

# Wellington to Hutt Valley Cycle and Pedestrian Link

Detailed Business Case to proceed from Initiation to Implementation  
New Zealand Transport Agency



14 August 2015



# Wellington to Hutt Valley Cycle and Pedestrian Link

Detailed Business Case - Final Report

Client: New Zealand Transport Agency

Co No.: N/A

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Ecological Assessment, Boffa Miskell, December 2014

Land Requirement Plans and Property Strategy

## Glossary of Terms

Abbreviation	Term
AEE	Assessment of Environmental Effects
AO	Approved Organisation
BCR	Benefit-Cost Ratio
CAPEX	Capital Expenditure
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CPTED	Crime Prevention Through Environmental Design
CVIU	Commercial Vehicles Investigation Unit
D&C	Design and Construct
DE	Design Estimate
EEM	Economic Evaluation Manual
EIR	Environmental Impact Report
EOI	Expression of Interest
EPA	Environmental Protection Agency
FYRR	First Year Rate of Return
GPS	Government Policy Statement
HCV	Heavy Commercial Vehicle
HNO	Highways and Network Operations
HPT	Historical Places Trust
IAP2	International Association for Public Participation
ILM	Investment Logic Map
IRS	Investment and Revenue Strategy
ITS	Intelligent Transport Systems
KPI	Key Performance Indicator
LLR	Lessons Learnt Review
LTMA	Land Transport Management Act
MOU	Memorandum of Understanding
MVKT	Million Vehicle Kilometres Travelled
NES	National Environmental Standards
NIU	National Infrastructure Unit
NLTF	National Land Transport Fund
NLTP	National Land Transport Programme
NOR	Notice of Requirement
NPC	Net Present Cost
NZCID	New Zealand Council for Infrastructure Development



Abbreviation	Term
NZ Transport Agency	The New Zealand Transport Agency
NZTS	New Zealand Transport Strategy
OPEX	Operating Expenditure
P&I	Planning and Investment
PI	Performance Indicator
PMS	Project Management Services
PoPS	Portfolio Procurement Strategy
PPFM	Planning Programming and Funding Manual
PPM	Principal Project Manager
PPP	Public Private Partnership
PT	Public Transport
PWA	Public Works Act
RAMM	Road Assessment and Maintenance Management
RFP	Request for Proposal
RLT	Regional Land Transport
RLTS	Regional Land Transport Strategy
RMA	Resource Management Act
RoNS	Road of National Significance
SAR	Scheme Assessment Report
SE	Scheme Estimate
SH(#)	State Highway (number)
SOI	Statement of Intent
SSC	State Services Commission
SSEMP	Site Specific Environmental Management Plan
TA	Territorial Authority
TDM	Traffic Demand Management
TOC	Total Outturn Cost
VAC	Value Assurance Committee (formerly SSRC)
VMS	Variable Messages Sign
WEBs	Wider Economic Benefits
SH2	State Highway 2
DBC	<i>Detailed Business Case</i>
W2HV	<i>Wellington to Hutt Valley (The Project)</i>

## Executive Summary

### Introduction

The Wellington to Hutt Valley transport corridor is a key strategic transport corridor for the Wellington region. It provides regional connectivity for motorists, freight and public transport on SH1 and SH2, and passengers and freight via the rail network (Wairarapa Line), as well as for cyclists and pedestrians.

Existing conditions for cyclists and pedestrians between Wellington and Hutt Valley are considered poor with the facilities that exist well below current guidelines. As a result cyclists and pedestrians put themselves and motorists at risk on a daily basis, and the recently retrofitted facilities do little to increase the perception of safety nor offer a level of attraction for future users. Access to the corridor is poor within the Wellington and Petone environs and the corridor is also subject to disruptions from storm events.

AECOM NZ Ltd has been commissioned by the NZ Transport Agency (the Transport Agency) to complete a Detailed Business Case (DBC) that investigates options to provide improved cycling and pedestrian facilities between Wellington and the Hutt Valley (W2HV) along the Hutt Road and SH2 transport corridor. The purpose of the DBC is to identify and prepare a recommended option for consenting and the implementation phase.

The DBC is split into two parts.

- **Part A** will develop and assess a range of feasible options through a stakeholder engagement and consultation process; provide a detailed analysis of the costs, risks and benefits; the outputs being scheme level reporting and the preliminary design of a recommended option.
- **Part B** will provide a consenting strategy and programme analysis of the recommended option.

### The Problems – Strategic Case

The problems identified in the draft Strategic Case for the SH2 Corridor between Ngauranga to Te Marua have now formed the problem statement basis for the Project. Although development of the DBC commenced prior to the draft Strategic Case, the problem statements are directly relevant to the Project.

- **Problem 1:** Poor configuration and operational environment of SH2 and associated local network results in poor multi-modal network performance
- **Problem 2:** High traffic volumes and insufficient network capacity results in peak delay and unreliable journey times that adversely affect regional productivity
- **Problem 3:** Constrained topography, the geology and lack of alternate routes results in poor network resilience

Improved pedestrian and cyclist facilities within the study area are considered to align with the project partners, being:

- Greater Wellington Regional Council (GWRC)
- Wellington City Council (WCC)
- Hutt City Council (HCC)
- Kiwirail

The strategic fit and effectiveness of the P2N cycleway project are assessed as **High**, and the efficiency as **Medium**, as per the project proposed in the NLTP (2012 – 15). A DBC is the recommended way forward in the Strategic Case.

## Objectives and Outcomes

Project objectives seek to provide transport infrastructure to support greater travel choice, increase corridor resilience, and improve safety and connectivity for cyclists and pedestrians along the corridor.

The proposed investment is aligned with governmental strategic objectives and would contribute to outcomes and objectives sought through regional and local transport strategy and policy. The recommended option will improve safety and connectivity for pedestrians and cyclists between Wellington and Hutt Valley. It will also contribute to improving health, and reducing congestion on SH2 through increasing the uptake of walking and cycling, and reducing the number of people that currently drive.

Anticipated transport related project outcomes include:

- Increased numbers of commuter cyclists using the corridor
- Increased numbers of pedestrians, runners and recreational / tourism-related cyclists using the corridor
- Lower accident rates for cyclists along the corridor
- Maintaining or improving journey times for commuting cyclists
- A transport corridor that offers increased resilience against natural events.

## The Project

The focus of the study is to assess a range of feasible options and identify a recommended option that will provide dedicated facilities for cyclists and pedestrians between Ngauranga and Petone. The preferred option must also consider connections north from Petone to Melling and south from Ngauranga to Aotea Quay. It is noted that Wellington City Council are concurrently investigating cyclist and pedestrian options between Aotea Quay and Ngauranga via the Hutt Road. Connections into Wellington city centre are being investigated. The project study area is illustrated in **Figure A.1** (over page).

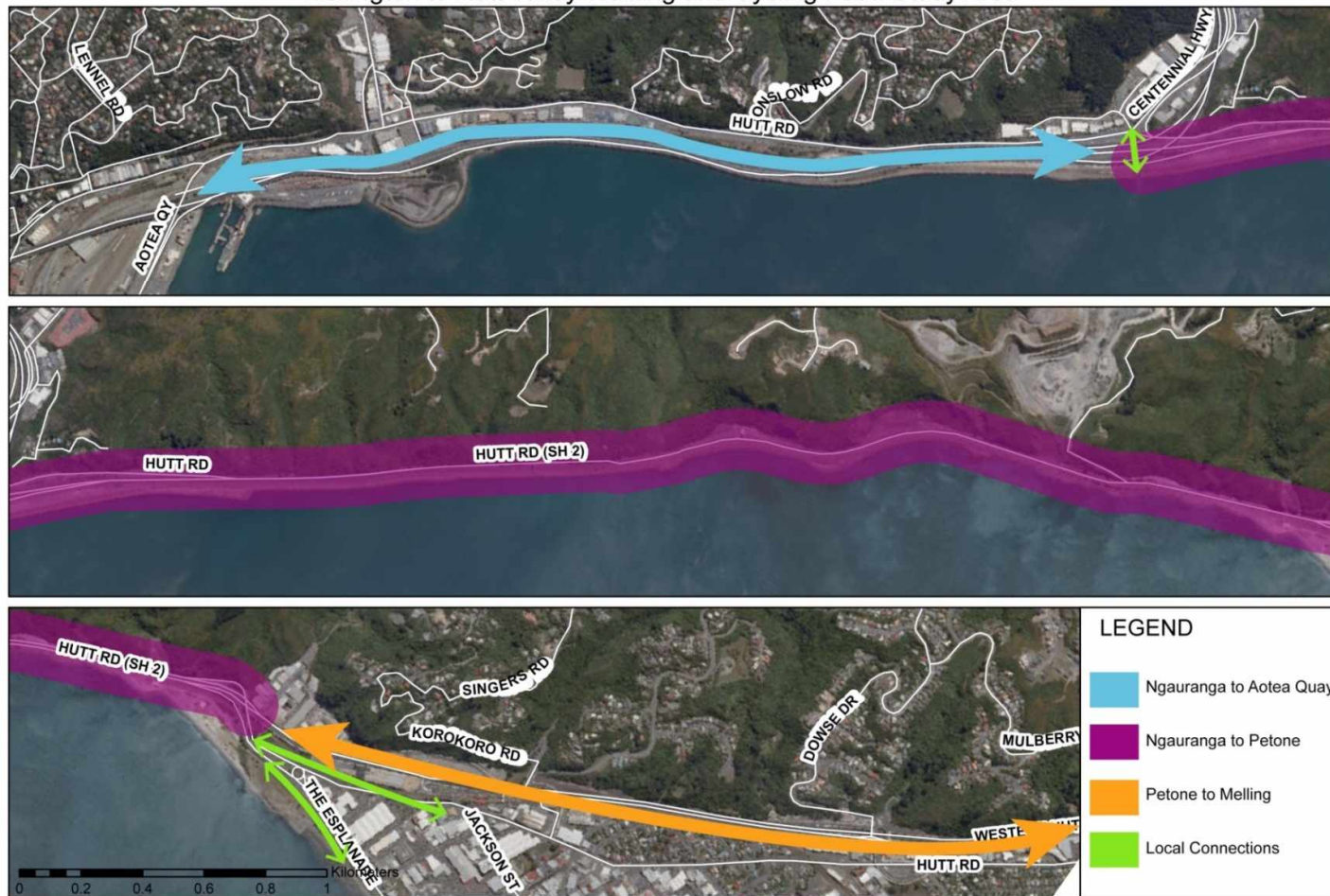
## Project Opportunities

The development of the business case identified a number of significant opportunities that could influence funding and investment outcomes within and adjoining the study area, being:

- The Petone to Grenada Link Road provides an opportunity to improve cycle and pedestrian access and connectivity at the proposed Petone interchange and plans to realign rail. There is potential to use spoil from the project for reclamation purposes.
- The corridor is at risk of the effects from climate change, including rising sea levels and increased occurrence of major storms. The corridor is also susceptible to damage from earthquakes. A response to the resilience issues will look to reduce delays resulting from significant natural events and provide alternative access out of the City during a major earthquake.
- Linking the Rimutaka Cycle Trail from Petone into Wellington City is a significant tourism opportunity. Support from central government was received to include the Petone to Aotea Quay section of the corridor as a potential Wellington Connector of the Cycle Trail, as part of NZ Great Rides.
- International and national changes in attitudes towards cycling as a viable commuter choice for health and enjoyment reasons suggests that the mode share of cyclists and pedestrians along the SH2 corridor could be significantly increased.
- During the first part of 2015 key advisors and councillor feedback has indicated a preference for a seaside platform to be widened up to 15m to 20m for transportation future proofing purposes such as the potential 6 laning of SH2 and straightening of the Hutt Rail Line.
- There is a strong desire to reclaim the coastline “only once” from a stakeholder perspective. It will be critical to determine the timing of when capacity upgrades on SH2 between Ngauranga and Petone might be required, in order to demonstrate why extra reclamation is needed. Investigations are on-going.

Figure A.1: Study Area

Wellington to Hutt Valley Walking and Cycling Path: Study Area



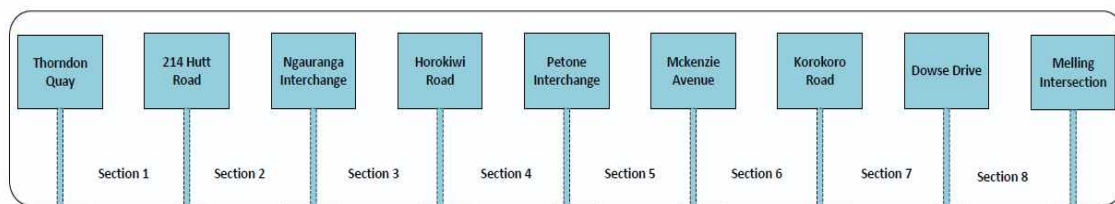
## Option Development

A wide range of options were developed using previous studies, knowledge of more recent strategic assessment and current thinking on cyclist and pedestrian facilities.

A corridor option model was prepared to identify corridor sections of potential key investment opportunity. The following inputs were used to develop the model using a number of key assumptions.

- Calculation of suppressed cyclist and pedestrian demand
- Ability to transfer existing cyclists
- Ability to maximise cycling growth
- Safety improvements

The sections are identified as follows.



This level of analysis allowed an early indication of potential key benefits for the purpose of option development. These are summarised as:

**Sections 1 and 2: Aotea / Thorndon Quay to Ngauranga:** Section 1 offers an opportunity to improve safety conditions and provide connections to local land uses, surrounding suburbs and the Wellington CBD. Section 2 complements the opportunities provided by Section 1.

**Sections 3 and 4: Ngauranga to Petone:** These sections are critical due to the ability to ‘connect’ two existing networks for cyclists and pedestrians. The driver for these two sections is the ability to release suppressed demand and transfer existing users, as well as increasing the actual and perceived safety of the corridor. The design opportunity is either improvements to the existing path (“Roadside”) or along the harbour edge (“Seaside”).

**Sections 5, 6, 7 and 8: Petone to Melling:** These sections contribute ‘connectivity’ to project outcomes. While connectivity to the wider network remains important the relative success of the wider network also influences this project. The issues of connectivity are included in the design response.

### Type of Facility Considered

According to current guidelines and good practice high vehicle volumes and speeds throughout the corridor, including Hutt Road (Wellington), suggest that any cycle facility should be fully separated from traffic (e.g. no cycle lanes). As an objective of the project is also to provide for pedestrians then “path” options offer the most consistent design response to project objectives, being either shared or separated.

Influencers for safe path width include the ability to provide for cyclists and pedestrians in a safe and direct manner that caters for commuters. Where lateral space is limited the minimum recommended standard for a shared path width is no less than 3.0m (AUSTROADS Guidelines as adopted in New Zealand). In locations where adjoining land use results in high numbers of pedestrians it is recommended that a segregated path is provided; the recommendation being 3.0m for cyclists and 2.0m for pedestrians.

The Transport Agency urban design guidelines “Bridging the Gap” also offer guidance on appropriate infrastructure responses. KiwiRail guidelines (updated May 2015) also offer guidance on the provision of paths within or adjoining the rail corridor.

## Stakeholder Engagement

### Enquiry by Design

An 'Enquiry by Design' process aimed to understand the most important design and level of service considerations for cyclists and pedestrians. The most important criteria included avoiding conflict with vehicles, connectivity, vehicle separation and width. The comments raised during the workshop informed the option development, performance indicators and evaluation criteria.

### Consultation

Consultation with stakeholders, including cycle groups, and the public has been undertaken using a variety of media. The key stakeholders of Wellington City Council (WCC), Hutt City Council (HCC), Greater Wellington Regional Council (GWRC) and KiwiRail were represented on the steering group and have therefore been involved throughout the development of options to a recommended option. Public consultation through Open Days and targeted meetings were undertaken on an ongoing basis.

Two route options were presented to consultees, being a "seaside" option and a "roadside" option. The majority of respondents (68%) support a seaside option for the following reasons.

- Consistency of path width.
- Greater amenity benefits to be achieved further from SH2.
- Wider economic benefits including social benefits for the region in terms of tourism, recreation and health benefits.

## Option Evaluation

A high level assessment was undertaken of the long list of options against the agreed project assessment criteria. **Section 6** of the DBC provides full details of the options. The long list of options were subsequently refined through consultation with the stakeholder and working groups.

The final short list of options were agreed as:

- **Option 1: Roadside Option** – utilises existing cycle path at grade
- **Option 2: Roadside Option** – utilises existing cycle path, some of which raised above grade
- **Option 3: Seaside Option**

Cost estimates will be undertaken at "Scheme" (SE) level of detail for Section 3 and 4, and at "Feasibility" level of detail for Sections 1, 2 and 5 – 8.

As each section contains different design options the following summary is provided section by section.

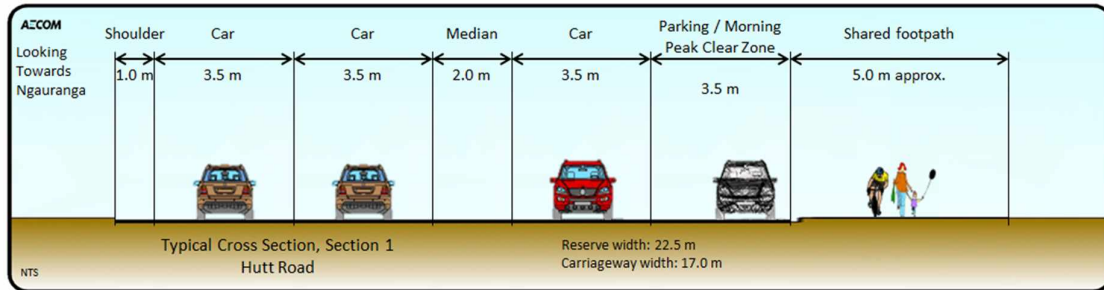
### **Section 1 Hutt Road: Thorndon Quay to Onslow Road**

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Section 1 contains common design elements for both Options 1, 2 and Option 3. These include:

- *Section 1 Option A* – Minor improvements to existing (the default option)
- *Section 1 Option B* - Minor improvements to existing plus indented parking
- *Section 1 Option C* – Minor improvements plus road space reallocation to replace northbound traffic lane with southbound kerbside parking
- *Section 1 Option D* – Minor improvements plus use of southbound traffic lane as a clearway during the morning peak period and as parking outside of clearway operation

### Section 1 Option D



The “Hutt Road Improvement Options Report” (see **Appendices**) identifies Section 1 Option D as a standalone recommended option and passes incremental analysis over Section 1 Option A.

Section 1 Option D can be summarised as having minimal impact on the traffic operation of Hutt Road while providing opportunity to provide customer parking for the businesses located along the Hutt Road.

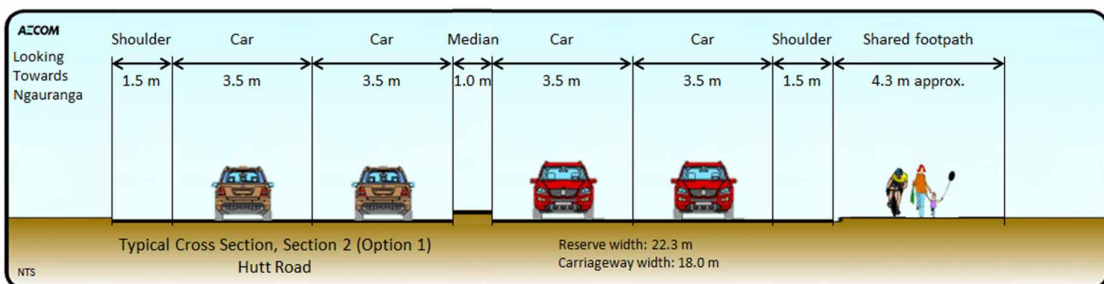
As noted, Wellington City Council is conducting a separate investigation into the potential Hutt Road improvements. The Wellington City Council investigation will also consider a potential seaside option south of Ngauranga, with a potential connection at Kaiwharawhara (along the stream from the seaside option to Hutt Road).

The outcome of the selected option will impact upon the preferred option of the DBC however is expected to support both seaside and roadside options.

### Section 2 Onslow Road to Ngauranga

Options 1, 2 and 3 are identical, as shown in the diagram below. This largely reflects the existing path with improved linemarking.

### Section 2 Option



**Connection Options:** A number of connection options were investigated at the Ngauranga Interchange including the existing rail platform underpass and truck / effluence stop underpass. In term of safety, security and amenity outcomes the existing underpass between Hutt Road and the SH2 / Ngauranga off-ramp was deemed to be the preferred connectivity option.

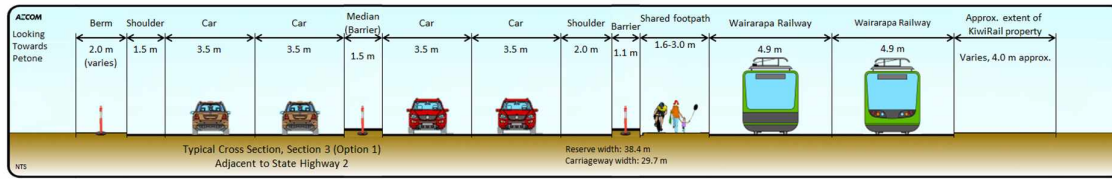
### Section 3 Ngauranga to Horokiwi

#### Roadside Options

Option 1 provides an upgrade to the existing cycle facility at grade. The initial assessment of Option 1 identifies significant obstructions reducing the width in some locations to 1.6m. This option would provide a 3m desirable width for 50% to 60% of the route.

Option 2 provides an upgrade to the existing cycle facility at grade with SH2 (same cross section as Option 1). The main point of difference in raising the facility to the level of the road is increased surveillance by vehicle occupants. Some additional width may result therefore overall safety for users is improved.

**Section 3 Option 1 and 2 (Roadside)**

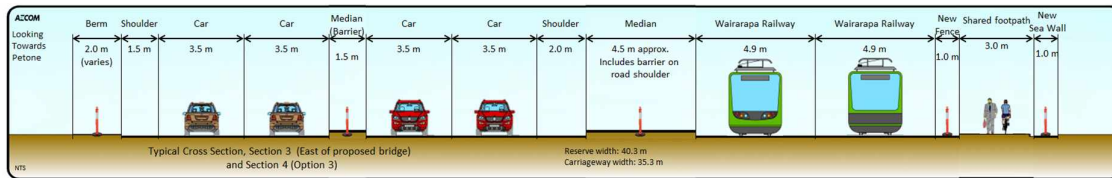


The roadside options along SH2 are generally constrained to a maximum 3.0m maximum width (varies between 1.6 – 3.0m) with minimal lateral clearance.

**Seaside Option**

Option 3 requires land reclamation to construct a shared path. A wider and more consistent facility will be provided which is therefore likely to attract additional future users including pedestrians and recreational users / tourists. This option would provide significant non-transport benefits in terms of economic productivity to the region through recreational / health benefits and tourism value.

**Section 3 Option 3 (Seaside)**



The seaside option can be designed to accommodate a 3.0m minimum width path plus lateral clearance. This option is more likely to result in an attractive facility for beginner cyclists plus pedestrians / runners and non-commuter users. As the facility would experience a degree of tidal flow during peak periods the path would provide a relatively high level of service for commuter cyclists during these times.

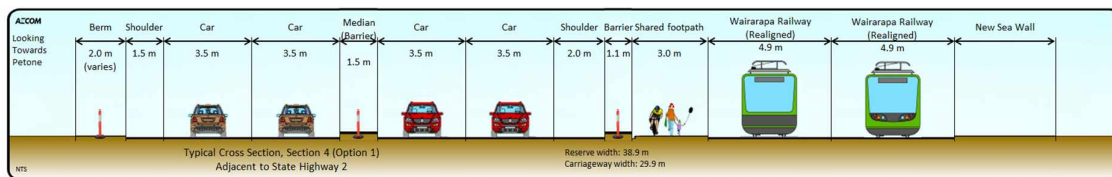
The seaside option also has the significant benefit of being able to respond to resilience related objectives and potential future proofing opportunities for reclamation. These are investigated through the on Resilience and Corridor Future Proofing Report (see **Appendices**).

