



14 February 2022

Thorndon Quay Hutt Road

Single Stage Business Case

Final Report

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Executive Summary

Many people live and work along Thorndon Quay and Hutt Road, and the roads form an important commuter corridor. Thorndon Quay and Hutt Road are the busiest bus corridors in Wellington, outside of Wellington city centre, carrying more than 10,000 bus passengers per day. The Thorndon Quay/Hutt Road corridor is also the busiest cycle route in the city, with up to 1,300 cyclists using the route on an average weekday.

An increasing number of people are expected to use Thorndon Quay and Hutt Road in the near future, due to the growing number of people living and working in Wellington City and in the northern suburbs.

The planned shared path, Te Ara Tupua, including the section between Ngauranga and Petone, will also enable more people to walk and cycle between Hutt Valley and Wellington CBD. Improved infrastructure on Thorndon Quay and Hutt Road will help make the shared path a success.

With the expected growth in the uptake of cycling, walking and public transport over the next 20 years, and the need to change the way we travel to reduce emissions from transport, improvements are needed along Thorndon Quay and Hutt Road urgently. These are proposed as part of the Let’s Get Wellington Moving (LGWM) three-year programme.

This Single Stage Business Case (SSBC) presents the case of investment in the project.

Problems, Benefits and Investment Objectives

Building on previous consultation and studies, and evidence gathered, the following problem statements were defined.

PROBLEM ONE
Unreliable bus travel times result in a poor customer experience for existing and potential bus users which reduces the attractiveness of and ability to grow travel by bus.
PROBLEM TWO
The current state of cycling facilities results in conflict between users, increases risk and limits cycling attractiveness for increasing volumes of cyclists.
PROBLEM THREE
Poor quality of the street environment creates an unpleasant experience for a growing volume of people reducing its attractiveness to walk and spend time in the area.
PROBLEM FOUR
High and growing traffic volumes combined with high speeds increases the likelihood and severity of crashes on Hutt Road.

By addressing the problems, the following potential benefits of investing in transport improvements for the Thorndon Quay and Hutt Road corridor were identified:



Improve the reliability and attractiveness of bus travel



Improve the quality and safety of walking and cycling facilities



Reduce frequency and severity of crashes along Hutt Road



Improve the place quality of Thorndon Quay



Maintain access for freight and the ferry terminal

Five investment objectives have been identified for the project which build on the identified problems and benefits for the corridor:

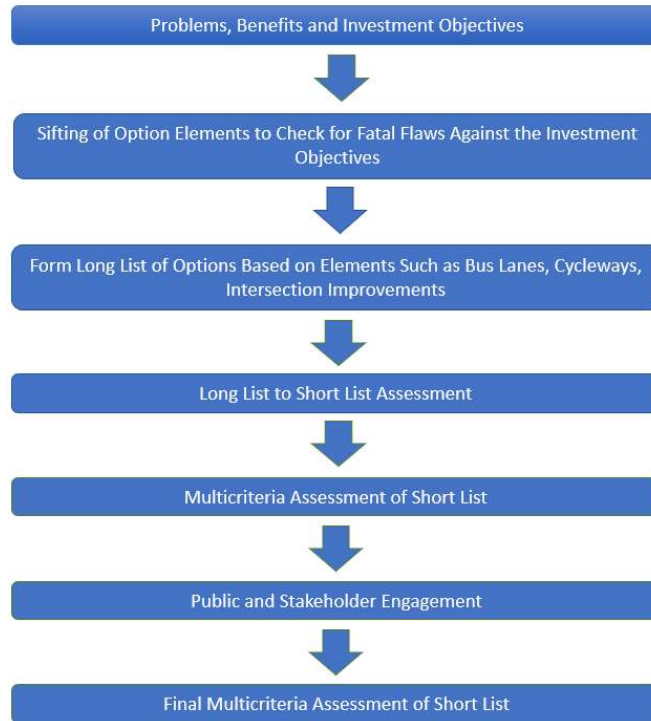
- i Improve Level of Service for bus users including improved access, journey times and reliability. Provide sufficient capacity for growth in public transport
- ii Improve Level of Service and reduce the safety risk, for people walking and cycling along and across Thorndon Quay and Hutt Road
- iii Reduce the frequency and severity of crashes
- iv Improve the amenity of Thorndon Quay to support the current and future place aspirations for the corridor/area¹
- v Maintain similar access for people and freight to the ferry terminal.

The latter objective was defined in response to concerns about the adverse effect bus lanes may have on freight traffic on Hutt Road.

Options Development and Assessment Process

The Thorndon Quay and Hutt Road project used a multi-stage process to develop and assess options. This process is summarised below.

¹ Whilst the focus of the investment objective is on Thorndon Quay, there are expected to be several locations along Hutt Road that will benefit from amenity improvements through implementation of the preferred option.



Sifting of Option Elements

The problems, benefits, and investment objectives, as well as assessment of evidence and feedback from previous stakeholder engagement², was used to develop an initial list of potential interventions such as bus lanes, cycleway options, improvements to intersections and pedestrian crossings.

Form Long List of Options

The interventions identified were reviewed against the investment objectives and some elements were rejected if they did not contribute towards achieving these, for example:

- Removing zebra crossings and replacing them with refuge islands, since zebra crossings have greater safety benefits
- Installing traffic signals at the Davis Street intersection, as it will increase bus travel times
- Building a roundabout at the Tinakori Road intersection since it would increase bus travel times by introducing delay to flows on Thorndon Quay.

The remaining elements were packaged into a long list of options.

Long List to Short List Assessment

The long list of options was assessed using a high level Multi Criteria Assessment (MCA) process to assess and compare options against a range of objectives and criteria, to arrive at four options for short list assessment. The key elements which make up the short-listed options included:

- Bus lanes or special vehicle lanes (SVLs) in the southbound direction only or both in the northbound and southbound directions on Thorndon Quay and Hutt Road.

² Refer to Chapter 3

- Uni-directional or bi-directional cycleway along Thorndon Quay.

A SVL was defined as a traffic lane which can be used only by buses and trucks.³ This option was included in response to the investment objective relating to freight access.

The assessment also identified that the provision of a bus or SVL on Hutt Road added additional risks. These include:

- An increased risk of side impact crashes - drivers will be required to cross two opposing lanes of traffic which will likely have different speeds at peak times due to the freely flowing SVL lane, thereby making it more difficult to judge safe gaps in traffic when turning
- An increased risk to motorcyclists and cyclists from turning traffic - the addition of the SVL had the potential to mask motorcyclists which may be filtering between the two traffic lanes to pass slower moving vehicles in the general traffic lane, and also cyclists riding on the shared path. Furthermore, due to congestion and the completion of the other shared path projects in the city, these users are likely to increase in number in the future, increasing the likelihood of a crash.

To mitigate this risk, options that included a central median and a service lane sub-option were developed. The options also included a new roundabout on Aotea Quay to provide a turnaround facility for trucks which may be impacted by the central median/service lane provision.

The full list of short-listed options is summarised below.

Option	Elements			Common Elements
	Thorndon Quay Bus Lanes	Thorndon Quay Cycle Lanes	Hutt Road Special Vehicle Lanes	
Option 1: Southbound bus lanes with Thorndon Quay bi-directional cycleway	Southbound	Bi-directional	Southbound	<ul style="list-style-type: none"> ▪ Removal of angle parking on Thorndon Quay to improve safety⁴ ▪ Speed limit review ▪ Intersection upgrades ▪ Pedestrian Crossing Improvements ▪ Bus stop rebalancing and layout improvements ▪ Thorndon Quay amenity improvements
Option 1A: Southbound bus lanes with Thorndon Quay bi-directional cycleway	Option 1 plus: <ul style="list-style-type: none"> • Left-in / Left-out on Hutt Road (central median) • Construct a roundabout on Aotea Quay 			
Option 1B: Southbound bus lanes with Thorndon Quay bi-directional cycleway	Option 1 plus: <ul style="list-style-type: none"> • Creation of a service lane on east side of Hutt Road (between Onslow and Kaiwharawhara) • Signalise Kaiwharawhara and Onslow Road intersections 			
Option 2: Southbound and Northbound bus lanes with Thorndon Quay uni-directional cycleway	Both directions	Uni-directional	Both directions	
Option 2A: Southbound and Northbound bus lanes with Thorndon Quay uni-directional cycleway	Option 2 plus the same variants as for Option 1A			
Option 2B: Southbound and Northbound bus lanes with Thorndon Quay uni-directional cycleway	Option 2 plus the same variants as for Option 1B			

³ Allowing motorcycles to use the SVL is not recommended. This will be confirmed during detailed design.

⁴ Since implemented by WCC

Option 3: Southbound bus lanes with Thorndon Quay uni-directional cycleway	Southbound	Uni-directional	Southbound
Option 3A: Southbound bus lanes with Thorndon Quay uni-directional cycleway	Option 3 plus the same variants as for Option 1A		
Option 3B: Southbound bus lanes with Thorndon Quay uni-directional cycleway	Option 3 plus the same variants as for Option 1B		
Option 4: Southbound and Northbound bus lanes with Thorndon Quay bi-directional cycleway	Both directions	Bi-directional	Both directions
Option 4A: Southbound and Northbound bus lanes with Thorndon Quay bi-directional cycleway	Option 4 plus the same variants as for Option 1A		
Option 4B: Southbound and Northbound bus lanes with Thorndon Quay bi-directional cycleway	Option 4 plus the same variants as for Option 1B		

Multi Criteria Assessment of Short List

Following the development of the short list of options, the next phase was the multi-criteria assessment (MCA) on the short list to inform the selection of a preferred option. The main considerations in the assessment were the extent to which the option met the project investment objectives, the effects of the option, and its delivery cost/timescale/operations implications.

Options were scored using an eleven-point scale (from -5 to 5), with zero being no change from current state, positive being an improvement to the current state and negative being worse than the current state. This indicated that the highest scoring options are Options 4A and 4B.

While Options 4A and 4B scored similarly overall, the provision of a service road (suboption B) was discounted as being more disruptive, fit less with other regional projects and carried larger implementation risk.

It was noted that the provision of a bidirectional cycleway (i.e. Options 1 or 4) should be aligned with the wider LGWM programme as there are bidirectional facilities planned to the north and south of the corridor. It was also noted that while both unidirectional and bidirectional cycle facilities would improve safety and level of service, unidirectional cycleways (Options 2 or 3) scored better for safety, due to less risk with cyclists travelling with the direction of general traffic.

Following the interim MCA workshop, the Technical Advisory Group met to discuss a recommended option. It supported the highest scoring option of 4A, while noting the additional safety risks inherent with bidirectional cycleways. Option 4A was recommended to be the best option to take forward as the interim preferred option. This decision was supported by the LGWM Programme Steering Group.

Public and Stakeholder Engagement

Public engagement on the emerging proposals was undertaken between 11th May and 8th June 2021. Over 1,600 responses were received, largely via an online survey. The consultation also

included an open day at Pipitea Marae on Thorndon Quay, and two market days at Harbourside Market, Waitangi Park and at Johnsonville Market. Ongoing discussions were held with some key stakeholders.

Overall, the engagement was well received, and the feedback was supportive of the proposals and no additional options emerged from the process which had not been considered before. However, many local businesses and retailers along the Thorndon Quay did not support any change to status quo primarily due to their concern that any changes that remove parking will be detrimental to their business. Hutt Road businesses were concerned with restricted access to their property and additional travel times. A number of items were identified for further consideration during detailed design.

Final Multi Criteria Assessment

Following stakeholder and public engagement, a second MCA workshop was held on 30 June 2021. The purpose of this workshop was to consider the impact of engagement feedback on the interim MCA scores, update scores based on any further information, as well as to incorporate the mana whenua values assessment into the MCA.

The delivery team noted that since the interim MCA, some preliminary design of Option 4A had progressed, including more detailed evaluation of the available width on Hutt Road and desired width for the various modes. Based on this further work, the delivery team considered that the service lane 'B' suboption does not physically fit within the corridor and property acquisition would be necessary. Discussion at the workshop confirmed that the delivery score for the service lane should be reduced to -5 (the lowest score possible).

As buildings would require alteration or demolition to implement the service lane suboptions, it was agreed that the service lane options, despite the scoring, should no longer be progressed due to the disproportionate cost and effect of land acquisition.

The introduction of the mana whenua values scores and the reduction of the delivery score for the service lane suboptions changed the relativity between options compared to the interim MCA. Options 4A and 4B still scored the highest, similar to the interim MCA. This scoring does not reflect the decision that the service lane suboptions should no longer be progressed. Option 4A was therefore recommended as the preferred option for the project.

The Recommended Project

In summary, the project recommended for Thorndon Quay will provide part-time bus lanes in both directions and extend the two-way cycle path from Hutt Road to the bus interchange at Mulgrave Street. Footpaths and the streetscape will also be improved. The provision of part-time bus lanes in both directions will also future proof the corridor to cater for increased future public transport demand - with potential for longer hours of operation or full-time bus priority (or Bus Rapid Transit) in future.

Changes will allow for future growth of bus users and cyclists and encourage more people to walk, shop and spend time on Thorndon Quay. Safety will be improved for everyone by improving pedestrian crossings by making it safer and easier to cross the road and providing a dedicated cycle path. Improvements are to be made to the Ngauranga/ Jarden Mile intersection, which will lead to significant improvements for people walking and cycling in this area.

The proposal for Hutt Road includes providing part-time bus lanes in both directions and bus priority at the Ngauranga/Jarden Mile intersection. Bus lanes are proposed in both directions to improve bus travel times and reliability during peak hours, making buses more reliable and an attractive form of transport. Consideration has been given to whether other vehicles should be

allowed to share the bus lane (Special Vehicle Lane) on Hutt Road such as freight. It is expected that motorcycles will not be permitted to use the lane. This will be confirmed at detailed design.

The design also includes upgrading and extending the existing shared cycle and footpath to the Ngauranga/Jarden Mile intersection. Options for upgrading the existing connection from this intersection to the Ngā Ūranga ki Pito-One (Ngauranga to Petone) section of Te Ara Tupua is not in the scope of this SSBC. This was considered in a separate study, which is included as an addendum to this SSBC.

Anticipated Benefits of the Project

The project is expected to deliver the following benefits which are consistent with the current Government Policy Statement (GPS) on Transport:

- An economic benefit to cost ratio (BCR) of between 0.4 (assuming all traffic stays on Hutt Road) and 1.8 (assuming all traffic has transferred to SH1 and has joined the back of the queue on SH1/2), depending on the assumptions made with regard to trip diversion from Hutt Road/Thorndon Quay to State Highway 1.
- A higher BCR is likely if it assumed that that all traffic transfers to SH1 but retimes to outside the peak hours.
- A reduction in the number of fatal and serious injury crashes (FSIs) from 2.6 to 1.9 per year on Thorndon Quay by 2026, due largely to the improved facilities for pedestrians and cyclists, and the predicted increase in bus use.
- Improved pedestrian and cycling amenity/level of service on Thorndon Quay and Hutt Road.
- Increased bus patronage along Hutt Road – estimated to be approximately 17% in the morning peak (two-hour period for buses travelling along Hutt Road/Thorndon Quay towards the CBD), and about 18% in the evening peak (two-hour) period for buses leaving the CBD, by 2026.
- Bus travel time savings of up to approximately eight minutes in the morning peak (two-hour) period, for buses entering the CBD, and up to approximately two and a half minutes in the evening peak (two-hour) period, for buses leaving the CBD, by 2026.
- Modest travel time savings (up to two minutes) for trucks travelling on Hutt Road.

The preferred option has been assessed using the latest Waka Kotahi Investment Prioritisation Method to understand its wider benefits and alignment with the GPS. This gives the investment proposal a priority order rating of five in the improvement category scale of one to eight, placing the project with an investment profile of HL Priority 6.

Financial Case

A risk-based cost estimate has been prepared for the recommended option. The project has an estimated cost in the range of \$55.3m (P50) - \$66.8m (P95). The estimates do not account for inflation or discounting and excludes any property costs apart from land associated with proposed works at Aotea Quay roundabout. The cost associated with land acquisition are estimated to be \$1.8m (P50) - \$2.2m (P95). Implementation of the project will also result in existing and additional assets requiring ongoing maintenance. A key risk is that the project cost exceeds the level of affordability.

Commercial Case

There is a strong motivation, need and support for LGWM to deliver the project as soon as possible. The primary activities to be undertaken during the pre-implementation phase are detailed design and construction support services and obtaining consents. It is estimated that the project will have a construction period of about 30 months.

A single professional design, engineering and consents services supplier is recommended to be utilised for the project. Given the need to accelerate the project, the option of progressing elements of pre-implementation using a direct appointment approach is recommended.

An initial assessment of delivery models indicates the project will likely be delivered via a variant of the Early Contractor Involvement (ECI) model. Works at Aotea Quay will be delivered as a separate package to ensure early completion ahead of works on Hutt Road and on Thorndon Quay.

This procuring model is appropriate due to the project complexity, uncertainty, innovation, and risk being low. It will allow the implementation phase of the project to enter the market quickly and be delivered within the anticipated timeline. It also allows for a high level of involvement and control of the project by LGWM. The recommended procurement strategy for the project needs to be communicated to the supplier market.

The project shares some similar objectives to the Waka Kotahi Ngā Ūranga ki Pito-One (Ngauranga to Petone) shared path project, such as to improve active mode facilities, connections, and accessibility for a range of customers. There will be common stakeholders, and their delivery timeframes could be similar too. Whilst both projects will be delivered independently, there are opportunities and benefits for the project teams to collaborate to share information, ideas, learnings and expertise. There may be scope advantages to seek optimisation and collaboration between the two projects, subject to the confirmation of the delivery timing of the Ngā Ūranga ki Pito-One shared path project and any funding agreements.

A project risk register has been developed and regularly reviewed throughout the SSBC process to manage risks appropriately. In the pre-implementation phase, it is likely that many of the technical risks associated with obtaining statutory approvals, will be transferred to the professional service providers on award.

A consenting strategy has been prepared which identifies project consenting, statutory approvals, environmental considerations and key mitigation areas. The strategy identifies that the works required to deliver the project will likely be permitted under the Resource Management Act 1991 (RMA)⁵. An archaeological authority is recommended to be acquired via Heritage NZ.

Management Case

Project implementation will be led by LGWM, as the project sponsor, in partnership with Waka Kotahi, WCC, GWRC and Mana Whenua. Design and construction will be undertaken by its consultants and contractors. The existing LGWM governance structure that has sat across the delivery of this SSBC is recommended to continue to co-ordinate delivery of the project in its next phase.

The development of a Communications and Engagement Plan for the pre-implementation and implementation phases of the project will form the starting point for ongoing engagement. There are diverse views and conflicting demands between different stakeholders that need to be reconciled.

Key focus areas for ongoing engagement are to seek feedback on detailed design and highlight key changes or enhancements from a design perspective. A number of the tools and processes established to date will be redeployed to address the concerns identified to date.

A detailed construction phasing strategy will need to be developed during the pre-implementation phase. Careful consideration will need to be given to the likely construction impacts of the project,

⁵ A key issue is the disturbance of potentially contaminated soil that may require resource consent under the NESCS.

given the importance of keeping the corridor operational during the construction of works. Equally, construction opportunities have been identified by the Partners that will lead to efficiencies in implementation. Works at the Aotea Quay turnaround facility have been assumed to take place separately to those on Thorndon Quay/Hutt Road, in order to avoid unacceptable delays to traffic during construction.

The LGWM Project Manager is responsible for on budget delivery and the services of a Cost Manager will be necessary during implementation to manage construction expenditure. Financial management shall be undertaken in accordance with the relevant Waka Kotahi procedures.

The project will be required to report weekly into the LGWM programme through all future phases of development and delivery. Reporting and information transfer is covered with the project management plan, namely: schedule, cost, risk/issues, health and safety, resourcing, and benefits.

Next Steps

The key next steps for the project include:

- Confirming endorsement of the recommendation of this Single Stage Business Case
- Procurement of services and progress with pre-implementation, and implementation of the Recommended Option, with an initial focus on critical path activities including land acquisition and statutory approvals
- Undertaking detailed design, using the community engagement feedback received to finalise the preferred option detailed design for construction
- Engagement with the teams and governance bodies delivering parallel work around the study area.

1 Introduction

1.1 The Let's Get Wellington Moving Programme

The Let's Get Wellington Moving (LGWM) Programme is an ambitious \$6.4 billion long-term multi-modal investment. It is a joint initiative between Wellington City Council (WCC), Greater Wellington Regional Council (GWRC), and Waka Kotahi (the New Zealand Transport Agency). The Programme objectives are summarised below.

A transport system that:



Following significant public engagement, a Programme Business Case (PBC) developed a vision and a Recommended Programme of Investment (RPI) for LGWM to support the delivery of this vision. LGWM is a once in a generation opportunity to transform how people get around New Zealand's Capital City. It seeks to deliver an integrated transport system that supports the community's aspirations for how Wellington City will look, feel and function. At its heart, it seeks to move more people with fewer vehicles, provide attractive travel choices and reshape how people live. It will make the city and region more compact and sustainable, and a better place to be in.

While recognised as one of the world's most liveable cities, Wellington's transport system is starting to constrain the city and region's liveability, economic growth and productivity. The Programme will provide better walking facilities, connected cycleways, and high-quality Mass Rapid Transit (MRT), along with more reliable buses, improvements at the Basin Reserve and an extra Mount Victoria Tunnel. These improvements will go hand-in-hand with planning and urban development changes. They will also help reduce emissions from road transport and our reliance on private vehicle travel.

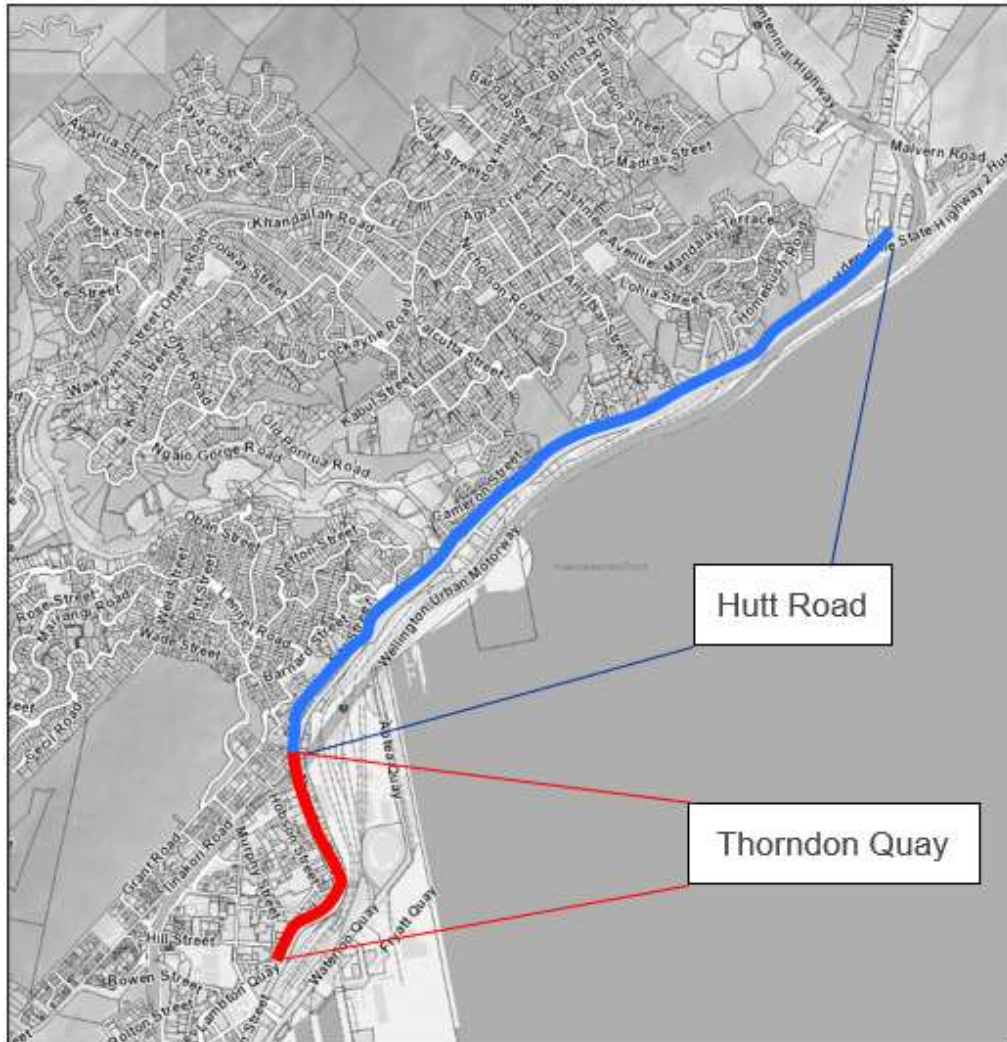
The main geographical area of focus for LGWM is between Ngauranga Gorge and the Airport, including the Wellington Urban Motorway and its connections to the central city, hospital, and the eastern and southern suburbs.

1.2 The Thorndon Quay Hutt Road Project

The Thorndon Quay and Hutt Road (TQHR) corridor is one of the city's most important commuter routes connecting Wellington CBD with the northern suburbs and the rest of the region. It is the busiest bus corridor outside of the city centre, and the busiest route in the city for people cycling to and from work. A Problem Definition and Case for Change was prepared for the TQHR corridor by LGWM in October 2019.

Thorndon Quay starts at the intersection of Mulgrave Street, just north of the Lambton Quay Bus Interchange at the northern edge of Wellington's CBD (adjacent to Victoria University / Wellington Railway Station) and extends for about 1km north to the intersection of Hutt Road and Tinakori Road. Hutt Road continues north of Thorndon Quay, and is parallel to State Highway 1 (SH1) and the North Island Main Trunk (NIMT) railway line for about 4km to Centennial Highway at the bottom of the Ngauranga Gorge. The TQHR corridor is shown in Figure 1-1.

