Hutt City Cycling and Micromobility

Hutt City Cycling and Micromobility SSBC

IZ135600-0000-GN-RPT-0001 | 6

07 May 2021

Hutt City Council

Hutt City Cycling and Micromobility

Project No:	IZ135600
Document Title:	Hutt City Cycling and Micromobility SSBC
Document No.:	IZ135600-0000-GN-RPT-0001
Revision:	6
Document Status:	Final
Date:	07 May 2021
Client Name:	Hutt City Council
Project Manager:	Chris Groom
Author:	Tyler Ross and Chris Groom
File Name:	Hutt City Cycling and Micromobility SSBC_economic assessment update_20042021

Jacobs New Zealand Limited

Level 8, 1 Grey Street,
PO Box 10-283
Wellington, 6143
New Zealand
T +64 4 473 4265
F +64 4 473 3369
www.jacobs.com

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
1	06/08/20	Draft for client feedback	CG/TR	CG	TB/KR	BW
2	10/09/20	Draft for Waka Kotahi feedback	CG/TR	CG	TB/KR	BW
3	09/12/20	Draft for peer review feedback	CG	CG	TB	BW
4	17/03/21	Final incorporating peer review feedback	CG/VA	CG	BH	BW
5	20/04/21	Update to economic assessment	CG	CG	BH	BW
6	07/05/21	Update for The Beltway project	CG	CG		

Contents

1. Introduction 11
1.1 Project overview 11
1.2 Previous work done to date 11
1.3 Purpose of the report 11
1.4 Stakeholders 11
1.5 Impact of Covid-19 12
1.6 Report structure 12
2. Programme Context 13
2.1 Population and Employment 13
2.2 Transport System 17
2.3 Socioeconomic Disparities 24
2.4 Geography 26
3. Strategic Case 28
3.1 Defining the Problem/ Opportunity 28
3.2 The benefits of investment 28
3.3 Confirming the strategic case 29
3.3.1 The transportation network does not meet cycle needs or expectations 29
3.3.2 A low and declining number of children are cycling to school 32
3.3.3 Cycling infrastructure is unsafe 34
3.3.4 Benefits realised to date 38
3.3.5 Overall findings 38
3.4 Investment objectives 39
4. Strategic Alignment 41
4.1 Ministry of Transport 41
4.1.1 2018/19 Government Policy Statement 41
4.1.2 2021/22 Government Policy Statement 42
4.1.3 Road to Zero 2020-2030 43
4.1.4 Accessible Streets Public Consultation 43
4.2 Waka Kotahi NZ Transport Agency 43
4.2.1 Cycling Safety Action Plan 43
4.2.2 Cycling Network Guidance 44
4.2.3 Amended Statement of Intent 2018-22 44
4.2.4 Arataki 2019 45
4.2.5 Wellington mode shift plan 46
4.3 Greater Wellington Regional Council 46
4.4 Hutt City Council 47
4.4.1 Urban Growth Strategy 2012-2032 47
4.4.2 Petone 2040 47

4.4.3 Walk and Cycle the Hutt 2014-2019 48
4.4.4 Central City Transformation Plan 2019 48
4.5 Related Projects 49
4.5.1 Let's Get Wellington Moving 49
4.5.2 Riverlink 50
4.5.3 Cross Valley Transport Connections 51
4.5.4 Innovating Streets 52
4.5.5 Te Ara Tupua 53
4.6 Covid-19 Response 54
4.6.1 Hutt City Council Emergency Budget 54
4.6.2 Transport demand 55
5. Programme development 56
5.1 Connectivity assessment 56
5.2 Long list development 56
5.3 Long list feedback and assessment 59
5.4 Short list development 61
5.4.1 Programme 1 - Base network 62
5.4.2 Programme 4 – Base + demonstration neighbourhoods 64
5.4.3 Programme 5 – Base + demonstration neighbourhoods + focus schools 66
5.4.4 Do minimum – Complete committed cycleways 68
5.5 Short listed programmes feedback 70
5.5.1 Waka Kotahi 70
5.5.2 Petone Community Board 71
5.5.3 Hutt Cycle Network 71
5.6 Short listed programmes assessment 72
5.6.1 Investment objectives assessment process 72
5.6.2 Investment objectives assessment results 73
5.6.3 Deliverability and financial feasibility assessment process 75
5.6.4 Deliverability and financial feasibility assessment results 75
5.6.5 Economic feasibility assessment results 76
5.6.6 Summary of programme assessment 77
5.7 Programme 4+ development 78
5.8 Updated programme assessment 80
5.8.1 Effectiveness for achieving the investment objectives 80
5.8.2 Deliverability and financial feasibility 82
5.8.3 Economic feasibility 82
5.8.4 Summary of programme assessment 83
6. Recommended Programme 84
6.1 Quick wins 2021 to 2024 84

6.2 Medium term 2024 to 2030 ... 85
6.3 Long term 2030 to 2036 ... 86
6.4 Supporting measures ... 87
7. Recommended programme economic assessment ... 88
7.1 Procedure followed ... 88
7.2 Assessment methodology ... 88
7.3 Assessment results ... 89
7.4 Sensitivity tests ... 89
8. Recommended programme investment assessment ... 91
8.1 Investment Assessment Framework ... 91
8.2 Investment Prioritisation Method ... 93
8.2.1 GPS Alignment ... 93
8.2.2 Scheduling ... 94
8.2.3 Efficiency ... 94
8.2.4 Priority order ... 95
9. Financial case ... 96
9.1 Indicative cost ... 96
9.2 Indicative programme cash flow ... 96
9.3 Funding arrangements ... 98
9.4 Affordability ... 98
10. Commercial Case ... 99
10.1 Procurement approach ... 99
10.2 Low-cost low risk activity ... 99
10.3 Cycling improvements activity ... 100
10.4 Promotion of road safety and demand management activity ... 100
10.5 Delivery capacity ... 101
10.6 Implementation risk review ... 101
11. Management Case ... 103
11.1 Programme management ... 103
11.2 Co-Delivery ... 103
11.3 Stakeholder communication and engagement plan ... 103
11.4 Programme performance and review ... 104
11.5 Programme updates ... 104
11.6 Implementation ... 104
12. Next steps ... 105

Appendix A. Cycleways Network Concept

Appendix B. Treatment Options

B.1 Willingness to cycle

B.2 Shared streets
B.3 Mid-block Treatment Options
B.3.1 Neighbourhood greenways
B.3.2 On road cycle lanes
B.3.3 Shared paths
B.3.4 Single direction cycle path
B.3.5 Bi-directional cycle path
Appendix C. Scoring notes for programme assessment
Appendix D. Demonstration Neighbourhood Selection Criteria
Appendix E. Focus schools selection criteria
Appendix F. Comparison of level of investment in cycleways/pathways infrastructure
Appendix G. High level cost estimates
Appendix H. Detailed economic assessment of recommended programme

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to complete the programme development of a single stage business case in accordance with the scope of services set out in the contract between Jacobs and Hutt City Council ('the Client'). That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

The cost estimates contained in this report are high level and therefore provide an overview of the relative cost of each project and programme option. The cost estimates are subject to change during the design and implementation phases of the business case process. Jacobs accepts no liability or responsibility for later revisions of the cost estimates.

If the client chooses to apply for funding from the Waka Kotahi NZ Transport Agency for the implementation of the proposed projects contained in this report then Jacobs accepts no liability or responsibility for the success of the funding application.

This report has been prepared on behalf of, and for the exclusive use of, the Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

Executive summary

This single stage business case makes the case for further investment in active and sustainable mode to encourage a shift towards these modes. This business case builds on the progress made under the Walk and Cycle the Hutt 2014-2019 strategy which includes Te Hikoi Ararewa (Wainuiomata shared path), Eastern Bays shared path and The Beltway. This report sets out a road map for the next stages in developing a connected cycleways network in Hutt City which includes a recommended programme of investment in infrastructure and supporting measures.

Considering the context of Hutt City the following features were found to be supportive of increased active and sustainable mode use:

- The majority of trips within Hutt City are short and on a flat gradient which is well suited to cycling and micromobility;
- There is the opportunity to leverage existing investment by Hutt City, Wellington City and Waka Kotahi in cycleway infrastructure to provide a connected network to key destinations in Hutt City and Wellington CBD; and
- Some areas of Hutt City are outside of a comfortable walking distance to train stations or a frequent bus route, therefore cycling and micromobility could help to improve access to employment opportunities.

It was also found that the further investment in active and sustainable modes would have a strong results alignment with Waka Kotahi, Greater Wellington and Hutt City strategies including the Government Policy Statement on Land Transport and Road to Zero. This is because providing infrastructure and skills training would improve both the infrastructure and speed management for vulnerable road users which are overrepresented in recorded crashes. Furthermore, increased participation in active and sustainable modes will give people more travel options to access jobs, education, healthcare and civic facilities in Hutt City.

The objectives which this business case seeks to achieve are:

- Increased number of residents that use bikes and micromobility as a mode of transport;
- Greater potential for school students to use active transport to and from school; and
- Improved safety for people who use bikes and micromobility

The benefits realised from the completion of Te Hikoi Ararewa (Wainuiomata shared path) show to the latent demand for active and sustainable mode trips in Hutt City when supportive infrastructure is provided. This is because pre shared path 7 cyclists and 25 pedestrians used Wainuiomata Road per day and post construction 39 cyclists and 300 pedestrians use the shared path per day. It is anticipated that further demand for active and sustainable trips will be unlocked when a connected network of safe and attractive routes is provided.

The starting point for the business case is the cycleways network concept contained in the Hutt City Cycleways Connectivity Assessment Report which was developed with stakeholder involvement. This business case develops a recommended programme of investment for the staged implementation of the cycleways network concept. The process that was followed to develop the recommended investment programme is:

1. Create a long list of focus areas for investment and seek feedback from stakeholders on what the priorities should be;
2. For the shorted list of investment priorities develop a programme which best achieves the outcomes sought, a programme is a series of infrastructure projects and supporting measures in sequence from implement first to implement last;
3. Assess the short-listed programmes against technical criteria (investment objectives, deliverability and financial affordability and economic feasibility) and seek feedback from stakeholders on the programmes;
4. From the assessment findings and the stakeholder feedback develop a hybrid programme that takes the best elements of the two highest performing programmes;

5. Complete a detailed assessment of the recommended hybrid programme to confirm that it is the highest performing in terms of achieving the investment objectives.

An overview of the recommended investment programme is shown on the map on the following page (

Figure 1-1). The focus areas for the recommended programme are providing connections to Hutt Central and Te Ara Tupua (Wellington to Hutt Valley walking and cycling link), proving a fine grain active and sustainable mode network in Petone, Hutt Central, Naenae and Wainuiomata and connections to schools. The proposed cycleways, which are Eastern Bays shared path, The Beltway (central and northern sections) and Te Ara Tupua, all have funding approved.

Figure 1-1: Network overview for recommended investment programme

An assessment of the recommended programme was completed following Waka Kotahi's Monetised benefits and costs manual, the key outcomes of this assessment are shown in the tables below (Tables 1-1). Overall, the recommended programme would have a benefit cost ratio of 2.0 which means that $2.00 of community benefits are realised from every $1 invested.

	Recommended programme benefits (discounted to present value)
Health and environmental benefits	$133.9 million
Crash cost savings	$5.6 million
Total programme benefits	$139.5 million

Tables 1-1: Key outputs from economic assessment of recommended investment programme

The staging of the recommended programme has a lower level of investment in the first three years with the larger infrastructure projects timed to occur in the medium to long term. This staging is to reflect short term funding constraints from Covid-19 and to allow Hutt City to focus on delivering The Beltway (central and northern sections) and Eastern Bays Shared Path. The proposed staging and levels of investment are as follows:

- Quick wins (2021 to 2024): $7.5 million for infrastructure and 0.6 million for supporting measures
- Medium term (2024 to 2030): $40.5 million for infrastructure and $1.2 million for supporting measures
- Long term (2030 to 2036): $37.0 million for infrastructure and $1.2 million for supporting measures

The Investment Prioritisation Method is a tool which Waka Kotahi uses to assist in the ranking of projects for funding from the National Land Transport Programme. The recommended programme has a high alignment score against the Government Policy Statement on Land Transport, a high scheduling score and a low efficiency score.

1. Introduction

1.1 Project overview

Hutt City Council has made significant progress in completing the projects referenced in Walk and Cycle the Hutt 2014-2019 strategy which includes Te Hikoi Ararewa (Wainuiomata shared path), Eastern Bays shared path and The Beltway. The purpose of this Single Stage Business Case (SSBC) is to identify the next stages in developing a connected cycleways and pathways network in Hutt City. The SSBC considers the needs of both bike using bikes and people using micromobility (e-scooters, e-skateboards and self balancing e-unicycles). This is because bikes and micromobility travel at similar speeds and use require similar amounts of space. The investment contained in the recommended programme will further improve accessibility to jobs, public transport, schools and community facilities by active and sustainable modes. The recommended programme contains both infrastructure (cycleways, shared paths, buffered bike lanes and traffic calming) as well as supporting measures (cycle skills training, end of trip facilities, marketing and events).

1.2 Previous work done to date

This SSBC builds on the Hutt City Cycling Improvements Strategic Case for Investment 2016 and Hutt City Cycleway Connectivity Assessment 2019. The strategic case was developed as part of the Beltway Project and identified the need for investment, investment logic mapping and problem/ benefit statements. As part of the SSBC the strategic case will be assessed against an updated evidence base to test whether the strategic case is still fit for purpose. The Hutt City Cycleways Connectivity Assessment is a cycling network study which identifies a complete cycling network in Hutt City including options for routes and treatments. This SSBC will inform the staged implementation of the complete active and sustainable modes network identified as part of the Connectivity Assessment.

1.3 Purpose of the report

The purpose of this report is to document the process undertaken to develop the recommended programme of investment in active and sustainable mode infrastructure and supporting measures. The recommended programme is part of the Hutt City Cycling and Micromobility Single Stage Business Case (SSBC) with the next stage being the completion of concept designs for the infrastructure projects. A SSBC pathway was chosen rather than separate Programme Business Case and Detail Business Case pathway due to low to moderate complexity, risk and uncertainty. This reflects Waka Kotahi advice on the business case pathway for single mode business cases.

1.4 Stakeholders

The stakeholders which have been consulted with during the development of this SSBC include representatives from:

- Hutt City Council
- Greater Wellington Regional Council
- Waka Kotahi
- Cycling Action Network
- Living Streets Aotearoa
- Elected representatives of Hutt City
- Community Groups

Stakeholder feedback was provided during a workshop hosted in Hutt City on 25 February 2020 which covered the strategic case and long list programme options. Further stakeholder feedback was sought on the short list programme and assessment via written feedback on 29 April 2020. Discussions with Waka Kotahi on the investment objectives and integration with other business cases occurred throughout the programme.

1.5 Impact of Covid-19

Overall, it is considered that the post Covid-19 context does not change the strategic case for investment in safe and connected active and sustainable mode network in Hutt City. This is because traffic volumes have returned to pre Covid-19 levels which indicates that people are making a similar number of trips.

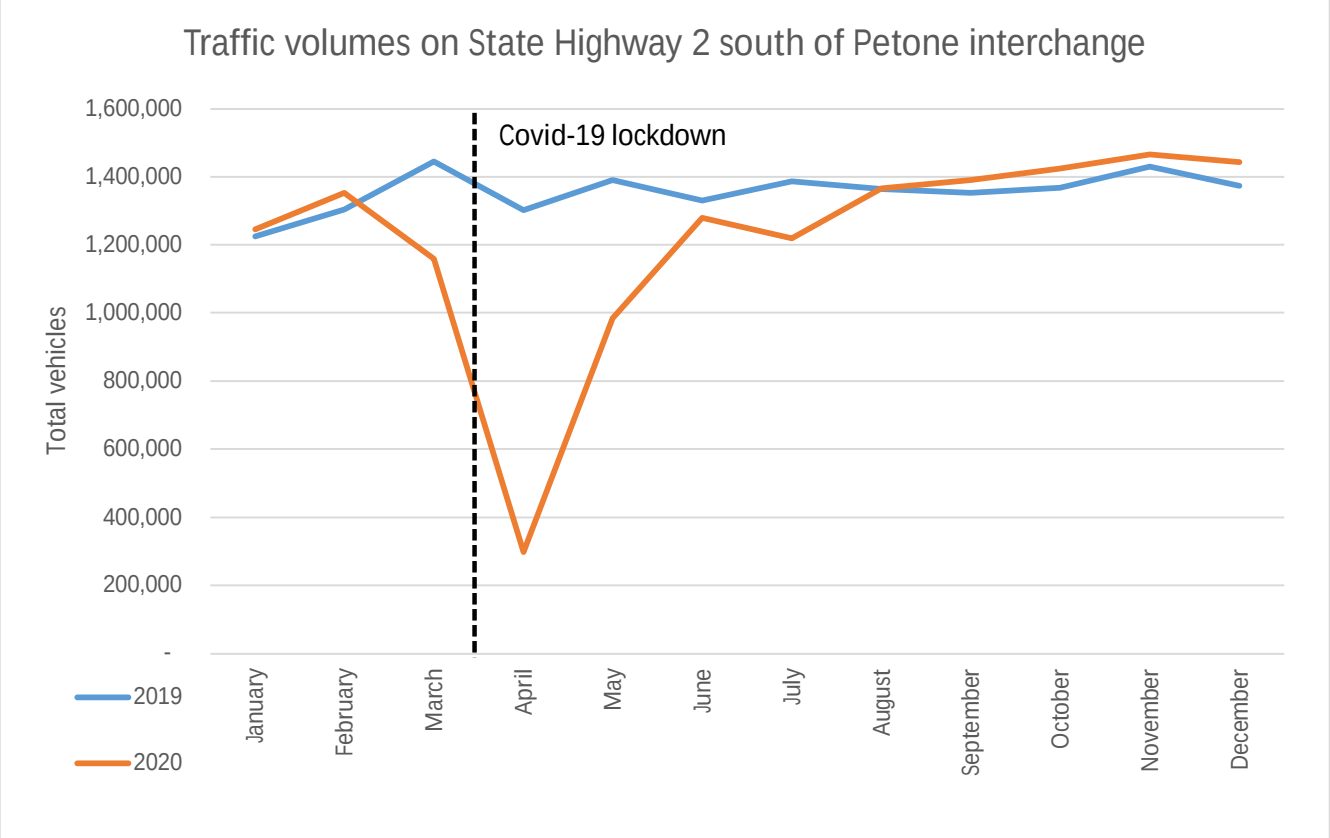


Figure 1-1: Total vehicle volumes on State Highway 2 south of Petone interchange for 2019 and 2020. Source: Waka Kotahi Traffic Monitoring State Highways

However, Covid-19 has placed additional short-term financial pressures on Hutt City Council and the National Land Transport Fund. To account for this the recommended programme has a light level of investment in the short-term with larger infrastructure projects being phased for the medium and long term.

1.6 Report structure

The Hutt City Cycling and Micromobility business case has the following format:

- Sections 2-4: Context, strategic case and strategic alignment confirms the strategic case for investment.
- Sections 5-7: Programme development documents the process followed to develop the recommended programme of investment including the economic assessment
- Sections 8-10: Financial, commercial and management cases
- Section 11: Next steps are outlined to continue the recommenced programme to design and consultation phase.

2. Programme Context

2.1 Population and Employment

In 2018 Hutt City had a population of 104,500 people which makes it the 7th largest city in New Zealand[1]. Between 2013 and 2018 Hutt City's population increased at an average rate of 1.2% per year with building consents increasing from 1189 in 2015/16 to 1633 in 2018/19[2].

Figure 2-1 shows the population density (residents per square kilometre) of Hutt City with the suburbs of Petone, Waterloo, Naenae, Taita and Stokes Valley having the highest population densities. The Western Hill suburbs and Eastern Bays are the residential areas with lower population densities. The Central City and Seaview/Gracefield also have low population densities but these areas have a high concentration of jobs.

[1] 2018 New Zealand Census

[2] Hutt City Council, 2019, *Population growing, building hits new highs, economy solid,* retrieved from http://www.huttcity.govt.nz/Your-Council/News-and-notices/media-releases/2019 -media-releases/population-growing-building-hits-new-highs-economy-solid

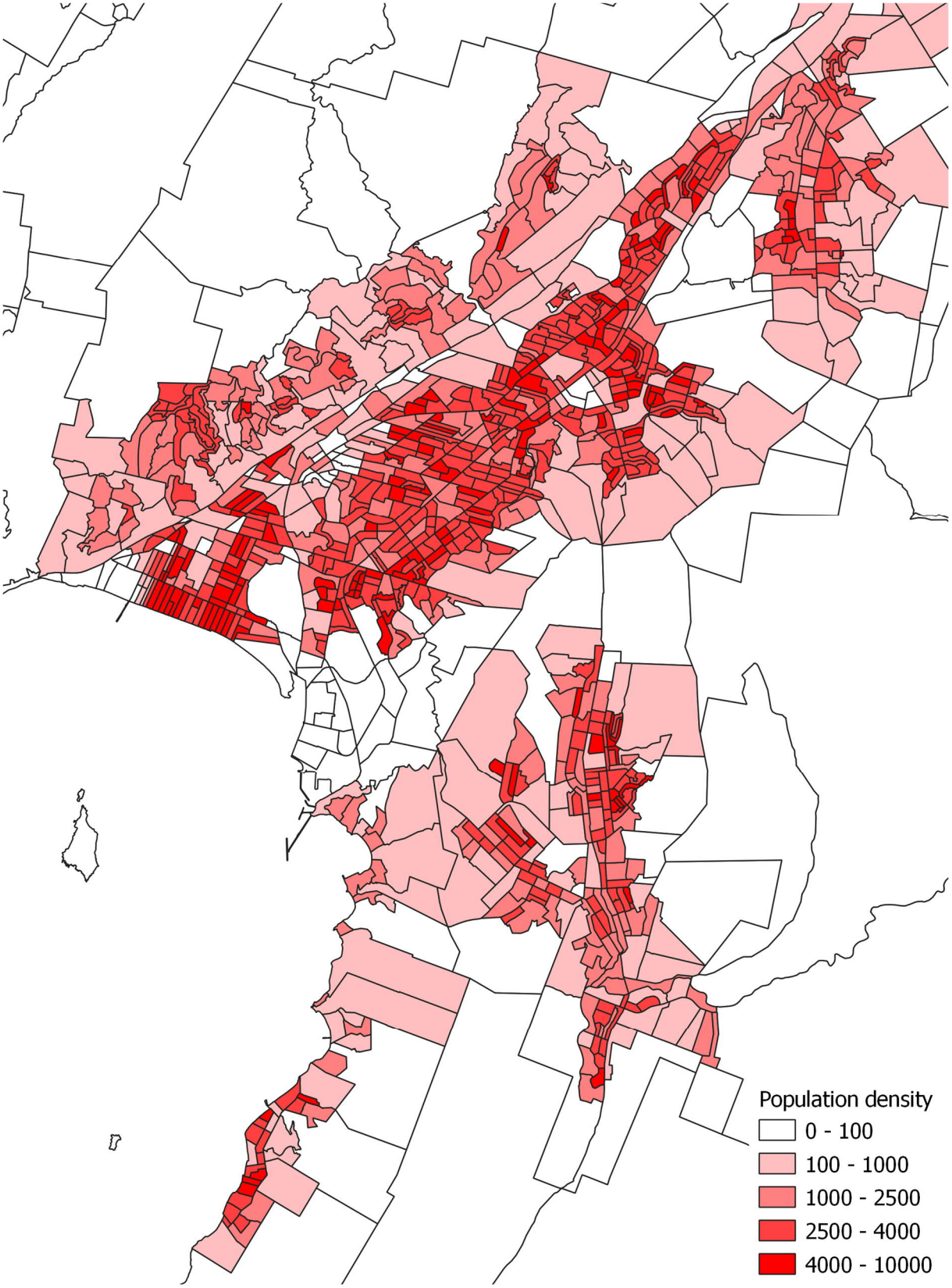


Figure 2-1: Population density (residents per square kilometre) of Hutt City. Source: 2013 NZ Census

A high density of young people (0 to 19-year olds) live in the suburbs of Petone, Waterloo, Naenae, Taita and Wainuiomata. Whereas the Western Hill suburbs and Eastern Bays have a comparatively lower density of young people.

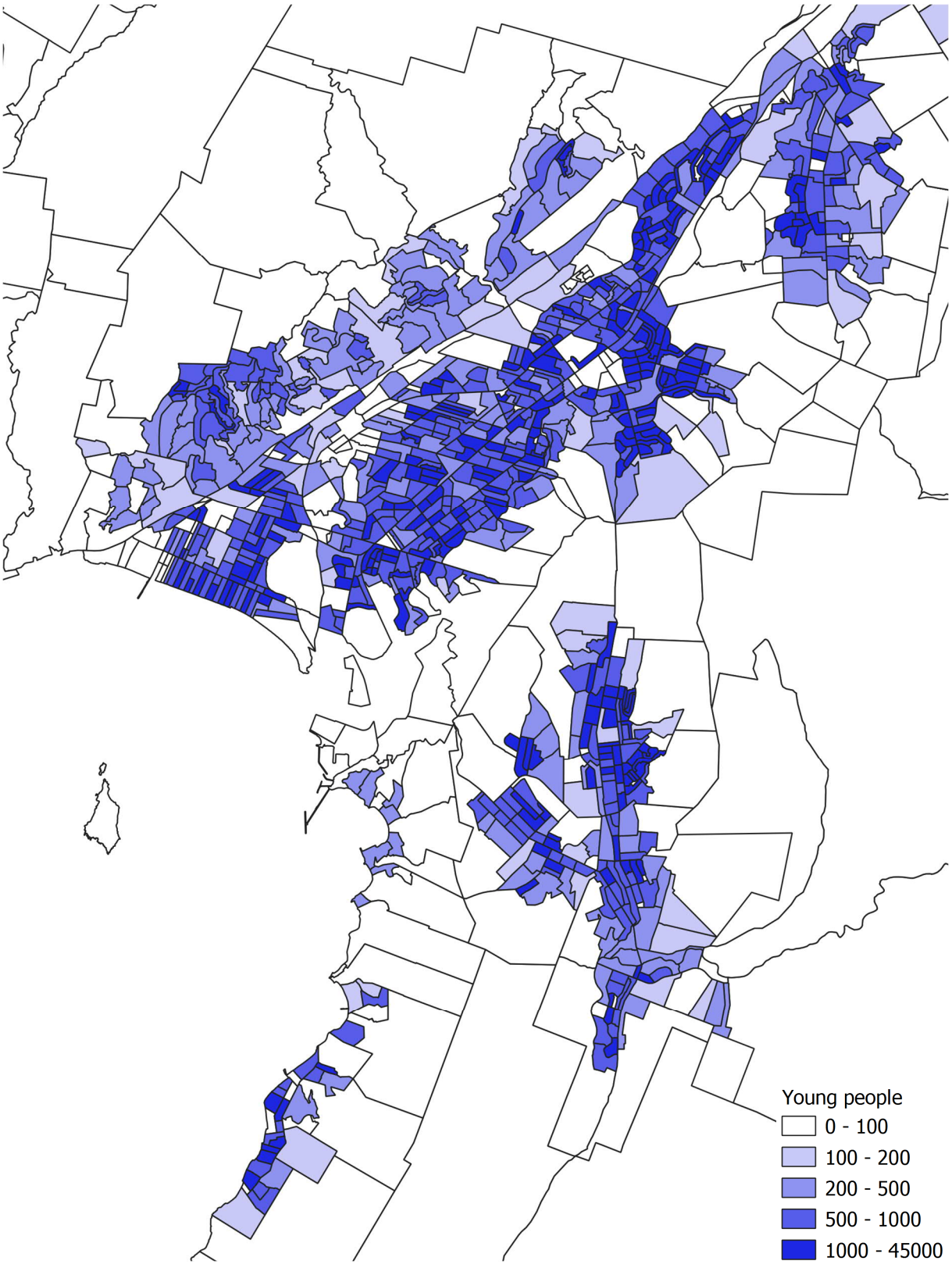


Figure 2-2: Number of young people per square kilometre in Hutt City. Source: 2013 NZ Census

Figure 2-1 shows that overall 53% of residents have jobs located within Hutt City, with 43% of residents commuting to Wellington City and 4% of residents travelling to Porirua or Upper Hutt for work. The area with the highest proportion local employment is Wainuiomata with 70% and the area with the lowest local employment is the Petone Community with 29%. The largest employment areas in Hutt City are Hutt Central with 6000 jobs, Petone with 5200 jobs, Gracefield with 3800 jobs and Hutt Hospital with 1300 jobs.

	Percentage of residents with jobs located in Hutt City	Percentage of residents with jobs located in Wellington City	Percentage of residents with jobs located in Porirua and Upper Hutt
Petone Community	29%	68%	3%
Eastbourne Community	42%	57%	1%
Central Ward	42%	54%	4%
Western Ward	48%	48%	4%
Eastern Ward	57%	40%	3%
Wainuiomata Ward	70%	27%	3%
Northern Ward	60%	32%	8%
All of Hutt City	53%	43%	4%

Table 2-1: Location of jobs for Hutt City residents from 2018 Census data

Implications for active and sustainable mode network development

Hutt City's population and employment patterns provides the following insights for the active and sustainable mode network development:

- The areas of Petone, Waterloo, Naenae, Taita, Stokes Valley and Wainuiomata have the highest population density and therefore cycleways in these areas may have the greatest potential uptake;
- A higher density of young people live in the suburbs of Petone, Waterloo, Naenae, Taita and Wainuiomata. Investment in these areas may provide the greatest opportunity to encourage more students to use active modes to and from school; and
- The majority of residents have jobs located in Hutt City (53%) with many of these trips to work being short distance and therefore well suited to cycling and micromobility. Average commute distance is discussed further in table 2-3 on page 17.

2.2 Transport System

The current transport network in Hutt City has the following main features:

- State Highway 2 which carries inter-city and inter-region traffic which runs north-south parallel to the Hutt River. The Petone, Dowse and Haywards Interchanges are grade separated with the Melling and Belmont intersection being signal controlled;
- Two rail lines serve Hutt City which are the Hutt Valley Line and Melling Line. The Hutt Valley line has a 10-minute peak service, a 20-minute off-peak service and a half hourly weekend service. With the Melling Line having a 20-minute peak service, an hourly off-peak service and no weekend service;
- The current cycleways/pathways in Hutt City are the Hutt River Trail, The Esplanade shared path, Wainuiomata Road shared path and sections of on road cycle lanes (Figure 2-3). Committed cycleways/pathways include Te Ara Tupua, The Beltway (central and northern sections) and Eastern Bays shared path which are at various stages of design and consenting. The current and committed cycleways/pathways network lacks safe and attractive connections to key destinations including Hutt CBD, Jackson Street and schools. There is also gaps in the cycleways/pathways network (particularly in Gracefield/Seaview), sections which provide poor cycling level of service and a lack of coverage in the main residential areas; and
- There is a network of footpaths along most local roads. Due to space constraints some roads in the Western Hill suburbs have a footpath only on one side of the road.

Hutt City's geography and the layout of the transport system creates several of pinch points which limits cycle accessibility. This is due to either a physical barrier or the need for people on bikes to use roads with high volumes and high-speed traffic. These pinch points include:

- State Highway 2 which cuts the Western Hill suburbs off from the rest of the city;
- Hutt River which divides Petone and Alicetown from the central city with limited provision for people on bikes being provided at river bridges;
- Hutt Valley Rail Line which separates Waterloo and Naenae of the eastern side from Taita and Hutt Central on the western side;
- Busy arterial roads which serve Hutt CBD which includes Waterloo Road, High Street, Woburn Road and Railway Avenue;
- Harcourt Werry Drive which is a high-speed road (70 km/hr) that limits access to the Hutt River Trail for people living in Taita, Avalon and Epuni;
- Busy multi-lane roundabouts including Hutt Road/ The Esplanade, Randwick Road/ Waione Street, Wainuiomata Road/ Main Road and Fairway Drive/ High Street; and
- Eastern Hutt Road which is a high-speed road (70 km/hr) that restricts access to Stokes Valley and Taita College.

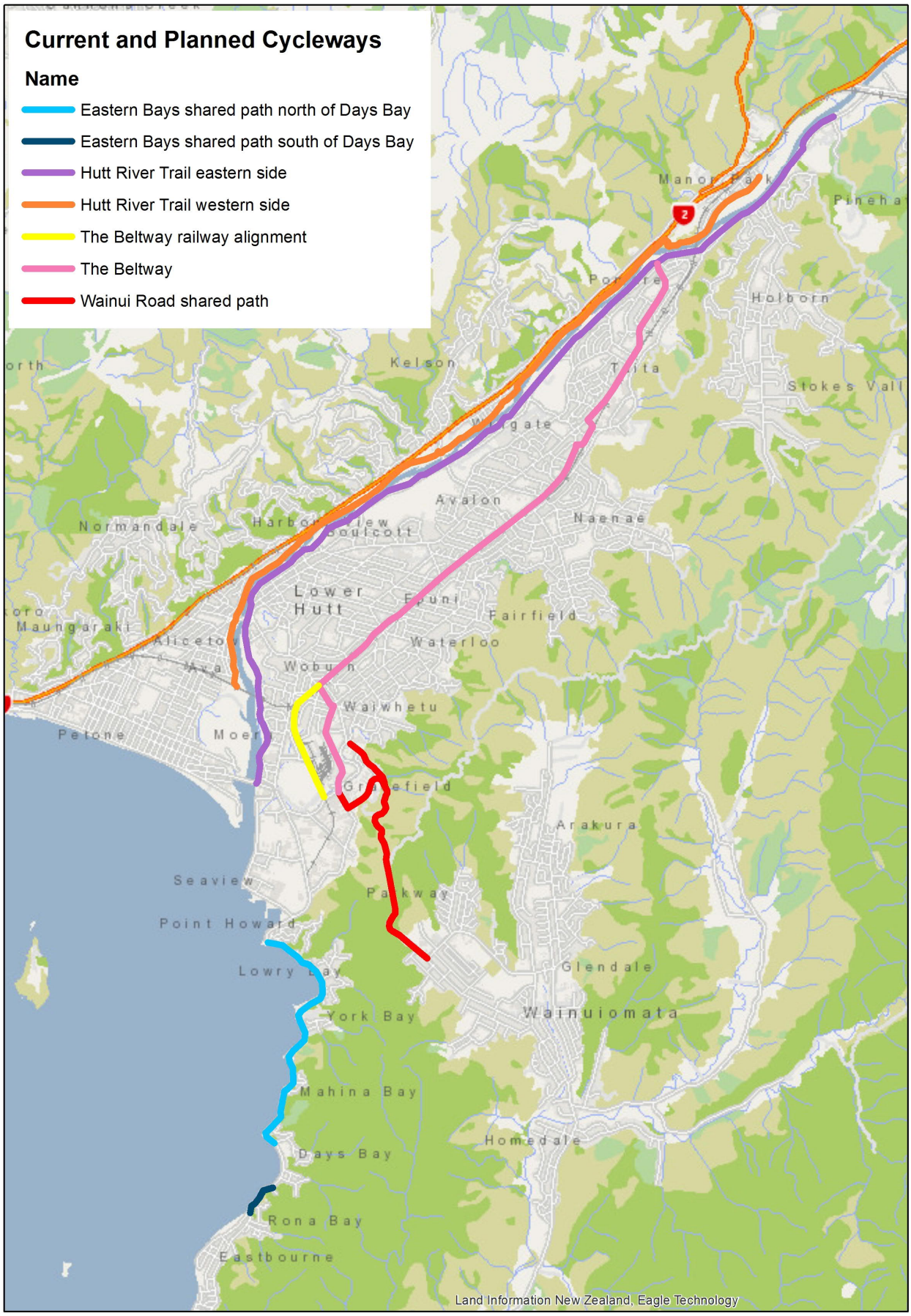


Figure 2-3: Current and planned cycleways network in Hutt City

Currently in Hutt City the majority of residents use motor vehicles as their main means of travel to work with a mode share of 66.1% (Table 2-2). Public transport and walking have the next highest mode shares with 20.0% and 3.8% respectively. Cycling is currently under represented as a transport mode in Hutt City with 1.6% of trips to work. There is the potential to significantly increase cycling mode share in Hutt City with comparable cities such as Nelson and Palmerston North having cycle mode shares of 7.0% and 5.0% respectively.

Main means of travel to work	Mode share
Motor vehicle (including passenger and motor cycle)	66.1%
Public transport	20.0%
Bicycle	1.6%
Walked	3.8%
Worked at home	7.3%
Other	1.3%

Table 2-2: Main means of travel to work (Source: 2018 NZ Census)

For main means of travel to education in Hutt City 60% of students use private vehicles (includes passenger and driver) based on 2018 census data (Figure 2-4). Walking or jogging was the next most popular mode with 23% of students followed by public transport with 14% of students (includes school bus, public bus, train and ferry). Only 3% of students used a bicycle as their main means of transport with cycling being less common for students over 15 years old, 3.3% of students under 15 years cycle compared to 1.1% of students over 15 years.

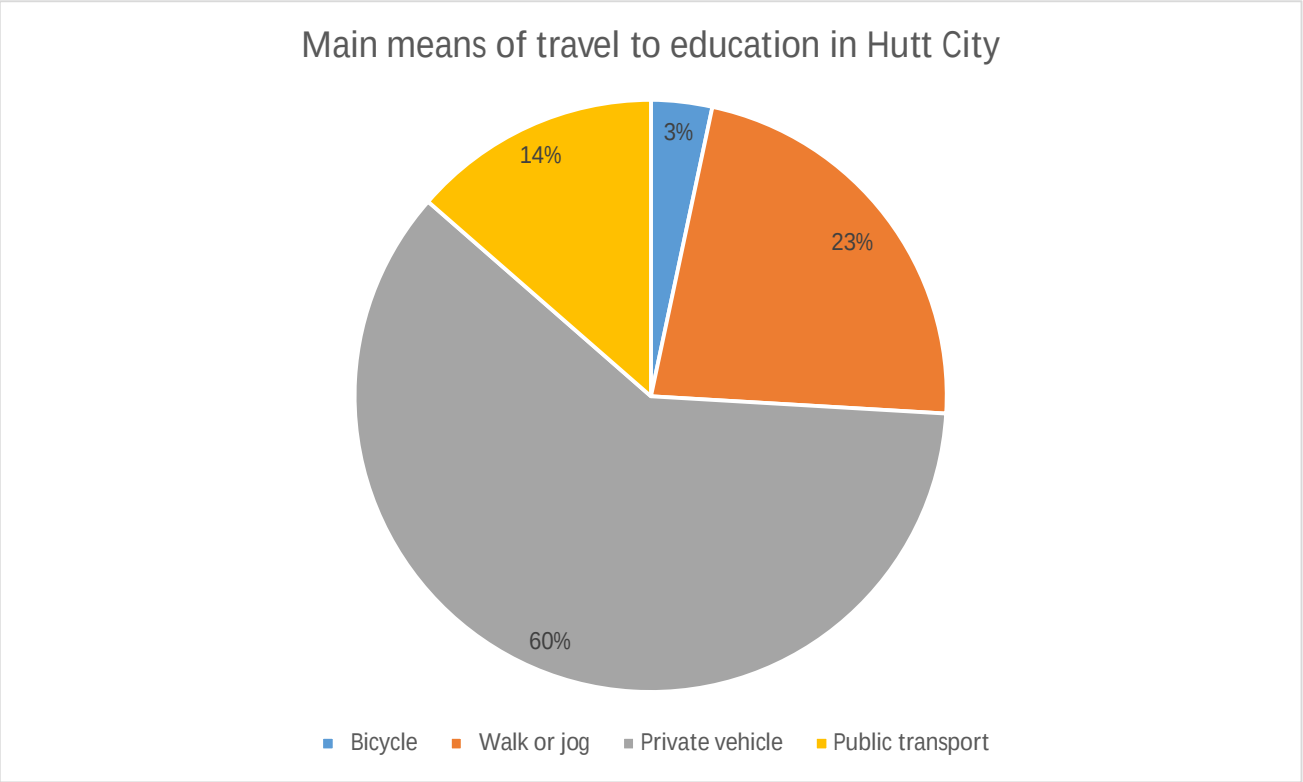


Figure 2-4: Main means of travel to education in Hutt City for students 19 years or younger. Source: NZ Census 2018 data

Figure 2-5 shows that the cycle mode share varies considerably across Hutt City. Stokes Valley and Wainuiomata has a cycle mode share of less than 1% with Korokoro, Gracefield and Morea all having cycle mode shares of above 3%.