**Section 4 Horokiwi to Petone**

**Roadside Options**

Option 1 requires the missing link to become connected in the form of a standard width shared facility. Proximity to the road corridor is evident and the look and feel of the facility is more aligned with commuter-types of users.

**Section 4 Option 1 and 2**



Option 2 is the same as Option 1. Assessment outcomes are similar to those mentioned in the Section 3 discussion above.

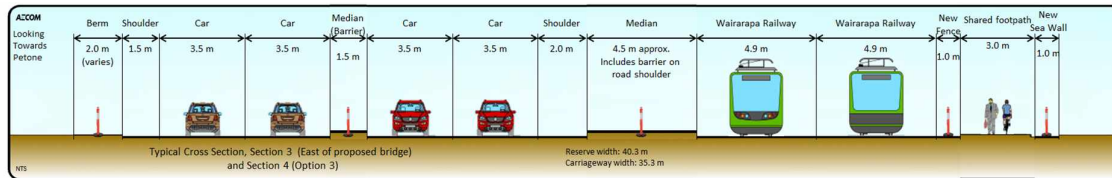
**Seaside Option**

Option 3 is similar in evaluation outcomes to Section 3.

**Petone Connections:** Connections are required to support either Option 1 or Option 3 within Section 4. The options investigated are within severely constrained road and / or KiwiRail environments. The directness and legibility of connections is vital.



### Section 4 Option 3



### Section 5 Petone Foreshore to McKenzie

#### Roadside Options

Option 1 utilises the existing connection on the Petone on-ramp (southbound) to access local network at The Esplanade and to the north along the rail corridor. At this point there is only one option available to both Seaside and Roadside based options.

#### Seaside Option

Option 2 joins directly to the existing path which offers connections to The Esplanade or under the Petone ramps along the rail corridor.

For both options connections to the local road network can be maximised at this location as once the corridor passes north of Petone Station options become more limited to more confident cyclists (along SH2) and minimal pedestrian provision.

The key piece of infrastructure for both options is a rail over-bridge for cyclists and pedestrians to access the Petone Railway Station carpark. The Station side options to utilise both the SH2 corridor and KiwiRail/KiwiRail corridor were investigated. The current recommended option is to use a new structure at McKenzie Avenue beside the existing overbridge to access both Pita-One Road and the northbound SH2 shoulder.

Southbound access arrangements can be made using either the SH2 southbound shoulder under McKenzie Avenue or through the Petone Station car park.

### Section 6 McKenzie to Korokoro

Section 6 provides options for both unidirectional cycle paths along the SH2 shoulders or alternatively a bidirectional off road shared path along the rail corridor between SH2 and the railway. Discussions on the feasibility of the rail corridor option are still in progress with KiwiRail the current recommended option is to provide separated unidirectional cycle facilities along the SH2 shoulders.

### Section 7 Korokoro to Dowse

Section 7 provides options both along the SH2 shoulders or alternatively along the rail corridor as per section 6. The main safety risk for cyclists on SH2 are the on-ramps and off-ramps at the Dowse Interchange. The proposed rail corridor bi-directional off road shared path option, if proved to be feasible, would terminate at Dowse with a ramp from the rail corridor level up to the Dowse Interchange to enable connections to SH2 northbound, and the surrounding street networks on either side of SH2.

Even if a rail corridor shared path south of Dowse is found not to be feasible, investigations have shown that there is room in the rail corridor to provide a short one way bypass of the Dowse Interchange for Southbound cyclists on SH2. As with Section 6 discussions are on-going with KiwiRail/KiwiRail to confirm feasibility of using the rail corridor, therefore the current recommended option is to provide separated unidirectional cycle facilities along the SH2 shoulders.

### Section 8 Dowse to Melling

Section 8 benefits for cyclists along SH2 reduce throughout this section due to the lower number of new cyclists being attracted to this facility and the lack of connections throughout. The SH2 and adjacent Melling Branch rail

corridor between Dowse and Melling is very constrained in width; investigations indicate that there is insufficient room to accommodate an off road path in this section.

Further opportunities to develop off-line routes along the Hutt River (and continuing north of Melling), however these would be best considered as part of the Hutt City cycle network.

## Economic Analysis

In summary the options selected for economic analysis comprise:

	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
<b>Option 1</b>	Option A	Existing Path	Roadside	Roadside	Roadside	SH2 / Rail	SH2 / Rail	Nil
<b>Option 3</b>	Option D		Seaside	Seaside	Seaside			

### Key Economic Benefits

Standard economic procedures were used to provide economic benefits for all options.

The Petone to Ngauranga section of the corridor is subject to significant storm events, the most recent event causing significant disruption to the rail corridor. A MOT report valued the disruption at up to \$30M. Work has assumed similar events occurring every 20 years and the resultant resilience benefit of the project if significant seawall improvements and reclamation occurs, an estimation of which is included in the economic benefits.

### Cost Estimates

Cost estimates for Option 1 and Option 3 were prepared for Sections 3 and 4 to a scheme level of detail (SE). Cost estimates for Option 1 and Option 3 were prepared for Sections 1, 2 and 5 – 7 to a feasibility level of detail (FE).

- The project expected estimate for Option 1 is \$18.7M.
- The project expected estimate for Option 3 is \$46.9M.

### Benefit Cost Ratio

Economic analysis using full procedures has been undertaken, the results for Option 1 and Option 3 were determined and taken through an economic peer review process. The final outcome of the review process provides the following level of benefit and BCR.

Option	NPV Benefits (\$)	NPV Costs (\$)	BCR
Option 1	41,000,000	17,000,000	2.4
Option 3	105,000,000	42,200,000	2.5

### Incremental Analysis and Sensitivity Testing

The NPV cost to construct Section 1 Option 1D is in the order of \$1.8M. The NPV benefit is approximately \$17M. This suggests an approximate BCR of 9.5 for Section 1 Option 1D if progressed as a standalone project.

In terms of incremental benefits over the current recommended scheme option (Section 1 Option 1A), the incremental BCR of Section 1 Option 1D is 30, which suggests that Section 1 Option 1D should be the recommended option for Section 1 of the project.

Sensitivity analysis conducted for all the key variables indicate that the BCR is robust. The lowest BCR of 2.1 for Option 3 would be a result of the construction cost increase to the value of the 95th percentile estimate, which is \$62M.

Based on Option 3, construction could take as long as four years. Staging of the project costs (and benefits) within a shorter construction timeframe may result in earlier recognition of benefits and return from investment.

An alteration to Option 3 that precludes cyclists using SH2 would contribute an additional \$8M of benefits, increasing the project BCR for this option to 2.7.

### Economic Robustness and Future Proofing

Alternative options to bring Option 1 up to the same standard as Option 3 were explored. These options generally involved significant additional cost with only minor return on benefits, ranging in BCR from 1.2 to 1.4. The application of further corridor benefits such as hard shoulder running increased the BCR to 1.6 for sections 3 and 4.

A further option was explored that involves a 20m reclamation and 6-laning of SH2. The significant additional cost (\$160M cost) would be off-set by quantifiable benefits associated with travel time improvements and resilience benefits (\$205M benefits) providing a BCR of 1.4 for sections 3 and 4.

### LTMA Assessment

While national policy focuses heavily on economic growth and productivity, it also places a large amount of importance on improving safety for all road users. The health benefit of cycling aligns with national policies for improving health of New Zealanders. Regional and local policies have more specific goals to cycling uptake and connectivity. It is evident that the W2H project options achieve multiple objectives and desired outcomes of the region. LTMA assessment supports both Options 1 and 3 at a strategic level.

The Investment Assessment Framework (IAF) profile for this project is confirmed as **HM\*L** using the Transport Agency's funding allocation process. The **M\*** for effectiveness reflects the confidence rating in the Investment and Revenue Framework (IAF) around funding confirmation. Once funding is confirmed by the NLTP Advisory Group meeting this IAF profile is likely to be upgraded to **HHL**.

## Peer Review

The cost estimates for Option 1 and Option 3 were confirmed during a parallel estimate review process.

The approach to economic analysis, BCR and incremental analysis were confirmed during economic peer review.

A 'proof of concept' review of Section 3 and 4 was undertaken in relation to geotechnical and design risk. The review generally agreed with the approach taken at a concept level however recognized the need for additional geotechnical investigations to obtain the next level of design.

## Constructability and Risk

A constructability assessment was undertaken by Ian Bond and Associates. Contingency and risk cost was subsequently assessed, the final cost estimates more than covering the level of risk agreed with the reviewer.

Main risk items in entering the Specimen Design and Implementation phases of the project are:

- Confirmation of alignment between Petone Station and Melling.
- Funding apportionment between partners.
- Level of future proofing recommended for SH2 between Ngauranga and Petone (subject to separate strategic assessment).
- Seabed level affecting the amount and design of fill required.
- KiwiRail costs associated with construction staging.
- Access requirements affecting TMP and access over the KiwiRail corridor.
- Available haulage routes.
- Weather including damage from storm events and loss of work could result in extension to time related costs of 3 months.
- Weather including loss of material from weather events, consider 10% wastage of placed material.

## Recommended Option

On the balance of qualitative and quantitative analysis the recommended option is Option 3 (seaside option).

Option 3 provides an opportunity for a high quality shared facility that will realise a wide range of benefits for cyclists and pedestrians and for all types of users from commuters to recreational users and tourists.

Option 3 provides the opportunity to contribute more directly to the regional economy through resilience and tourism benefits.

Support will be required from other funding agencies in the region, potentially WCC, HCC and GWRC. The Urban Cycleway Fund (UCF) is an important funding mechanism to lend support to the recommended option.

### Financial Case

The project Benefit Cost Ratio is 2.5. This BCR however can be improved by two considerations: project staging and acquiring the fill material for land reclamation from the Petone to Grenada project. Obtaining the fill from the Petone to Grenada project could save up to \$7M in the project costs. If this could be realised, the BCR would increase to 3.1.

### Social and Environmental

Option 3 has a potentially negative environmental impact largely due to the reclamation. This extent of the impact on the harbour edge anecdotally affects largely modified land. Areas of particular ecological, terrestrial or landscape sensitivity have been investigated; and it is considered that the negative impacts associated with construction and operation can largely be mitigated. An ecological assessment is available as an addendum to this report.

Option 3 will ultimately provide increased opportunities for multimodal access to and across the State highway network, will increase cycling and pedestrian demand along the Wellington foreshore and reduce greenhouse gas emissions.

Overall, the impacts of Option 3 are considered to be positive.

### Urban Design

Option 3 provides the opportunity to enhance to the corridor from an urban design perspective and positively impact on the existing coastal environment. The significant urban design opportunity is recognised through the potential to provide a positive coastal experience for all potential users.

### Property

A Property Strategy has been prepared separately to this report. Discussions are on-going with KiwiRail and Port Nicholson Settlement Trust.

## Conclusion

The recommended option is Option 3 with a project expected estimate of \$46.9M, a net present value benefit of \$105M, and a BCR of 2.5.

The assessment profile for Option 3 is **HML**.

The recommended option has been tested against potential environmental and social impacts and is considered to have an overall, positive impact.

Option 3 also has potential positive impacts in relation to corridor resilience, tourism and urban design outcomes.

Option 3 is considered to be consistent with project objectives, in particular:

- Increased safety perceptions through the provision of separated cyclist and pedestrian infrastructure
- Increased usage through improved infrastructure covering a wide range of potential new users
- Increased network resilience through reclamation and a widened corridor cross section
- Overall positive social and environmental impacts

Option 3 is expected to deliver upon the project outcomes identified as:

- Up to 280 additional commuter-related cyclist trips per day
- Up to 65 additional tourism / recreational cyclist trips per day
- Up to 50 additional pedestrians / runners per day
- Up to 80% accident savings over key sections of the corridor
- Up to \$20M estimated savings due to improved corridor resilience

## PART A – THE CASE FOR THE PROJECT

## 1.0 Introduction

There are currently some 400 cyclist and pedestrian trips every day between Wellington and Hutt Valley along the State Highway 2 and Hutt Road corridor. These users travel both within the shoulder running lane which is narrow in places, and within the existing path which only runs in the southbound direction. Due to the deficiency of current facilities the users are considered to be putting themselves and motorists at risk of incident.

This study seeks to identify, assess and recommend appropriate development options, using a business case approach. The options will be assessed against the corridor problems focused around, actual and perceived safety, poor connectivity to the network and resilience issues.

The outcome will look to provide a safe, connected and resilient cycle and pedestrian path along the corridor and improve access to Wellington Harbour.

### 1.1 Background

The transport corridor between Wellington and Hutt Valley comprises Hutt Road, SH1, SH2, significant interchanges and a rail corridor. Facilities for cyclists and pedestrians between Wellington and Hutt Valley offer a poor level of service for users. As a result existing cyclists and pedestrians are putting themselves and motorists at risk, and the current retrofitted facilities do little to increase the perception of safety nor offer a level of attraction for future users.

The current and pedestrian facilities between Ngauranga and Petone interchanges are a combination of shoulder running within a 100 kph speed environment and a separated southbound shared path.

- Shoulder running occurs both north and southbound between Ngauranga and Petone – cyclists and pedestrians use the SH2 shoulder.
- A separated path southbound between Ngauranga and Horokiwi. The separated path provides a poor level of service for users, with variable widths between 1.3m and 3.6m, poorly maintained surfaces, poor drainage, flooding and obstructions. As a result the existing path is not used by the majority of cyclists, with existing cyclists choosing to use the SH2 north and southbound shoulders instead.

Cyclist and pedestrian access to this corridor is via Hutt Road from Wellington city centre and The Esplanade and Hutt Road from Petone town centre. Cyclists also use SH2 between Petone interchange, Dowse interchange, Melling and north.

A number of studies have been undertaken which looked to improve conditions for cyclists and pedestrians between Ngauranga and Petone, however the studies generally resulted in localised safety improvements such as pavement markings and warning signage and did not result in more significant upgrade with the potential to attract a greater number of users.

### 1.2 Project Purpose

The Detailed Business Case is split into two parts:

- **Part A** will develop and assess a range of feasible options through a stakeholder engagement and consultation process; provide a detailed analysis of the costs, risks and benefits; the outcome being scheme level reporting, preliminary design and a recommended option.
- **Part B** will provide a consenting strategy and commercial analysis of the recommended option.

The focus of the study is to develop a recommended option that will provide a dedicated facility for cyclists and pedestrians between Ngauranga and Petone plus investigate wider connections north to Melling and south to Thorndon Quay.

Consideration of the north and south connections are important in order to ensure a new cyclist and pedestrian path has safe and efficient links to and from Wellington and the Hutt Valley. Consideration of the north and south connections includes either linking into existing cyclist and pedestrian routes, indicative improvements to the existing or new indicative links.

### 1.3 Project Objectives

The project objectives, as reviewed and approved by the project steering group are as follows:

- 1) To provide walking and cycling infrastructure linking Wellington and Hutt Valley that improves safety for pedestrians and cyclists, and that is a catalyst for increased use of walking and cycling between these destinations
- 2) To improve the connections and integration of walking and cycling infrastructure between Petone and Ngauranga and the strategic cycling and walking planning of Hutt City and Wellington City
- 3) To consider transport resilience in providing a walking and cycling facility
- 4) To manage the social, cultural, land use and other environmental impacts of the project in the project area and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, design and conditions

### 1.4 Study Area

The project is located in the Wellington region. The project study area extends from the Thorndon Quay end of Hutt Road in Wellington, through Ngauranga Interchange along the SH2 corridor to Petone overbridge, and north to Melling interchange.

The primary focus of the study is the link between Ngauranga Interchange and Petone Overbridge (points 3a to 3b), while also considering the connections to the north and south to a lesser level of detail. In response to analysis during the study and public consultation however, the Hutt Road has been looked at to a greater level of detail.

A diagram of the study area is provided in Figure 1.

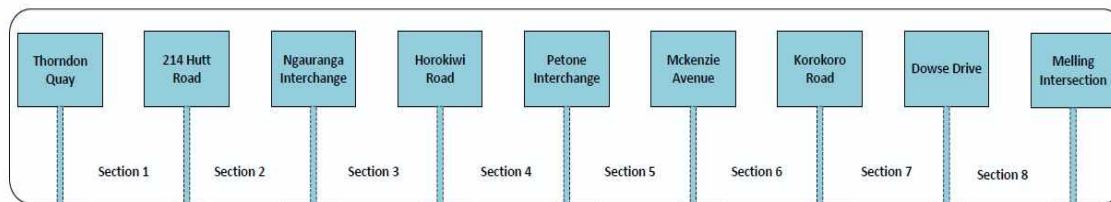
Figure 1 Project Study Area



The study area has been split into eight sections (see Figure 2) which aim to reflect the current level of provision for cyclists and pedestrians, and the design response to improve provision. This is important given the extent and varied conditions along the corridor.



Figure 2 Project area sections



**Section 1 – Thorndon Quay to Onslow Road:** Section 1 commences on Hutt Road, at the end of Thorndon Quay. This section includes a mix of cycle lanes and cycle paths, both separated and shared with pedestrians, along the eastern side of the Hutt Road up to Onslow Road.

**Section 2 – Onslow Road to Ngauranga Interchange:** Section 2 continues from Onslow Road to the Ngauranga Interchange along the existing shared path and ends at the signalised intersection of Hutt Road and SH2 off ramps.

**Section 3 – Ngauranga Interchange to Horokiwi Road:** Section 3 passes under the Ngauranga Interchange and connects onto the existing shared path alongside SH2. The shared path ends at Horokiwi. The alternative route for cyclists is either northbound or southbound along SH2.

**Section 4 – Horokiwi Road to Petone Interchange:** This section is the ‘missing link’. The ‘missing link’ refers to the lack of any separate facility for cyclists and pedestrians, as users are forced into travelling along the northbound and southbound shoulder of SH2. This section ends at the Petone Interchange.

**Section 5 – Petone Interchange to McKenzie Avenue:** The Petone Interchange incorporates links onto the Petone Esplanade and Hutt Road. The section extends north along Hutt Road and the SH2 corridor to McKenzie Avenue which sits between the rail corridor and SH2.

**Section 6 – McKenzie Avenue to Korokoro Road:** This section considers potential connections at Petone Station and the McKenzie Avenue / Pita-One Road to Korokoro Road.

**Section 7 – Korokoro Road to Dowse Drive:** This section extends between Korokoro Road and Dowse Drive along the SH2 and rail corridor.

**Section 8 - Dowse to Melling:** This section extends between Dowse Drive and Melling Interchange along the SH2 and rail corridor.

## 1.5 Project Governance

Table 1 sets out the project governance for the study. The New Zealand Transport Agency (NZ Transport Agency or “the Agency”) is the project sponsor and provides the strategic direction for the project.

Wellington City Council (WCC) and Hutt City Council (HCC) are members of the project governance team and provide direction to ensure that project supports local objectives and needs. KiwiRail and Greater Wellington Regional Council (GWRC) as significant stakeholders, are represented on the governance team.

Table 1 Governance Team

Role	Name	Organisation
Steering Group Chair	Caron Greenough	NZ Transport Agency
Planning and Investment (P&I)	Peter Hookham	NZ Transport Agency
Project Manager (formerly)	Mark McGavin	NZ Transport Agency
Project Manager (latterly)	Maggie Buttle	NZ Transport Agency
HCC governance	Bruce Sherlock	Hutt City Council (HCC)
WCC governance	Geoff Swainson	Wellington City Council (WCC)
KiwiRail governance	-, Michael McKeon	KiwiRail
GWRC governance	Natasha Hayes	Greater Wellington Regional Council (GWRC)

### 1.1.1 NZ Transport Agency

The Agency is responsible for giving effect to the Government Policy Statement (GPS 2012), which sets out the government's strategic direction for investment in the land transport network. This role extends from planning and funding activities, supporting public transport, building the networks that connect communities, to ensuring the people and vehicles that use the system are safe to do so.

One of the key responsibilities for the Agency in Wellington is the effective operation of the city's State Highway network.

The Land Transport Management Act (LTMA) 2003 requires the Agency to assess all potential projects against the GPS, the relevant Regional Land Transport Strategy and the New Zealand Transport Strategy's five (5) current key strategic priorities listed below:

- Improving customer service and reduce compliance costs.
- Planning for and delivering Roads of National Significance.
- Improving the road safety system.
- Improving the efficiency of freight movement.
- Improving the effectiveness of public transport.

### 1.1.2 NZ Transport Agency Board

The Agency Board has overall responsibility for this project. The Board reports directly to the Minister of Transport and is responsible for:

- Land transport planning
- Managing the state highway network
- Regulating access to, and participation in, the land transport network
- Promotion of land transport safety and sustainability.

### 1.1.3 Highways and Network Operations Group Value Assurance Committee

The HNO Group Value Assurance Committee (VAC) is the most senior project decision making team within the HNO group, which comprises the National Manager Professional Services and various other senior managers and technical specialists. This project will require VAC approval.

### 1.1.4 Project Sponsor

The Project Sponsor is the NZ Transport Agency. The Project Sponsor is responsible for:

- Ultimate authority and responsibility for the project
- Endorsing changes to scope, schedule, budget and quality
- Endorsing escalation and championing recommendations to the Highways VAC
- Endorsing the Project Management Plan to confirm that project scope and deliverables are correct
- Reviewing progress and providing advice on resolution of issues
- Resolving issues beyond the Project Managers authority.

## 2.0 Document Review

The key drivers for change to improve cyclist and pedestrian facilities from Petone to Ngauranga remain the same as the reasons set out in the 2006 Scheme Assessment Report and the subsequent studies including the Strategic Case.

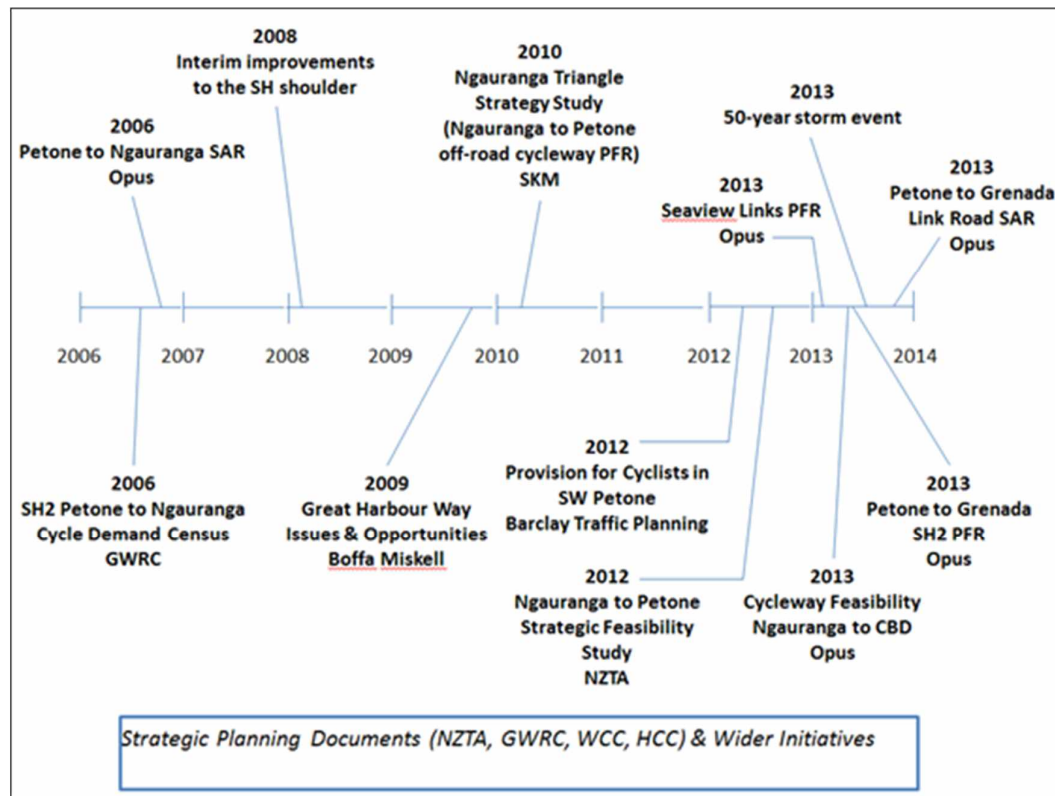
The problems for cyclists and pedestrians within the corridor include:

- The level of service and poor connectivity for existing cyclists and pedestrians due to the narrow width of the path, the 'missing link', poor drainage, debris and poor lighting.
- The actual and perceived safety concerns with cyclists and pedestrians using the SH2 north and southbound shoulders given the constrained width and the high speed and high volume nature of adjoining traffic lanes, plus the need to merge across motorway on-ramps and off-ramps, and;
- The ability of the existing facility to attract new cyclists is severely restricted because of the inherent safety risk of the facilities provided.