Figure 1-1 Thorndon Quay Hutt Road Corridor



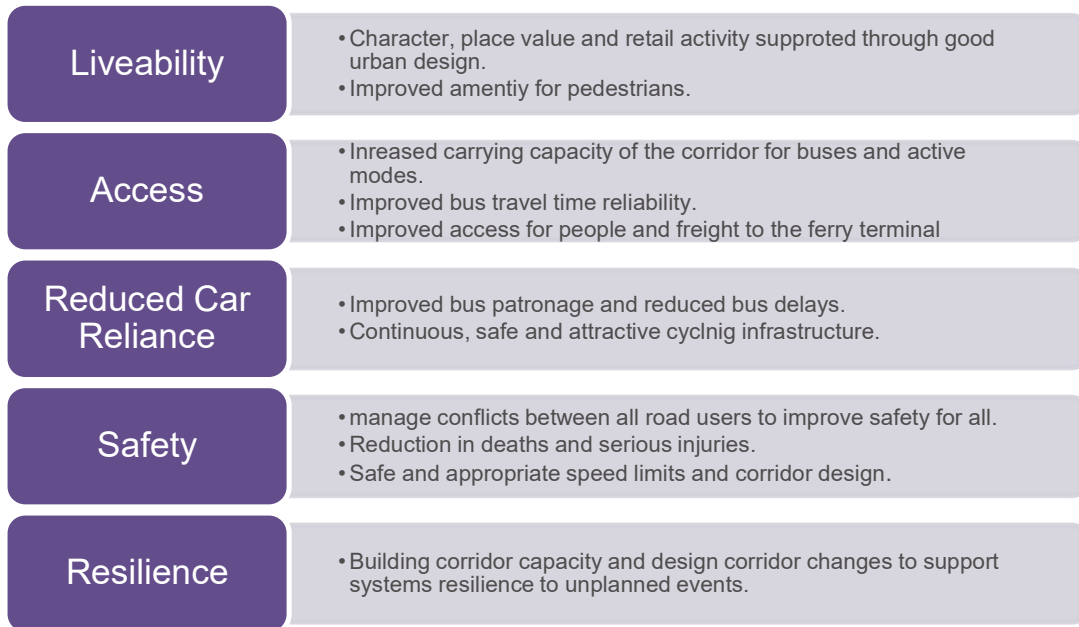
With a growing number of people expected to live and work in Wellington City and the wider region, more people will want to walk, cycle or take the bus along the TQHR corridor instead of going by car. Completion of the Ngā Ūranga ki Pito-One section of Te Ara Tupua, will enable more people to walk and cycle between the Hutt Valley and Wellington. Options to upgrade the existing connection from this intersection to Te Ara Tupua is not in the scope of this SSBC, but was being considered in a separate study which is included in Appendix A.

In summary, the aim of investment in the TQHR corridor (“the project”) is to provide safe and reliable travel choices for everyone and, in particular, to support more people to take public transport or use active modes by:

- Making travel by bus to the central city and through the TQHR corridor faster and more reliable, and
- Creating a safer and better environment for people walking and on bikes.

How the objectives for the TQHR project fit within the wider LGWM objectives are summarised in Figure 1-2.

Figure 1-2 Project Objectives



1.3 LGWM Early Delivery Workstream

The TQHR project is part of the three-year delivery programme which aims to develop and implement components of the LGWM programme that are capable of progressing in the short-term. These are projects that are not constrained by the scope of larger and/or more complex components of the wider programme of investment such as MRT that may be several years away from implementation. The three-year programme will help demonstrate to the community and stakeholders the direction of the wider programme.

1.4 Purpose of the Single Stage Business Case

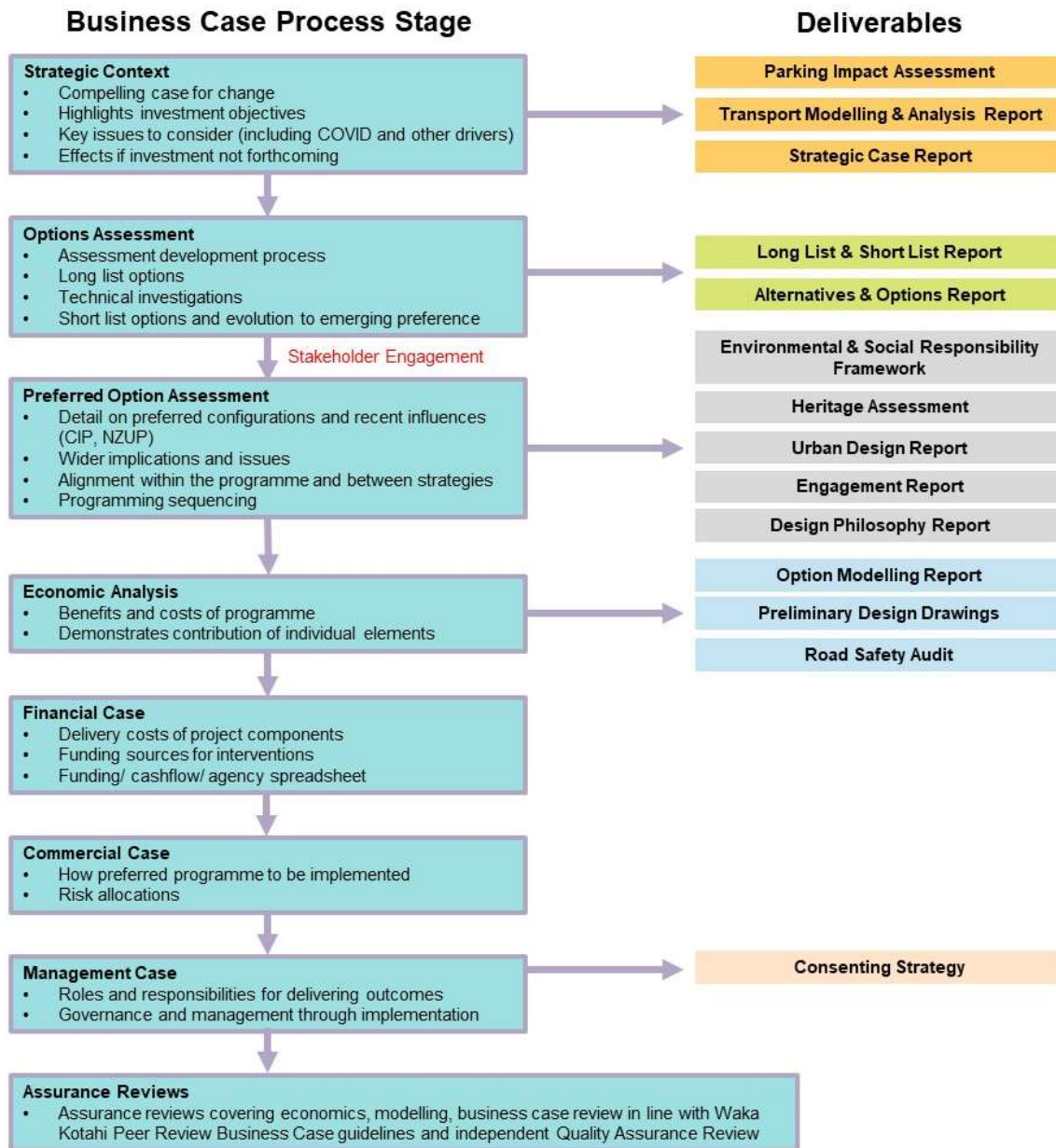
The purpose of this Single Stage Business Case (SSBC) is to build on the 'Problem Definition and Case for Change' and develop the case for investment in the project. It confirms the problems and opportunities set out in the 'Problem Definition and Case for Change' and sets out the overarching goals and objectives for investment. An optioneering process is then followed to establish a preferred option to address these problems and achieve the investment objectives.

An economic, financial, and commercial assessment is undertaken for the preferred project option. The SSBC also outlines how the preferred option can be delivered which gives effect to the desired outcomes of LGWM.

1.5 Business Case Process

The process followed to develop the business case is summarised in Figure 1-3, which includes the key deliverables. The SSBC has been developed in two distinct stages. In the first stage, a range of options were considered, and an emerging solution was identified. This solution was taken to public consultation. In the second stage, the emerging solution was developed and assessed in more detail so that a preferred option could be confirmed. Interim versions of some of the deliverables shown in Figure 1-3 were prepared to inform the earlier tasks undertaken. These are not shown on the diagram.

Figure 1-3 Single Stage Business Case Process and Deliverables



1.6 Previous Technical Work Informing this Business Case

The development of the business case was informed by the technical work undertaken for a number of earlier studies of the corridor, including:

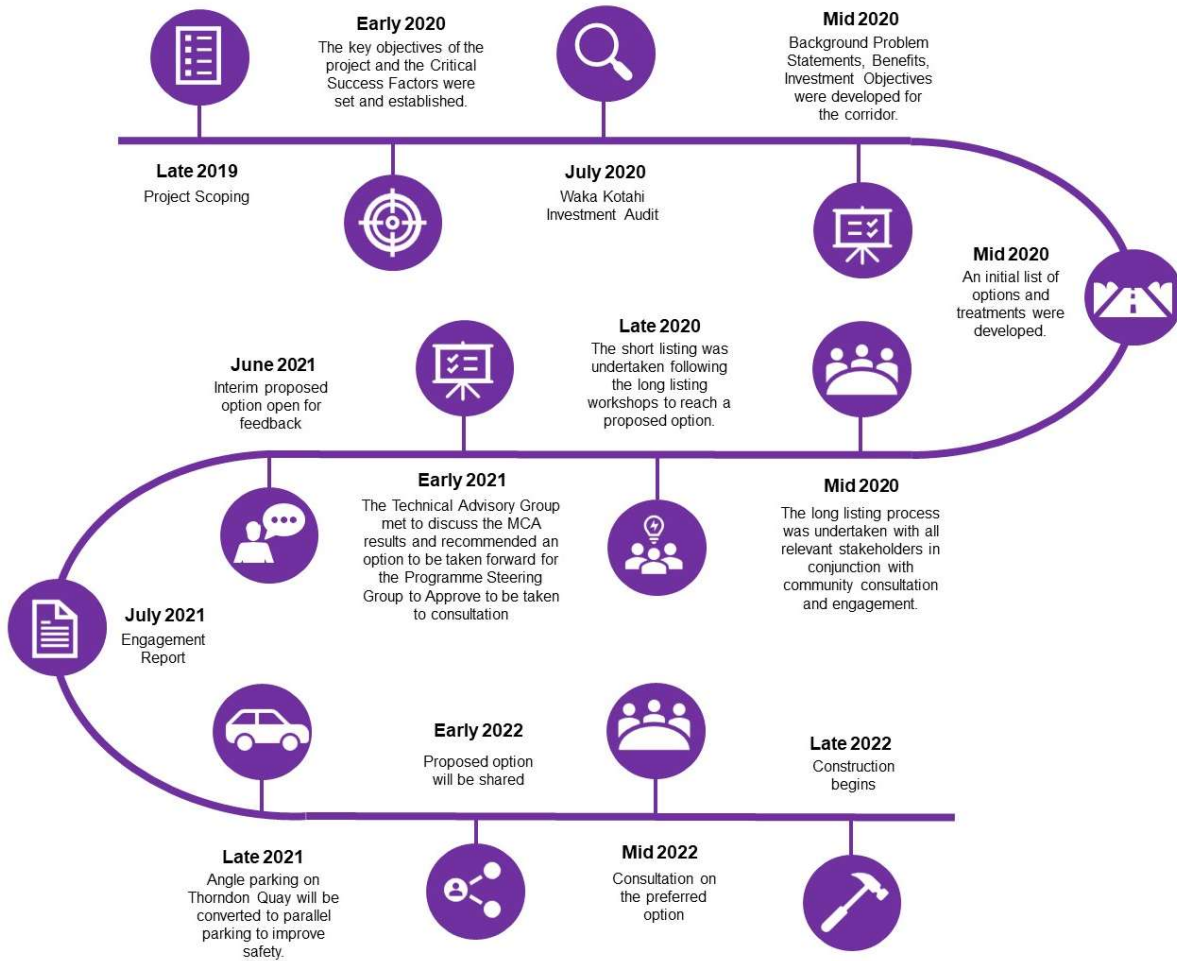
- Hutt Road Sustainable Transport Study (WCC, 2015)
- Wellington Central Business District (CBD) to Ngauranga Cycleway Indicative and Detailed Business Case (IBC and DBC) (WCC, 2016)
- Hutt Road Cycleway and Transport Improvements Committee report (WCC, 19 May 2016)
- Northern Connection: Thorndon (WCC, 2017)
- Design Report: Thorndon (WCC, 2018)

- Thorndon Quay Cycleway Committee Report (WCC, April 2018)
- Safety Audit of Hutt Road Cycleway (Stantec for WCC, January 2020)
- Wellington Multi-User Ferry Terminal PBC (June 2019).

1.7 Project Timeline

The project timeline is summarised in Figure 1-4. This shows the anticipated timescale for activities which will follow on from approval of the SSBC.

Figure 1-4 Project Timeline⁶



1.8 Project Workshops

A number of workshops and meetings with the TWG have informed and shaped the development of the SSBC. The main ones are as summarised in Table 1-1.

⁶ Angle parking changes on Thorndon Quay have since been implemented since consultation in May/June 2021.

Table 1-1 TWG Workshops and Meeting

Workshop/ Meeting	Date	Purpose
Objectives, Critical Success Factors (CSFs)	28/01/20	Drive over of the corridor by bus, setting objectives and critical success factors (CSF's).
Quick Wins	05/03/20	Testing of key issues and development of quick wins with the project technical working group (TWG).
Quick Wins Shortlist Confirmation	01/04/20	Confirmation of quick wins shortlist with the TWG.
Long List Themes	12/05/20	Presentation of the corridor vision, urban design assessment and identification of long list themes and interventions.
Investment Objectives	19/05/20	Meeting to discuss and agree problem statements, benefits, investment objectives and success factors. Attended by project team members, Owner Interface Managers (OIMs) and TWG representatives.
Long List to Short List Workshop 1	10/06/20	First presentation of a multi criteria assessment (MCA) outcomes and the emerging short list.
Long to Short List Follow up Workshop (1)	16/06/20	Follow up meeting to Long List to Short List Workshop 1 to discuss the emerging short list and format for public consultation.
Long to Short List Follow up Workshop (2)	7/07/20	Meeting with TWG to discuss Hutt Road options.
Long to Short List Follow up Workshop (3)	12/08/20	Workshop with TWG members to discuss the outcome of the safety assessment.
Long to Short List Workshop 2	3/09/20	Final presentation of the MCA outcomes and the emerging short list options for public consultation.
MCA and Preferred Options Workshop 1	18/11/20	Workshop to determine the ranking of short-list options and preferred options based on the investment objectives, effects, and delivery, maintenance, and operations.
MCA and Preferred Options Workshop 2	30/06/21	Workshop to review the interim assessment identified in 2020 in the light of the 2021 engagement feedback.

Extensive stakeholder engagement has been undertaken on the LGWM programme and on the proposals for the TQHR project. The most recent consultation took place in May/June 2021.

1.9 Interim Reports

A number of interim reports were prepared following the commencement of the SSBC process, notably:

- Engagement Report (July 2020)
- Parking Impact Assessment (September 2020)
- Strategic Case Report (October 2020)
- Long List to Short List Report (November 2020)
- Transport Modelling and Analysis Report (November 2020) – informing the preferred option
- Meeting Notes from Stakeholder Briefings (Undated)
- Stakeholder Briefing (May 2020)
- Engagement Data Analysis Report (June 2021)
- Heritage Assessment (July 2021)
- Social and Environmental Responsibility Screen (July 2021)
- Consenting Strategy (July 2021)
- Alternative and Options Report (October 2021)
- Preliminary Design Philosophy Statement (PDPS) (November 2021)
- Transport Modelling and Analysis Report (February 2022).

1.10 Business Case Structure

This SSBC is structured in six chapters following this introduction, as summarised in Table 1-2.

Table 1-2 Business Case Structure

Chapter		Content
2	Context	Provides background information on the project area and surrounding area.
3	Previous Stakeholder Engagement	Provides a summary of the engagement undertaken on the project up to that reported in the July 2020 Engagement Report
4	The Case for Change	Defines the problems and opportunities, benefits of investment and summary of issues and constraints.
5	Options Development and Assessment	Outlines the process undertaken from identification of options to determining the preferred, including the Stakeholder Engagement undertaken in May/June 2021. This includes a monetary and non-monetary assessment of the preferred option.
6	Financial Case	Provides information surrounding delivery and maintenance costs and funding options with associated risks.
7	Commercial Case	Provides evidence of the commercial viability of the proposal and the consenting and procurement strategy that will be used to engage the market.
8	Management Case	Provides information surrounding the viability of delivering the proposal.

2 Context

2.1 Growth and the Transport System in the Wellington Region

In recent decades major cities, such as Auckland, Sydney and Melbourne, have dominated economic and population growth in Australasia, attracting ever greater shares of skills, business and investment. Smaller cities like Wellington have had to find ways to stand out and position themselves. What a city can offer, in terms of quality of life and quality of jobs, is the decision driver for the locations in which mobile, skilled populations would like to live in.

Wellington has a world-class quality of life, a physical environment of outstanding beauty, a highly skilled population, high incomes, healthy communities, and a reputation for creativity and quality events. This is reflected in its reputation as a liveable city.

2.1.1 Population and Employment Growth

The population of the Wellington Region currently stands at around 510,000 people. Over 40% of the current 235,000 jobs in the Wellington region are in the central city. The high concentration of employment in the central city attracts commuters from the wider Wellington region.

Intensification of both residential and commercial land use in the central city, and an increase in the number of visitors, is leading to a growth in short journeys and demand for a safe and convenient central city street network with a high level of amenity. The growth in the number of jobs in the central city is also leading to an increase in the number of longer distance commuters who need to travel into the central city at peak times. This is especially evident for those travelling from the north, where new housing development is taking place.

2.1.2 The Transport System

Growth in the Wellington region as a whole is driving demand for journeys to the central city and port. There is also a demand for journeys through the central city, to reach important destinations such as the airport and hospital. This latter demand results in increased car travel through the central city as the public transport system's design is mainly focused on moving people into and out of the CBD. These significant movements conflict with the increasing number of buses, pedestrians and cyclists accessing the central city.

The transport system has a key role to play in facilitating further growth in Wellington, supporting further intensification of the central city and the high quality of life it has to offer. Enabling more people to live and move around the central city is desirable economically, as it supports an increasingly productive economy by matching innovative businesses with a highly skilled labour pool. Good job opportunities and a high quality of life tend to attract talented and skilled people to the city. Intensification in the central city and around public transport hubs is also desirable as it reduces the environmental impacts of travel to and from the central city.

In recent years, most of the growth in travel demand to, from and within the central city has been accommodated by people choosing more sustainable ways to travel, by walking, cycling and using rail and bus services. Private vehicle activity within the central city has been held in check by constrained road corridor capacity, traffic congestion on the approaches to the central city, and the relatively high cost of commuter car parking within the central city itself.

2.2 Existing Transport and Land Use on the TQHR Corridor

2.2.1 Land Use

There is a diverse mix of land use including residential, commercial, industrial, retail and education activities on Thorndon Quay between the Lambton Quay Bus Interchange and Davis Street. Land uses on Thorndon Quay between Davis Street and Tinakori Road include a number of high turnover land uses, including cafes, day care centres, vehicle repairs, a gym, trade shops, and large format retail such as carpet stores, furniture retailers, and plumbing supplies etc. There are also some residential apartments.

Land use on Hutt Road consists of larger retail units (e.g. Kaiwharawhara Spotlight shop and Placemakers). There is only limited residential land use, although there are a number of accesses leading to Ngaio and other residential areas. From the intersection of Onslow Road into the city there are a number of large commercial units operating which have direct entrance/ exits to/ from Hutt Road. An effluent disposal point is located in close proximity to Hutt Road, and a railway station exists at Ngauranga.

Hutt Road is bounded to the west by a steep scrub covered escarpment which constrains land use. State Highway 1, the NIMT railway line and Wellington Harbour are to the east. Land use is typically concentrated on the east side of the road, due to the topography and proximity to the rail corridor. There are numerous retaining walls of various typologies along the road.

Both Thorndon Quay and Hutt Road form a central spine for traffic and public transport connecting between the central city and the northern suburbs, as well as key growth areas and areas not served by the rail network.

2.2.2 Road Classification and Posted Speed Limit

Both Hutt Road and Thorndon Quay are classified as arterial roads under Waka Kotahi one network road classification (ONRC). Arterial roads are "vital roads which provide key strategic links in urban areas and contribute to the economic and social well-being of communities and the businesses that operate within them". They are also both classified as an over-dimension route and can be used by vehicles conveying hazardous goods.

The TQHR corridor is the main route and public transport corridor between the central city and northern suburbs, a key growth area, including areas not served by the rail network. In the event of a major incident on SH1, Hutt Road and Thorndon Quay are used as an emergency detour.

The current posted speed on Thorndon Road is 50km/hr. Hutt Road has a posted speed limit of 60km/hr, which increases to 80km/h north of Onslow Road.

Figure 2-1 shows Wellington's road classification as defined by the Network Operating Framework (NOF). Figure 2-2 shows the extent of the area's strategic cycle network, including existing facilities and those planned.

Figure 2-1: Wellington Network Operating Framework

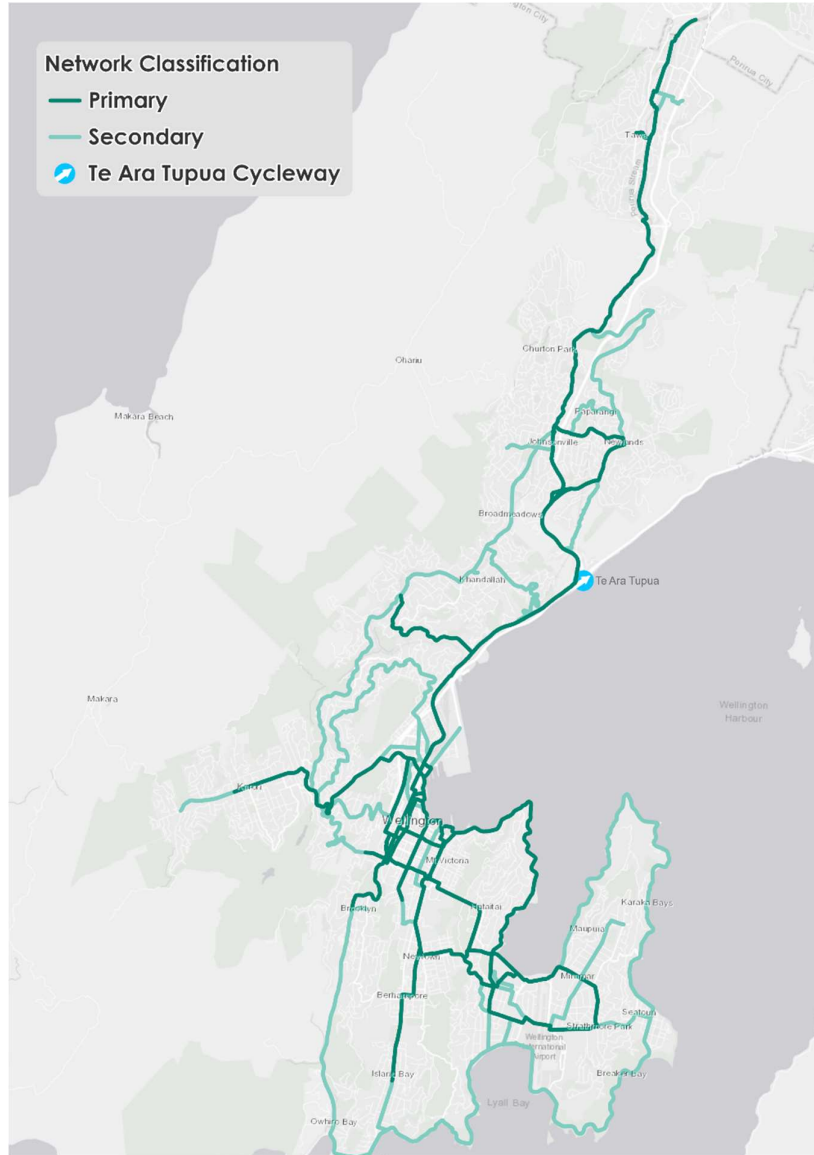
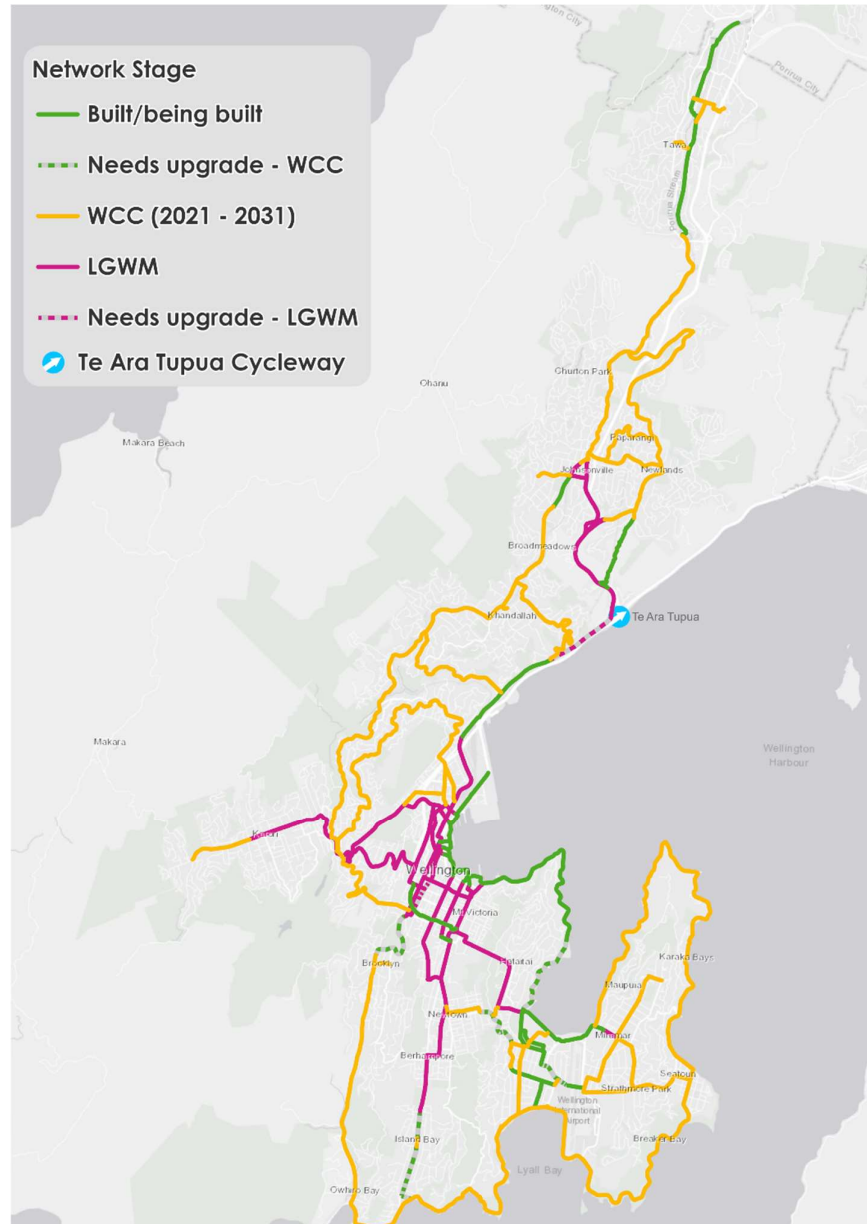


Figure 2-2: Wellington Strategic Cycle Network



2.2.3 Road Geometry

The majority of Thorndon Quay is about 24m wide from boundary to boundary. The road space is primarily allocated to general traffic lanes, however they include road cycle lanes, loading zones and metered parking spaces (some parallel, some diagonal). Footpaths are also typically 2 to 2.5m wide.

