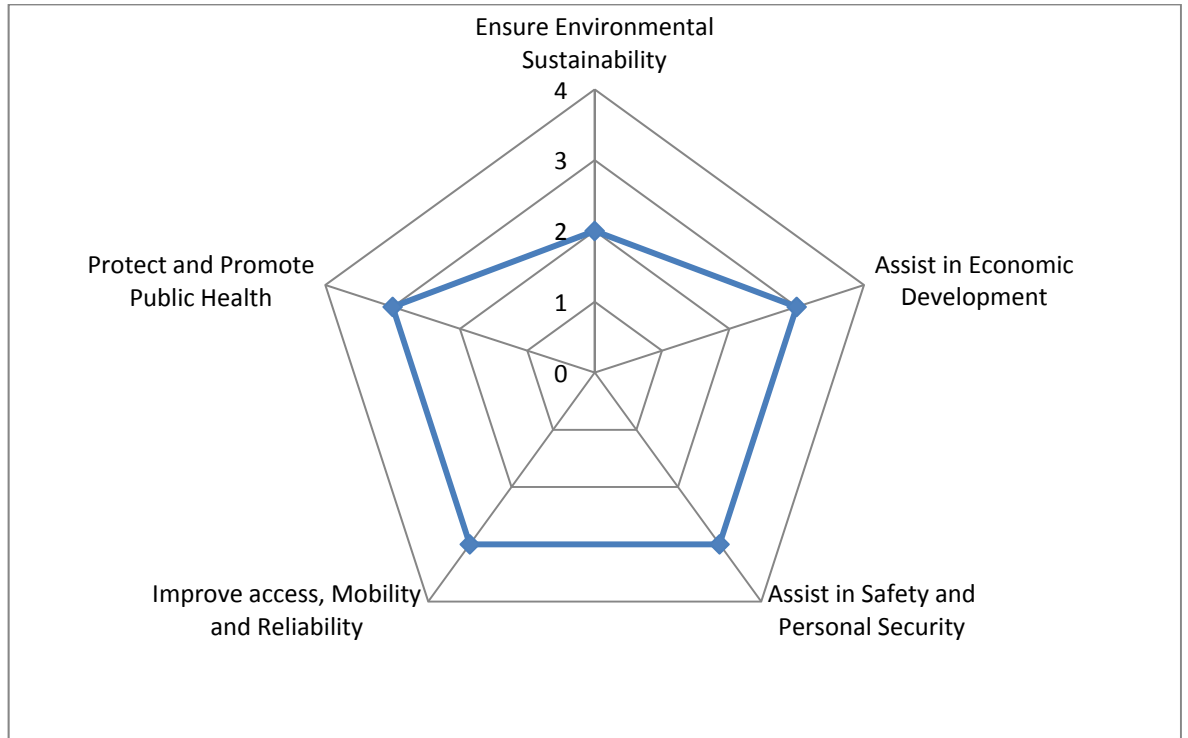
Objective	Summary
Ensure Environmental Sustainability	This route would provide for future redevelopment of the Petone foreshore area.
Assist in Economic and Regional Development	This road will improve access and capacity for vehicles accessing the Seaview/Gracefield area. Added capacity and increased speed will lead to a reduction of travel times and improve travel time reliability during peak periods. This project will



Objective	Summary
	provide an alternative to The Esplanade (especially if traffic calming is put in place) and will improve the amenity of the foreshore area, which may attract new development. This will reduce the operating costs of transport serving Seaview/ Gracefield enabling production to be more efficient. This route provides for agglomeration of the Seaview/Gracefield area into the wider region.
Assist in Safety and Personal Security	This project (especially if implemented in conjunction with traffic calming) will help assist in removing traffic from The Esplanade, allowing safer access to the foreshore area.
Improve Access, Mobility and Reliability	Removing HCV's from The Esplanade will improve access for those wanting to make use of the foreshore area. The new route will also improve capacity and travel time to the Seaview area.
Protect and Promote Public Health	Removing vehicles from The Esplanade will mean that the foreshore is more accessible to the community, this may lead to an increase in walkers and cyclists.



The benefits of the project are shown graphically in Figure 4-11 as follows.