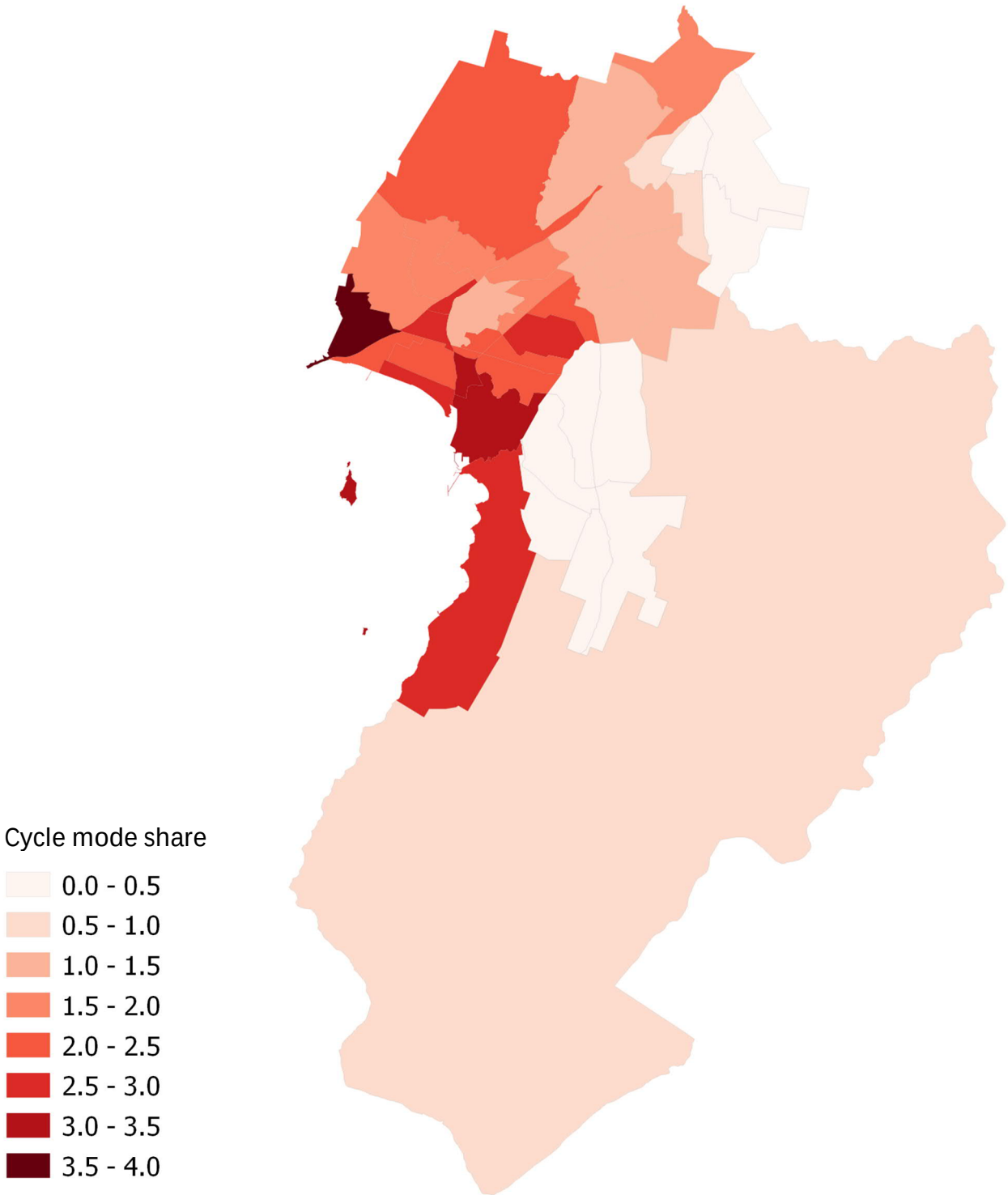


Figure 2-5: Cycle mode share in Hutt City by census area units (Source: 2018 NZ Census)

The distance travelled to work varies considerably between residents who work in Hutt City and residents who commute to Wellington City. Table 2-3 shows the average commute distance broken down by community board and ward area. Commute distances are calculated on using straight line distance between census area units and do not follow the road network.

For residents who work in Hutt City the average commute distance is 3.9 km, which is around a 15 min cycle. The commute distance within Hutt City increases slightly for the Eastbourne Community and Northern Ward (5.9 km or a 20 min cycle) due to these areas being further away from the main employment centres. For residents who work in Wellington City the average commute distance is 14.9 km which represents a 45 min cycle. However, for residents in South Hutt City the commute to Wellington City is shorter at an average of 12.3 km or a 35 min cycle for the Petone Community.

	Average commute distance for trips within Hutt City	Average commute distance for trips to Wellington City
Petone Community	2.3 km	12.3 km
Eastbourne Community	5.9 km	11.2 km
Central Ward	2.5 km	15.1 km
Western Ward	3.9 km	14.7 km
Eastern Ward	3.4 km	15.8 km
Wainuiomata Ward	4.8 km	14.5 km
Northern Ward	5.9 km	20.6 km
All of Hutt City	3.9 km	14.9 km

Table 2-3: Average commute distance by community board and ward area in Hutt City

In December 2018 Lime was granted a permit by Hutt City Council and Upper Hutt District Council to operate a trial dock less e-scooter rental business. Lime e-scooters could be rented by the minute with users being able to park the e-scooters at their destination rather than needing to return them to fixed locations. In June 2019, Lime decided to pull out of the Hutt Valley market due to Wellington City Council selecting competitors Jump and Flamingo to operate e-scooter rentals in Wellington City. Therefore, at the time of writing this SSBC Hutt City does not have publicly available e-scooter rentals however it is possible that another company may operate e-scooter rentals in the future. During the seven months of operation in the Hutt Valley 225,000 trips were taken on Lime scooters by 50,000 users.

An online survey by the University of Canterbury[3] in February and March 2019 provides the following insights into e-scooter usage:

- 25% of e-scooter users had used an e-scooter once and 75% had used e-scooters more than once;
- First time e-scooter users were most motivated by wanting to have fun and try e-scootering;
- Subsequent e-scooter use was motivated by the speed and convenience of e-scooters as a means of transport;
- Younger people, men and those in full-time employment were most likely to use e-scooters; and
- Only around half of users (51%) think that the footpath is an appropriate environment to ride an e-scooter.

For survey respondents who used e-scooters more than once the following travel behaviour was recorded:

- 57% of e-scooter trips replaced trips that would otherwise have been made by active modes;
- 28% of e-scooter trips replace a trip that would have been made with a motor vehicle; and
- 7% of e-scooter trips were new trips that would not otherwise have been made.

Implications for active and sustainable mode network development

Hutt City's transport system provides the following insights for the active and sustainable mode network development:

- There is the opportunity to connect the existing and planned cycleways/pathways network to key destinations and main residential areas which will increase cycling and micromobility uptake across the whole network;
- Removing barriers to active and sustainable mode accessibility from conflicts with other transport modes is an important consideration for the design of the cycleways/pathways network;
- Areas in Northern Hutt City and Wainuiomata have had lower cycling uptake than Southern Hutt City and the Western Hill suburbs;
- Trips to work within Hutt City are short distance which are well suited for cycling and micromobility with 62% of residents being employed within Hutt City;
- Commute trips to Wellington City particularly for areas in Northern Hutt City are longer and therefore may be better suited to more confident users. However, the availability of e-bikes/e-scooters and encouraging active and sustainable modes to train stations may help to reduce the importance of distance; and

[3] Fitt, H & Curl, A. *Perceptions and experiences of Lime scooters: Summary survey results*, 2019.

- E-scooter rentals are not currently publicly available in Hutt City although micromobility devices can be purchased and used by residents.

2.3 Socioeconomic Disparities

Hutt City, like most cities in New Zealand, has areas were residents on average have lower incomes and employment opportunities and areas with higher incomes and employment opportunities. The relative socioeconomic disparities of an area are measured in the New Zealand Deprivation Index which is shown in (Figure 2-6 on following page). The Deprivation Index classifies areas from a scale of 1 being least socioeconomically deprived to 10 which is most socioeconomically deprived. The areas in north-east Hutt City are amongst the 10% most socioeconomically deprived areas of New Zealand with Western Hills, Eastern Bays and Hutt Central being the least deprived.

For areas with high socioeconomic deprivation the availability of affordable transport options is an important factor in the accessibility of employment opportunities for residents in these areas. Cycling and micromobility along with public transport can provide affordable transport options compared to the cost of owning and maintaining a vehicle. However not all areas with high deprivation are within walking distance to a train station which includes parts of Naenae, Stokes Valley, Avalon and Moera.

Implications for active and sustainable mode network development

The New Zealand Deprivation Index provides the following insights for the active and sustainable mode network development:

- Some areas of Hutt City have high deprivation and low access to affordable transport options due to being located outside of a walking distance to a rail station. Therefore, encouraging cycling and micromobility provides the opportunity to improve access to employment opportunities both in Hutt City and the wider Wellington region.

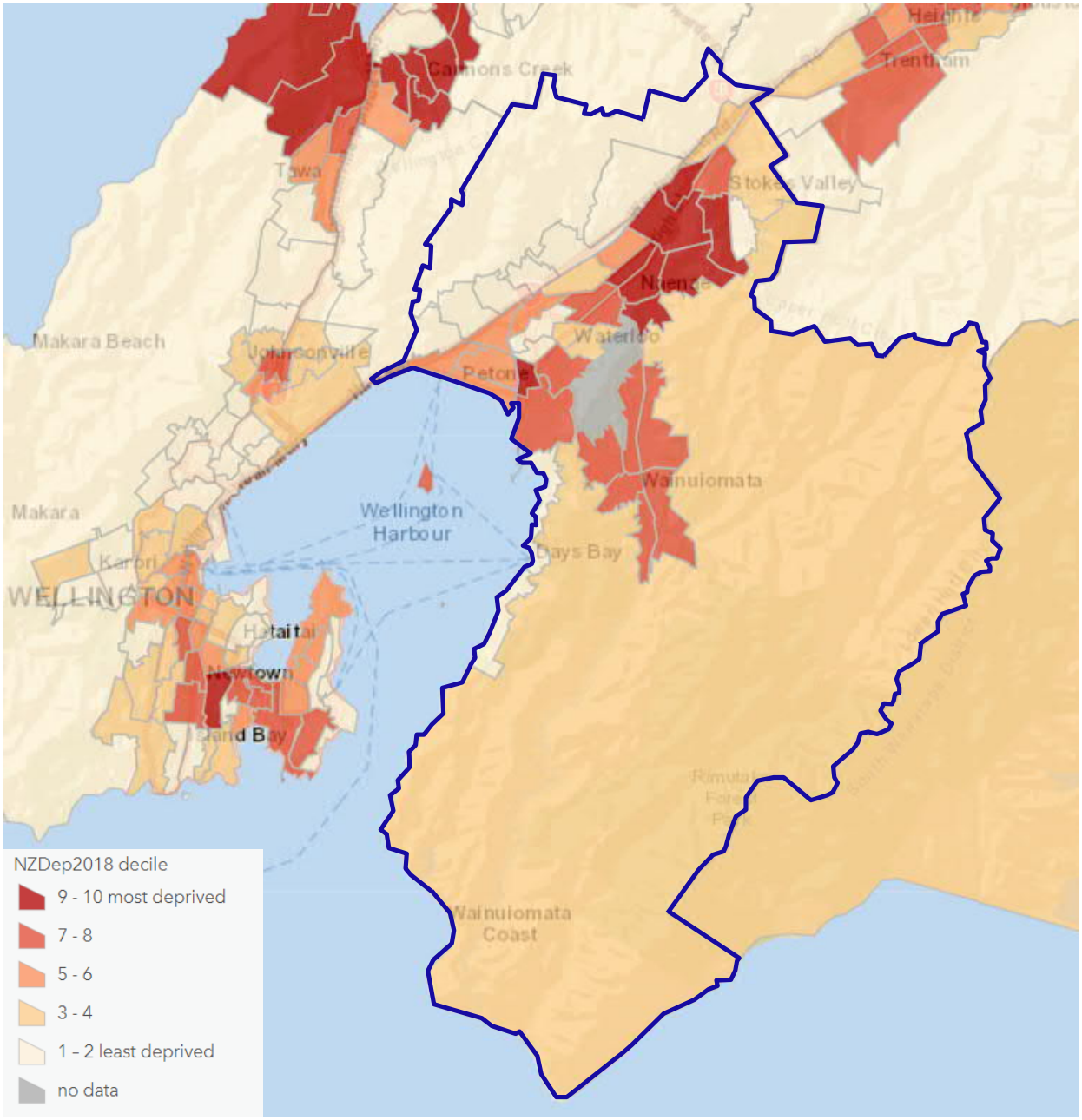


Figure 2-6: New Zealand Deprivation Index, 2018 (Source: University of Otago)

2.4 Geography

The most significant geographic feature of Lower Hutt is the flat valley floor which contains the central city and main residential areas of Petone, Waterloo, Naenae and Taita (Figure 2-6 on the following page). This area is well suited to cycling and micromobility with flat gradients and a relatively compact size with most residential areas being able to access the central city with a 10 to 20 min cycle. Another feature of Hutt City is the Western Hill suburbs which have steeper gradients which may limit potential uptake in these areas. Stokes Valley and Wainuiomata are more distant suburbs that would require a 30 to 40 min cycle to access the central city.

Implications for active and sustainable mode network development

Hutt City's geography provides the following insights for the active and sustainable mode network development:

- There is significant potential to shift trips to cycling and micromobility in Hutt City, particularly in the Valley floor which is flat and destinations relatively close; and
- The areas of Western Hill suburbs, Stokes Valley, Wainuiomata and Eastbourne also have potential to increase participation in active and sustainable modes. For these areas distance and road gradient may limit potential uptake however the increasing availability and usage of e-bikes and e-scooters may help to overcome these challenges.

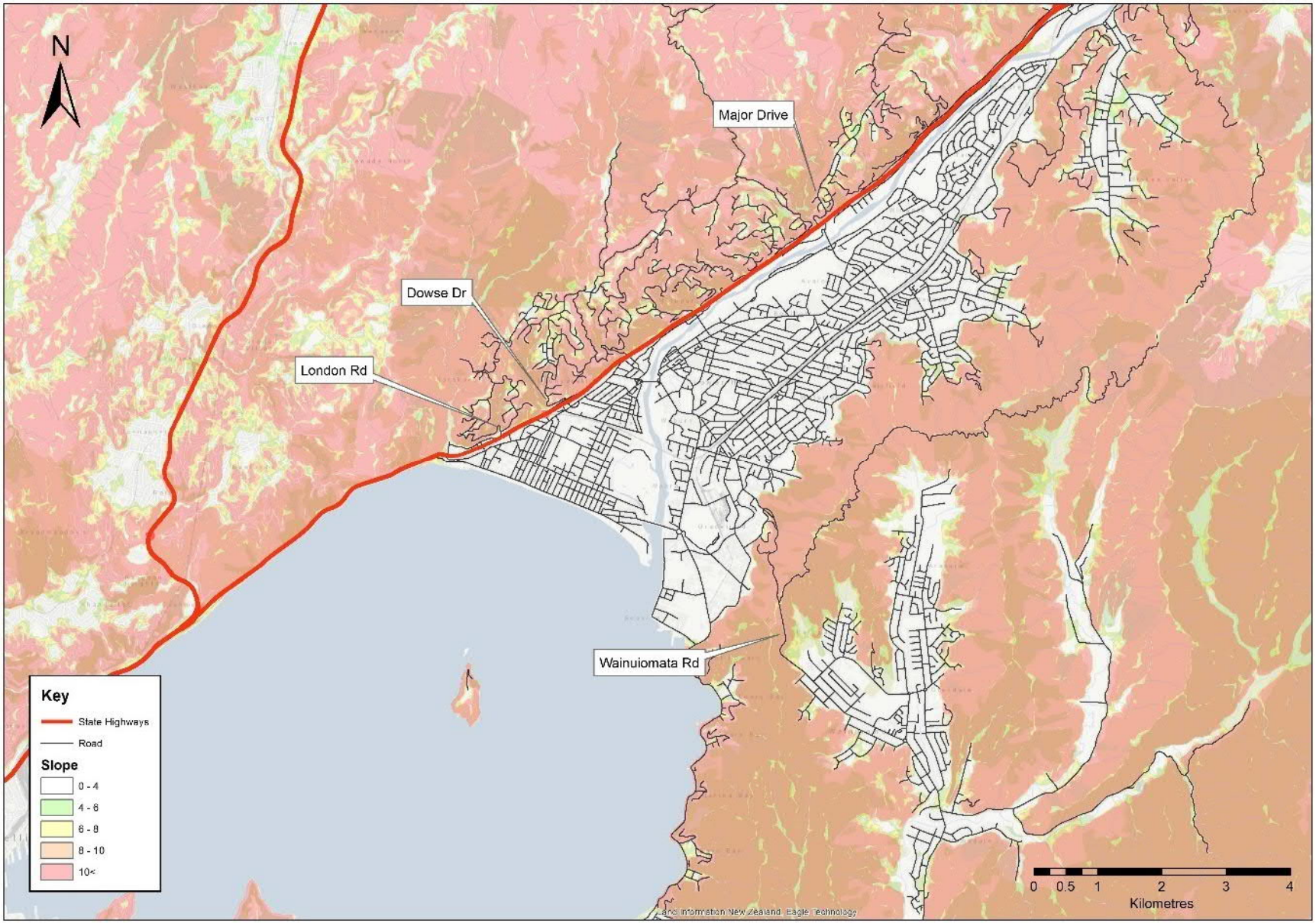


Figure 2-7: Hutt City slope steepness measured in degrees

3. Strategic Case

This section outlines the reasons to invest in developing improved connectivity, facilities and safety for people on bikes and people using micromobility in the Hutt City. The strategic case[4] for investment in cycling improvements was completed in 2016 with representation from key partner organisations including the Waka Kotahi, Hutt City Council and Hutt Cycle Network.

3.1 Defining the Problem/ Opportunity

A set of problem statements were developed with the purpose of identifying the problems faced by people using bikes (and other residents who may be interested in cycling) in Hutt City. The problem statements were developed during a facilitated workshop held on 16 November 2015.

The agreed problems are as follows with relative importance shown with percentages:

Problem 1: The transportation network does not meet cycle needs or expectations, leading to an increase in urban congestion (50%)

Problem 2: A low and declining number of children are cycling to school contributing to increased vehicular congestion around schools (30%)

Problem 3: Cycling infrastructure is unsafe, resulting in an unacceptable number of crashes involving cyclists (20%)

For problem 1 it was found that key routes to the Hutt City CBD are unattractive and unsafe which leads to poor perceived and actual level of service for cycling. What cycling infrastructure does exist is poorly connected, does not follow desire lines and is poorly sign posted.

For problem 2 parents' perceptions that cycling is not safe lead to primary school children not being permitted to cycle to school alone. It was felt that this is a missed opportunity because older children would start cycling late and are not enthused by cycling.

Conflict with traffic particularly in the CBD, at roundabouts and around schools is seen as causing problem 3 with cycling infrastructure being unsafe. The perception of cycling being unsafe was identified as decreasing participating in cycling in Hutt City.

3.2 The benefits of investment

Stemming from the problem statements are the benefits of investment which are as follows:

Benefit 1: Improved safety for network users (30%)

Benefit 2: Increased participation in sustainable transport (40%)

Benefit 3: Reduced traffic volumes (30%)

The most critical benefit is increased participation in sustainable transport, this is because increase participation will partly achieve the other two benefits (improving safety and reduced traffic volumes). An increase in sustainable travel will have the 'safety in numbers' effect where motorists become more use to sharing the street with people on bikes.

[4] Strategic Business Case – Hutt City Cycling Improvements, Neil Caughey, Beca, 2016

3.3 Confirming the strategic case

The first stage of this SSBC was to check whether the Strategic Case which was completed in 2016 is still fit for purpose. To achieve this the problem statements and benefits of investment were assessed against an updated evidence base. The following section outlines the results of this assessment.

3.3.1 The transportation network does not meet cycle needs or expectations

Census data was used to assess any change in participation in active modes (Figure 3-1). For the 2013 Census 2.2% of respondents used cycling as their main means of transport compared to 1.6% of respondents for the 2018 Census. During the same time period walking to work experienced a moderate decline from 4.7% in 2013 to 3.8% in 2018. This evidence indicates that participation in active modes is declining and to achieve the objectives outlined in the strategic content (section 4), active mode share should be significantly increasing.

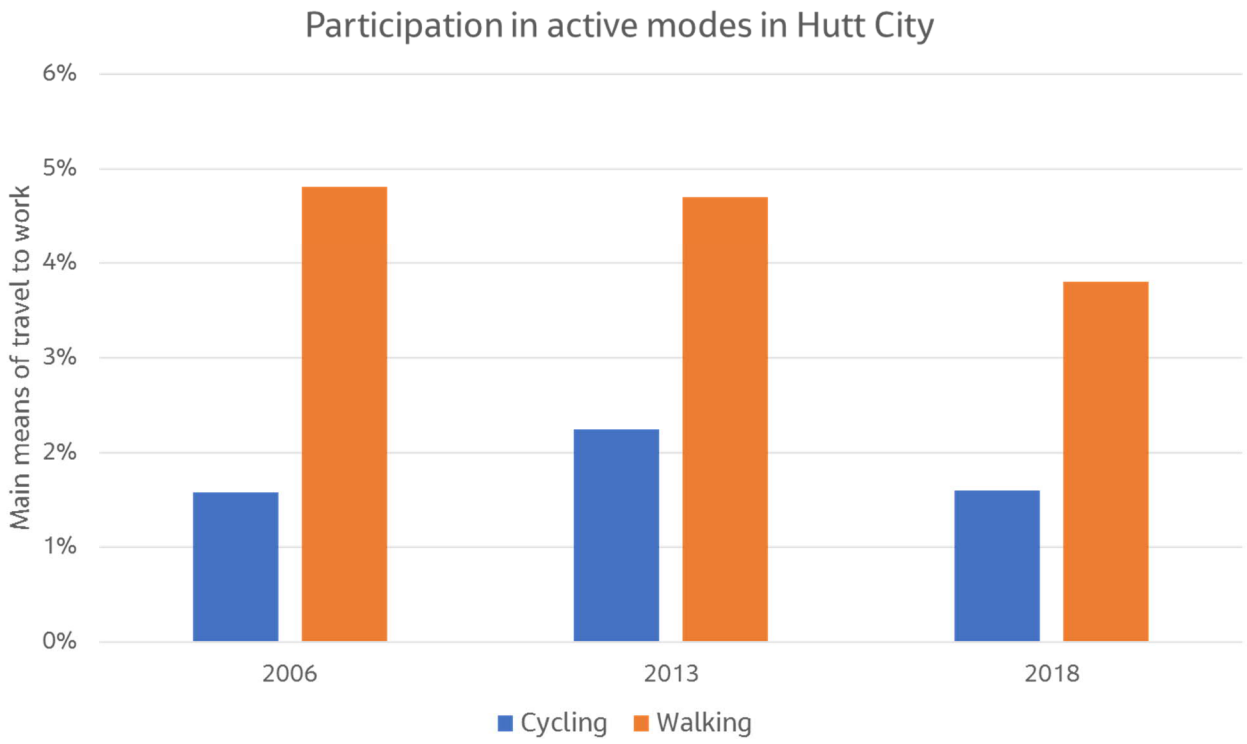


Figure 3-1: Percentage of Hutt City residents who used cycling or walking as their main means of transport to work on Census day (Source: NZ Census)

A recent survey into the attitudes and perceptions of cycling and walking found support for investment in cycling from respondents from Hutt City[5]. This is because 66% of respondents said that cycling is a great way to get around town and 67% of respondents supported investing in cycle lanes because it gives people more travel options (Table 3-1). However only 11% of respondents said that cyclists are sufficiently separated from traffic and only 30% of respondents said that they are satisfied with the availability of cycle paths/lanes. Most respondents from Hutt City were not satisfied with the level of service currently being provided to cyclists in their community.

Survey questions	Respondents from Hutt City
It is becoming more popular for people to use a bicycle to get to work, study or to the shops	52%
Investing in cycle lanes is important because it gives people more travel options	67%
The more people using bicycles, the better it is for drivers	40%
Cycling is a great way to get around town easily and efficiently	66%
My town has a well - connected cycle network	28%
Cyclists are sufficiently separated from traffic	11%
I'm satisfied with the availability of cycle paths/lanes in my community	30%
There are more/better cycle paths/lanes in my area	18%

Table 3-1: Responses to the attitudes and perceptions of cycling and walking survey for residents of Hutt City

[5] Waka Kotahi (2018). *Understanding attitudes and perceptions of Cycling and Walking.* https://www.nzta.govt.nz/assets/Walking-Cycling-and-Public-Transport/docs/NZTA-Attitudes-to-cycling-and-walking-final-report-2018.pdf

For cycling and micromobility to be an attractive mode of transport for the majority of people a road must either have low traffic volumes and speeds or provide seperation from traffic[6]. In order to understand which roads are attractive to people of all abilities and which roads appeal only to confident cyclists; the cycleways and main roads in Hutt City were mapped (Table 3-4). The map below shows the lack of attractive cycling connections to Hutt CBD which is a main employment, retail and civic destination. There is also a lack of connections to suburban areas including Stokes Valley, Naenae and Petone.

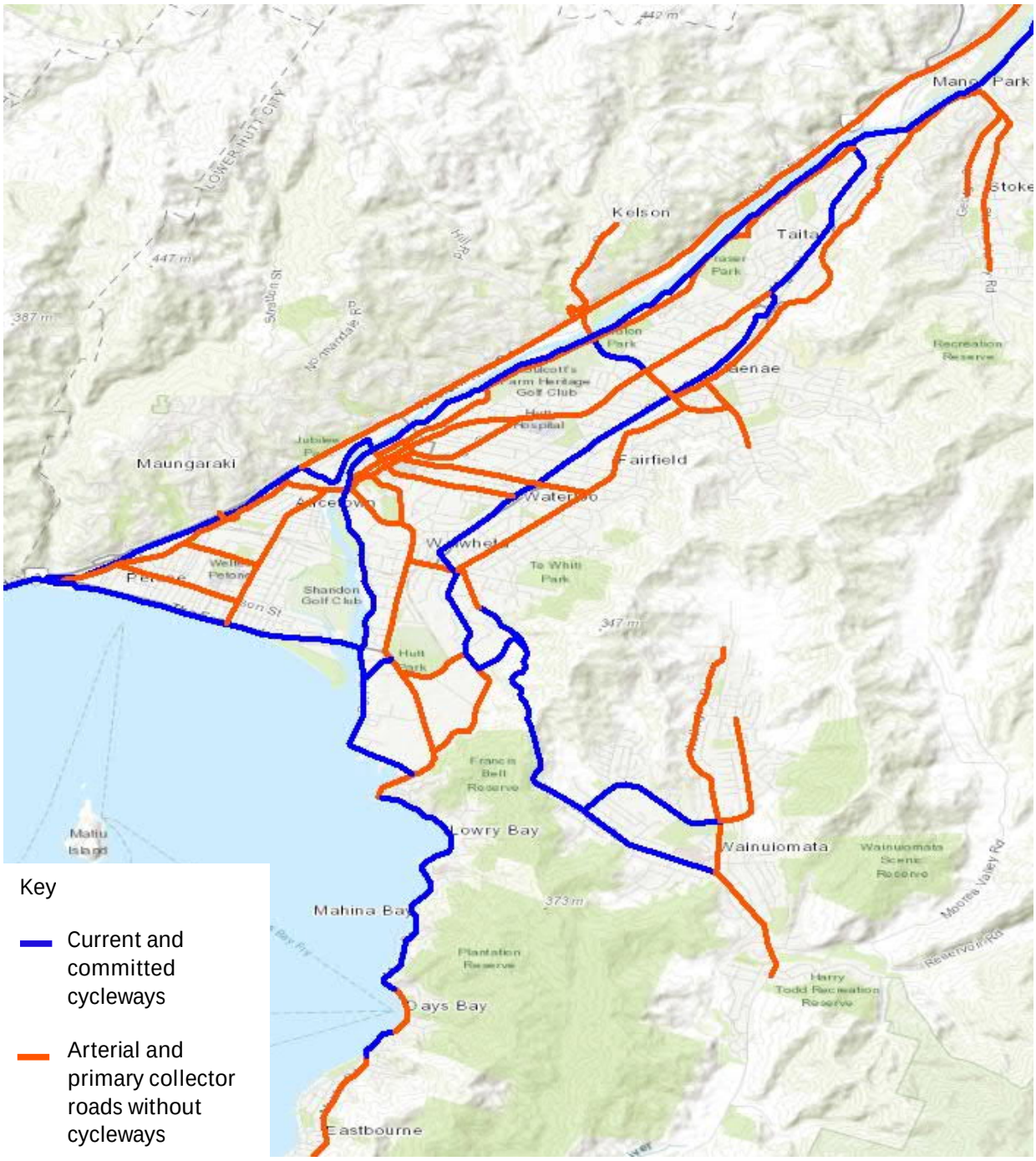


Figure 3-2: Map showing current/ committed cycleways and arterial/ primary collector roads without cycleways

[6] People who cycle, Cycling Network Guidance, Waka Kotahi https://www.nzta.govt.nz/walking-cycling-and-public-transport/cycling/cycling-standards-and-guidance/cycling-network-guidance/cycle-network-and-route-planning-guide/principles/people-who-cycle/

Table 3-2 below shows the traffic volume and speed for roads which serve key destinations in Hutt City that do not have current or planning cycling infrastructure. These roads have traffic volumes and speeds which exceed the threshold neighbourhood greenways of no higher than 1,500 to 2,000 vehicles per day and vehicle speeds no higher than 30 km/hr[7]. Neighbourhood greenway is the term for low speed and low volume roads where cyclists and vehicles are able to safely share the road.

Road	Classification	Approx. Traffic Volume	Traffic Speed
High Street	Arterial	16,000 vpd	50 km/hr
Waterloo Road	Arterial	8,000 vpd	50 km/hr
Cuba Street	Arterial	6,000 vpd	50 km/hr
Hutt Road	Arterial	16,000 vpd	50 km/hr
Randwick Road	Arterial	16,000 vpd	50 km/hr
Waiwhetu Road	Arterial	8,500 vpd	50 km/hr
Eastern Hutt Road	Primary collector	7,000 vpd	50 km/hr
Harcourt Werry Drive	Primary collector	6,000 vpd	70 km/hr
Main Road	Arterial	9,000 vpd	50 km/hr

Table 3-2: Traffic volume and speeds on key roads without cycling infrastructure (Source: One Road Network Classification)

3.3.2 A low and declining number of children are cycling to school

Information on the use of active transport to and from school for children aged 5 to 14 was obtained from Massey University Environmental Health Indicators. Figure 3-3 shows the percentage of children which regularly use active transport to and from school by District Health Boards (DHB) (Hutt Valley includes both Hutt City and Upper Hutt). Hutt Valley DHB had the third lowest proportion of students using active modes to school in New Zealand with 34%. This is much lower than Capital & Coast DHB (Wellington, Porirua and Kapiti areas) which had 58% of students using active modes to and from school. This evidence indicates that there is the opportunity to encourage more students to use active modes to school in Hutt City which will help to improve health outcomes.

[7] Waka Kotahi. *Cycling network guidance, Neighbourhood greenways*. Retrieved from https://www.nzta.govt.nz/walking-cycling-and-public-transport/cycling/cycling-standards-and-guidance/cycling-network-guidance/designing-a-cycle-facility/between-intersections/neighbourhood-greenways/

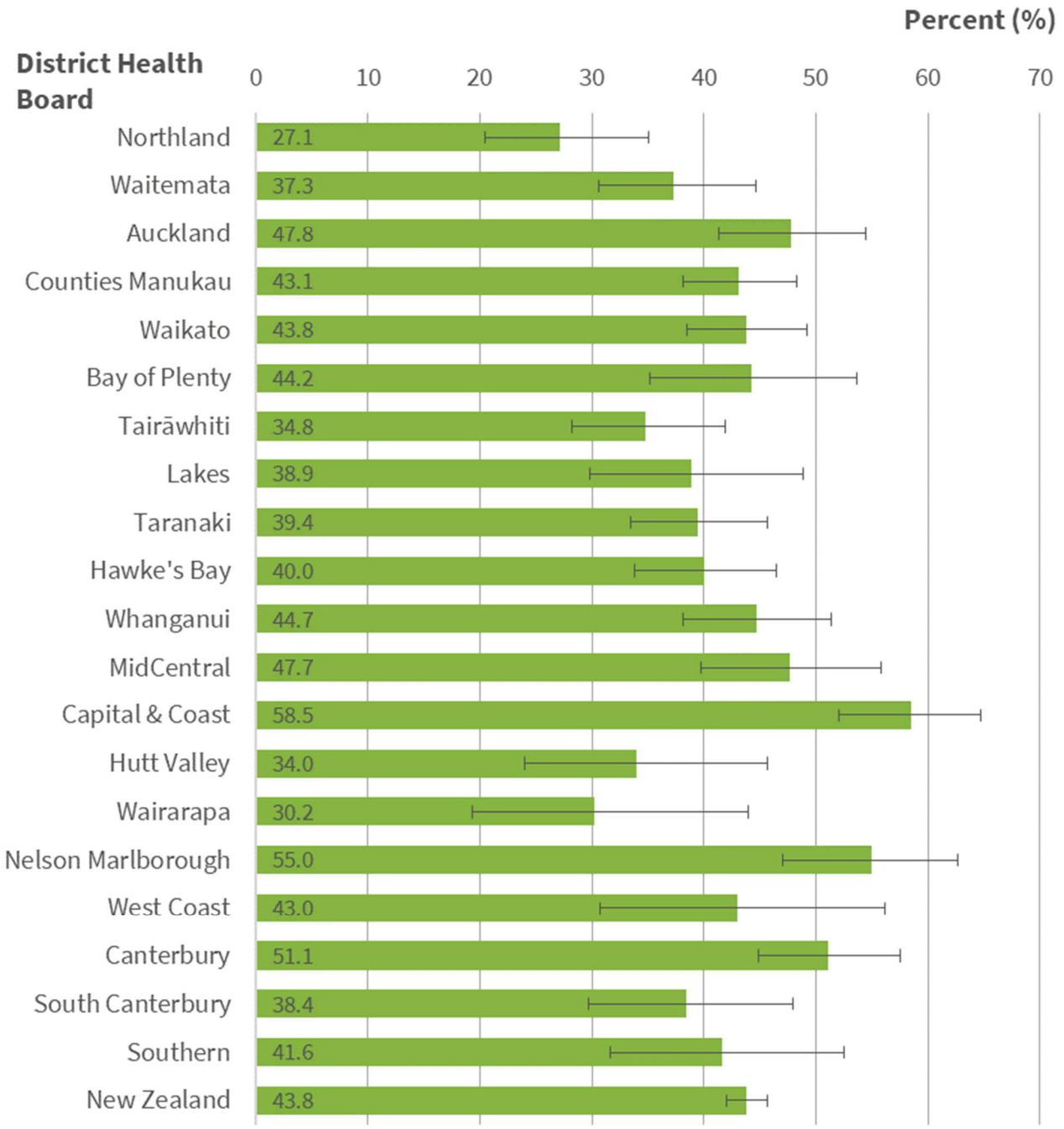


Figure 3-3: Proportion of students aged 5 to 14 that regularly use active transport to and from school by DHB (Source: Massey University Environmental Health Indicators)

Part of the reason that the proportion of students who cycle to school has been declining is increasing traffic volumes around schools. This is because students and parents feel less confident using cycling as a mode of transport when traffic volumes are high. The graph below shows modelled traffic volumes on key arterial roads in Hutt City for the base year 2017 and forecast year 2027. This shows that traffic volumes across key arterial roads is forecast to increase in the future which is a trend that discourages cycling to schools.

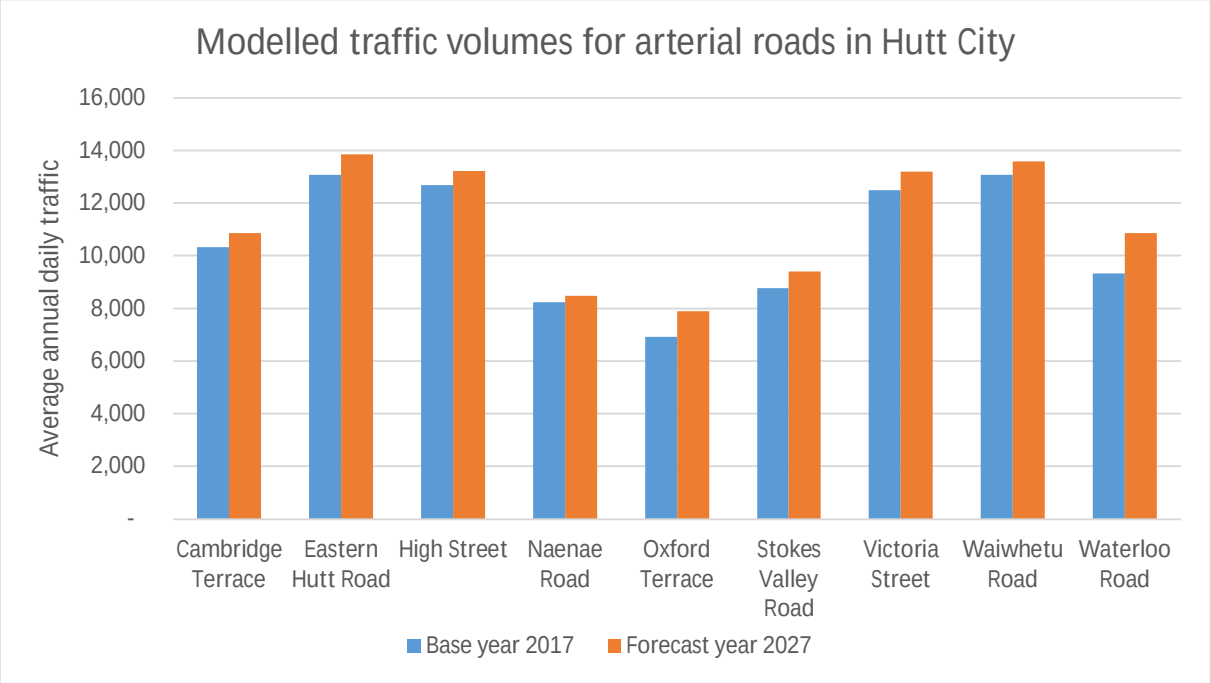


Figure 3-4: Modelled traffic volumes for arterial roads in Hutt City. Source: Hutt City Aimsun Model

3.3.3 Cycling infrastructure is unsafe

Figure 3-5 shows the recorded crashes involving cyclists in Hutt City for the three years prior to the Strategic Case and three years after. The graph shows an increase in crashes involving cyclists with 8 serious crashes between 2014 and 2016 compared to 13 serious crashes between 2017 and 2019. The Road to Zero strategy has a vision that no one is killed or seriously injured in road crashes and sets a target to reduce deaths and serious injuries by 40 percent over the next 10 years[8].