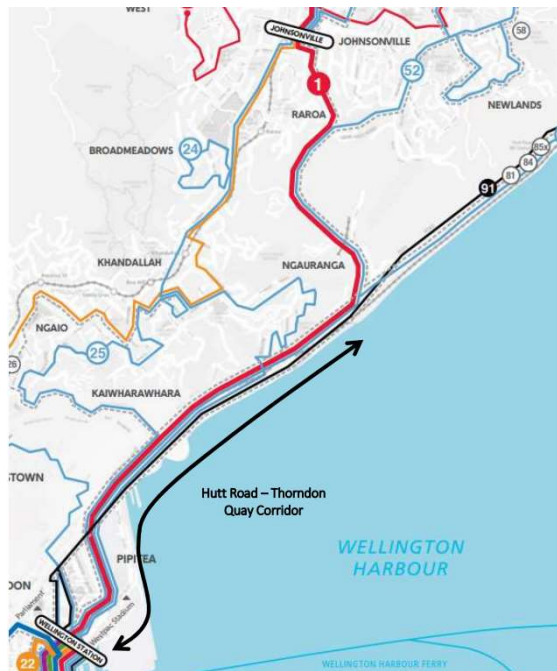
Hutt Road is predominantly 22.5m wide from boundary to boundary between Tinakori Road and the Ngauranga Gorge. This section of the corridor has a raised median in the form of a narrow-kerbed island or wide flush median and wider traffic lanes (typical in the order of 3.4m). The central median is delineated by either chevron white lining or low-profile mountable kerbing. There is a recently opened two-way off-road cycleway, and separate footpath on the eastern side of the corridor, along the section between the Caltex Station and Tinakori Road. There is a shared path

on eastern side of Hutt Road from Caltex Station north, to Jarden Mile. Footpaths exist on both sides of Jarden Mile and the southbound side of Centennial Highway.

2.2.4 Bus Services

Eleven bus routes operate along the corridor from the Lambton Quay Bus Interchange (Wellington Bus Station), as shown in Figure 2-3. At peak times there are in the order of 40 buses per hour, operating along Thorndon Quay (i.e. towards the city in the morning peak and away from the city in the evening peak). There are currently typically 16 buses per hour in each direction in the inter-peak period.

Figure 2-3 Bus Routes Serving the TQHR Corridor



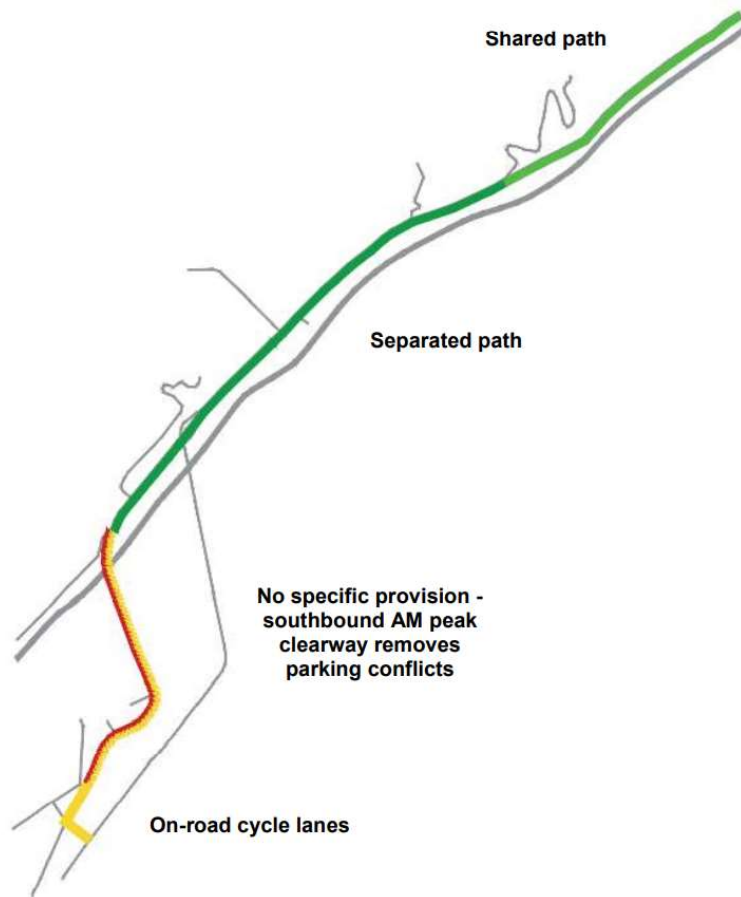
2.2.5 Cycle Facilities

Figure 2-4 summarises the current cycle facilities provided on the TQHR corridor. The existing facilities include:

- A shared walking and cycling path on Hutt Road (north of Onslow Road)
- A separated on Hutt Road (south of Onslow Road)
- On-road cycle lanes on Thorndon Quay.

The TQHR corridor is the only route for people coming from or to the Hutt Valley, and is also heavily used by people coming from / to the northern suburbs.

Figure 2-4 Cycle Facilities



2.2.6 Transport Demand

2.2.6.1 Traffic Flows

Hutt Road is the busiest section of the main route, between Kaiwharawhara Road and Aotea Quay. Traffic volumes increase from north to south along the route, until Aotea Quay where volumes decrease at both Aotea Quay and Tinakori Road, as shown in Appendix B. Traffic volumes increase again after Mulgrave Street.

2.2.6.2 Bus Use

There are approximately 10,000 bus passengers on an average day, using the corridor (two-way), making it the busiest corridor outside the city centre. A large proportion of bus travel is towards the City Centre in the morning (AM) peak period and away from the City Centre in the evening (PM) peak period. Demand is greatest at the southern end of the corridor, since more bus services join Hutt Road at Onslow Road and Kaiwharawhara Road.

Historic passenger demands in the morning peak two-hour period on Thorndon Quay, as derived from annual cordon surveys, are shown in Figure 2-5.

Figure 2-5 Bus Passenger Demand 2000 to 2019⁷

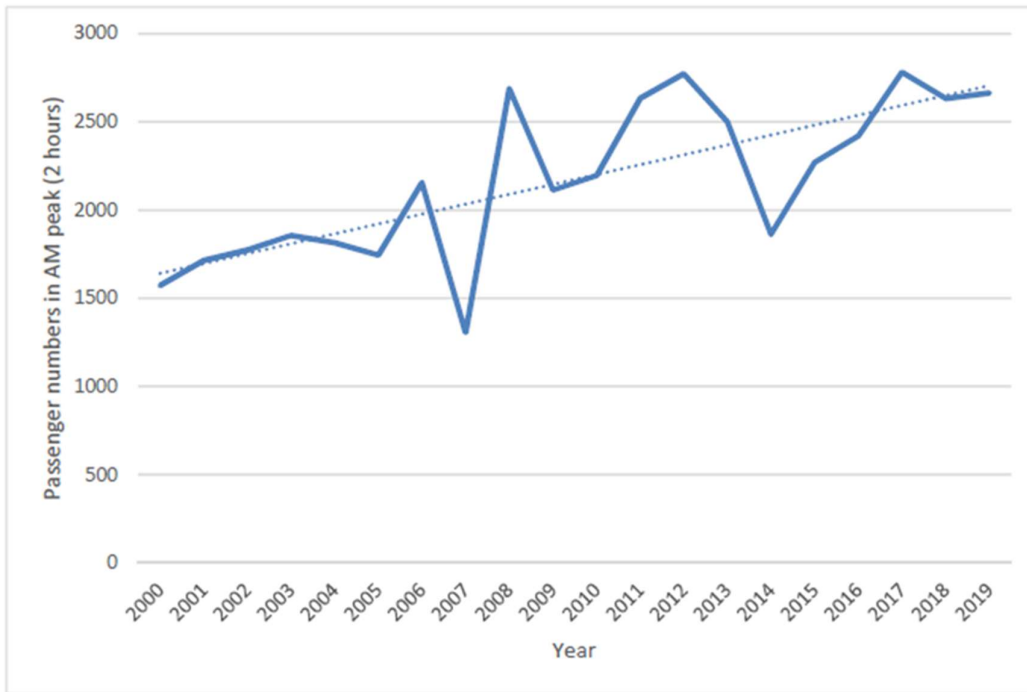
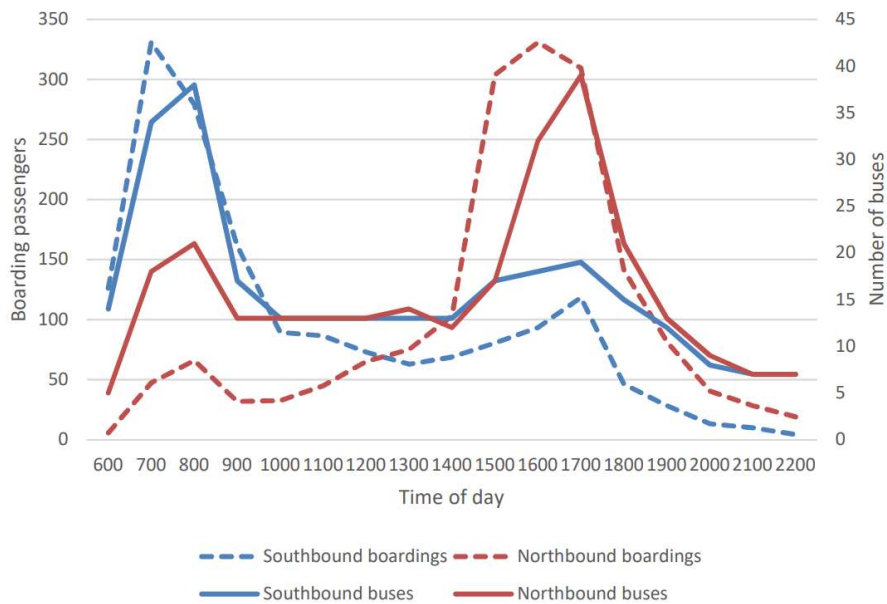


Figure 2-6 shows the number of boarding passengers and the number of buses on the TQHR corridor, by time of day and direction.

Figure 2-6 Boarding Passengers on the TQHR Corridor



⁷ 2020 bus patronage data is not shown because the patronage impacts caused by Covid-19 are not considered of significant scale to affect the outcomes of this business case.

2.2.6.3 Cycle Demand

The TQHR corridor is the busiest commuter cycling route in Wellington. Figure 2-7 shows the average and maximum daily cycle demands on Thorndon Quay by month (April 2018 to March 2019⁰⁹). The data shows that on average the weekday flow varies between approximately 700 and 1,300 cycle trips with higher demands in the warmer months. Maximum weekday flows are as high as approximately 1,600 trips per day. Weekend average flows vary between 160 and 360 cycle trips per day, with a maximum weekend flow of around 470 cycle trips per day.

Figure 2-7 Average and Maximum Daily Cycle Demands on Thorndon Quay by Month

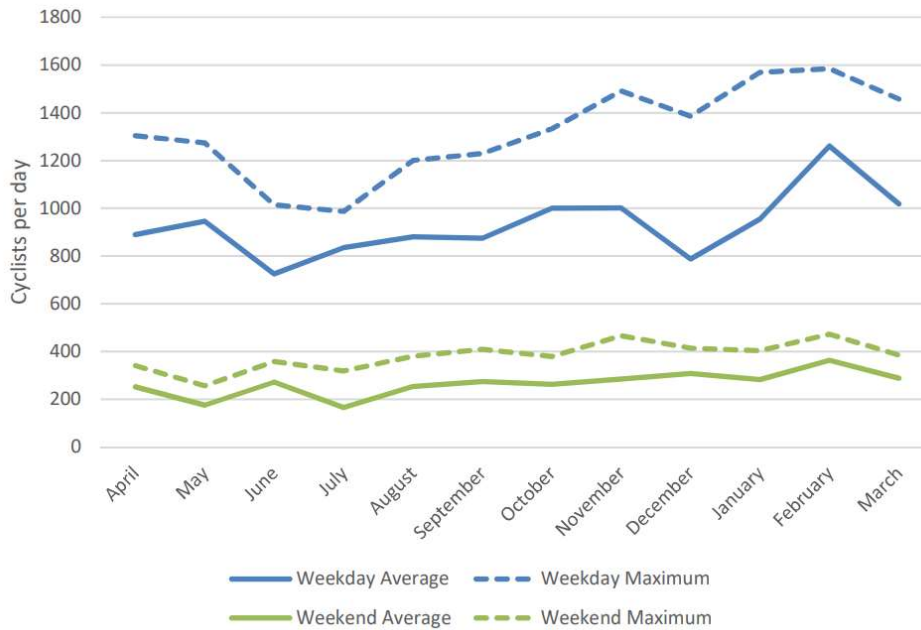
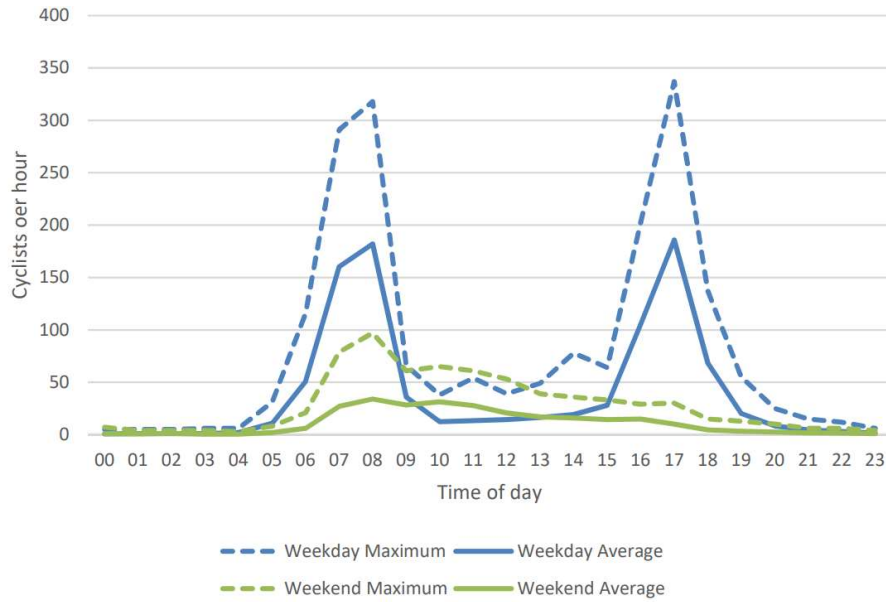


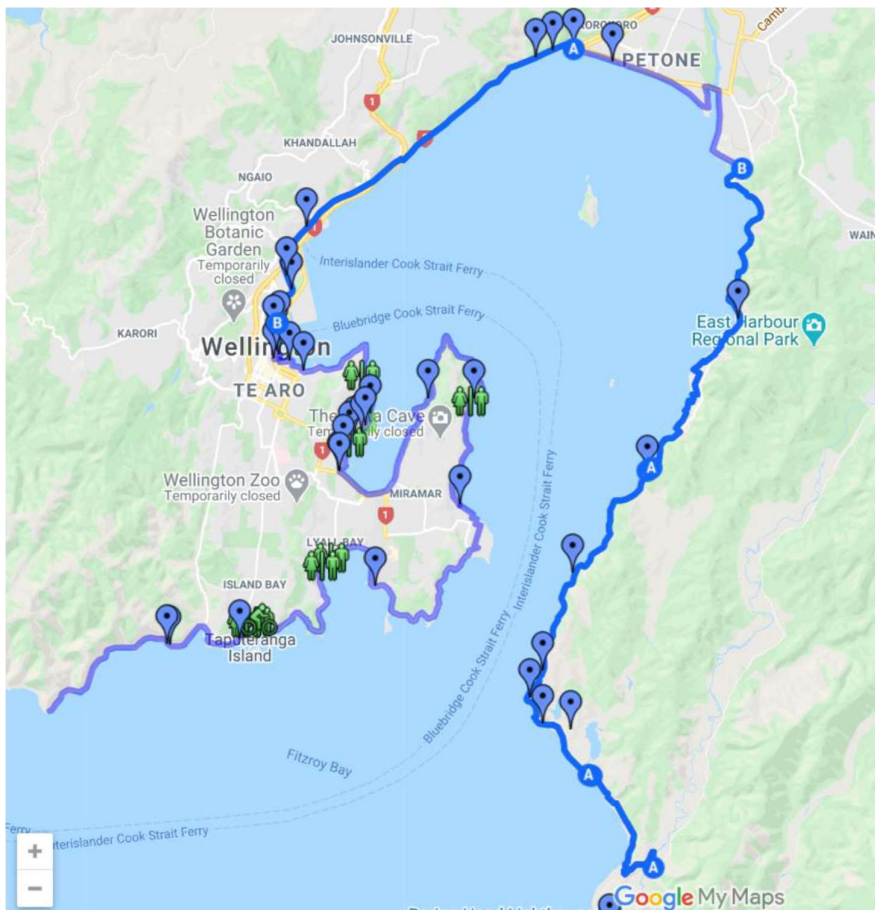
Figure 2-8 shows the average and maximum cycle demands on Thorndon Quay by hour between April 2018 and March 2019⁰⁹. The data shows that the weekday flows are concentrated around the network peak periods with the annual average hourly peak of 180 cyclists per hour. However, maximum hourly flows are as high as 340 cyclists per hour. Weekend average peak hourly flows are around 35 cycle trips per hour, with a maximum of around 100 cycle trips per hour.

Figure 2-8 Average and Maximum Daily Cycle Demands on Thorndon Quay by Time of Day



The TQHR corridor forms part of the Great Harbour Way/ Te Aranui o Pōneke Cycle Route, shown in Figure 2-9 and also serves as a recreational cycling route.

Figure 2-9 Great Harbour Way/ Te Aranui o Pōneke Cycle Route



2.2.6.4 Pedestrian Demand

Table 2-1 shows the current approximate number of pedestrians at different locations along the corridor. This shows that pedestrian demand is greatest closest to central city and reduces with distance from the central city.

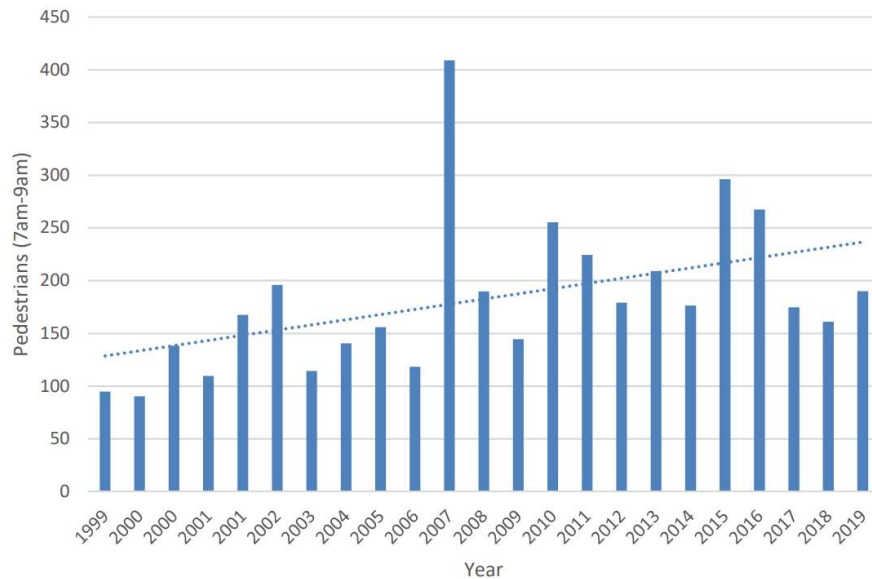
Table 2-1 Current Pedestrian Demand

Location	Peak Hour Demand	Daily Demand ⁸
Hutt Road (north of Onslow Road)	5-15	50-150
Hutt Road (Kaiwharawhara Road to Onslow Road)	20-40	200-400
Hutt Road (Thorndon Quay to Kaiwharawhara Road)	50-100	500-1,000
Thorndon Quay	200-300	2,000-3,000

Pedestrian activity on Hutt Road is low to minimal, with virtually no pedestrian activity north of Kaiwharawhara Road, due to the existence of a high bluff adjacent to the road, and the railway corridor.

Figure 2-10 shows the pedestrian demand trend on Thorndon Quay in the morning two-hour peak period (7am-9am). The graph shows data from 1999 onwards.

Figure 2-10 Pedestrian Demand by Year on Thorndon Quay



2.2.6.5 Truck Movements

Hutt Road is also an important route for trucks, providing access to the existing the ferry terminal at Kaiwharawhara via the Aotea Quay interchange. This ferry is a key connection between the North and South Islands and therefore a significant economic contributor to the Wellington area and wider Aotearoa economy. Trucks comprise of up to 15% of traffic flows. Truck movements on Thorndon Quay are much lower.

⁸ Assumed to be ten times the peak hour flow

2.3 Future Changes

2.3.1 Land Use

Under medium projections, the population of the Wellington Region is forecast to grow by 15% over the next 30 years, equating to 75,000 extra residents. The distribution of this growth is estimated to be as follows:

- 30% will be focused on Wellington’s central city and inner suburbs
- 20% will occur in Wellington City’s northern suburbs
- 13% will occur in other areas of Wellington City
- The remainder (37%) will be around urban centres outside Wellington City, relatively evenly split across the Kapiti Coast, Porirua, Upper Hutt and Lower Hutt, with a lesser amount in the Wairarapa.

The population of Wellington’s northern suburbs⁹ is forecast to increase from 51,600 (in 2018) to 62,000 (2043). These estimates are based on the current ID¹⁰ projections (developed February 2016).

Employment projections show regional employment growing by between 15% and 20%, over the next 30 years. They suggest that between 55% and 60% of future growth in employment is likely to be in the central city. This growth will potentially increase the number of jobs in these suburbs, from the current 99,000 to between 114,000 and 131,000 over the next 30 years.

Land use along the TQHR corridor is expected to see transformation and intensification over the time horizon of the LGWM programme. It is anticipated that Thorndon Quay specifically, will become an increasingly sought-after edge of CBD location for high density residential, office and other commercial uses.

Light industrial, depot and warehousing activities are expected to be replaced by higher order, land use activities as land values rise. The amenity of the area is also likely to increase, especially near the CBD where residential activity will drive expectations for a better street environment.

Figures 2-11 to 2-13 show the land use plans for the corridor, as defined in the current Wellington District Plan.