■ **Figure 4-11: Benefits of the Wakefield to Rail Alignment with connection to Elizabeth Street Project**



4.3.2. Additional Options for the Short List, not considered as part of Long List

Clockwise and anti clockwise one way options for the Cross Valley Link

This option was developed at the workshop and allows unrestricted one way traffic flow in one direction along The Esplanade with the other direction of flow provided by the “Udy Street Wiggle”. On each of these roads the counter flow is permitted but is subject to traffic calming. This reduces the volume of traffic on The Esplanade by reducing traffic in one direction. This can be done in two ways depending on which direction you leave traffic flowing on The Esplanade and which direction you traffic calm. The advantage is that there is no need for any new bridges. The disadvantages include lack of efficiency in the “Udy Street Wiggle” and lack of clarity for the public in route selection. This option has not been formally assessed as part of the long list as it was developed at the workshop, but will be taken to the short list for further assessment.

The Esplanade with four lanes and 50km/h.

This option upgrades The Esplanade to four lanes for the entire length of the road.

Ramp Signalling

Ramp signalling can be considered on the Petone onramp in the morning peak. This project has synergies with the Cross Valley Link and would assist in removing traffic from The Esplanade.



4.3.3. Options Rejected from Long List

Udy Street to Manchester Street to Golf course

Manchester Street is a small local road within a residential area; providing a 4 lane link along this route will require significant property purchases and will have a significant impact on the local residents in terms of noise, vibration, potentially air quality and community severance. This project would also cut through the local golf course, severely impacting on this community facility. In addition, part of the road would be located within a flood hazard zone. As a result of the impact on local residents, the golf course and the susceptibility of the road to flood hazards, this option will not be considered any further.

Udy Street to Cuba Street to Jackson Street east to Waione Street.

This option follows a similar route to the Udy Street wiggle (described above), passing through a residential area. This would result in noise, vibration and possible air quality effects for this community. It would also sever the community and impact on current master planning work occurring by Housing New Zealand Corporation to improve their housing stock in the area. Part of the route is also affected by contaminated land and much of the area by The Esplanade is currently under treaty claim. The Udy Street wiggle offers a similar road without the need to pass through a residential area. Due the impacts on the community and the similarities that this option has with the Udy Street wiggle, this option will not be considered any further.

Udy Street to Manchester Street to Golf Course to Halford Place to Waione Street

Manchester Street is a small local road within a residential area, providing a 4 lane link along this route will have a significant impact on the local residents in terms of noise, vibration, and possible air quality and community severance. There will be significant property purchases required for a four lane link. This project will also cut through the local golf course, severely impacting on this community facility. In addition, part of the road would be located within a flood hazard zone. As a result of the impact on local residents, the golf course and the susceptibility of the road to flood hazards, this option will not be considered any further.

Two Lane The Esplanade

This project would significantly reduce the capacity of The Esplanade and result in significant increase in congestion and delays to motorists particularly during peak periods. Increased congestion and travel time reliability will be unattractive to development in the Seaview area. The option would not assist in reducing the volume of heavy vehicles along The Esplanade as there is no alternative route. It is unlikely this option will encourage walking and cycling as a consequence of the reduced amenity of The Esplanade.



4.4. Petone Area to Grenada Area Options

4.4.1. Options taken through to Short List

This part of the project has been considered as a number of links as outlined in Figure 2-4, during the workshop a number of the links were eliminated (for reasons described in section 4.4.2) and this led to a “completed link” with a number of variations at either end. The proposed route will have a connection at the Tawa Interchange; it will then pass south to the boundary of Lincolnshire Farm (A1). The route passes through Lincolnshire Farm on the path designated by the “Lincolnshire Farm Structure Plan dated 2001” (B3). The route continues south east towards SH2 between Horokiwi Road and the Horokiwi Quarry (C3). Approximately 150m from the intersection of SH2, it will continue north east, running parallel to SH2 (D5). Table 4-13 below provides a summary of the evaluation criteria met as a result of implementation of this project.