[8] Road to Zero https://www.transport.govt.nz/area-of-interest/safety/road-to-zero/

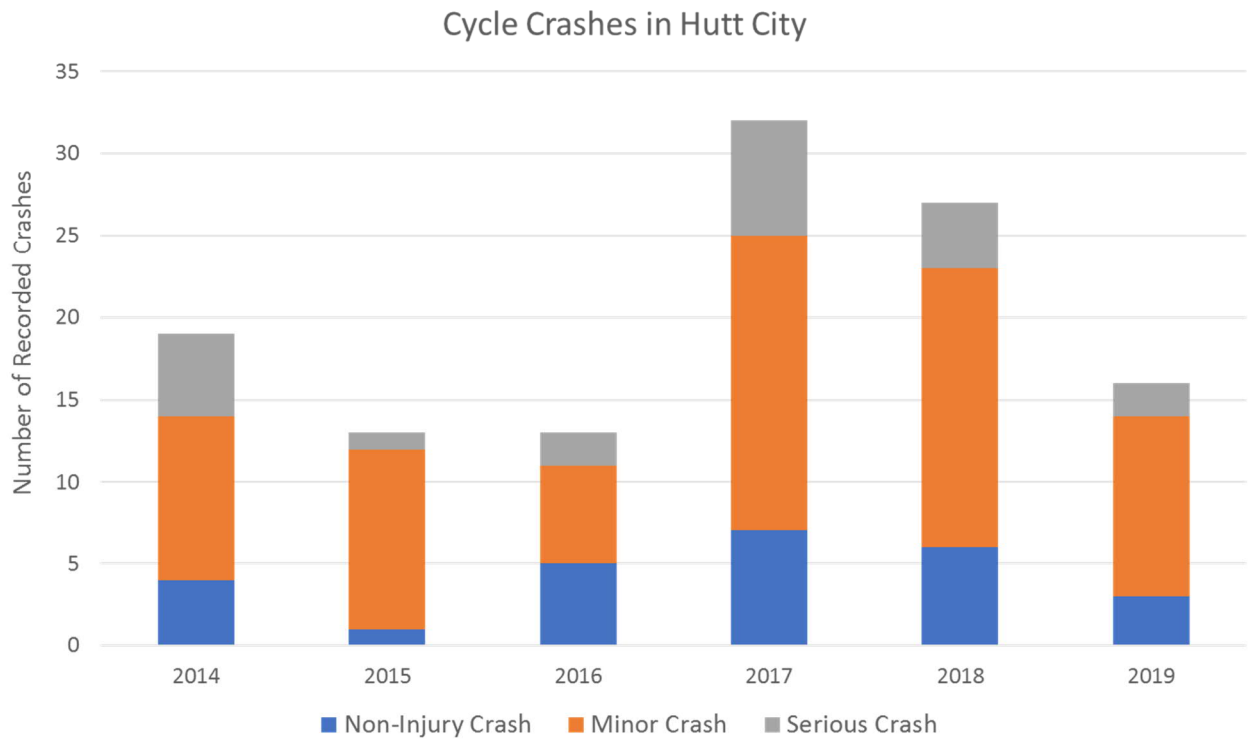


Figure 3-5: Recorded crashes involving cyclists in Hutt City (Source: CAS)

With regards to crash location 66% of crashes occurred at intersections whilst 33% of crashes occurred at mid-block locations. There is a cluster of crashes recorded in Hutt CBD, The Esplanade, High Street and Hutt Road as shown in Figure 3-6 on the following page.

The majority of crashes that occurred at intersections were due to motor vehicles failing to give way or turning across the path of bicycles. Of the intersection crashes, 48 crashes occurred at T-junctions or crossroads whilst 20 crashes occurred at roundabouts. Crashes occurring at mid-block locations were due to a variety of factors including drivers failing to see cyclists when existing and entering driveways and drivers failing to give cyclists sufficient room when overtaking.

During the same time period there was one recorded minor injury crash involving micromobility which occurred at the corner of Kings Crescent and Pretoria Street. However, it is understood that there is a general underreporting of crashes involving micromobility users.

The implications of this evidence is that safety improvements at the intersections is important for reducing cycle crash rate because 2 out of 3 recorded crashes occurred at intersections. Also that improving safety for people using bicycles on CBD streets, The Esplanade, High Street and Hutt Road is important to address the cluster of recorded crashes that have occurred at these locations.

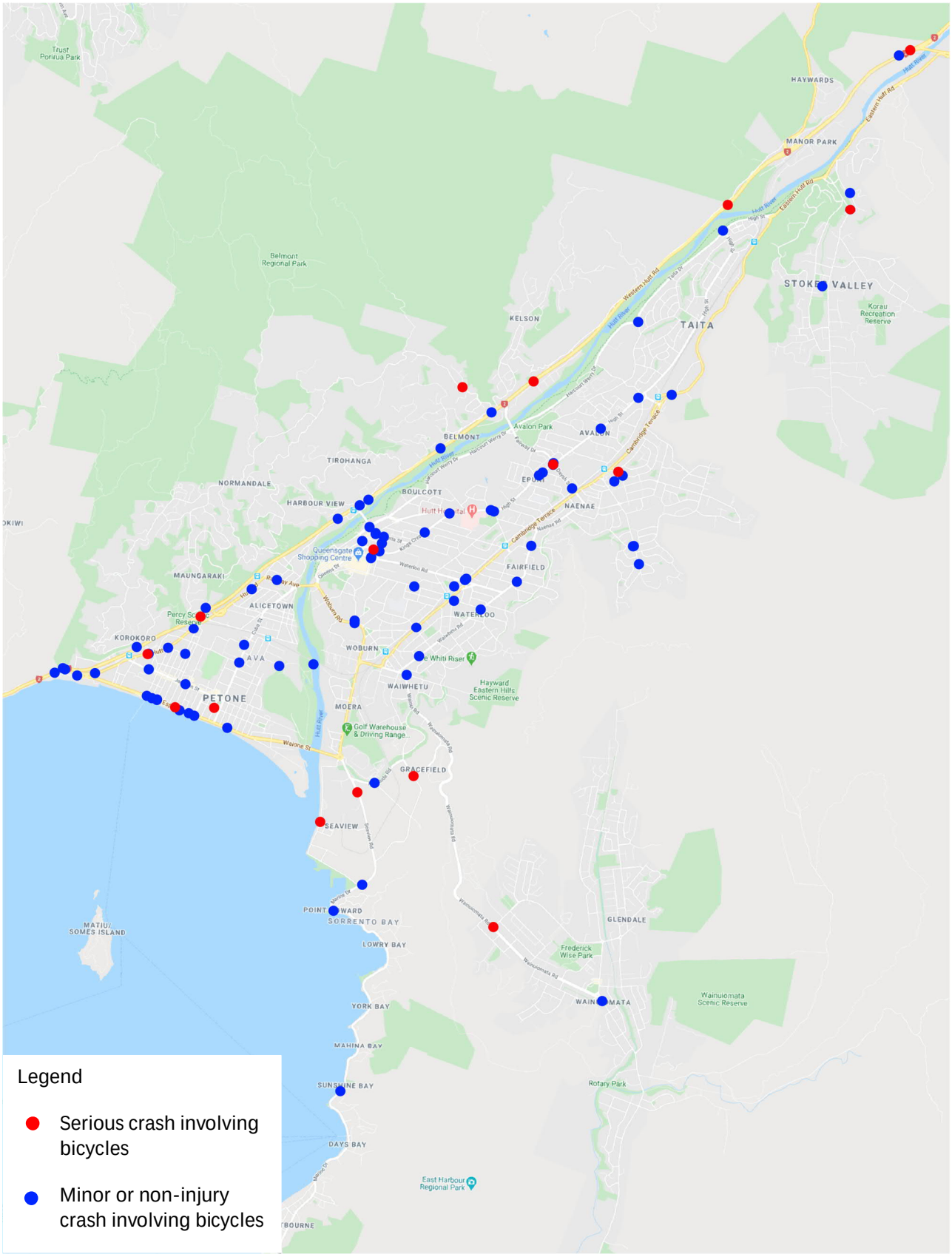
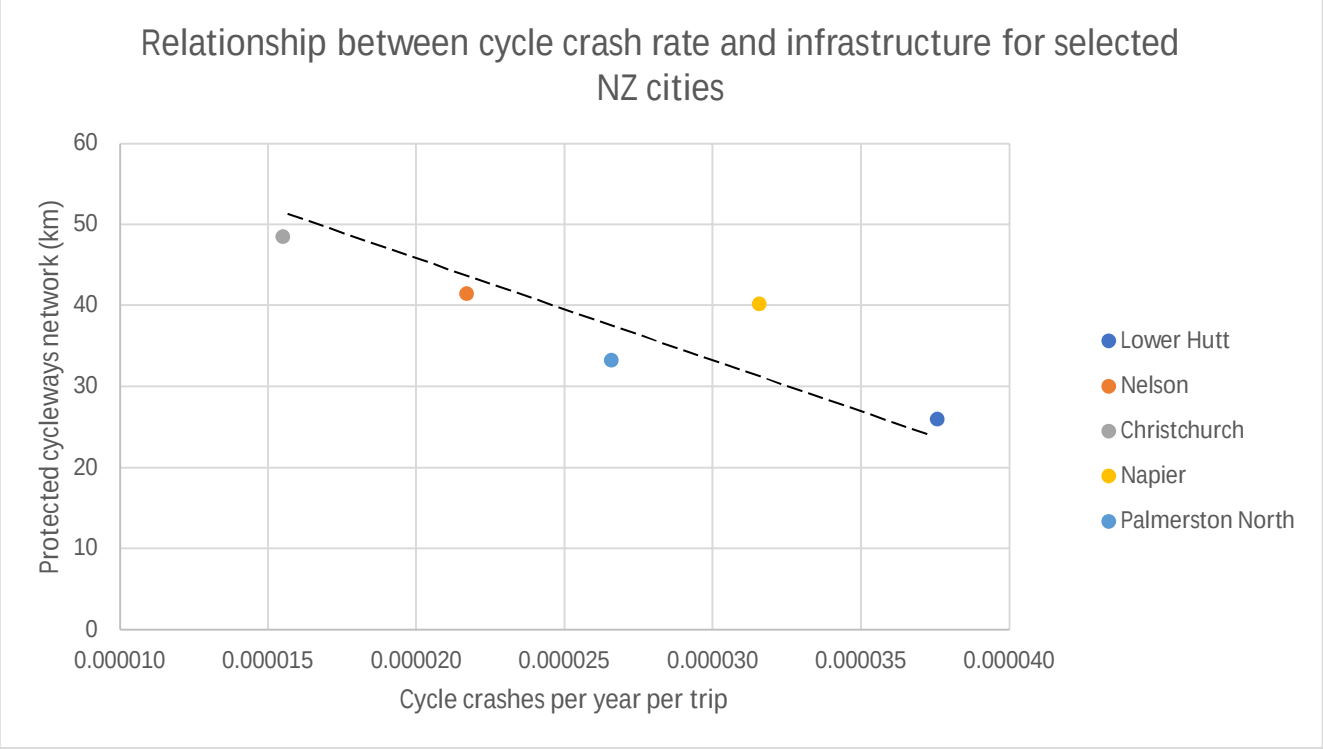


Figure 3-6: Reported crashes involving bicycles (2015-2019)

To answer the question whether improved cycling infrastructure results in a lower cycling crash rate a comparison of New Zealand cities which have different levels of cycling infrastructure was undertaken. The analysis compares the cycle crash rate which is measured by the number of recorded cycle crashes in 2018 (all severities) divided by the total number of cycling trips. The total number of cycle trips for each city was estimated using 2018 NZ census data to determine the number of cycle trips to work and school and times this by two (because people generally make return trips by the same mode) and also times this by the number of weekdays in a year. This was then compared to the length of the cycleways network in each city (shared paths, on road cycleways and off-road cycleways). The cycleways network was calculated using published network maps for each council and then measuring the network using Google Maps.

The results show a clear correlation between cycleways network length and cycle crash rate with cities with a larger network having the lowest crash rate. Christchurch which has the largest protected cycleways network at 48.5km also has the lowest cycle crash rate at 0.000015 cycle crashes per year per trip. This compares to Lower Hutt which has the smallest protected cycleways network of the cities studied and has the highest crash rate at 0.000038 cycle crashes per year per trip. The cycle crash rate per trip for Christchurch was less than half of that of Lower Hutt which represents a significant improvement in cycle safety.

Please note that not all variables have been controlled for this comparison which include traffic volumes, traffic speeds, intersection frequency and driveway frequency.



3.3.4 Benefits realised to date

Te Hikoi Ararewa (Wainuiomata Shared Path) was officially opened in June 2019. The shared path provides a 4m wide off-road sealed path with roadside barriers to provide separation between the shared path and the traffic lanes. Te Hikoi Ararewa provides a safe environment for pedestrians and cyclists on a high-speed road, improved connections between Lower Hutt and Wainuiomata and improved access to mountain biking and walking trails. Table 3-3 and Table 3-4 below compared the pre and post construction active mode usage on Wainuiomata Hill for both the Hutt side and Wainuiomata side.

Hutt side

	Pre construction	Post construction	Change
Daily average cyclists	24	69	45
Daily average pedestrians	25	124	99

Table 3-3: Comparison of active mode usage on Hutt side before and after Te Hikoi Ararewa

Wainuiomata side

	Pre construction	Post construction	Change
Daily average cyclists	7	39	32
Daily average pedestrians	25	300	275

Table 3-4: Comparison of active mode usage on Wainuiomata side before and after Te Hikoi Ararewa

The pre and post construction comparison shows a significant increase in cycling and walking as a result of the Te Hikoi Ararewa project. For the Hutt side usage increased by an average of 45 cyclists and 99 pedestrians per day. On the Wainuiomata side usage increased by an average of 32 cyclists and 275 pedestrians per day.

3.3.5 Overall findings

It was found that the problems identified in the Strategic Case are still relevant in 2020 and the updated evidence case indicates that these problems are still present. There is still more work to be done to achieve the strategic objectives of increasing cycling mode share, increasing active mode use to schools and improving safety for vulnerable road users. Therefore, it is considered that the Strategic Case is still fit for purpose and will be used to inform the following stages of this SSBC.

3.4 Investment objectives

In order to measure progress towards the benefit statements the following investment objectives have been developed as part of the SSBC. These investment objectives have been discussed with the Partnership Investments team at Waka Kotahi and are consistent with the targets contained in the Wellington Regional Mode Shift Plan.

Investment objective 1: Increase the number of Hutt City residents that use bikes and micromobility as a mode of transport

Measures:

- Census: increasing the number of Hutt City residents that cycle to work and study from 1.6% in 2018 to 5% in the 2038 as measured by NZ Census
- Network coverage: increasing the length of the Hutt City cycling network from 26km in 2020 to 50km by 2036[9]

Investment objective 2: Increase the potential for Hutt City school students to use active transport to and from school[10]

Measures:

- Perception survey: increasing the proportion of Hutt City residents that perceive children using active transport to and from school as being safe or very safe from 40% in 2019 to 55% by 2036 as measured by the Greater Wellington Transport Perceptions Survey
- Behaviour survey: increasing the proportion of 5 to 14 year old Hutt City students who use active transport to and from school from 34% to 45% by 2036 as measured by New Zealand Health Survey

Investment objective 3: Improve safety for people who use bikes and micromobility in Hutt City

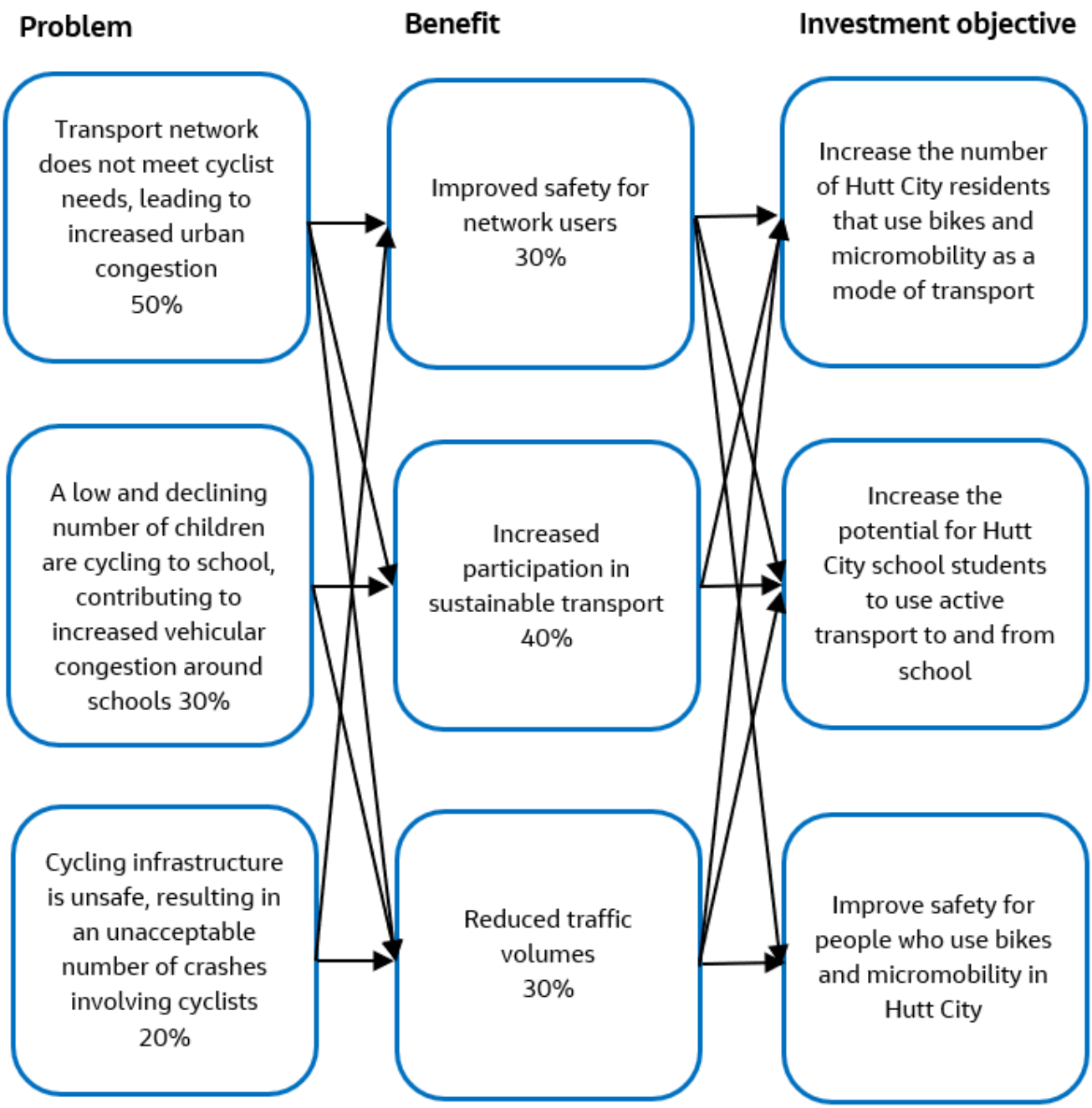
Measures:

- Recorded crashes: reducing DSI crashes per cycling trip in Hutt City by 40% by 2036 as recorded in CAS, 16 DSI cycle crashes reported in previous five-year period
- Risk rating: improving the rating of main cycling routes in Hutt City to a quality of service rating 2 (suitable for a wide range of users) by 2036 as defined by Auckland Transport's Quality of service evaluation tool for cycle facilities

[9] 14km of cycleways have committed funding

[10] It is recognised that there is some overlap between investment objective 2 and 3 because a key factor in students using active modes to school is parents perception of how safe the route to school is

The investment logic map below shows the connections between the problem statements, benefits and investment objectives.



4. Strategic Alignment

This section describes how the investment in Hutt City cycling and micromobility and the identified investment problems and benefits align with local and national strategies.

4.1 Ministry of Transport

At the time of writing this report the Ministry of Transport had released the draft Government Policy Statement on Land Transport (GPS) 2021/22 for public consultation. However, the 2018/19 GPS was still in effect until 1 July 2021. Therefore, an overview of both the 2018/19 and 2021/22 is provided below with alignment between the investment objectives and both GPS being assessed.

4.1.1 2018/19 Government Policy Statement

The four strategic priorities to improve the performance of the land transport system are safety, access, environment and value for money (Figure 4-1). Safety reflects an increase in ambition for delivering a land transport system that is free of death and serious injury. For access there is a focus on supporting a mode shift for trips in urban areas from private vehicles to more efficient, low cost modes like walking, cycling and public transport. Environment prioritises reducing greenhouse gas emissions from transport and supports a mode shift to lower emission forms of transport.

Figure 4-1: Strategic direction of the GPS 2018/19 (source: Ministry of Transport)

SSBC alignment with GPS 2018/19

The investment objectives for the Hutt City Cycling and Micromobility Business Case have a strong alignment with the 2018/19 GPS. This is because investment benefit 1, improved safety for network users, reflects the safety priority in the GPS. People using bikes and micromobility are over represented in injury crashes in Hutt City and therefore increased investment in shared paths and cycles will improve safety outcomes for these road users. Furthermore, investment benefit 2, increased participation in sustainable transport, aligns strongly with the access and environment priorities in the GPS. This is because increased participation in sustainable modes increases access to economic and social opportunities in Hutt City whilst also reducing greenhouse gas emissions.

4.1.2 2021/22 Government Policy Statement

The four strategic priorities for land transport investment are safety, better travel options, climate change and improved freight connections (Figure 4-2). A change from the 2018/19 GPS is that value for money is expressed as a principle that applies to all investment rather than a strategic priority. Other changes are the inclusion of improving freight connections as a strategic priority and refocusing the better travel options and climate change strategic priorities.

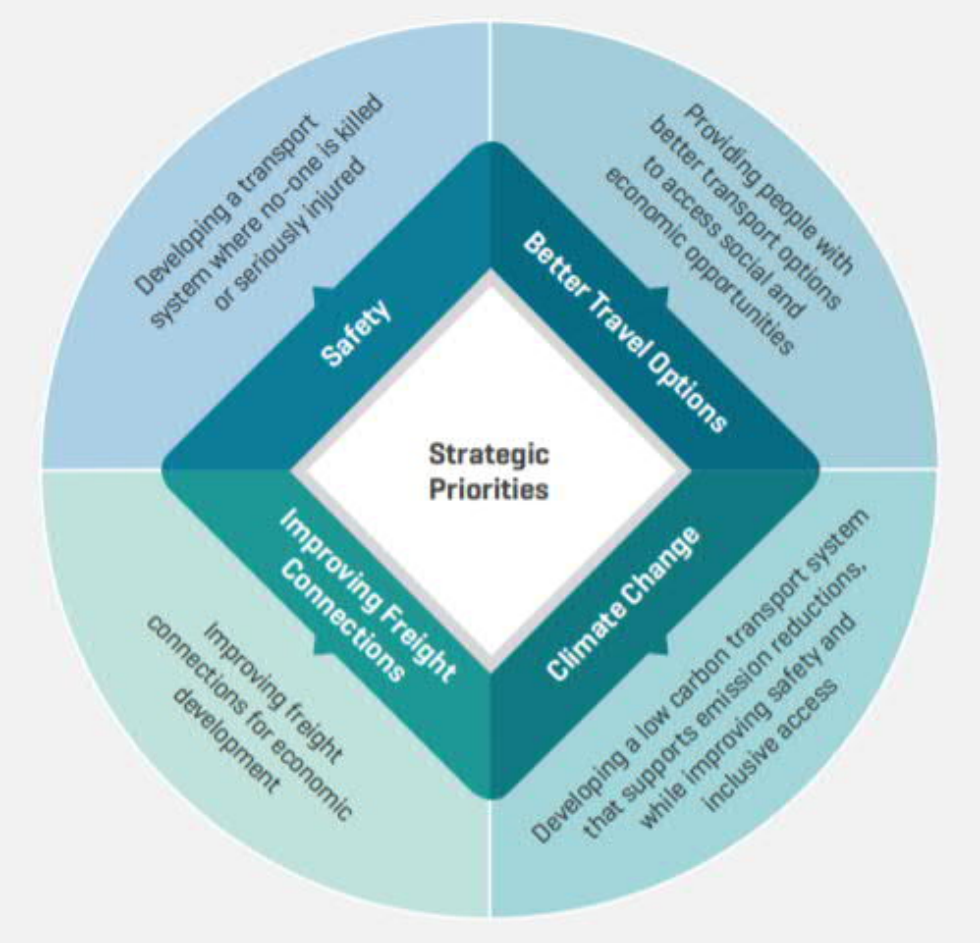


Figure 4-2: Strategic direction of the GPS 2021/22 (source: Ministry of Transport)

SSBC alignment with GPS 2021/22

The Hutt City Cycling and Micromobility Business Case also has a strong alignment with the 2021/22 GPS. This is because investment benefit 1, improved safety for network users, aligns closely with the GPS goal of developing a transport network where no-one is killed or seriously injured. Investment objective 2, increased participation in sustainable transport, will give people better travel options to access jobs, education, healthcare and other destinations in Hutt City. Investment benefit 3, reduced traffic volumes, will help to reduce transport emissions by replacing vehicle trips which run on fuel with active mode trips or electric scooter trips. Furthermore, the outcomes of the SSBC will also help to improve freight connectivity to key freight hubs including Seaview/ Gracefield, Naenae and Taita by encouraging a shift towards active and sustainable modes which in turn reduces traffic volumes.

4.1.3 Road to Zero 2020-2030

Road to Zero is New Zealand road safety strategy sets the guiding principles for how the road network is designed and how road safety decisions are made. The strategy has the vision of a New Zealand where no one is killed or seriously injured in road crashes. One of the seven guiding principles of the strategy is that we design for human vulnerability. People using bikes and micromobility are less protected in the event of a crash than people in vehicles and therefore we need to design for lower speeds where vulnerable road users may be present. Therefore, a focus area of the Road to Zero strategy is to invest in infrastructure safety treatments that are proven to save lives which includes traffic calming, separated walking and cycling facilities or shared-use paths.

One of the key investment benefits of this SSBC is improved safety for network users which aligns well with the Road to Zero strategy. The proposed investment in a connected network of safe cycleways and supporting cycle skills training will help to address the known safety issue for people using bikes.

4.1.4 Accessible Streets Public Consultation

E-scooters are classified as low-powered vehicles provided that the maximum power output does not exceed 300 watts[11]. This means that e-scooters are not classified as a motor vehicle and can be used with registration or a driver's licence. Other micromobility devices including electric skateboards and electric unicycles are classified as vehicles. However, these devices have difficulties in meeting vehicle safety standards which means that they cannot be operated on the road.

Currently e-scooters can be used on the footpath and on the road but cannot be used in cycle lanes which are designed for the sole use of cyclists. As part of the Accessible Streets Public Consultation document one of the proposed changes includes allowing e-scooters to use cycle lanes and cycle path[12]. Another proposed rule change for e-scooters as part of Accessible Streets is a 15 km/hr speed limit when using the device on a footpath. At the time of writing this SSBC Accessible Streets is a consultation document with any final rule changes expected in late 2020.

For the SSBC the Accessible Streets Public Consultation means that micromobility should be included as potential users of cycleways and bike lanes.

4.2 Waka Kotahi NZ Transport Agency

4.2.1 Cycling Safety Action Plan

In December 2014, the Cycling Safety Panel published its recommendations for making cycling safer and more attractive in the Cycling Safety Action Plan. The panel made 35 recommendations, with significant progress for

[11] Low-powered vehicles, Waka Kotahi, Retrieved from https://www.nzta.govt.nz/vehicles/vehicle-types/low-powered-vehicles/
[12] Accessible Streets Public Consultation, Ministry of Transport, 2020, Retrieved from https://www.transport.govt.nz/multi-modal/keystrategiesandplans/road-safety-strategy/accessible-streets/

many recommendations having been made through the National Cycling Programme. The 2018 final progress report outlines 10 key priority areas which are remaining actions to be covered.

These key priority areas include:

- Safer speeds for safer cycling;
- Completing networks for cycling;
- Infrastructure solutions for people on bikes and driving heavy vehicles; and
- Expanding BikeReady and Bikes in Schools programmes.

These key priority areas helped to inform the recommend programme of this SSBC which includes both infrastructure and supporting measures both of which will improve cycling safety in Hutt City.

4.2.2 Cycling Network Guidance

The Cycling Network Guidance sets out a principles-based process for deciding what cycling provision is desirable and provides best-practice guidance for the design of cycleways. The process to planning a cycling network includes the following steps:

- Assessing cycling demand and identifying cycle route options;
- Considering different ways to satisfy the needs of the different people who will cycle;
- Evaluating cycle route options and facility types; and
- Prioritising the implementation of the cycle network plan.

The Cycling Network Guidance has informed the process followed as part of this SSBC and has been referred to throughout the programme development.

4.2.3 Amended Statement of Intent 2018-22

Waka Kotahi produces a State of Intent every three years that sets out its strategic direction to implement the GPS on Land Transport. The State of Intent contains eight position statements which describe the outcomes which Waka Kotahi seeks to achieve. Two position statements which are inclusive access and liveable communities have investment in walking and cycling as contributing to deliver on the position statements. The following is Waka Kotahi's position and targets for inclusive access and liveable communities;

Inclusive access: Everyone should have fair and equitable access to the transport system

- Target: Increased mode share of public transport and active modes in high-growth urban areas; and

Liveable communities: We will partner to efficiently combine planning and investment for transport and land use to contribute to more vibrant, interactive communities

- Target: Increased space in our cities dedicated to people

The Hutt City Cycling and Micromobility SSBC would help to achieve the inclusive access and liveable communities targets by increasing cycling mode share and providing more space for sustainable modes.

4.2.4 Arataki 2019

Arataki is Waka Kotahi's 10-year view of what is needed to deliver on the government's current priorities and long-term objectives for the land transport system. Five step changes were identified which are areas where there is the need for change over and above maintain base levels of service. These step changes are;

1) Improve urban form: provide connections between people, product and places
2) Transform urban mobility: shift from a reliance on single occupancy vehicles to more sustainable transport solutions
3) Significantly reduce harms: transition to a transport system that reduces deaths and serious injuries
4) Tackle climate change: support the transition to a low-emissions economy and enhance resilience to the impacts of climate change
5) Support regional development: enable regional communities to thrive socially and economically

For the Wellington region improving urban form, transforming urban mobility and tackling climate change were identified as important focus areas (Figure 4-3).

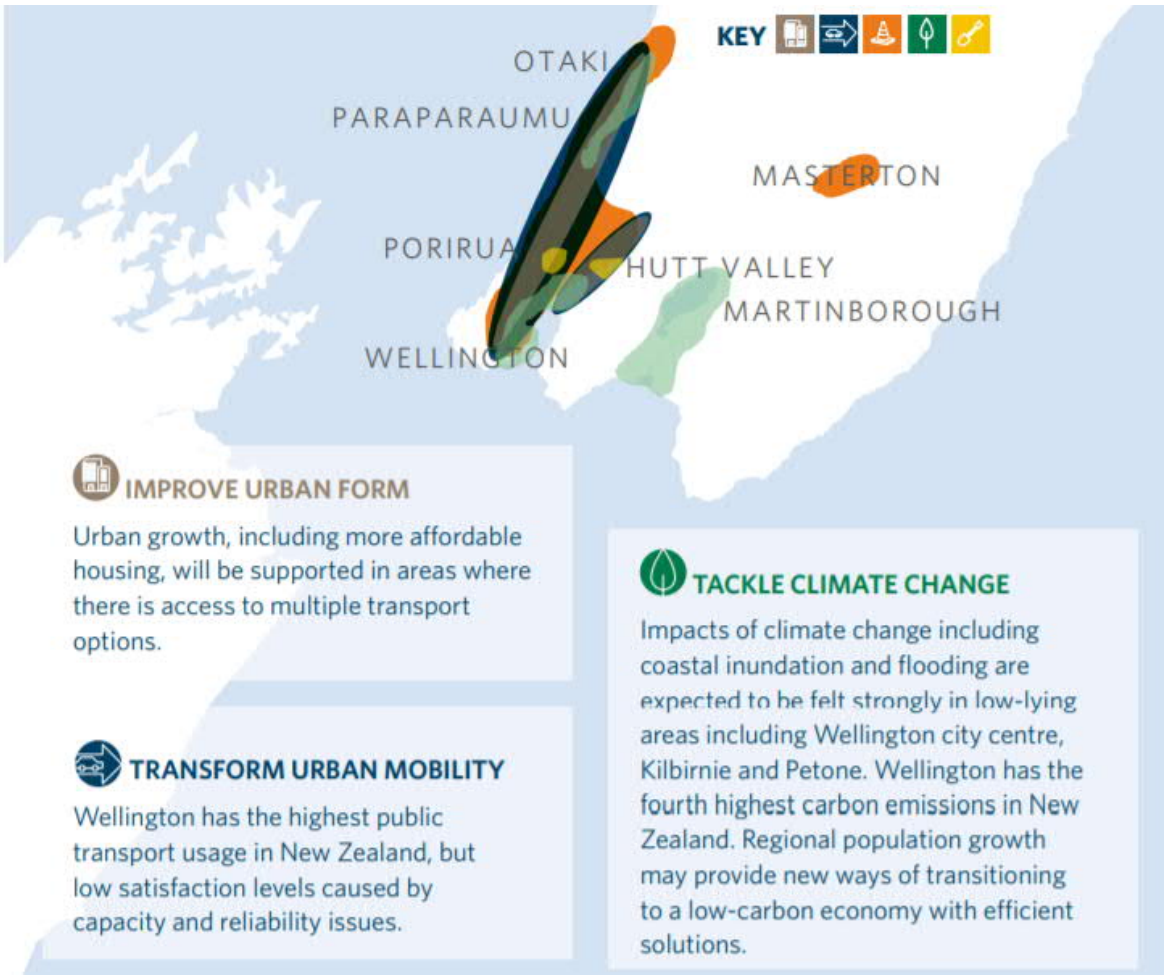


Figure 4-3: Wellington highly important focus areas (source: Waka Kotahi)

This SSBC will help to implement the three step changes identified for the Wellington Region because of the following reasons:

- Cycling and micromobility are space efficient modes (e.g. requires less space for parking than cars) which can better serve the new housing planned for parts of Hutt City;
- Parts of Hutt City are outside of a comfortable walking distance to train stations or bus hubs; cycling and micromobility can increase access to public transport by overcoming the first/ last mile problem; and
- Cycling and micromobility are zero/ low carbon modes of transport which can help Hutt City transition to a low emission transport system.

4.2.5 Wellington mode shift plan

The Wellington mode shift plans sets out how the region will make process over the short-medium term to increase the share of travel by public transport, walking and cycling. The mode shift plan outlines focus areas to achieve faster mode shift based on three levers available to Waka Kotahi and partner organisations. There levers are shaping urban form, making shared and active modes more attractive and influencing travel demand and transport choice.

For Hutt City the focus areas include progressing RiverLink, Te Area Tupua, continue to expand the cycling network and improved multi-modal access to stations. This SSBC complements these priorities by connecting the major cycleways and by expanding the cycleway network to serve more areas of Hutt City. Further investment in safe infrastructure will also help to encourage walking and cycling to schools and rail stations. This SSBC would also support travel demand management by including investment in non infrastructure measures such as bike parking, cycle skills training etc which are tools to influence travel choices.

4.3 Greater Wellington Regional Council

The Wellington Regional Land Transport Plan (RLTP) 2015 sets out the strategic direction for land transport in the Wellington region over the next 10 to 30 years. The strategic 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.

To achieve this vision the RLTP has 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
- An attractive and safe walking and cycling network
- A well planned, connected and integrated transport network
- An efficient and optimised transport system that minimises the impact on the environment

In 2018 Greater Wellington completed a mid-term review of the RLTP. The review concluded that the strategic direction of the RLTP 2015 remains fit for purpose and identified public transport, resilience and active modes as key areas of focus until the 2021 RLTP is published.

Further investment in cycling and micromobility within Hutt City will help to achieve the regional strategic objectives of providing a safer transport network and an attractive cycling network.

4.4 Hutt City Council

The Hutt City Council plans and strategies that are particularly relevant to the development of Hutt City Cycling and Micromobility business case are:

- Urban Growth Strategy 2012-2032
- Petone 2040
- Walk and Cycle the Hutt 2014-2019
- Central City Transformation Plan 2019

4.4.1 Urban Growth Strategy 2012-2032

The strategy focuses on how much the city will need to grow in the future, where new homes and business will be located and what will be done to support and encourage this development. The Urban Growth Strategy has a target population growth of at least 110,000 people live in Hutt City by 2032 that would require an increase of at least 6,000 homes. The increase in housing is planned to be accommodated partly through greenfield development in the Upper Fitzherbert area of Wainuiomata and Upper Kelson area. Also, through intensification with high-rise apartments planned for the CBD and low-rise apartments provided for in pars of Eastbourne, Petone, Waterloo shops and the periphery of the CBD.

This SSBC considers the growth areas identified in the Urban Growth Strategy when developing the proposed Hutt City cycling and micromobility network.

4.4.2 Petone 2040

Petone 2040 is a strategic spatial plan for the Petone and Moera areas which coordinates development and urban design over the next 20 years. The spatial plan identifies seven areas within Petone and Moera for potential for housing intensification with apartments and townhouses being envisaged in these areas (Figure 4-4). For transport the spatial plan identifies The Esplanade, Hutt Road, Buick Street and Cross Valley Link as new or enhanced pedestrian and cycle routes (Figure 4-5).