⁹ Ngaio, Crofton Downs, Khandallah, Newlands, Johnsonville, Grenada, Churton Park, Woodridge

¹⁰ <https://home.id.com.au/>

Figure 2-11 Land Use Plans for the Thorndon Quay Area

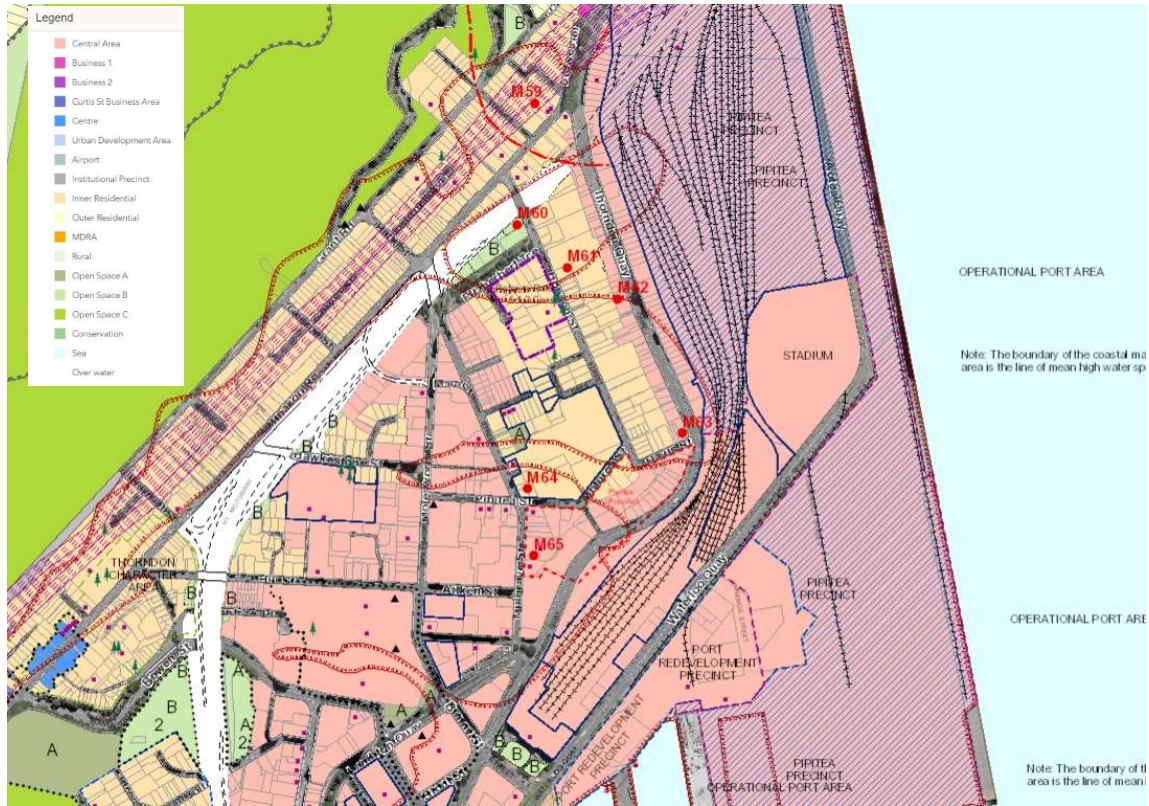


Figure 2-12 Land Use Plans for the Thorndon Quay/Hutt Road Area

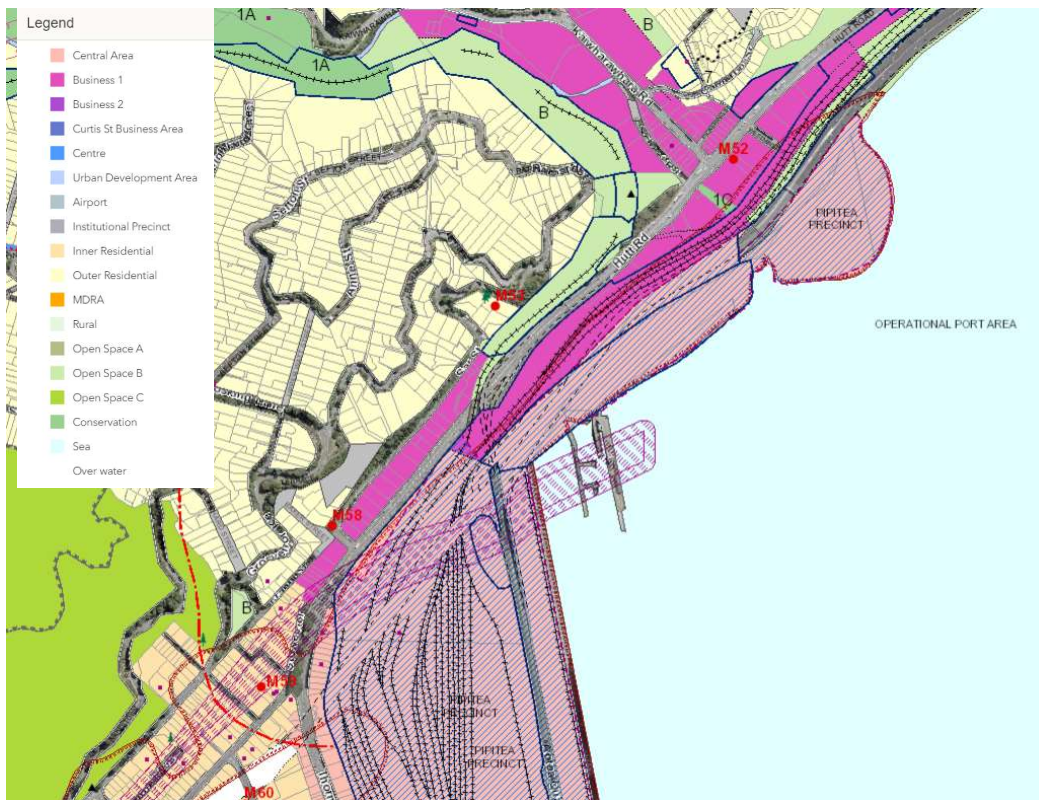


Figure 2-13 Land Use Plans for the Hutt Road Area



2.3.2 Interrelated Transport Projects

There are a number of transport projects which could impact the TQHR project and have been considered in the development of options. These are summarised in Table 2-2.

Table 2-2 Future Transport Projects

Project	Timeframe	Status	Explanation/Linkage
Golden Mile (LGWM)	3-4 years	SSBC underway	Improve bus convenience, travel times and reliability in Wellington's CBD.
City Streets (LGWM)	3-10 years	Tranche 1 SSBCs commences	Reallocation of road space on streets in the central city to enable the transport system to move more people with fewer vehicles and to improve access for all modes e.g. bus priority measures.
Low Cost Low Risk (Waka Kotahi)	1-3 years	Being implemented or being consulted on / designed	Includes generally small-scale 'quick win' improvements to Ngauranga Gorge for buses and people walking and cycling.
Transitional Bike Network Programme (WCC)	0-3 years	SSBCs underway	Accelerated roll-out of interim Wellington bike network, alongside associated bus network improvements.
Street Transformation Programme (WCC)	0-10 years	Underway	Permanent upgrades to improve walking, cycling and public transport (outside of LGWM scope)

Project	Timeframe	Status	Explanation/Linkage
Ngā Ūranga ki Pito-One Shared Path (Waka Kotahi)	3-4 years	Committed	Linking Ngauranga to Petone, this project will form an improved section of the Great Harbour Way/ Te Aranui o Pōneke Cycle Route by providing a new route along the harbours edge. This links into the existing shared path that joins Hutt Road at Jarden Mile. An addendum to this SSBC is considering a potential upgrade to this existing section of shared path.
Wellington Multi-User Ferry Precinct Indicative Business Case (IBC)	3-15 years	IBC underway	A new multi-user ferry terminal is proposed to be built at Kaiwharawhara. This will be shared by Bluebridge and Interislander ferries.
Wellington Single User Ferry Terminal	2-4 years	Under design	A new wharf and terminal is planned to support KiwiRail's purchase of two new rail-enabled Interislander mega-ferries, which are significantly larger than their current fleet.
Travel Behaviour Change (LGWM)	3-10 years	SSBC Underway	A package of travel behaviour change measures which can be implemented as part of the LGWM programme to significantly contribute to the travel choice and mode shift goals of LGWM.
Mass Rapid Transit (MRT) IBC (LGWM)	3-10 years	IBC Underway	Confirming the viability of MRT as an investment solution for Wellington linking Wellington Railway station to Te Aro, Newtown, Kilbirnie, Miramar and Wellington Airport.
State Highway Improvements IBC (LGWM)	3-10 years	IBC Underway	A package of improvements on the SH1 corridor between Ngauranga Gorge and Wellington Airport.

2.3.3 Transport Demand

The land use changes will drive demand for transport to and from the area. Forecasts prepared for the overall LGWM programme in 2019 indicated the following overall annual transport demand growth rates between 2013 and 2036:

- 0 to 0.6% in the morning peak period
- 0.25 to 0.5% in the inter-peak period
- 0 0.2% in the evening peak period.

Programme wide demand forecasts prepared in 2021 by the Wellington Analytics Unit (WAU), which assume improvements to the TQHR corridor, indicated annual growth in bus patronage of 3% per annum from 2026-2036 and 2% per annum from 2036 on the TQHR corridor. In absolute terms, this is growth from around 10,000 per day at present to about 11,000 per day in 2026 and to around 15,000 per day by 2036). These forecasts reflect the limited additional capacity the rail network can provide in Wellington, and therefore much of the increase in public transport demand is forecast to occur on the bus network.

The proposed Te Ara Tupua project will provide a missing critical walking and cycling connection between Wellington and Hutt valley. It is expected to result in a step change in the demand on the corridor. Forecasts for the project indicate that during the opening year (due mid-2024), the following user demands on an average weekday are expected:

- 600 additional cyclists' trips per day (1,300 in total)
- 450 additional walker/runner trips per day (450 walkers/ runner trips in total)
- 100 additional device user trips (e.g. e-scooters, etc) per day (100 device user trips in total).

The weekend forecasts are slightly higher compared to the weekday forecasts but have less pronounced and differing peak periods. Demand is predicted to increase by approximately 10% per annum between 2025 and 2030.

This will result in a step change in cycle demand. Most of the extra cycle demand is likely to use the Hutt Road Thorndon Quay corridor and travel to Wellington's CBD. There will also be additional cyclists on TQHR corridor travelling via Ngauranga Gorge and Kaiwharawhara.

There is also potential for increased recreational walking and cycling along the TQHR corridor, however. This increase in recreational walking and cycling is difficult to quantify as the current environment and wider walking and cycling connections (to the north of Hutt Road) are not well suited to walking and cycling for leisure purposes. Many walkers and runners are likely to use only a portion of the path, predominantly starting and finishing at the Petone end.

A large increase in truck movements, potentially by as much as 50%, is expected by 2036, due to the introduction of new larger ferries.

2.4 Alignment with National, Regional and Local Policies and Plans

Investment in the TQHR corridor is aligned with national, regional and local policy plans and policies, as summarised in Table 2-3.

Table 2-3 Policy and Plan Alignment

Policy/Plan	Alignment with TQHR Project
<p>Government Policy Statement (GPS) for Land Transport 2021/22-2031/32</p>	<p>The purpose of the transport system is to improve people's wellbeing, and the liveability of places. It does this by contributing to five key outcomes, identified in the Ministry of Transport's Transport Outcomes Framework. These are:</p> <ul style="list-style-type: none"> ▪ Inclusive access ▪ Economic prosperity ▪ Healthy and safe people ▪ Environmental sustainability ▪ Resilience and security, <p>GPS 2021 has four strategic priorities which will guide land transport investments from 2021/22-2030/31. These are:</p> <ul style="list-style-type: none"> ▪ Safety ▪ Better travel options ▪ Climate change ▪ Improving freight connections.
<p>Wellington Regional Land Transport Plan 2021 (adopted June 2021)</p>	<p>Investment in the region's transport system will be guided by the following priorities:</p> <ul style="list-style-type: none"> ▪ Public transport capacity ▪ Travel choice ▪ Strategic access ▪ Safety ▪ Resilience.
<p>Wellington Urban Growth Plan: Draft Spatial Plan</p>	<p>Invest in the city to deliver a:</p> <ul style="list-style-type: none"> ▪ Compact city ▪ Liveable city ▪ City set in nature.
<p>Wellington Urban Growth Plan: Planning for Growth</p>	<p>The plan deals with the major planning issues facing the city and region in the next two to three decades – including population growth, housing affordability, protecting the City's biodiversity, transport, climate change and natural hazards.</p>
<p>Towards 2040: Smart Capital, 2011</p>	<p>Position Wellington as an internationally competitive city with a strong and diverse economy, a high quality of life and healthy communities. Seek to make Wellington:</p> <ul style="list-style-type: none"> ▪ A people-centred city ▪ A connected city ▪ An eco-city ▪ A dynamic central city. <p>The vision would see the central city as a vibrant and creative place offering the lifestyle, entertainment and amenities of a much bigger city. The central city will continue to drive the regional economy.</p>
<p>Te Atakura – First to Zero</p>	<p>In June 2019, Wellington City Council adopted Te Atakura – First to Zero, which is a blueprint to make Wellington City a zero carbon capital (net zero</p>

	<p>emissions) by 2050. This blueprint outlines key activities that can help reduce our emissions in four target areas: Transport, Building Energy and Urban Form, Advocacy, and the Council.</p>
<p>WCC Parking Policy (June 2020)</p>	<p>Provides a framework to guide future decision-making on the management of all Council-controlled parking spaces. This includes off-street parking and on-street parking, both free-of-charge (unrestricted) and those which incur a user-charge. The policy sets out objectives, high level principles, a parking space hierarchy (that prioritises the types of parking in different areas), area-based parking management guidance (that prioritises how we manage supply and demand). It also provides a new approach to setting parking fees and developing area-based parking management plans.</p>
<p>Low Carbon Capital – a Climate Change Action Plan for Wellington 2016–2018</p>	<p>Greening Wellington's Growth by:</p> <ul style="list-style-type: none"> ▪ Maintaining the city's liveability - the features that support our high quality of life and the city's character ▪ Keep the city compact, walkable and supported by an efficient transport network ▪ Protect the city's natural setting - nestled between our green hills and coastline, contributing to our distinctive character ▪ Make the city more resilient to natural hazards such as earthquakes and the effects of climate change. <p>Changing the way we move by:</p> <ul style="list-style-type: none"> ▪ Supporting car-share and electric vehicle charging ▪ Continuing to support car sharing ▪ Investing in walking, cycling and public transport modes.
<p>Let's Get Wellington Moving Objectives</p>	<p>Revised objectives and proposed weightings were developed in June 2021, as follows:</p> <ul style="list-style-type: none"> ▪ Liveability – Enhances urban amenity and enables urban development outcomes (20%) ▪ Access – Provides more efficient and reliable access for users (15%) ▪ Carbon emissions and mode shift – Reduces carbon emissions and increases mode shift by reducing reliance on private vehicles (40%) ▪ Safety – Improves safety for all users (15%) ▪ Resilience – Is adaptable to disruptions and future uncertainty (10%)
<p>Innovating Streets – making safer streets for people (WCC)</p>	<p>Innovating Streets pilots are four of 70 throughout the country with the purpose of creating safer, healthier and more people friendly towns and cities. These projects will be done using tactical urbanism and are about co-designing quick, low-cost, scalable improvements that help to create more vibrant, people-friendly spaces in Wellington's neighbourhoods. The funded Innovating Streets pilots in Wellington city are:</p> <ul style="list-style-type: none"> • Placemaking pop-ups in Newtown (along Riddiford Street between Mein and Rhodes streets, and on Hall Street), Te Aro (between Taranaki, Cuba Ghuznee and Abel Smith streets) and Allen Street (outside The Fringe Festival Box Office) • A safer connection for everyone in Wilson Street, Newtown between Constable Street and Riddiford Street • A safe cycling facility for people travelling on Brooklyn Road from Webb Street to Ohiro Road

2.5 Parties Involved in the Project

Table 2-4 summarises the main parties involved in the Thorndon Quay Hutt Road project and their strategic interest.

Table 2-4 Parties Involved in the Project and their Strategic Interest

Party	Strategic Interest
Let's Get Wellington Moving	<p>Let's Get Wellington Moving (LGWM) is a multi-decade programme of investment in Wellington's transport and urban development. It is a joint initiative between five partners:</p> <ul style="list-style-type: none"> ▪ Three government (Crown and local government) agencies: <ul style="list-style-type: none"> ▪ Wellington City Council (WCC) ▪ Greater Wellington Regional Council (GWRC) ▪ Waka Kotahi NZ Transport Agency ▪ Taranaki Whānui ki te Upoko o te Ika (represented by the Port Nicholson Block Settlement Trust) and ▪ Ngāti Toa (represented by Te Rūnanga o Toa Rangatira). <p>The LGWM Governance Reference Group provides a critical interface between the partners at the governance level and provides advice to the programme.</p> <p>The LGWM Partnership Board is made up from representatives of the three funding partners and is the single point of accountability and the main decision-making body for the programme.</p> <p>The Programme Director, appointed by the Partnership Board, is responsible for delivering the programme, The Programme Director is supported by the Programme Leadership Team who provide advice and guidance related to key programme decisions and overarching management.</p> <p>The vision for the LGWM Programme is for a great harbour city:</p> <ul style="list-style-type: none"> ▪ That is accessible to all ▪ With attractive places ▪ With shared streets ▪ Efficient local and regional journeys. <p>Realising this vision will involve moving more people with fewer vehicles.</p>
Wellington City Council	<p>WCC is the local authority responsible for Wellington City. Its purpose is to enable democratic local decision-making and action by, and on behalf of, communities. It seeks to promote the social, economic, environmental, and cultural well-being of people that live, work or visit Wellington now and in the future.</p> <p>WCC invests to make Wellington more resilient, vibrant and competitive, and makes sure residents continue to have a high quality of life. The strategy and vision for Wellington is built on its current strengths but also recognises the challenges the city faces now and over the medium to long term.</p> <p>The Council's four goals for Wellington are:</p> <ul style="list-style-type: none"> ▪ A people centred city ▪ A connected city ▪ An eco-city ▪ A dynamic central city.

<p>Greater Wellington Regional Council</p>	<p>GWRC is responsible for promoting Quality for Life by ensuring the environment of the Wellington Region is protected while meeting the economic, cultural and social needs of the community. One of its responsibilities is managing public transport services across the Wellington region, including arranging funding and contracts for service delivery. GWRC activities seek to work towards the following vision:</p> <ul style="list-style-type: none"> ▪ An extraordinary region ▪ Thriving environment ▪ Connected communities ▪ Resilient future.
<p>Waka Kotahi</p>	<p>Waka Kotahi is the crown entity responsible for planning and investing in the land transport system. It administers the National Land Transport Fund (NLTF). Their primary objective is to contribute to an effective, efficient, and safe land transport system in the public interest. Through its various functions, Waka Kotahi is responsible for delivering on the Government’s Transport Sector Outcomes to create a transport system that:</p> <ul style="list-style-type: none"> ▪ Provides inclusive access ▪ Supports economic prosperity ▪ Is resilient and secure ▪ Provides environmental sustainability ▪ Supports healthy and safe people.
<p>Mana Whenua</p>	<p>Mana Whenua are a key project partner. They have historic and territorial rights over the land, and a special cultural and spiritual relationship with the environment. This is a matter of national importance under the Resource Management Act.</p> <p>An Iwi Partnerships Working Group has been established to help the programme appropriately consider Mana Whenua perspectives and support broader Iwi engagement.</p>

2.6 Mana Whenua Values

The following draft Mana Whenua values for the LGWM programme were used to guide the development of options considered.

2.6.1 Tahī – Whakapapa (A Sense of Place)

- Building works restore a healthy relationship with nature
- Finished projects tell the story of the place
- Native plantings
- Urban agriculture.

2.6.2 Rua - Wai-ora (Respect the Role of Water)

- Acknowledge the importance of water
- Resurrect the natural water courses
- Manage water run off to ensure only purest water flows to the harbour.

2.6.3 Toru - Pūngao-ora (Energy)

- Minimise energy use during construction
- Completed projects to aim to be energy neutral.

2.6.4 Whā - Hau-ora (Optimising Health and Wellbeing)

- Prior to construction minimise uncertainty by clear goals and timeline
- During construction minimise disturbance to neighbours
- Completed projects to use plantings and water flows to provide healthy environments.

2.6.5 Rima - Whakamahitanga (Use of Materials)

- Recycle the maximum of materials disposed of during construction
- Build with materials and methods that use the lowest energy possible
- Avoid toxic materials that may leach into air or ground water.

2.6.6 Ono – Manaakitanga (Support a Just and Equitable Society)

- Embody our values in these projects
- Work with locals to the extent possible
- Provide safe and inviting public spaces.

2.6.7 Whitu – Whakāhuatanga (Celebrate Beauty in Design)

- Design in a way that lifts the human spirit
- Incorporate public art and interpretation to tell the story of what has gone before.

2.6.8 Whakamatautautanga

- Monitoring.

3 Previous Stakeholder Engagement

Extensive engagement has been undertaken prior to and as part of developing the LGWM programme. The SSBC for the TQHR corridor has built on this, and the knowledge and relationships that have been developed.

This chapter provides a summary of the stakeholder and community engagement that has been undertaken up to and including May 2020, prior to and as part of developing the LGWM programme and to inform the option development process for the TQHR project. It includes analysis of the stakeholders who have an interest in the project and an explanation of the communication approaches and activities that have been employed to engage with them.

Stakeholder engagement undertaken in 2021 on the preferred TQHR option is summarised in Chapter 5.

The prime purpose of the consultation undertaken on the TQHR project is to enable the effective participation of individuals and communities in the decision-making process. This will enable elected representatives to make better-informed decisions on behalf of those councils they represent.

The principles guiding consultation processes set out in the Local Government Act 2002 are designed to ensure individuals and their communities have information about decisions, the opportunity to engage with their councils and make their views known.

There are six guiding principles set out in the Act:

- Councils must provide anyone who will or may be affected by the decision, or anyone who has an interest in the decision, with reasonable access to relevant information.
- These people should also be encouraged to express their views to council.
- People who are invited to present their views to council should be given clear information about the purpose of the consultation and the scope of the decisions being made.
- People who wish to present their views must be given reasonable opportunity to present them.
- Councils should receive these views with an open mind and give them due consideration when making a decision.
- The council should provide people presenting their views with information relevant to decisions and the reasons for them.

The Act also sets out processes for discussing concerns about a council with the Office of the Ombudsmen, the Office of the Auditor General or the Parliamentary Commissioner for the Environment.

3.1 2016 Engagement on the Hutt Road Shared Path

Public consultation on the recently constructed shared path on Hutt Road was held in March 2016. Two open days were held for people to come along and find out more. There were 991 submissions. Councillors heard 45 public oral submissions at the Transport and Urban Development Committee meeting on 5th May 2016.

Work on the first phase of upgrading the shared path started in October 2016, starting with replacing street lighting on the western side of Hutt Road. Preliminary construction on the new paths got under way in April 2017 and continued until mid-2018 as far as the Tinakori Road intersection. Widening the bridge over Kaiwharawhara Stream occurred in late 2019.

3.2 2017 and 2018 Engagement on Interim Improvements to Thorndon Quay

Engagement was undertaken by WCC in February 2017 with the Thorndon Quay community, regarding proposals for roadside bike lanes and associated changes to Thorndon Quay. This engagement consisted of a number of letter drops to businesses, open days and workshops, as well as consultation on some proposed interim improvements between Davis Street and Mulgrave Street. WCC received 316 submissions to this consultation, the majority of which came from people who regularly travel along Thorndon Quay.

Those who supported the proposal expressed they would like safety issues due to angle parking to be addressed. Those who did not support the proposal mostly had comments about the removal of parking.

55% of submitters who supported the proposal with changes, commented on extending the bike lanes north and making a better separation between cyclists and people in cars. 68% of submissions rated this bike connection as important or very important.

The top comment from people who thought the connection was of 'high importance', related to the safety of cyclists. The top comments from those that thought the connection was of low importance believed there were higher priorities.

An interim improvement for bikes was approved by Wellington City Councillors in 2018. This interim improvement would have converted the angle parking to parallel parking and marked on-road bike lanes between Davis Street and Mulgrave Street in order to improve the safety of this section of Thorndon Quay. It was planned this change would be made in conjunction with routine road sealing work at the end of 2018, however due to budget constraints the road sealing change was not made.

3.3 2020 Engagement on the Emerging TQHR Project Options

A stakeholder briefing on the TQHR project was held on 28th May 2020. At the time of preparing the long list of options, New Zealand had just entered into a Level 2 alert in response to the Covid-19 Pandemic. Prior to this, New Zealand had been in alert Levels 3 and 4 which prohibited normal economic activities, such as business operations, except for essential services such as supermarkets and pharmacies. The majority of the public were requested to stay at home and not to travel. As a result of the restrictions on movement and activity, engagement with stakeholder groups was limited.

Stakeholder questions and comments were collated for the project team to consider for the development of the proposal. Feedback was provided on key aspects, such as different modes and priorities.

Wider public engagement was undertaken in May and June 2020 using the online mapping tool, Social Pinpoint. Most of the feedback we received was from people who travel through the Hutt Road and Thorndon Quay area, with less from people who travel to work or have a business on Thorndon Quay or Hutt Road. Bus operators and bus drivers also gave their feedback.

648 online comments were received from 158 people, and five contact form submissions. There were around 30 comments posted on Facebook. Feedback encompassed a wide range of aspects along both Thorndon Quay and Hutt Road and has been used to inform and support the development of proposed long-term options.

The main findings of the consultation was a desire for:

- Increased safety for everyone
- Improved bus priority and reliability
- Better walking and cycling facilities
- A more attractive street environment.

Further details of the stakeholder and public issues and comments from the previous studies relating to this corridor are summarised in Table 3-1.