## 2.1 Previous Studies

Projects and improvements completed since 2006 is summarised in the Figure 3. Further details of the studies are provided in the sections below.

Figure 3 Timeline of the work undertaken to date since 2006



### 2.1.1 Scheme Assessment Report (Opus, May 2006)

Opus prepared a Scheme Assessment Report (SAR) for NZTA in May 2006 followed by an addendum issued in October 2006. The SAR updated an earlier Feasibility Report for the Ngauranga to Petone Cycleway prepared by Opus in 1997. The SAR focused on looking at providing a separate cyclist and pedestrian link from Ngauranga to Petone, and developed five options, being:

- Option 1 - Cycleway bridge
- Option 2 - Cycleway underpass
- Option 3 - Level crossing
- Option 4 - Railway realignment (with reclamation)
- Option 5 - Short rail realignment (no reclamation).

Options 1, 2 and 3 included alignments on the seaward side of the rail corridor with a new connection at Petone provided through reclamation of a strip of land, and either a bridge, underpass or level crossing for each. The alignments of options 4 and 5 included a cycle/pedestrian path between the rail and SH2 road corridor. Each the option went as far Petone to the existing cycle path south of Horokiwi, and so any new cycle path was proposed to link into the existing cycle path.

For the existing cycle path resurfacing, widening<sup>1</sup> and drainage improvements were considered. A reduction in the existing SH2 shoulder was not considered acceptable and therefore the two narrow sections of the existing cycle path were proposed to remain.

The SAR considered a low cost option that avoided reclamation and a reduction in state highway shoulder, however due to safety and capacity impacts on the state highway this option was not considered further. It is noted in the SAR that improvements to the highway shoulders (used as a cycle path) or improvements to the existing southbound separated cycleway may offer low cost solutions for existing cyclists.

The preferred option in the SAR was option 1, which would have involved construction of a bridge over the railway near SH2/Horokiwi Road, upgrading the existing cycleway facility to the south and the provision of a new seaward cycle path to the north on reclaimed land. This option would have closed the existing 800m gap and provided a continuous two-way off-road cycleway.

The options were estimated to cost between \$12M to \$21.6M for construction, with the preferred option of a Cycleway Bridge over the railway having an Expected Estimate of \$12.9 – 15.4m and a BCR of 0.10 (February 2006).

Option 4 was the next preferred option and was noted as likely to be the most successful in attracting new and existing cyclists; however the most expensive was estimated between \$17M to \$21.6M for construction and had a BCR of 0.9.

This SAR concludes that given the high capital costs and the low benefit/cost ratios of the options then consideration should be given to future transport projects in the vicinity which may influence the construction or provide some synergy/cost sharing and to explore on-road facilities.

### 2.1.2 Scheme Assessment Report Addendum (October 2006)

Following the submission of the SAR, further investigations of alternative low cost off road options were requested by the Transport Agency. The finding from the addendum however reconfirmed one of the key conclusions from the SAR that low cost, two-way off-road alternatives are not possible due to the narrow width of the corridor.

The report developed option 5B which utilised additional spaces created by the closure of the right turn bay at Horokiwi, realignment of the double track rail line and minimal reclamation to provide a continuous cycleway between the railway and SH2. The cost of this option was between \$12M - \$19.6M, and although more expensive than option 1 in the SAR it was considered more likely to attract new and existing cyclists because it removed the need to cross the railway.

The right-turn at Horokiwi has subsequently been closed however the new space provided was utilised to provide an acceleration lane for north-bound traffic turning onto SH2 from the Horokiwi intersection.

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<sup>1</sup> Widening was considered in some sections of the existing cycle path where it didn't require land from the State Highway shoulder.

### 2.1.3 SH2 Interim Improvements (NZ Transport Agency, 2008)

In 2008 the Transport Agency implemented a number of interim improvements to the SH2 shoulder for cyclists. The improvements were triggered because of a cyclist fatality at the Petone Interchange and the well-known risk for cyclists using the SH2 shoulder.

The interim improvements were necessary while long term improvements for a separated cycle/pedestrian facility were still under consideration. The interim improvements focused on upgrading the on-road facilities through improving the presence of cyclists where traffic merges and or crosses the path of cyclists. The improvements sought to recognise existing riders and riding lines rather than developing a new riding line.

The interim improvements included:

- Highlighting potential conflict points with the use of green surfacing.
- A trial of surface material to gauge feedback from cyclists.
- Hold Rails and improved cut downs to assist cyclists at crossing points.
- Installation of activated warning signs at locations where width and visibility are restricted or cyclists are crossing (see Figure 4).
- Audio Tactile Profiled (ATP) markings to discourage vehicles from encroaching on the shoulder.
- Shoulder widening (where feasible) and the use of catch fences to prevent debris from falling on the hard shoulder.
- Mirroring riding lines with facilities to enhance cycling choices.

The interim improvements were implemented in late 2008 and received a mixture of positive and negative feedback from cyclists.

Figure 4 Cyclist activated warning light – part of the improvements implemented in 2008



### 2.1.4 Ngauranga Triangle Study (SKM, 2010)

The Ngauranga Triangle Strategic Study is a joint study between the NZ Transport Agency, Wellington City Council and Hutt City Council which outlines an integrated long term strategy for the Ngauranga Triangle.

The Ngauranga Triangle consists of SH1 between Tawa and Ngauranga, SH2 between Ngauranga and Petone and possible link between Petone and Tawa/Grenada. A cycleway from Petone to Ngauranga was featured in this study, and following this the Transport Agency commissioned SKM to undertake a Project Feasibility Report (see

below) to consider the feasibility of construction, completing and upgrading the cycleway and pedestrian facility adjacent to SH2 between Ngauranga and Petone.

### **2.1.5 Ngauranga Triangle Study, - Ngauranga to Petone Off-Road Cycleway Project Feasibility Report (SKM, January 2010)**

This report assessed the feasibility of providing an off-road shared cycle and pedestrian facility from Ngauranga to Petone. The preferred option was to upgrade the existing segregated cycleway with improved riding surface, drainage, improved maintenance and widening where possible.

A bridge was proposed south of the Horokiwi across the railway and then a cycleway on the seaward side of the existing railway up to Petone (as per the preferred option in the SAR, 2006), with either reclamation or boardwalk structures. The preferred option was designed to accommodate frequent and concurrent use in both directions and designed for speeds greater than 30kph, with a width of 3.6m (based on Austroads Guide to Traffic Engineering) to include a 3m cycleway, 0.3m path and 0.3m clearance to a proposed fence. The existing cycleway was proposed to be widened to 3m where feasible with a 0.3m clearance for the railway fence.

The proposed bridge over the railway was noted as not ideal for high-speed cyclists, however the seaward side cycleway was considered to form the initial stages of the Great Harbour Way.

The benefits of the proposed cycleway scheme were calculated based on the EEM guidance for undertaking economic analysis which revealed:

- Benefits - \$13.7m
- Costs - \$13.9m
- Benefit Cost Ratio – 1.0

Overall the PFR demonstrated that the project profile for the Ngauranga to Petone is Medium, Low, Medium. A rating of Medium demonstrated that the project aligns with the Transport Agency strategic objectives. The report concluded that the project requires further refinement to confirm cycling demand, and recommended that a scoping report be carried out before proceeding to SAR (now DBC).

### **2.1.6 Ngauranga to Petone Cycleway Sensitivity Testing (SKM, 2010)**

Following the PFR (above) SKM carried out sensitivity testing based on LTNZ methodology which is based on census data for mode share and vehicles on a parallel route, and considered connections between populated points such as Wellington CBD to Hutt CBD. This approach varied from the EEM approach which bases demand on the population adjacent to the route (which given the topography is nil).

The sensitivity testing found an estimated 267 cyclists would utilise the cycleway once implemented and was based on 50% of existing cyclists using the cycle route rather than the shoulder. The BCR calculated for the project was then upgraded to 3.1<sup>2</sup>.

### **2.1.7 Ngauranga to Petone Cycleway Strategic Feasibility Study (Opus and NZ Transport Agency, October 2012)**

The Strategic Feasibility Study was undertaken by the NZ Transport Agency to identify a strategic solution for the Ngauranga to Petone cycleway while meeting the needs of the state highway and taking into account the key stakeholders. This report included a literature review; cycling surveys; topographic survey and an Options Estimate Report including further feasibility designs and estimates.

This report updated the cost estimates undertaken by SKM in 2010 on the preferred option (as above), and also developed FE level costs for three seaward side cycleway options of varying widths, constructed through either reclamation, boardwalk or a combination of the two, with either a level crossing or overhead crossing. All of the options included upgrades to the existing cycleway through improved riding surface, drainage and widening where feasible<sup>3</sup>. The updated cost estimates of options considered in the SAR (2006) and PFR (2010) are summarised in the Table 2.

<sup>2</sup> Opus subsequently recommended a change in BCR to 2.85 following the updated project costs (section 2.2.7)

<sup>3</sup> The N2P project is included in the National Land Transport Programme (NLTP) 2012 – 15 as a probable project, which includes reclamation of 800m coastal strip, building a cycleway and constructing a bridge or crossing to the existing upgraded cycleway at Horokiwi, thus providing a two-way cycle route.

Table 2 Summary of Economic Outputs

Option	Width	SKM Option	Reclamation	Boardwalk	Combination
Options with bridge	5m	\$15.45m	\$59.95	\$37.19	Not possible.
	3.5		\$45.85	\$27.72	
	2.6		\$43.37	\$22.41	
Options with level crossing	5m	\$15.45m	\$86.01	\$45.67	\$65.62
	3.5m		\$68.17	\$32.40	\$50.76
	2.6m		\$55.47	\$24.07	\$45.39

Source: Table 7.1 N2P SFS (October 2012)

The cycle surveys undertaken as part of the PFR reiterated the poor quality of the existing cycle route and the reasons the majority of existing cyclists choose not to use it (debris, drainage, width, poor quality surface area, unsuitability for commuter-speed cycling). In order to therefore achieve close to 100% utilisation of the cycleway in both directions and remove cyclist using the shoulder, the long-term vision for the corridor is concluded as providing:

- Absolute minimum consistent width of 2.6m.
- High quality hot rolled asphalt or similar surface.
- Means to prevent debris accumulating on the cycleway.
- Regular sweeping and maintenance.
- Ease of connection to both the south and north of the cycleway for both northbound and Southbound cyclists.
- Minimal delay in crossing the rail line (if necessary at all).

The study recommends that options for the long term future cycle route consider the following:

- **Cycle route dimensions:** A minimum width of 2.6m to allow for a two-way shared path, however widths of 3.5 or 4m are desirable.
- **Railway crossings:** It is considered that some form of crossing would form part of any future cycleway (e.g. bridge, level crossing) due to the topographical constraints on the SH2 side of the railway.
- **Underpass:** The existing pedestrian underpass located at the Ngauranga railway station which provides a walkway between the Ngauranga side of the twin track to the central railway platform is inadequate for use connecting a seaward cycleway to the Ngauranga side of the railway because it is 2.2m in height (insufficient for cyclists) and has a 90 degree bend that is 3.8m wide. An underpass would also require a substantial level change at a gradient of around 7%. Previous studies have also found that an underpass is more expensive than a bridge.
- **Over bridge:** Due to the need for vertical clearance of 5.5m above the rail track and maximum allowable gradient of 7%, ramps would need to be 78m in length. It is also considered that the ramp gradient and does not cause significant delays to cyclists.
- **Level crossing:** The report notes that KiwiRail have been reluctant to create an at-grade due to the high frequency rail services, pedestrian /cyclist delays and risk of conflicts<sup>4</sup>.

The report concludes that there seems little potential to shift all cyclists onto a new off-road cycle facility, and therefore recommends that the on-going strategy for the corridor should be to provide for cyclists who continue to utilise the SH2 shoulder while also providing off-road facilities for less confident cyclists between Wellington and the Hutt Valley.

<sup>4</sup> Subsequent consultation with KiwiRail as part of the DBC revealed that KiwiRail would not allow an at-grade level crossing along this section of SH2.

## 2.2 NZ Transport Agency Business Case Approach

### 2.2.1 Point of Entry

The NZ Transport Agency Business Case approach was implemented in July 2013, with all current and planned projects encouraged to transition to the business case approach from this date (depending on the stage of the project). The business case approach forms the basis for activity and programme development for the National Land Transport Fund (NLTF). It supports planning and investment for outcomes with early collaboration between stakeholders and development of a robust, evidence base case. The business case approach replaces the previous Transport Agency approach based on the Transport Agency 'Z Series Minimum Standards'.

A Programme Business Case and/or an Indicative Business Case have not been undertaken to date for the Petone to Ngauranga Cycleway Project (as per the Transport Agency business case approach), however there have been a large number of previous studies undertaken to date (see below) that have explored a number of options for pedestrians and cyclists between Petone and Ngauranga. This means that the project is effectively at a Detailed Business Case stage and was confirmed as such in by the TPPD team on 30th January 2013<sup>5</sup>.

### 2.2.2 Strategic Case, Ngauranga to Te Marua (July 2015)

As one of the first Strategic Case's undertaken we are now of the opinion the problems identified were too focused on the Ngauranga to Petone section rather than the wider corridor.

The Transport Agency and its key stakeholders have "sharpened" the problem statements to include wider and integrated transport needs, and to also align with the SH2 strategic transport problems. These problem statements form part of the draft Strategic Case for the SH2 Corridor between Ngauranga to Te Marua.

The problems identified in this Strategic Case have now formed the problem statement basis for the Project. Although development of the DBC commenced prior to the draft Strategic Case, the problem statements are directly relevant to the Project.

- **Problem 1:** Poor configuration and operational environment of SH2 and associated local network results in poor multi-modal network performance
- **Problem 2:** High traffic volumes and insufficient network capacity results in peak delay and unreliable journey times that adversely affect regional productivity
- **Problem 3:** Constrained topography, the geology and lack of alternate routes results in poor network resilience

The Strategic fit and effectiveness assessments for this Strategic Case identified a likely **H/H** investment profile.

Attached are the ILM maps in **Appendix A**.

## 2.3 Related Studies

### 2.3.1 The Great Harbour Way (November 2009)

The Great Harbour Way (GHW) vision was developed in collaboration with WCC, HCC and GWRC, and aims to develop a continuous shared cycle and pedestrian route around the coastline of Wellington harbour (as far as practicable) stretching from Pariwhero/Red Rocks to Pencarrow Head. The study reiterates that Ngauranga to Petone is the most challenging section for providing the GHW for cyclists and pedestrians, and includes many of the issues and constraints noted in previous studies (listed above) including the risk that cyclist and pedestrians face if travelling northbound using the existing path having to use the shoulder in conflict with the flow of traffic.

The aim of the GHW is for a seaward cycle/pedestrian route (where practicable) and therefore the solution for the Petone to Ngauranga (and further south towards Wellington) is for reclamation along the seaward side. The reclamation and cycle/pedestrian route would then continue along the Petone Esplanade.

### 2.3.2 Provision for Cyclists in Southwest Petone, Report for Hutt City Council (March 2012)

This report was commissioned by HCC following the completion of the Dowse to Petone SH2 upgrades and concerns about providing safe facilities for cyclists. The study looks at suitable strategies for managing cycle traffic, whether within the highway shoulder, parallel routes such as the Hutt Road or new routes yet to be formed.

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<sup>5</sup> Strategic Case: Strategic Assessment and Funding Application (draft April 2013)



The investigation was intended as a scoping study, with possible measures considered at a concept level only. The costings and feasibility considerations will be researched in a separate report as part of more detailed investigations at a future date<sup>6</sup>.

The report looked at three possible strategies to meet the needs of cyclists which include:

- Option 1 - Promote use of routes such as that formed by Block Road, Pharazyn Street, Bridge Street, Parliament Street and Hutt Road.
- Option 2 - Promote use of State Highway 2 by long-distance cyclists, with supplementary facilities on local roads for cyclists with local destinations.
- Option 3 - Establish a new route to be used by cyclists, with facilities either on or off road.

The report concludes that SH2 is the preferred route for most commuter cyclists because of the direct alignment, wide shoulders and lack of intersections and frontage activity. SH2 was also shown to have a good safety record for cyclists when compared to the Hutt Road.

The main concerns around SH2 is highlighted as the need to negotiate on and off ramps, particularly at Petone, and recommends measures such as defined crossing points and flashing signs to reduce the risk for cyclists. The report also recommends that the feasibility of providing a southbound cycle path between the back of Dowse Interchange and the railway should be investigated.

Option 2 was recommended as an alternative option to SH2, which was noted as most effective for cyclists with local destinations. However it has a number of issues, with inadequate width for a cycle lane (due to parking) and numerous intersections and frontage activity. The report concludes that if a dedicated cycle lane cannot be provided then traffic lanes should be widened to accommodate on-road cyclists.

### 2.3.3 Wellington Cycleway Feasibility Study Ngauranga to CBD Preliminary Funding Report

Opus was commissioned by WCC to complete a cycleway feasibility study for a coastal route between Ngauranga and Aotea Key. The report assessed the following options:

- **Option 1 - Great Harbour Way (GHW):** This option looked at creating an off-road cycleway along the coastline on the eastern side of the railway line and State Highway, and considered various connection points at the northern and southern ends of the route. The expected construction cost of this option is \$23m, with a BCR of 0.5.
- **Option 2: Hutt Road Improvement:** This option considered an enhanced facility along Hutt Road, including on and off cycle lanes. This option is more direct than the GHW option, and had a lower cost at \$3.98m with a BCR of 1.7. The preferred option was Copenhagen style off-road facilities because they provided enhanced safety for cyclists given the traffic speeds and high volumes, and so were also seen as most likely to attract new cyclists.
- **Option 2d** was the preferred option, this option recommended a 2-way cyclist only Copenhagen style lane on the east side of the road. This would involve relocating the existing parking along the Hutt Road to either the back of the private properties, between traffic lanes and cycle lanes or onto clearways on the Hutt Road during off-peak times.

The report recommends undertaking more detailed cost estimates and a staged construction approach to spread costs over a greater period. The initial focus was recommended as constructing the section south of Caltex service station as this is where many of the deficiencies of the existing route are located.

## 2.4 Summary

The drivers for change to improve cyclist and pedestrian facilities from Petone to Ngauranga remain similar to the reasons set out in the 2006 Scheme Assessment Report and subsequent studies including the Strategic Case. The missing 800m gap in the cycleway and the deficiencies with the existing cycle/pedestrian path are issues highlighted in all of the previous reports in terms of:

- The usability of the existing SH2 segregated cycle and pedestrian path for existing confident cyclist because of the narrow width of the path, poor drainage, debris and lighting. The consequence of the existing path is that it is unused by the majority of existing cyclists;

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<sup>6</sup> No report on costings and feasibility has been produced to date.

- The safety concerns around existing cyclists and pedestrians using the SH2 shoulder given that it is a high speed, high volume route, and;
- The ability of the existing facility to attract new cyclists is severely restricted because of the perceived (and present) safety risk of the missing 800m gap and the attractiveness and path quality that the existing facility provides.

The need for the DBC has emerged due the need to develop a recommended option that not only addresses the 800m missing link along SH2 but to also consider the connections in order to provide a well-connected, efficient and attractive route for existing and potential cyclists and pedestrians.

## 3.0 Problems, Opportunities and Constraints

Problem definition is centred on inherent cyclist and pedestrian safety risks which results in a marginalised form of travel and suppressed demand.

Opportunities focus on the provision of higher quality and safe facilities which will generate greater use by cyclists, pedestrians and other recreational and potential tourist users, resulting in a step change in attitudes and behaviour of users and non-users. A strategic opportunity focuses on providing a more resilient transport corridor for all future users.

Constraints are generally related to the topographical nature of the site, plus the complexities around the connections at each end of the Ngauranga to Petone section.

### 3.1 The Transport Corridor – Describing the Problem

The transport corridor between Ngauranga and Petone provides the main connection between Wellington and Hutt Valley, with SH2 and the Wairarapa Line located within the corridor. SH2 is classified as a National High Volume Road<sup>7</sup> with a posted speed limit of 100km. It carries over 60,000 vehicles per day, including freight and commuter vehicles. The Wairarapa Line provides for commuter travel between the Hutt Valley and Wellington, and is also part of the North Island Main Trunk which provides an important passenger and freight link.

Figure 5 shows a typical cross section along the corridor between Ngauranga and Petone. Within the cross section can be seen the harbour and seawall, the two rail lines and overhead wires, the cycle and pedestrian path, SH2 and the Wellington to Hutt escarpment. Other constraining factors include underground services, security fencing, retaining structures, light poles, gantries and signage.

Figure 5 View of Wellington City from the Cycle and Pedestrian Path



South of Ngauranga the corridor includes SH1, the railway line and the Hutt Road, a busy urban arterial with adjoining commercial land use. North of Petone the corridor includes SH2, the railway line and the Hutt Road. Connection points are circuitous or involve grade separation options over the railway line and / or SH2.

From south to north the general existing conditions that drive the problem definition of potential cycle and pedestrian improvements are described below.

<sup>7</sup> Based on the NZTA One Network Road Classification

### 3.1.1 Hutt Road, Wellington (Sections 1 and 2)

The Hutt Road section is adjoined on the eastern side with a variety of businesses which include retail and light commercial uses. Car parking for the businesses is located either at the back of buildings (accessed via driveways) or via parking which is located on footpath next to the building frontages. Figure 6 shows the existing path along Hutt Road with obstacles such as lamp posts and conflict with driveways and vehicles parking along the edge of the footpath edge and also in the cycle path.

Figure 6 Off Road shared path along Hutt Road, Wellington (Section 1)



A number of businesses such as Spotlight, BMW garage and the Early Years childcare centre has car parking available in front of the building on the footpath, in some cases, leased from Wellington City Council. Due to the land use along Hutt Road there are significant safety issues with cars travelling over the shared pedestrian and cyclist path to access car parking located either at the back of buildings, or parking located at the front of buildings.

North of the commercial section of Hutt Road a shared path provides an improved level of service through to the Ngauranga interchange which includes access to a stock effluent disposal (see Figure 7). Access is provided under SH1 / SH2 interchange to the seaward side of the corridor.