Figure 4-4: Potential areas for housing intensification (source: Hutt City Council)

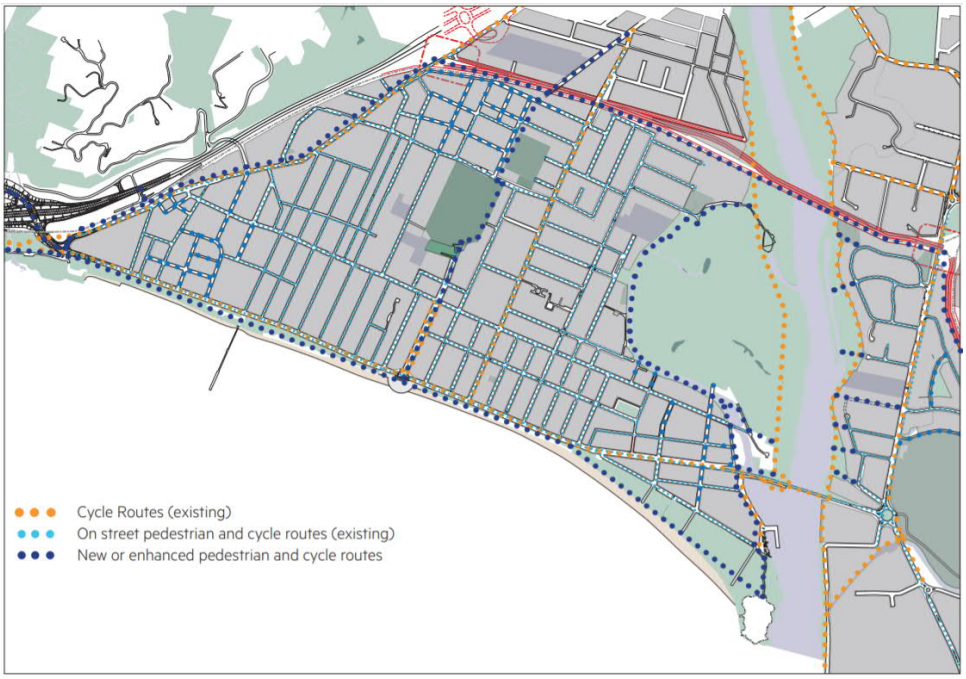


Figure 4-5: Proposed pedestrian and cycle routes (source: Hutt City Council)

This SSBC used the new and enhanced cycle routes identified in the Petone 2040 strategy as the starting point for the proposed cycling and micromobility network in Petone and Moera.

4.4.3 Walk and Cycle the Hutt 2014-2019

The Walk and Cycle the Hutt strategy has the aim of encouraging more people to cycle and walk more often and further, for commuting and recreational purposes. To achieve this the strategy contains the following objectives:

- Prioritise the completion of key walking and cycling routes which are a The Beltway, Eastern Bays shared path and Wainuiomata Hill Road;
- Improve connections between key routes and destinations such as the CBD, railway stations, community facilities, shops and schools;
- Identify and develop safe routes to schools;
- Provide well-designed bicycle parking and end of trip facilities in the city;
- Expand education, training and awareness programmes and events to change attitudes to cycling and walking; and
- Provide way finding information through signage and mapping, particularly for key routes and destinations.

Hutt City has made significant process in achieving the objectives of the Walk and Cycle the Hutt strategy with the key walking and cycling routes being completed or in the design/ consenting stages. This SSBC will help to achieve the other objectives of Walk and Cycle strategy including connections to key destinations, safe routes to schools and end of trip facilities.

4.4.4 Central City Transformation Plan 2019

The Transformation Plan establishes a comprehensive strategy for the coordinated development and design of Lower Hutt's central city and surrounding areas (Figure 4-6). The Transformation Plan contains the following key recommendations:

1. Concentrate retail activity within a smaller area of the central city
2. Encourage multi-level mixed-use development along the River frontage
3. Redevelop surplus commercial land around a consolidated urban core for multi-story apartments
4. Prioritise Queens Drive as the principle north/south route through the central city
5. Introduce new east-west streets and laneways to the street grid to improve access to the River frontage

Figure 4-6: Central City Transformation Plan overview map (source: Hutt City Council)

This SSBC would support the implementation of the Central City Transformation Plan by encouraging residents to access the Central City using sustainable transport modes. This will help to make the Central City a more people focused place because less car trips to the Central City means that road space could be used for other purposes.

4.5 Related Projects

At the time of writing this report there are three other business cases and programmes which interact with the Hutt City Cycling and Micromobility SSBC. The following section describes each of these business cases/ programmes and describes how the strategic outcomes complement the Hutt City Cycling and Micromobility SSBC.

4.5.1 Let's Get Wellington Moving

Let's Get Wellington Moving is a joint initiative between Wellington City Council, Greater Wellington Regional Council and Waka Kotahi. The focus is between Ngauranga Gorge and Miramar which includes the central city, Wellington Hospital and the airport. The long-term programme includes connected cycleways network, high-quality mass rapid transit, improvements at the Basin Reserve and an extra Mt Victoria Tunnel. The programme of early works priorities creating a better environment for people walking and on bikes and making travel by bus through the central city faster and more reliable (Figure 4-7).

Let's Get Wellington Moving will remove barriers for people to cycle from Lower Hutt to Wellington City with improvements for people cycling on Thorndon Quay and the Golden Mile and safer speed limits in the central city. Therefore, Let's Get Wellington Moving is complementary to the Hutt City Cycling and Micromobility SSBC because it will make it significantly safer and more attractive for people to commute to Wellington City by bike.

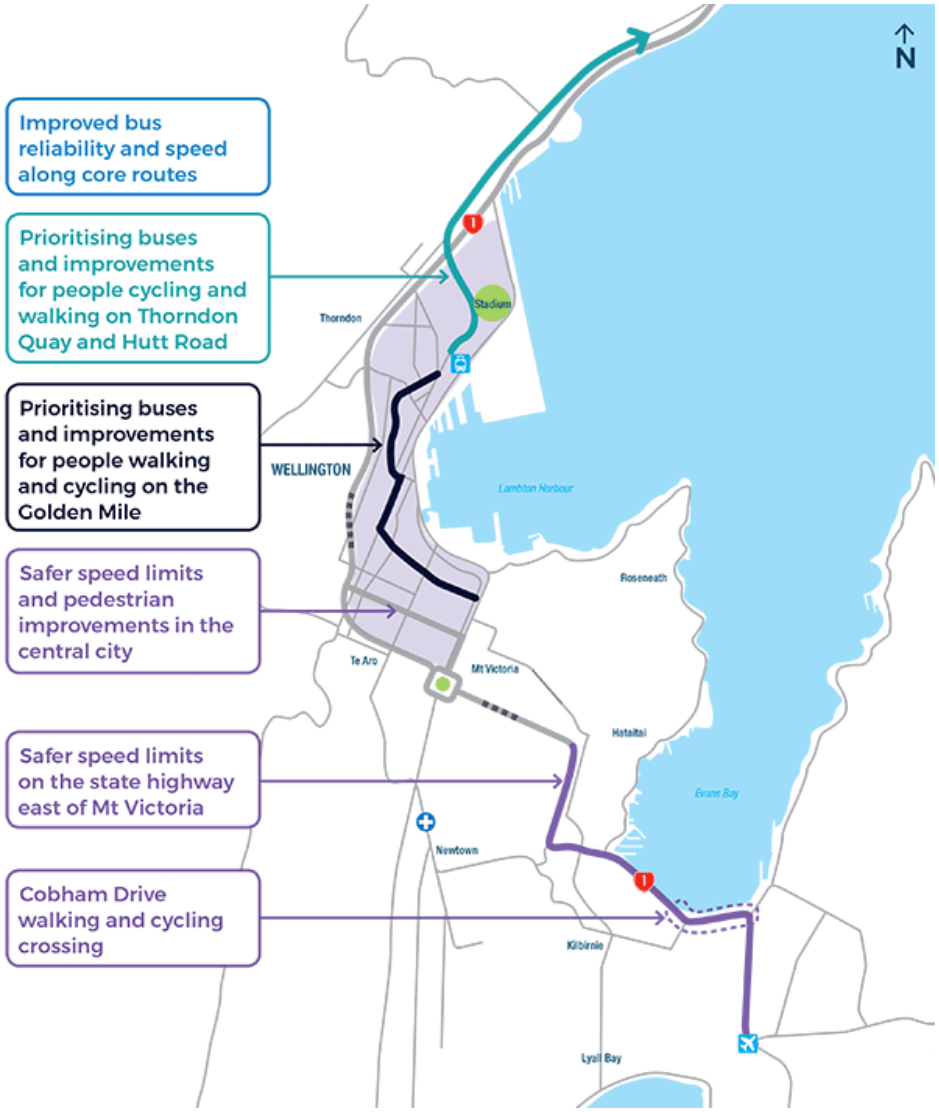


Figure 4-7: Early delivery programme (source: Let's Get Wellington Moving)

4.5.2 Riverlink

Riverlink is a collaborative programme between Greater Wellington Regional Council, Hutt City Council and Waka Kotahi to deliver flood protection, urban development plan and Melling Interchange transport improvements (Figure 4-8). In January 2020 the Government announced that the transport improvements at Melling will be funded as part of the NZ Upgrade Programme with construction expected to begin in late 2022. The key transport features are;

- A new Melling/SH2 interchange which removes the at-grade traffic signals;
- Moving the railway station closer to the city centre;
- A new pedestrian and cycle bridge between the relocated railway station and the central city;
- Slow traffic area in the central city with through traffic directed around the central city; and
- Intersection upgrades in the central city.

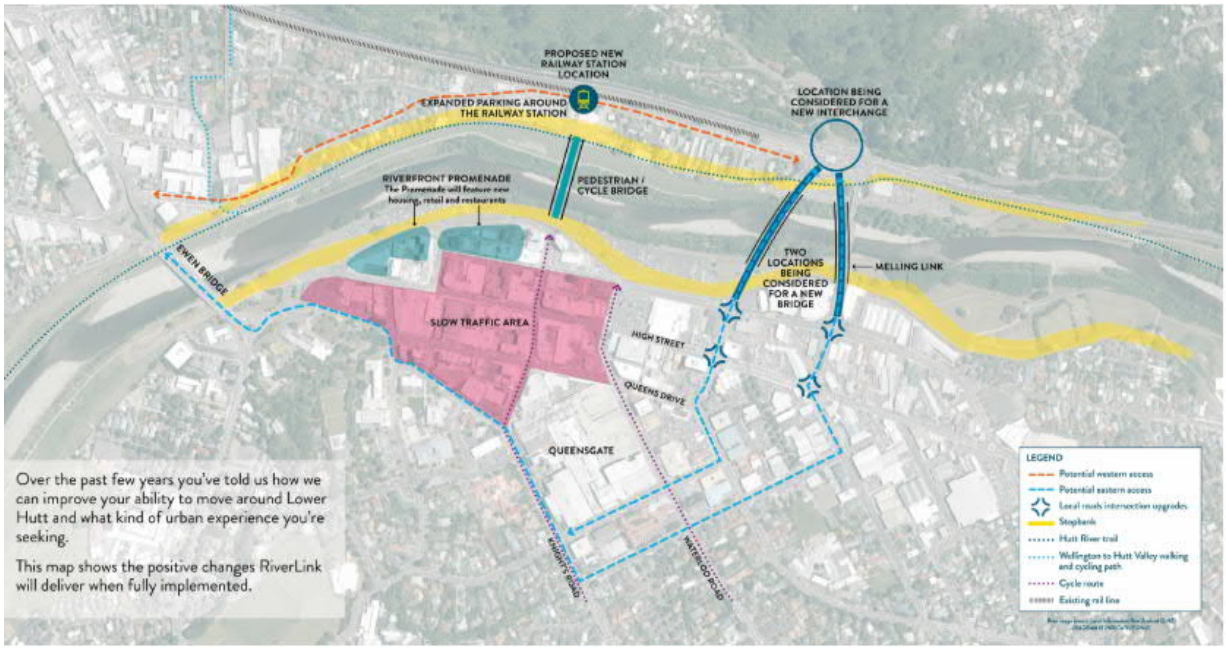


Figure 4-8: Possible transport improvements as part of Riverlink (source: Greater Wellington Regional Council)

The planned changes to central city traffic patterns and new pedestrian/cycle connections which are part of Riverlink have been reflected in the Hutt City Cycling and Micromobility SSBC. Riverlink supports the development of a safe and attractive cycling network in Hutt City by prioritising people walking and cycling in the central city and by improving busy intersections which can be a barrier to active modes.

4.5.3 Cross Valley Transport Connections

Cross Valley Transport Connections is a programme business case which was under development at the time of writing this report. The objective of the business case is to improve transport connections between Seaview, Waiwhetu and Wainuiomata to State Highway 2 and shift through traffic off The Esplanade. Proposed stage 1 improvements (Figure 4-9) include the following:

- Active mode improvements on The Esplanade, Hutt Road and Railway Avenue;
- Bus priority measures at key intersections; and
- Rail station access plans.

Longer term a new east-west multi-modal corridor is proposed which includes an upgrade of Ava Rail Bridge and new interchanges. However, this business case is at the early stages of development and is subject to changes during the planning process.

Cross Valley Transport Connections business case helps to achieve the same outcomes of improved safety and increased participation in active modes that the Hutt City Cycling and Micromobility SSBC seeks to achieve. This is because both business cases identify The Esplanade, Hutt Road, Wakefield Street and Railway Avenue as important active mode corridors which warrant improvements. Furthermore, the proposed replacement of the Ava Rail Bridge would enable a higher quality crossing to be provided for people using bikes and micromobility.

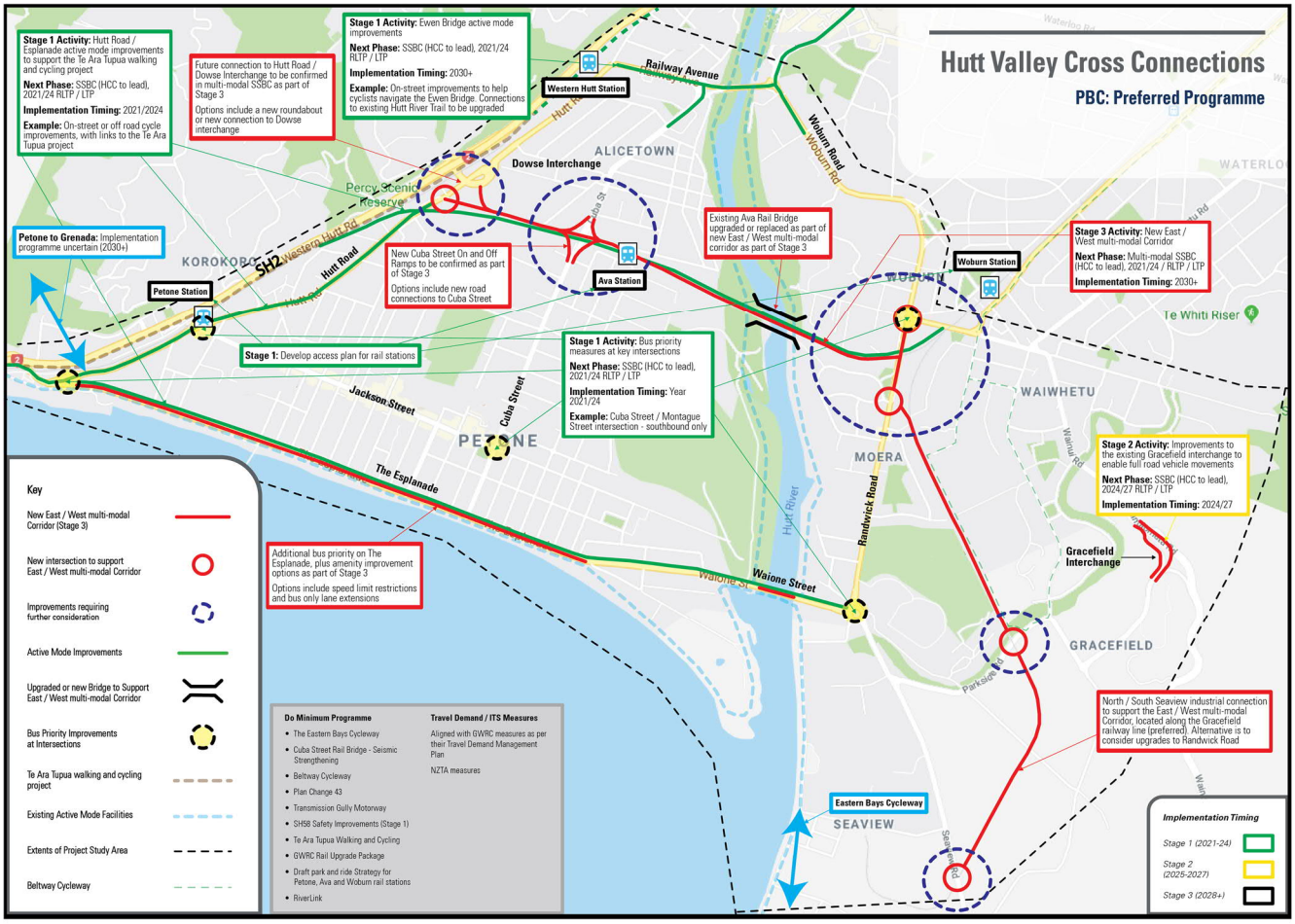


Figure 4-9: Draft programme for Cross Valley Transport Connections (note: programme is subject to change)

4.5.4 Innovating Streets

Waka Kotahi's Innovating Streets programme aims to make it faster and easier for road controlling authorities to transition local streets to safer and more liveable spaces for people (Figure 4-10). The types of projects which fall under the Innovating Streets umbrella are those which use lower cost and temporary techniques to trial changes to streets. An advantage of the Innovating Streets approach is that it can make community consultation easier because people can experience the space with the proposed changes. Using temporary materials also makes it easier to adjust the design during the trial which means that community feedback can quickly be incorporated.

Common types of Innovating Streets projects include:

- Parklets which repurpose parking spaces as mini urban parks;
- Events to re-imagine streets as public space;
- Traffic restriction to control vehicle speeds and improve safety for pedestrians and cyclists; and
- Reallocation of road space from vehicles to other uses.

Figure 4-10: Hutt City Play Streets where a residential street is temporarily closed to traffic

The Innovating Streets approach will be considered for the implementation of projects which are developed as part of this SSBC.

4.5.5 Te Ara Tupua

Te Ara Tupua is the project to create a safe walking and cycling connection between Wellington and Lower Hutt (Figure 4-11). Currently the only way to cycle between Wellington and Lower Hutt is on the shoulder of State Highway 2 which due to high speed traffic only appeals to experienced cyclists. The Petone to Melling section of Te Ara Tupua will run along the rail corridor between Petone and Western Hutt Stations before joining onto the Hutt River Trail. The Ngauranga to Petone section involves widening the sea wall between Ngauranga and Petone with pedestrians and cyclists having a new shared path on the harbour side. The Petone to Melling section is currently under construction and is expected to be completed by approximately May 2021. The Ngauranga to Petone section is currently in the consenting stage with construction expected to be complete in 2024.

Figure 4-11: Overview of Te Ara Tupua project

The Hutt City Cycling and Micromobility business case complements the Te Ara Tupua project by potentially improving connections onto the Wellington to Lower Hutt shared path. This would enable more people to access Te Ara Tupua that would further increase the benefits of the Wellington to Lower Hutt walking and cycling connection.

4.6 Covid-19 Response

The emergence of Covid-19 created uncertainties for New Zealand's communities and economy including the transport and local government sectors. This section outlines any potential changes to the programme context in a post Covid-19 environment. This section draws on Waka Kotahi research on the impact on Covid-19 as part of the Arataki information package[13].

4.6.1 Hutt City Council Emergency Budget

Prior to Covid-19, Hutt City Council was consulting on a 7.9% rates increase to accommodate expenses including a new Naenae pool, upgrades to water infrastructure and a modernisation of the rubbish and recycling system. Due to the challenges arising from Covid-19, Council agreed to an emergency one-year budget with a rates increase of 3.8%. The 2020/21 annual plan contains funding for The Beltway (central and northern sections), Cross Valley Transport connections investigation work and Riverlink consent applications and design work[14].

The Hutt City Cycling and Micromobility SSBC recognises the short-term funding constraints which Hutt City Council, like most Councils in NZ, are facing. Investment in a network of safe and attractive active/ sustainable modes network is a long-term project which is reflected in the financial case of this SSBC.

[13] Arataki – Potential Impacts of Covid 19, Final Report, 27 May 2020, Martin Jenkins and Infometrics for Waka Kotahi, https://www.nzta.govt.nz/assets/planning-and-investment/docs/arataki/arataki-potential-impacts-of-covid-final-report-may-2020.pdf

[14] Hutt City Council press release: http://www.huttcity.govt.nz/Your-Council/News-and-notices/media-releases/hutt-city-council-opts-for-lower-rates-increase-and-cuts-costs-for-year-ahead/

4.6.2 Transport demand

The immediate impacts of Covid-19 on the New Zealand economy a significant reduction in the tourism, retail and hospitality sectors. Furthermore, due to border restrictions and reduced airline capacity significantly less immigration, international students and work visas which may influence short to medium term population growth. For the economy as a whole the Treasury is forecasting a reduction in GDP and a rise in employment in 2020 with a recovery from the second half of 2021[15]. However, it is expected that the Wellington region will be shielded from the worst impacts due to a large proportion of residents being employment in the public sector and professional services[16].

Because of the relative resilience of the Wellington regional economy it is expected that the overall transport demand will remain largely unchanged over the medium to long term. There may be a sustained reduction in peak trips to the city centre due to increased working from home for professional services. However, supporting a mode-shift from single occupancy vehicle trips to sustainable modes remains a priority to reduce greenhouse gas emission. There will be an on-going need for affordable transport services to access employment and essential services which includes active modes and public transport.

One of the few benefits of Covid-19 is that people got to experience their local neighbourhood with a significant reduction in traffic due to travel restrictions during lock-down. This made it much more pleasant to walk and cycle which is an experience may make it easier for people to reimagine what their streets could be used for.

Overall it is considered that the post Covid-19 context does not change the strategic case for investment in safe and attractive cycling and micromobility network in Hutt City.

[15] Treasury Report T2020/973: Economic scenarios – 13 April 2020 https://treasury.govt.nz/publications/tr/treasury-report-t2020-973-economic-scenarios-13-april-2020-html#section-2

[16] Covid-19 implications for land transport – regional summary Wellington potential impacts, Waka Kotahi, https://www.nzta.govt.nz/assets/planning-and-investment/docs/arataki/regional-summary-9-wellington-potential-impacts-of-covid-19.pdf

5. Programme development

5.1 Connectivity assessment

The start point for the programme development was the cycleways network concept contain in the 2019 Hutt City Cycleways Connectivity Assessment[17]. The purpose of the Connectivity Assessment was to identify potential cycleway routes and infrastructure treatment options that would form a complete cycleways network in Hutt City. The cycleways network concept was developed with stakeholder input and draws on best practice cycleway planning guidance from Waka Kotahi and Christchurch City Council. The recommended programme of investment contained in this business case is the plan for the staged implementation of the cycleways network concept. The cycleways network concept is shown in Appendix A with a discussion of the infrastructure treatments being contained in Appendix B.

5.2 Long list development

The first step in developing the investment programme was to capture a list of programme options which are ways of determining the order in which the cycleways network will be developed. The programme options include both infrastructure improvements and supporting measures that encourage further uptake. Additional programme options were included in the long list based on stakeholder feedback, as discussed below.

At this stage in process the options were kept at a high level with the discussion being on what the strategic direction for investment should be rather than on specific routes or measures. During the short list development stage more detail was added to the programme options.

The long list of programme options are described in Table 5-1 & shown in Table 5-2 on the following pages:

[17] Prepared by Jacobs for Hutt City Council. Document number IZ109700-0002-GN-RPT-0001

Option	Name	Description	Supporting measures	Priority areas for investment	Target customers
1	Enhance connections to primary routes	Connections to Hutt CBD and Hutt Hospital, upgrading routes in Seaview/ Gracefield, connections between Hutt River Trail and the Beltway	Improved end of trip facilities and bike friendly business programme	Seaview/ Gracefield, Hutt Central, Epuni, Avalon and Taita	People of all ages and abilities who live close to the primary routes
2	Local employment access	Connections to main employment areas include Hutt CBD, Petone, Seaview/Gracefield, GNS and Avalon Studios	Improved end of trip facilities and work travel planning	Petone, Seaview/ Gracefield, Hutt Central, Epuni and Avalon	People of all ages and abilities who work locally
3	Rail station access	Connections to rail stations particularly by improving local roads	Improved end of trip facilities	Petone, Waterloo, Naenae and Taita	People of all ages and abilities who live within 15 min cycle to rail station
4	Demonstration neighbourhoods	Focusing investment in selected neighbourhoods to realise complete network in these areas	Neighbourhood accessibility plans to link infrastructure, enforcement, encouragement and education	Selection criteria to be determined	People of all ages and abilities who live within the selected neighbourhoods
5	Enhanced connections to schools	Focusing investment on cycleways which serve schools with supporting traffic calming measures	Cycling skills training, bikes in schools and school travel planning	Selection criteria to be determined	Students of all cycling abilities who attend local schools
6	Long distance commuter	Cycleways which feed onto the Wellington to Hutt Valley walking and cycling link (Te Ara Tupua)	End of trip facilities in Wellington CBD	Petone, Alicetown, Hutt Central and Waterloo	People who are more confident cyclists that work in Wellington CBD

Table 5-1: Long list programme descriptions

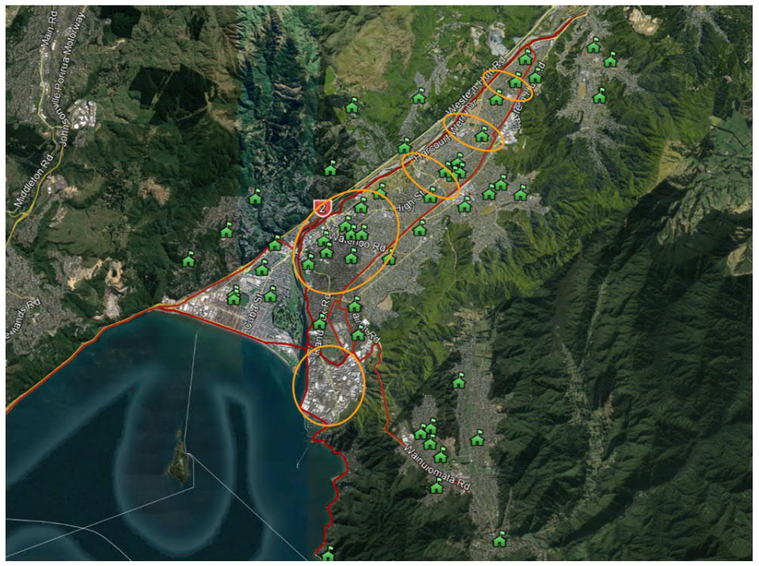
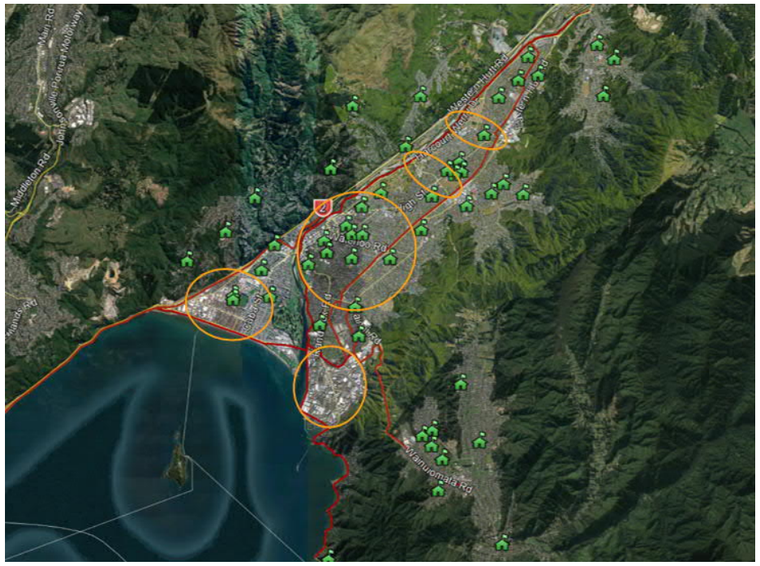
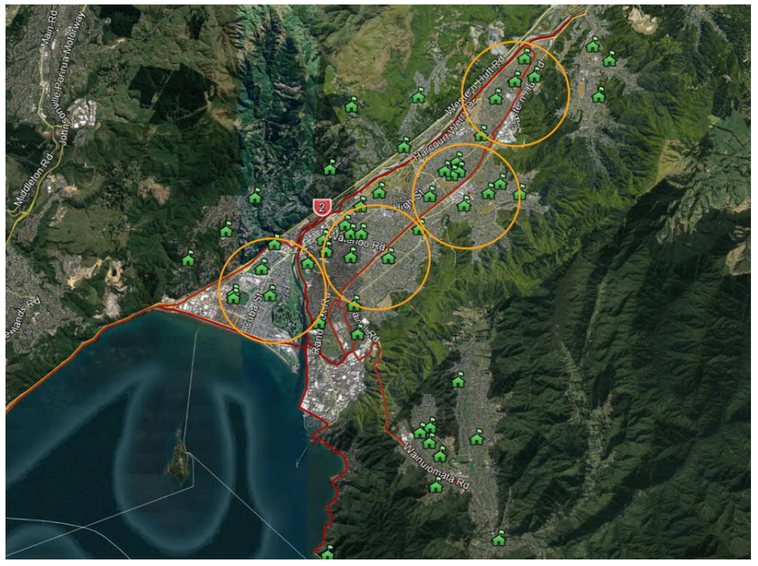
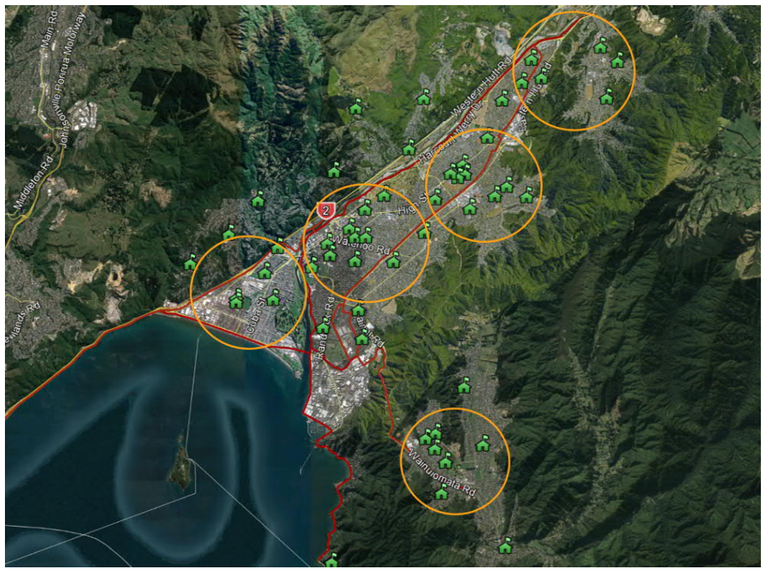
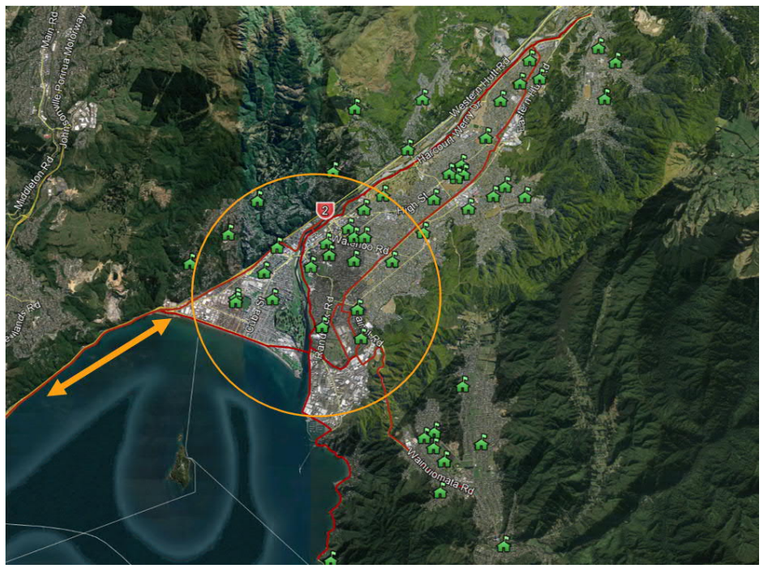
Option 1: Enhance connections to primary routes	Option 2: Local employment access	Option 3: Rail station access
		
Option 4: Demonstration neighbourhoods	**Option 5: Enhanced connections to schools**	**Option 6: Long distance commuter**
		

Table 5-2: Indicative focus areas for long list programmes

5.3 Long list feedback and assessment

At the first workshop hold on 25 February 2020 the programme options were discussed with the stakeholders with the aim of agreeing a short list of programmes to be explored further. The stakeholders represented at the first workshop are:

- Hutt City Council, Transport Group
- Greater Wellington Regional Council, Strategy Team
- Waka Kotahi, Partnership Investments
- Cycling Action Network
- Elected representatives of Hutt City

During a group activity, stakeholders were asked to provide feedback on what they liked and disliked about each of the programme options. Stakeholders were also asked to score each of the programme options based on how much of a priority they thought the programme would be for the community (Table 5-3 on the following page). The combination of both written feedback and scores allowed each of the programmes to be ranked against each other and for changes to the programme options to be discussed.

1. *Enhance connections to primary routes*

   Stakeholders liked that this option linked to key destinations including CBD and Hutt Hospital thereby encouraging more people to cycle for local trips. Another positive was the improved east-west connections that leveraging off the current investment in The Beltway cycleway.

   Stakeholders disliked the focus on existing/ adult cyclists and that the programme would not serve many schools. Overall this option was seen being part of wider programme but not enough on its own to address the problems.

2. *Local employment access*

   The positives are that this option encourages local workers to cycle which improves access to employment especially for areas like Seaview which has limited public transport services.

   Stakeholders felt that this programme would focus investment too much into a small number of areas as many suburbs do not have local employment. Another disadvantage is that the programme only caters for people who work locally and does not link to pubic transport for longer trips.

3. *Rail station access*

   Stakeholders liked that improving cycling and micromobility access to rail stations would take pressure off park and ride facilities. However, concern was raised about the security of bikes parked at the stations as bikes cannot be taken onboard peak trains. The security of bikes at rail stations could be addressed with additional cycle lockers.

4. *Demonstration neighbourhoods*

   The feedback received was that focusing on neighbourhoods provides the opportunity to connect communities and improve health outcomes. This approach can also be customised to each community and provides a measurable before and after comparison to demonstrate success.

The concerns raised was the issue of equity for areas that do not receive investment as this could lead to different outcomes across the city. To address the issue of equity, some stakeholders felt that the focus should be on neighbourhoods which have low levels of participation in active modes and poor access to other transport modes.

5. *Enhanced connections to schools*

Stakeholders liked that a focus on schools would help to develop life long cyclists that would improve health outcomes and build more independence for children. Another positive is that traffic calming measurements can be a lower cost intervention and that other measures such as school bikes trials could complement the infrastructure investment.

The concerns raised were around parents' perceptions of safety, equity of access to bikes and scooters and open school enrolments. There is the potential address these concerns with infrastructure and supporting measures as part of this SSBC.

6. *Long distance commuter*

This programme was seen as having the benefits of providing people with a sustainable transport option to commute to Wellington that would also take pressure off State Highway 2. The concerns raised was that this programme would rely on the timing of the Ngauranga to Petone project and that there would not be as many local community outcomes. Another issue raised was that the focus would be on the "strong and fearless" type cyclists who may already be cycle commuting.

Programme option	Score out of 10 (with 10 being the highest score) for the question; How much of a priority is each of the programme options?		
	Group 1	Group 2	Group 3
Option 1: Enhance connections to primary routes	9-10	5-6	9
Option 2: Local employment access	5-6	7	3
Option 3: Rail station access	5-6	6	7
Option 4: Demonstration neighbourhoods	8	8-9	7-8
Option 5: Enhanced connections to schools	7-8	10	10
Option 6: Long distance commuter	4	5	5-6

Table 5-3: Stakeholder scoring of the programme options

Both the written feedback and scoring of the long list of programme options from the stakeholder workshop reveals a consistent support for programme 1 (primary routes), programme 4 (demonstration neighbourhoods) and programme 5 (schools). For this reason, these three high level programme options were short listed to be developed further into detailed programmes. The process that was followed to further develop the short list of programmes is discussed below.

5.4 Short list development

Comparing the areas of investment for the three short-listed programmes (options 1, 4 and 5) revealed overlaps in destinations within Hutt City. For example, programme 1 which includes connections to Hutt CBD would also serve a cluster of schools including Sacred Heart College, Chilton Saint James and Eastern Hutt School. Another example Programme 4 is that potential demonstration neighbourhoods such as Wainuiomata and Naenae also contain several schools. Figure 5-1 shows the geographic overlap between the three short-listed programmes.