Table 3-1 High Level Overview of Previous Engagement Comments





Issue	Description
Facilities (or lack of) for cyclists	<ul style="list-style-type: none"> ▪ Lack of dedicated facilities on Thorndon Quay ▪ Restricted space - cyclists forced to use traffic lane when parked cars are present ▪ Existing high volumes of cyclists is expected to grow following the completion of the Ngā Ūranga ki Pito-One section of Te Ara Tupua ▪ Cyclist safety ▪ Connection to other cycle paths.
Slow and unpredictable bus travel times	<ul style="list-style-type: none"> ▪ Mixing with general traffic at signalised intersections ▪ Stop/ start delays at zebra crossings ▪ Pulling in/ out of bus stops which sit outside the traffic lane ▪ Side friction caused by turning traffic and parked cars.
Facilities (or lack of) for Pedestrians	<ul style="list-style-type: none"> ▪ High volumes on some sections and large numbers crossing Thorndon Quay ▪ Lack of crossing facilities for pedestrian north of Bordeaux bakery ▪ Anticipated increased pedestrian demands ▪ Some crossing types/ forms not suitable for their location or volumes of pedestrians ▪ Lack of shade and shelter.
Road Safety	<ul style="list-style-type: none"> ▪ High speeds and high traffic volumes on Hutt Road ▪ Cars failing to stop at red lights ▪ Lack of pedestrian crossings.
Parking	<ul style="list-style-type: none"> ▪ Availability of parks for businesses (incorrect timeframes) ▪ Existing angle parks too steep/ hazardous.
Placemaking	<ul style="list-style-type: none"> ▪ Lack of green spaces ▪ Lack of trees/ shrubbery ▪ Lack of shelter ▪ Too few/ No rubbish bins ▪ Dark (feels unsafe) ▪ Lack of public toilets ▪ Lack of art/ sculptures ▪ Lacking identity and connection to history.

4 Case for Change

This chapter summarises the strategic case for investment, including the problems to be addressed, the anticipated benefits of addressing the problems and the investment objectives. This builds on the Problem Definition and Case for Change Report prepared by LGWM in October 2019, and feedback from stakeholder engagement. Further details of the problems, benefits and objectives are contained in the Strategic Case report.

4.1 Problem Statement

A series of problem statements were developed with project team members, OIMs and TWG representatives at an Investment Logic Mapping (ILM) workshop held on 19 May 2020. These problem statements are summarised below, with approximate weightings associated with each problem statement.

PROBLEM ONE	
Unreliable bus travel times result in a poor customer experience for existing and potential bus users which reduces the attractiveness of and ability to grow travel by bus.	
PROBLEM TWO	
The current state of cycling facilities results in conflict between users, increases risk and limits cycling attractiveness for increasing volumes of cyclists.	
PROBLEM THREE	
Poor quality of the street environment creates an unpleasant experience for a growing volume of people reducing its attractiveness to walk and spend time in the area.	
PROBLEM FOUR	
High and growing traffic volumes combined with high speeds increases the likelihood and severity of crashes on Hutt Road.	

The current and future problems to be addressed are summarised in Figures 4-1 and 4-2.

Figure 4-1 Current Problems



Figure 4-2 Future (2026) Problems if we Do Nothing



4.2 Evidence to Support Problem Statement One

Unreliable bus travel times result in a poor customer experience for existing and potential bus users which reduces the attractiveness of and ability to grow travel by bus (35%)

4.2.1 The Cause and Effect of the Problem

PS1 - Cause and Effect

The **cause** of this problem is defined as buses being impeded by other traffic using the same corridor and intersection or crossing delay. The **effect** of this is a poorly performing bus service especially in the southbound direction during the morning peak. This makes it unattractive for users and limits the ability to grow bus travel.

4.2.2 Evidence of Traffic Congestion

Buses are often stuck behind cars on the TQHR corridor, making travelling by bus slow and unreliable. For the majority of the TQHR corridor, buses mix with general traffic and are subject to the same delays and congestion that affects general traffic. The majority of delays are associated with traffic congestion at intersections, crossings and parking, and at bus stops.

In the morning peak a clearway operates for southbound traffic, and there are often no significant delays for buses entering the CBD between bus stops, as there is generally no on-street car

parking impeding bus movements. During other times of the day, buses are delayed by cars manoeuvring into and out of parking spaces. When this occurs, buses can either wait in the lane or overtake the parking car in the opposing lane / median. The ability to overtake is dependent on the road width and the traffic volume in the opposing lane.

Between 7am and 9am on weekdays, it currently takes about 13 minutes to travel by bus along the approximately 5km length of Hutt Road and Thorndon Quay from Ngauranga/Jarden Mile to Wellington railway station. Transport modelling indicated that travel by bus is expected to take up to 14 minutes by 2026, if no improvements are made. Travel times are expected to increase over a longer peak period, as demand spreads at peak times.

There will be increased travel demand as population grows. As traffic congestion increases, bus journeys will be less reliable if greater priority is not provided for buses.

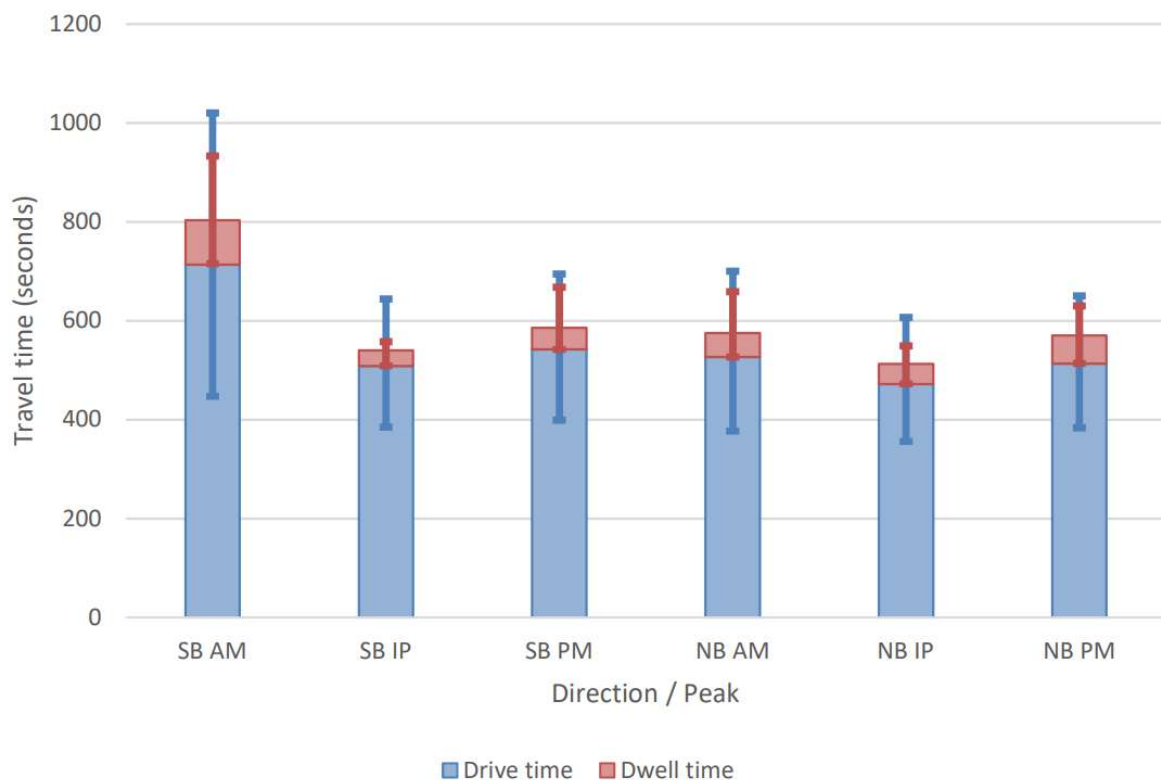
Further information on average traffic volumes, and general traffic congestion, on the corridor are provided in the Strategic Case.

4.2.3 Evidence of Variability in Bus Travel Times

Figure 4-3 shows the variability in overall bus travel time on weekdays along the TQHR corridor. These travel times include dwell time and are shown by peak/off-peak and by direction, as represented by the 15th and 85th percentile travel times. It shows that the variability in bus travel times is greatest in the morning peak period for southbound bus movements.

The majority of bus travel time is made up of drive time which includes time taken to decelerate to and accelerate from the bus stops, as opposed to dwell time at bus stops. There is significant variability in bus stop dwell times, as explained below.

Figure 4-3 Bus Travel Times by Time of Day (average with 15th and 85th Percentiles)



4.2.4 Evidence of Delays at Bus Stops

The majority of bus stops on the TQHR corridor are recessed out of the traffic lane, with substandard entry and, or exit tapers, which have the potential for delays to occur. This is particularly a problem for buses travelling southbound during the morning (AM) peak period. Delays are particularly acute at stops with angle parking adjacent, where the buses are recessed up to 5.5m instead of the typical 2.1m.

Bus stop lengths are also substandard at several locations, for example at the southbound bus stop at Capital Gateway, which is one of the busiest stops on the corridor, has a recessed length of less than 20m compared with a desirable 39m for a single bay bus stop.

Bus stop catchment areas overlap in some cases also, giving potential to rationalise the number of stops provided and therefore potentially help speed up bus services and make them less prone to delays at stops.

In some locations, bus stops are located prior to pedestrian crossings, so passengers who alight from the bus and who want to cross the main road will cross in front of the bus and hence can delay its onward journey.

Further details of the delays experienced by buses at bus stops is contained in Appendix C.

4.3 Evidence to Support Problem Statement Two

The current state of cycling facilities results in conflict between users, increases risk and limits cycling attractiveness for increasing volumes of cyclists (30%)

4.3.1 The Cause and Effect of the Problem

PS2 - Cause and Effect

The **cause** of this problem is defined as a growing number of cyclists travelling along the corridor without space or suitable facilities to cater for safe cycling. The **effect** of this is an increased risk to cyclists of coming into conflict with motor vehicles and limiting the uptake of cycling as a mode of travel on this corridor.

4.3.2 Evidence of Poor Cycle Facilities

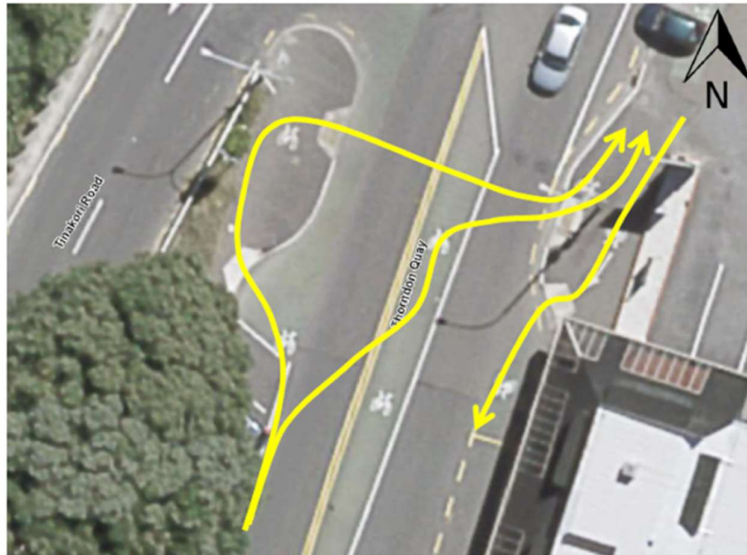
There is no existing cycle path on Thorndon Quay. Although there is a dedicated two-way bike path along the majority of Hutt Road, it is not complete and provides a sub-standard level of service for cycle users (further information provided in the Strategic Case). People who may cycle into the city find their options are affected and limited due to these issues. A review of CAS data indicates suggests that there are many cycle crashes that are not captured via police records.

In the morning peak period, a clearway for southbound traffic result in reduced conflict between cyclists and parked cars compared to at other times of the day when cyclists are often forced to share space with general traffic. This has multiple effects, the first being that cyclists are at risk of collision with passing traffic, car parking and vehicle accesses. The second effect is that cyclists in the traffic lane delay through traffic, including buses.

Access from on-road cycling along Thorndon Quay to the cycle path on Hutt Road, is challenging for cyclists travelling northbound. These cyclists must find a gap in the northbound traffic flow to

wait in the median before cycling across the southbound lane to join the cycle path. The current arrangement is shown in Figure 4-4.

Figure 4-4 Southern Access to the Hutt Road Cycle Path at Tinakori Road/Hutt Road Intersection



Cyclists on Thorndon Quay have to interact with vehicle traffic at intersections along the length of the road. Cyclists (and vehicles) have priority over side road traffic at all intersections except for the signalised intersections south of Mulgrave Street where they have cycle lanes and advanced stop boxes.

4.3.3 Evidence of Conflicts between Cyclists and Other Road Users

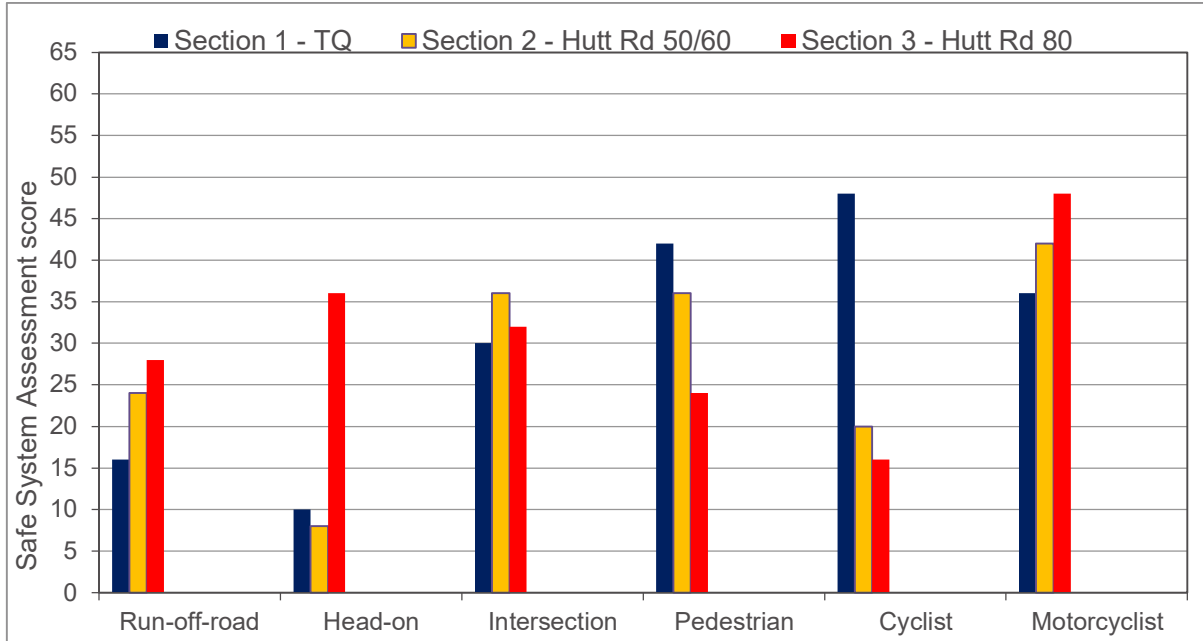
Analysis of cycle injury crash data along the corridor for the ten-year crash period (2010-2019 inclusive) indicated that:

- Cyclists are the most likely to be involved in an injury crash on the corridor, making up 45% of injury crashes (60 out of 133 crashes) and 50% of serious injuries (14/28)
- Along Thorndon Quay the most likely cause of a cyclist injury crash is the interaction with a parked or parking vehicle (26 out of 35 crashes) - this includes opening doors for parallel parks, entering/ exiting angled parks and u-turning whilst looking for a parking space
- The most likely cause of cyclist injury crashes on Hutt Road is due to a collision with vehicles at business access point across the shared path (19 out of 43 crashes)
- The most common time for a cyclist injury crash is during the morning peak period and typically involves people in the 40 to 49 age group (i.e. adult commuters).

A Safe System Assessment Framework (SSAF) was also undertaken for the corridor (refer to Appendix D), as summarised in Figure 4-5. This indicated that the safety risk for cyclists is the highest of any user group on Thorndon Quay. This is due to the lack of a separated facility, the busy nature of the road environment, poor connections to adjacent facilities, the proximity to on-street parking and the speed environment.

It is noted that most cycle crashes are not attended by Police and are not recorded in CAS.

Figure 4-5 Safe System Assessment Framework



4.3.4 Evidence of Poor Levels of Service for Cyclists

The level of service (LOS) for cyclists on the TQHR corridor was calculated using the Danish Roadway Segment method¹¹. This indicates that cyclists currently have an average to poor LOS (LOS D to F) on the different sections of Thorndon Quay and a poor LOS (F) on the on-road section of Hutt Road. The cycle path section of Hutt Road has an adequate LOS (A).

It should be noted that the Danish method does not take into account conflicts between cyclists and vehicles caused by intersections, accesses or angle parking. These are key concerns for cyclists on Thorndon Quay and Hutt Road.

4.3.5 Evidence of Deficiencies in the Hutt Road Cycleway

A number of safety issues were identified in a safety audit undertaken of the recently opened Hutt Road cycleway. The more serious issues identified from the audit relate to access/egress to businesses along the south-eastern side of the corridor. These predominantly identified issues with vulnerable users on the shared use facility and in particular for cyclists.

In relation to accesses generally, the safety audit noted that “a high level of cyclist/ vehicle and pedestrian/ vehicle conflicts were observed at major access points. In most situations, it was the exiting driver not looking for cyclists, and pulling directly in front of the vulnerable user”. The higher speed of cyclists was also observed to contribute to these conflicts.

When Te Ara Tupua is completed, it is expected there will be at least three times as many cyclists on the TQHR corridor. Growth in cycling demand will therefore not be supported by the current infrastructure.

¹¹ Trafitec Danish Roadway Segment Cycling LOS (2007)

4.4 Evidence to Support Problem Statement Three

Poor quality of the street environment creates an unpleasant experience for a growing volume of people reducing its attractiveness to walk and spend time in the area (20%)

4.4.1 The Cause and Effect of the Problem

The cause of this problem is defined as a lack of suitable pedestrian facilities on Thorndon Quay and Hutt Road.

The effect of this is an increased safety risk to pedestrians on Hutt Road and Thorndon Quay in particular, south of Moore Street and north of Bordeaux Bakery. There is a lack of shade and shelter, resulting in an unpleasant environment for pedestrians. This limits the attractiveness of walking as a travel choice, and is likely to be a deterrent to the predicted large increase in future pedestrian demand.

PS3 - Cause and Effect

The **cause** of this problem is defined as the poor quality of the street environment which does not make Thorndon Quay or Hutt Road an attractive or pleasant place to walk or spend time in. The **effect** of this is an increased safety risk to a growing number of pedestrians on Hutt Road and Thorndon Quay and a lack of amenity is limiting the attractiveness of walking as a mode of travel.

4.4.2 Evidence from Healthy Streets Assessment

A Healthy Streets Assessment was undertaken for the corridor and is included in the Problem Definition and Case for Change Report (October 2019). This showed that Hutt Road scored well against the metrics around the quality and separation of facilities for pedestrians and cyclists. However, did not score as well against the metrics associated with vehicle speeds, volumes and heavy vehicle proportions.

Thorndon Quay's index is very similar to that calculated for Hutt Road, with no clear strengths and the lack of shade and shelter/ things to see and do are identified weaknesses. Thorndon Quay scored well against the metrics around the quality and separation of facilities for pedestrians but did not score as well against the metrics associated with vehicle speeds, volumes, heavy vehicle proportions and cyclist separation.

4.4.3 Evidence of Poor Level of Service for Pedestrians at Intersections

The existing footpath widths and street environment on Thorndon Quay do not make it very attractive to walk, shop or spend time. Pedestrian demand is expected to increase in the future, as is the use of other mobility options such as scooters. The expected increased demand for walking will not be supported by the current infrastructure.

An analysis of pedestrian movements at signalised intersections along the corridor included in the Problem Definition and Case for Change Report (October 2019), indicated that they have small green time ratios and high delays resulting in average to poor level of service. Particular areas of concern for pedestrians are on Hutt Road, where traffic speeds are higher and there are unsuitable or a complete lack of crossing facilities. There is also a large separation between formal crossing facilities, particularly north of Bordeaux Bakery.

4.4.4 Evidence of Poor Pedestrian Safety

An analysis of crash data for pedestrians in the ten-year period from 2010 to 2019 indicated:

- Pedestrians make up a low number of injury crashes, being involved in 9% of injury crashes (twelve out of 133) and 11% of serious injuries (three out of 28)
- Of the twelve crashes, eight were located in Thorndon Quay and four were along Hutt Road
- In the Thorndon Quay section, pedestrian crashes occurred at the Mulgrave intersection, Moore Street zebra crossing and south of Tinakori Road
- Two of the four pedestrian crashes on Hutt Road occurred at the Rangiora Avenue zebra crossing

The SSAF showed that for pedestrians the safety risk is higher than vehicles in the Thorndon Quay section. The likelihood and severity of a crash along the corridor is similar. However, the provision of the shared path and the reduced number of pedestrians north, towards Jarden Mile along Hutt Road reduces the safety risk.

4.5 Evidence to Support Problem Statement Four

High and growing traffic volumes combined with high speeds increases the likelihood and severity of crashes on Hutt Road (15%)

4.5.1 The Cause and Effect of the Problem

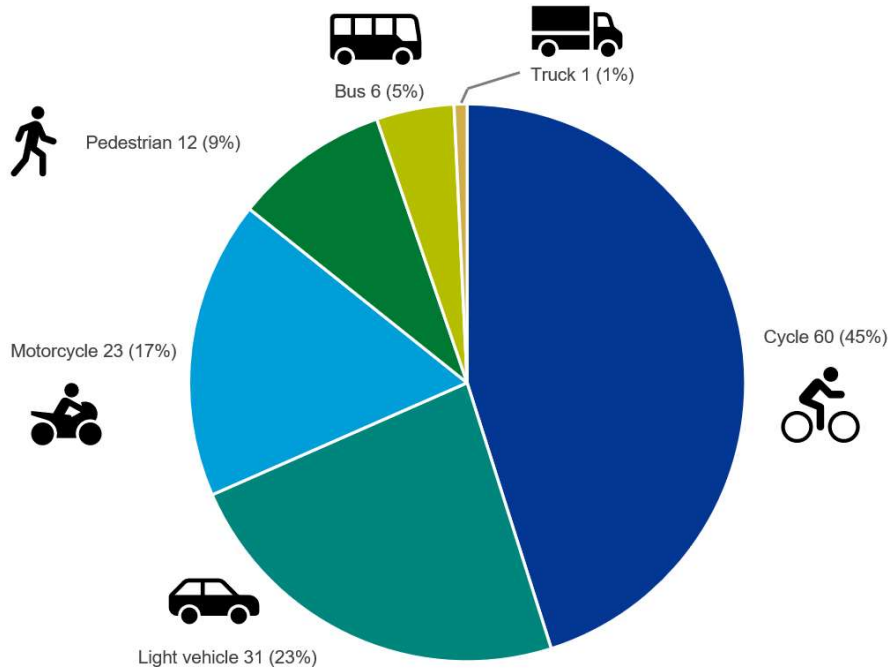
PS4 - Cause and Effect

The **cause** of this problem is high and increasing traffic volumes on a section of high speed corridor and the high number of vehicle crossing movements. The **effect** of this is an increased safety risk and crash severity for all road users on Hutt Road.

4.5.2 Road Safety Evidence

Over the past ten years, from 2010 to 2019 inclusive, there were 133 injury crashes recorded by the Police along Hutt Road and Thorndon Quay. Of these crashes, 60 involved cyclists (45%), twelve involved pedestrians (9%) while 23 involved motorcyclists (17%), as depicted in Figure 4-6. Twenty eight of the crashes resulted in serious injuries.

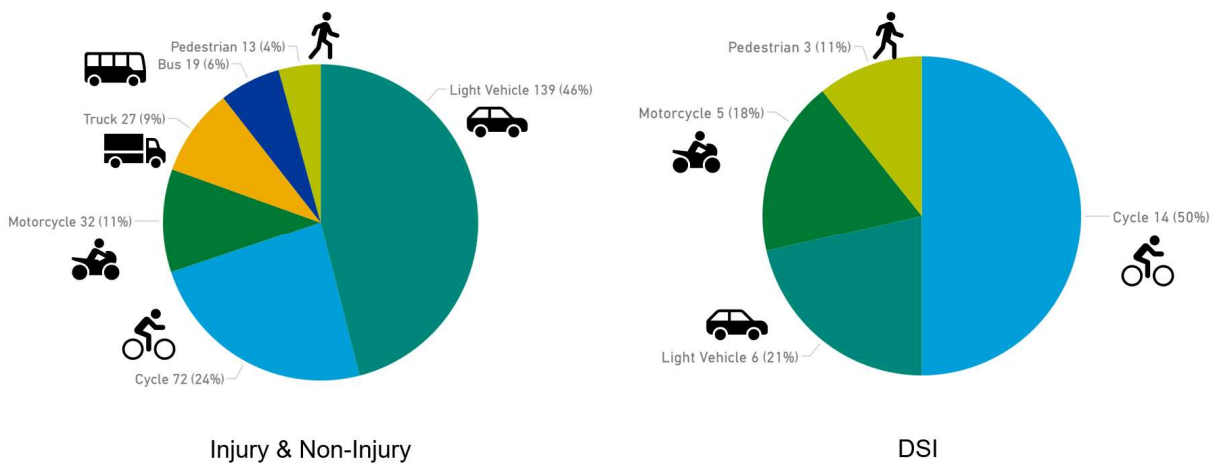
Figure 4-6 Crashes by Mode (2010-2019 inclusive)



Over 70% of crashes causing injuries to people cycling on Thorndon Quay are from people opening car doors into the traffic lane, drivers turning into or reversing out of angle parking and u-turning while looking for a car park.

The number of injury and non-injury, and deaths and serious injuries (DSIs) recorded on the TQHR corridor in the ten-year period is summarised in Figure 4-7. Vulnerable users account for 79% of all DSIs.