■ **Table 4-13: Objectives met with Development of the proposed link road**

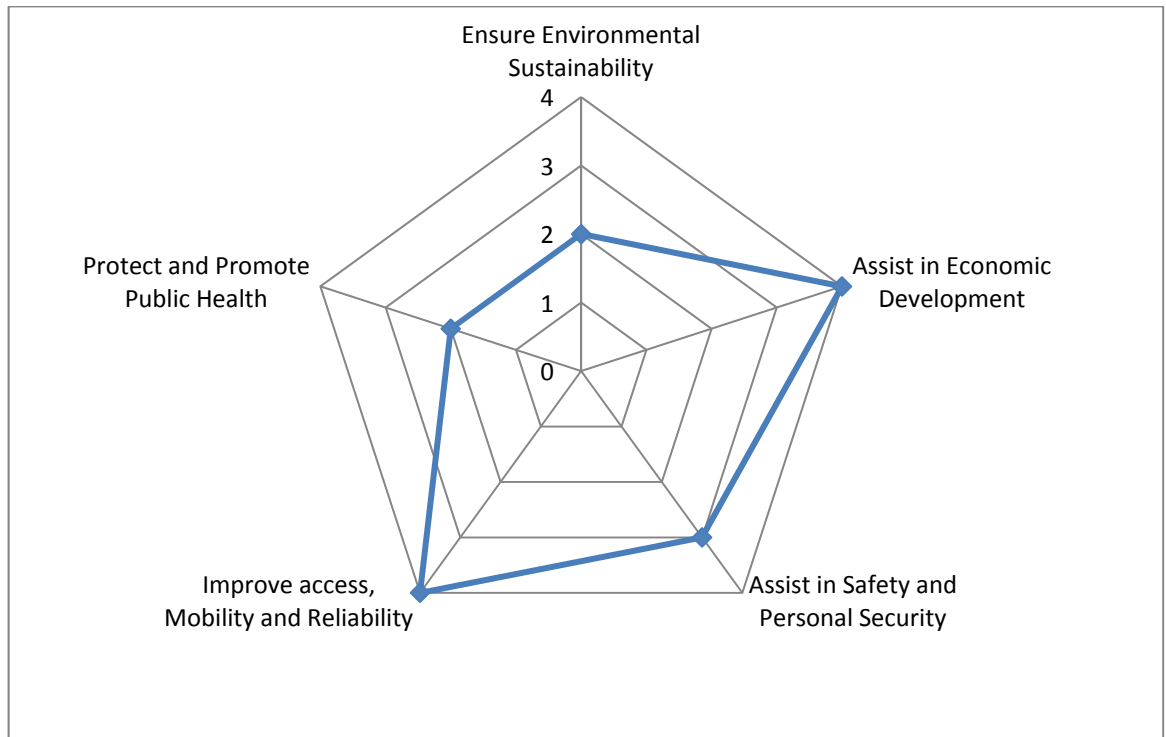
Objective	Summary
Ensure Environmental Sustainability	Route travel distance may be shortened improving community cohesion and potentially reducing environmental impacts (air and noise impacts) on State Highway 1 and 2. However, there are adverse impacts that need to be mitigated including locating the road to ensure contaminated land is successfully addressed and ensuring recreational values are not compromised through Belmont Regional Park.
Assist in Economic and Regional Development	A direct link between SH1 and SH2 will assist in reducing the travel time and travel time variability between SH1, SH2 and the Seaview area, and will reduce the overall travel times on the network. Reducing travel times to and from the Seaview area may attract new development in the area and this will have positive economic benefits. A direct route will reduce the travel costs and will increase the efficiency of production in this area. This will save money for businesses and will allow for reinvestment, increasing economic activity. The proposed road will pass through the Lincolnshire Farm area (and in particular the industrial area of this development) and will assist in promoting development in the area. As the link continues alongside the quarry there may be reduced waiting (and travel) times at the Horokiwi Road Intersection with SH2 for trucks seeking access to and from the quarry. This link will also assist in regional agglomeration.
Assist in Safety and Personal Security	The link road will provide a shorter travel distance between SH2 and SH1. This will assist in reducing the overall VKT on the network. Which reduces crash exposure on a VKT basis



Objective	Summary
<p>Improve Access, Mobility and Reliability</p>	<p>Will provide an alternative route between SH1 and SH2, adding resilience to the network as well as reducing travel times and travel time variability between SH1, SH2 and the Seaview area. There will be a travel time reduction on the rest of the network as congestion decreases (as a result of the alternative route). The link will pass through the Lincolnshire Farm Development providing access to the industrial area of this development and near to the Horokiwi Settlement and the quarry. The link will be designed to accommodate cyclists and there is a possibility of providing walking tracks to and from areas of interest (historical areas, regional parks etc). Importantly it provides opportunity for direct bus services between Wellington north and the southern Hutt Valley</p>
<p>Protect and Promote Public Health</p>	<p>As described above this link will be designed to accommodate cyclists and may attract people from private vehicles to bicycle. Access to the regional parks will be improved, and this may be complemented by walkways to and from this and other areas of interest such as historical and cultural locations.</p>



The benefits of the project are shown graphically in Figure 4-12 as follows.



■ **Figure 4-12: Benefits of the Link Road**

The following options are the different options for connections at either end of the link road described above. These will be further analysed in the short list option assessment.

- Connection between the Johnsonville Interchange and Lincolnshire Farm
- Connection to Petone near the Petone Interchange
- Connection to SH2 near the Petone Interchange
- Connection to both SH2 and Petone near the Petone Interchange
- Connection to the Dowse Interchange



4.4.2. Options Rejected from Long List

B1 – A connection north of the Lincolnshire Farm Development

This link is not compatible with the other sections of the Lincolnshire Farm area, as it does not encourage movement into this area to support the industrial land uses, suburban centre and residential development. It encourages cross movement from Petone to Grenada but does not address other connectivity issues such as supporting Lincolnshire Farm.