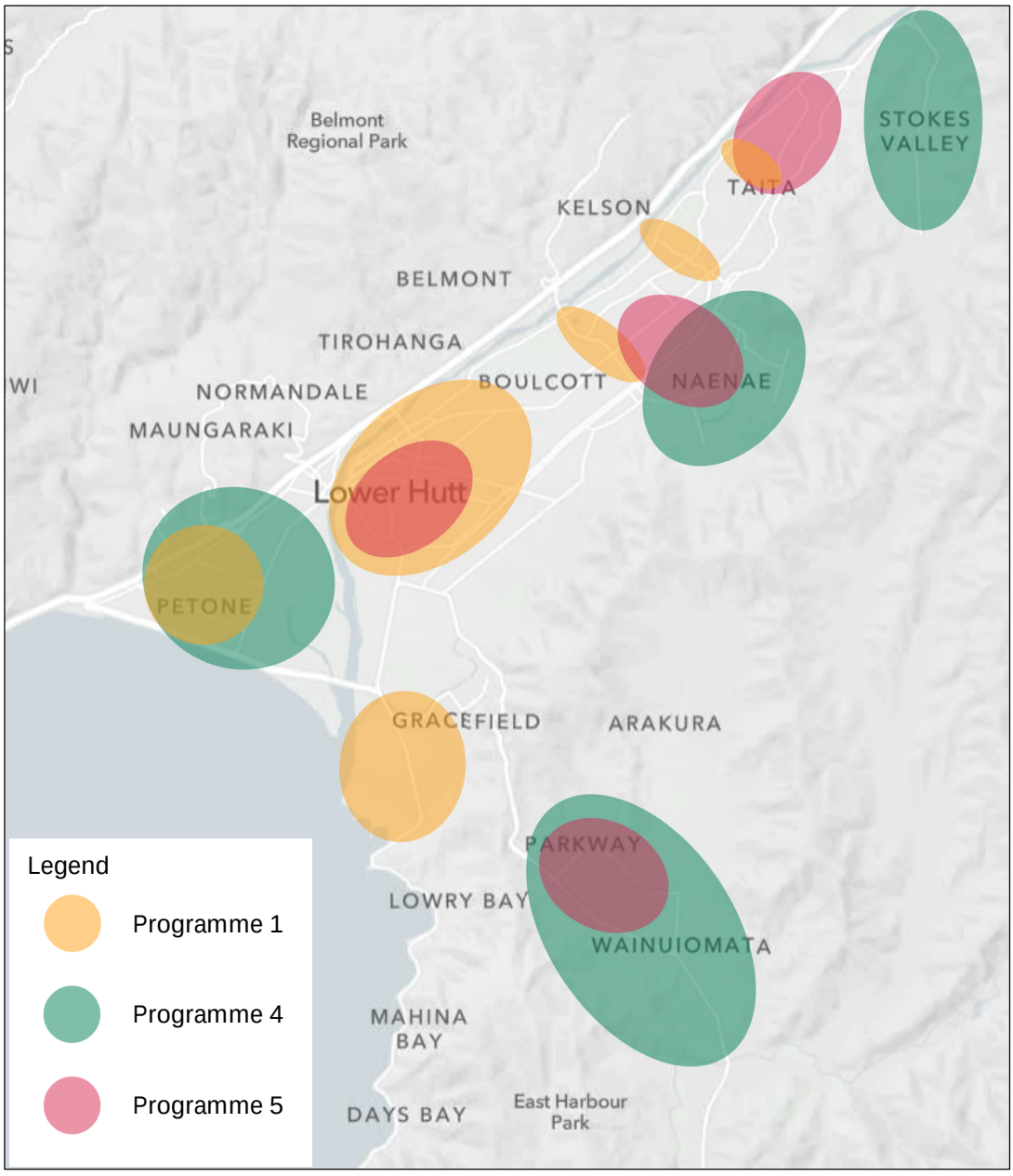


Figure 5-1: Map showing overlaps between programme focus areas

To achieve the investment objectives it is considered necessary that all the programmes contain connections between the primary cycleways to Hutt CBD, Hutt Hospital and Petone. This is because these areas are key destinations for employment, community facilities and retail that would provide the most effective way of increasing the number of residents that use bikes and micromobility. Furthermore, Hutt CBD has a cluster of recorded crashes and therefore providing safe cycleways in this area would help to improve safety for people who use bikes and micromobility.

The main differentiators is that programme 4 would include connections along main roads in outer areas and programme 5 would include connections to more schools. Therefore, the short-listed programmes were developed to compare outcomes from a base network which focused on central areas against a larger network which included central areas and outer areas. This approach also enabled a comparison of low, medium and high levels of investment.

Because many students need to cross arterial roads to travel to school it was considered necessary to first have cycleways along the main roads before expanding the network to include collector roads around schools. This is why programme 5 is base + demonstration neighbourhood + focus schools.

5.4.1 Programme 1 - Base network

This programme represents a base network which prioritises improving connections between primary cycleways and providing new connections to key destinations. Because of high traffic volumes in Hutt Central connections to key destinations are primarily cycleways or shared paths. The focus areas for investment for programme 1 are Hutt Central, Epuni, Petone, Seaview and Avalon. Based on the workshop feedback Petone was added as a focus area which reflects Petone's role as a key employment and retail destination. Programme 1 has a comparatively low level of investment and does not serve outer residential areas.

The indicative network for programme 1 was developed by selecting the cycleways within the focus areas from the Hutt City Cycleway Connectivity Assessment complete network. A visualisation of the process followed to develop the network for programme 1 is shown in Figure 5-2.

In addition to infrastructure it was proposed that funding for increased bike parking and greater marketing and events are included in the programme. These supporting measures would help leverage the investment in infrastructure by providing secure bike parking at destinations and by increasing awareness of the benefits of active and sustainable modes.

Complete cycling and micromobility network concept

Base network focus areas

Programme 1 infrastructure

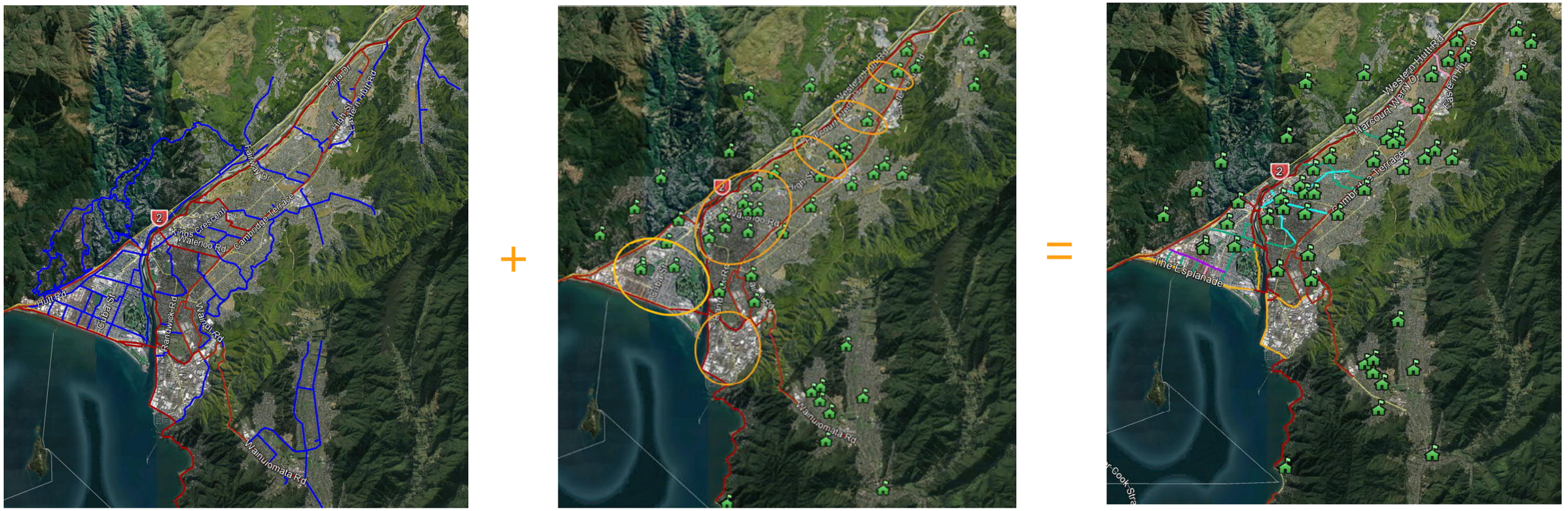


Figure 5-2: Visualisation of process to develop indicative network for programme 1

5.4.2 Programme 4 – Base + demonstration neighbourhoods

Programme 4 adds to the base network by including demonstration neighbourhoods which focus on completing the cycleways network in selected neighbourhoods. It is intended that the benefits from the first demonstration neighbourhood would be to build support for subsequent stages. Programme 4 has a medium level of investment compared to the other programmes and includes connections in both central and outer areas.

There was general agreement from the stakeholders that neighbourhoods that have poor health outcomes and lower access to affordable transport should be prioritised. To incorporate this feedback the selection criteria for the demonstration neighbourhoods included socio-economic deprivation index and public transport accessibility as criteria (criteria and results shown in Appendix C). The neighbourhoods of Stokes Valley, Naenae and Wainuiomata scored the highest based on the assessment criteria and were included in programme 4. Epuni is a neighbourhood which also scored highly but is included in the base network, therefore the next highest scoring neighbourhood Stokes Valley was selected for the demonstration neighbourhoods. A visualisation of the process followed to develop the indicative network for programme 4 is shown in Figure 5-5-3.

The supporting measures for programme 4 include increased bike parking, marketing and events and cycling training. The increased funding for cycling training could allow an expansion of the Bike Ready and Bikes in Schools programmes to reach more schools in Hutt City.

Base network

Demonstration neighbourhood focus areas

Programme 4 infrastructure

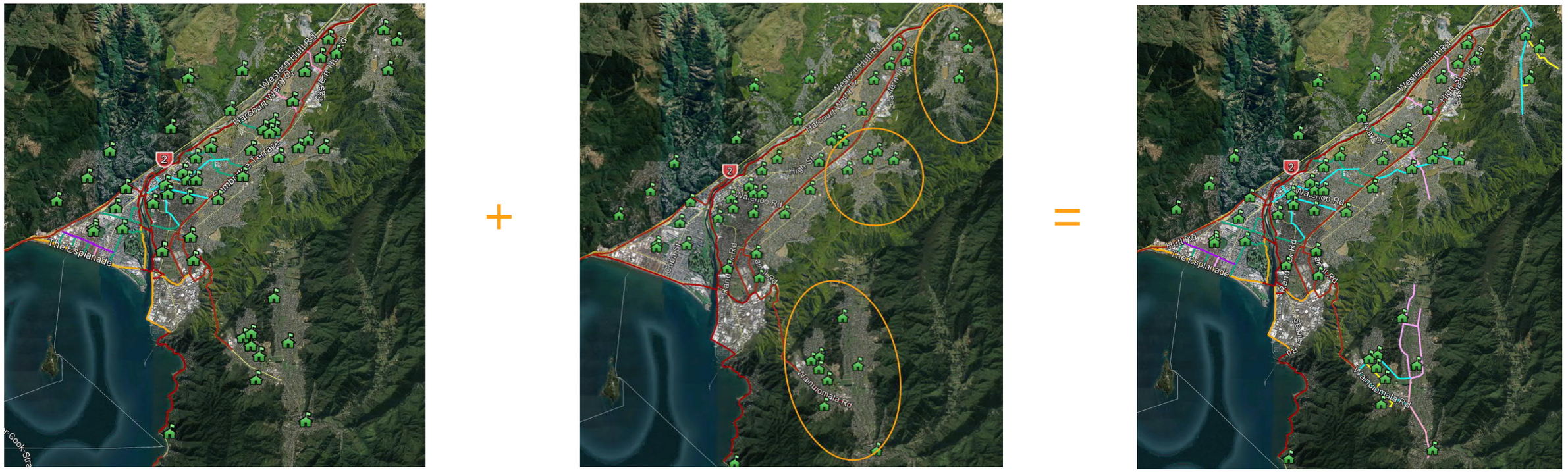


Figure 5-5-3: Visualisation of process to develop indicative network for programme 4

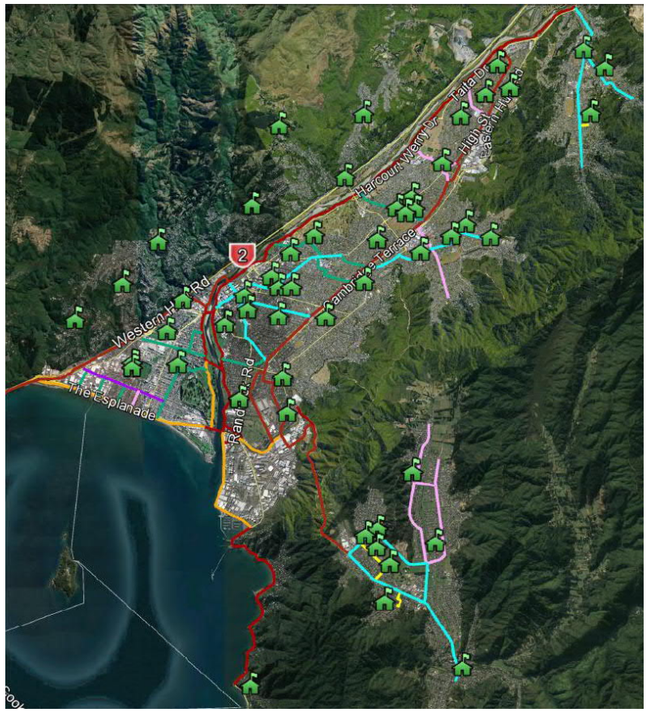
5.4.3 Programme 5 – Base + demonstration neighbourhoods + focus schools

Programme 5 adds to the base network and demonstration neighbourhoods by including investment in focus schools which includes traffic calming on local streets within the school zone. The aim would be to maximise the number of students that would have safe and attractive cycleways/pathways between their home and school. Programme 5 has a high level of investment compared to the other programmes and includes cycleways on main streets and traffic calming on minor streets.

In order to investigate which schools within Hutt City may have the highest potential for increased active mode use a selection process was developed (criteria and results shown in Appendix D). The selection criteria include the size of the school roll, the location of the school and any prior involvement in sustainable transport initiatives. The schools with the highest scores are in the areas of Wainuiomata, Hutt Central, Avalon, Naenae, and Taita. A visualisation of the process followed to develop the indicative network for programme 5 is shown in Figure 5-4.

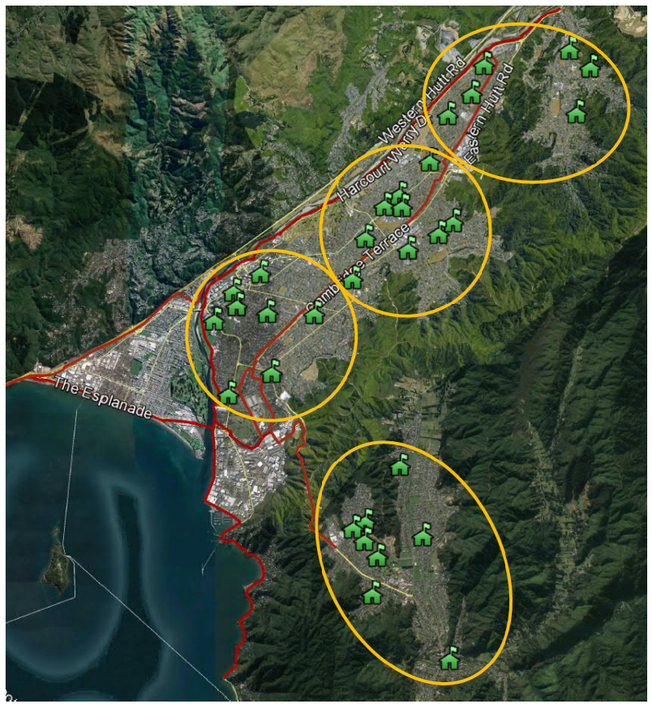
To support the cycleways infrastructure programme 5 would include investment in increased bike parking, marketing and events and cycling skills training. It is proposed that cycle skills training be coordinated with infrastructure investment so that students which have safe cycleways/pathways to schools would also have the skills and confidence use active and sustainable modes to school.

Base + demonstration neighbourhoods



+

Focus schools



=

Programme 5 infrastructure

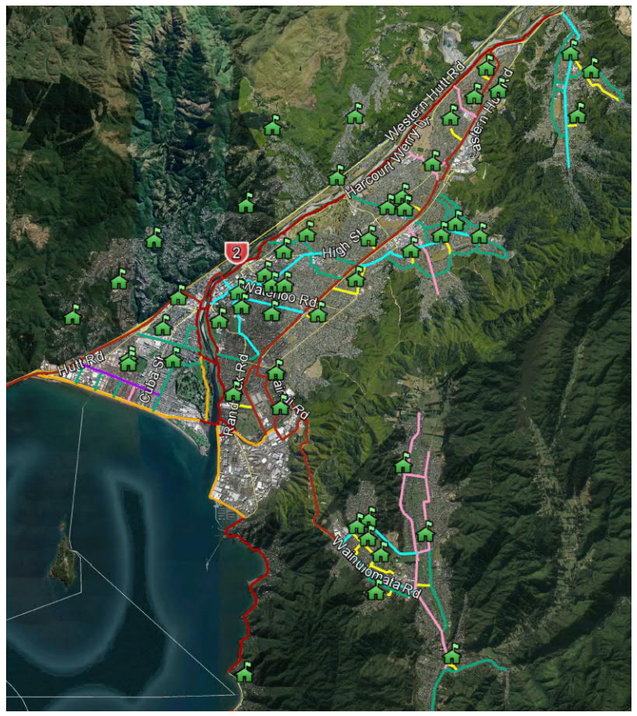


Figure 5-4: Visualisation of process to develop indicative network for programme 5

5.4.4 Do minimum – Complete committed cycleways

The do-minimum provides a baseline cycleways network that would be achieved with no additional investment in cycleways/pathways infrastructure (Figure 5-5). The do-minimum therefore includes the existing cycleways and projects that have funding committed (The Beltway central/northern sections and Eastern Bays shared path). Both the short-listed programmes and the do-minimum are assessed against the investment objectives in section 5.5.

Figure 5-5: Do minimum cycleways network

5.5 Short listed programmes feedback

A second stakeholder workshop was organised for 1 April 2020; however, the decision was made to not proceed with the workshop and instead ask stakeholders for written feedback. This was due to the nationwide lockdown in response to Covid-19.

Information about the draft programme short list options including list of projects, supporting measures, programme budget and programme timing was sent to stakeholders. Summary tables of the feedback received from stakeholders are included below and are grouped by organisation. The table also includes comments from the project team on how refinements were made to the programmes to incorporate the stakeholder feedback.

5.5.1 Waka Kotahi

Feedback from stakeholders	Refinements made to programmes in response
Should have a clear long-term vision of the complete network and spell out how each step in the programme is a logical step towards achieving this 20 or 30 year vision	Incorporated feedback by separating the programme into short term, medium term and long-term phases
That there is a large amount of cross over between destinations in Lower Hutt to be broken down neatly into separate benefits e.g. a cycleway to the CBD will serve trips to work, schools and shops	Updated wording of SSBC to describe the programmes as benefiting multiple types of trips
Demonstration neighbourhoods should complete the full network in one area first but the programme reads like the three areas will be progressed together, seen as spreading effort/investment too thinly rather focusing on completing one area	Updated staging of programme to focus investment on completing one demonstration neighbourhood at a time
Programme timeframe is too short based on progress of other cycleways to date	Incorporated feedback by extending the programme timeframe to allow more time for design and consultation phases
Should consider interactions with Cross Valley Connection and Station Access Planning	Attended meeting with Cross Valley Link project team in June 2020 and discussed interactions between business cases
Should include a wider range of supporting measures as part of the programmes	Developed recommended supporting measurement in more detail
Surprised that Petone was not selected as a demonstration neighbourhood due to potential connection to Wellington to Hutt Valley cycleway and quiet streets	Included Petone as priority area for investment in updated programme

5.5.2 Petone Community Board

Feedback from stakeholders	Changes made to programmes in response
Uncertainty on whether funding would be available in post Covid financial environment	Programme staging updated to have a lower level of investment in short term
Felt that an upgrade of the current The Esplanade shared path is not feasible due to pinch points from buildings and high pedestrian volumes	Feedback incorporated by including on-road cycleway as treatment option for The Esplanade
Felt that focus should be on improving connections from The Esplanade to Jackson Street	Connections to Jackson Street included in quick wins programme
Would support a 30km/hr speed limit on Jackson St to improve safety but could not support a cycleway on Jackson St at this time	Feedback noted

5.5.3 Hutt Cycle Network

Feedback from stakeholders	Changes made to programmes in response
Programme 5 is preferred on the current options because inclusion of safe low traffic areas around schools which is essential to change perceptions of cycling for parents	Feedback noted
Encouraging cycling to schools is seen as essential for building momentum for social licence for further improvements	Feedback noted
Concern that Stokes Valley is included as demonstration area due to travel patterns and lack of planned development.	Priority areas for investment updated in recommended programme
Programme 1 was viewed as having benefits but would not go far enough to achieve the momentum that is needed to realise significant mode shift	Feedback noted
Supporting measures need to be spelled out including measures that may be outside of councils direct control	Developed recommended supporting measurement in more detail

5.6 Short listed programmes assessment

The short-listed programmes were assessed against the following:

- How likely the programmes would achieve the investment objectives;
- The deliverability and financial feasibility of the programmes; and
- An economic feasibility assessment following the economic evaluation manual (EEM).

The purpose of these assessments is to understand which short-listed programme would deliver the most community benefits relative to the size of the investment made. The assessments were also intended to understand the relative strengths and weaknesses of the short-listed programmes so that refinements to the programmes could be made.

5.6.1 Investment objectives assessment process

The short-listed programmes were assessed against how well they would achieve the investment objectives of increased participation in sustainable modes, improved safety and encouraging students to use active modes. Two assessment indicators were selected for each investment objective which use readily available information which are aligned with the investment measures. Table 5-4 below shows the indicators used for the short-listed assessment.

Investment objectives	Investment measures	Indictors used for assessment
Increase the number of residents that use bikes and micromobility as a mode of transport	Increase the number of Hutt City residents that cycle to work and study from 1.6% in 2018 to 5% in the 2038 NZ Census	Estimated new cyclists using buffer method in EEM
	Increase the length of the Hutt City cycling network from 26km in 2020 to 50km by 2036	Length of proposed additional cycleways
Increase the potential for school students to use active transport to and from school	Increase the proportion of Hutt City residents that perceive children using active transport to school as being safe or very safe from 40% in 2019 to 55% by 2036 as measured by Greater Wellington's Transport Perceptions Survey	Number of schools served by the proposed cycling networks
	Increase the proportion of 5 to 14 year old Hutt City students who use active transport to school from 34% to 45% by 2036 as measured by the New Zealand Health Survey	Number of young people living within 400m buffer of proposed cycling networks

Investment objectives	Investment measures	Indictors used for assessment
Improve safety for people who use bikes and micromobility	Reduced DSI crashes per cycling trip in Hutt City by 40% in 2036 as recorded in CAS	Estimated reduction in cycle crashes using crash reduction factors in EEM
	Improve the rating of main cycling routes in Hutt City to a quality of service rating 2 by 2036 as defined by Auckland Transport's Quality of Service evaluation tool for cycle facilities	Percentage of roads rated as quality of service 2 or better

Table 5-4: Criteria for assessing short-listed programmes against investment objectives

5.6.2 Investment objectives assessment results

The results of assessing the short-listed programmes against the investment objectives are shown in Table 5-5 on the following page. The investment objectives assessment results provide the following insights:

- That programme 5 (base + demonstration neighbourhoods + focus schools) scored the highest against the investment objectives with the do minimum (complete committed cycleways) scoring the lowest. This reflects the larger cycleway network for programme 3 which serves a greater number of destinations and residential areas.
- The main differentiator between programmes 4 (base + demonstration neighbourhoods) and 5 (base + demonstration neighbourhoods + focus schools) was for increasing the potential for students to use active transport to and from school.
- Programme 1 (base network) scored low for increasing participation in active modes due to the lack of network coverage in the main residential areas. Programme 1 also scored relatively low for serving trips to and from school because the base network is focused on connections between cycleways and connections to Hutt CBD.

Investment objective	Indicators used for assessment	Do minimum: Complete committed cycleways	Programme 1: Base network	Programme 4: Base + demonstration neighbourhoods	Programme 5: Base + demonstration neighbourhoods + focus schools
Increase the number of Hutt City residents that cycle to work and study from 1.6% in 2018 to 5% in the 2028 NZ Census	Estimated new users using buffer method	0	2	4	5
Increase the length of the Hutt City cycling network from 26km in 2020 to 50km by 2036	Length of proposed additional cycleways	0	3	4	5
Increase the proportion of Hutt City residents that perceive children using active transport to and from school as being safe or very safe from 40% in 2019 to 55% by 2027 as measured by the Greater Wellington Transport Perceptions Survey	Number of schools served by the proposed cycling networks	0	1	3	5
Increase the proportion of 5 to 14 year old students who use active transport to and from school from 34% to 45% by 2036 as measured by New Zealand Health Survey	Number of young people within 400m buffer of proposed cycling networks	0	2	5	5
Reduced DSI crashes per cycling trip in Hutt City by 30% in 2027 as recorded in CAS	Crash by crash analysis (method A) in the economic evaluation manual	0	3	4	4
Improve the rating of main cycling routes in Hutt City to a quality of service rating 2 by 2036 as defined by Auckland Transport's Quality of service evaluation tool for cycle facilities	Percentage of main roads rated as quality of service 2 or better	0	3	4	4

5	4	3	2	1	0	-1	-2	-3	-4	-5
Very significant positive impact	Significant positive impact	Moderate positive impact	Minor positive impact	Very minor positive impact	Neutral impact	Very minor adverse impact	Minor adverse impact	Moderate adverse impact	Significant adverse impact	Very significant adverse impact

Table 5-5: Results for assessment of short-listed programmes against investment objectives

5.6.3 Deliverability and financial feasibility assessment process

The deliverability and financial feasibility of the short-listed programmes was assessed against the potential impacts on other transport modes, constructability and consentability and financial feasibility. It may be possible to mitigate the identified impacts during the design and consultation phases depending on the choice of cycleway layout. For each of the potential impacts a high-level assessment was completed against the considerations listed below.

Impact on other transport modes:

- Whether the cycleways in the programme would reduce road capacity on arterial or primary collector roads and therefore increase delays for vehicles and public transport
- Whether the programme would negatively impact on-street parking and how much demand for parking there is in the area

Constructability and consentability:

- Whether the programme includes the construction of new structures such as bridges or underpasses
- Whether the programme may negatively impact on sensitive natural environments

Financial feasibility:

- Whether the programme cost would be an increase or decrease in the level of investment in Hutt City compared to the Urban Cycleways Programme. This assessment does not include investment made in Te Ara Tupua. The workings for the financial feasibility are shown in the Appendix F.

5.6.4 Deliverability and financial feasibility assessment results

The deliverability and financial feasibility assessment results (Table 5-6 on the following page) provides the following insights into the short-listed programmes:

- Programme 1 was assessed as being the easiest to deliver the most financially feasible due to the programme cost being less than the previous funding committed to cycling;
- All three programmes had the potential to have moderate impacts on other transport modes to the potential changes to intersection control and new crossings; and
- Programme 5 was determined to be unaffordable due to the significant increase (107% increase compared to the previous Urban Cycleways Programme) in funding required above current investment levels.
- Furthermore programme 5 would require a much larger share of the funding allocated in the 2021 GPS to the walking and cycling activity class than Lower Hutt's share of New Zealand's urban population (6.2% of funding required compared to Lower Hutt having a 2.5% of NZ's urban population)

Additional discuss on financial feasibility is provided in section 8 Financial Case.

	Do minimum: Complete committed cycleways	Programme 1: Base network	Programme 4: Base + demonstration neighbourhoods	Programme 5: Base + demonstration nieghbourhoods + focus schools
Impact on other transport modes	0 Committed cycleways mostly run parallel to the harbour or rail lines and do not have at grade intersections with major roads	-2 Programme may require crossings of Harcourt Werry Dr and CBD intersection changes	-3 Programme may require crossings of Harcourt Werry Dr, CBD intersection changes and Wainuiomata intersection changes	-3 Programme may require crossings of Harcourt Werry Dr, CBD intersection changes and Wainuiomata intersection changes
Constructability and consentability	0 Consent application granted for Te Ara Tupua and consent application lodged for Eastern Bays shared path	-1 Cycleways within existing road corridor, may require kerb line changes in Hutt Central	-2 Cycleways within existing road corridor however additional complexity from busy roundabouts in Wainuiomata and Naenae	-2 Cycleways within existing road corridor however additional complexity from busy roundabouts in Wainuiomata and Naenae
Financial feasibility	0 Funding committed from National Land Transport Programme, Covid Recovery and Response Fund and Hutt City Council	3 Reduction in per year funding commitment to cycling	-3 Increase in per year funding commitment to cycling	-5 Significant increase in per year funding commitment to cycling

Table 5-6: Results for deliverability and financial feasibility assessment

5.6.5 Economic feasibility assessment results

The economic feasibility assessment for the short-listed programmes follows the short form procedure for walking and cycling activities contained in the Economic Evaluation Manual. Subsequent to this business case starting the Economic Evaluation Manual was replaced with the Monetised Benefits and Costs Manual. The final economic assessment for the recommended programme follows the full procedures for walking and cycling activities contained in the Monetised Benefits and Costs Manual.

The economic assessment provides the following insights into the relative efficiency of the programmes (Table 5-7 to 5-9):

- Programme 5 has the highest health and environmental benefits and crash cost savings due to having the largest cycleways network which could serve the greatest number of trips; and
- Programme 1 has the highest BCR with 3.4 with programme 5 having the lowest BCR with 2.1. The relative difference in BCRs is due to programme 1 having lower infrastructure costs than the other two short listed programmes.

	Programme 1	Programme 4	Programme 5
Health and environmental benefits	$143 million	$190 million	$226 million
Crash cost savings (with 20% crash reduction factor)	$2 million	$3 million	$5 million

Table 5-7: Benefit streams for the short-listed programmes

	Programme 1	Programme 4	Programme 5
Estimated infrastructure cost	$42 million	$88 million	$117 million
Supporting measure cost	$3 million	$3 million	$3 million
Total cost	$45 million	$91 million	$121 million

Table 5-8: Estimated programme costs in net present value

	Programme 1	Programme 4	Programme 5
Benefit cost ratio with 6% discount rate	3.4	2.3	2.0

Table 5-9: Benefit cost ratios for short listed programmes

5.6.6 Summary of programme assessment

In summary the assessment of the short-listed options shows that programme 1 performs poorly against the investment objectives. This is because the baseline cycleways network would not provide connections to the main residential areas or the majority of schools. Programmes 4 and 5 both performed well against the investment objectives with the main differentiator being that programme 5 scores higher for encouraging active transport to school.

Programme 5 was assessed as being financially unaffordable due to the significant increase in funding required above existing investment levels and pressure that it would place on the walking and cycling activity class of the NLTP. Although programme 5 has the highest health and environmental benefits and crash cost savings it has the lowest BCR due to high infrastructure costs.

On balance programme 4 performed best against the assessment because it scored well for most investment objectives whilst being financially feasible. Programme 4 would include both connections to key destinations in Hutt Central and Petone whilst also including suburban connections onto The Beltway and (Te Hikoi Ararewa) Wainuiomata shared path. Therefore programme 4 is effective in improving access to employment, community facilities and train stations by bike and micromobility across large areas of Hutt City.

However, it is considered that programme 4 would not go far enough for encouraging students to use active transport to school which is one of the investment objectives. Furthermore, encouraging students to use active transport was also seen by the reference group as being an essential element of any investment programme. Therefore, it is recommended that programme 4 be updated to include more connections to schools which is discussed further in the following section.

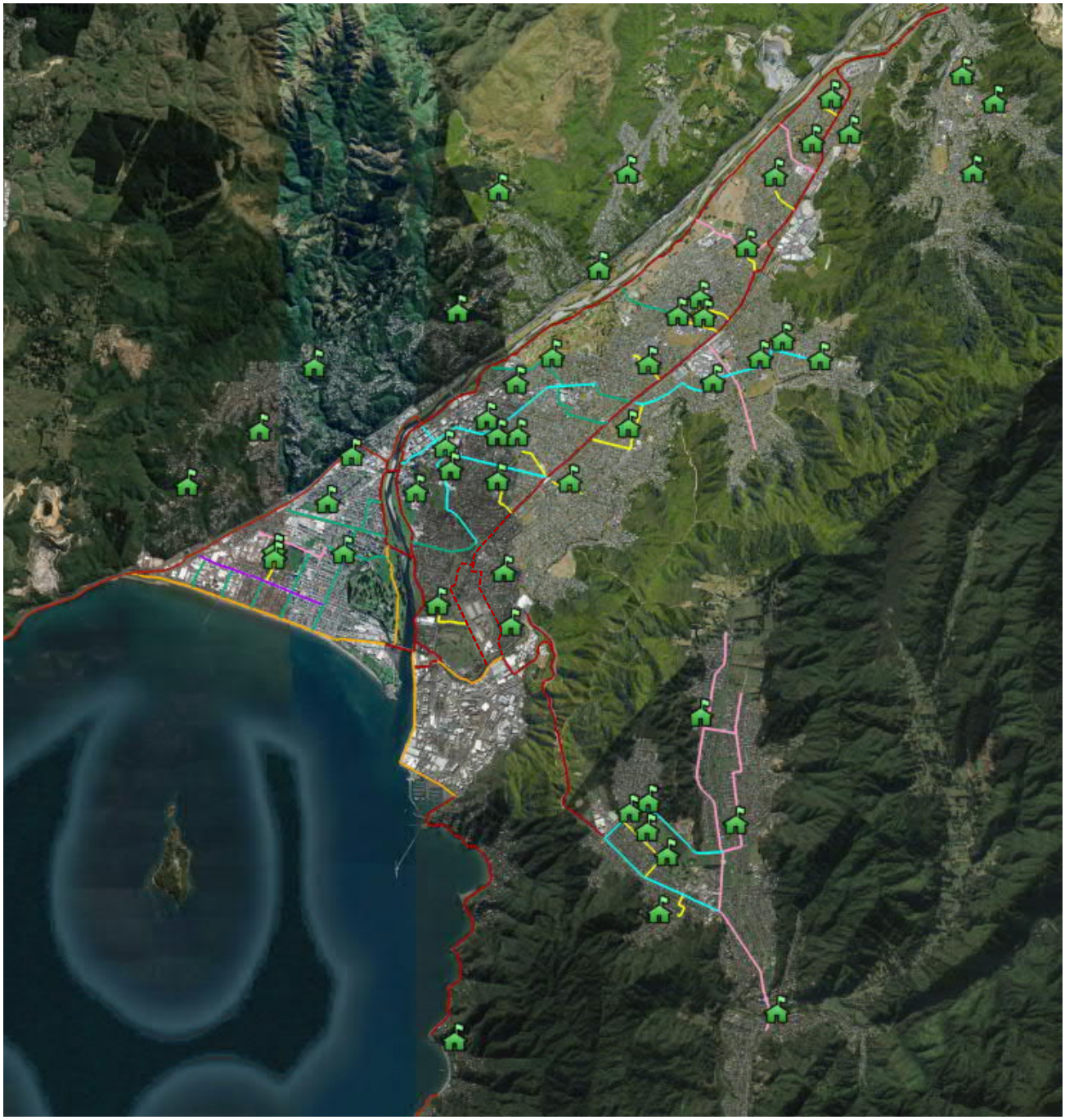
5.7 Programme 4+ development

The changes made to programme 4 to include more connections to schools and to reflect the feedback received from stakeholders on the short-listed programmes are as follows:

- Replace Stokes Valley with Petone as a demonstration neighbourhood because of the longer trip length in Stokes Valley and higher planned development in Petone. Furthermore, a complete cycleways network in Petone would maximise connections onto Te Ara Tupua and Petone has a comparatively high number of recorded crashes involving cyclists;
- Include Udy St, Britannia St and Kensington Ave in the programme to form a complete cycleways network in Petone;
- Change The Esplanade facility type to on road protected cycleway between Waione Street bridge and Te Puni Street due to the limited potential to widen the existing shared path in areas; and
- Provide shared paths to all schools along The Beltway including Pomare, St Michael's, Taita Central, Avalon, Dyer Street, Epuni, St Bernard's, Waterloo, Hutt Intermediate and Randwick Schools.

The indicative network for programme 4+ is shown in

Figure 5-6.



Legend

- Neighbourhood greenway
- Cycleway, shared path or bike lane
- Cycleway or shared path
- Shared path
- Existing and proposed cycleways
- Off road cycleway
- Cycleway or shared street
- School

Figure 5-6: Indicative cycleways network for programme 4+

5.8 Updated programme assessment

The same assessment that was completed for the short-listed programmes as undertaken for programme 4+. The results for the assessment against the investment objectives, deliverability and financial feasibility and economic feasibility are shown below. The methodology for the assessment is discussed in section 5.7 above.

5.8.1 Effectiveness for achieving the investment objectives

The results for the assessment against the investment objectives are shown in

Figure 5-7 on the following page. Comparing the results for programme 4+ against the results for the short-listed programmes provides the following insights:

- Overall programme 4+ would be effective in achieving the investment objectives with a higher score for encouraging students to use active modes than programme 4; and
- Programme 4+ scores best of all the programmes for improving safety for bike and micromobility users because would invest in Petone which is an area that has a relatively high crash history.

Investment objective	Indicators used for assessment	Do minimum: Complete committed cycleways	Programme 1: Base network	Programme 4: Base + demonstration neighbourhoods	Programme 5: Base + demonstration neighbourhoods + focus schools	Programme 4+: Hybrid
Increase the number of Hutt City residents that cycle to work and study from 1.6% in 2018 to 5% in the 2028 NZ Census	Estimated new users using buffer method	0	2	4	5	4
Increase the length of the Hutt City cycling network from 26km in 2020 to 50km by 2036	Length of proposed additional cycleways	0	3	4	5	4
Increase the proportion of Hutt City residents that perceive children using active transport to and from school as being safe or very safe from 40% in 2019 to 55% by 2027 as measured by the Greater Wellington Transport Perceptions Survey	Number of schools served by the proposed cycling networks	0	1	3	5	5
Increase the proportion of 5 to 14 year old students who use active transport to and from school from 34% to 45% by 2036 as measured by New Zealand Health Survey	Number of young people within 400m buffer of proposed cycling networks	0	2	5	5	4
Reduced DSI crashes per cycling trip in Hutt City by 30% in 2027 as recorded in CAS	Crash by crash analysis (method A) in the economic evaluation manual	0	3	4	4	5
Improve the rating of main cycling routes in Hutt City to a quality of service rating 2 by 2036 as defined by Auckland Transport's Quality of service evaluation tool for cycle facilities	Percentage of main roads rated as quality of service 2 or better	0	3	4	4	4

5	4	3	2	1	0	-1	-2	-3	-4	-5
Very significant positive impact	Significant positive impact	Moderate positive impact	Minor positive impact	Very minor positive impact	Neutral impact	Very minor adverse impact	Minor adverse impact	Moderate adverse impact	Significant adverse impact	Very significant adverse impact

Figure 5-7: Assessment of hybrid programme against the investment objectives

5.8.2 Deliverability and financial feasibility

The results for the deliverability and financial feasibility assessment results are shown in the Table 5-10 below. Overall programme 4+ was assessed as having a moderate impact on other transport modes due to the possible need for additional traffic signals. All the programmes were all assessed as being similar constructability and consentability score with the proposed projects using the existing road corridor. Programme 4+ would require an increase in funding allocated to cycleways/pathways and supporting measures compared to investments made in previous years.

	Do minimum: Complete committed cycleways	Programme 1: Base network	Programme 4: Base + demonstration neighbourhoods	Programme 5: Base + demonstration nieghbourhoods + focus schools	Programme 4+: Hybrid
Impact on other transport modes	0 Committed cycleways mostly run parallel to the harbour or rail lines and do not have at grade intersections with major roads	-2 Programme may require crossings of Harcourt Werry Dr and CBD intersection changes	-3 Programme may require crossings of Harcourt Werry Dr, CBD intersection changes and Wainuiomata intersection changes	-3 Programme may require crossings of Harcourt Werry Dr, CBD intersection changes and Wainuiomata intersection changes	-3 Programme may require crossings of Harcourt Werry Dr, CBD intersection changes and Wainuiomata intersection changes
Constructability and consentability	0 Consent application granted for Te Ara Tupua and consent application lodged for Eastern Bays shared path	-1 Cycleways within existing road corridor, may require kerb line changes in Hutt Central	-2 Cycleways within existing road corridor however additional complexity from busy roundabouts in Wainuiomata and Naenae	-2 Cycleways within existing road corridor however additional complexity from busy roundabouts in Wainuiomata and Naenae	-2 Cycleways within existing road corridor however additional complexity from busy roundabouts in Wainuiomata and Naenae
Financial feasibility	0 Funding committed from National Land Transport Programme, Covid Recovery and Response Fund and Hutt City Council	3 Reduction in per year funding commitment to cycling	-3 Increase in per year funding commitment to cycling	-5 Significant increase in per year funding commitment to cycling	-3 Increase in per year funding commitment to cycling

Table 5-10: Deliverability and financial feasibility assessment

5.8.3 Economic feasibility

The results from the economic assessment are shown in Table 5-11 to Table 5-13. The economic assessment shows that programme 4+ has higher benefits than programme 4 and lower costs than programme 5. The hybrid programme also had the highest crash cost savings of all the programmes because it invests in safe cycleways in Petone which has a relatively high crash history.