Figure 7 Ngauranga Interchange, looking south along Hutt Road (Section 2)



### 3.1.2 Existing Path between Ngauranga and Horokiwi (Section 3)

The existing separated path along SH2 between Ngauranga and Horokiwi, over a distance of about 3.8km. The southern end of this section is separated from SH2 by a series of crib walls, as shown in Figure 8. The northern section is generally separated from SH2 by a wire rope barrier, as shown in Figure 9. Connections to the Ngauranga Gorge occur via the Hutt Road to the paths alongside Centennial Highway (SH1).

The path has varying widths between 1.5m to 3m. As a result the surface is poor quality, uneven and maintenance less than desirable which results in debris building up on the path. Vegetation along the path is not maintained.

Figure 8 Existing separated path approaching Ngauranga



Figure 9 Existing separated path south of Horokiwi, with a wire rope barrier



### 3.1.3 SH2 between Horokiwi and Petone

Cyclists (and pedestrians) are forced to use the SH2 shoulders northbound and southbound due to the missing link (see Figure 10). The southbound shoulder is wider (over 1.0m in most parts) however there is no physical separation from motor vehicles.

Similarly there is no physical separation from motor vehicles on the northbound shoulder, however the shoulder is very narrow and there is side conflict at the Horokiwi turning and the BP garage turning. Interim improvements were made to the path in 2008 (as shown in Figure 11).

Figure 10 SH2 southbound past Petone on ramp, 'the missing link'



Figure 11 SH2 northbound shoulder approaching the Petone off-ramp



### 3.1.4 Hutt Road, Petone

The Hutt Road section in Petone is a shared path along the western side of Hutt Road, and is generally obstructed throughout with street trees. The railway corridor along the western edge of Hutt Road presents a significant barrier in terms of access and connectivity.

Figure 12 Shared path along Hutt Road, south of Petone Train Station



### 3.1.5 North of Petone Interchange

North of the Petone interchange SH2 runs between the rail corridor and commercial land use (see Figure 13). There is little to no shoulder for cyclists to use. Pedestrian paths are generally narrow or non-existent

Figure 13 Shared path along Hutt Road, south of Petone Train Station



### 3.1.6 SH2 McKenzie Avenue Overbridge, towards Petone Station

McKenzie Avenue crosses SH2 from Pita One Road to access Petone Station. Space in this area is generally used for parking for the station. The SH2 ramps present safety issues for cyclists travelling along the motorway.

Figure 14 Shared path along Hutt Road, south of Petone Train Station



McKenzie overbridge has no separate facilities for cyclists and no facilities for pedestrians as can be seen in Figure 15.

Figure 15 McKenzie Road Overbridge





### 3.1.7 Dowse Interchange

Dowse Drive crosses over the railway line and SH2 via a grade separated roundabout. Marked cycle 'lanes' are on the SH2 shoulders however in general the environment is poor for cyclists and pedestrians, due to the multi-lane roundabout and motorway ramps. Some space exists along the rail corridor as shown in Figure 16. Hutt Road is constrained due to high demand for parking and access to adjoining land use, as shown in Figure 17.

Figure 16 Dowse Interchange, looking south

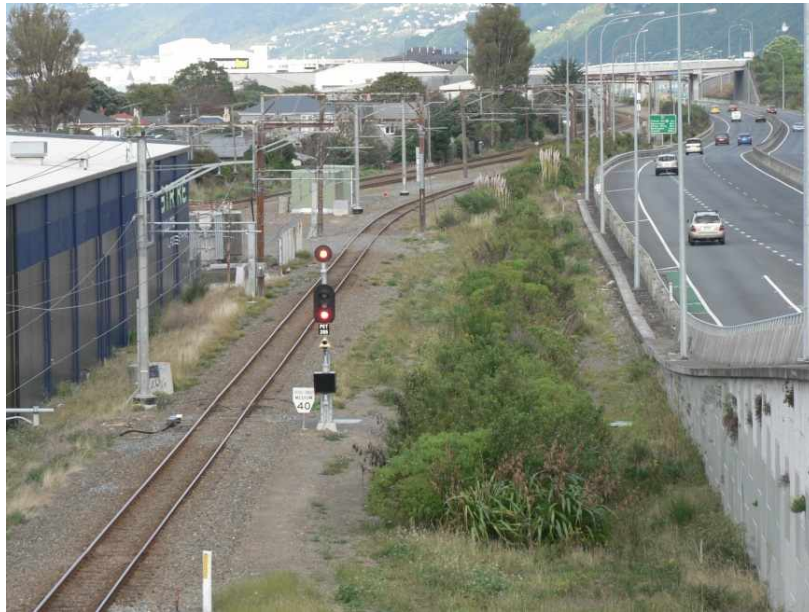


Figure 17 Dowse Interchange, looking south along Hutt Road



### 3.1.8 Melling

The northern end of the study corridor comprises the coordinated signalised intersections of Melling Link to Harbour View Road. The final stop on the railway line is at Melling Station. Cycle and pedestrian connections are possible here to the Rimutaka Cycle Trail alongside the Hutt River.

## 3.2 Problem Definition and Opportunities

### 3.2.1 Strategic Case and ILM

The Strategic Case and ILM is outlined in Section 2.2 and included in **Appendix A**.

### 3.2.2 Existing Key Problems and Opportunities

A summary of the key problems identified by corridor sections is provided in Table 3.

Table 3 Key Problems per section along the corridor

Key Problems	Details	Opportunity of addressing problem
<b>Section 1 - Hutt Road, Wellington</b>		
Conflict with turning and parked vehicles	Conflict between turning and parked vehicles and cyclists is created because of the following: <ul style="list-style-type: none"> <li>- Parking spaces on the footpath (next to building frontages) are provided for employees at the businesses along Hutt Road.</li> <li>- Customer Car parks in front retail units such as Spotlight.</li> <li>- Driveways which access parking at the back of buildings.</li> <li>- Vehicles parked in the path (blocking the path for cyclists and pedestrians).</li> </ul>	<ul style="list-style-type: none"> <li>- Reduced cyclist crash rate.</li> <li>- Increased numbers of cyclists and pedestrians along corridor.</li> </ul>
Obstacles	Obstacles such as signs, bus stop and lamp posts block the path and create pinch points.	<ul style="list-style-type: none"> <li>- Improved, consistent width.</li> <li>- Reduced conflict between pedestrians and cyclists.</li> </ul>
Inadequate width	An inadequate width is available for cyclists and pedestrians because of the obstacles and car parking on the path.	<ul style="list-style-type: none"> <li>- Improved quality.</li> <li>- Dedicated cycle path and separate footpath can be provided if the width is increased (by removing parking and obstacles).</li> </ul>
Poor Surface and signage	<ul style="list-style-type: none"> <li>- The surface is uneven.</li> <li>- Signage to want drivers to watch for cyclists is poor.</li> </ul>	<ul style="list-style-type: none"> <li>- Improved quality path.</li> <li>- Improved safety through drivers greater awareness.</li> </ul>
<b>Section 2 - Hutt Road Wellington</b>		
This section is sufficient with a good quality shared path	n/a	<ul style="list-style-type: none"> <li>- Few benefits are provided by improving this section because it is currently safe with no traffic conflict and the width is sufficient.</li> </ul>
<b>Sections 3, 4 and 5 - SH2 between Ngauranga Interchange and McKenzie Avenue</b>		
Poor quality surface along the existing path along SH2	The existing path has the following issues: <ul style="list-style-type: none"> <li>- Uneven and poor surface</li> <li>- Debris and overgrowing vegetation as a result of inadequate maintenance.</li> <li>- Flooding and drainage issues</li> <li>- Other problems could result from:               <ul style="list-style-type: none"> <li>- The majority of existing cyclists could continue using the SH2 shoulder.</li> <li>- The existing cycle path is unlikely to attract new cyclists, resulting in the potential suppressed not being realised.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Provide high quality facility with good connections will result in facility and safety benefits for existing users and realisation of suppressed demand.</li> <li>- Other potential benefits could include those resulting from recreational users, walkers and runners.</li> </ul>

Key Problems	Details	Opportunity of addressing problem
Inconsistent width of the existing path along SH2	Inconsistent path width which ranges from 1.5m to 3.0m limits two-way movement and overtaking, causes conflict between cyclists and pedestrians.	<ul style="list-style-type: none"> <li>- Two-way movement provided.</li> <li>- Overtaking opportunities.</li> <li>- Reduced conflict between cyclists and pedestrians.</li> </ul>
Missing link along SH2	<p>Currently there is no cycleway/pedestrian path on SH2 from Petone to 250m south of the Horokiwi intersection. This means that cyclists must use the SH2 shoulder.</p> <p>Northbound cyclists that do use the path cycle contra-flow against oncoming traffic.</p>	<ul style="list-style-type: none"> <li>- Improved safety.</li> <li>- Increased numbers of cyclists and pedestrians along corridor.</li> </ul>
Inconsistent width of northbound shoulder facilities	Northbound cyclists along the northbound SH2 shoulder have varying widths between several metres and negligible.	<ul style="list-style-type: none"> <li>- Improved safety.</li> <li>- Increased numbers of cyclists and pedestrians along corridor.</li> </ul>
Merges at Petone Interchange	Conflict with turning traffic either continuing north or turning up the off-ramp conflicts with cyclists doing opposite movements.	<ul style="list-style-type: none"> <li>- An alternative off-road route could help improve safety and increase number of cyclists and pedestrians along the corridor.</li> </ul>
Obstacles along the Hutt Road in Petone	The Hutt Road has a number trees planted on the footpath which reduce the width of the path and block the path for cyclists. There is also significant parking demand along the corridor.	<ul style="list-style-type: none"> <li>- Improved safety.</li> <li>- Increased numbers of cyclists and pedestrians along corridor (suppressed demand).</li> <li>- Increased cyclists using dedicated facilities.</li> </ul>
<b>Sections 6, 7 and 8– McKenzie Avenue to Melling Interchange</b>		
On and Off ramps at Dowse Interchange.	Conflict between cyclists using the shoulder lanes and vehicles exiting or entering SH2 via the ramps	<ul style="list-style-type: none"> <li>- An alternative off highway route could help improve safety and increase number of cyclists and pedestrians along the corridor.</li> </ul>
Lack of shoulder at along SH2 near Melling.	There is no shoulder along SH2 at the Melling intersection, which forces cyclists into the traffic lanes.	

### 3.3 Issues, Constraints and Opportunities

Issues are uncertainties that the study may not be able to resolve but must work in the context of, including studies that have an effect on the project. Constraints represent the bounds within which the study is being undertaken, such as legislation, funding, and environmental considerations.

Environmental, social and urban design issues were identified and evaluated in accordance with the Transport Agency environmental and social screen process.

The following section outline the opportunities within the Wellington to Hutt Valley project.

#### 3.3.1 Petone to Grenada Project (P2G)

The Petone to Grenada Link Road aims to alleviate congestion on one of the busiest part of the Wellington Northern Corridor between Grenada and Wellington. The project proposes four lanes (two lanes in each direction) with a median barrier from Petone to Grenada, along with significant changes to the Petone over bridge which aim to provide improved cycling facilities.

The project provides an important opportunity to improve cycle access from Petone and separation for cyclists from motorised traffic. The P2G proposals plan a realignment of the existing railway, which provides a significant opportunity to incorporate a cycleway in the space.

Ongoing consultation will be necessary between the two projects in order to consider both the changes in infrastructure at the interchange at Petone plus the opportunity to take spoil for any potential reclamation option along the foreshore.

### 3.3.2 Ngauranga to Aotea Quay Project

The Ngauranga to Aotea Quay project is an active traffic management system project being undertaken as part of the Wellington Northern Corridor road of national significance (Levin to Wellington Airport) programme.

The project provides an opportunity to remove the KiwiRail access lane under Ngauranga Interchange. This access lane provides an opportunity to widen the currently deficient shared path under the interchange, shown in the image below. As this project develops the ability to use the KiwiRail access lane may change and more impact may from the project on the W2H proposals may be identified. Consultation with the project team has been undertaken while developing the short list of options. As the project progresses to detailed design, ongoing consultation will be necessary.

### 3.3.3 Travel Behaviour Change

SH2 suffers from congestion at peak times which causes unreliable journey times and delays. The provision of a dedicated, safe and efficient cyclist and pedestrian link provides the opportunity to increase the proportion of people travelling by active modes along the transport corridor, and reduce congestion along SH2.

The 2013 census revealed an encouraging trend in Wellington City and the region with the number of people travelling by active modes (walking, jogging, cycling) increasing, and an overall decrease in people commuting via car, truck or van. For instance cycling increased to 3.5% compared to 2.1% in Wellington City with a total of 1572 more people cycling to work.

In 2006 15.3% of people walked or jogged to work in Wellington city, this increased to 17.3% in 2013. Investment in active modes along SH2 provides an opportunity to continue to increase these figures and unlock suppressed demand along the corridor. Importantly the investment would reflect actual trends in Wellington, where commuting by walking, jogging and cycling is becoming increasingly popular. A summary of the key changes between the 2006 and 2013 census are provided in Table 4.

**Table 4 Journey to Work Data: 2006 to 2013**

Method of travel to work

Wellington City		2013		2006		Change	
Main method of travel	Number	%	Wellington Region %	Number	%	Wellington Region %	2006 to 2013
Drove a car, truck or van	39,756	37.8	47.4	41,181	40.1	48.5	-1,425
Passenger in a car, truck, van or company bus	4,314	4.1	4.5	5,118	5.0	5.3	-804
Motorbike or power cycle	1,641	1.6	1.3	885	0.9	0.8	+756
Train	3,141	3.0	6.2	3,177	3.1	5.8	-36
Public bus	14,565	13.8	7.6	14,325	14.0	7.6	+240
Bicycle	3,729	3.5	2.4	2,157	2.1	1.7	+1,572
Walked or jogged	18,183	17.3	9.8	15,696	15.3	8.8	+2,487
Worked at home	5,640	5.4	6.2	5,187	5.1	5.7	+453
Did not go to work on census day	10,158	9.7	10.3	9,900	9.6	10.1	+258
Other	1,353	1.3	1.1	1,101	1.1	0.9	+252
Not stated / included	2,763	2.6	3.2	3,903	3.8	4.7	-1,140
<b>Total</b>	<b>105,243</b>	<b>100.0</b>	<b>100.0</b>	<b>102,630</b>	<b>100.0</b>	<b>100.0</b>	<b>+2,613</b>

Source: Statistics New Zealand, [Census of Population and Dwellings](#) 2006 and 2013. Compiled and presented in profile.id by [id](#), the population experts.

### 3.3.4 Constrained Corridor

The corridor is constrained on the eastern side by the Wellington Escarpment and on the western side by the harbour. The railway line is close to the harbour with no available land for the railway lines to be moved further to harbour edge. The Wellington Escarpment constrains any movement or expansion of SH2 to the east.

Figure 18 shows how close the existing the railway line is to the harbour edge, with the escarpment in the background.

Figure 18 Separated Path, Railway corridor, and SH2 looking north



The constrained nature of the corridor means that land reclamation is necessary to provide a sufficient path width for cyclists and pedestrians without compromising the SH2 shoulders and traffic lane, or the railway line. The need for land reclamation means at a high level there are only two options which are viable, which are land reclamation on the seaside or land reclamation and rail realignment.

Any path on the seaside option inevitable means that bridges will be required to cross the railway line. The constrained corridor is therefore one of the main constraints of the whole study and a determiner in all design options.

### 3.3.5 Resilience

Resilience is an important issue for the corridor, due to the ability of a new shared path (if on the seaside option) to provide resilience against major natural events. To address this constraint a separate study is being undertaken in parallel to understand how resilience can be provided by a shared path (see **Resilience Addendum Report**).

Providing a safe and dedicated facility for cyclists and pedestrians along the corridor could reduce the congestion along SH2 following a major earthquake and provide an alternative mode out of the city. In addition it could also provide protection for the railway corridor operations during a major storm.

#### Storm Events

The corridor is vulnerable to storms and flooding. This is likely to be exacerbated in the future because of the effects of climate change which include rising sea level and increased frequency of storms.

The resilience issues of the corridor are currently high-profile as a result of a 1 in 50 year storm event in May 2013 which resulted in breaches in the sea wall protection along the railway and the subsequent closure of the rail line for one week while repairs took place. This resulted in a net loss of earnings of over \$30M to KiwiRail as assessed in the MOT report (see **Resilience Addendum Report**). It also resulted in additional demand for travel along the SH2 corridor which resulted in travel delay and severe congestion during peak times.

#### Earthquakes

Following a major earthquake in Wellington the Wairarapa line was closed for inspections resulting on greater demand and congestion along SH2.

A seaside path will provide an alternative route and mode out of Wellington following a major earthquake, which will reduce congestion immediately after an event.

### 3.3.6 Tourism

The Wellington Harbour is a major focal point of tourism opportunity. This is evidenced by the current Rimutaka Cycle Trail, one of the NZ Great Rides, which currently travels along the Hutt River and terminates on the Petone foreshore. The second round of investment in the NZ Great Rides is due to look at “connections” into towns and cities. Linking the Rimutaka trail into Wellington City is one such tourism opportunity.

### 3.3.7 Economic

An economic evaluation in accordance with the EEM has been carried. However from a wider economic perspective the adequacy of the strategic transport network between two of the three primary populations in the region is a key matter. It is however difficult to quantify wider economic benefits. Efficient movement of people and freight between key population and commercial nodes for all modes assists in broad terms with economic outcomes for the region.

There is also an economic cost in terms of incidents which is exacerbated by the high number of trips along the Petone to Wellington CBD corridor.

### 3.3.8 Social / Public Health

The Hutt Valley is separated from Wellington by a constrained corridor between the coast and the escarpment. This has necessitated the transport corridor being partly located on reclaimed land. While road and commuter rail links are well provided for the existing facilities for pedestrians and cycling are poor.

Improvements to walking and cycling facilities may:

- Improve connectivity by providing alternative transport modes and increased recreational opportunity;
- Induce increased active transport trips which will create positive human health effects.

## 3.4 Summary of Environmental Issues and Constraints

### 3.4.1 Ecological

The transport corridor is highly modified by previous reclamations. The development of the high quality cycle and pedestrian path along the foreshore will provide an opportunity to reconnect with the foreshore environments.

The primary ecological effects in both the options considered relate to the coastal environment with reclamations of the Coastal Marine Area required for both. These reclamations consist of rock armour and are not generally accessible by foot.

In terms of existing ecology advice from DoC is that the seawall is not a nesting area for Penguins but there is rare native spinach nearby at the Korokoro Park. Additional advice from DoC is that there are no known significant ecological values in the intertidal or sub tidal in that area. Therefore while the ecology of the area is coastal it has been highly modified and there may be the opportunity to provide improvements. There are no direct impacts upon other ecosystems such as the Korokoro or Horokiwi Streams for either option.

### 3.4.2 Noise and Air Quality

The transport corridor is an area of high noise from both the road and rail operations and as a consequence of low overall amenity currently for walking and cycling. The high volumes of traffic also produce emissions that are at a higher level the closer a pedestrian or cyclist is to the road. Any roadside option would lie within close proximity to the road corridor for cycling and walking while any seaside option would provide greater separation.

### 3.4.3 Landscape and Urban Design

The existing landscape reflects the fact that it is a transport corridor located between a modified coastline and the escarpment below Wellington’s northern suburbs. The corridor along SH2 is highly modified, with opportunities provided by the seaside option to improve the existing landscape and urban design of the corridor. A new path on the seaside of the railway corridor will have a greater impact than a shared path within the existing road corridor.

A significant constraint is the need to retain or not adversely affect the existing views of the harbour from SH2 and the railway lines. There is also the opportunity with the coastal option to improve landscape amenity through additional planting.

A full Urban Design Framework and Assessment has been established. This is included in **Appendix L**. The framework references the NZTA urban design guidelines – Bridging the Gap (October, 2013).

#### 3.4.4 Heritage and archaeology

Heritage and archaeological sites were identified through consultation with Heritage NZ and the following Iwi groups:

- Port Nicholson Block Settlement Trust
- Te Runanga o Toa Rangitira

The following sites of significance were identified through ongoing consultation:

- A potentially historic site is the Korokoro Roman Catholic urupa (1853-1953) located near the Korokoro Road and Korokoro Crescent intersection. This site has significance to Maori as the burial place of chiefs.
- Honiana Te Puni Reserve in Petone which is owned by the Port Nicholson Settlement Trust and is an important site historically and also has plans for the site of a potential water sports hub.
- The Horokiwi, Korokoro and Ngauranga streams have significant historical and cultural value for the Port Nicholson Settlement Trust.

There are cultural values in the Petone area centred around the Korokoro Park although other recognised sites are on the escarpment side of the highway. Discussions with Port Nicholson Trust who are the owners of the Korokoro Park are continuing but no significant issues have been raised.

Both options do not require earthworks or disturbance in the direct vicinity of any of these sites. In addition the location along SH2 is a highly modified environment, however it will be important when undertaking possible earthworks and land reclamation to monitor any possible archaeological sites. A general authorisation under the Historic Places Act will also need to be sought.

### 3.5 Summary of Transport Issues

It is clear the corridor has many transport and non-transport problems triggered by its locations, constrained environment, competing demands, social and environmental context and exposure to natural events.

#### Actual and Perceived Safety

The Wellington to Hutt Valley corridor is topographically constrained with competing demands for its transport users. This has resulted in a constrained transport corridor that offers a poor environment for cyclists and pedestrians between the Ngauranga and Petone interchanges. The corridor has a poor safety record and poor perception of safety and attractiveness for its 400 cyclist and pedestrian trips per day.

#### Connectivity

Connections between Aotea Quay and Ngauranga via the Hutt Road for cyclists and pedestrians are considered challenging, as are connections at Petone and further north between Petone Station and Melling. This adds to the poor environment for cyclists and pedestrians and limits the future uptake of commuters and recreational users.

#### Resilience

The constrained environment has created resilience issues for both the road and rail networks. The outcomes of the September 2012 fuel tanker crash, the June 2013 storm as well as the August 2013 earthquake are all high profile examples of the disruption to services and poor response to incidents that impact users along this key transport corridor.

## 4.0 Outcomes

The proposed investment is in accordance with national, regional and local policies and plans, and will help contribute to the organisational outcomes of Government, the NZ Transport Agency, GWRC, WCC and HCC. The project is assessed as having a high strategic fit because of the opportunity to reduce congestion along SH2, reduce the crash risk for pedestrians and cyclists, link to main urban areas and also improve health and reduce emissions from vehicles.

### 4.1 Strategic Outcomes

The proposed investment will provide significant benefits that will contribute to the outcomes of national, regional and local government organisations. The provision of new or improved walking and cycling facilities will unlock existing suppressed demand for walking and cycling between Wellington and Hutt Valley. Providing a fully segregated shared path that is safe and efficient will help to change perception about the safety risk of walking and cycling between Wellington and Hutt Valley as well as incident risk. Improving safety for cyclists and pedestrians will be crucial to unlocking suppressed demand along the corridor and for improving safety for existing users.

A safe and efficient cyclist and pedestrian link between Wellington and Hutt Valley will reduce congestion along SH2, as more people choose to cycle (or walk) rather than drive.

### 4.2 Contribution to National, Regional and Local Objectives

The following sections outline how the project (not the options) align with and contribute to the objectives and outcomes sought in national, regional and local policy.

#### 4.2.1 Land Transport Management Act (2013)

All transport proposals are required to be assessed against the objectives and purpose of the LTMA (2003). The purpose of the LTMA is to '*contribute to an effective, efficient, and safe land transport system in the public interest*'. The LTMA has five decision making criteria against which projects are assessed. These include; assisting economic development, assisting safety and personal security, improving access and mobility, protecting and promoting public health, and ensuring environmental sustainability.