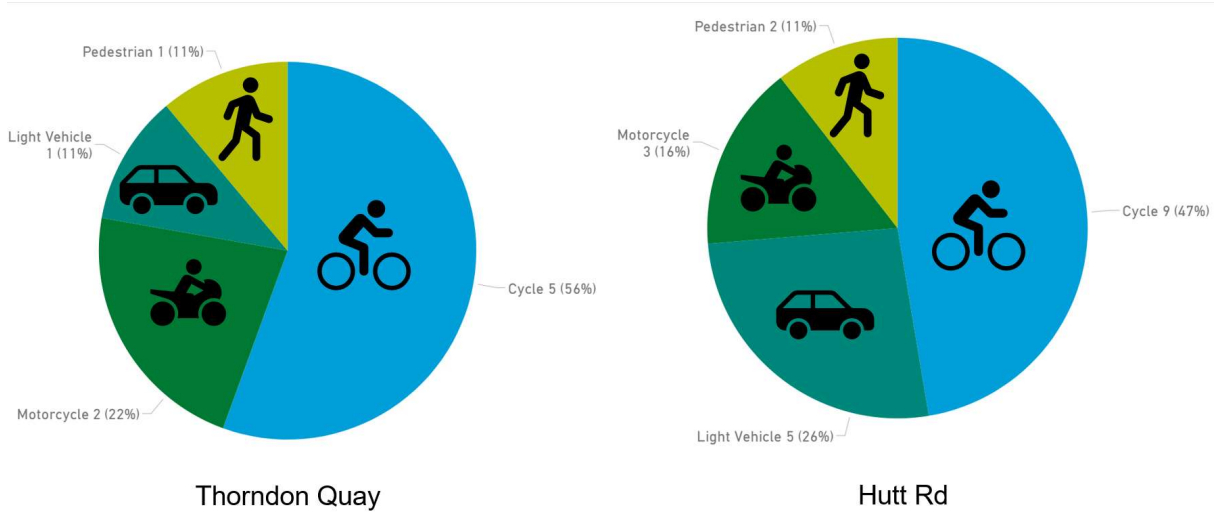
Figure 4-7 All Crashes vs DSI by Mode (Ten Year Period for Thorndon Quay and Hutt Road)



Analysis of crash data indicates that vehicles are the second likely (behind cyclists) to be involved in an injury crash. Vehicle injury crashes attribute to 23% of injury crashes (31 out of 133) and 21% of serious injuries (six out of 28) in the past ten-year period from 2010 to 2019.

The number of DSIs by mode for Thorndon Quay and Hutt Road in the ten-year period is summarised in Figure 4-8. The split of DSIs is similar on Thorndon Quay to Hutt Road.

Figure 4-8 DSIs by Mode (Ten Year Period for Thorndon Quay and Hutt Road)



In general, the two main crash types which both occur near intersections are rear end/ obstruction crashes and crossing/ turning crashes. Hutt Road makes up most of the injury crashes (22 out of 31) where the speed environment is higher, and these injury crashes are mainly located at the complex Kaiwharawhara Road and Jarden Mile intersection.

Motorcyclists are the third most likely to be involved in an injury crash, consisting of 17% of injury crashes (23 out of 133) and 18% of serious injuries (five out of 28). Along Hutt Road the crashes involving motorcycles were concentrated at intersections, being mainly rear end/ obstruction crashes and crossing/ turning crashes.

There were a low number of bus crashes (six out of 133) with no serious injuries. These mostly occur at the southern end of Thorndon Quay around Mulgrave Street and in the northern section of Hutt Road.

Along Hutt Road the most likely cause of a cyclists' injury crash is interacting with vehicles at an access point across the shared path (19 out of 43 cyclist injury crashes). Along this shared path there are numerous accesses for businesses.

Of the twelve crashes involving pedestrians, eight occurred along Thorndon Quay and four along Hutt Road. In the Thorndon Quay section, the pedestrian crashes occurred at the Mulgrave intersection, Moore Street zebra crossing and south of Tinakori Road. In the Hutt Road section, two crashes occurred at the Rangiora Avenue zebra crossing.

The most common crash type recorded for cyclists and motorcyclists combined was due to crossing/ turning at intersections or accesses. There were a total number of 22 crashes of this type. Of these crashes, 20 of them involved motor vehicles either striking vulnerable users or being struck by them, and the remaining two crashes were due to cyclists avoiding being hit by a motor vehicle.

Apart from these two crashes, 20 crashes happened at the intersections/ accessways along Hutt Road, with three crash clusters identified at the accessways of Caltex, Spotlight and School Road/ Hutt Road intersection. There were three cyclist crashes at the Caltex accessways, with two of them occurring before the cycleway improvement and one during the cycleway upgrade construction.

An analysis of CAS shows that, over the 10-year period, there appears to be a rising trend in all injury crashes as well as for cycle and motorcycle crashes, as shown in Figure 4-9 (for TQHR, Hutt

Road and Thorndon Quay respectively). While the number of cycling and motorcycling crashes appears to be increasing, the sample size is relatively small and so caution should be given to drawing much conclusion from this. In addition, there has been ongoing cycling improvements during this time as well as an increase in cyclists which may affect future crash occurrence. However, at the very least, an on-going issue involving these users is apparent.

The differential between ACC claim figures and cycle crashes recorded within CAS suggests that there are a considerable number of crashes that are not reported to the police. It is also noted that as Hutt Road and Thorndon Quay are used as an emergency detour when SH1 is closed or delays occur on it, this could have a major impact on the safety along this route, particular for vulnerable road users.

Figure 4-9 Ten Year Crash Trend



4.5.3 Evidence from Safe System Assessment Framework

The SSAF analysis indicated that the key safety risks are at intersections. This is due to the frequency, complexity, speed environment and intersection form, as well as a high head on crash risk in the 80km/h section of Hutt Road.

The SSAF also showed that for pedestrians, the safety risk is higher than vehicles in the Thorndon Quay section. Along the corridor the likelihood and severity of a crash is similar, but the provision of the shared path, and the reduced pedestrian demand, as you move north towards Jarden Mile along Hutt Road, reduce the crash risk.

The SSAF indicated that motorcyclists have a similarly high safety risk level, with slight increases in risk as the speed environment increases.

4.6 Summary of the Evidence Base

The evidence base gathered to support the problems this SSBC seeks to address is summarised in Table 4-1.

Table 4-1 Summary of Evidence Base

Problem	Cause and Effect	Key Evidence
1: Unreliable bus travel times result in a poor customer experience for existing and potential bus users which reduces the attractiveness of and ability to grow travel by bus	Cause: Buses are impeded by other traffic using the same corridor and intersection or crossing delay	Overall, the level of service for buses is generally poor. Potential issues/ findings highlighted by the analysis include: <ul style="list-style-type: none"> Relatively high growth in passenger demands High travel times and variability, particularly in the morning peak period (southbound). Key sources of delay include: <ul style="list-style-type: none"> Signalised intersections Pedestrian zebra crossings Bus stop spacing Parking Bus stop congestion (includes re-entry delays and delays associated with sub-standard stop layout).
	Effect: a poorly performing bus service that often is running late, especially in the southbound direction during the morning peak. This makes it unattractive for users	<ul style="list-style-type: none"> Evidence is strong regarding the length of time bus services take to negotiate the corridor in the morning peak period.
2: The current state of cycling facilities results in conflict between users, increases risk and limits cycling attractiveness for increasing volumes of cyclists	Cause: a growing number of cyclists travelling along the corridor without space or suitable facilities to cater for safe cycling.	<ul style="list-style-type: none"> High growth in cycling demands. Lack of road space and route continuity along Thorndon Quay section of the route.
	Effect: Increased risk to cyclists of coming into conflict with motor vehicles and limits the uptake of cycling as a mode of travel on this corridor.	<ul style="list-style-type: none"> The safety risk for cyclists is the highest of any user group (in the Thorndon Quay section). This is due to the non-separated facility (no shared path), the busy nature of the road environment, poor connections to adjacent facilities, the proximity to on-street parking and the speed environment (greater than 30km/h).
3: Poor quality of the street	Cause: A lack of suitable or inappropriate pedestrian facilities	<ul style="list-style-type: none"> Pedestrian activity is fairly low along the whole corridor, but trending upwards.

<p>environment creates an unpleasant experience for a growing volume of people reducing its attractiveness to walk and spend time in the area</p>	<p>on Thorndon Quay and Hutt Road.</p>	<ul style="list-style-type: none"> There are pockets or clusters of pedestrian activity along the corridor either at crossing points, bus stops or in retail/commercial areas which are not well catered for. High Speed and traffic volumes on some sections of Hutt Road Lack of crossing points north of Thorndon Quay.
	<p>Effect: An increased safety risk to pedestrians on Hutt Road and Thorndon Quay (south of Moore Street and north of Bordeaux Bakery) and a lack of shade and shelter and things to see and do is limiting the attractiveness of walking as a mode of travel.</p>	<ul style="list-style-type: none"> Poor Healthy Streets Scores due to the lack of shelter and shade and things to see and do. Analysis of pedestrian movements at signalised intersection along the corridor indicate they are average to poor (LOS D-E) performance. Particular areas of concern for pedestrians are on Hutt Road where speeds are higher and there are unsuitable or a complete lack of crossing facilities. Pedestrians make up a low number of injury crashes, being involved in 9% of injury crashes and 11% of serious injuries. Of the twelve crashes, eight were located in Thorndon Quay and four were along Hutt Road. The SSAF shows that for pedestrians the safety risk is higher than vehicles in the Thorndon Quay section. Along the corridor the likelihood and severity of a crash is similar, but the provision of the shared path and the reduced number of pedestrians as you move north towards Jarden Mile along Hutt Road decrease the risk.
<p>4: High and growing traffic volumes combined with high speeds increases the likelihood and severity of crashes on Hutt Road</p>	<p>Cause: High traffic flows and high speeds on Hutt Road</p>	<ul style="list-style-type: none"> The posted speed on Hutt Road is 50 km/h from the intersection of Thorndon Quay and Hutt Road to the intersection of Aotea Quay and Hutt Road, 60 km/h to the intersection of Onslow Road and Hutt Road and 80 km/h for the rest of the section to the Jarden Mile intersection.
	<p>Effect: Increased safety risk and crash severity for all road users.</p>	<ul style="list-style-type: none"> The SSAF highlighted that the key safety risks are located at intersections due to the frequency, complexity, speed environment and intersection form, as well as a high head on crash risk in the 80km/h section of Hutt Road given the limited separation.

4.7 Benefits of Investment

At the workshop meeting held on 19 May 2020, and at subsequent stakeholder engagement sessions, the potential benefits of successively investing in the project were identified, developed and agreed, together with weightings for each benefit statement:

- More reliable and attractive bus journeys between Ngauranga and the CBD (30%)
- Increase the mode share of buses and active modes travelling along Hutt Road and Thorndon Quay (30%)
- Improve amenity and place value of Thorndon Quay (20%)
- Improve vulnerable road user safety on Thorndon Quay and Hutt Road (20%).

4.8 Investment Logic Map

An investment logic map showing how the problem and benefits relate to each other, the investment response and measures which could be used to measure the response, is summarised in an Investment Logic Map (ILM). This is shown in Figure 4-10.

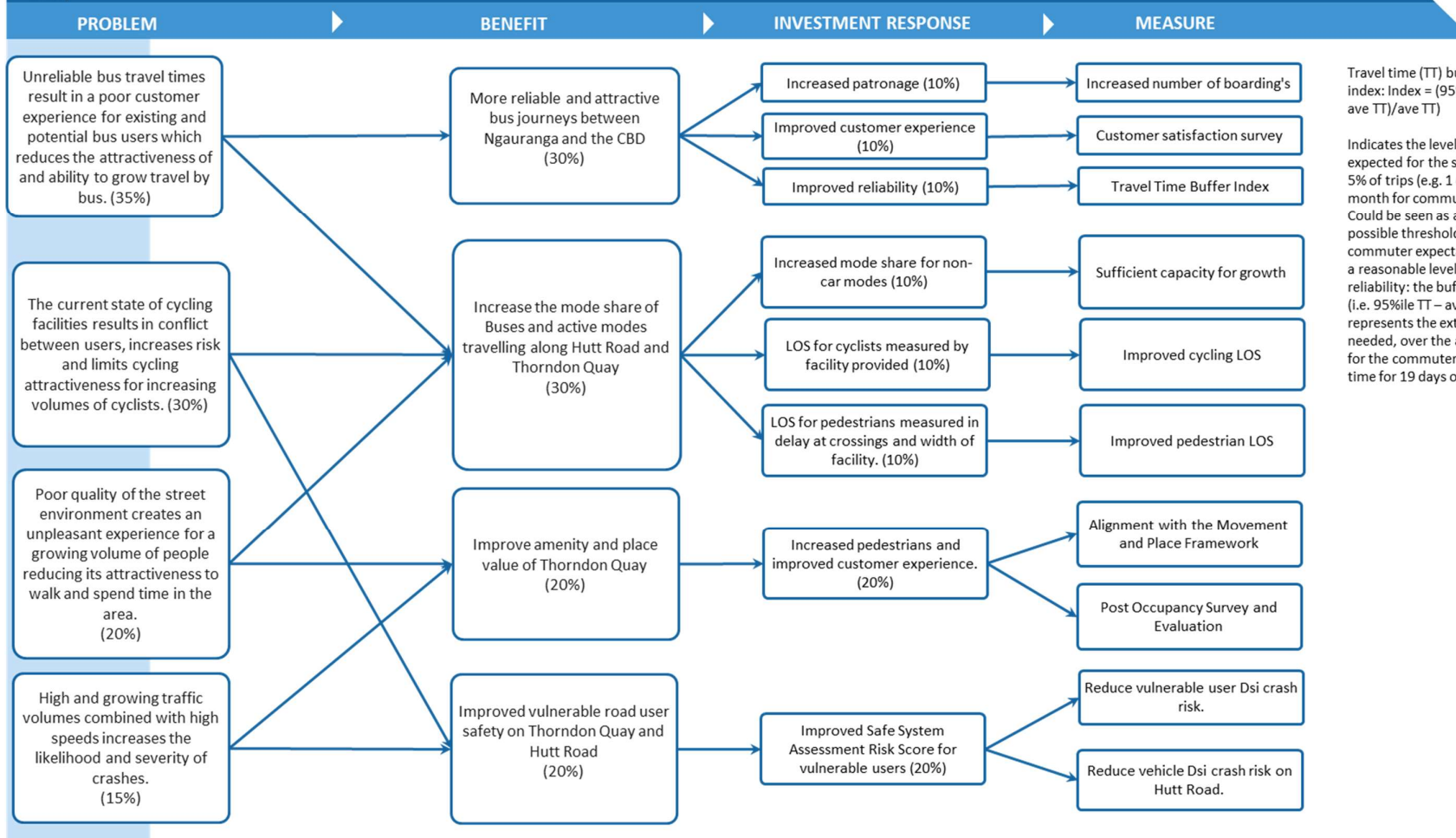
Figure 4-10 Investment Logic Map

Thorndon Quay Hutt Road

Let's Get Wellington Moving

INVESTMENT LOGIC MAP

Activity



Travel time (TT) buffer index: Index = (95% ile TT - ave TT)/ave TT)

Indicates the level of delay expected for the slowest 5% of trips (e.g. 1 day/month for commuters). Could be seen as a possible threshold for commuter expectations of a reasonable level of reliability: the buffer time (i.e. 95%ile TT - ave TT) represents the extra time needed, over the average, for the commuter to be on time for 19 days out of 20

4.9 Investment Objectives

Following the definition of the problem statements and benefits, and the development of an ILM, investment objectives for this SSBC were defined. An additional objective related to maintaining access to the ferry terminal was added in response to proposals for bus priority measures being developed for Hutt Road, and the need to avoid adverse impacts of this on truck movements. The Strategic Case has more information on this.

The final Investment Objective are listed below and summarised in the graphics below.

INVESTMENT OBJECTIVE ONE
Improve Level of Service for bus users including improved access, journey times and reliability. Provide sufficient capacity for growth in public transport
INVESTMENT OBJECTIVE TWO
Improve Level of Service, and reduce the safety risk, for people walking and cycling along and across Thorndon Quay and Hutt Road
INVESTMENT OBJECTIVE THREE
Reduce the frequency and severity of crashes
INVESTMENT OBJECTIVE FOUR
Improve the amenity of Thorndon Quay to support the current and future place aspirations for the corridor/area
INVESTMENT OBJECTIVE FIVE
Maintain similar access for people and freight to the ferry terminal

Buses

We want to make bus travel times faster and more reliable, making it more attractive for people to use the bus.



Walking and the streetscape

We want to improve facilities for pedestrians and improve the Thorndon Quay streetscape so that more people want to spend time there.



Cycling

We want to improve facilities and safety for people riding their bikes.



Safety

We want to make Thorndon Quay and Hutt Road safer for everyone.



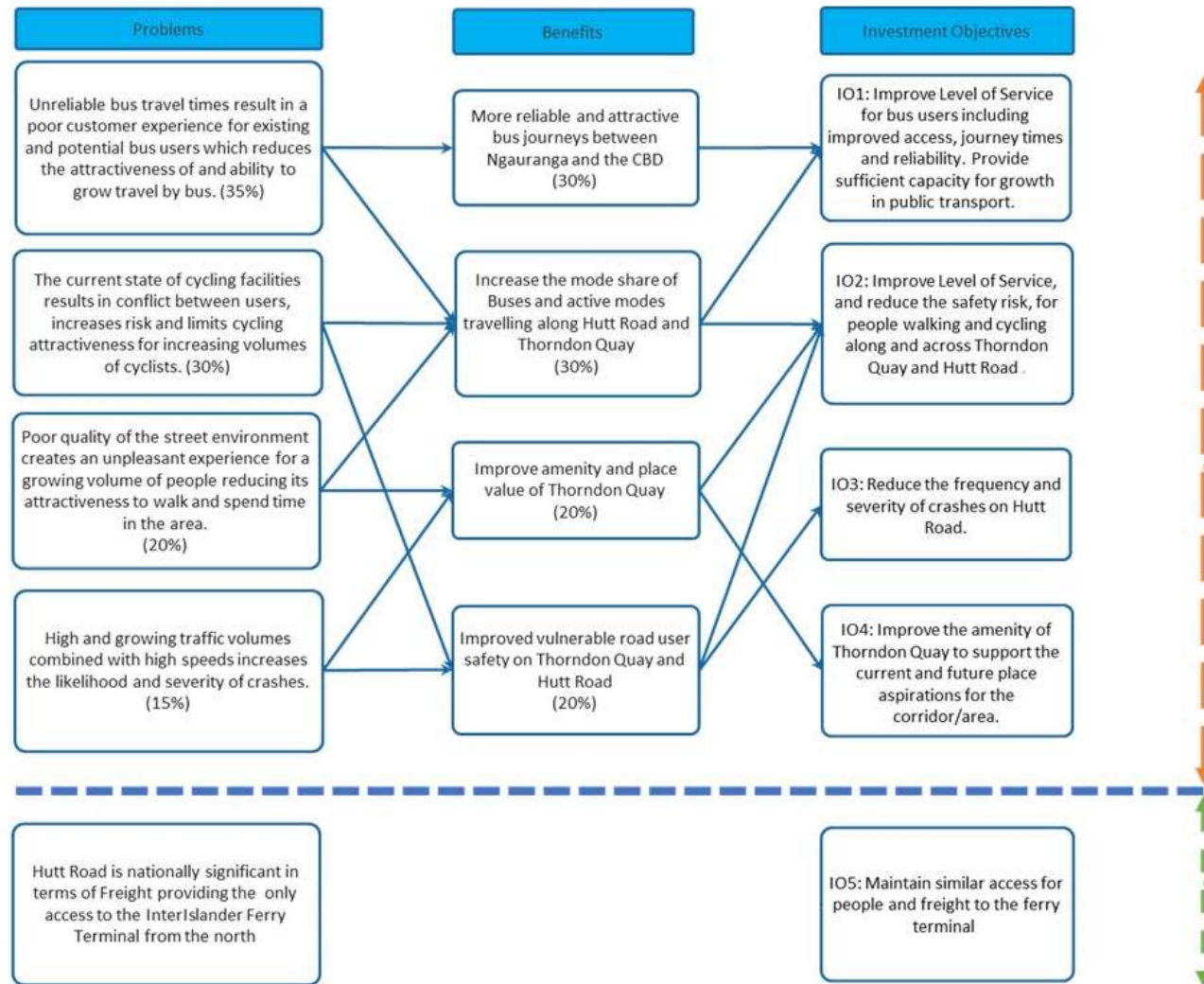
Freight and ferry

We want to make sure that freight and other traffic can reliably get to and from the ferry at Kaiwharawhara.



The linkage between the problems, benefits and investment objectives is shown in Figure 4-11.

Figure 4-11 ILM With Investment Objectives



4.10 Critical Success Factors

In addition to the investment objectives, four Critical Success Factors (CSFs) were identified by the Project Partners to further inform the development of options. These are shown in Figure 4-12.












Figure 4-12 Critical Success Factors

1. Demonstrate tangible improvements for public transport, pedestrians, and cyclists within the 2018-21 / 2021-24 NLTP periods
2. Limit the impact of implementation on businesses located on Thorndon Quay and Hutt Road
3. Positive economic impact on businesses on Thorndon Quay and Hutt Road
4. Stakeholders and public feel that they have had the opportunity to contribute and understand the rationale for the recommended programme

4.11 Alignment of Benefits/Objectives with LGWM Programme

As TQHR forms part of the wider LGWM programme, the problems, benefits, investment objectives and KPI's for the LGWM programme and TQHR were assessed to determine the alignment between them. Table 4-2 summarises the alignment of the LGWM benefits/ objectives with the TQHR problem statements.

Table 4-2 Alignment of LGWM Benefits/Objectives with TQHR Problems

LGWM Problems	LGWM Benefits/Objectives		TQHR Problems	Alignment
Increasing congestion and unreliable journey times	A transport system that enhances the liveability of the central city	 LIVEABILITY	Unreliable bus travel times result in a poor customer experience for existing and potential bus users which reduces the attractiveness of and ability to grow travel by bus.	 ACCESS  REDUCED CAR RELIANCE  LIVEABILITY
Poor and declining levels of service	A transport system that reduces reliance on private vehicle travel	 REDUCED CAR RELIANCE	The current state of cycling facilities results in conflict between users, increases risk and limits cycling attractiveness for increasing volumes of cyclists.	 REDUCED CAR RELIANCE  SAFETY
	A transport system that provides more efficient and reliable access for users	 ACCESS	Poor quality of the street environment creates an unpleasant experience for a growing volume of people reducing its attractiveness to walk and spend time in the area.	 REDUCED CAR RELIANCE  SAFETY  LIVEABILITY









Safety issues especially for active modes	A transport system that improves safety for all users	 SAFETY	High traffic volumes and speeds increase the likelihood and severity of crashes.	 SAFETY
Vulnerability to disruption from unplanned events	A transport system that is adaptable to disruptions and future uncertainty	 RESILIENCE		





Table 4-3 shows that the TQHR investment objectives are aligned to each LGWM programme objective. In terms of resilience, the core function of the corridor was considered with respect to its critical function, the existing route designation in terms of vulnerability and its use as an alternative route to SH1. As such the most important aspect of this is to maintain the current level of access for freight and people.


Table 4-3 Alignment with LGWM Objectives

TQHR Investment Objectives	LGWM Objectives Alignment				
	 LIVEABILITY	 REDUCED CAR RELIANCE	 ACCESS	 SAFETY	 RESILIENCE
Improve Level of Service for bus users including improved access, journey times and reliability. Provide sufficient capacity for growth in public transport	●	●	●		
<ul style="list-style-type: none"> Improve Level of Service, and reduce the safety risk, for people walking and cycling along and across Thorndon Quay and Hutt Road 	●	●	●	●	
Reduce the frequency and severity of crashes.		●	●	●	●
Improve the amenity of Thorndon Quay to support the current and future place aspirations for the corridor/area.	●				
Maintain similar access for people and freight to the ferry terminal			●		●

In terms of alignment with the LGWM programme KPI's, Table 4-4 summarises the contribution that the TQHR project will make to these. The baselines can be derived from actual surveys and modelled data.

Table 4-4 Contribution TQHR Will Make to Achieving the LGWM Programme KPIs and Measures

LGWM IO's	LGWM KPI's		LGWM KPI Measure	TQHR Contribution (Low, Medium, High)
 LIVEABILITY	KPI 1	Amenity Index - The quality of the urban environment	Amenity Index prepared specifically for LGWM	Low
	KPI 2	Transport-related CO2 emissions in the central city	CO2 emissions from VKT from model	Low
	KPI 3	Opportunities for urban development and value uplift	Qualitative assessment	Low
	KPI	Monitor traffic noise		Low
	KPI	Monitor Liveability Survey	Quality of Road Network, Quality of Public Transport (Economist Intelligence Unit Global)	Medium
	KPI	Monitor Air Quality	Particulates, NO2	Low
 REDUCED CAR RELIANCE	KPI 4	Improve the system occupancy	Transport model at four cordons	Medium
	KPI 5	Delays for people walking in the central city	Qualitative assessment of 11 intersections as to whether they are likely to experience a reduction in pedestrian delay.	N/A
	KPI 6	The quality of cycling facilities	Danish midblock LoS for eight corridors	High
	KPI	Monitor mode share within CBD/VKT within the CBD		Low
 ACCESS	KPI 7	The number of people living and working within 30 mins of key destinations	Census population and employment data coupled with geospatial analysis using historical data and modelled traffic. Civic Centre, Hospital, Airport and Port	Low
	KPI 8	The reliability of travel time by different modes to key regional destinations	Observed, qualitative and modelled (CoV) for a few key routes	High
	KPI	Monitor number of people travelling to CBD		Low
 SAFETY	KPI 9	Deaths and serious injuries for people walking and cycling in and around the central city	CAS and estimated reductions	High
	KPI	Monitor total casualties by severity and mode		High

LGWM IO's	LGWM KPI's		LGWM KPI Measure	TQHR Contribution (Low, Medium, High)
 RESILIENCE	KPI 10	Network resilience to disruption caused by large-scale natural hazards	Qualitative assessment using Regional Resilience PBC assessment	Low
	KPI	Monitor lane availability reductions due to unplanned events		N/A

4.12 Key Performance Indicators and Targets

Table 4-5 summarises the main outcomes and the baseline information and targets that have been defined for each Investment Objective. The target KPIs have been developed based on SMART principles.