	Programme 1	Programme 4	Programme 5	Programme 4+
Health and environmental benefits	$143 million	$190 million	$226 million	$206 million
Crash cost savings	$2 million	$3 million	$5 million	$7 million

Table 5-11: Benefit streams for programme options

	Programme 1	Programme 4	Programme 5	Programme 4+
Estimated infrastructure cost	$42 million	$88 million	$117 million	$85 million
Supporting measure cost	$3 million	$3 million	$3 million	$3 million
Total cost	$45 million	$91 million	$121 million	$88 million

Table 5-12: Estimated programme costs

	Programme 1	Programme 4	Programme 5	Programme 4+
Benefit cost ratio	3.4	2.3	2.0	2.6

Table 5-13: Benefit cost ratios for short listed programme options

5.8.4 Summary of programme assessment

Considering the results of the assessment against the investment objectives, deliverability/ financial feasibility and economic feasibility it is recommended that programme 4+ be put forward to funding approval. This is because programme 4+ would be effective in improving access to employment, public transport, community facilities and schools by bike and micromobility. Programme 4+ would leverage the funding committed to cycleways/pathways in Hutt City by providing connections in Hutt Central, suburban neighbourhoods and to schools.

6. Recommended Programme

It is recommended that the implementation of the programme be staged as quick wins, medium-term and long-term to align with the completion of related transport projects and the available funding. The level of investment for the quick wins package reflects Council funding commitments towards completing the Urban Cycleways Programme and the post Covid-19 financial situation. For the indicative level of investment for each area in the tables below $ is less than $2M budgeted, $$ is between $2M and $10M and $$$ is more than $10M.

6.1 Quick wins 2021 to 2024

The quick wins package focuses on activities which can be implemented quickly and with low infrastructure costs. These activities include the Knights Road cycleway trial, shared paths to schools and links to Jackson Street. The Knights Road cycleway trial would be implemented as part of the Innovating Streets programme. The purpose of the quick wins package is to leverage off the investment provided by the Innovating Streets programme and also investment made in The Beltway and provide initial connections to Hutt CBD and Petone.

Area	Infrastructure	Supporting measures	Indicative level of investment
Petone/ Alicetown	Cycle friendly crossings and neighbourhood streets to connect The Esplanade and Jackson Street	Public bike parking Marketing, promotion and events	$
Hutt Central	Shared paths connections to schools along The Beltway Knights Road cycleway trial (implemented through Innovating Streets programme)	Public bike parking Cycle skills training Bikes in schools Marketing, promotion and events	$
Waterloo	Shared path connections to schools along The Beltway	Cycle skills training Bikes in schools	$
Epuni/Boulcott	Shared path connections to schools along The Beltway	Cycle skills training Bikes in schools	$
Avalon	Shared path connections to schools along The Beltway	Cycle skills training Bikes in schools	$
Taita	Shared path connections to schools along The Beltway	Cycle skills training Bikes in schools	$

Table 6-1: Proposed activities for the quick wins package between 2021 and 2024

6.2 Medium term 2024 to 2030

It is proposed that the focus for the medium-term investment is completing the cycleways network in Hutt Central and Petone. This is because these areas are key destinations and this staging would align the cycling and micromobility programme with completion of Riverlink and Te Ara Tupua. Other areas of investment are upgrading Port Road and the Waiwhetu River shared path to better connect the Eastern Bays shared path, Hutt River Trail and Te Hikoi Ararewa (Wainuiomata shared path).

Area	Infrastructure	Supporting measures	Indicative level of investment
Petone/ Alicetown	Formalise The Esplanade on road cycleway Extend north/south connections on Britannia St and Kensington Ave East/ west connections on Jackson St, Udy St and Wakefield St Upgrade Hutt River trail through Sladden Park	Cycle lane enforcement Marketing, promotion and events Way-finding signage and maps	$$$
Gracefield/Seaview	Upgrade shared paths on Port Rd and along Waiwhetu River	Way-finding signage and maps	$$
Hutt Central	Formalise Knights Road cycleway New cycleway connections to CBD on Bellevue Rd and Kings Crescent CBD cycleways timed to align with Riverlink project	Marketing, promotion and events Way-finding signage and maps	$$$
Epuni/Boulcott	Neighbourhood street connections to Hutt Hospital on Brees St, Copeland St and Boulcott St	Way-finding signage and maps	$

Table 6-2: Proposed activities for the medium-term package 2024 to 2030

6.3 Long term 2030 to 2036

The proposed activities for the long-term programme include completing the cycleways networks in Naenae and Wainuiomata that would cater for both local trips and trips across Hutt City. Another focus area is to improve connections between The Beltway and Hutt River Trail in Avalon and Taita.

Area	Infrastructure	Supporting measures	Indicative level of investment
Naenae	Connections on Seddon St and Naenae Rd/ Rata St	Public bike parking Cycle lane enforcement Cycle skills training Bikes in schools Marketing, promotion and events Way-finding signage and maps	$$
Avalon	Connections between Hutt River Trail and The Beltway	Cycle lane enforcement Way-finding signage and maps	$
Taita	Connections between Hutt River Trail and The Beltway	Cycle lane enforcement Way-finding signage and maps	$
Wainuiomata	Upgrades to existing The Parkway and Wainuiomata Road bike lanes Shared paths to schools Connections to north and south Wainuiomata	Public bike parking Cycle lane enforcement Cycle skills training Bikes in schools Marketing, promotion and events Way-finding signage and maps	$$$

Table 6-3: Proposed activities for long-term package 2030 to 2036

6.4 Supporting measures

In addition to investment in cycleways/pathways the recommended programme includes supporting measures (including end of trip facilities, enforcement, training and information) which assist in achieving the investment objectives. The recommended programme proposes additional investment in public cycle parking ($0.75 million), marketing promotion and events ($1.5 million) and bikes in schools ($0.75 million). It is proposed that the support measures are coordinated with the implementation of the cycleways network to remove all barriers to active and sustainable mode uptake. The details of the supporting measures and lead organisations are detailed in Table 6-4.

Initiative	Recommended approach	Indicative investment
Public cycle parking (HCC lead)	Expand the cycle parking provided at key destinations including Hutt CBD, Petone, Days Bay and sports grounds. Potential to increase cycle parking by approximately 700 spaces. Investigate secure long stay cycle parking for Hutt CBD.	$0.75 million
Cycle parking at train stations (GWRC lead)	Continue to monitor the provision of cycle parking at train stations and adjust provision of cycle parking to ensure that demand is met.	N/A included as business as usual costs
Speed enforcement (Police lead)	Continue to work with Police on speed enforcement in high risk areas including around schools and town centres.	N/A included as business as usual costs
Cycle lane enforcement (HCC lead)	Continued enforcement and education to reduce parking in bike lanes.	N/A included as business as usual costs
Marketing, promotion and events (HCC and GWRC lead)	Targeted additional marketing, promotion and events to coincide with the completion of sections of the cycle network.	$1.5 million
Cycle skills training (GWRC lead)	Continuation of the Pedal Ready programme which is coordinated with the completion of the cycle network to schools	N/A included as business as usual costs
Bikes in Schools (HCC and GWRC lead)	Funding for additional schools to be involved in the Bikes in Schools which includes equipment and riding track. Potential for approximately 15 schools to be involved in programme	$0.75 million
Cycle way-finding signage and maps (HCC lead)	Implement a consistent way-finding and directional signage across the network to help users to navigate more easily	N/A signage and maps generally included in project costs

Table 6-4: Supporting measures for 2021 to 2036

7. Recommended programme economic assessment

7.1 Procedure followed

Subsequent to this business case commencing the Economic Evaluation Manual has been replaced by the Monetised Benefits and Costs Manual. This section documents the process that was followed to assess the recommended programme against the full procedures for walking and cycling activities contained in the Monetised Benefits and Costs Manual. The Economic Evaluation Manual short form procedures were previously used to compare the short-listed programmes in section 5.8 of this report. The results from the Monetised Benefits and Costs Manual are more detailed and will therefore be used as the final assessment for the recommended programme.

7.2 Assessment methodology

A summary of the assessment methodology followed is:

- The benefit streams claimed are health benefits and crash cost savings
- No benefits or costs from lower vehicle operating speeds have been counted
- GIS analysis was used to calculate the number of new cyclists for each of the projects separately using the buffer method contained in the Monetised Benefits and Costs Manual
- Full discounting procedures were applied to the benefits and the costs taking into account the staging of investment and completion years of projects
- The key inputs for the health benefits calculation is the number of new cyclists and the length of the cycleway facility
- Safety benefits were calculated using the recorded crashes involving cyclists and then applying a 20% reduction in crashes based which is based on Waka Kotahi crash risk factors guidelines
- Maintenance costs were included for shared path facilities only because it has been assumed that on road cycling facilities would not have an overall increase in maintenance costs. This is because on road cycling facilities would reallocate existing road space whereas shared paths would be additional infrastructure. Maintenance costs for shared path facilities per year was assumed to be 3% of construction costs
- Following Monetised Benefits and Costs Manual guidance a 40-year assessment period has been used and a 4% discounting rate

7.3 Assessment results

Table 7-1 below summarises the economic evaluation results with the values being shown to the nearest thousand dollars, all benefits and costs have been discounted to present value.

	Health and environmental benefits	Crash cost reduction benefits	Construction costs	Maintenance costs	Supporting measures cost
Quick wins	$17,815,245	$3,055,468	$7,041,331	$3,057,439	$533,671
Medium term	$63,924,031	$2,056,449	$31,458,177	$3,904,305	$896,200
Long term	$52,207,808	$457,355	$22,741,642	$647,643	$708,280
Total	$133,947,084	$5,569,271	$61,241,150	$7,609,388	$2,138,151

Table 7-1: Benefits and costs for recommended programme discounted to present value

The overall benefit cost ratio for the recommended programme is 2.0 following the full procedure in the Monetised Benefits and Costs Manual.

7.4 Sensitivity tests

Multiple sensitivity tests have been applied to the economic evaluation to how sensitive results are to changes to different inputs and assumptions. The sensitivity tests that have been applied include:

- Recalibrate new cyclists based on observed data: The estimated number of existing cyclists using the buffer method was compared to the observed number of existing cyclists using 2018 census data. The estimated number of existing cyclists is 1,770 and the observed number of existing cyclists is 1,443. The estimate number is 18% higher than the observed number, therefore a sensitivity test is reducing the number of new cyclists by 18% to be in line with observed data.
- Reduce crash cost savings due to committed cycleways: To take into account safety benefits of committed cycleways the crash cost savings were reduced by 23%. This is the proportion of the total cycleways network (committed and proposed) which is committed outside of this business case.
- Discount rate of 3%: Reducing the discount rate for future benefits and costs from 4% to 3%
- Discount rate of 6%: Increasing the discount rate for future benefits and costs from 4% to 6%
- Exclude all crash cost saving: Remove crash cost saving from the benefits stream
- 20% higher costs: Increase construction and maintenance costs by 20%
- 40% higher costs: Increase construction and maintenance costs by 40%

The results for the sensitivity tests are shown in Table 7-2 below. The sensitivity tests show that the crash costs have little influence on the BCR because crash cost savings makes up a small proportion of the benefits. The number of new cyclists and higher costs do influence the BCR however under all scenarios the BCR is over 1.0. A lower discount rate of 3% results in a higher BCR of 2.2 because more future benefits are able to be claimed, the opposite is true with a 6% discount rate.

	Benefits	Costs	BCR
Baseline	$139,516,355	$70,988,689	2.0
Recalibrate new cyclists based on observed data	$177,338,682	$70,988,689	1.7
Reduced crash cost savings due to committed cycleways	$138,235,423	$70,988,689	1.9
Discount rate of 3%	$172,322,241	$77,685,633	2.2
Discount rate of 6%	$94,242,548	$59,969,931	1.6
Exclude all crash cost savings	$133,947,084	$70,988,689	1.9
20% higher costs	$139,516,355	$85,186,427	1.6
40% higher costs	$139,516,355	$99,384,165	1.4

Table 7-2: Sensitivity test results

8. Recommended programme investment assessment

8.1 Investment Assessment Framework

This section assesses the recommended programme against Waka Kotahi's Investment Assessment Framework (IAF) 2018-21. The recommended programme has a Very High/ Low assessment profile following the Monetised Benefits and Costs manual (Table 8-1 & Table 8-2). The recommended programme would have a priority order 1 for the activities prioritised for improvement which includes walking and cycling improvements. This is because the recommended programme is assessed as having a very high results alignment against the GPS 2018-21 (Table 8-3 on following page).

GPS Priorities	Results alignment	Comments
Access	Very High	The recommended programme addresses critical missing links in a strategic network by providing new connections to Hutt CBD and improving connections between strategic cycleways Hutt City is defined as a major metro area and the recommended programmes addresses critical missing links to multi-modal interchanges including Waterloo, Petone, Naenae and Taita stations.
Environment	High	The recommended programme enables a modal shift from private motor vehicles to active modes with an estimated 1,880 new cyclists.

Table 8-1: Results alignment assessment

	4% discount rate (Monetised benefits and costs manual)
Recommended programme BCR	2.0
Cost benefit appraisal assessment	Low (BCR 1-2.9)

Table 8-2: Cost benefit appraisal of the recommended programme

RESULTS ALIGNMENT	COST BENEFIT APPRAISAL	PRIORITY ORDER
Very high	L/M/H/VH	1
L/M/H	Very high (BCR 10+); PV_EoL	2
High	High (BCR 5-9.9)	3
High	Medium (BCR 3-4.9)	4
Medium	High (BCR 5-9.9)	4
High	Low (BCR 1-2.9)	5
Medium	Medium (BCR 3-4.9)	5
Medium	Low (BCR 1-2.9)	6
Low	High (BCR 5-9.9)	7
Low	Medium (BCR 3-4.9)	8
Low	Low (BCR 1-2.9)	Exclude

Table 8-3: Priority order for activities prioritised for improvement

8.2 Investment Prioritisation Method

At the time of writing this SSBC the draft Investment Prioritisation Method (IPM) was released for consultation which will replace the IAF for the next NLTP period. Because the interventions contained in this SSBC are proposed to be implemented from the next NLTP period onwards an assessment of the recommended programme against the criteria contained in the IPM has been completed. The IPM has three factors for assessing activities which are GPS alignment, scheduling and efficiency.

8.2.1 GPS Alignment

GPS alignment is an assessment of how well the activity contributes towards achieving the GPS strategic priorities, the assessment of the recommended programme is shown in Table 8-4 below. Overall the indicative GPS alignment rating of the recommended programme is a high results alignment which is based on better travel options outcome.

GPS Strategic Priority	Benefit	Indicative Rating	Notes
Better travel options	Impact on assess to opportunities	High	• The recommended investment programme will provide walking and cycling links which form part of a major urban area network. These links include The Esplanade and Port Road which are contained in the Wellington Regional Land Transport Plan 2015. • This SSBC will also improve connections to a nationally significant tourism destination which is the Remutaka Cycle Trail. The proposed improvements will also help to achieve the Great Harbour Way vision which is a continuous high quality walking and cycling route around Wellington Harbour.
Climate change	Impact on GHG	Medium	• It is estimated that the recommended programme would provide approximately 2.5% reduction in private vehicle kilometres travelled.[18]

Table 8-4: Assessment of the recommended programme against the strategic priorities of the GPS 2021/22

[18] Calculation is based on 56,470 private vehicle trips (sourced from Hutt Aimsun Model 2017), 1,388 new cycling trips (based on buffer method contained in the monetised benefits and costs manual) and average trip to work distance of 10.6km

8.2.2 Scheduling

Scheduling indicates the critically or independency of the proposed activity with other activities in a programme or with other related investments. Critically is defined as the significant of the activity's role as part of the network particularly due to availability (or not) of alternatives. Independency means the degree to which the activity is necessary to unlock the benefits of another related or integrated investment which may include major housing or industrial development.

The assessment of the recommended programme against the IPM scheduling criteria is shown in Table 8-5. Overall the recommended programme is assessed as having a high scheduling rating.

Scheduling	Indicative Rating	Notes
Interdependency	High	• The Cycling and Micromobility SSBC is important for the benefits realisation of the Te Ara Tupua project. This is because proposed cycling connections in Hutt City (and Petone in particular) will enable more people to safely access Te Ara Tupua.
Criticality	High	• The recommended investment programme will make a significant contribution towards the Wellington Mode Shift Plan. Delay in implementing the recommend investment programme will negatively impact on mode shift aspirations, greenhouse gas reduction targets and safety for vulnerable road users.

Table 8-5: Assessment of recommended programme against the scheduling criteria contained in the IPM

8.2.3 Efficiency

Efficiency indicates the expected return on investment and considers the whole life costs and benefits of the activity through a cost-benefit analysis. The recommended programme has a low efficiency rating following the Monetised benefits and costs manual.

	4% discount rate (Monetised benefits and costs manual)
Recommended programme BCR	2.0
Efficiency factor	Medium (BCR 1.0 – 2.9)

Table 8-6: Efficiency rating for the recommended programme

8.2.4 Priority order

Investment prioritisation is the basis against which Waka Kotahi evaluates proposed activities for inclusion in the NLTP. Activities with a higher priority order are more likely to be included in the NLTP, depending on the investment threshold for each activity assessment and the value of the proposed activity.

Priority order is a 3-factor matrix which considers the GPS alignment, scheduling and efficiency ratings (Table 8-7). The indicative priority order for the recommended investment programme is priority order 5 using a discount rate of 4%.

GPS alignment	Scheduling	Efficiency				
		VL* (BCR<1.0)	L (BCR 1.0-2.9)	M (BCR 3.0-5.9)	H (BCR 6.0-9.9)	VH (BCR>=10.0)
VH	H	7	3	2	1	1
VH	M	8	3	2	1	1
VH	L	9	4	3	2	2
H	H	9	5	4	4	3
H	M	10	6	5	5	3
M	H	10	7	6	6	4
M	M	11	9	8	6	5
H	L	11	8	8	7	7
M	L	11	10	10	9	9
L	H/M/L	12	12	12	12	12

Table 8-7: Investment Prioritisation Matric for Improvement Activities from the draft IPM

9. Financial case

9.1 Indicative cost

The level of investment for the recommended programme is a total of $88 million over a 15-year period with $85 million budgeted for infrastructure improvements and $3 million towards supporting measures. The implementation recommended programme is staged with a lower level of investment in the first 3 years with the larger infrastructure projects timed to occur in the medium to long term.

Below is the indicative level of investment for each stage of implementation which relates to the list of projects contained in section 6. The cost estimates will need to be revised when more detail cost estimates are available during the design and consultation stage.

- Quick wins (2021 to 2024): $7.5 million for infrastructure and $0.6 million for supporting measures
- Medium term (2024 to 2030): $40.5 million for infrastructure and $1.2 million for supporting measures
- Long term (2030 to 2036): $37.0 million for infrastructure and $1.2 million for supporting measures

9.2 Indicative programme cash flow

Table 9-1 on the following page shows the indicative un-escalated programme cost by financial year which relates to the cost estimates for the projects included in the quick wins, medium-term and long-term packages. It has been assumed that investment in supporting measures would be even throughout the investment period. The programme cash flow will be revised throughout the implementation of the programme.

	Quick wins			Medium term						Long term					
Financial year	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Infrastructure investment	2.5	2.5	2.6	6.7	6.7	6.7	6.8	6.8	6.8	6.1	6.1	6.1	6.2	6.2	6.2
Supporting measures	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Annual total	2.7	2.7	2.8	6.9	6.9	6.9	7.0	7.0	7.0	6.3	6.3	6.3	6.4	6.4	6.4
Cumulative total		5.4	8.2	15.1	22	28.9	35.9	42.9	49.9	56.2	62.5	68.8	75.2	81.6	88

Table 9-1: Indicative un-escalated programme cost by financial year

9.3 Funding arrangements

Potential funding arrangements for the implementation of the recommended programme are as follows:

- Hutt City Council and Waka Kotahi co-funding projects at the normal funding assistance rate for Hutt City which for the 2018-21 National Land Transport Programme is 51%; and
- Inclusion of selected projects in the Innovating Streets programme which met the specific criteria of the programme. The funding assistance rate for Innovating Streets Programme is 90%.

The cycleways network contained in the recommended programme is within local road corridor and therefore it is assumed that no Highway Network Operations funding would be available.

The Urban Cycleways Programme 2014 contained a funding arrangement with 1/3 from the NLTP, 1/3 from the Urban Cycleways Fund and 1/3 Council share. The Urban Cycleways Programme is fully committed and at the time of writing this SSBC the Government had indicated that the Urban Cycleways Programme would not be renewed.

Final funding arrangements will depend on future government decisions on the funding assistance rate for cycling improvement activities.

9.4 Affordability

The affordability of the recommended programme depends on the following:

- Level of funding available from Hutt City Council which depends on Long Term Plan budget setting process which started in 2020;
- Funding available from the NLTF which is influenced by the level of funding allocated to the Walking and Cycling activity class in the GPS and funding committed to walking and cycling projects across New Zealand; and
- Level of funding available through other government funding sources such as the Shovel Ready Programme.

10. Commercial Case

10.1 Procurement approach

In addition to benefits to road users, investment in cycleways/pathways can also help to create jobs in the construction sector and support the wider Hutt City economy. Particularly for the quick wins package that would occur during the Covid-19 recovery Council could maximise local employment through the procurement approach used.

Council could look to move away from the lowest price conforming tender method and apply a greater weighting to the quality components of a construction tender process. This could improve the financial health of the local construction sector by ensuring that they have future work that would permit them to reinvestment in new employees. Nationally the Government is supporting the construction sector during the post Covid-19 period through the Shovel Ready Programme which could be further supported by Council.

10.2 Low-cost low risk activity

The recommended cycling and micromobility programme contains a combination of projects of different scales and complexities. It is recommended that funding is sought from the low-cost low risk activity class of the National Land Transport Programme for infrastructure projects below $2 million in value. The types of projects which fall into this category are neighbourhood streets, shared path and buffered bike lanes which are low complexity inventions that are well understood. The low-cost low risk activity class allows the procurement process for small infrastructure projects to be streamlined and would reduce the required project management time.

The activities which are recommended for inclusion in the low-cost low risk programme are shown in Figure 10-1

Activity	Type	Cost estimate ($ million)	Staging
Te Puni Street	Neighbourhood street	$0.44	Quick wins
Victoria Street	Neighbourhood street	$0.44	Quick wins
Bay Street	Neighbourhood street	$0.44	Quick wins
Bolton Street	Neighbourhood street	$0.44	Quick wins
William Street	Neighbourhood street	$0.44	Quick wins
Taita schools	Shared path	$0.86	Quick wins
Avalon schools	Shared path	$1.32	Quick wins
Waterloo schools	Shared path	$1.85	Quick wins
Hutt Central schools	Shared path	$1.39	Quick wins
Kensington Ave	Neighbourhood street	$0.99	Medium term
Brees Street	Neighbourhood street	$1.1	Medium term

Copeland Street	Neighbourhood street	$0.66	Medium term
Udy street	Shared path	$1.72	Medium term
Britannia Street	Shared path	$0.66	Medium term
Randwick School	Shared path	$0.26	Medium term
Hutt River trail	Shared path	$1.72	Medium term
Waiwhetu River	Shared path	$1.32	Medium term
Reynolds Street	Buffered bike lanes	$0.88	Long term
Percy Cameron Street	Buffered bike lanes	$0.88	Long term
Frederick Street	Neighbourhood street	$1.43	Long term
Main Road	Buffered bike lanes	$1.76	Long term
Sedden Street	Buffered bike lanes	$1.65	Long term
Reading Street	Shared path	$0.53	Long term
Konini Street	Shared path	$1.32	Long term

Figure 10-1: Activities for possible inclusion in low-cost low risk programme

10.3 Cycling improvements activity

For the larger infrastructure projects (over $2 million in value) it is recommended that funding is sought from the cycling facilities activity class of the National Land Transport Programme. The application for the provision of public cycle parking should also be made through the cycling facilities activity class. The types of infrastructure projects contained in the recommended programme which fall into this category are long sections of protected cycleways, buffered bike lanes and shared paths. These projects are more complex in terms of technical and stakeholder input which may have multiple options for how the cycling and micromobility facilities is designed. Therefore, these projects fit well under the cycling facilities activity class which provides for a greater level of design and project management involvement.

10.4 Promotion of road safety and demand management activity

For the marketing, promotion and events and bikes in schools initiatives it is recommended that an application is made under the promotion of road safety and demand management activity class. These activities meet the criteria of supporting behaviour change to increase road safety and promote mode shift. A single application can be made for both marketing, promotion and events and bikes in schools initiatives because these are similar projects that are to be delivered within the same geographic area.

10.5 Delivery capacity

During the 2018-2021 National Land Transport Programme period Hutt City Council will have delivered several large cycleway/pathway projects. The value of the cycleway/pathway projects which are completed or under construction are shown in

Figure 10-2 below:

Activity	Spend
Wainuiomata Hill Shared Path	$12,600,000
The Beltway	$6,900,000
Low Cost Low Risk cycling improvements	$3,200,000

Figure 10-2: Cycleway/pathway projects delivered by HCC in 2018 NLTP

This highlights the Councils recent experience in delivering significant cycleway/pathway infrastructure projects. The Beltway and Wainuiomata Hill Shared Path are both technically complex and high-profile projects which required specialist input and community consultation. In comparison the projects contained in the recommended programme are not as technically complex but would have a similar level of public interest.

10.6 Implementation risk review

An implementation risk review has been undertaken in accordance with the Waka Kotahi programme business case guidance (refer to Table 10-1 on following page). It is intended that the risk review be updated during the design phase of implementing the programme.

Risks Relating To	Likelihood	Comment	Risk owners	Risk mitigation
Technical	Low	The recommended programme includes protected cycleways on urban arterials and primary collector roads. These projects have a low technical difficultly as they do not require any structures, underpasses or land reclamation	Hutt City Council	Design stage provides the opportunity to mitigate any technical issues through route and treatment choice.
Operational	Low	The activities contained in the recommended programme have a low operational risk both during construction and for the continued operation of the network. This is because the proposed activities are appropriate for a low speed urban environment.	Hutt City Council	Traffic management plans will be developed as part of the implementation phase.
Financial	Medium	The cost estimates have been developed at a feasibility level of detail using costs per kilometre from similar cycleways projects. Activities and costs for the short-term programme have been considered against the HCC emergency budget. The larger cost burden for cycleway/pathway infrastructure has been allocated in the medium to long-term programmes to allow Council to adequately plan for these in their 10-year plan.	Hutt City Council	Refine cost estimates during design and consultation phase The programme is flexible enough to permit additional activities to be brought forward in phasing if the current financial situation improves.
Stakeholder/public	Low-Medium	It is expected to be a high level of stakeholder and public interest in the cycleways programme. A stakeholder and public engagement plan has been drafted as part of this business case and will be developed in more detail during the design phase.	Hutt City Council	Consult with stakeholders and the public early in the design phase
Environmental and social responsibility	Low	The potential to affect sites of cultural, heritage or environmental significance is low with all works to be undertaken within the existing road corridor.	Hutt City Council and construction contractor	Any residual environmental impact will be managed through the employment of best practice construction methods.
Safety	Low	The proposed treatments are standard to the transport network and do not have any special or significant ongoing maintenance requirements. Safety audits will be completed of the designs both pre and post construction which is common practice for transport projects. Overall the activities have been chosen because of their potential to improve safety.	Hutt City Council and construction contractor	Consideration will be given to safety in design practices during the design phase for the activities. Designs will be changes to address any potential safety issues identified as part of the safety audit process.

Table 10-1: Implementation risk review

11. Management Case

11.1 Programme management

Delivering the recommended programme will be managed by Hutt City Council who are experienced in managing the planning, design and delivery of large cycleway/pathway projects. Procurement of suppliers for both professional services and physical works will be in accordance with established procurement policy of the Council. The activities will be delivered in accordance with Waka Kotahi requirements and meet all reporting and funding requirements.

11.2 Co-Delivery

Some of the supporting measures include as part of the recommended are outside of Hutt City Council's direct control as they are delivered by other organisations. Examples include speed enforcement which is the responsibility the NZ Police and cycle skills training which is run by Greater Wellington Regional Council. It is therefore proposed that Hutt City Council partners with these organisations to coordinate the delivery of these measures with the development of the active and sustainable modes network.

11.3 Stakeholder communication and engagement plan

Communication and engagement with stakeholder and the community is critically important for the success of the proposed cycling and micromobility programme. Hutt City Council will take a collaborative approach in engaging with stakeholders and the community were feedback is sought early in the route and design choice process. This would be an iterative process where concepts would be presented to stakeholders and the community for feedback and then developed in more detail before further feedback was sought.

The list of key stakeholders includes:

- Community boards
- Hutt Cycle Network
- Living Streets Aotearoa
- Hutt Valley Chamber of Commerce
- Business associations
- Iwi
- Automobile Association
- Hutt Valley District Health Board
- School board of trustees
- Residents and business owners

11.4 Programme performance and review

The performance of the programme will be measured using the following information:

- Cycling and micromobility volume before and after infrastructure changes
- Crashes involving bikes and micromobility users
- Traffic volumes and speeds for streets with proposed traffic calming measures
- Surveys with cyclists and micromobility users to capture satisfaction with the facilities
- Level of service improvements
- Length of cycle network implemented
- Perception surveys of residents

Hutt City Council undertakes yearly manual counts of cyclists entering the CBD which provides a useful baseline to compare usage against. It is recognised that existing cycle counts to not cover outer areas of Hutt City and that a baseline of usage in these areas will also need to be undertaken.

11.5 Programme updates

The implementation of the programme would be staged over 15 years to reflect funding availability and delivery capacity. It is recommended that every 3 years that the investment programme is updated to reflect any changes to the transport context and funding availability. The updates provide the opportunity to adjust the order which the projects are implemented whilst working towards the goal of a connected cycling and micromobility network.

11.6 Implementation

It is envisaged that each of the investment packages (quick wins, medium term and long term) would progress through the design, consultation and implementation phases as combined packages rather than a series of separate individual projects. For example, the medium-term package could be managed as a single package rather than 17 separate cycleways, neighbourhood streets and shared path projects. This is because each of the packages covers discrete geographic areas which means that efficiencies could be achieved by combining the process. Furthermore, it could be easier during the consultation stage to convey the benefits of the programme to the public if it is presented as a connected network rather than individual paths/ cycleways projects.

It is recommended that the design, consultation and implementation phases for each package are staged with the quick wins package being first. This is because the 15-year investment period means that design and consultation for the long-term package may not need to start until halfway through the investment period. A decision on whether to proceed from the design and consultation phase to the implementation phase could be sought from Waka Kotahi for each of the three packages.

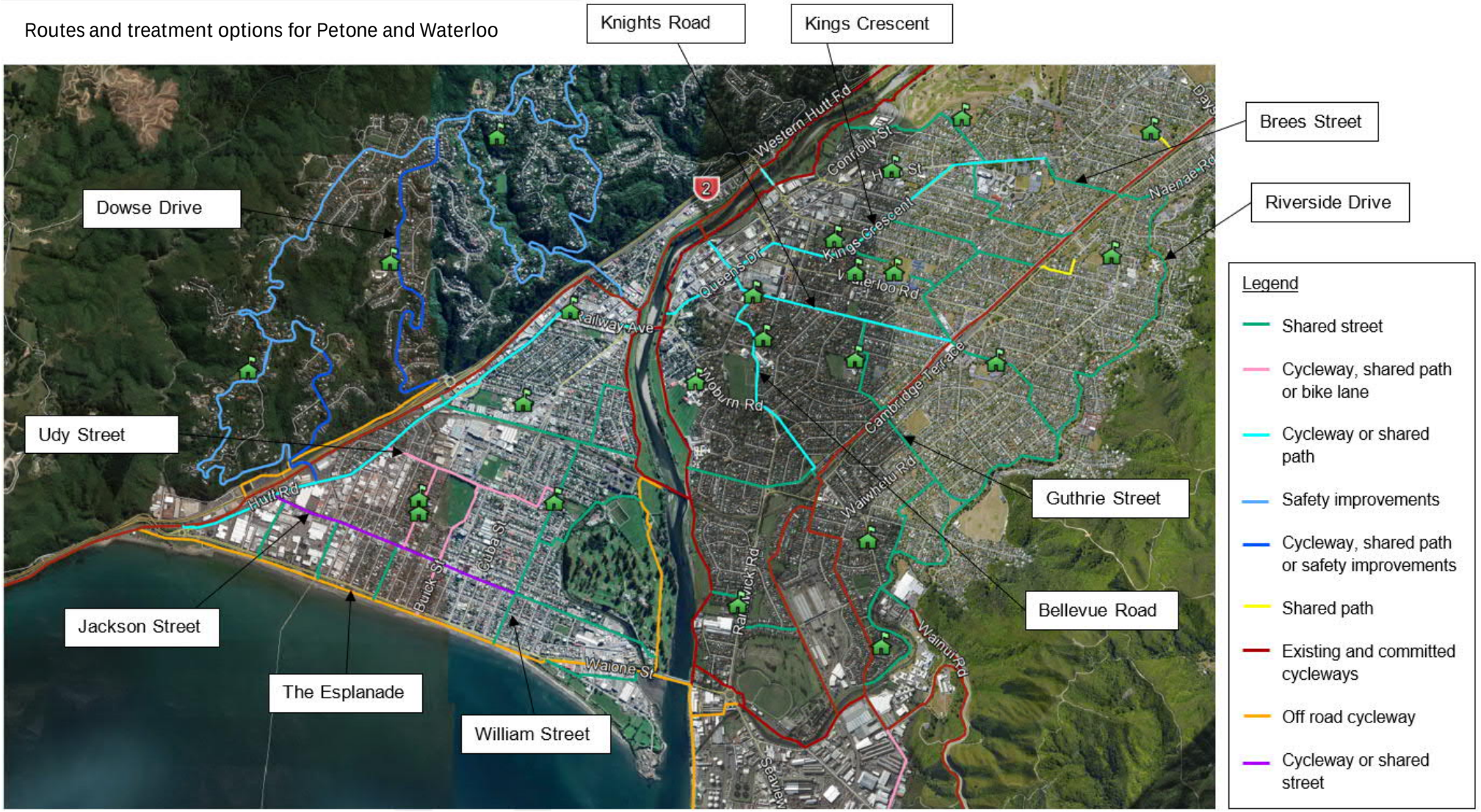
12. Next steps

The next steps for the Hutt City Cycling and Micromobility SSBC are as follows:

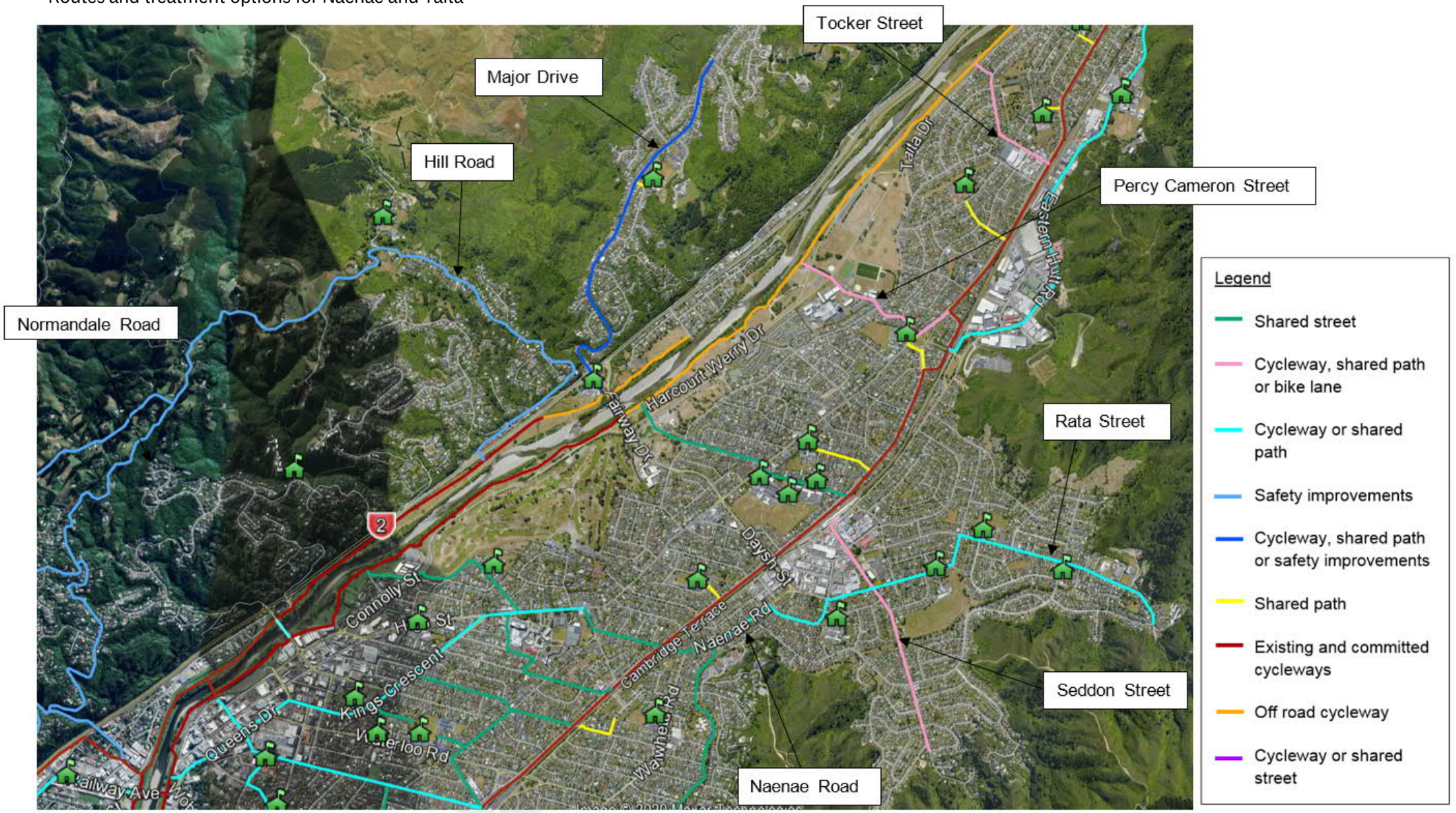
- Endorsement of SSBC by Waka Kotahi board;
- Workshop the SSBC recommendations with Hutt City Councillors;
- Endorsement of the recommended programme at Hutt City Council meeting;
- Inclusion of SSBC investment programme in National Land Transport Programme and Long Term Plan;
- Alignment between the recommended programme with business as usual activities of partner organisations; and
- Concept design and stakeholder/ community consultation starting with the activities included in the quick wins package.