The proposal will improve safety for cyclists and pedestrians by providing a safe shared path along SH2 that is segregated from motorised traffic and has safe and efficient connections on and off the path. The proposed shared path will also improve accessibility between Wellington and Hutt Valley by providing an alternative mode of transport to driving or using public transport. This will reduce the cost of travel for people travelling between Wellington and Hutt Valley, and also encourage people to commute for work or education using active modes of transport (walking and cycling). This will contribute to improving people's health through reducing sedentary travel and help to reduce emissions from motorised transport along this corridor.

The objective of the Transport Agency under the LTMA is to 'undertake its functions in a way that contributes to an effective and efficient, and safe land transport system in the public interest' (para 94, page 99). The project is assessed against effectiveness, efficiency and safety below.

#### Effective

The shared path will provide an effective route for cyclists and pedestrians between Wellington and Hutt Valley, that provides a valuable link between these two urban areas for commuters and also for recreation. The proposed path options integrate successfully to the north and south either through linking in with existing networks, upgraded network or through providing new links.

#### Efficient

The proposed investment will provide an efficient link for cyclists and pedestrians, that is direct and has quick and legible links that connect the path to the north and south.



## Safe

The proposed investment will significantly improve the actual and perceived safety of cyclists and pedestrians by providing a segregated shared path along SH2 and safe connections on and off the path to the north and south. To the south of the shared path along SH2, the path will link on the existing Hutt Road in Wellington and an upgraded section of the Hutt Road (section 1) to improve safety for cyclists through reducing conflict with vehicles turning into driveways and parking spaces along the path. To the north, the shared path will link onto the Petone foreshore and an upgraded or new path up to the Petone railway station.

### 4.2.2 Government Policy Statement on Land Transport Funding (2012/13 – 2021/22)

The Government Policy Statement on Land Transport Funding (GPS) (MOT, 2012) sets out the Government's outcomes and priorities for the land transport sector, including how it will achieve investment in certain activity classes such as maintenance of state highways, road policing and walking and cycling. The GPS influences decisions on how funding from the National Land Transport Fund is invested.

The government's overarching goal for transport, set out in the GPS is for an

*'effective, efficient, safe, secure, accessible and resilient transport system that supports the growth of our country's economy in order to deliver greater prosperity, security and opportunities for all New Zealanders' (para 11, 6).*

The government's three focus areas for the for this GPS is; economic growth and productivity, value for money and road safety. The focus areas for GPS 2014/15 is unknown therefore the proposed investment will be assessed against the current GPS.

### Economic Growth and productivity – investing in walking and cycling

Investment in walking and cycling is expected to contribute to economic growth and productivity through reducing congestion along SH2. By providing a safe and effective cyclist and pedestrian link between Wellington and Hutt Valley more people will be encouraged to cycle and the current suppressed demand for walking and cycling between Wellington and Hutt Valley will be realised. This will in turn help to make better use of the existing capacity on SH2 as fewer people choose to drive.

Through providing a segregated, separate path for pedestrians and cyclists, and through improving the north and south connections, safety for cyclists and pedestrians will improve.

### Value for money

The proposed investment will help make better use of the existing capacity on SH2 by providing a safe alternative to driving or using public transport. Through enabling people to commute by cycling (or walking) between Wellington and Hutt Valley (and so unlocking the current suppressed demand) traffic congestion along the corridor will reduce.

### Road Safety

The proposed investment will significantly improve the actual and perceived safety of cyclists and pedestrians by providing a segregated shared path along SH2 and safe connections on and off the path to the north and south. To the south of the shared path along SH2, the path will link on the existing Hutt Road in Wellington and an upgraded section of the Hutt Road (section 1) to improve safety for cyclists through reducing conflict with vehicles turning into driveways and parking spaces along the path. To the north, the shared path will link onto the Petone foreshore and an upgraded or new path up to the Petone railway station.

### 4.2.3 The New Zealand's Road Safety Strategy 2010 to 2020 – "Safer Journeys" (MOT, 2010)

The strategy provides a guide to improvements in road safety and sets the government's long term vision for the road safety in New Zealand as: "A safe road system increasingly free of death and serious injury".

The strategy sets out a vision for walking and cycling that by 2020 – *'we will have a safe road environment that encourages more people to walk and cycle, where vehicles travel at safe speeds and there is a culture of sharing the road. We will aim to achieve a significant reduction in the number of pedestrians and cyclists killed and seriously injured while at the same time encouraging people to use these modes through safer roading infrastructure'.*

The proposed investment will help to achieve this vision through segregating cyclists and pedestrians from high speed traffic along SH2 and providing safe connections. Providing a safe path will help to encourage more people to walk or cycle between Wellington and Hutt Valley.

The strategy suggests the following actions to improve safe for cyclists and pedestrians:

- Change the give way rules for turning traffic (see Roads section).
- Strengthen techniques to integrate safety into land-use planning (see Roads section).
- Lower speeds in urban areas (see Speed section).
- Increase coverage of temporary lower speed limits around schools.
- Increase cycle skills training in schools and increase the effectiveness of road user education to make it safer to walk and cycle.

#### 4.2.4 NZ Transport Agency

The NZ Transport Agency is responsible for giving effect to the Government Policy Statement (GPS2012), which sets out the government's strategic direction for investment in the land transport network. This include the following four core business functions:

- Planning the land transport networks.
- Investing in land transport.
- Managing the state highway network.
- Providing access to and use of the land transport system.

#### Strategic Direction

The Transport Agency Strategic Direction articulates the purpose and desired long term impacts of the Transport Agency, the Transport Agency customers and stakeholders, functions and priorities. The desired long term outcomes are:

- Better use of existing transport capacity more efficient freight supply chains a resilient and secure transport network easing of severe urban congestion.
- More efficient vehicle fleets.
- Reductions in deaths and serious injuries from road crashes.
- More transport mode choices.
- A reduction in adverse environmental effects from land transport.

#### Transport Agency Integrated Planning Strategy (September 2010)

The Integrated Planning Strategy sets what the Transport Agency aims to achieve from an integrated planning approach and outlines how the Transport Agency intends to embed this approach into its business.

The NZTAs vision is set out in the strategy, and states that – *'The NZTA aims to use all of its functions to help create better transport systems and options (safer, cheaper and offering more choice, reliability and efficiency) for all of our customers (commuters, freight operators, consumers, tourists, students and the wider public), especially at peak travel times...'* (pg.5).

The strategy sets out the Transport Agency's position on a number of issues, which includes multi-modal issues. The current position states that:

*'The LTMA makes clear that our role is to promote matters relating to the land transport system. This means we actively promote the efficiency and effectiveness of road (buses, taxis, cycling, walking and private vehicles), rail (passenger and freight) and coastal shipping networks and services. However, because we invest in road and passenger rail-related activities through the NLTP, we prioritise our involvement in these matters'* (pg. 11).

The Transport Agency 's ongoing objectives (2010 – 2020) includes one objective most relevant to walking and cycling, which is to - *'reduce private vehicle travel, especially at peak travel times'*.

The relevant strategic deliverables that relate to this objective include:

- Complete 'missing links' in existing public transport and walking and cycling networks in major urban areas, in collaboration with others;
- Support initiatives that reduce travel demand in major urban areas, such as carpooling websites, airport bus services, telework initiatives and land use patterns that avoid long distances between home/work/school and business/market;
- Demonstrate the financial and societal benefits of more walking and cycling in urban areas through the Model Communities Programme.

The proposed investment supports the Transport Agency's organisational vision, objective and strategic deliverables outlined above. The proposed will reduce private vehicles travel through providing a safe, attractive and efficient cyclist and pedestrian path which will help to unlock suppressed demand for walking and cycling between Wellington and Hutt Valley. The proposed path will complete an existing missing link in walking and cycling infrastructure between Wellington and Hutt Valley and improve mode choice. The proposed investment will also improve safety for cyclists and pedestrians through providing separation from motorised vehicles.

#### **Bridging the Gap, NZ Transport Agency Guidelines on Urban Design (October 2013)**

NZTA's urban design objectives and requirements sets out 10 fundamental urban design principles which should guide the development of transport projects and contains best practice on detailed design aspects.

One of the ten principle's "Design with Nature" considers the underlying natural environment and ecosystems so as to minimise adverse effects on these. This will include consideration of the:

- Local topography and geology
- Vegetation patterns, particularly native vegetation
- Local drainage systems, including waterways and flood plains
- Wildlife habitats and corridors.

These are considered with the context of the Urban Design Framework developed for this project (refer **Appendix L**). While the concept has been investigated the specimen design phase will need to lead the urban design response to the provision of infrastructure alongside the Wellington coastline.

#### **4.2.5 Greater Wellington Regional Council**

##### **Wellington Regional Land Transport Plan (June 2015)**

The Wellington Regional Land Transport Plan (RLTP) (GWRC, 2015) is a statutory document prepared by the Regional Transport Committee that provides the overall strategic framework for investment on the region's land transport network to inform the development of the National Land Transport Plan (NLTP) and is the basis for:

- Identifying key regional transport issues, core problems and benefits.
- Outlining strategic principles and priorities for the key transport corridors in the region including the role of each mode in delivering an integrated solution.
- Developing a set of network plans for strategic roads, public transport and walking and cycling
- Identifying prioritised key projects and packages to implement the identified strategic direction

The RLTP's Vision is "To deliver a safe, effective and efficient land transport network that supports the region's economic prosperity in a way that is environmentally and socially sustainable"

This will be implemented through the following key strategic objectives::

- A high quality, reliable public transport network
- A reliable and effective strategic road network
- An effective network for the movement of freight
- A safer system for all users of our regional transport network.
- An increasingly resilient transport network

- A well planned, connected and integrated transport network
- An attractive and safe walking and cycling network
- An efficient and optimised transport system that minimises the impact on the environment.

The RLTP seeks the following outcomes relevant to the proposed investment:

- Reduced severe road congestion
- Improved regional road safety
- Increased safety for pedestrians and cyclists
- Improved transport infrastructure resilience to disruption from unplanned events
- A transport network that supports the restoration of access and regional recovery after a major event.
- Increased mode share for pedestrians and cyclists
- Increased level of service for pedestrians and cyclists
- Increased use of active modes for journeys to school

The RLTP identifies Ngauranga to Petone as the most significant gap in the regional cycling network. Key strategic measures in the RLTP relevant to the proposed investment are:

#### **Ngauranga to Airport Corridor**

- Investigating and implementing improved cycling and walking connections between Wellington City and Hutt City (via Ngauranga) consistent with the vision of the Great Harbour Way/ Te Aranui o Poneke concept

#### **Hutt Corridor**

- Fixing the gap in the strategic cycle network between Petone and Ngauranga through provision of a high quality, safe and attractive pedestrian/cyclist facility linked to the existing the local footpath/cycle networks to the north and south
- Continuing to improve and implement off road and recreational walking and cycling facilities and tracks to provide alternative options for walking and cycling trips, including progressing implementation of the Great Harbour Way and Upper Hutt Rail Corridor Cycle Link and continued improvement of the Hutt River Trail.
- Improving future resilience of the key transport and life lines corridor between Ngauranga and Petone in relation to seismic events, natural hazards and climate change impacts.

#### **The Hutt Corridor Plan (Greater Wellington Regional Council 2011)**

The Hutt Corridor Plan is the transport corridor formed by State Highway 2 and the Wairarapa Line from Ngauranga in the south through to Te Marua, Upper Hutt in the north, as well as east – west connections between State Highway 2 and State Highway 1, including State Highway 58 and Akatarawa Road. It includes major arterial routes and key routes for public transport, walking and cycling connecting with this corridor.

It therefore incorporates part of the study corridor.

The plan sets out actions and improvements to be implemented up to 2018 – 21 period to help achieve the long term vision set out in the Wellington Regional Land Transport Strategy.

The plan makes specific reference to the Ngauranga to Petone walkway/cycleway between Ngauranga and Horokiwi. It sets out the known issues with the existing poor quality path, the missing link and the safety issues around cyclists using the SH2 shoulders. A good quality walkway and cycleway between Ngauranga and Petone is identified as a significant gap in provision, which stops people safely walking or cycling between the region's two largest cities. It notes the need to undertake an investigation on the options for providing the link.

The proposed investment set out in this report delivers the outcomes sought in this plan. The proposal would address the issues identified in this report around the existing provision along SH2.

#### **Regional Cycling Plan (Greater Wellington Regional Council 2008)**

The Regional Cycling Plan sets out an action plan with a series of high level initiatives aimed at contributing to the outcomes of the RLTS. The plan outlines support for the 'Great Harbour Way Concept' to provide a 'continuous,

safe, signposted walkway and cycleway around the whole perimeter of Te Wanganui-a-Tara (Wellington Harbour) from Fitzroy Bay in the west to Sinclair Head in the east'.

It highlighted the current gap in provision between Petone and Ngauranga as significant and highlights it a priority.

Any seaside option will be in line with the Great Harbour Way concept in that it provides a seaside route along the harbour and is continuous between Petone and Ngauranga. The proposed investment would support the provision sought in this plan and would address the existing gap in provision.

#### **4.2.6 Hutt City Council (HCC)**

##### **HCC Cycling Strategy and Implementation Plan (February 2008)**

The strategy aims to guide the council's involvement in the provision for cycling in the city. It outlines the common issues of cycle provision in Lower Hutt as; coherence, directness and safety and security. The report also provides an overview of different cycle paths and shared paths that can be provided in Lower Hutt, and provides a review of existing provision.

The plan provides a strategic plan of the proposed cycleways in Lower Hutt which combine on-road facilities, off-road and alternative routes. The plan does not include SH2 south of Petone but it is noted as a significant gap in provision.

The proposed investment will contribute to the plan by linking into existing and planned routes in Lower Hutt and also linking the city with Wellington, which is a significant gap in improving cycling in and out of the city.

#### **4.2.7 Wellington City Council (WCC)**

##### **Cycling Policy (2008)**

Wellington City Council Cycling Policy sets out the council's objectives for improving facilities for cyclists. There are no policies or actions in relation to cycling facilities along SH2. However it is noted that WCC supports the concept of the Great Harbour Way as an important regional connection, while noting that its development would be challenging and expensive and that it is a regional project.

The cycling objectives set out in the strategy are:

- To improve cycle safety throughout Wellington
- To improve the convenience of cycling in Wellington
- To improve the experience of cycle trips to and from the Central Area
- To improve the experience of cycle trips to and from Suburban Centres
- To improve the experience of cycle trips to and from educational centres
- To improve the experience of cycle trips for recreation

##### **Walking Policy (2008)**

The purpose of the walking policy is to provide a framework for initiatives to collaboratively improve the pedestrian walking environment in Wellington. The primary focus is to on promoting walking trips that would otherwise be undertaken by car.

The walking objectives set out in the strategy are:

- Objective 1: To promote the benefits of walking so that more people walk
- Objective 2: To improve pedestrian safety throughout the city
- Objective 3: To improve the experience of those walking through or about the Central Area
- Objective 4: To increase the number of commuter trips taken by foot to and from the Central Area
- Objective 5: To improve the experience of those walking to and from public transport stops
- Objective 6: To increase the number of short walking trips to and from Suburban Centres
- Objective 7: To increase the number of walking trips made to and from educational centres and the regional hospital

### **Wellington City Council's Long Term Plan (2015-2025)**

Wellington City Council's Long Term Plan (2015 -2025) sets out the long term vision and plan for Wellington City Council. In term of cycling it is highlighted in the long term plan that the council is investing in cycle safety projects and new cycling routes. The Council is allocating \$58 million over the 10 year period of the LTP to implement a city wide network of safe cycling routes, although the LTP does not specifically identify the proposed investment.

## **4.3 Summary**

The proposed investment is in line with and would contribute to the outcomes and objectives sought in the national, regional and local plans outlined above. The proposed investment will improve safety for pedestrians and cyclists the transport corridor between Wellington and Hutt Valley. It will also contribute to improving health, and reducing congestion on SH2 through increasing the uptake of walking and cycling, and reducing the number of people that currently drive.

The project objectives were developed specifically for the DBC. The objectives reflect the key issues and opportunities identified in this DBC and in previous studies, specifically with regards to improving safety and connections for cyclists and pedestrians.

The actual and perceived safety risk is key concern for potential cyclists and pedestrians, therefore an outcome is sought to develop a safe link to attract suppressed demand.

The resilience objective reflects disruption from corridor flooding, sea level rise and storm surge following a major storm event or other natural hazards.

Anticipated transport related project outcomes include:

- Increased numbers of commuter cyclists using the corridor
- Increased numbers of pedestrians, runners and recreational / tourism-related cyclists using the corridor
- Lower accident rates for cyclists along the corridor
- Maintaining or improving journey times for commuting cyclists
- A transport corridor that is less likely to be interrupted by natural events.

## 5.0 Stakeholders and Engagement

Extensive consultation has been undertaken with stakeholders, statutory stakeholders and the public in the development of this report. Consultation undertaken has included enquiry by Design workshops with a walking and cycling reference group, a public information and a workshop with various walking and cycling groups based in Wellington and Hutt Valley. Consultation has been undertaken on an ongoing basis with Wellington City Council, Hutt City Council, Greater Wellington Regional Council and KiwiRail. The public have been able to provide feedback via the consultation website, or via email, phone or post.

The majority of feedback received from the public was fully supportive of the project to improve walking and cycling links between Wellington and Hutt Valley, with only a minority supporting no investment or investment in route in Wellington city. The majority of feedback has indicated support for a seaside option due to improved safety, connectivity and amenity.

### 5.1 Consultation and Communication Approach

Consultation with directly affected parties and stakeholders was undertaken as part the development of this DBC, and was undertaken in accordance with the RMA 1991 and consistent with best practice guidelines. The consultation process provided communities with information and the opportunity to help form and respond to proposals, the LTMA 2008, the Transport Agency Engagement Policy 2008, and Transport Agency Guidelines for the Management of Consultation with Iwi or Hapū.

Further details of the Consultation and Communication approach is contained in the Consultation Report (see **Appendix N**).

The consultation principles were to:

- Identify and engagement with all affected parties, including directly affected, stakeholders, Iwi and the wider community.
- Provide clear and concise information and communication.
- Create a platform for honest and open communication.
- Gain maximum participation engagement and feedback.
- Encourage the active participation and collaborative input into the route selection and design process.
- Ensure that feedback is adequately documented and fed back into the design process.
- Receive maximum buy-in from stakeholders and the wider community.
- Gain media coverage.
- Meet Transport Agency's obligations under the Resource Management Act 1991 and Land Transport Act 2003 and Local Government Act 2003.

#### 5.1.1 Key Stakeholders

Key stakeholders with a statutory or regulatory interest in the project were identified early in the project and engaged throughout the development of BDC. The key stakeholders are summarised in Table 5.

**Table 5 Key stakeholders**

Organisation	Role
Greater Wellington Regional Council (GWRC)	Statutory, transport planning and design roles. Potentially also a landowner.
Wellington City Council (WCC)	Statutory, transport planning and design roles. Potentially also a landowner.
Hutt City Council (HCC)	Statutory, transport planning and design roles. Potentially also a landowner.
KiwiRail	Infrastructure provider and landowner.

Organisation	Role
Wellington Tenth's Trust	Iwi <sup>8</sup>
Port Nicholson Settlement Trust	Iwi

Te Runanganui o Taranaki Whanui ki te Upoko o te Ika a Maui and Ngati Toa were contacted at the start of the study but did not wish to be consulted in this study.

### 5.1.2 Walking and Cycling Reference Group (WCRG)

A Walking and Cycling Reference Group was set up to enable end users (cyclists, pedestrian, and runners) to contribute to the development of options and the design of a preferred option, principally through the Enquiry by Design Workshops. The members of the reference group were sourced from local cycling, walking, and running groups with an interest in the Project (listed in the table below). The cycling representatives were taken from the following sub-groups (through self-selection):

- **Fast and fearless<sup>9</sup>:** Typically highly confident, who seek the fastest and most direct route and will cycle without fear in most road environments.
- **Enthusied and confident:** This group comfortable to share the road with vehicles but prefer cycle lanes/segregated paths, and are most encouraged to ride a bike when cycle infrastructure is provided and are attracted to cycling through improved cycle infrastructure.
- **Interested and concerned:** This group represent potential cyclists and are interested, but want safe, direct, comfortable, attractive and connected cycle infrastructure.
- **No way, No how:** This group would never be encouraged to cycle despite the provision of cycle infrastructure or behavioural initiatives. This group were not involved in the Cycling and Walking Reference Group because they would never consider cycling regardless of infrastructure improvements etc.

### 5.1.3 Other stakeholders

Stakeholders with an interest in the Project (to a greater extent than the wider public) were also consulted. This included the stakeholders previously consulted during the 2006 Ngauranga to Petone investigations.

Other stakeholders are shown in Table 6.

Table 6 Other Stakeholders

Stakeholder Group	Organisation
Cycling/Walking/Running groups	CAN Cycling Advocates Group
	Cycle Aware Wellington
	Hutt Cycle Aware
	Great Harbour Way Coalition
	Bike NZ
	Frocks on Bikes
	Living Streets Aotearoa
	Wellington Mountain Bike and Cycle Touring Club
	Port Nicholson Poneke Cycling Club
	Hutt Valley Harriers
	Hutt Valley Marathon Clinic

<sup>8</sup> Iwi groups were not part of the project steering group

<sup>9</sup> The "Four Types" categorisation was first developed in 2005 by Roger Geller, as the City of Portland began to consider what it would take to dramatically increase bicycle use in Portland. The intent behind its development was to get a better handle on the market for bicycle transportation. The numbers or proportions originally assigned were not based upon any survey or polling data, or on any study. Rather, they were developed based on the professional experience of one bicycle planner (Roger Geller).



Stakeholder Group	Organisation
	Hutt Valley Mountain Bike Club
	Welly Walks
<b>Community /Recreation groups</b>	Petone Community Board
	Korokoro Environmental Group (KEG)
	Petone Planning Action Group
	Petone Rowing Club
<b>Other Statutory organisations</b>	Historic Places Trust
	Department of Conservation
<b>Road and Transport providers</b>	NZ Road Transport Association
	NZ Trucking Association
	Heavy Haulage Association
	AA
<b>Other Transport Agency Projects or Maintenance Contract provider</b>	Aotea Quay RoNS
	Petone to Grenada Project Team
	Ngauranga to Aotea Quay Project Team
	Transport Agency's Network Maintenance Management Consultant
<b>Network Utility providers</b>	Telecommunication providers
	Gas providers
	Electricity providers
	Capacity
<b>Emergency Service providers</b>	NZ Fire Service
	NZ Police
	Wellington Free Ambulance
<b>Other</b>	Fulton Hogan/Horokiwi Quarry
	GWRC Workplace Travel Plan Network
	Hutt Chamber of Commerce

## 5.2 Consultation Methods

A variety of media options were used to provide information to stakeholders and the public. The information aimed to raise awareness of the project, encourage people to participate in the consultation and to provide information on the options being considered. Public consultation was undertaken from October 2013 to June 2014. Alongside this, targeted meetings were undertaken on an ongoing basis with statutory stakeholders and other interested stakeholders.

The following methods were used to provide information and seek information from the public and stakeholders:

- Project Steering Group<sup>10</sup>
- Publicity – press releases and newsletters.
- Project website.
- Public Information day
- Enquiry by Design Workshops.
- Workshop with walking and cycling groups based in Wellington and Lower Hutt.
- Meetings with stakeholders.
- Consultation with potential affected landowners.
- Phone line and email.
- Project cards with a QR code linking to the project website and surveys.
- Council briefings with WCC and HCC

Stakeholders and the public could provide their feedback on the short list of options via the dedicated phone line, email, post or via paper and online feedback forms. Two public surveys were undertaken, and feedback sought on the two separate surveys. The first feedback sought comments on the existing issues, current behaviour and feedback on the initial short listed options. The second feedback sought comments on the short list of option and on issues such as funding and timescales.