The option also traverses Belmont Regional Park, which would have significant adverse effects on the recreation and ecological values of the park. It encourages vehicle movements through communities in the Western Hutt Hills which could result in community severance issues. Consenting for this route would be very difficult and as such this option has not been considered any further.

B2 – Connection through the northern section of the Lincolnshire Farm Development

This link, while closer than B1, is not compatible with the other sections of the Lincolnshire Farm area. This is because it does not encourage movement into this area to support the industrial land uses, suburban centre and residential development. It encourages cross movement from Petone to Grenada but does not address other connectivity issues such as supporting Lincolnshire Farm. The B2 route continues down the Korokoro Valley in Belmont Regional Park and this would have serious impact on the ecological and recreation values of the Korokoro Stream. It would impact on the landscape values and affect nearby Korokoro residents through an increase in noise in the area.

It would be difficult to gain consent for this option for the reasons set out above. The balancing of transport benefits and the wider land use issues for the route indicates little or no benefits. As such this option has not been considered any further.

B3 – Connection through the Boulevard Area of Lincolnshire Farm

This link is an important part of the Lincolnshire Farm structure plan as it provides access from the main link into the proposed new centre. As part of future development of the area, this link road will need further development. Placing an expressway through the suburban centre would seriously impact the functionality of the centre. As such the route is not considered any further as an expressway.



C1 – Connection through the Korokoro Community to Dowse

If this connection is provided “above ground” it would run directly through the Korokoro community, for this reason alone this route is considered unacceptable due to adverse social and environmental effects. In addition, the route would traverse Belmont Regional Park, affecting the recreational, environment and social values associated with this section of the park. Overall, consenting would be very difficult to achieve.

There are steep gradients along this route that would make a road with a suitable vertical alignment difficult to achieve. A tunnel along this route would be extremely expensive and is unacceptable in comparison with the alternative options. Because of the above reasons this link will not be considered any further.

C2 - Connection through the Korokoro Community to Petone

This route runs through the Korokoro Valley and the Belmont Regional Park and the environmental impacts are significant. The route would impact on places where the local community meet and in areas used for recreation walking. It would also impact on many streams including the Korokoro Stream and would impact on historical sites - including the old Dam. It would have traffic noise impacts on Korokoro residents that live near ridgelines. There is also the potential to cause long term erosion issues. Gaining consent for this road would be very difficult to achieve. Because of these reasons, this link is unacceptable and will not be considered any further.

D6 – Connection at SH2 and moving of the Highway towards the sea

The proposed route would have steep gradients or batters in order to connect to SH2. Once at sea level this route would require reclamation of the sea bed which would have impacts on marine ecology and require statutory approvals. This connection would be difficult for vehicles travelling southbound and wanting to access the link road. As a consequence this option will not be considered any further.

D7 – Connection at Horokiwi

A connection at Horokiwi will cause unacceptable delays to traffic both on SH1 and SH2. It is near an identified historic land slide which could cause significant geotechnical risks, requiring mitigation. For these reasons it has not been considered any further.



5. Conclusions

As a result of this investigation the following options will proceed through to the short list assessment.

Ngauranga to Tawa:

- Additional southbound bus lane in Ngauranga Gorge; and
- Tawa Interchange safety improvements.

Ngauranga to Dowse:

- “Beach to Bush” crossing of SH2;
- Existing pedestrian and cycleway completed;
- Petone on ramp signalling;
- Ngauranga on ramp signalling;
- Redesign of the Petone Interchange (including provision for cyclists and walkers); and
- 120 km /h road and rail realignment and seaward side cycleway.

Cross Valley Link:

- The Esplanade and Jackson Street West - 30 kph traffic calming and posted speed limit, permit required for heavy vehicles;
- Wakefield to rail alignment following Gracefield rail reserve to Elizabeth Street;
- Udy Street to Cuba Street to The Esplanade to Waione Street (Udy Street wiggle);
- Wakefield to rail alignment;
- Wakefield to Whites Line alignment;
- The Esplanade with four lanes and 70km/h; and
- Clockwise and anti clockwise one way options for the Cross Valley Link.

The Link Road will be considered as outlined with a number of permutations at each end to link in with the existing infrastructure.



Appendix A Long List Preliminary Assessment

The Appendix has been provided as a supplementary document. Please refer to this for the assessment tables.