Appendix A. Cycleways Network Concept

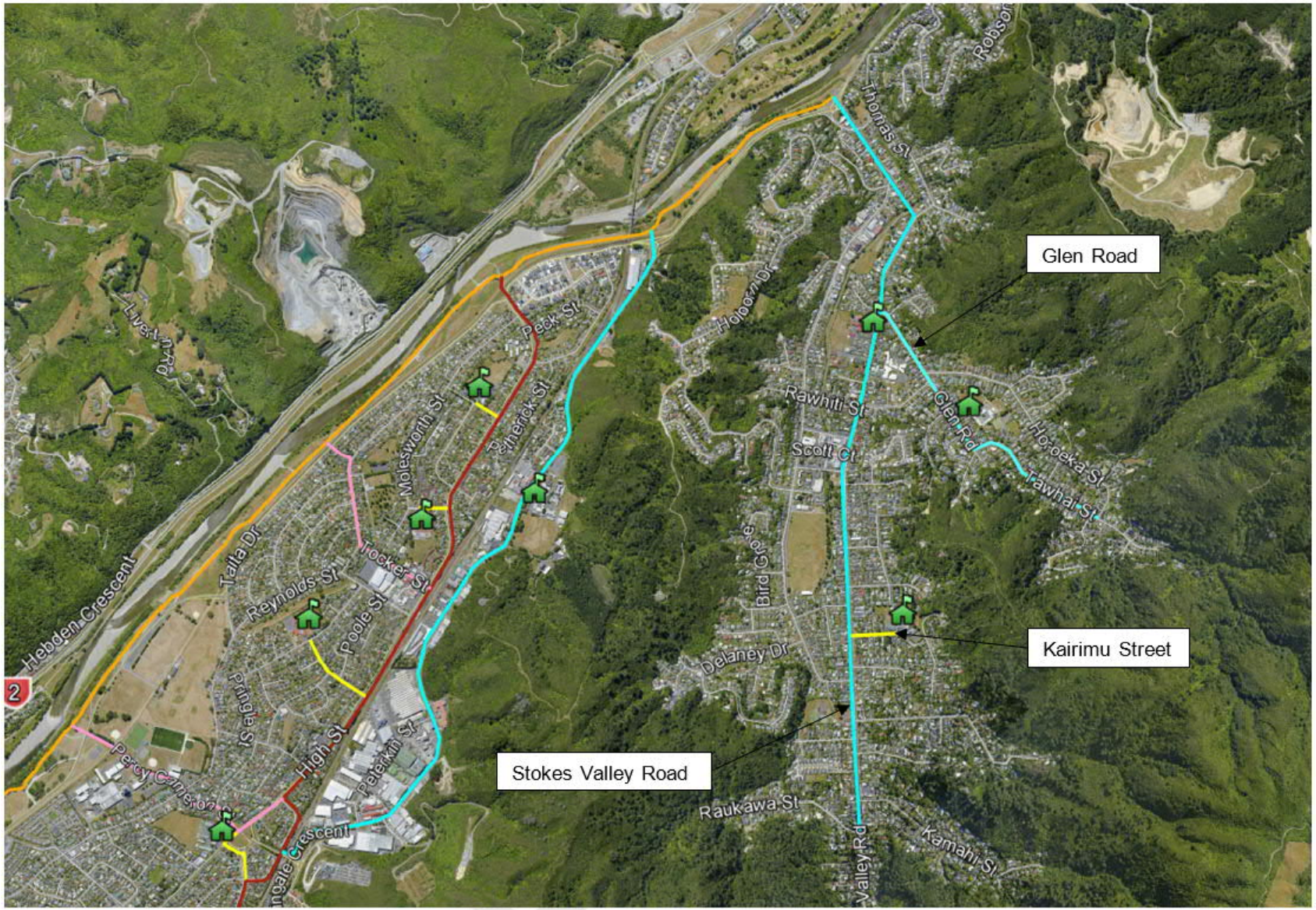
Routes and treatment options for Petone and Waterloo



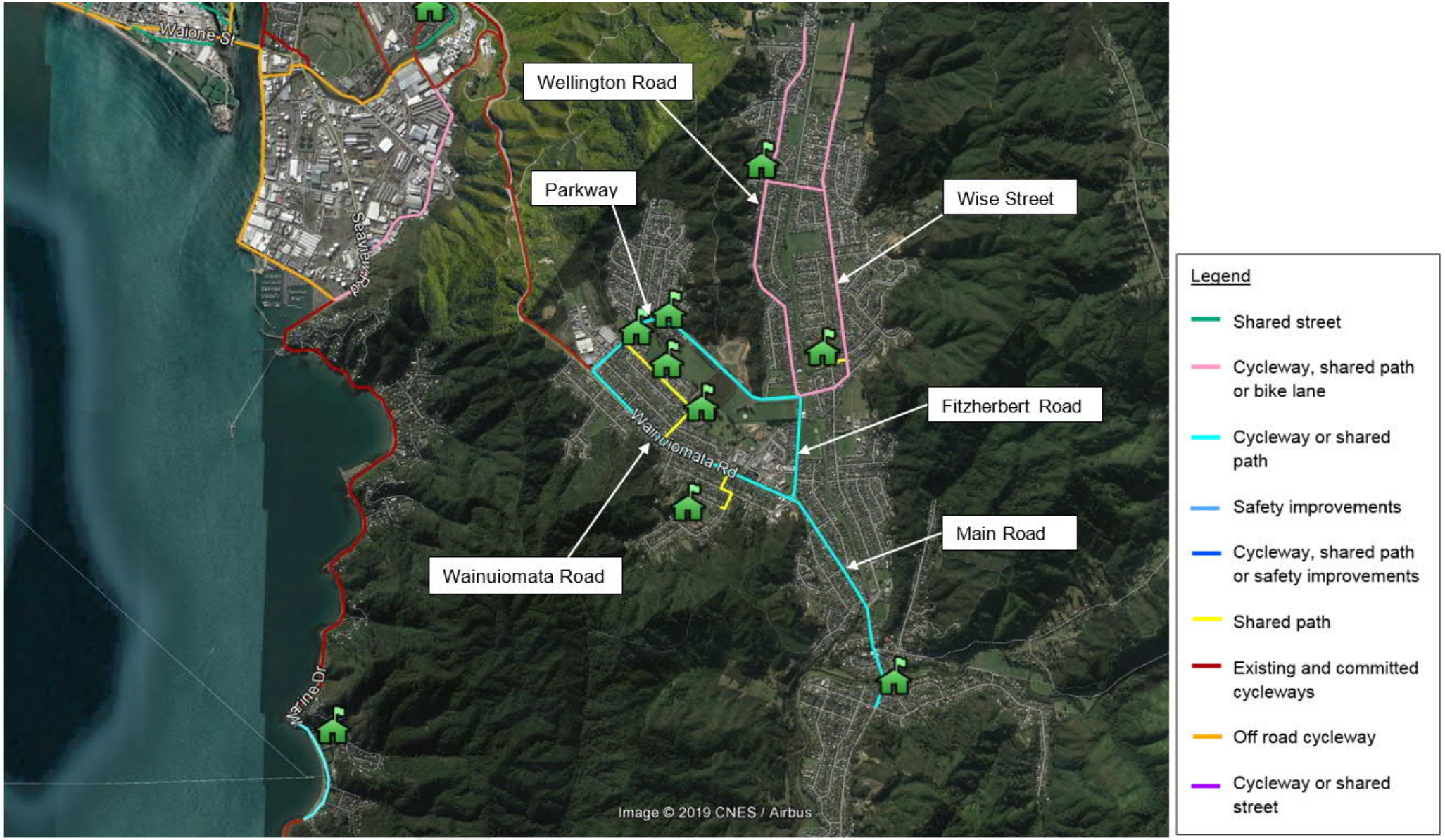
Routes and treatment options for Naenae and Taita



Routes and treatment options for Stokes Valley



Routes and treatment options for Wainuiomata



Routes and treatment options for Eastbourne

Appendix B. Treatment Options

The following section discusses the different ways that cycling and micromobility can be catered for between intersections. This section informed the approach to selecting the feasible treatment options for each of the short-listed cycleway routes.

B.1 Willingness to cycle

Research published by the Journal of the Transportation Research Board in 2014[19] found that willingness to cycle can be broken down into one of four categories relating to the type of infrastructure required before someone is willing to give cycling a go. These categories are shown in Figure B-1 below:

	Approx. percent of population	Requirements
Strong and Fearless	>1%	Will cycle no matter the road conditions.
Enthused and Confident	10%	Prefer to find a balance between direct cycling routes and level of service for bicycle users.
Interested but Concerned	60%	Will only cycle in low traffic/low speed environments or on physically separated cycleways.
No Way, No How	30%	Unwilling or unable to cycle.

Figure B-1: Type of people who cycle

The research shows the majority of people fall into the “interested but concerned” category with people in this group only considering cycling when separated from traffic when on busy roads. For people in this group the perceived safety of cycling is the main barrier preventing them from cycling more often. Therefore, safety should be considered throughout the planning and design of cycleways as this group is where potential new users mostly come from.

B.2 Shared streets

A key consideration in designing cycleways is determining whether it is appropriate to mix bicycle users with general traffic or whether physical separation between modes is required. In low volume and low speed environments it is appropriate to mix bicycle users and general traffic, in all other situations separation is required.

Low volume and low speed road environments have the advantages of improving safety of all active modes and micromobility as well as being low cost and easy to implement. Therefore, as a first step the following hierarchy of considerations was applied to the short list of routes;

1. Can the traffic volumes and speeds be reduced to allow shared roadways?

2. Can existing road space be reallocated to allow for separated cycleways?

[19] Four types of cyclists? Examination of typology for better understanding of bicycling behaviour and potential. *Transportation Research Record: Journal of the Transportation Research Board, 2387(1),129-138.*

3. Can the carriageway or footpath be widened to allow for separated cycleways?

For routes that primarily serve schools a higher importance was placed on providing physical separation being people using bikes of general traffic. This is because students tend to be less confident riding in traffic and traffic outside schools is often busy during drop-off and pick-up times even if the average daily traffic volumes are low.

B.3 Mid-block Treatment Options

There are a number of ways that people on bikes can be provided for at mid-block sections of road. The diagram below (Figure B-2) shows the high-level different types of treatments. Moving left to right on the diagram, each treatment provides a higher degree of separation from general traffic but also requires a greater amount of road space.

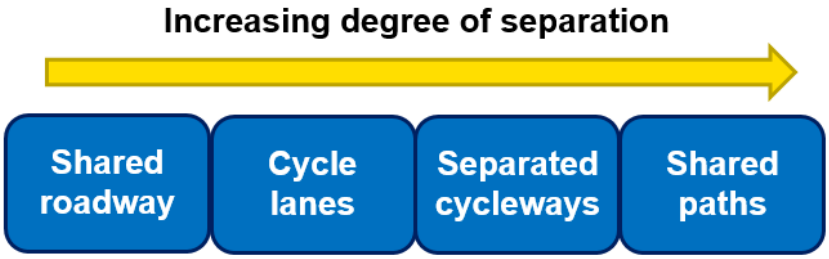


Figure B-2: Diagram showing high level cycling facility treatment options

B.3.1 Neighbourhood greenways

On quiet streets (where the traffic volume is no higher than 1,500 to 2,000 vehicles per day and the traffic operating speed is 30 kph or less) no physical separation between bicycles and general traffic is required. Instead the intention is to both make motorists aware of the presence of bicycles whilst also encouraging bicycle users to cycle towards the middle of the lane when it is safe to do so.

Mechanisms for doing this include the use of bicycle sharrows, curb builds outs and speed tables to encourage general traffic to travel at slower speeds (as shown in Figure B-3).

Figure B-3: Shared roadway route treatment (Source: Christchurch City Council)

B.3.2 On road cycle lanes

Painted on road cycle lanes should be approximately 1.8m to 2.0m wide to enable bicycle users to pass one another safely whilst not encroaching on general traffic[20]. A key consideration in the use of cycle lanes is to ensure that their width is enough to protect bicycles from the car door zone. If on street parking is absent next to the cycle lane it may be appropriate to reduce the width of the cycle lane if traffic speed and/or volumes permit doing so.

[20] Christchurch City Council (2013). *Christchurch Cycle Design Guidelines.*

B.3.3 Shared paths

Shared path width is determined by identifying the number of pedestrians and bicycle users which are likely to use the facility during peak hour based on a 75/25 directional split (Error! Reference source not found. B-4). Where the number of pedestrians or the number of cyclists is high then it may be appropriate to provide a separate cycling facility instead of a wide shared path.

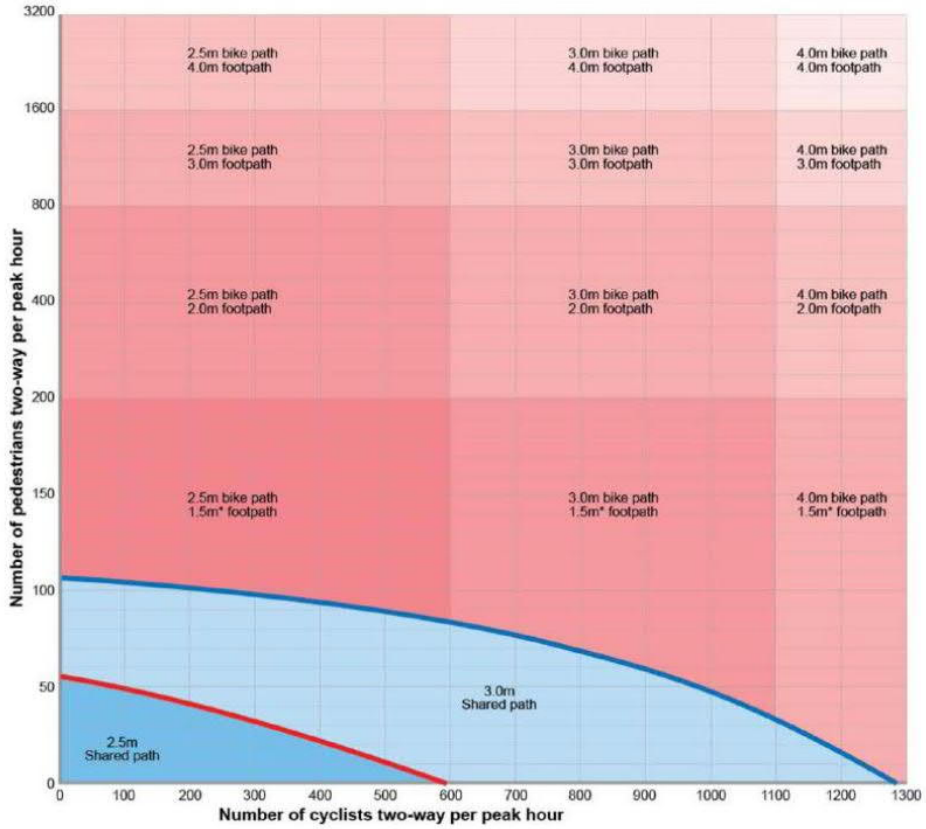


Figure B-4: Recommended shared path width based on a 75/25 directional split[21]

B.3.4 Single direction cycle path

Figure B-5 identifies that the recommended minimum width of single direction bicycle paths is 1.5m. This width is based on the minimum space required for someone to ride a bicycle safely and does not enable people to safely pass one another suggesting paths of a greater width would be more attractive.

[21] Austroads (2017). *Guide to Road Design Part 6A: Paths for Walking and Cycling*

	Path width (m)		
	Bicycle path	**Pedestrian path**	**Total**
Desirable minimum width	1.5	1.5	3.0
Absolute minimum width	1.2(1)	≥ 1.2	≥ 2.4

1 *A minimum width of 2.0 m is required where passing within the cyclists' path section occurs or where it is desirable that passing manoeuvres by cyclists occur outside of the pedestrian path section of the facility.*

Appendix B-5: Recommend path width single direction cycle path

B.3.5 Bi-directional cycle path

Appendix B-6 identifies the recommended minimum width of bi-direction bicycle paths is between 2.0m and 3.0m which enables people on bikes to pass one another. Bi-directional cycle paths may not be appropriate for roads with frequent driveways or side roads because it may be difficult for drivers to see cyclists who are travelling in the opposite direction as vehicles.

	Suggested path width (m)		
	Bicycle path	**Pedestrian path**	**Total**
Desirable minimum width	2.5	2.0	4.5
Minimum width – typical maximum	2.0– 3.0	≥ 1.5	≥ 4.5

Appendix B-6: Recommended path width for bi-directional cycle path

Appendix C. Scoring notes for programme assessment

Investment objective	Indicators used for assessment	Do minimum: Complete committed cycleways	Programme 1: Connections to primary routes	Programme 4: Connections to primary routes and demonstration neighbourhoods	Programme 5: Connections to primary routes, demonstration neighbourhoods and focus schools	Programme 4+: Hybrid
Increase the number of Hutt City residents that cycle to work and study from 1.6% in 2018 to 5% in the 2028 NZ Census	Estimated new users using buffer method	Baseline	Estimated 31% increase in new users from baseline	Estimated 71% increase in new users from baseline	Estimated 81% increase in new users from baseline	Estimated 64% increase in new users from baseline
Increase the length of the Hutt City cycling network from 26km in 2020 to 50km by 2036	Length of proposed additional cycleways	Baseline	22km new cycleways	43 km new cycleways	72 km new cycleways	44 km new cycleways
Increase the proportion of Hutt City residents that perceive children using active transport to and from school as being safe or very safe from 40% in 2019 to 55% by 2027 as measured by the Greater Wellington Transport Perceptions Survey	Number of schools served by the proposed cycling networks	Baseline	10 schools served	25 schools served	34 schools served	35 schools served
Increase the proportion of 5 to 14 year old students who use active transport to and from school from 34% to 45% by 2036 as measured by New Zealand Health Survey	Number of young people within 400m buffer of proposed cycling networks	Baseline	7,500 young people nearby	15,000 young people nearby	15,000 young people nearby	13,000 young people nearby
Reduced DSI crashes per cycling trip in Hutt City by 30% in 2027 as recorded in CAS	Crash by crash analysis (method A) in the economic evaluation manual	Baseline	Estimated 17% reduction in crashes	Estimated 21% reduction in crashes	Estimated 24% reduction in crashes	Estimated 28% reduction in crashes
Improve the rating of main cycling routes in Hutt City to a quality of service rating 2 by 2036 as defined by Auckland Transport's Quality of service evaluation tool for cycle facilities	Percentage of roads rated as quality of service 2 or better	Baseline	51% at quality of service 2 or above	71% at quality of service 2 or above	71% at quality of service 2 or above	68% at quality of service 2 or above

Appendix D. Demonstration Neighbourhood Selection Criteria

Criteria	Scoring (out of 10)	Rationale
Commute distance for all modes using Census data	10 is average commute distance of 4.5 km and 1 is average commute of 9 km	Cycling and micromobility is less suited to long commutes and therefore areas with shorter commutes are scored higher
Population under 15 years old using Census data	1 is 15% of people aged under 15 years and 10 is 25% of people aged under 15 years	Investing in areas with a higher proportion of children provides greater community benefits from improved health outcomes
How well served the area is by Metlink high frequency bus routes or rail services	10 is the suburb is not served by a high frequency bus route or train line and 0 the suburb is served by multiple high frequency bus routes or train lines	Cycling and micromobility provides an affordable transport options and therefore areas with less transport choice would benefit more from investment
Proximity to primary cycling network (both current and committed)	10 suburb is within 0.5 km of the existing primary cycling network and 1 suburb beyond 1 km of the existing primary cycling network	Areas which are located close to the existing cycleways/pathway network offer the potential to connect onto the existing network and thereby leverage past investment
Presence of local shops, amenities and community facilities	10 is suburb contains three of either supermarket, library, medical centre, community centre and sports fields. 5 is suburb with two of the facilities	Trips to local services are well suited to cycling and micromobility because of the short distance
Number of serious crashes involving cyclists and pedestrians in last 10 years from CAS data	2.5 active mode crashes per square kilometre over last 5 years scores 10 and 0.5 crashes per km^2 scores 1	Areas with a history of high crashes involving active modes have the potential for greater safety benefits from investment
Socio-economic deprivation index score for the community	Areas with a low deviation score 10 and areas with a high deviation score 10	A high deviation score indicates that an area may have lower incomes and employment. Cycling and micromobility are affordable transport modes that can improve access to jobs.
Road gradient for arterial and collector roads within suburb	10 is flat, 5 is moderate gradient, 0 is steep gradient	Hilly areas are less suited to cycling and micromobility than flat areas and therefore may have lower uptake
Population density within suburb	10 is population density above 2800 people per km and 1 is population density of 1000 people per km	The more people that live in a neighbourhood the higher the potential uptake in cycling and micromobility is

	Petone	Korokoro	Alicetown	Maungaraki	Normandale	Belmont	Kelson	Stokes Valley	Taita	Avalon	Naenae	Epuni	Waterloo	Boulcott
Commute distance for all modes using Census data	6	5	6	3	4	1	1	1	1	3	3	4	4	5
Population under 15 years old using Census data	2	5	5	7	5	5	7	9	10	2	9	5	5	4
How well served the area is by Metlink high frequency bus routes or rail services	0	10	0	10	10	10	10	5	0	0	0	0	0	5
Proximity to primary cycling network (both current and committed)	10	0	10	0	0	5	5	10	10	10	5	10	5	5
Presence of local shops, amenities and community facilities	10	0	0	0	0	0	0	10	5	5	10	5	0	0
Number of crashes involving cyclists and pedestrians in last 5 years from CAS data	7	0	10	0	0	3	0	3	0	7	7	10	5	10
Socio-economic deprivation index score for the community	6	1	5	1	1	1	1	7	10	5	10	6	3	4
Road gradient for arterial and collector roads within suburb	10	0	10	0	0	0	0	5	10	10	10	10	10	10
Population density within suburb	3	1	8	4	4	4	4	5	7	8	9	8	7	4
	54	22	54	25	24	29	28	55	53	50	63	58	39	47
Short listed neighbourhoods								Y			Y			

	Woburn	Hutt Central	Wainuiomata	Waiwhetu	Eastbourne
Commute distance for all modes using Census data	7	6	4	5	2
Population under 15 years old using Census data	2	1	10	6	4
How well served the area is by Metlink high frequency bus routes or rail services	0	0	10	5	10
Proximity to primary cycling network (both current and committed)	10	10	10	5	5
Presence of local shops, amenities and community facilities	0	10	10	0	10
Number of crashes involving cyclists and pedestrians in last 5 years from CAS data	5	10	0	3	3
Socio-economic deprivation index score for the community	1	2	8	7	1
Road gradient for arterial and collector roads within suburb	10	10	5	10	10
Population density within suburb	4	4	5	3	5
	39	53	62	44	50
Short listed neighbourhoods			Y		

Appendix E. Focus schools selection criteria

Criteria	Scoring (out of 10)	Rationale
School roll	10 is 500 students enrolled, 5 is 350 students and 1 is 50 students	Larger schools have higher potential uptake in active modes
School character	Local school score 10, special character school score 5 and private school score 0	Private schools and special character schools draw students from a larger area. Long trips to schools are less suited to cycling and micromobility
Proximity to cycleway routes	School located within 200m of current or proposed cycleway score 10, within 400m score 5 and further than 400m score 0	Leverage existing investment in protected cycleways by connecting nearby schools
Safety around schools	Schools with 30 or more speed or vulnerable road user type crashes within 500m radius of school score 10	History of speed related crashes or crashes involving vulnerable road users is an indication that traffic calming could be needed
Road hierarchy	School gate on arterial road score 0, school gate on primary collector road score 5 and school gate on local road score 10	Arterial roads and collector roads have higher traffic volumes which makes cycling and micromobility less attractive transport modes
School involved in Movin' March	10 for involved in Movin March and 0 for not involved	Involvement in Moving March shows school engagement in active transport initiatives
School involved in Bikes in Schools	10 for involved in bikes in schools and 0 for not involved	Students would have been taught cycling skills are are therefore more likely to consider cycling to school
Road gradient	Road which school gate is on is flat score 10, moderate gradient score 5 and steep gradient score 0	Steep roads are less suited to cycling and micromobility especially for less confident users
Decile rating	Low decile is a 10 and a high decile is a 1	Prioritises investment in communities with the greatest needs

	Arakura School	Avalon Intermediate	Avalon School	Belmont School	Boulcott School	Chilton Saint James School	Dyer Street School	Eastern Hutt School	Epuni School	Fernlea School	Gracefield School	Hutt Central School	Hutt Intermediate	High Valley High School
School roll	3	4	5	8	7	3	4	10	2	5	5	6	10	10
School character	10	10	10	10	10	0	10	10	10	10	10	10	10	10
Proximity to cycleway routes	10	10	5	10	5	10	10	10	0	0	10	0	5	10
Safety around school	4	7	4	5	3	6	9	10	9	3	3	9	3	7
Road hierarchy	5	0	10	0	5	0	10	0	10	10	5	0	10	0
School involved in Movin' March	0	0	0	0	0	0	0	10	10	10	0	0	0	0
School involved in Bikes in Schools	0	0	0	0	0	0	0	0	0	10	0	0	0	0
Road gradient	10	10	10	0	10	10	10	10	10	10	10	10	10	10
Decile rating	8	8	8	3	3	0	6	1	7	6	5	2	2	2
Unweighted score	50	49	52	36	43	29	59	61	58	64	48	37	50	49
Short listed	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes

	Kelson School	Konini Primary School	Koraunui School	Korokoro School	Maranatha Christian	Maungaraki School	Muritai School	Naenae Intermediate	Naenae College	Naenae School	Normandale School	Our Lady of the Rosary	Petone Central School	Pomare School
School roll	5	3	5	4	3	7	8	7	10	5	4	5	1	1
School character	10	10	10	10	5	10	10	10	10	10	10	5	10	10
Proximity to cycleway routes	0	5	0	0	0	0	0	10	5	10	0	10	10	10
Safety around school	1	7	1	1	1	4	1	6	8	4	2	10	8	7
Road hierarchy	5	10	10	10	10	10	10	10	5	10	10	0	10	10
School involved in Movin' March	0	10	0	10	0	10	0	0	0	10	10	0	0	0
School involved in Bikes in Schools	0	0	0	0	0	0	0	0	0	0	0	10	0	0
Road gradient	0	10	10	0	0	0	10	10	10	10	0	10	10	10
Decile rating	1	6	7	0	3	0	0		7	7	0	5	6	9
Unweighted score	22	61	43	35	22	41	39	53	55	66	36	55	55	57
Short listed	No	Yes	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes

	Pukeatua Primary	Randwick School	Raphael House Rudolf Steiner	Rata Street School	Sacred Heart School	Sacred Heart College	San Antonio School	St Bernadettes School	St Bernards College	St Claudine Thevenet	St Michaels School	St Orans College	Sts Peter and Paul School	Taita Central School
School roll	3	3	4	7	3	10	1	2	10	5	2	10	9	3
School character	10	10	5	10	5	5	5	5	5	5	5	5	5	10
Proximity to cycleway routes	10	5	0	10	10	10	0	10	0	5	10	0	10	5
Safety around school	5	4	2	6	8	6	1	7	4	4	10	5	10	8
Road hierarchy	10	0	10	10	10	5	10	10	0	10	10	0	5	10
School involved in Movin' March	0	10	10	10	10	0	0	0	0	10	0	0	0	10
School involved in Bikes in Schools	0	10	0	10	0	0	0	0	0	10	0	0	0	0
Road gradient	10	10	0	10	10	10	10	10	10	10	10	10	10	10
Decile rating	7	7	0	8	0	3	0	7	4	7	8	0	1	8
Unweighted score	55	59	31	81	56	49	27	51	33	66	55	30	50	64
Short listed	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes

	Taita College	Tawhai School	Tui Glen School	Te Kura Kaupapa	Wa Ora Montessori	Wainuiomata Intermediate	Wainuiomata Primary	Wainuiomata High School	Waterloo School	Wellesley College	Wilford School
School roll	8	7	3	5	4	6	5	10	10	6	7
School character	10	10	10	5	5	10	10	10	10	0	10
Proximity to cycleway routes	0	0	0	0	10	10	10	10	5	10	10
Safety around school	4	2	3	5	3	9	4	4	8	2	2
Road hierarchy	0	5	5	10	10	10	5	5	10	5	10
School involved in Movin' March	0	10	0	0	0	0	10	0	0	0	0
School involved in Bikes in Schools	0	0	10	0	0	0	10	0	0	0	0
Road gradient	10	10	10	10	10	10	10	10	10	10	10
Decile rating	9	5	8	7	2	7	6	7	2	0	4
Unweighted score	41	49	49	42	44	62	70	56	55	33	53
Short listed	No	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes

Appendix F. Comparison of level of investment in cycleways/pathways infrastructure

Urban Cycleways Programme	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2020/21	2021/22	2022/23	Total project cost	Source
The Beltway				$ 1.50	$ 1.90	$ 1.15	$ 1.00	$ 0.90	$ 0.90	$ 7.35	Budget in Long Term Plan 2018-2028
Eastern Bays Shared Path				$ 2.25	$ 3.60	$ 2.00	$ 2.30	$ 2.20	$ 2.20	$ 14.55	Budget in Long Term Plan 2018-2028
Wainuiomata Shared Path	$ 4.30	$ 4.30	$ 4.30							$ 12.90	Actual construction costs
										$ 30.00	
	over 9 years	per year									
Previous investment in cycling	$ 34.80	$ 3.9									
	over 15 years	per year	change in level of investment								
Programme 1	$ 45	$ 3.0	-22%								
Programme 4	$ 91	$ 6.1	57%								
Programme 5	$ 120	$ 8.0	107%								
Programme 4+	$ 87	$ 5.8	50%								
Population of Hutt City in 2018	104500										
Urban population of New Zealand in 2018	4201960										
Hutt City shared of population	2.5%										
GPS 2021 funding for walking and cycling per yea	$ 130,000,000										
Programme costs average per year											
Programme 1	$ 3,000,000										
Programme 4	$ 6,100,000										
Programme 5	$ 8,000,000										
Programme 4+	$ 5,800,000										

Population of Hutt City in 2018	104500
Urban population of New Zealand in 2018	4201960
Hutt City shared of population	2.5%
GPS 2021 funding for walking and cycling per yea	$ 130,000,000
Programme costs average per year	
Programme 1	$ 3,000,000
Programme 4	$ 6,100,000
Programme 5	$ 8,000,000
Programme 4+	$ 5,800,000
Percentage of GPS funding required	
Programme 1	2.3%
Programme 4	4.7%
Programme 5	6.2%
Programme 4+	4.5%
*Assumed average for upper funding range	

Appendix G. High level cost estimates

Programme 1					
Location	**Type**	**Length (km)**	**Construction cost estimate**	**Professional services costs**	**Total project cost**
Reynolds St	Buffered bike lane	0.8	$ 800,000	$ 80,000	$ 880,000
Percy Cameron St	Buffered bike lane	0.8	$ 800,000	$ 80,000	$ 880,000
Frederick St	Neighbourhood street	1.3	$ 1,300,000	$ 130,000	$ 1,430,000
Knights Rd	Protected cycleway	1.1	$ 3,300,000	$ 330,000	$ 3,630,000
Bellevue Rd	Protected cycleway	1.3	$ 3,900,000	$ 390,000	$ 4,290,000
Kings Crescent	Protected cycleway	1.6	$ 4,800,000	$ 480,000	$ 5,280,000
Whites Line West	Neighbourhood street	2.5	$ 2,500,000	$ 250,000	$ 2,750,000
Brees St	Neighbourhood street	1	$ 1,000,000	$ 100,000	$ 1,100,000
Copeland St	Neighbourhood street	0.6	$ 600,000	$ 60,000	$ 660,000
Port Rd	Shared path	1.8	$ 2,160,000	$ 216,000	$ 2,376,000
William Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Hutt River trail	Shared path	1.3	$ 1,560,000	$ 156,000	$ 1,716,000
The Esplanade	Protected cycleway	2.1	$ 6,300,000	$ 630,000	$ 6,930,000
Jackson Street	Neighbourhood street	1.4	$ 1,400,000	$ 140,000	$ 1,540,000
Te Puni Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Victoria Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Bay Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Bolton Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Waiwhetu River	Shared path	1.0	$ 1,200,000	$ 120,000	$ 1,320,000
Margaret Street	Protected cycleway	0.6	$ 1,800,000	$ 180,000	$ 1,980,000
Queens Drive	Protected cycleway	1	$ 3,000,000	$ 300,000	$ 3,300,000
Infrastructure cost					$ 42,262,000
Supporting measure cost					$ 3,000,000
Total programme cost					$ 45,262,000

Programme 4					
Location	**Type**	**Length (k**	**Construction cost estimate**	**Professional services costs**	**Total project cost**
Reynolds St	Buffered bike lane	0.8	$ 800,000	$ 80,000	$ 880,000
Percy Cameron St	Buffered bike lane	0.8	$ 800,000	$ 80,000	$ 880,000
Frederick St	Neighbourhood street	1.3	$ 1,300,000	$ 130,000	$ 1,430,000
Knights Rd	Protected cycleway	1.1	$ 3,300,000	$ 330,000	$ 3,630,000
Bellevue Rd	Protected cycleway	1.3	$ 3,900,000	$ 390,000	$ 4,290,000
Kings Crescent	Protected cycleway	1.6	$ 4,800,000	$ 480,000	$ 5,280,000
Whites Line West	Neighbourhood street	2.5	$ 2,500,000	$ 250,000	$ 2,750,000
Brees St	Neighbourhood street	1	$ 1,000,000	$ 100,000	$ 1,100,000
Copeland St	Neighbourhood street	0.6	$ 600,000	$ 60,000	$ 660,000
Port Rd	Shared path	1.8	$ 2,160,000	$ 216,000	$ 2,376,000
William Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Hutt River trail	Shared path	1.3	$ 1,560,000	$ 156,000	$ 1,716,000
The Esplanade	Protected cycleway	2.1	$ 6,300,000	$ 630,000	$ 6,930,000
Jackson Street	Neighbourhood street	1.4	$ 1,400,000	$ 140,000	$ 1,540,000
Te Puni Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Victoria Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Bay Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Bolton Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Waiwhetu River	Shared path	1	$ 1,200,000	$ 120,000	$ 1,320,000
Margaret Street	Protected cycleway	0.6	$ 1,800,000	$ 180,000	$ 1,980,000
Queens Drive	Protected cycleway	1	$ 3,000,000	$ 300,000	$ 3,300,000
Wainuiomata Road	Protected cycleway	1.7	$ 5,100,000	$ 510,000	$ 5,610,000
Parkway	Protected cycleway	1.8	$ 5,400,000	$ 540,000	$ 5,940,000
Wellington Road/ Fitzherbert F	Buffered bike lane	3.3	$ 3,300,000	$ 330,000	$ 3,630,000
Wise St/ Nelson Cres/ Norfolk	Buffered bike lane	2.6	$ 2,600,000	$ 260,000	$ 2,860,000
Main Road	Buffered bike lane	1.6	$ 1,600,000	$ 160,000	$ 1,760,000
Stokes Valley Road	Protected cycleway	3.1	$ 9,300,000	$ 930,000	$ 10,230,000
Rata Street/ Naenae Road	Protected cycleway	3.2	$ 9,600,000	$ 960,000	$ 10,560,000
Sedden Street	Buffered bike lane	1.5	$ 1,500,000	$ 150,000	$ 1,650,000
Glen Road	Shared path	1.3	$ 1,560,000	$ 156,000	$ 1,716,000
Kairimu Street	Shared path	0.2	$ 240,000	$ 24,000	$ 264,000
Reading Street	Shared path	0.4	$ 480,000	$ 48,000	$ 528,000
Konini Street	Shared path	1.0	$ 1,200,000	$ 120,000	$ 1,320,000
Infrastructure cost					$ 88,330,000
Supporting measure cost					$ 3,000,000
Total programme cost					$ 91,330,000

Programme 5					
Location	***Type***	**Length (k**	**Cost estimate**	**Professional services costs**	**Total project cost**
Reynolds St	Buffered bike lane	0.8	$ 800,000	$ 80,000	$ 880,000
Percy Cameron St	Buffered bike lane	0.8	$ 800,000	$ 80,000	$ 880,000
Frederick St	Neighbourhood street	1.3	$ 1,300,000	$ 130,000	$ 1,430,000
Knights Rd	Protected cycleway	1.1	$ 3,300,000	$ 330,000	$ 3,630,000
Bellevue Rd	Protected cycleway	1.3	$ 3,900,000	$ 390,000	$ 4,290,000
Kings Crescent	Protected cycleway	1.6	$ 4,800,000	$ 480,000	$ 5,280,000
Whites Line West	Neighbourhood street	2.5	$ 2,500,000	$ 250,000	$ 2,750,000
Brees St	Neighbourhood street	1	$ 1,000,000	$ 100,000	$ 1,100,000
Copeland St	Neighbourhood street	0.6	$ 600,000	$ 60,000	$ 660,000
Port Rd	Shared path	1.8	$ 2,160,000	$ 216,000	$ 2,376,000
William Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Hutt River trail	Shared path	1.3	$ 1,560,000	$ 156,000	$ 1,716,000
The Esplanade	Protected cycleway	2.1	$ 6,300,000	$ 630,000	$ 6,930,000
Jackson Street	Neighbourhood street	1.4	$ 1,400,000	$ 140,000	$ 1,540,000
Te Puni Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Victoria Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Bay Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Bolton Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Waiwhetu River	Shared path	1	$ 1,200,000	$ 120,000	$ 1,320,000
Margaret Street	Protected cycleway	0.6	$ 1,800,000	$ 180,000	$ 1,980,000
Queens Drive	Protected cycleway	1	$ 3,000,000	$ 300,000	$ 3,300,000
Wainuiomata Road	Protected cycleway	1.7	$ 5,100,000	$ 510,000	$ 5,610,000
Parkway	Protected cycleway	1.8	$ 5,400,000	$ 540,000	$ 5,940,000
Wellington Road/ Fitzherbert F	Buffered bike lane	3.3	$ 3,300,000	$ 330,000	$ 3,630,000
Wise St/ Nelson Cres/ Norfolk	Buffered bike lane	2.6	$ 2,600,000	$ 260,000	$ 2,860,000
Main Road	Buffered bike lane	1.6	$ 1,600,000	$ 160,000	$ 1,760,000
Stokes Valley Road	Protected cycleway	3.1	$ 9,300,000	$ 930,000	$ 10,230,000
Rata Street/ Naenae Road	Protected cycleway	3.2	$ 9,600,000	$ 960,000	$ 10,560,000
Sedden Street	Buffered bike lane	1.5	$ 1,500,000	$ 150,000	$ 1,650,000
Glen Road	Shared path	1.3	$ 1,560,000	$ 156,000	$ 1,716,000
Kairimu Street	Shared path	0.2	$ 240,000	$ 24,000	$ 264,000
Reading Street	Shared path	0.4	$ 480,000	$ 48,000	$ 528,000
Konini Street	Shared path	1.0	$ 1,200,000	$ 120,000	$ 1,320,000
Wainuiomata	Neighbourhood street	5.1	$ 5,100,000	$ 510,000	$ 5,610,000
Naenae	Neighbourhood street	8.8	$ 8,800,000	$ 880,000	$ 9,680,000
Stokes Valley	Neighbourhood street	3.9	$ 3,900,000	$ 390,000	$ 4,290,000
Wainuiomata schools	Shared path	2.2	$ 2,640,000	$ 264,000	$ 2,904,000
Naena schools	Shared path	0.7	$ 840,000	$ 84,000	$ 924,000
Taita schools	Shared path	0.7	$ 780,000	$ 78,000	$ 858,000
Avalon schools	Shared path	1.0	$ 1,200,000	$ 120,000	$ 1,320,000
Waterloo schools	Shared path	1.4	$ 1,680,000	$ 168,000	$ 1,848,000
Hutt Central schools	Shared path	1.1	$ 1,320,000	$ 132,000	$ 1,452,000
Randwick School	Shared path	0.7	$ 840,000	$ 84,000	$ 924,000
Infrastructure cost					$118,140,000
Supporting measure cost					$ 3,000,000
Total programme cost					$121,140,000