## 5.3 Potentially Affected Parties

### 5.3.1 Potentially affected land owners

The following land owners are potentially affected by the proposals for both options:

- McKenzie overbridge widening – potential impacts on land under development (new owner)
- KiwiRail
- Port Nicholson Settlement Trust
- Hutt City Council.

Consultation has been undertaken with all affected land owners via face to face meetings. The consultation will be ongoing as the recommended option is progressed in future studies.

Assessment of potential property impacts is summarised in Section 8.

## 5.4 Consultation Summary

A number of studies have been done into options for a walking and cycling link from Petone to Ngauranga (refer to section 1.2 for more detail). Each has included some level of targeted consultation, and a formal public consultation phase was held from November 2013 to the end of March 2014.

Members of the public, walking and cycling interest groups, potentially affected land owners and tenants were all invited to participate. Key stakeholders such as Greater Wellington Regional Council, Wellington City Council, Hutt City Council and KiwiRail were also consulted as options were developed, ensuring that potential issues and constraints would be considered throughout the process. The main forum for consulting with stakeholders in the latter group has been through the formation of a Steering Group, individual meetings as required, and briefings to both Hutt and Wellington City Council. Workshops and meetings were also held with a project-specific walking and cycling reference group and key stakeholders such as Cycle Aware Wellington, Hutt Cycling Network and the Great Harbour Way Coalition.

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<sup>10</sup> The Steering Group has representatives from NZTA, Wellington City Council, Hutt City Council, Greater Wellington Regional Council and KiwiRail.

## 6.0 Alternatives and Option Assessment

This section identifies the long list of options, applies approved methods of assessment, resulting in a short list of project options. A multi-criteria assessment was undertaken to refine and determine a short list of options.

The options shortlisted from the MCA and identified through discussions with the Steering Group and other key stakeholders are:

Option 1 – Roadside shared path

Option 2 – Roadside shared path (raised to road level)

Option 3 - Seaside shared path

These options were subject to economic analysis using full procedures (see Section 8).

The findings, combined with the Alternatives Assessment Summary (see **Appendix B**), Option Summary Tables (see **Appendix C**), Hutt Road Report for Wellington City Council (see **Appendix G**) Environmental Screening (see **Appendix M**), together with the assessment of other inputs such as urban design and landscape (see **Appendix L**) enabled the project recommended option to be made.

### 6.1 Option Development

The long list of options were developed from the studies relating to the Petone to Ngauranga cycleway<sup>11</sup> since 2006 and also related previous studies (see Section 2).

The reasons for including the options considered in previous studies specifically relating to the missing link from Petone to south of Horokiwi and the existing cycle path from Horokiwi to Ngauranga, as well related studies in Wellington and Hutt Valley was to ensure that the north and south connections were adequately assessed and integrated to any improvements from Petone to Ngauranga. Additional options were also developed by AECOM as part of this DBC.

The previous options were deficient due to the lack of connections and consideration of the needs of existing confident cyclists, who are unlikely to use a path which requires a detour. The benefits of drawing on related and directly related studies therefore ensured that full consideration was given to the positive north and south connections.

The previous studies and the option are summarised in Table 7.

**Table 7 Previous studies and options which formed the long list of options analysed**

Study	Options	Assessed as part of developing a long list
Scheme Assessment Report (Opus, May 2006)	<ul style="list-style-type: none"> <li>- Option 1 - Cycleway bridge</li> <li>- Option 2 - Cycleway underpass</li> <li>- Option 3 - Level crossing</li> <li>- Option 4 - Railway realignment (with reclamation)</li> <li>- Option 5 - Short rail realignment (no reclamation).</li> </ul>	Y
Scheme Assessment Report - Addendum (Opus, October 2006)	<ul style="list-style-type: none"> <li>- Option 5B - Utilise additional spaces created by the closure of the right turn bay at Horokiwi, realignment of the double track rail line and minimal reclamation to provide a continuous cycleway between the railway and SH2.</li> </ul>	Y

<sup>11</sup> Previous studies have referred to the project as the 'Petone to Ngauranga cycleway' or 'Ngauranga to Petone cycleway', this study was renamed the 'Wellington to Hutt Valley Cyclist and Pedestrian link' in response to the need to consider the connections.

Study	Options	Assessed as part of developing a long list
Ngauranga Triangle Study - Ngauranga to Petone off-road cycleway Project Feasibility Report (SKM, January 2010)	<ul style="list-style-type: none"> <li>- Improve existing path (drainage, maintenance, resurfacing, widening where possible)</li> <li>- Reclamation to provide a seaward cycleway (3.6m wide) and a bridge over rail at Horokiwi. Links to existing cycleway, widened where possible to 3m and 0.3m clearance from fence either side</li> </ul>	Y
Ngauranga to Petone Cycleway Strategic Feasibility Study (Opus and NZTA, October 2012)	<ul style="list-style-type: none"> <li>- Close the gap by land reclamation, overbridge, two-way upgrade to existing cycleway (NZTA/OPUS SFS, 2012)</li> </ul>	Y
Wellington Cycleway Feasibility Study Ngauranga to CBD Preliminary Funding Report (Opus, 2012)	Harbour way options <ul style="list-style-type: none"> <li>- 1 – Great Harbour Way (primary option)</li> <li>- 1NX – Northern connections</li> <li>- 1SX – Southern connections</li> </ul>	Y
	Hutt Road Improvements <ul style="list-style-type: none"> <li>- 2a – Widen on-road cycle lanes/shoulders</li> <li>- 2b – Provide on-road 1.5m lanes</li> <li>- 2c – on-road shared bus/cycle lanes</li> <li>- 2d – upgrade existing 2-way cycle path on footpath</li> <li>- 2e – Improve existing shared path</li> </ul>	Y
Great Harbourway (Boffa Miskel, 2009)	<ul style="list-style-type: none"> <li>- Hutt &amp; Thorndon route remain in medium term</li> <li>- 3.0m ped/cycle walkway from Petone &amp; overbridge to SH2 path.</li> </ul>	Y
Provision for Cyclists SW Petone (Barclays, 2012)	<ul style="list-style-type: none"> <li>- Option 1 - Pharazyn to Hutt Road cycleway, either road 1.5m cycle either side of road or combined ped/cyclist path.</li> <li>- Option 2 - Continued use of State Highway 2 shoulders.</li> <li>- Option 3a - Pito-one-Road at Korokoro to London Road , cross Hutt Rd. or continue on western side of SH2 to Dowse Drive through Percy's Reserve.</li> <li>- Options 3b - Rail Corridor - with continuous route from Melling Bridge to Wakefield Street (off-road, one lane) if the Wairarapa Line is closed.</li> </ul>	Y

The options in these studies formed the long list of options for the study. In addition new options were also developed based on the analysis of problems and the design solutions available to address the problems. The additional options developed which also formed part of the long list of options included:

- Rail realignment and reclamation to increase the width of the existing cycle to 5m (AECOM option 1, 2013).
- New P2G interchange with cycleway under interchange and links for NB cyclists over McKenzie overbridge.
- Northbound improvements (sub-option) (AECOM option 3, 2013).
- Land reclamation (3.5m) with seaward cycleway and bridge at Ngauranga (AECOM option 4a, 2013).
- Land reclamation (5m) with seaward cycleway and bridge at Ngauranga (AECOM option 4b, 2013).

## 6.2 Assessment of other land transport alternatives

The long list of options were assessed using multi-criteria assessment (MCA). The MCA was undertaken by the project team and the NZTA project manager, and approved by the Steering Committee. The criteria used was

developed based around the project objectives which were informed by the Enquiry by Design workshop (see below).

### 6.2.1 Consultation - Enquiry by Design workshop

The MCA used to assess the long list of options was informed by consultation. The first Enquiry by Design workshop which took place on 15 October 2013 aimed to understand the most important design and level of service considerations for cyclists and pedestrians. The most important criteria included avoiding conflict with vehicles, connectivity, vehicle separation and width. The comments raised during the workshop and criteria identified help to inform the project objectives, and so the criteria used to assess the options.

### 6.2.2 Development of the Project Objectives

The project objectives were developed based on the problems identified along the corridor, in consultation with the project steering committee<sup>12</sup> and to ensure alignment with RMA requirements. The criteria and KPIs developed for the MCA were based on the project objectives.

### 6.2.3 Assessment Criteria

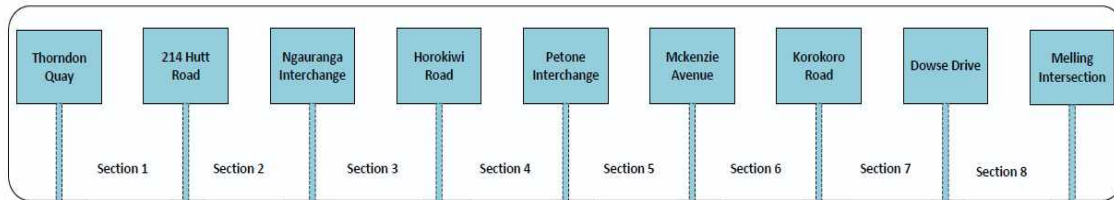
The criteria used to assess the long list of options is provided in Table 8.

Table 8 Assessment criteria used in the long list MCA

Project Objective	KPI
To improve safety perceptions of walking and cycling modes of transport between Petone and Ngauranga by improving connections and integrating walking and cycling activities with other networks in Lower Hutt and Wellington.	Improves safety for cyclists and pedestrians between Petone and Ngauranga (including north/south connections).
	Improves walking and cycling connections between Wellington and Hutt Valley.
	Integrates with existing (or planned) walking and cycling networks in Wellington and Lower Hutt
To provide infrastructure that is a catalyst for increased usage of the Wellington to Hutt Valley corridor by walkers and cyclists regardless of ability.	Is likely to increase demand for walking or running between Petone and Wellington (or part of the route).
	Is likely to increase demand for cycling between Petone and Wellington. Particularly 'enthused and confident' and 'interested but concerned' cyclists.
	Is likely to be used by existing cyclists.
To consider transport network resilience in providing a walking and cycling facility with enhanced safety standards and capacity.	Provides an opportunity to support the resilience of the transport corridor against future environmental scenarios.
To manage the social, cultural, land use and other environmental impacts of the project in the project area and its communities by so far as practicable avoiding, remedying or mitigating any such A28 effects through route and alignment selection, design and conditions.	Potential environmental impacts can possibly be avoided, remedied or mitigated or enhanced.
	Potential landscape and urban design impacts, including physical & visual impacts on the coastal environment and escarpment, existing views for other corridor users and loss of amenity for adjacent properties can potentially be avoided, remedied, mitigated or enhanced.
	Potential to provide improved pedestrian/cyclist amenity, including design quality and aesthetics, and landscape experience (views and access to the coastal environmental).
	Potential to improve the urban form and quality of the transportation corridor and streetscape for all users.
	Potential social or cultural impacts can possibly be avoided, remedied or mitigated or enhanced.

<sup>12</sup> The Steering Committee including representative from NZTA, WCC, HCC, GWRC and KiwiRail

The options were aligned with the section they relate to, for example any options relating to solving the missing link were allocated to section 4. 'The sections' are defined in more detail in Section 1, but broadly include the



following:

Each long list option was assessed against the KPIs and given a score. The outcome of this MCA was one or two shorted list option per section. The spreadsheet showing the assessment criteria, the options allocated to particular sections and the scoring for each of the options is provided in **Appendix B**.

The options which had the highest score and were initially shortlisted from the MCA workshop included the options summarised within each section in Table 9.

**Table 9 Short Listed Options following MCA**

Section	Initial Shortlisted Options
1	- <b>Option 7</b> - Copenhagen style cycle lanes and new parking layout.
2	- <b>Option 8</b> - Improvements to existing cycle path (path treatments and line markings etc.)
3	- <b>Options 1, 2 and 3</b> - Improve the existing cycleway with improved maintenance etc. - <b>Option 6</b> - Land reclamation (5m) with seaward cycleway and bridge at Ngauranga - <b>Option 7</b> - Realign railway line to increase width of existing cycleway to 5m (Meets project objectives and KPIs but is Cost prohibitive).
4	- <b>Option 4</b> - Reclamation and rail realignment reclamation. Cycleway in new area between road and rail. Links to existing cycleway, - <b>Option 7</b> - Seaward side shared path - <b>Option 9</b> - Cycleway (5m wide) between rail and road to link to the existing (rail realignment and reclamation). - <b>Option 12</b> - Land reclamation, 3.5m seaward shared path - <b>Option 13</b> - Land reclamation, 5m seaward shared path
5	- <b>Option 3</b> - New P2G interchange with cycleway under interchange and links for NB cyclists over McKenzie overbridge.
6	- <b>Option 3</b> - Pito One Road cycle path northbound and cycle path in Rail corridor southbound.
7	- <b>Option 3</b> - Pito One Road cycle path northbound and cycle path in Rail corridor southbound.
8	- <b>Option 3</b> - Pito One Road cycle path northbound and cycle path in Rail corridor southbound.

## 6.3 Option Refinement

The options initially shortlisted as part of the MCA process were further refined as a result of consultation and design considerations and constraints.

### 6.3.1 Consultation

The following consultation was undertaken which led to changes to the initial short listed options:

- Consultation with WCC revealed that the preferred option for Copenhagen style cycle lanes along Hutt as recommended by Opus (2013) is not supported by WCC. The option is not considered viable because of the proposed parking arrangement and due to safety concerns for cyclists. WCC are therefore looking at

possible short term and long term options for Hutt Road, including a possible bus priority lane shared with cyclists and new parking arrangements. Consequently, the short list of options were refined to improvements (yet to be defined) for section 1 and minor improvements for section 2. A preferred option is yet to be identified and WCC has tendered a separate investigation into these sections.

- Consultation with HCC confirmed at the council supported the short list options for sections 6, 7 and 8, as per the Barclays (2013) report. HCC supported looking at using the Melling railway corridor, as per the Barclays report, however further design refinement and development showed a lack of space available in the rail corridor between the Dowse Interchange and Melling Station . while the Melling rail line remains in operation (see below).

### 6.3.2 Design

Refinement of the designs led to changes to the short list of options, which included changes from section 6 onwards and integration of the currently preferred P2G Petone Interchange. Details are provided below.

#### Rail Corridor

Further investigation have identified that an off road cycleway within the railway corridor may be possible in sections 6 and 7 , subject to KiwiRail agreement, however north of Dowse Interchange (Section 7), there is insufficient room in the rail corridor for even a southbound cycle lane.. The Hutt Road provides a potential alternative route however as set out in the Barclay (2010) report it has a worse crash risk and so does not provide a safe alternative route.

Improvements along Hutt Road may provide a safe alternative if improvements were made, however this is out of the scope of this study and is located within Hutt City Council's jurisdiction and so could form part of future investigations. Given the restricted space available, there is no fully off highway option from Melling to Petone station, although discussions are ongoing with KiwiRail about the feasibility of a bi-directional rail corridor shared path from Petone Station as far as Dowse Interchange. However until these discussions are concluded, and together with the lack of an existing safe alternative route along Hutt Road therefore, the only alternative option is continued use of the SH2 shoulders.

The infrastructure along SH2 including Melling and Dowse Interchanges has been relatively recently improved, however no adequate provision for cyclists was integrated which makes retrofitting the existing interchanges expensive and problematic.

## 6.4 Short-List Options

As a result of the refinement of options through consultation and design iterations the final short list of options were agreed. These options are summarised in Table 10.

Table 10 Final short list of options

Section	Option Details	Option Details
1	Option 1 – Hutt Road improvements	See Hutt road sub options below (section 6.5.1).
2	Option 1 – Minor Improvements	The section is already sufficient and provides a good level of service for cyclists and pedestrians, which means improvements won't generate any benefits.  The existing shared path to be upgraded and minor safety improvements
3	Option 1 – Roadside shared path.	Existing shared path to be upgraded. Improved southern end access and removed dog-leg. Widened to 3.0m with pinch-points (2.64m, 1.79m, 1.65).
	Option 2 - Roadside shared path, raised to the height of SH2.	Same as option 1 but the height of the path will be raised to meet the same height SH2.
	Option 3 - Seaside shared path.	Existing shared path on southern end to be upgraded, improved southern end access. At 700m crossing over the railway tracks, new

Section	Option Details	Option Details
		3.0m shared path on reclaimed land, lighting.
4	Option 1 – Roadside shared path.	<p>There is no shared path at the northern end (cyclists ride on the shoulder). Rail track to be relocated to reclaimed land to make space for the new 3.0m wide shared path.</p> <p>At northern end the path splits into:</p> <ul style="list-style-type: none"> <li>- Continuation of the new shared path on the western side of rail tracks, and</li> <li>- an upgraded existing path between the tracks and Hutt Road.</li> <li>- There is also an existing unsealed track along the coast, which won't be upgraded.</li> </ul>
	Option 3 - Seaside shared path.	<p>Continuation from section 3:</p> <ul style="list-style-type: none"> <li>- a new 3.0m shared path on reclaimed land on the eastern side of the railway tracks (seaside).</li> </ul>
5	Option 1 – Shared path west side of railway	<p>Continuation from Section 4:</p> <ul style="list-style-type: none"> <li>- a new 3.0m wide shared path on the western side of the rail tracks continues past McKenzie Avenue to terminate at Petone train station</li> <li>- an upgraded existing path on the western side of Hutt Road terminates early</li> <li>- the existing unsealed track continues.</li> <li>- At McKenzie Avenue several options continue into Section 6: <ul style="list-style-type: none"> <li>- a new shared use path in Pito-One Road, both directions</li> <li>- northbound shoulder lane on SH2</li> <li>- southbound shoulder lane on SH2</li> </ul> </li> <li>- Shared path north of Petone Station using KiwiRail land is awaiting design feasibility.</li> </ul>
	Option 2 – Shared Path crossing from east to west side of railway	<p>Continuation from Section 4:</p> <ul style="list-style-type: none"> <li>- a new 3.0m wide shared path on the eastern side of the railway connects with an upgraded and widened Hutt City footpath under the Hutt Road SH2 overbridges</li> <li>- a new 3.0m wide shared path in the rail corridor on the eastern side of the railway connecting to a new 4m wide shared cycling and pedestrian overbridge over the rail tracks that then runs down the western side of the railtracks continues past McKenzie Avenue to terminate at Petone train station.</li> <li>- at McKenzie Avenue, a new overbridge parallel to the existing McKenzie Avenue road overbridge connects with several options continue into Section 6: <ul style="list-style-type: none"> <li>- a new shared use path in Pito-One Road, both directions</li> <li>- northbound shoulder lane on SH2</li> <li>- southbound shoulder lane on SH2</li> </ul> </li> <li>- Note: an alternative shared path north of Petone Station in the rail corridor is currently being investigated with KiwiRail.</li> </ul>



Section	Option Details	Option Details
6	Option 1 – SH2 shoulders north and southbound (Option 2 - Pito-one Road and Percy's Reserve northbound)	Continuation from Section 5: <ul style="list-style-type: none"> <li>- a new shared path on Pito-One Road,</li> <li>- northbound shoulder lane on SH2</li> <li>- southbound shoulder lane on SH2</li> <li>- Southbound one-way path using KiwiRail land.</li> <li>- Note: an further option of two way shared path in the rail corridor north of Petone Station to Dowse Interchange is currently being investigated with KiwiRail.</li> <li>-</li> </ul>
7	Option 1 – SH2 shoulders north and southbound (or southbound only if using KiwiRail land)  Option 2 - Pito-one Road and Percy's Reserve northbound	Continuation from Section 6: <ul style="list-style-type: none"> <li>- the upgraded existing shared path west of SH2, scenic, crossing SH2 at Dowse Drive and terminating on the eastern side</li> <li>- northbound shoulder lane on SH2 continuing past Dowse Drive and terminating</li> <li>- southbound shoulder lane on SH2 continuing past Dowse Drive and terminating.</li> <li>- Use of rail corridor to bypass Dowse interchange ramps in southbound direction</li> <li>- Note: an further option of two way shared path in the rail corridor north of Petone Station to Dowse Interchange is currently being investigated with KiwiRail.</li> </ul>
8	Option 1 – SH2 shoulders north and southbound	Continuation from Section 7: <ul style="list-style-type: none"> <li>- At a point north of Dowse interchange there is insufficient room within the rail corridor for even a one way path – therefore SH2 shoulder cycle lanes are the only options available. Look to improve width where possible.</li> </ul>

## 6.5 Hutt Road Options

To address safety concerns along the Hutt Road, Wellington, the following short list of options are assessed:

- 1A: Improvements to existing path e.g. remove obstructions; parking on footpath
- 1B: Improvements to existing path; provide indented parking
- 1C: Widen and improve existing path; reallocate vehicle lane to kerbside parking (24 hours)
- 1D: Widen and improve existing path; reallocate vehicle lane to clearway parking (off-peak)

The “Hutt Road Improvement Options” (see **Appendix G**) identifies Section 1 Option D as a standalone recommended option and passes incremental analysis over Section 1 Option A.

Section 1 Option D can be summarised as having minimal impact on the traffic operation of Hutt Road while providing opportunity to provide customer parking for the businesses located along the Hutt Road.

The final recommendation for Section 1 will require approval from WCC. As part of a current investigation to confirm a preferred option WCC is currently investigating further options.

As part of this investigation a seaside option south of Ngauranga may be considered feasible. This would potentially involve a connection to the Hutt Road at Kaiwharawhara connection (being either under or over SH1 and the rail corridor).

## 6.6 Petone to Melling Investigation

Detailed investigations, together with discussions with KiwiRail and the other Steering Group members, have been undertaken to assess the feasibility of constructing a shared pathway in the rail corridor in the Petone to Melling area. These investigations are ongoing, so the current preferred option is as follows:

- A two way shared path in the rail corridor from just north of the Hutt Road overbridges through to Petone station including a new overbridge to take the path from the eastern side of the rail tracks to the western side by McKenzie Avenue.
- A new two way shared path overbridge beside the existing McKenzie Avenue overbridge over SH2 to connect to Pito-one Road .
- Improved northbound and south bound shoulders on SH2 to Melling as far as possible.

Discussions with the Steering Group members identified a strong desire for an alternative off road option to the use of shoulders north of McKenzie Ave and particularly to provide a means of bypassing the Dowse Interchange on and off ramps. Subsequent surveys of the rail corridor have identified that it may be possible to provide a two way shared path in the rail corridor from the Petone Railway Station car park to Dowse Interchange, subject to identification of an acceptable solution to a pinchpoint adjacent to the Melling Branch rail junction just south of Dowse. In addition a safe route through the Petone station carpark that minimises the loss of car park spaces still needs to be identified.

## 6.7 Wider Reclamation Option

During the first part of 2015 key advisors and councillor feedback has indicated a preference for a seaside platform to be widened up to 15m to 20m for transportation future proofing purposes such as the potential 6 laning of SH2 and straightening of the Hutt Rail Line.

There is also a strong desire to reclaim the coastline “only once” from a stakeholder perspective. A key question underpinning any decision to pursue a wider seaside platform (now) is to determine the need for such a proposal. To this end, it will be critical to determine the timing of when capacity upgrades on SH2 between Ngauranga and Petone might be required, in order to demonstrate why extra reclamation is needed.

Further work on this is required to explore a 15m to 20m wide reclamation opportunity for the SH2/ Hutt Railway Line transportation corridor as part of the development of the Resource Management Applications (RMA).

While not yet considered as a standalone option economic sensitivity testing has been undertaken to determine economic feasibility. This is outlined in **Section 9.5**.

## 6.8 Summary

The options shortlisted from the MCA and identified through discussions with the Steering Group and other key stakeholders are:

- Option 1 – Roadside shared path (including Hutt Road Option 1D)
- Option 3 - Seaside shared path (including Hutt Road Option 1D)

These options were subject to economic analysis using full procedures (see Section 8). The findings, combined with the Alternatives Assessment Summary (see **Appendix B**), Option Summary Tables (see **Appendix C**) and Environmental Screening (see **Appendix M**), together with the assessment of other inputs such as urban design and landscape enabled the project recommended option to be made.