Table 4-5 Investment Objectives Outcomes, Baseline and Targets

Investment Objective	Objective Description/Measurable Outcome/Baseline	Indicative Targets
1	<p>Increase demand for bus services by 2026 and the speed of bus services by 2026.</p> <ul style="list-style-type: none"> Baseline is approximately 950 passengers in the morning peak 2-hour period (southbound); and 1,000 passengers in the evening peak 2-hour period (northbound) Baseline is approximately 14 minutes travel time in the morning peak 2-hour period (southbound); and 9 minutes travel time in the evening peak 2-hour period (northbound) 	<ul style="list-style-type: none"> Increase in patronage to approximately 1,000 in the morning peak 2-hour period (southbound); and 1,100 in the evening peak 2-hour period (northbound) Reduce bus transit times by approximately five minutes in the morning peak 2-hour period (southbound) and by approximately one minute in the evening peak 2-hour period (northbound)
2	<p>Improve Level of Service for non-car modes by 2026.</p> <ul style="list-style-type: none"> Baseline Walking is LoS D (Thorndon Quay) Baseline Cycling is LoS F (Thorndon Quay) <p>Increased cycle volumes on Thorndon Quay.</p> <ul style="list-style-type: none"> Baseline is 300-1,600/day 	<ul style="list-style-type: none"> Walking – LoS (C on Hutt Road; C/D on Thorndon Quay (Northbound/Southbound) Cycling LoS (F/B on Hutt Road; F/C on Thorndon Quay). Increase cycle volumes on Thorndon Quay by at least 50%
3	<p>Reduce the safety risk along Thorndon Quay and Hutt Road for all road users by 2026.</p> <ul style="list-style-type: none"> Baseline for vulnerable users is 2.6 DSI crashes per year Baseline for all vehicles is 1.5 DSI crashes per year 	<ul style="list-style-type: none"> Reduce vulnerable user DSI crash risk by 20% within ten years using measures aligned with Safe System Principles. Reduce vehicle DSIs by 10% within ten years using measures aligned with Safe System Principles.

Investment Objective	Objective Description/Measurable Outcome/Baseline	Indicative Targets
4	<p>Amenity index/ Healthy Streets index aligns with Movement Framework criteria for Thorndon Quay by 2026.</p> <ul style="list-style-type: none"> ▪ Baseline for Thorndon Quay is M3/P1 in the Movement and Place Framework. <p>Increased pedestrian trips/throughput on Thorndon Quay.</p> <ul style="list-style-type: none"> ▪ Baseline is 2-3,000 per day 	<ul style="list-style-type: none"> ▪ Thorndon Quay to be M3/P2 in the Movement and Place Framework by 2026 ▪ Increase pedestrian trips/throughput on Thorndon Quay by over 20% from baseline.
5	<p>Broadly maintain truck travel times between Jarden Mile and Aotea Quay off ramp by 2026</p> <ul style="list-style-type: none"> ▪ Baseline: 7 minutes travel time in the morning peak 2-hour period (southbound); 5 minutes travel time in the evening peak 2-hour period (northbound) 	<ul style="list-style-type: none"> ▪ Maintain truck travel times.

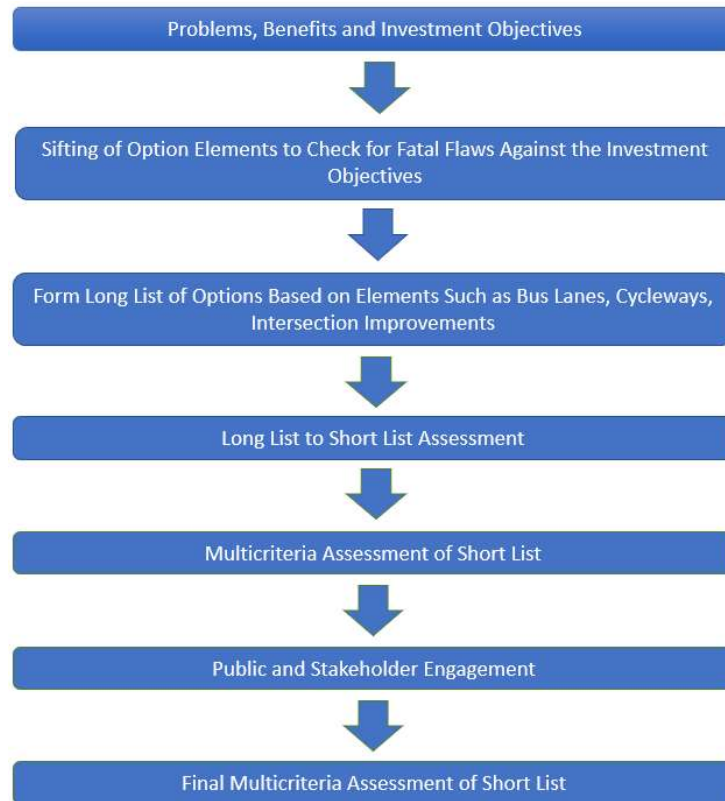
5 Economic Case – Options Development and Assessment

This chapter summarises the process undertaken to identify and refine a preferred option. Further details of the option development process are contained in the Long to Short List Report and the Options and Alternatives Report.

5.1 Option Development Process

Options were developed following the process summarised in Figure 5-1.

Figure 5-1 Option Generation to Short List Process



5.2 Reference Case

A reference (or do minimum) case was defined to provide a base case for all options to be assessed against. This assumed that the following transport projects that are already committed, funded or under construction are implemented by 2036:

- Ngauranga to Petone cycleway: A 4.5km shared path with a 5m wide sealed surface on the seaward side of the Hutt Valley Railway Line
- Transmission Gully: A 27km four-lane motorway which connects with SH1 at the existing Mackays Crossing interchange and merges with the current SH1 at Linden
- Peka Peka to Ōtaki: A bypass of Ōtaki, and the provision of a high standard four-lane expressway.

In June 2021, WCC approved proposals to changes to on-street parking provision on Thorndon Quay from angled to parallel, and they have now been implemented. This proposal addressed several safety concerns for cyclists and other road users but also would reduce parking capacity by approximately 70 spaces. As this proposal was not approved in the initial stages of the SSBC process, these changes were one of the interventions considered.

5.3 Transport Modelling

Demand forecasts and operational assessments have been undertaken for the TQHR project using both the Wellington Transport Strategy Model (WTSM 2013), the Ngauranga to Airport Aimsun Model (N2AM 2016) and a detailed Sidra model developed for this project. Further information is provided in the separate Transport Modelling and Analysis Report (November 2020).

WTSM is a four-stage demand model with the ability to respond to infrastructure or policy scenarios with trip destination and mode choice changes. It has a base year of 2013 and forecast years of 2026, 2036 and 2046. N2AM is a traffic assignment model and covers the Wellington CBD and surrounding suburbs from south of Ngauranga. It has a base year of 2016 and a forecast year of 2026.

Land use changes in line with current development plans for the Greater Wellington region are incorporated in the WTSM and N2AM models.

Sidra intersection models were developed to examine the operation of key intersections on the corridor once a preferred option was identified.

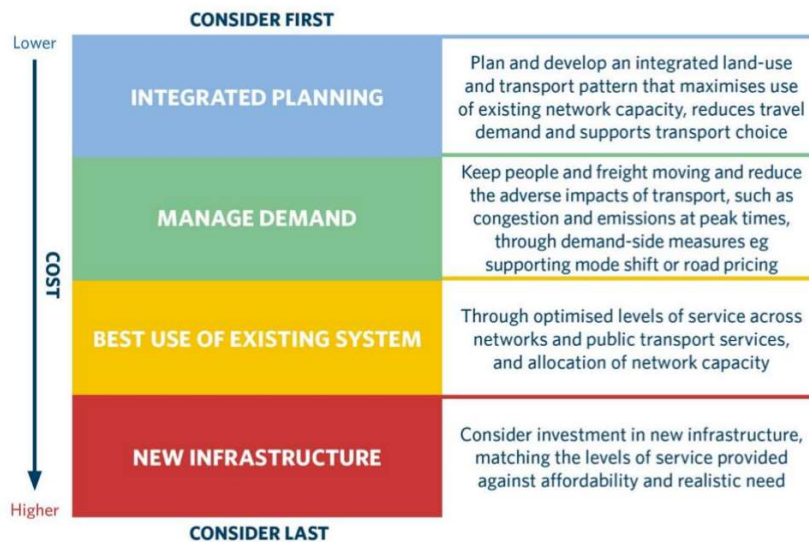
Note that further modelling will be undertaken during detailed design to optimise the design, and better understand the impacts of the preferred option, particularly on cyclists and public transport users.

5.4 Very Long List of Interventions Generation and Sifting

5.4.1 Intervention Hierarchy

Waka Kotahi developed the intervention hierarchy to ensure value for money, and that low-cost investment is considered ahead of more expensive physical infrastructure and technology investment. This is summarised in Figure 5-2 and was used to inform the development of potential treatment options.

Figure 5-2 Intervention Hierarchy



5.4.2 Options Out of Scope

Building from the PBC, several examples of options were identified as being out of scope for the TQHR corridor. This is to avoid introducing previously discounted options or activities being developed and implemented by the Project Partners through other programmes. The out-of-scope activities included:

- Consideration of MRT options
- Integrated ticketing/ off board ticketing
- Public transport fares
- Road/ parking pricing
- Park and Ride facilities
- Re-routing of bus services (including changes to the internal layout/ operation, or relocation, of the existing Lambton Quay Bus Interchange at the southern extent of the corridor)
- Reconfiguring / the optimisation of traffic signals, lane allocation and minor pedestrian and cycle improvements)
- Options which impact on listed current building consents
- Significant local road restrictions.

Travel demand management (TDM) options are also beyond the scope of this SSBC, as a separate business case is being prepared for LGWM to consider the case for region wide interventions.

5.4.3 Initial Very Long List

A large number of interventions were initially identified which sought to address the problem statements defined in the Strategic Case. The generation of interventions was informed by solutions identified in previous studies of the corridor, and the outcome of previous engagement.

The option initially identified were both stand-alone interventions, and interventions which could be combined to form larger packages. These were grouped into those which could be implemented on Hutt Road and those which could be implemented on Thorndon Quay.

The initial interventions were sifted by assessing the level of alignment or ‘fit’ with the Investment Objectives defined in the Strategic Case to develop a long list of options for evaluation. Sifting was undertaken on a qualitative basis by assessing whether any intervention failed to meet any of the Investment Objectives. If an option was considered to score negative against an Investment Objective, it was considered to be fatally flawed and was not progressed to the long list. However, the option was not considered to be fatally flawed if it was neutral to one or more Investment Objectives.

The sifting of options drew on the collective professional judgements of the business case team’s technical specialists and was also informed by discussions held with the TQHR Technical Advisors and within the project team.

5.4.4 Interventions Not Progressed to the Long List

Based on the initial sifting, the following interventions identified for both Thorndon Quay and Hutt Road which were not progressed were as follows:

- Removing existing zebra crossings and replacing with pedestrian crossing refuges – this would have safety disbenefits to pedestrians

- Combined bus and cycle lanes – these were not progressed due to safety concerns of mixing buses with cyclists
- Mid-block vertical displacement – due to the adverse effect it would have on bus ride and passenger comfort.

Interventions for Thorndon Quay were excluded from further consideration:

- Off road cycleway at the rear of Woolstore to Davis Street
 - The proposal would require the use of the rail corridor, which is unlikely to be acceptable to KiwiRail
 - The proposal is also unlikely to be attractive to users from a Crime Prevention through Environmental Design (CPTED) perspective (a cycle facility which achieves the desired LoS for pedestrians and cyclists could not be provided due to the limited space available)
- Signalising the Davis Street intersection – this would have an adverse effect on the reliability of bus services
- Converting the Tinakori Road intersection to a roundabout – due to its adverse effect on the reliability of bus services.

5.5 Long List Options

The interventions identified from the sifting of the very long list of interventions were combined to form a series of corridor treatment options, and a number of node and intersection treatment options. These options were not considered for compatibility with the corridor theme options at this stage of the option development process.

5.5.1 Corridor Treatment Options

The following high-level corridor treatment options on Hutt Road and Thorndon Quay were identified:

- Southbound Special Vehicle Lanes (SVL) / Bus Lanes – a SVL is a traffic lane which can be used only by buses, or buses and trucks, or trucks and high occupancy vehicles (buses and cars with multiple occupancy) on a full or part time basis¹²
- SVLs/ Bus Lanes in both directions
- Bus lane in both directions on Thorndon Quay and southbound SVL on Hutt Road
- Cycle facilities (bi-directional and uni-directional)
- Footpaths and amenities – i.e. improved footpath widths and amenities
- Parking provision – i.e. changes from angled to parallel parking and removal of parking (note that these changes have now been implemented by WCC)
- Property access/ turning facilities – i.e. restrictions on access to adjacent properties (left in/ left out, the provision of alternative access roads, etc.)
- Property acquisition – the property implications of any of the above treatment options on property was also evaluated.

It should be noted that the corridor treatment options identified at this stage of the optioneering process were not mutually compatible with each other. For example, footpaths and amenity improvements can be constrained by cycle facilities, and therefore in some cases it may not be possible to provide additional footpath width in some locations. Similarly, options that involve kerb

¹² Motorcycles were assumed not to be permitted to use the proposed bus lanes/SVLs

realignment or parking space removal will be proposed only where they are as a consequence of other options, as opposed to standalone options. It should be noted that preliminary designs will be tested through developed design phase to reflect the developing LGWM UDF and the more detailed design thinking that will occur in the next phase.

5.5.2 Node and Intersection Treatment Options

The following node and intersection treatment options were identified:

- Intersection treatments:
 - Thorndon Quay/ Mulgrave Street
 - Signalise the bus movement in and out of Thorndon Quay
 - Change the form of intersection to have all traffic from Mulgrave Street use the intersection currently used by buses, thereby resulting in no conflict with Mulgrave Street traffic or bus movements
 - Thorndon Quay/ Moore Street
 - Signalise and provide a “head start” facility to allow buses to proceed ahead of other traffic on Thorndon Quay
 - Thorndon Quay/ Tinakori Street
 - Signalise and include active mode crossings and bus priority
 - Remove the merge from two lanes to one lane between Sar Street and Tinakori Road to facilitate continuous movement (e.g. a morning peak period bus lane)
 - Hutt Road/ Kaiwharawhara Street
 - Convert the slip lane into a normal left turn lane
 - Convert the existing “T” intersection to a “seagull” intersection (i.e. like Onslow Road) and provide new link from end of School Road to Kaiwharawhara Road
 - Restrict right turn access at the intersection and extend School Road across to Kaiwharawhara Road.
- Pedestrian and cycling treatments, including:
 - Providing raised platform zebra crossings on left turn slip lanes at intersections
 - Remove left turn slip lanes and incorporate left turn movements in the main intersection e.g. at the Thorndon Quay/ Mulgrave Street intersection
 - Provide a pedestrian crossing across Moore Street at its intersection with Thorndon Quay to prioritise pedestrians walking along Thorndon Quay
 - Alter the form of pedestrian crossing at the Moore Street/ Thorndon Quay intersection to reduce conflicts between movement along the corridor and movement across Thorndon Quay
 - Alter the form of pedestrian crossing at Thorndon Quay shops to better manage the conflicts between movement along the corridor and movement across Thorndon Quay
 - Provide more pedestrian crossings in the vicinity of Thorndon Quay shops to reduce the “barrier” for crossing the road
 - Provide a pedestrian crossing at the Tinakori Road intersection to facilitate pedestrians walking along Thorndon Quay
 - Provide new crossing(s) at the Tinakori Road intersection to provide access to Tinakori Road (and Sar Street), and provide better access to bus stops and cycle facilities

- Improve the footpath from Tinakori Road to Thorndon Quay and add cycle wheel ramps beside the stairs
- Improve crossing facilities or grade separate active modes at the Kaiwharawhara Road intersection (i.e. on the north side of intersection on Hutt Road)
- Provide a new pedestrian crossing at the Kaiwharawhara Road intersection (i.e. on the south side of intersection on Hutt Road)
- Extend the cycleway on Hutt Road from Jarden Mile to connect to the proposed Ngā Ūranga ki Pito-One project
- Improve crossing facilities or grade separate active modes at the Jarden Mile intersection.
- Amenity improvements at the following locations:
 - Mulgrave Street intersection (seating/ landscaping)
 - Seating/ landscaping in the space under pohutukawa trees between the motorway overbridge and Tinakori Road
 - Lighting improvements at the motorway overbridge near Tinakori Road to create a gateway effect
 - Around cultural and heritage places e.g. streams.
- Bus operational treatments:
 - Provide a bus “head start” at the pedestrian crossing at Thorndon Quay
 - Convert kerbside lane or add a bus priority southbound lane at the Kaiwharawhara Road intersection/ convert the kerbside lane or add a lane to provide southbound bus priority
 - Provide a bus queue jump lane (northbound) at the Kaiwharawhara Road intersection
 - Provide a bus lane on southbound approach to the Jarden Mile intersection and on the ramp heading towards State Highway 2 (SH2)
 - Provide a right turn lane or dedicated facility (signal) for buses to turn right to the ramp from the left-hand side after departure from the bus stop located at the intersection of Jarden Mile
 - Revise the bus stop locations at the intersection of Jarden Mile to minimise walking distance to connecting services (e.g. relocating the stop to the north of the intersection on a triangular shaped island)
 - Restrict car parking in the vicinity of the Jarden Mile intersection, to reduce operational impediments for buses.
- Safety improvements
 - Speed limit reductions
 - Raised tables.

5.6 Long List Option Assessment Process

The long list of corridor theme, node and intersection options was scored qualitatively against the evaluation criteria by a range of specialists. This consisted of transport planning, road safety, consenting, civil engineering and landscape architecture specialists.

As the form of node and intersection treatments will be determined by the preferred corridor treatment option, node and intersection treatment options and corridor treatment options were

evaluated independently of each another. It was not practical to assess the vast number of combinations of node and intersection treatment options and corridor treatment options.

5.7 Long List Assessment Results

The results of the evaluation of the long list options are summarised in Appendix E (whole of corridor treatments) and Appendix F (node and intersection treatments), including the main reasons for recommending progressing or rejecting the options. The options coloured in 'green' are those recommended to be carried forward to the shortlist, and those not recommended to be progressed to the short list are highlighted 'red'.

5.8 Options Short Listed

Based on the outcome of the long list evaluation, it was concluded that all the short-listed options should include the following key elements:

- Peak period bus priority lanes on Thorndon Quay (southbound only, or in both directions). This will maximise people throughput along the corridor, improve the level of service for bus users and allow parking to take place in off-peak periods
- Peak period SVLs on Hutt Road (southbound only, or in both directions). This will improve people throughput and the level of service for bus users, to maintain the level of service for port related freight traffic and to allow parking to take place in off-peak periods (it should be noted that the initial analysis indicated the SVLs should be available for buses and trucks only)
- Improved separated cycle facilities on Thorndon Quay (either uni-directional or bi-directional cycle lanes) to improve safety for cyclists and complement the existing bi-directional cycleway on Hutt Road
- Intersection upgrades which are consistent with the corridor treatments:
 - Hutt Road/ Jarden Mile
 - Designated pedestrian and cyclist crossing provision and increased size of islands
 - Reassignment of lanes for the northbound approaches
 - Relocation of bus stops
 - SVLs on the northbound approach to the intersection
 - Hutt Road/ Onslow Road
 - The current Seagull configuration is proposed to be fully signalised to provide a secure crossing for cyclists who are not currently catered for (this will require combining the southbound through and right movements into one lane and 'split' phasing the intersection to restrict right turn filter movements)
 - Hutt Road/ Tinakori Street
 - Raised crossings to provide a safer crossing environment for pedestrians and cyclists
 - Thorndon Quay/ Mulgrave Street
 - Full signalisation to assist bus movements in and out of the existing Lambton Quay Bus Interchange
- Amenity improvements on Thorndon Quay, notably:
 - Tree planning
 - Shade
 - Seating

- Shelter
- Gardens
- Interpretation/wayfinding.
- Existing pedestrian facilities along and across the corridor to be maintained, with traffic signal control introduced at the existing crossing on Hutt Road near Rangiora Avenue (see Figure 5-3 and 5-4).
- New or relocated/revised pedestrian crossings (whether there are to be signalised or unsignalised options) was considered later in the design process) at the following locations (see Figure 5-3 and 5-4):
 - Thorndon Quay – between Davis Street and Moore Street (existing zebra crossing relocated)
 - Thorndon Quay – between Davis Street and Tinakori Street (existing zebra crossing to be relocated)
 - Hutt Road at Aotea Quay ramps (new crossing facility)
- The pedestrian crossing on Hutt Road near Rangiora Avenue will be signalised.
- All angled car parking space on Thorndon Quay is to be removed and replaced with parallel car park spaces to improve safety (since completed by WCC in September 2021)
- Remove closely spaced bus stops or relocate/redesign bus stops (as outlined in Appendix G)
- Lower speed limits.

Figure 5-3 Proposed Changes to Intersections and Crossings on Thorndon Quay

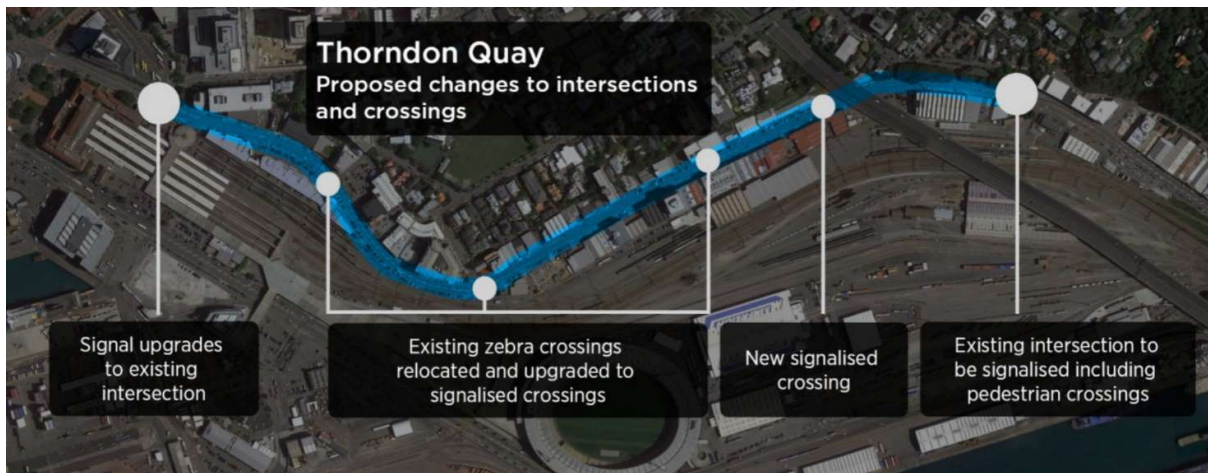
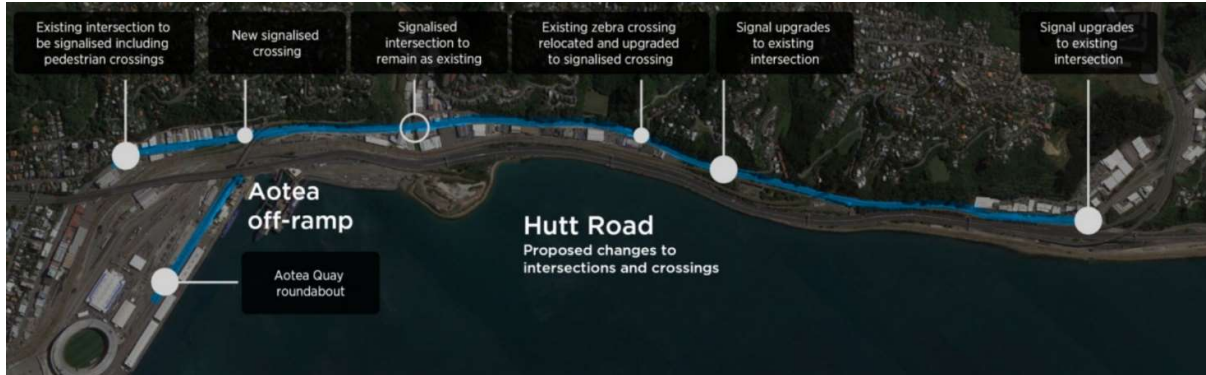


Figure 5-4 Proposed Changes to Intersections and Crossings on Hutt Road



5.8.1 Core Options

The key decisions which need to be addressed in the short list evaluation are around:

- Whether the bus lane on Thorndon Quay and the SVL on Hutt Road should be provided in a southbound direction only or in both directions
- Whether the cycleway on Thorndon Quay should be uni-directional (i.e. one direction of travel each side) or provide a bi-directional cycleway (i.e. on the eastern (seaward) side).

Four core options were therefore defined as follows:

- Option 1 – Southbound bus lane on Thorndon Quay/ SVL on Hutt Road, with a bi-directional cycleway on Thorndon Quay
- Option 2 – Bus lanes on Thorndon Quay/ SVLs on Hutt Road in both directions, with a uni-directional cycleway on Thorndon Quay
- Option 3 – Southbound bus lane on Thorndon Quay/ SVL on Hutt Road, with a uni-directional cycleway on Thorndon Quay
- Option 4 – Bus lanes on Thorndon Quay/ SVLs on Hutt Road in both directions, with a bi-directional cycleway on Thorndon Quay.