Programme 4+					
Location	***Type***	**Length (km)**	**Cost estimate**	**Professional services costs**	**Total project cost**
Reynolds St	Buffered bike lane	0.8	$ 800,000	$ 80,000	$ 880,000
Percy Cameron St	Buffered bike lane	0.8	$ 800,000	$ 80,000	$ 880,000
Frederick St	Neighbourhood street	1.3	$ 1,300,000	$ 130,000	$ 1,430,000
Knights Rd	Protected cycleway	1.1	$ 3,300,000	$ 330,000	$ 3,630,000
Bellevue Rd	Protected cycleway	1.3	$ 3,900,000	$ 390,000	$ 4,290,000
Kings Crescent	Protected cycleway	1.6	$ 4,800,000	$ 480,000	$ 5,280,000
Whites Line West	Neighbourhood street	2.5	$ 2,500,000	$ 250,000	$ 2,750,000
Brees St	Neighbourhood street	1	$ 1,000,000	$ 100,000	$ 1,100,000
Copeland St	Neighbourhood street	0.6	$ 600,000	$ 60,000	$ 660,000
Port Rd	Shared path	1.8	$ 2,160,000	$ 216,000	$ 2,376,000
William Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Hutt River trail	Shared path	1.3	$ 1,560,000	$ 156,000	$ 1,716,000
The Esplanade	Protected cycleway	2.1	$ 6,300,000	$ 630,000	$ 6,930,000
Jackson Street	Neighbourhood street	1.4	$ 1,400,000	$ 140,000	$ 1,540,000
Te Puni Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Victoria Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Bay Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Bolton Street	Neighbourhood street	0.4	$ 400,000	$ 40,000	$ 440,000
Waiwhetu River	Shared path	1	$ 1,200,000	$ 120,000	$ 1,320,000
Margaret Street	Protected cycleway	0.6	$ 1,800,000	$ 180,000	$ 1,980,000
Queens Drive	Protected cycleway	1	$ 3,000,000	$ 300,000	$ 3,300,000
Wainuiomata Road	Protected cycleway	1.7	$ 5,100,000	$ 510,000	$ 5,610,000
Parkway	Protected cycleway	1.8	$ 5,400,000	$ 540,000	$ 5,940,000
Wellington Road/ Fitzherbert F	Buffered bike lane	3.3	$ 3,300,000	$ 330,000	$ 3,630,000
Wise St/ Nelson Cres/ Norfolk	Buffered bike lane	2.6	$ 2,600,000	$ 260,000	$ 2,860,000
Main Road	Buffered bike lane	1.6	$ 1,600,000	$ 160,000	$ 1,760,000
Rata Street/ Naenae Road	Protected cycleway	3.2	$ 9,600,000	$ 960,000	$ 10,560,000
Sedden Street	Buffered bike lane	1.5	$ 1,500,000	$ 150,000	$ 1,650,000
Reading Street	Shared path	0.4	$ 480,000	$ 48,000	$ 528,000
Konini Street	Shared path	1.0	$ 1,200,000	$ 120,000	$ 1,320,000
Kensington Ave	Neighbourhood street	0.9	$ 900,000	$ 90,000	$ 990,000
Udy Street	Shared path	1.3	$ 1,560,000	$ 156,000	$ 1,716,000
Britannia Street	Shared path	0.5	$ 600,000	$ 60,000	$ 660,000
Taita schools	Shared path	0.7	$ 780,000	$ 78,000	$ 858,000
Avalon schools	Shared path	1.0	$ 1,200,000	$ 120,000	$ 1,320,000
Waterloo schools	Shared path	1.4	$ 1,680,000	$ 168,000	$ 1,848,000
Hutt Central schools	Shared path	1.1	$ 1,260,000	$ 126,000	$ 1,386,000
Randwick School	Shared path	0.2	$ 240,000	$ 24,000	$ 264,000
Infrastructure cost					$ 85,162,000
Supporting measure cost					$ 3,000,000
Total programme cost					$ 88,162,000

Appendix H. Detailed economic assessment of recommended programme

BCR
All Schemes

	Facility benefits	Crash cost savings	Construction Costs	Maintenance Costs	Support measures
Quick Wins	17,815,245	3,055,468	7,041,331	3,057,439	533,671
Medium Term	63,924,031	2,056,449	31,458,177	3,904,305	896,200
Long Term	52,207,808	457,355	22,741,642	647,643	708,280
Total	133,947,084	5,569,271	61,241,150	7,609,388	2,138,151

Benefits	139,516,355
Costs	70,988,689
BCR	2.0

Assumptions and Parameters

Schemes	Description	Construction period in years
Scheme 1	Quick Wins	0.5
Scheme 2	Medium Term	6
Scheme 3	Long Term	6

Year 0	2020
Evaluation period	40
Evaluation first year	2021
Evaluation last year	2060
Discount factor	4%
Discount factor - sensitivity	6%
Cyclist growth rate	1%
Existing daily cyclist	1,443
Length cycled (km)	10.61
Reduction in trip length	0.4
Travel time cost	$7.80
Relative attractiveness with no cycle lane	1.00
Relative attractiveness with on road cycle lane	1.80
Mean cycling speed (km/h)	20
Days of a year	365
Health benefits for new user($/km)	2.2
Update factor WCB (2018 to 2020)	1.04
Update factor ECC (2015 to 2020)	1.14
Update factor TTC (2002 to 2020)	1.57
Annual maintenance costs %	3%
Degrowth factor for crashes	0.86

Crash cost savings
Quick Wins

Financial Year	Year	New daily cyclists	Crash cost savings, $ 2015	Crash cost savings, $ 2020	Discounting factor	Discounted crash cost savings in $, 2020
2018/19	2018	767	0	0	0.00	0
2019/20	2019	768	0	0	0.00	0
2020/21	2020	769	0	0	1.00	0
2021/22	2021	770	0	0	0.96	0
2022/23	2022	771	49,860	56,840	0.92	52,552
2023/24	2023	772	99,719	113,680	0.89	101,061
2024/25	2024	773	149,579	170,520	0.85	145,761
2025/26	2025	774	149,579	170,520	0.82	140,155
2026/27	2026	775	149,579	170,520	0.79	134,764
2027/28	2027	776	149,579	170,520	0.76	129,581
2028/29	2028	777	149,579	170,520	0.73	124,597
2029/30	2029	778	149,579	170,520	0.70	119,805
2030/31	2030	779	149,579	170,520	0.68	115,197
2031/32	2031	780	149,579	170,520	0.65	110,767
2032/33	2032	781	149,579	170,520	0.62	106,506
2033/34	2033	782	149,579	170,520	0.60	102,410
2034/35	2034	783	149,579	170,520	0.58	98,471
2035/36	2035	784	149,579	170,520	0.56	94,684
2036/37	2036	785	149,579	170,520	0.53	91,042
2037/38	2037	787	149,579	170,520	0.51	87,540
2038/39	2038	788	149,579	170,520	0.49	84,173
2039/40	2039	789	149,579	170,520	0.47	80,936
2040/41	2040	790	149,579	170,520	0.46	77,823
2041/42	2041	791	149,579	170,520	0.44	74,830
2042/43	2042	792	149,579	170,520	0.42	71,952
2043/44	2043	793	149,579	170,520	0.41	69,184
2044/45	2044	794	149,579	170,520	0.39	66,524
2045/46	2045	795	149,579	170,520	0.38	63,965
2046/47	2046	796	149,579	170,520	0.36	61,505
2047/48	2047	797	149,579	170,520	0.35	59,139
2048/49	2048	798	149,579	170,520	0.33	56,865
2049/50	2049	799	149,579	170,520	0.32	54,677
2050/51	2050	800	149,579	170,520	0.31	52,574
2051/52	2051	801	149,579	170,520	0.30	50,552
2052/53	2052	802	149,579	170,520	0.29	48,608
2053/54	2053	803	149,579	170,520	0.27	46,739
2054/55	2054	804	149,579	170,520	0.26	44,941
2055/56	2055	805	149,579	170,520	0.25	43,212
2056/57	2056	806	149,579	170,520	0.24	41,550
2057/58	2057	807	149,579	170,520	0.23	39,952
2058/59	2058	808	149,579	170,520	0.23	38,416
2059/60	2059	809	149,579	170,520	0.22	36,938
2060/61	2060	810	149,579	170,520	0.21	35,517
	Total					3,055,468

Crash cost savings
Medium Term

Financial Year	Year	New daily cyclists	Crash cost savings, $ 2015	Crash cost savings, $ 2020	Discounting factor	Discounted crash cost savings in $, 2020
2018/19	2018	229	0	0	0.00	0
2019/20	2019	230	0	0	0.00	0
2020/21	2020	231	0	0	1.00	0
2021/22	2021	232	0	0	0.96	0
2022/23	2022	233	0	0	0.92	0
2023/24	2023	234	0	0	0.89	0
2024/25	2024	235	0	0	0.85	0
2025/26	2025	236	21,157	24,119	0.82	19,824
2026/27	2026	237	42,314	48,238	0.79	38,123
2027/28	2027	238	63,471	72,357	0.76	54,985
2028/29	2028	239	84,628	96,476	0.73	70,494
2029/30	2029	240	105,785	120,595	0.70	84,728
2030/31	2030	241	126,942	144,714	0.68	97,764
2031/32	2031	242	126,942	144,714	0.65	94,003
2032/33	2032	243	126,942	144,714	0.62	90,388
2033/34	2033	244	126,942	144,714	0.60	86,911
2034/35	2034	245	126,942	144,714	0.58	83,569
2035/36	2035	246	126,942	144,714	0.56	80,354
2036/37	2036	247	126,942	144,714	0.53	77,264
2037/38	2037	248	126,942	144,714	0.51	74,292
2038/39	2038	249	126,942	144,714	0.49	71,435
2039/40	2039	250	126,942	144,714	0.47	68,687
2040/41	2040	251	126,942	144,714	0.46	66,046
2041/42	2041	252	126,942	144,714	0.44	63,505
2042/43	2042	253	126,942	144,714	0.42	61,063
2043/44	2043	254	126,942	144,714	0.41	58,714
2044/45	2044	255	126,942	144,714	0.39	56,456
2045/46	2045	256	126,942	144,714	0.38	54,285
2046/47	2046	257	126,942	144,714	0.36	52,197
2047/48	2047	258	126,942	144,714	0.35	50,189
2048/49	2048	259	126,942	144,714	0.33	48,259
2049/50	2049	260	126,942	144,714	0.32	46,403
2050/51	2050	261	126,942	144,714	0.31	44,618
2051/52	2051	262	126,942	144,714	0.30	42,902
2052/53	2052	263	126,942	144,714	0.29	41,252
2053/54	2053	264	126,942	144,714	0.27	39,665
2054/55	2054	265	126,942	144,714	0.26	38,140
2055/56	2055	266	126,942	144,714	0.25	36,673
2056/57	2056	267	126,942	144,714	0.24	35,262
2057/58	2057	268	126,942	144,714	0.23	33,906
2058/59	2058	269	126,942	144,714	0.23	32,602
2059/60	2059	270	126,942	144,714	0.22	31,348
2060/61	2060	271	126,942	144,714	0.21	30,142
	Total					2,056,449

Crash cost savings
Long Term

Financial Year	Year	New daily cyclists	Crash cost savings, $ 2015	Crash cost savings, $ 2020	Discounting factor	Discounted crash cost savings in $, 2020
2018/19	2018	392	0	0	0.00	0
2019/20	2019	393	0	0	0.00	0
2020/21	2020	394	0	0	1.00	0
2021/22	2021	395	0	0	0.96	0
2022/23	2022	396	0	0	0.92	0
2023/24	2023	397	0	0	0.89	0
2024/25	2024	398	0	0	0.85	0
2025/26	2025	399	0	0	0.82	0
2026/27	2026	400	0	0	0.79	0
2027/28	2027	401	0	0	0.76	0
2028/29	2028	402	0	0	0.73	0
2029/30	2029	403	0	0	0.70	0
2030/31	2030	404	0	0	0.68	0
2031/32	2031	405	6,595	7,518	0.65	4,884
2032/33	2032	406	13,190	15,036	0.62	9,392
2033/34	2033	407	19,785	22,555	0.60	13,546
2034/35	2034	408	26,380	30,073	0.58	17,366
2035/36	2035	409	32,975	37,591	0.56	20,873
2036/37	2036	410	39,569	45,109	0.53	24,084
2037/38	2037	411	39,569	45,109	0.51	23,158
2038/39	2038	412	39,569	45,109	0.49	22,267
2039/40	2039	413	39,569	45,109	0.47	21,411
2040/41	2040	414	39,569	45,109	0.46	20,587
2041/42	2041	415	39,569	45,109	0.44	19,795
2042/43	2042	416	39,569	45,109	0.42	19,034
2043/44	2043	417	39,569	45,109	0.41	18,302
2044/45	2044	418	39,569	45,109	0.39	17,598
2045/46	2045	419	39,569	45,109	0.38	16,921
2046/47	2046	420	39,569	45,109	0.36	16,270
2047/48	2047	421	39,569	45,109	0.35	15,645
2048/49	2048	422	39,569	45,109	0.33	15,043
2049/50	2049	423	39,569	45,109	0.32	14,464
2050/51	2050	424	39,569	45,109	0.31	13,908
2051/52	2051	425	39,569	45,109	0.30	13,373
2052/53	2052	427	39,569	45,109	0.29	12,859
2053/54	2053	428	39,569	45,109	0.27	12,364
2054/55	2054	429	39,569	45,109	0.26	11,889
2055/56	2055	430	39,569	45,109	0.25	11,431
2056/57	2056	431	39,569	45,109	0.24	10,992
2057/58	2057	432	39,569	45,109	0.23	10,569
2058/59	2058	433	39,569	45,109	0.23	10,162
2059/60	2059	434	39,569	45,109	0.22	9,772
2060/61	2060	435	39,569	45,109	0.21	9,396
	Total					457,355

Quick wins

Financial Year	Year	William St discounted health benefits	Te Puni St discounted health benefits	Victoria St discounted health benefits	Bolton St discounted health benefits	Partridge St discounted health benefits	Cooper St discounted health benefits	Mackay St discounted health benefits	Avalon St discounted health benefits	Gordon St discounted health benefits	Dyer St discounted health benefits	Hardy St discounted health benefits	Porutu St discounted health benefits	Witako St discounted health benefits	Kauri St discounted health benefits
2018/19	2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019/20	2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020/21	2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021/22	2021	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022/23	2022	45,452	11,317	10,916	23,921	7,091	6,802	17,275	6,359	19,211	21,111	15,238	50,709	23,609	25,287
2023/24	2023	87,607	21,962	21,192	46,203	13,712	13,155	33,396	12,304	37,169	40,798	29,504	98,017	45,627	48,929
2024/25	2024	126,645	31,965	30,854	66,927	19,885	19,082	48,419	17,855	53,933	59,132	42,843	142,091	66,133	71,003
2025/26	2025	122,051	31,013	29,945	64,630	19,225	18,452	46,799	17,272	52,171	57,135	41,472	137,320	63,901	68,688
2026/27	2026	117,624	30,087	29,060	62,411	18,585	17,843	45,233	16,708	50,464	55,204	40,144	132,705	61,743	66,446
2027/28	2027	113,356	29,186	28,198	60,267	17,966	17,252	43,717	16,161	48,811	53,337	38,856	128,242	59,657	64,275
2028/29	2028	109,243	28,310	27,360	58,195	17,368	16,681	42,252	15,632	47,211	51,532	37,608	123,926	57,640	62,172
2029/30	2029	105,278	27,458	26,545	56,194	16,789	16,129	40,834	15,120	45,662	49,787	36,399	119,752	55,690	60,137
2030/31	2030	101,457	26,630	25,752	54,261	16,229	15,594	39,463	14,624	44,162	48,100	35,227	115,716	53,804	58,166
2031/32	2031	97,774	25,825	24,981	52,393	15,687	15,076	38,137	14,143	42,710	46,469	34,091	111,813	51,981	56,257
2032/33	2032	94,224	25,042	24,231	50,588	15,162	14,575	36,854	13,678	41,305	44,893	32,991	108,039	50,219	54,410
2033/34	2033	90,803	24,282	23,501	48,845	14,655	14,091	35,614	13,228	39,944	43,369	31,925	104,391	48,515	52,621
2034/35	2034	87,505	23,543	22,792	47,162	14,164	13,622	34,415	12,793	38,627	41,896	30,891	100,863	46,869	50,889
2035/36	2035	84,327	22,825	22,103	45,535	13,690	13,168	33,255	12,371	37,352	40,472	29,891	97,452	45,277	49,213
2036/37	2036	81,264	22,127	21,433	43,964	13,231	12,729	32,134	11,963	36,118	39,095	28,921	94,154	43,738	47,590
2037/38	2037	78,311	21,449	20,782	42,446	12,787	12,305	31,049	11,567	34,924	37,765	27,982	90,966	42,251	46,020
2038/39	2038	75,466	20,791	20,149	40,980	12,358	11,894	30,001	11,185	33,768	36,479	27,072	87,883	40,813	44,500
2039/40	2039	72,724	20,151	19,534	39,564	11,942	11,496	28,987	10,815	32,649	35,236	26,191	84,904	39,423	43,028
2040/41	2040	70,080	19,530	18,937	38,196	11,541	11,112	28,007	10,457	31,567	34,035	25,338	82,023	38,080	41,604
2041/42	2041	67,533	18,927	18,357	36,875	11,152	10,740	27,059	10,110	30,519	32,874	24,511	79,238	36,782	40,226
2042/43	2042	65,078	18,341	17,793	35,599	10,777	10,380	26,143	9,774	29,506	31,752	23,711	76,547	35,528	38,893
2043/44	2043	62,712	17,773	17,245	34,367	10,414	10,033	25,257	9,450	28,525	30,667	22,936	73,945	34,315	37,602
2044/45	2044	60,432	17,221	16,714	33,177	10,063	9,696	24,401	9,136	27,576	29,619	22,185	71,430	33,144	36,353
2045/46	2045	58,234	16,685	16,198	32,027	9,723	9,371	23,573	8,832	26,658	28,607	21,459	68,999	32,011	35,145
2046/47	2046	56,116	16,165	15,696	30,917	9,395	9,056	22,773	8,538	25,769	27,628	20,755	66,649	30,917	33,976
2047/48	2047	54,074	15,660	15,210	29,845	9,077	8,751	22,000	8,253	24,910	26,683	20,074	64,378	29,859	32,845
2048/49	2048	52,107	15,171	14,737	28,810	8,770	8,457	21,252	7,978	24,078	25,769	19,414	62,184	28,838	31,750
2049/50	2049	50,211	14,695	14,278	27,810	8,474	8,172	20,529	7,712	23,274	24,886	18,776	60,062	27,850	30,691
2050/51	2050	48,384	14,234	13,833	26,844	8,187	7,897	19,831	7,454	22,496	24,033	18,158	58,012	26,896	29,667
2051/52	2051	46,623	13,787	13,401	25,912	7,909	7,631	19,156	7,205	21,743	23,208	17,559	56,031	25,974	28,676
2052/53	2052	44,926	13,353	12,982	25,011	7,641	7,373	18,503	6,964	21,015	22,412	16,980	54,117	25,083	27,717
2053/54	2053	43,291	12,931	12,575	24,142	7,382	7,124	17,872	6,731	20,311	21,642	16,419	52,266	24,223	26,790
2054/55	2054	41,715	12,523	12,180	23,302	7,131	6,884	17,263	6,505	19,630	20,899	15,877	50,478	23,391	25,893
2055/56	2055	40,196	12,127	11,797	22,492	6,889	6,651	16,674	6,287	18,971	20,181	15,352	48,751	22,587	25,025
2056/57	2056	38,732	11,743	11,426	21,709	6,655	6,426	16,104	6,076	18,334	19,487	14,843	47,081	21,811	24,186
2057/58	2057	37,321	11,370	11,066	20,953	6,429	6,209	15,554	5,872	17,717	18,816	14,352	45,468	21,061	23,374
2058/59	2058	35,962	11,009	10,716	20,223	6,210	5,998	15,022	5,675	17,121	18,169	13,876	43,909	20,337	22,589
2059/60	2059	34,652	10,658	10,377	19,518	5,999	5,795	14,508	5,484	16,545	17,543	13,415	42,403	19,637	21,830
2060/61	2060	33,389	10,319	10,048	18,838	5,794	5,598	14,012	5,299	15,988	16,938	12,969	40,948	18,961	21,096
		2,732,879	748,184	724,894	1,481,054	446,138	429,302	1,083,329	403,568	1,218,443	1,317,654	976,208	3,173,860	1,474,174	1,605,558

Medium term

Financial Year	Year	Knights Rd discounted health benefits	The Esplanade discounted health benefits	Bellevue Rd discounted health benefits	Kings Cres discounted health benefits	White Lines West discounted health benefits	Brees St discounted health benefits	Copeland St discounted health benefits	Jackson St discounted health benefits	Udy St discounted health benefits	Britannia St discounted health benefits	Elizabeth St discounted health benefits	Hutt River Trail discounted health benefits	Waiwhetu River discounted health benefits	Port Rd discounted health benefits
2018/19	2018	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019/20	2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020/21	2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021/22	2021	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022/23	2022	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2023/24	2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024/25	2024	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2025/26	2025	42,790	51,120	44,070	73,171	64,284	24,311	23,438	67,512	43,480	20,794	2,639	46,474	54,323	27,002
2026/27	2026	82,532	98,774	85,038	141,070	124,178	46,973	45,207	130,142	83,904	40,099	5,120	89,662	104,689	52,327
2027/28	2027	119,389	143,136	123,068	203,979	179,905	68,071	65,394	188,153	121,432	57,995	7,449	129,737	151,315	76,049
2028/29	2028	153,515	184,370	158,313	262,169	231,674	87,681	84,085	241,797	156,216	74,558	9,632	166,863	194,404	98,238
2029/30	2029	185,057	222,636	190,923	315,897	279,689	105,880	101,360	291,313	188,401	89,861	11,675	201,199	234,153	118,964
2030/31	2030	214,154	258,084	221,036	365,408	324,143	122,739	117,296	336,928	218,127	103,970	13,585	232,893	270,746	138,292
2031/32	2031	206,520	249,308	213,247	352,230	313,046	118,566	113,113	324,737	210,450	100,245	13,172	224,648	260,881	133,959
2032/33	2032	199,156	240,826	205,730	339,526	302,323	114,532	109,079	312,984	203,040	96,653	12,771	216,692	251,374	129,755
2033/34	2033	192,054	232,627	198,476	327,278	291,961	110,634	105,188	301,656	195,890	93,189	12,381	209,017	242,212	125,676
2034/35	2034	185,203	224,703	191,475	315,469	281,950	106,866	101,434	290,736	188,989	89,848	12,002	201,611	233,383	121,719
2035/36	2035	178,595	217,044	184,720	304,085	272,276	103,224	97,814	280,209	182,329	86,627	11,635	194,465	224,875	117,881
2036/37	2036	172,221	209,642	178,201	293,110	262,930	99,704	94,322	270,062	175,901	83,520	11,277	187,571	216,677	114,158
2037/38	2037	166,074	202,488	171,910	282,530	253,900	96,302	90,954	260,281	169,699	80,524	10,930	180,920	208,776	110,546
2038/39	2038	160,144	195,574	165,839	272,329	245,175	93,015	87,706	250,854	163,713	77,635	10,593	174,503	201,163	107,044
2039/40	2039	154,425	188,893	159,981	262,496	236,746	89,838	84,573	241,766	157,937	74,850	10,266	168,312	193,826	103,648
2040/41	2040	148,909	182,436	154,328	253,016	228,603	86,767	81,551	233,006	152,363	72,163	9,948	162,338	186,756	100,354
2041/42	2041	143,589	176,197	148,874	243,876	220,736	83,800	78,636	224,562	146,984	69,573	9,639	156,576	179,943	97,161
2042/43	2042	138,458	170,167	143,611	235,066	213,136	80,933	75,825	216,424	141,794	67,075	9,340	151,016	173,378	94,064
2043/44	2043	133,509	164,341	138,532	226,573	205,794	78,162	73,114	208,579	136,785	64,666	9,049	145,653	167,052	91,062
2044/45	2044	128,736	158,711	133,632	218,385	198,702	75,485	70,500	201,017	131,952	62,344	8,767	140,479	160,956	88,152
2045/46	2045	124,133	153,271	128,903	210,492	191,850	72,898	67,978	193,729	127,288	60,104	8,493	135,487	155,082	85,331
2046/47	2046	119,693	148,015	124,341	202,883	185,232	70,399	65,546	186,704	122,788	57,944	8,227	130,671	149,421	82,597
2047/48	2047	115,411	142,937	119,939	195,547	178,839	67,984	63,200	179,932	118,445	55,862	7,969	126,026	143,967	79,947
2048/49	2048	111,282	138,030	115,692	188,476	172,664	65,650	60,938	173,406	114,255	53,854	7,719	121,544	138,711	77,378
2049/50	2049	107,299	133,289	111,593	181,660	166,699	63,396	58,757	167,115	110,213	51,918	7,476	117,221	133,646	74,889
2050/51	2050	103,458	128,709	107,639	175,089	160,938	61,217	56,653	161,051	106,312	50,051	7,240	113,051	128,766	72,477
2051/52	2051	99,754	124,283	103,825	168,755	155,373	59,113	54,624	155,207	102,548	48,251	7,012	109,028	124,064	70,139
2052/53	2052	96,182	120,008	100,144	162,649	149,998	57,080	52,667	149,574	98,916	46,516	6,790	105,147	119,532	67,874
2053/54	2053	92,737	115,878	96,593	156,763	144,807	55,116	50,781	144,145	95,412	44,842	6,575	101,403	115,166	65,680
2054/55	2054	89,415	111,888	93,167	151,090	139,793	53,218	48,961	138,912	92,032	43,229	6,367	97,792	110,959	63,554
2055/56	2055	86,211	108,033	89,861	145,621	134,951	51,385	47,206	133,869	88,770	41,673	6,165	94,309	106,905	61,494
2056/57	2056	83,121	104,310	86,672	140,349	130,274	49,614	45,514	129,008	85,623	40,173	5,969	90,949	102,999	59,499
2057/58	2057	80,142	100,713	83,596	135,267	125,758	47,904	43,882	124,322	82,587	38,726	5,779	87,708	99,235	57,566
2058/59	2058	77,268	97,238	80,627	130,368	121,396	46,251	42,308	119,807	79,657	37,332	5,595	84,581	95,608	55,694
2059/60	2059	74,497	93,882	77,764	125,646	117,184	44,655	40,790	115,455	76,831	35,988	5,416	81,566	92,114	53,881
2060/61	2060	71,825	90,640	75,001	121,095	113,116	43,113	39,327	111,260	74,104	34,691	5,243	78,657	88,747	52,125
		4,637,459	5,682,200	4,806,359	7,879,412	7,120,022	2,702,477	2,539,721	7,256,215	4,745,166	2,247,343	309,902	5,055,769	5,815,806	3,126,180

Long term

Distance	0.8												
Financial Year	Year	Tocker St discounted health benefits	Cameron St discounted health benefits	Frederick St discounted health benefits	Wainuiomata Rd discounted health benefits	Parkway discounted health benefits	Wellington Rd discounted health benefits	Wise St discounted health benefits	Main Rd discounted health benefits	Rata St discounted health benefits	Sedden St discounted health benefits	Reading St discounted health benefits	Konini St discounted health benefits
2018/19	2018	0	0	0	0	0	0	0	0	0	0	0	0
2019/20	2019	0	0	0	0	0	0	0	0	0	0	0	0
2020/21	2020	0	0	0	0	0	0	0	0	0	0	0	0
2021/22	2021	0	0	0	0	0	0	0	0	0	0	0	0
2022/23	2022	0	0	0	0	0	0	0	0	0	0	0	0
2023/24	2023	0	0	0	0	0	0	0	0	0	0	0	0
2024/25	2024	0	0	0	0	0	0	0	0	0	0	0	0
2025/26	2025	0	0	0	0	0	0	0	0	0	0	0	0
2026/27	2026	0	0	0	0	0	0	0	0	0	0	0	0
2027/28	2027	0	0	0	0	0	0	0	0	0	0	0	0
2028/29	2028	0	0	0	0	0	0	0	0	0	0	0	0
2029/30	2029	0	0	0	0	0	0	0	0	0	0	0	0
2030/31	2030	0	0	0	0	0	0	0	0	0	0	0	0
2031/32	2031	17,879	16,471	56,902	58,740	63,249	62,952	44,254	40,770	106,578	37,185	7,710	26,513
2032/33	2032	34,523	31,816	109,656	113,260	121,949	121,641	85,561	78,684	205,519	71,773	14,897	51,163
2033/34	2033	49,995	46,091	158,487	163,786	176,344	176,280	124,063	113,892	297,233	103,898	21,588	74,045
2034/35	2034	64,356	59,351	203,611	210,534	226,666	227,071	159,900	146,535	382,107	133,690	27,806	95,255
2035/36	2035	77,663	71,647	245,232	253,709	273,138	274,210	193,202	176,748	460,512	161,270	33,577	114,879
2036/37	2036	89,971	83,030	283,545	293,507	315,970	299,900	224,096	204,661	518,369	186,757	38,923	133,003
2037/38	2037	86,857	80,183	273,203	282,955	304,596	289,714	216,603	197,482	499,780	180,223	37,599	128,321
2038/39	2038	83,850	77,432	263,236	272,780	293,630	279,867	209,354	190,553	481,854	173,916	36,320	123,802
2039/40	2039	80,945	74,775	253,632	262,969	283,058	270,349	202,343	183,864	464,568	167,828	35,083	119,440
2040/41	2040	78,140	72,207	244,378	253,509	272,864	261,150	195,562	177,409	447,898	161,950	33,888	115,232
2041/42	2041	75,430	69,725	235,460	244,388	263,035	252,258	189,002	171,177	431,824	156,277	32,732	111,170
2042/43	2042	72,814	67,328	226,866	235,593	253,559	243,664	182,659	165,163	416,323	150,800	31,616	107,250
2043/44	2043	70,287	65,013	218,585	227,114	244,423	235,358	176,523	159,358	401,376	145,513	30,537	103,467
2044/45	2044	67,847	62,775	210,606	218,938	235,614	227,330	170,589	153,756	386,963	140,410	29,494	99,817
2045/46	2045	65,491	60,614	202,917	211,055	227,122	219,571	164,851	148,348	373,065	135,484	28,486	96,294
2046/47	2046	63,215	58,526	195,508	203,455	218,934	212,074	159,301	143,129	359,664	130,730	27,512	92,895
2047/48	2047	61,018	56,509	188,369	196,127	211,040	204,828	153,935	138,092	346,741	126,140	26,571	89,614
2048/49	2048	58,896	54,561	181,490	189,062	203,429	197,825	148,746	133,231	334,281	121,711	25,661	86,449
2049/50	2049	56,847	52,679	174,861	182,250	196,092	191,059	143,728	128,540	322,266	117,435	24,783	83,394
2050/51	2050	54,869	50,861	168,473	175,682	189,018	184,520	138,876	124,012	310,680	113,309	23,933	80,447
2051/52	2051	52,958	49,104	162,319	169,351	182,198	178,202	134,185	119,642	299,510	109,326	23,113	77,603
2052/53	2052	51,114	47,408	156,388	163,246	175,623	172,096	129,649	115,425	288,739	105,481	22,320	74,859
2053/54	2053	49,333	45,770	150,674	157,360	169,285	166,197	125,264	111,356	278,353	101,771	21,554	72,211
2054/55	2054	47,613	44,187	145,168	151,686	163,174	160,497	121,024	107,429	268,339	98,190	20,814	69,656
2055/56	2055	45,953	42,659	139,862	146,215	157,283	154,989	116,925	103,639	258,684	94,735	20,099	67,190
2056/57	2056	44,350	41,182	134,750	140,941	151,603	149,668	112,962	99,981	249,375	91,399	19,408	64,812
2057/58	2057	42,802	39,757	129,824	135,856	146,128	144,527	109,131	96,452	240,398	88,180	18,741	62,516
2058/59	2058	41,308	38,379	125,078	130,954	140,850	139,560	105,428	93,046	231,744	85,074	18,096	60,302
2059/60	2059	39,866	37,050	120,505	126,228	135,761	134,761	101,848	89,760	223,400	82,076	17,473	58,165
2060/61	2060	38,473	35,765	116,099	121,671	130,856	130,125	98,387	86,589	215,354	79,183	16,871	56,104
		1,764,661	1,632,857	5,475,684	5,692,919	6,126,491	5,962,241	4,437,949	3,998,723	10,101,498	3,651,713	767,207	2,595,866

Costs Assessment
All Schemes

		Quick Wins Costs in $, 2020		Medium Term Costs in $, 2020		Long Term Costs in $, 2020			Discounting factor	Quick Wins Discounted Costs in $, 2020		Medium Term Discounted Costs in $, 2020		Long Term Discounted Costs in $, 2020		
Year	Year	Construction Costs	Maintenance Costs	Construction Costs	Maintenance Costs	Construction Costs	Maintenance Costs	Supporting measures cost in $ 2020		Construction Costs	Maintenance Costs	Construction Costs	Maintenance Costs	Construction Costs	Maintenance Costs	Discount supporting measure costs
-2	2018				0		0		0.00	0	0	0	0	0	0	0
-1	2019				0		0		0.00	0	0	0	0	0	0	0
0	2020				0		0		1.00	0	0	0	0	0	0	0
1	2021	2,537,333			0		0		0.96	2,439,744	0	0	0	0	0	0
2	2022	2,537,333	162,360		0		0	200,000	0.92	2,345,907	150,111	0	0	0	0	184,911
3	2023	2,537,333	162,360		0		0	200,000	0.89	2,255,680	144,337	0	0	0	0	177,799
4	2024		162,360	6,750,333	0		0	200,000	0.85	0	138,786	5,770,213	0	0	0	170,961
5	2025		162,360	6,750,333	241,560		0	200,000	0.82	0	133,448	5,548,282	198,545	0	0	164,385
6	2026		162,360	6,750,333	241,560		0	200,000	0.79	0	128,315	5,334,886	190,908	0	0	158,063
7	2027		162,360	6,750,333	241,560		0	200,000	0.76	0	123,380	5,129,699	183,566	0	0	151,984
8	2028		162,360	6,750,333	241,560		0	200,000	0.73	0	118,635	4,932,402	176,506	0	0	146,138
9	2029		162,360	6,750,333	241,560		0	200,000	0.70	0	114,072	4,742,695	169,717	0	0	140,517
10	2030		162,360		241,560	6,174,667	0	200,000	0.68	0	109,685	0	163,189	4,171,384	0	135,113
11	2031		162,360		241,560	6,174,667	55,440	200,000	0.65	0	105,466	0	156,913	4,010,946	36,013	129,916
12	2032		162,360		241,560	6,174,667	55,440	200,000	0.62	0	101,410	0	150,878	3,856,679	34,628	124,919
13	2033		162,360		241,560	6,174,667	55,440	200,000	0.60	0	97,509	0	145,075	3,708,345	33,296	120,115
14	2034		162,360		241,560	6,174,667	55,440	200,000	0.58	0	93,759	0	139,495	3,565,716	32,015	115,495
15	2035		162,360		241,560	6,174,667	55,440	200,000	0.56	0	90,153	0	134,130	3,428,573	30,784	111,053
16	2036		162,360		241,560		55,440	200,000	0.53	0	86,685	0	128,971	0	29,600	106,782
17	2037		162,360		241,560		55,440		0.51	0	83,351	0	124,010	0	28,461	0
18	2038		162,360		241,560		55,440		0.49	0	80,145	0	119,241	0	27,367	0
19	2039		162,360		241,560		55,440		0.47	0	77,063	0	114,655	0	26,314	0
20	2040		162,360		241,560		55,440		0.46	0	74,099	0	110,245	0	25,302	0
21	2041		162,360		241,560		55,440		0.44	0	71,249	0	106,005	0	24,329	0
22	2042		162,360		241,560		55,440		0.42	0	68,509	0	101,928	0	23,393	0
23	2043		162,360		241,560		55,440		0.41	0	65,874	0	98,007	0	22,493	0
24	2044		162,360		241,560		55,440		0.39	0	63,340	0	94,238	0	21,628	0
25	2045		162,360		241,560		55,440		0.38	0	60,904	0	90,613	0	20,796	0
26	2046		162,360		241,560		55,440		0.36	0	58,562	0	87,128	0	19,997	0
27	2047		162,360		241,560		55,440		0.35	0	56,309	0	83,777	0	19,228	0
28	2048		162,360		241,560		55,440		0.33	0	54,143	0	80,555	0	18,488	0
29	2049		162,360		241,560		55,440		0.32	0	52,061	0	77,457	0	17,777	0
30	2050		162,360		241,560		55,440		0.31	0	50,059	0	74,477	0	17,093	0
31	2051		162,360		241,560		55,440		0.30	0	48,133	0	71,613	0	16,436	0
32	2052		162,360		241,560		55,440		0.29	0	46,282	0	68,859	0	15,804	0
33	2053		162,360		241,560		55,440		0.27	0	44,502	0	66,210	0	15,196	0
34	2054		162,360		241,560		55,440		0.26	0	42,790	0	63,664	0	14,611	0
35	2055		162,360		241,560		55,440		0.25	0	41,145	0	61,215	0	14,049	0
36	2056		162,360		241,560		55,440		0.24	0	39,562	0	58,861	0	13,509	0
37	2057		162,360		241,560		55,440		0.23	0	38,040	0	56,597	0	12,989	0
38	2058		162,360		241,560		55,440		0.23	0	36,577	0	54,420	0	12,490	0
39	2059		162,360		241,560		55,440		0.22	0	35,171	0	52,327	0	12,009	0
40	2060		162,360		241,560		55,440		0.21	0	33,818	0	50,314	0	11,548	0
	Total	7,612,000	6,332,040	40,502,000	8,696,160	37,048,000	1,663,200	3,000,000		7,041,331	3,057,439	31,458,177	3,904,305	22,741,642	647,643	2,138,151