## 7.0 Recommended Project Option

This section makes a recommendation in support of Option 3 proceeding to full assessment. Initial analysis suggests that implementation is feasible particularly if a staged approach is used.

The focus of this detailed business case is to develop a recommended option that will 'close the gap' between Petone Interchange and Ngauranga Interchange by providing a dedicated facility for cyclists and pedestrians.

The study considers the connections to the north beyond the Petone Interchange up to the Dowse Interchange, and to the south of the Ngauranga Interchange along the Hutt Road into Wellington.

### 7.1 Recommendation

On the balance of qualitative and quantitative analysis the recommended option is Option 3. Option 3 provides an opportunity to provide a high quality seaside shared facility that will realise a wide range of benefits for cyclists and pedestrians and for all types of users from commuters to recreational users and tourists.

Option 3 provides the opportunity to contribute more directly to the regional economy through resilience and tourism benefits.

Option 3 triggers significant non-transport benefits and non-transport costs and this additional investment may need wider consideration as part of a financial case.

### 7.2 Implementation

As a multi-agency study area there is a fairly straight forward approach to project implementation. The balance of benefits lie in closing gap and providing a high quality cycling and walking facility between Petone and Ngauranga. For the Transport Agency the funding and value generated within this section is of priority.

Network improvements and improved connectivity at each end are important to achieving the levels of suppressed demand anticipated. These provisions may be implemented by the relevant local authorities following the SH2 connection.

Further implementation options are identified in the Summary Tables in **Appendix C**.

## 8.0 Recommended Option – Assessment

This section assesses the performance of the recommended option against project objectives and outcomes, implementation, wider project impacts and cost optimisation.

A summary of performance against the above criteria is given. The economic assessment of the recommended option is reported in Section 9, Economic Analysis.

Option 3 is generally considered to support the project objectives and outcomes.

### 8.1 Objectives and Outcomes

Table 11 summarises the extent to which the project objectives are achieved.

Table 11 Assessment Against Project Objectives

Project Objective	Commentary
To improve the safety perception of walking and cycling modes of transport between Petone and Ngauranga by improving connections and integrating walking and cycling activities with other networks in Lower Hutt and Wellington.	Consultation confirmed that perceptions are correlated with connections at Ngauranga and Petone and with user level of service along Hutt Road (south). Between Petone and Ngauranga Option 3 more strongly responds to the objective from a cycling and walking perspective.
To provide infrastructure that is a catalyst for increased usage of the corridor by walkers and cyclists regardless of ability.	Of the 650 respondents to the website the vast majority (90%) said they would use the facility if adequate infrastructure was in place.  During project workshops the majority (68%) of respondents support the seaside option (Option 3). Option 3 also responds well to multiple users such as recreational users and tourists.
To consider transport network resilience in providing a walking and cycling facility with enhanced safety standards and capacity.	Option 3 provides scope to align resilience requirements along the corridor and has the ability to meet or exceed engineering standards and pedestrian / cyclist best practise.
To manage the social, cultural, land use and other environmental impacts of the project in the project area and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, design and conditions.	At draft report stage it is believed that the environmental impacts of Option 3 can be adequately mitigated.

Table 12 presents commentary on the extent to which the project outcomes are being achieved with the option recommendation.

Table 12 Assessment Against Project Outcomes

Project Outcome	Commentary
Increased numbers of commuter cyclists using the corridor	Analysis indicates that Option 3 has the potential to release the highest level of suppressed demand for cycling and walking along the corridor. From about 450 daily trips to 730 daily trips (up 280 trips) are expected to use the Petone to Ngauranga section.

Project Outcome	Commentary
Increased numbers of pedestrians, runners and recreational / tourism-related cyclists using the corridor	The increase in pedestrians / runners is anticipated to be about 50 per day. Tourism related use of Option 3 is tied to the demand from the Rimutaka Cycle Trail and related types of activities, and could increase by up to 24,000 trips per year (or 65 trips per day).
Lower accident rates for cyclists along the corridor	With Option 1D in Hutt Road and Option 3 in other sections a high proportion of road cyclists are expected to transfer to shared path or cycleway. This would reduce the cycling accidents in some route sections by up to 90%.
Maintaining or improving journey times for commuting cyclists	Average cyclist speeds are generally maintained throughout the corridor.
A transport corridor that offers resilience against natural events.	The reclamation and future proofing components do have measureable economic benefit, currently estimated at over \$20M during the lifetime of the project.

## 8.2 Implementation

### 8.2.1 Constructability

A constructability assessment was undertaken by Ian Bond and Associates. This report is included in **Appendix E**. The main risk items in for implementation of the project are:

- Seabed level affecting the amount and design of fill required
- KiwiRail costs associated with construction staging
- Access requirements affecting TMP required and access over KiwiRail access
- Available haulage routes
- Weather including damage from storm events and loss of work could result in extension to time related costs of 3 months
- Weather including loss of material from weather events, consider 10% wastage of placed material.

### 8.2.2 Statutory Requirements

For the seaside option an alteration to the Railway Purposes designation will be required together with a new designation for the cycle and pedestrian path east of the railway line. This would be in the name of the NZTA as the requiring authority taking responsibility for the implementation of the work.

The most significant matter is the requirement for a coastal permit to reclaim land. The NZ Coastal Policy Statement, the Wellington Regional Policy Statement and the provisions of the Wellington Regional Coastal Plan must all be considered and taken into account. Advice from DoC is that it will be up to the applicant to justify any reclamation specifically in recognition of the NZ Coastal Policy Statement (Policies 10 and 14 in particular) and the Project team will bear that in mind when considering the form of the reclamation, while addressing effects and providing mitigation.

Considering the seaside and roadside options both contain a reclamation there will also be the need to consider how the deposition of fill will occur and how discharges to air, land or the coastal marine area will be managed. Subject to modern construction practices and appropriate controls these factors can be appropriately managed.

We have considered the quantum of fill, where the fill will come from, how it will be transported and consenting implications. Further details of the approach to consenting are to be considered in the Consenting Strategy to be provided in **Part B** (included in **Appendix I**)

### 8.2.3 Property Impacts

The following land owners are potentially affected by Option 3:

- McKenzie Overbridge
- Port Nicholson Development Trust
- KiwiRail
- Hutt City Council

An addendum report covers the potential property impacts and strategy.

### **McKenzie Overbridge**

During the investigations the recommended option would likely impact upon land to the south of the McKenzie Overbridge. While the current alignment through this land provides a safer and more direct option for cyclists this land has now been sold for development and alternative options are required.

### **Port Nicholson Block Settlement Trust**

The Port Nicholson Block Settlement Trust land is affected by Option 3, which will leave the newly reclaimed land and join the existing land along the Petone waterfront on the eastern side of the railway line.

Ongoing consultation has been undertaken with the Port Nicholson Block Settlement Trust throughout the development of this DBC. They have indicated support for shared path options that provide health benefits for users. They are concerned that the Option 3 path will require on-going maintenance and reliance on KiwiRail (if that is to be the case) could mean that the path is not maintained. Ongoing consultation will be required in the next stages during detailed design and implementation to ensure the trust have input into the final design.

### **KiwiRail**

KiwiRail land is directly affected by Option 3. The proposed overbridge south of Petone Station will be situated in the rail corridor and current options north of Petone Station, as far as Dowse could be located within the rail corridor. Investigations of the extent of the impact are on-going in conjunction with KiwiRail.

A route through the Petone Station carpark to connect with a possible rail corridor route to Dowse, will need to be agreed with both KiwiRail as the land owner and Greater Wellington Regional Council as the station owner and funder of rail passenger services, because of potential loss of car parking spaces.

The reclamation between Ngauranga and Petone may also provide an opportunity to realign or improve the rail corridor adjoining the path. KiwiRail has suggested that the path would be beneficial as maintenance access to the corridor.

It has been agreed that once the Ngauranga to Aotea Quay project is implemented KiwiRail will no longer need their existing service lane under the Ngauranga Interchange. This service lane will be reallocated to widen the existing shared path and improve the alignment. The current path is a sub-standard width and so this provides a positive opportunity to increase the path width.

KiwiRail have been consulted throughout this study and are also represented on the Steering Group. In particular a number of meetings have been held to discuss the details of the Petone to Dowse section of the project which is proposed to largely run with in the rail corridor and to understand KiwiRail's Requirements.

Ongoing consultation with KiwiRail will be required in the next stages of the study to ensure that potential disruption to KiwiRail operations during both construction and subsequent operation of the shared path is limited.

KiwiRail's guidelines for public pathways on operational railway<sup>13</sup> land requires a proposed pathway be subject to a risk assessment during the design phase and be subsequently formally documented through a grant, licence to occupy or lease between the proposing organisation (NZTA in this case) and KiwiRail

### **Hutt City Council**

The proposed shared path through Percy's Reserve follows the same route as an existing unpaved track. It is proposed that the currently unpaved path is paved and widened to provide a 3.0m shared path for cyclists and pedestrians.

Initial discussions with the Parks Asset Manager at Hutt City Council highlighted potential implementation issues that should be resolved during the implementation phase. The Parks Asset Manager indicated a preference for the cycle path to be located on the fringes of the park and not through the park. Potential conflict between

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<sup>13</sup> Public Pathways on the Operational Railway – Guidance for Applicants Preliminary Issue 22 may 2015

pedestrians and cyclists was highlighted, particularly as the park is said to be used by a lot of visitors, especially during spring and summer.

Hutt City Council has been consulted throughout the development of this DBC and were represented as members of the steering group. Hutt City Council's position on potentially routing the shared path through Percy's Reserve should be confirmed in the next stage of the study.

#### **8.2.4 Asset Management**

As existing maintenance of the shared path between Ngauranga and Horokiwi is minimal and the carriageway shoulders are maintained in association with state highway maintenance the "Do Minimum" cost is negligible.

The proposed maintenance regime of a seaside facility could be significant. Further details will be investigated for the final report.

### **8.3 Wider Project Impacts**

#### **8.3.1 Environmental Impact**

Environmental and social impacts are assessed as per the NZ Transport Agency guidelines and are attached in **Appendix C**. Environmental screening of the project options is included in **Appendix M**.

The impacts below offer brief summaries of these tables.

Option 3 has a negative environment impact due to the reclamation required. This extent of the impact on the harbour edge anecdotally affects largely modified land. Areas of particular ecological, terrestrial or landscape sensitivity have been investigated and are available in a separate report by Boffa Miskell.

The **Ecological Report** considers the Option 3 impact in terms of the expansion into the coastal marine area, the terrestrial and intertidal marine values present are low and of a common, modified and ubiquitous nature. The report considers the values in the subtidal habitat are medium and the effect of loss a medium significant effect ("more than minor"). Permanent loss of subtidal habitat requires mitigation or an offset. There are also a number of "at risk" coastal birds present and using the habitat; mostly for roosting, with at least one species breeding. When these birds are present values are higher and effects of construction or improper rocky shore construction (i.e. a vertical smooth sea wall) could be (in the absence of processes to avoid effects) "more than minor".

Recommendations are made as to design and implementation methods to mitigate impacts on the coastal marine area.

#### **8.3.2 Social Impact**

The shared path would have a positive social improvements not only by improving the current provision for cyclists and pedestrians which is poor and unsafe, but through providing the local community with access to the sea along this section of the coast. Overall impacts of Option 3 are considered to be positive.

#### **8.3.3 Urban Design and Landscape**

A full Urban Design Framework and Assessment has been established to support Option 3. This is included in **Appendix L**. The framework references the NZTA urban design guidelines – Bridging the Gap (October, 2013).

Option 3 provides the opportunity to enhance to the corridor from an urban design perspective and positively impact on the existing coastal environment which is poor. The significant urban design opportunity is recognised through the potential to provide a positive coastal experience for all potential users.

#### **8.3.4 Joint Working**

As Option 3 provides benefits across local agency boundaries and triggers the opportunity to contribute more directly to the regional economy through resilience and tourism benefits the joint working benefits are significant.

Support will be required from other funding agencies in the region, potentially WCC, HCC, GWRC and MBIE. This has been identified through an Addendum report issued to the Transport Agency.

## 8.4 Consultation Feedback

### 8.4.1 Public Feedback

The majority of feedback was fully supportive of the project with only a minority of comments (4 responses in total) questioning why money was being spent on cyclists. A total of 778 responses were received in total (including via the feedback forms, email, phone and post).

Public feedback on issues and concerns highlighted:

- The existing separated path between Horokiwi and Ngauranga having poor surfacing, inadequate maintenance, inadequate width and poor drainage
- The missing link due to the need to travel on the SH2 shoulder in north and southbound directions.
- The dangerous merges at Petone Interchange, Dowse and Melling
- The inadequate shoulder width at Melling
- On Hutt Road (Wellington) the conflict with vehicles parking on the footpath or turning into driveways and car parks conflicting with cyclists, plus the poor surfacing, obstacles on the path and inadequate path width
- On Hutt Road (Lower Hutt), the trees currently planted along the footpath.

In terms of feedback on the short list of options, the majority of respondents support the seaside option with 68% selecting a preference for the seaside option in both surveys. The reasons for supporting the seaside option included:

- Consistency of path width
- Greater amenity benefits to be achieved further from SH2
- Wider economic benefits including social benefits for the region in terms of tourism, recreation and health benefits.

There was no reduction for support in seaside option in the second survey despite the fact that it was communicated that this option was likely to have a higher cost and could be delayed due to the more complex nature of constructability issues.

Unsupportive comments and concerns with regards to the seaside option included:

- Concerns about bad weather and exposure to storms and high winds
- Maintenance as it will be further from SH2 and subject to sea debris
- Lack of passive surveillance from SH2
- Detours or gradients required because of the bridges.
- Supportive comments with regards to any roadside option included:
  - Affordability
  - Better connections
  - Could happen sooner
  - More sheltered in bad weather.
- Unsupportive comments and concerns included:
  - The lack of consistent width
  - Proximity to SH2
  - Lack of 'vision' for walking and cycling facilities in Wellington.

### 8.4.2 Key Stakeholder Views

The key stakeholders; WCC, HCC, GWRC and KiwiRail were represented on the steering group and have therefore been involved throughout the development of options to a recommended option. Specific positions and views of the organisation are yet to be confirmed.



## 8.5 Do-Minimum Option

The Do Minimum scenario is Do Nothing. It retains the existing situation and involves no costs. The maintenance costs are nil, because the cyclists use shoulders and roadway which has to be maintained regardless of the cyclists presence. In sections where some cyclists ride on a shared pedestrian/cycle footpath, the footpath has to be maintained regardless of the cyclists presence.

## 9.0 Economic Analysis

The economic analysis was consistent with the requirements of the full procedure of NZTA *Economic Evaluation Manual*. The analysis required a number of key assumptions concerning the accident reduction, cycling growth rate, numbers of new cyclists attracted to the proposed off-road path, transfer of the existing cyclists from the road to the proposed facility, the cycling speeds under various conditions, and the number of tourists to use the proposed facility. These assumptions are presented below.

For the recommended Option 3, the project expected estimate is \$46.9M; with a NPV cost of \$42.0M, and a NPV benefit of \$105M. The overall BCR is 2.5.

Sensitivity analysis conducted for all the key variables of Option 3 indicates that the BCR is robust. The lowest BCR of 1.9 would be a result of the construction cost increase to the value of the 95<sup>th</sup> percentile estimate, which is \$55M (discounted).

Further sensitivity testing of options has been undertaken on wider strategic options, including the benefits of future the SH2 corridor. This is reported in Appendix Q

### 9.1 Key Assumptions

Economic analysis was undertaken using the full procedures described in the latest update of the NZTA *Economic Evaluation Manual*. The elements of the analysis which were not covered by the manual were based on additional NZTA publications, namely: McDonald, A *et al* (2007) *Estimating demand for new cycling facilities in New Zealand*, Research Report 340, Land Transport New Zealand; and Genter, JA *et al* (2008) *Valuing the health benefits of active transport modes*, Research Report 359, New Zealand Transport Agency.

Assumptions used for the analysis, summaries of worksheets and peer review responses are located in **Appendix F**.

#### 9.1.1 General Economic Analysis:

- Evaluation period – 40 years assumed from the first year when major expenditure occurs;
- Real discount rate – 6% assumed as per current NZTA guidance;
- Assumed Construction Start – financial year starting in July 2014;
- Expected duration of construction, all sections – 4 years;
- Annualisation – 365 days;
- Value of time (all users) - \$7.80/h, source: NZTA *Economic Evaluation Manual*, Table A4.1, commuters;
- Vehicle operating costs 29.7c/km for 50kph speed and 30.7c/km for 80kph speed, source: NZTA *Economic Evaluation Manual*, Table A5.7, urban arterial.

#### 9.1.2 Vehicular traffic in SH2:

- SH2 traffic volume 67,000 vehicles per day both directions, based on 5 year counts;
- Annual traffic growth rate of 0.0% - no traffic growth since 2008;
- HCV 5.9%;
- Car occupancy – 1.2.

#### 9.1.3 Accident reduction:

The severity of accidents for Option 3 was reduced one notch from the existing (Do Minimum) situation, i.e. the serious injury accidents were converted to minor injury, etc. For Option 1 the cost of accidents was derived as an average of the Do Minimum and Option 3 costs, because the improvements associated with Option 1 were lesser but harder to define than those of Option 3.

#### 9.1.4 Cycling:

Annual cycling growth rate:

- Do Minimum – 3%;
- Option 1 – 3%;
- Option 3 – 6% for Years 1 – 10, 3% thereafter.

NB. Growth rates based on the historical trends in the region.

New cyclists:

- Option 1 – 190 in Sections 1 to 4, 70 in Sections 5 to 7;
- Option 3 – 280 in Sections 1 to 4, 110 in Sections 5 to 7;
- Source of new cyclists – 80% current car occupants, 20% rail passengers.

NB. New cyclist estimates based on the forecasting procedure presented in McDonald, A *et al* (2007) *Estimating demand for new cycling facilities in New Zealand*, Research Report 340, Land Transport New Zealand.

Transfer from the road to the off-road facility:

- All new cyclists will travel on the off-road facility.

Existing cyclist transfer rates are:

- Section 1 Option 1A – 20%
- Section 1 Option 1D – 100%
- Section 2 – 100%
- Section 3 Option 1 – 100% northbound and 40% southbound cyclists
- Section 3 Option 3 – 100%
- Section 4 Option 1 - 100% northbound and 40% southbound cyclists
- Section 4 Option 3 – 100%
- Section 5 Option 1 - 20%
- Section 5 Option 3 - 50%
- Section 6 – 20%
- Section 7 – 20%.
- Health benefits of cycling – \$2.14 per cycling kilometre.

NB. This is the value of a medium estimate presented in Genter, JA *et al* (2008) *Valuing the health benefits of active transport modes*, Research Report 359, New Zealand Transport Agency.

Cycling speed:

- Urban environment on-road in street network – 15kph;
- Urban environment on-road on an arterial – 20kph;
- Out of town on-road – 25kph;
- Shared path constrained – 15kph;
- Shared path, minor upgrading – 20kph;
- Shared path, major upgrading – 25kph.

### 9.1.5 Walking:

- Annual walking growth rate - 2%;
- Health benefits of walking – \$4.27 per walking kilometre.

NB. This is the value of a medium estimate presented in Genter, JA *et al* (2008) *Valuing the health benefits of active transport modes*, Research Report 359, New Zealand Transport Agency.

### 9.1.6 Tourism:

- Annual number of cyclists expected to use the new facility between Petone and Wellington is 14,000 in 2018, 19,000 in 2019 and 24,000 in 2021.
- Annual tourism growth rate after 2020 is expected to stabilise at 2%.

NB. The number of tourists to cycle the route was conservatively assessed from the documents provided by MBIE. The Rimutaka Rail Cycling Trail in 2012 attracted nearly 50,000 tourists. Most of these tourists came from Wellington. As there is no suitable cycling facility between Ngauranga and Petone, they had to be transported by bus or ferry to Petone.

## 9.2 Economic Summary of Recommended Project Option

This section presents the results of the economic analysis, as shown in Table 13.

Table 13 Economic Analysis Summary Table

Timing				
Earliest Implementation Start Date	July 2014			
Expected Duration of Implementation	4 years			
Economic Efficiency				
Time Zero	1 July 2013			
Base date for Costs and Benefits	1 July 2013			
Present Value of Total Project Cost of Do Minimum	\$0M			
Present Value net Total Project Cost of Recommended Option	\$42M			
Present Value net Benefit of Recommended Option (exc. WEBs)	\$105M			
Present Value net Benefit of WEBs of Recommended Option	NA			
BCR (exc. WEBs)	2.5			
BCR (inc. WEBs)	2.5			
First Year Rate of Return (FYRR)	Varies for different Sections			
P50 Costs				
			Present Value	
	Do Min	Recommended Option	Do Min	Recommended Option
Design	\$m	\$3.0M	\$m	\$2.7M
Statutory Applications	\$m	\$m	\$m	\$m
Property	\$m	\$m	\$m	\$m
Construction/Implementation	\$m	\$36.6M	\$m	\$32.9M
External Impact Mitigation	\$m	\$m	\$m	\$m
Other Capital (e.g. insurances)	\$m	\$m	\$m	\$m
Capital Risk Management	\$m	\$14.5M	\$m	\$13.1M

Timing				
<b>TOTAL IMPLEMENTATION COST</b>	<b>\$0m</b>	<b>\$54.1M</b>	<b>\$0m</b>	<b>\$48.7M</b>
Maintenance	\$m	\$m	\$m	\$m
Renewal	\$m	\$m	\$m	\$m
Operating	\$m	\$m	\$m	\$m
Other Ongoing Costs (e.g. Toll Collection)	\$m	\$m	\$m	\$m
Post Project Evaluation	\$m	\$m	\$m	\$m
<b>ONGOING COST</b>	<b>\$m</b>	<b>\$m</b>	<b>\$m</b>	<b>\$m</b>
Project Contingency	\$m	\$7.4M	\$m	\$6.7M
<b>TOTAL P50 PROJECT COSTS</b>	<b>\$0m</b>	<b>\$61.51M</b>	<b>\$0m</b>	<b>\$55.3M</b>
BENEFITS				
			Present Value	
			Do Min	Recommended Option
Travel Time Savings			\$m	-\$6.0M
Vehicle Operating Cost Savings			\$m	\$3.6m
Vehicle emissions reductions			\$m	\$0.1M
Accident Cost Savings			\$m	\$27.8M
Cycling			\$m	\$44.4M
Walking				\$10.6M
Tourism			\$m	\$6.9M
Resilience			\$m	\$17.8M
		<b>PV total net benefits</b>	<b>\$m</b>	<b>\$105M</b>

### 9.3 Comparison with Earlier Stages

The options assessed do not have a comparable resemblance to earlier schemes as these tended to assess sections of the corridor rather than the costs and benefits of a connected approach.

### 9.4 Sensitivity Analysis of Options

#### 9.4.1 Cost/Benefit Variability

The sensitivity analysis tested the impact on the project BCR of the variability of the costs and benefits. The variables having the most significant impact were the project construction costs, walking and cycling benefits, and the benefits of resilience. The other variables have negligible effect.

The cost was tested in the range of -20% to the 95<sup>th</sup> percentile estimate. The BCR would increase to 3.1 if the cost were reduced by 20%. If the costs increased to the upper bound value, the BCR would drop to 1.9.

Walking and cycling benefits as well as resilience benefits were tested within the -20% to +20% range. The lower BCR would be 2.3, and the higher 2.7. These impacts are much lower than those of the construction costs.

The peer reviewer suggested that the cycling speeds used in the analysis were too high. The sensitivity test was carried for the speeds lower by 5km/h. The BCR remained unchanged at 2.5. Another assumption questioned by the reviewer was the number of cyclists moving from SH2 to the new off-road cycling facility. The original assumption is that in Sections 3 and 4 all cyclists will move.

Moving the cyclists from SH2 has two impacts: on travel time and on accidents, because the off-road path is safer. The results of the sensitivity test for 20% of cyclists remaining on SH2 show that the impact is small – the BCR decreased to 2.4.

Sensitivity analysis is summarised in Table 14.

Table 14 Sensitivity Analysis

Sensitivity Testing					
Variable	Base Case	Lower Bound		Upper Bound	
		Value	BCR	Value	BCR
Cost Variability					
Construction / Implementation	\$42.2m	\$33.8m	3.1	\$55.3m	1.9
Maintenance	\$m	\$m		\$m	
Renewal	\$m	\$m		\$m	
Operating	\$m	\$m		\$m	
Benefit Variability					
Travel Time Savings	\$m	\$m		\$m	
Vehicle Operating Cost Savings	\$m	\$m		\$m	
Accident Cost Savings	\$27.8m	\$22.2m	2.4	\$33.3m	2.6
Vehicle Emissions Reductions	\$m	\$m		\$m	
Walking & Cycling	\$55.0m	\$44.0m	2.2	\$66.0m	2.8
Tourism	\$m	\$m		\$m	
Resilience	\$17.8m	\$14.3m	2.4	\$21.4m	2.6
All cycling speeds lower by 5kph			2.5		
Cyclists remaining on SH2	0%	20%	2.4		

## 9.5 Sensitivity Testing of Alternative Options

Further sensitivity tests were undertaken at the request of the NZTA Head Office Planning and Investment team . These tests are detailed in **Appendix Q**.

The following options were tested against Option 3 for the purpose of robustness.

### 9.5.1 Option X1 “Widened Roadside”

In Option X1 the existing shared use path alongside the SH2 would be widened to 3m .Option X1 upgrades Option 1 to the same standard as Option 3 through reclamation and relocation of the rail corridor eastwards. There would be no change to SH2 in this option. It assumed that the same level of reclamation is required as for Option 3.

### 9.5.2 Option X2 “Cliffside Reclamation”

In Option X2 the existing roadside shared use path alongside SH2 would be widened to 3m1. Option X2 upgrades Option 1 to the same standard as the Option 3 by relocating SH2 to the west and cutting into the hillside to achieve the appropriate widths. There would be no change to the position of the railway in this option and consequently no reclamation is required.

### 9.5.3 Option X3 “20m Reclamation”

In Option X3, a 20m wide reclamation from the current shoreline is provided to enable connection of an “ideal transport corridor” with SH2 widened to current standards and an additional north and south bound lane provided. A relocated double track railway and 3m wide path would also be provided on the reclaimed platform.

#### 9.5.4 Summary of Economic Robustness

Option costs and benefits were investigated using available data and economic sensitivity testing. In summary the findings are as follows:

- Options X1 and X2 present a range of BCR's between 1.2 and 1.4.
- Any benefits that arise from the straightening of SH2 under Option X2 are likely to be nullified by the travel time dis-benefit generated during the construction period of up to 22 months. Any net benefit associated with shoulder-running bus services or possible 5-laning would increase the BCR to 1.6.
- Option X3 presents a greater opportunity for future benefits, some of which could not be quantified. The significant additional cost (\$160M cost) would be off-set by quantifiable benefits associated with travel time improvements and resilience benefits (\$205M benefits) providing a BCR of 1.4 for sections 3 and 4.
- There are range of resilience benefits associated with the options above.
  - Improved SH2 resilience and reduction in incident duration
  - Reduction in crash severity for options where the shared path is alongside and at the same grade as SH2
  - Ability to provide six lanes along SH2, improving capacity
  - Additional land available for rail operations
  - Improved capacity to respond to natural disasters
- An alteration to Option 3 that precludes cyclists using SH2 would contribute an additional \$8M of benefits, increasing the project BCR for this option to 2.7.

## 9.6 Assessment Profile – Option 3: Seaside Option

The Investment Assessment Framework (IAF) profile for this project is confirmed as HM\*L using the Transport Agency's funding allocation process as detailed in Table 15 and Table 17.

The M\* for effectiveness reflects the confidence rating in the Investment and Revenue Framework (IAF) around funding confirmation. Once funding is confirmed by the NLTP Advisory Group meeting this IAF profile is likely to be upgraded to HHL.

Table 15 Strategic Fit

By default the strategic fit for any walking and cycling activity is low.		
A walking and cycling activity may be given a medium strategic fit rating if the problem issue or opportunity is:	How the activity achieves the requirements (meets low criteria)	Rating
Part of a secondary corridor within a walking/cycling strategic network in a main urban area, for the purposes of utility cycling, including associated facilities to put the corridor into service. OR	SH2 is a primary corridor linking Wellington with the Hutt Valley, it is the only commuter route for utility cyclists to travel between these two locations. The proposed investment will help make better use of the existing capacity on SH2 by providing a safe alternative to driving or using public transport. It will enable more people to commute by cycling (or walking) between Wellington and Hutt Valley, by unlocking the current suppressed demand.	√
A link to complete or complement existing walking and cycling strategic network in a main urban area. OR	The project forms part of the agreed Wellington walking and cycleway network that will complement the existing walking and cycling networks in Wellington City and Lower Hutt. The existing path along SH2 currently has a gap from 250m south of the Horokiwi turning up to the Petone Interchange. The gap in the path means that pedestrians and cyclists are forced onto the SH2 shoulder. By providing a seaside path (option 3) a consistent width can be provided that will provide a high quality route for cyclists and pedestrians between Wellington and Hutt Valley.	√
On a corridor, or site, with a medium walking and cycling crash risk OR	The NZTA Crash Analysis System (CAS) reveals that there were a total of 51 crashes involving pedestrians or cyclists along the Hutt Road between Melling and Thorndon between 2008 and 2012. There was a single crash resulting in a fatality in this period within nine crashes causing serious injury. A further 29 crashes resulted in minor injuries with 12 causing no injury. The most prevalent type of crashes along the corridor are right turn against (22% of crashes) and overtaking (17% of crashes). A further 10% of crashes are as a result of merging. A failure to give way is identified as a contributing factor to 47% of crashes. The fatal crash was as a result of a motor vehicle in the cycle lane, crowding the cyclist. A total of 41% of crashes were at intersections along the corridor, with approximately 24% of crashes occurring at the Petone and Ngauranga interchanges.	√
A link from a main urban area to a substantial employment centre, outside of main urban area, which may be considered on an exception basis where high demand is demonstrated	The project will improve connections between Wellington and Petone and Lower Hutt, which are significant employment centres outside of Wellington city. There were 9,542 businesses and 42,360 paid employees in Hutt City at the 2013 census.	√
A link to complete connections to the	The Rimutaka Cycle Trail currently commences at Petone	√



NZ Cycle Trails	and runs along the Hutt River to Upper Hutt. Once the project is completed, it will provide an safe off road connection with the Rimutaka cycleway to/from central Wellington thus providing better connections to tourist facilities and transport links from the Rimutaka cycleway. In addition, although not currently part of the NZ Cycle Trails network, the project will improve a section of the Great Harbour Way walking and cycling train around Wellington harbour.	
<b>A walking and cycling activity may be given a high strategic fit rating if the problem issue or opportunity is:</b>	<b>How the activity achieves the requirements (meets all low and medium criteria)</b>	<b>Rating</b>
Part of a primary corridor within a walking or cycling strategic network in a main urban area, for the purposes of utility cycling including associated facilities to put the corridor into service OR	SH2 is a primary corridor linking Wellington with the Hutt Valley, it is the only commuter route for utility cyclists to travel between these two locations. The proposed investment will help make better use of the existing capacity on SH2 by providing a safe alternative to driving or using public transport. It will enabling more people to commute by cycling (or walking) between Wellington and Hutt Valley, by unlocking the current suppressed demand.	√
On a corridor, or site, with a high walking and cycling crash		NA

Table 16 Effectiveness Rating

Component	Explanation	Rating
Outcomes focused	<ul style="list-style-type: none"> <li>Tangible change in addressing the problem identified in the Strategic Fit assessment</li> <li>Consistency with levels of service in an appropriate classification system</li> </ul>	<p><b>H</b></p> <p>The Wellington to Hutt Valley cycleway addresses a significant gap in the region's cycle network and will deliver a consistent and safe cycling and walking route, providing improved levels of service consistent with the One Network Classification system.</p> <p>The outcomes identified in the strategic fit assessment are a significant reduction in accidents, closing the gap in cycle path between Horokiwi and Petone, uptake of walking and cycling on the route, and easing congestion in SH2. The proposed project will achieve all these outcomes.</p> <p>The accidents will be reduced by transferring cyclists from SH2 to a safe off-road path. The path will be continuous between Wellington and Petone. Recreational walking and cycling and commuter cycling will be attracted by the safe scenic coastal path.</p> <p>The cycling trails north of Petone are annually visited by 50,000 tourists, who have to be transported by bus or ferry from Wellington, because of the broken link to Petone. Many of these tourists will use the seaside path as part of their experience.</p> <p>Some of the commuter drivers on SH2 will</p>

		<p>be attracted to cycling on the safe path, reducing the number of cars on SH2 and therefore easing congestion.</p>
<p>Integrated</p>	<ul style="list-style-type: none"> <li>• Consistency with the current network and future transport plans</li> <li>• Consistency with other current and future activities</li> <li>• Consistency with current future land use planning</li> <li>• Accommodates different needs across modes</li> <li>• Support as an agreed activity across partners</li> </ul>	<p><b>H</b></p> <p>The Wellington to Hutt Valley cycleway is supported in the Wellington Regional Land Transport Plan 2015 as a key measure for improving connectivity and safety of key walking and cycleway routes. It is consistent with the future land use and is designed to accommodate the needs of both commuter cyclists as well as leisure related cycling and walking. The project will provide improved connections to the local cycle networks from Melling to Petone and from the Hutt Road to the Wellington CBD.</p> <p>The preferred option (seaside shared cycling and walking path) also will improve the resilience of the transport corridor between Wellington and the Hutt Valley, by reducing the vulnerability of the railway and highway to damage during severe storm events.</p>
<p>Correctly scoped</p>	<ul style="list-style-type: none"> <li>• The degree of fit as part of an agreed strategy or business case</li> <li>• Has followed the intervention hierarchy to consider alternatives and options including low cost options</li> <li>• Is of an appropriate scale in relation to the issue/opportunity</li> <li>• Covers and/or manages the spatial impact (upstream and downstream, network impacts)</li> <li>• Mitigates any adverse impacts on other results</li> </ul>	<p><b>H</b></p> <p>The preferred option of a seaside cycleway and walking path addresses a number of the GPS impacts, specifically reduction in deaths and serious injuries, more transport choices, resilient transport network, contribution to positive health outcomes and easing of congestion.</p> <p>Numerous alternatives have been proposed and assessed in earlier works by other consultants. The current work focuses on the best of the previous alternatives and additional alternatives developed for this project. In effect 10 options were long-listed and assessed.</p> <p>The list was refined during the consultation and design review process, producing a short list of three final options. At that stage the client and the stakeholders were satisfied that all appropriate alternatives were considered.</p> <p>A multi-criteria assessment was then undertaken to work through the long list of options including roadside and seaside shared paths.</p>
<p>Affordable</p>	<ul style="list-style-type: none"> <li>• Is affordable through the life cycle for all parties</li> <li>• Has understood and traded off the</li> </ul>	<p><b>H</b></p> <p>Wellington City Council, Hutt City Council and GWRC have agreed to contribute a total</p>

	<p>best whole of life cost approach</p> <ul style="list-style-type: none"> <li>• Has understood the benefits and costs between transport users and other parties and sought contributions as possible</li> <li>• the opportunity to leverage Urban Cycleway Programme funding at a project and programme level has been taken, if applicable</li> </ul>	<p>of \$9.5 million to the , the project. In addition the project has also been allocated \$9 million through the Urban Cycleway Programme for the Melling to Petone and Ngauranga to Bunny street sections . HNO plan to seek funding for the remaining \$25 million state highway component of the project from both the State Highway and Walking &amp; Cycleway activity classes of the NLTF , given the projects wide range of transport and economic benefits. The combined funding streams and the leverage of the Urban Cycleway Programme to make this option affordable.</p>
Timely	<ul style="list-style-type: none"> <li>• Delivers enduring benefits over the timeframe identified in the justified strategy or business case</li> <li>• Provides benefits in a timely manner</li> <li>• The programme/project will be delivered within the timing envelope of the Urban Cycleway Programme, if applicable</li> </ul>	<p><b>H</b></p> <p>Construction is anticipated to begin in early 2016 with the two sections of the project which have received funding from the urban cycleway programme route expected to be completed by mid-2018. This is within the timing envelope of the urban cycleway programme.</p> <p>The construction of the Ngauranga to Petone section is currently scheduled to start in 2019 to align with the possible use of fill from the Petone to Grenada project for reclamation for the seaside shared walking and cycle path.</p>
Confidence	<ul style="list-style-type: none"> <li>• Manages current and future risk for results/outcomes</li> <li>• Manages current and future risk for costs</li> </ul>	<p><b>M</b></p> <p>The funding plan for the third party contributions has been signed off by each CE to the Central Regional Director of NZTA.</p> <p>The project is indicated to receive funding contributions from the Urban Cycleway Programme.</p> <p>The NLTF split between the Walking and Cycling Activity Class, and the State Highway Activity Class is yet to be confirmed by the Board in October.</p>
Overall	<ul style="list-style-type: none"> <li>• Assessment based on lowest rating of all components.</li> </ul>	<p><b>M</b></p>

## 10.0 Financial Case

The project Benefit Cost Ratio is 2.5.

This BCR however can be improved by two considerations: project staging and acquiring the fill material for land reclamation at no cost from the Petone to Grenada project.

Obtaining the fill from the Petone to Grenada project could save up to \$3M in the project costs. If this could be realised, the BCR would increase to 2.7.

### 10.1 Project Delivery Costs

The cost estimates of the project are: design \$3.0M, construction \$43.9M, funding risk \$17.6M, and the 95<sup>th</sup> percentile cost of \$61.5M.

There is a possibility of obtaining free of charge the fill for land reclamation from the neighbouring NZTA Petone to Grenada project, which would lower the capital cost requirement by up to \$3.0M. Should this materialise, the project BCR would increase to 2.7.

An updated Capital Cost Estimate is attached at **Appendix D**.

### 10.2 Benefits of Project Staging

The benefit cost ratio of the project would improve if a judicious staging is applied. This would imply selective implementation of the stage sequence, where the sections bringing highest benefits in proportion to costs would be constructed first. For example Sections 1 and 2 have high individual BCRs and should be implemented first. On the other hand Section 5 has a very high cost and low benefits.

The recent announcement of the Urban Cycleways Fund contribution towards the Wellington to Hutt Valley cycle and pedestrian link has allowed for early construction of two sections, the Ngauranga to Wellington city sections (section 1, and 2) as well as the Melling to Petone section (sections 5,6,7,and 8). The expected construction start dates for these sections are estimated to be:

- Melling to Petone – mid 2016
- Ngauranga to CBD – late 2016

Early construction of these sections will allow some benefits to be realised earlier for the project.

### 10.3 Ongoing Maintenance and Operations Costs

The maintenance costs have not been provided for the purpose of the economic analysis. It has been assumed that although the option maintenance costs would be higher than those of Do Minimum, they won't have a material effect on the BCR.

Estimated annual maintenance costs per option:

#### Option 1 Maintenance Costs

Item	\$
On-going seal and pavement maintenance as the pavement will partially be existing and some new pavement (Full reseal every 8 years)	27500
Annual sum towards pothole and hot mix repairs,	5475
Annual sum to sweep shared path surface to ensure it remains free from spilling ballast from the rail tracks and bottles / rubbish from SH2,	7278
<b>Total</b>	<b>40253</b>

### Option 3 Maintenance Costs

Item	\$
On-going seal and pavement maintenance (Full reseal every 12 years)	18333
Annual sum towards pothole and hot mix repairs,	2775
Allowance for repairing storm washouts or harbourside damage (note this is probably an average annual allowance to cover the cost of infrequent significant storm events.	20000
Annual sum to sweep shared path surface to ensure it remains free from spilling ballast from the rail tracks and bottles / rubbish,	4852
<b>Total</b>	<b>45,960</b>

## 10.4 Project Revenues

The project is not intended to generate revenue, since the use of the proposed shared cycle/pedestrian path will not be tolled.

## 10.5 Funding Options

There are a number of government agencies that would benefit from the project. An analysis of the benefits reveals a distribution between agencies, as issued as an Addendum report.

## 10.6 Financial Risk

The likely funding risk for the proposed activity is that the agencies that will benefit won't be committed to funding the project in proportion to their expected benefits.

## 11.0 Project Reviews and Risk

This section outlines key project risks and the management of these risks. Key risks lie in the areas of funding and affordability. While the present economic efficiency rating is reasonably defensible the incremental loss of key benefits such as loss of safety savings combined with increasing capital costs would reduce the project BCR. These risks are being managed through awareness and on-going investigations to close out key issues.

### 11.1 Constructability and Risk

A constructability assessment was undertaken by Ian Bond and Associates. This report presents the reconciled cost estimates on the basis of the physical cost of works. Contingency and risk cost was subsequently assessed, our final cost estimates more than covering the level of risk agreed with the reviewer.

Main risk items going into the Specimen Design and Implementation phases of the project are:

- Seabed Level affecting the amount and design of fill required.
- KiwiRail costs associated with construction staging
- Access requirements affecting TMP required and access over KiwiRail access
- Available haulage routes
- Weather including damage from storm events and loss of work could result in extension to time related costs of 3 months.
- Weather including loss of material from weather events, consider 10% wastage of placed material.

### 11.2 Project Steering Group

The project steering group has undertaken periodic reviews of the project. Risk items and on-going investigations that have been reported to the Steering Group include:

- Option development and realising tangible and non-tangible benefits
- Investigation of resilience opportunities and options
- Reclamation options
- Development of Hutt Road options
- Option affordability
- Allocation of potential funding streams

### 11.3 Peer Review

The cost estimates presented were agreed and reconciled during a parallel estimate review process. Updated cost estimate sheets are provided in **Appendix D**.

A 'proof of concept' review of Section 3 and 4 was undertaken in relation to geotechnical and design risk. The review generally agreed with the approach taken at a concept level however recognized the need for additional geotechnical investigations to obtain the next level of design. The review and responses to the review are included in **Appendix E**.

### 11.4 Economics Peer Review

Peer review was undertaken by Pinnacle Research & Policy Ltd, with responses provided in **Appendix F**.

The key areas of reconciliation are on the issues of:

- **Growth rates for cyclists.** The proposed 6% growth rate capped at 10 years is deemed to be high. However, Wellington regional transport strategy sets specific mode share targets for cyclists to be met through investment in better facilities. Calculations to support the mode shift required would support growth rates for cyclists of up to 12% in the short term.
- **Transfer of cyclists from SH2 to the new facility.** The analysis requires a total shift of cyclists who currently use the SH2 should to the new facility. We believe this is supported through the provision of a high quality, direct and well connected cycleway that is completely segregated from traffic. It is also possible that the Transport Agency could restrict cyclists from using SH2 due to the safety risk and consequence of serious and fatal accidents.
- **Safety savings on Hutt Road.** The preferred option for Section 1 results in significant safety savings, a view not agreed with by the peer reviewer.

The sensitivity testing undertaken suggests that the economic efficiency of the project is not overly sensitive to a reduction in growth rate nor the ability to transfer cyclists as travel time savings is not a significant source of project benefit. A reduction in safety savings along the Hutt Road will have an impact however only up to a 15% reduction in economic efficiency (we still believe a net safety savings will result from the scheme).

The key risk to economic efficiency is higher project capital costs. For example, an increase by 20% to approximately the 95<sup>th</sup> percentile cost would reduce the BCR below 2.0.

The BCR presented in this report is considered robust, has responded to peer review and uses reconciled and agreed cost estimates.

## 11.5 Safety Audit

The draft Preliminary Design Drawings (revision issued for safety audit) and Preliminary Design Philosophy Statement (version 1) were issued for the purpose of safety audit.

ViaStrada produced an audit document dated 28 March 2014 (see **Appendix H**). As well as integrating some of the auditor's comments into the draft Preliminary Design Drawings AECOM has drafted an initial response which is issued as an Addendum report to this DBC.

The auditors generally agree that Option 3 best meets the project objectives, and with relative merits over Option 1. However, the auditors do not believe that the Option 3 response to Section 1 (Hutt Road) improves safety for cyclists. The design response at this stage is that significant improvements in safety for cyclists would result from further design related detail.

The serious issues raised in the safety audit and the initial designer responses includes:

**Dowse Road Roundabout:** At this stage it is unlikely that the project will respond to these issues at this roundabout therefore the concerns will be passed onto the Transit Agency for review.

**SH2 Southbound Ramps:** At this stage it is unlikely that the project will respond to these issues at this roundabout therefore the concerns will be passed onto the Transit Agency for review.

## 12.0 Conclusion

### 12.1 Summary

The purpose of the Detailed Business Case was to provide a detailed analysis of the costs, risks and benefits of a recommended option to improve pedestrian and cyclist facilities between Wellington and Hutt Valley.

The study investigated a range of alternative options that were evaluated using a multi-criteria approach to produce a short list of three viable options.

These options were:

- Option 1: Roadside Option – utilises existing cycle path at grade
- Option 2: Roadside Option – utilises existing cycle path, some of which raised above grade
- Option 3: Seaside Option

On the balance of qualitative and quantitative analysis the recommended option is Option 3.

Option 3 provides an opportunity to provide a high quality seaside shared facility that will realise a wide range of benefits for cyclists and pedestrians and for all types of users from commuters to recreational users and tourists.

Option 3 has a project expected estimate of \$46.9M, a net present value benefit of \$105M, and a BCR of 2.5.

The investment profile for Option 3 is HML.

The recommended option has been tested against environmental and social impacts and is considered to have an overall, positive impact. Option 3 also has potential positive impacts in relation to corridor resilience, tourism and urban design outcomes.

Option 3 is considered to be consistent with project objectives, in particular:

- Increased safety perceptions through the provision of separated cyclist and pedestrian infrastructure
- Increased usage through improved infrastructure covering a wide range of potential new users
- Increased network resilience through reclamation and a widened corridor cross section
- Overall positive social and environmental impacts

Option 3 is expected to deliver upon the project outcomes identified as:

- Up to 280 additional commuter-related cyclist trips per day
- Up to 65 additional tourism / recreational cyclist trips per day
- Up to 50 additional pedestrians / runners per day
- Up to 80% accident savings over key sections of the corridor
- Up to \$20M estimated savings due to improved corridor resilience



Appendix A

# Investment Logic Map

Appendix B

# Alternatives Assessment Summary

Appendix C

# Assessment Summary Tables

Appendix D

# Capital Cost Estimates and Parallel Cost Review

Appendix E

# Project Risk Analysis and Constructability Review

Appendix F

# Economic Analysis and Peer Review

Appendix G

# Hutt Road Wellington Report

## Appendix H

# Project Safety Audit



Appendix I

# Consenting Strategy

Appendix J

# Property Strategy and Land Requirement Plans

Appendix K

# Procurement Strategy

Appendix L

# Urban Design and Landscape

Appendix M

# Environmental Screen

Appendix N

# Consultation Report

## Appendix O

# Geotechnical Reports

Appendix P

# Corridor Resilience



Appendix Q

# Additional Sensitivity Tests