5.8.2 Sub Options

The assessment also identified that the provision of a bus or SVL on Hutt Road added additional risks. These include:

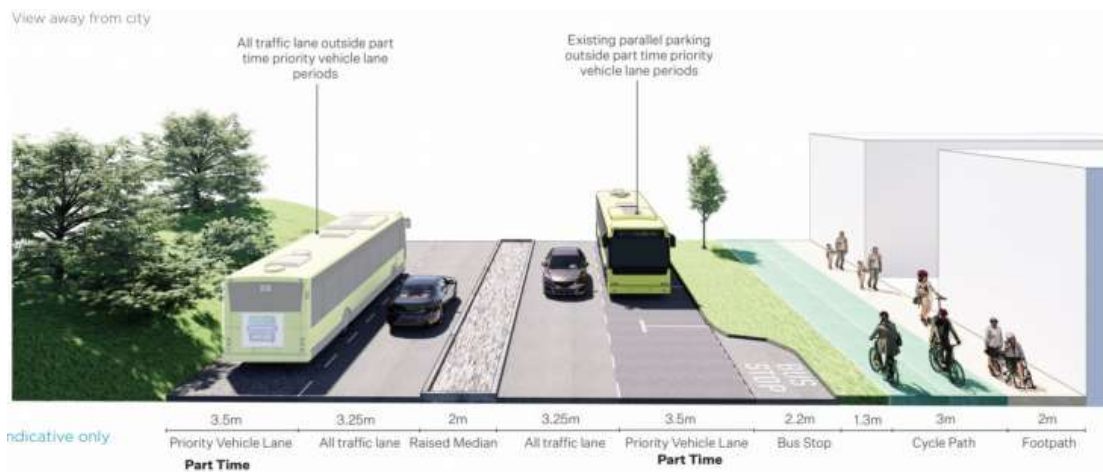
- An increased risk of side impact crashes - drivers will be required to cross two opposing lanes of traffic which will likely have different speeds at peak times due to the freely flowing SVL lane, thereby making it more difficult to judge safe gaps in traffic when turning
- An increased risk to motorcyclists and cyclists from turning traffic - the addition of the SVL had the potential to mask motorcyclists which may be filtering between the two traffic lanes to pass slower moving vehicles in the general traffic lane, and also cyclists riding on the shared path. Furthermore, due to congestion and the completion of the other shared path projects in the city, these users are likely to increase in number in the future, increasing the likelihood of a crash.

To mitigate this risk, options that included a central median and a service lane sub-option were developed:

- Sub-Option A – left-in left-out access only on Hutt Road, with some gaps in the median and at intersections for small vehicles to turn at, but requiring a new turnaround facility to be provided at Aotea Quay for longer vehicles to turn at
- Sub-Option B – a new service lane on the east side of Hutt Road (between Onslow Road and Kaiwharawhara Road) and requiring modifications to the existing Onslow Road and Kaiwharawhara Road signalised intersections.

Figure 5-5 shows an example of how a raised median can be incorporated in the design of Option 4. A raised median can be incorporated in Options 1-3 in a similar way.

Figure 5-5 Raised Median on Hutt Road

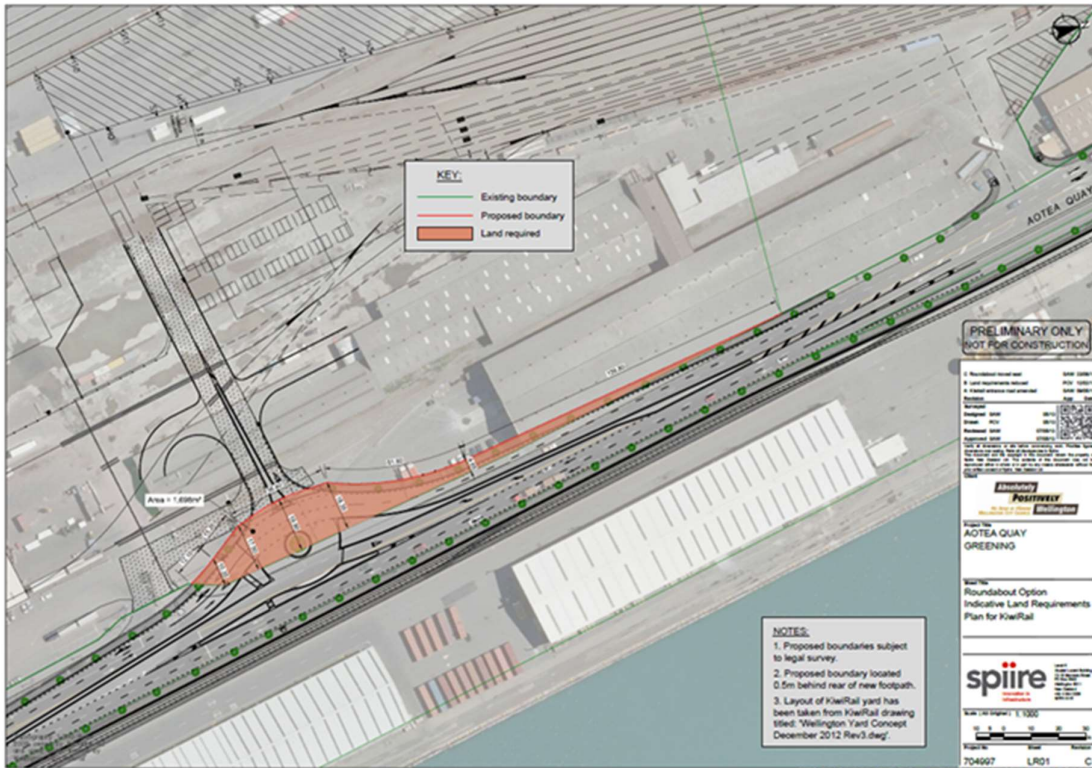


5.8.2.1 Aotea Quay Turnaround facility (Sub Option A)

A proposed new turnaround facility on Aotea Quay, at the KiwiRail container terminal entrance, would provide a safe place to turn for drivers of large vehicles intending to travel north from a business on Hutt Road. It would also reduce the amount of traffic on Hutt Road by providing alternative access to the Kaiwharawhara ferry terminal from State Highway 1.

A design for a roundabout on Aotea Quay was developed for WCC in 2014. This is shown in Figure 5-6.

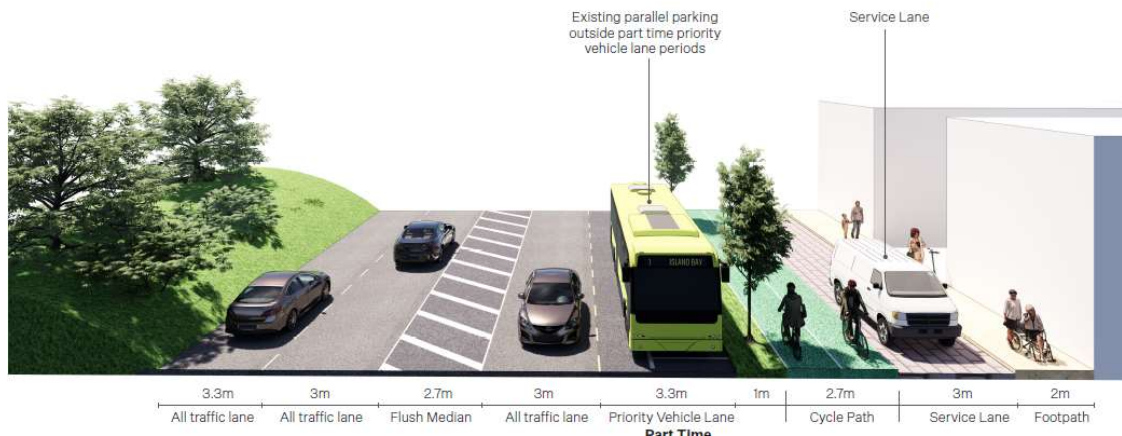
Figure 5-6 Proposed Roundabout at Aotea Quay



5.8.2.2 Service Lane on Hutt Road (Sub Option B)

An indicative cross section for a service lane on Hutt Road is shown in Figure 5-7. This is shown to be incorporated in Option 1 but could also additionally be incorporated into all four options.

Figure 5-7 Service Lane on Hutt Road



5.8.3 Summary of Options and Sub Options Short Listed

The full list of options and sub-options short-listed are summarised in Table 5-1.

Table 5-1 Short Listed Options

Option	Elements			Common Elements
	Thorndon Quay Bus Lanes	Thorndon Quay Cycle Lanes	Hutt Road SVL(s)	
Option 1: Southbound bus/SVL lanes with Thorndon Quay bi-directional cycleway	Southbound	Bi-directional	Southbound	<ul style="list-style-type: none"> ▪ Removal of angle parking on Thorndon Quay to improve safety¹³ ▪ Lower speed limits ▪ Intersection upgrades ▪ Pedestrian crossing improvements ▪ Bus stop rebalancing and layout improvements ▪ Thorndon Quay amenity improvements
Option 1A: Southbound bus/SVL lanes with Thorndon Quay bi-directional cycleway	Option 1 plus: <ul style="list-style-type: none"> • Left-in / Left-out on Hutt Road (central median) • Turnaround facility on Aotea Quay 			
Option 1B: Southbound bus/SVL lanes with Thorndon Quay bi-directional cycleway	Option 1 plus: <ul style="list-style-type: none"> • Service lane on east side of Hutt Road (between Onslow Road and Kaiwharawhara Road) • Modifications to the existing Kaiwharawhara Road and Onslow Road signal-controlled intersections 			
Option 2: Southbound and Northbound bus/SVL lanes with Thorndon Quay uni-directional cycleway	Both directions	Uni-directional	Both directions	
Option 2A: Southbound and Northbound bus/SVL lanes with Thorndon Quay uni-directional cycleway	Option 2 plus the same variants as for Option 1A			
Option 2B: Southbound and Northbound bus/SVL lanes with Thorndon Quay uni-directional cycleway	Option 2 plus the same variants as for Option 1B			
Option 3: Southbound bus/SVL lanes with Thorndon Quay uni-directional cycleway	Southbound	Uni-directional	Southbound	
Option 3A: Southbound bus/SVL lanes with Thorndon Quay uni-directional cycleway	Option 3 plus the same variants as for Option 1A			
Option 3B: Southbound bus/SVL lanes with Thorndon Quay uni-directional cycleway	Option 3 plus the same variants as for Option 1B			
Option 4: Southbound and Northbound bus/SVL lanes with Thorndon Quay bi-directional cycleway	Both directions	Bi-directional	Both directions	
Option 4A: Southbound and Northbound bus/SVL lanes with Thorndon Quay bi-directional cycleway	Option 4 plus the same variants as for Option 1A			
Option 4B: Southbound and Northbound bus/SVL lanes with Thorndon Quay bi-directional cycleway	Option 4 plus the same variants as for Option 1B			

¹³ Since completed by WCC in September 2021

Figure 5-8 is a schematic diagram of the four core options. Indicative cross sections for the options are shown in Figure 5-9 to 5-16. It should be noted that the dimensions on the cross sections are indicative only and are not necessarily consistent between different options.

Figure 5-8: Indicative Plans Option 1 to 4

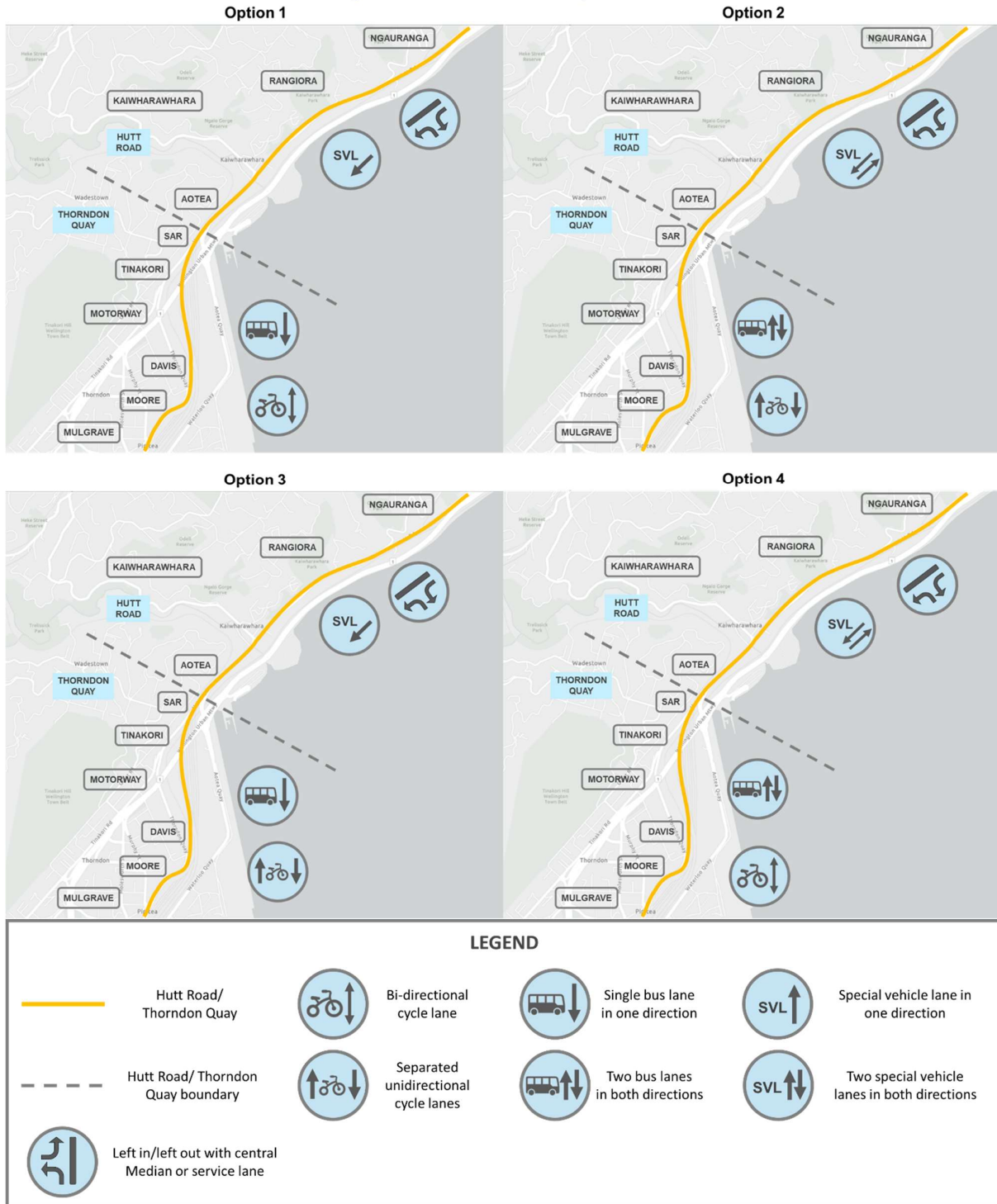


Figure 5-9 Option 1 – Thorndon Quay Indicative Plan and Cross Section

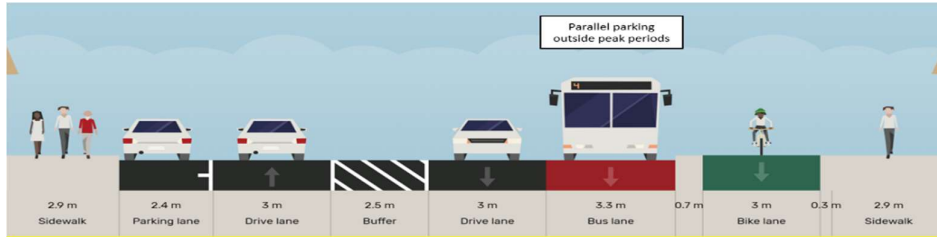


Figure 5-10 Option 1 – Hutt Road Indicative Plan and Cross Section

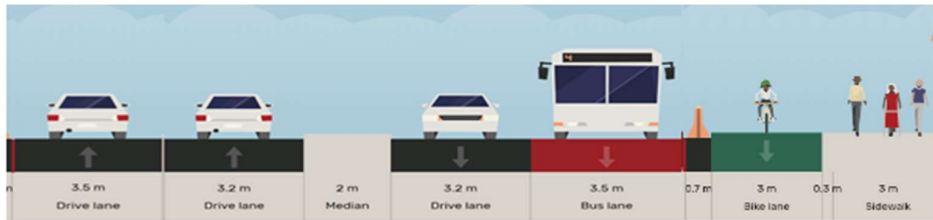


Figure 5-11 Option 2 – Thorndon Quay Indicative Plan and Cross Section

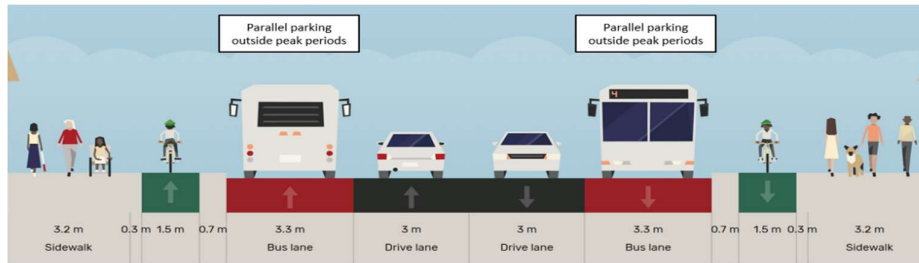


Figure 5-12 Option 2 – Hutt Road Indicative Plan and Cross Section



Figure 5-13 Option 3 – Thorndon Quay Indicative Plan and Cross Section

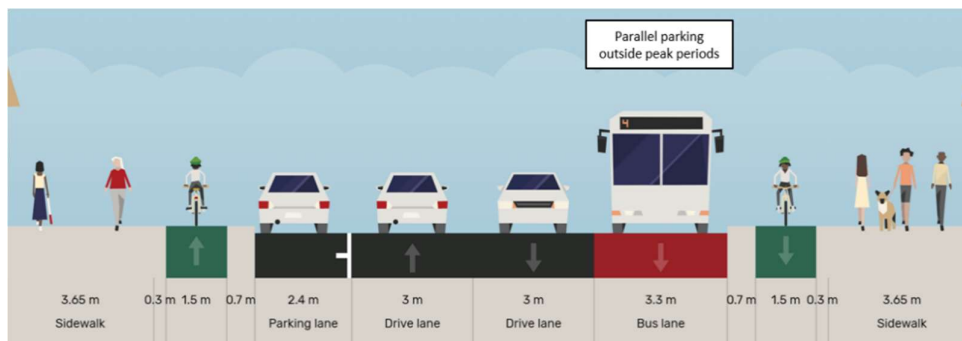


Figure 5-14 Option 3 – Hutt Road Indicative Plan and Cross Section

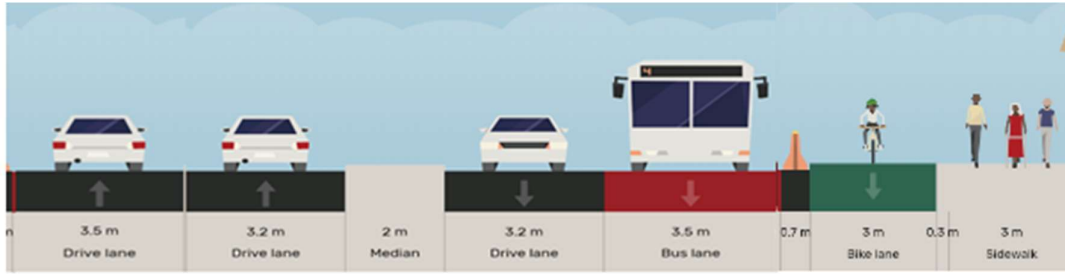


Figure 5-15 Option 4 – Thorndon Quay Indicative Plan and Cross Section

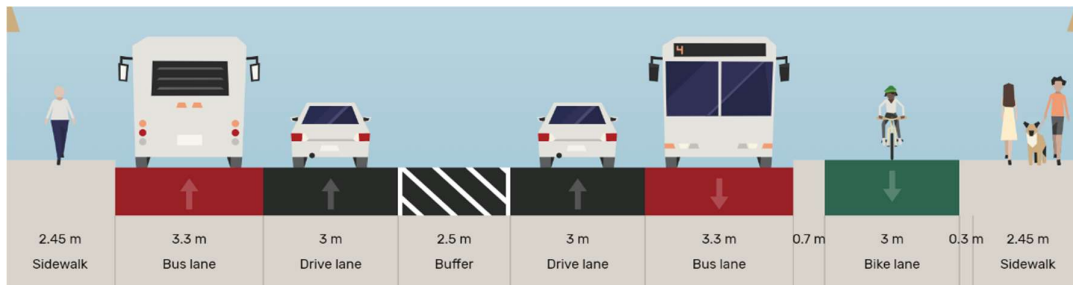
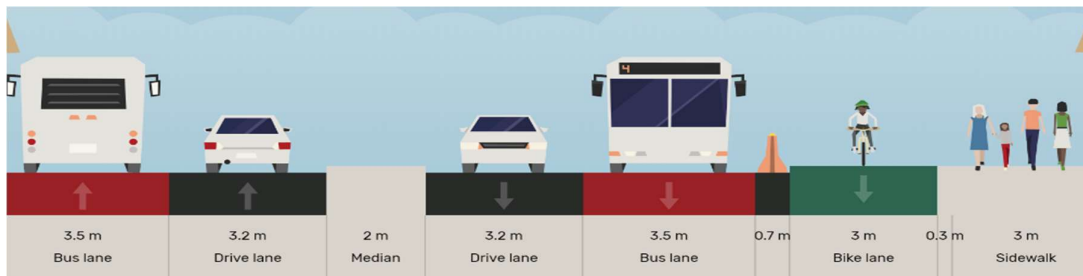


Figure 5-16 Option 4 – Hutt Road Indicative Plan and Cross Section



5.9 Long to Short List Assessment Process

In order to determine a preferred option, the short-listed options and sub options were subjected to a multi criteria assessment (MCA) process. The assessment process aims to highlight the differences between the options, the similarities and the trade-offs of choosing one option over another. A number of other technical tasks including transport demand/ operational modelling and cost estimation were adopted to determine the preferred option.

An assessment framework was developed based on an MCA framework developed by LGWM, however, was additionally adapted to the needs of the TQHR project.

5.9.1 Safe System Assessment

A Safe System Assessment was undertaken for the purposes of understanding the risk elements in infrastructure that are known to be a major contributor to deaths and serious injuries (DSI) on our roads. This approach uses the safe system principles and thinking which underpin the Government's Road to Zero Strategy.

The SSAF is used to understand the underlying high-risk infrastructure elements, inform safer design options and demonstrate the risk reduction achieved. It can also be used to highlight areas where there is less Safe System alignment requiring further consideration and mitigation. The SSAF is based on the guidance contained with Austroads Research Report AP-R609-16 Safe System Assessment Framework.

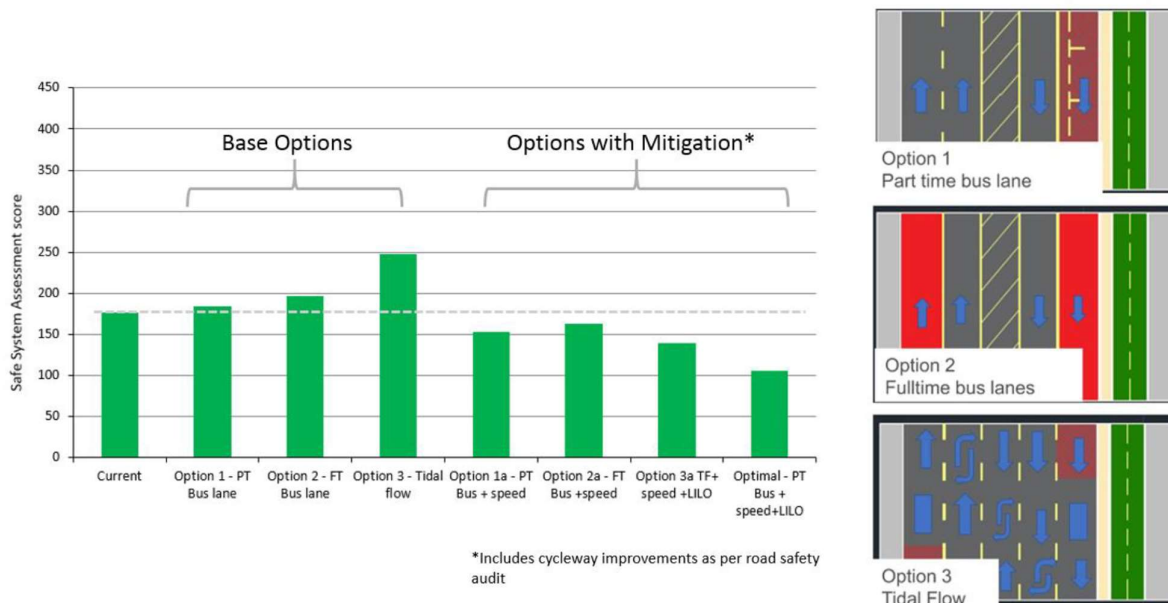
Alongside the current situation early options were assessed including:

- Four lanes (i.e. two in each direction) including one southbound part-time morning peak period bus lane
- Four lanes (two each direction) including a full-time bus lane in each direction
- Five lanes with tidal flow arrangement with three lanes provided in the morning and evening peak period respectively (including a part-time bus lane in each direction).

Further options were also assessed which included potential mitigation measures for further exploration by the project team.

It can be seen in Figure 5-17 that the Safe System Assessment score overall was higher than the current situation for all the base options and a tidal flow option in its base form being the least safe. Noting a higher score indicates less alignment with the safe system approach and hence, would be expected to be less safe.

Figure 5-17 Overall Safe System Scores



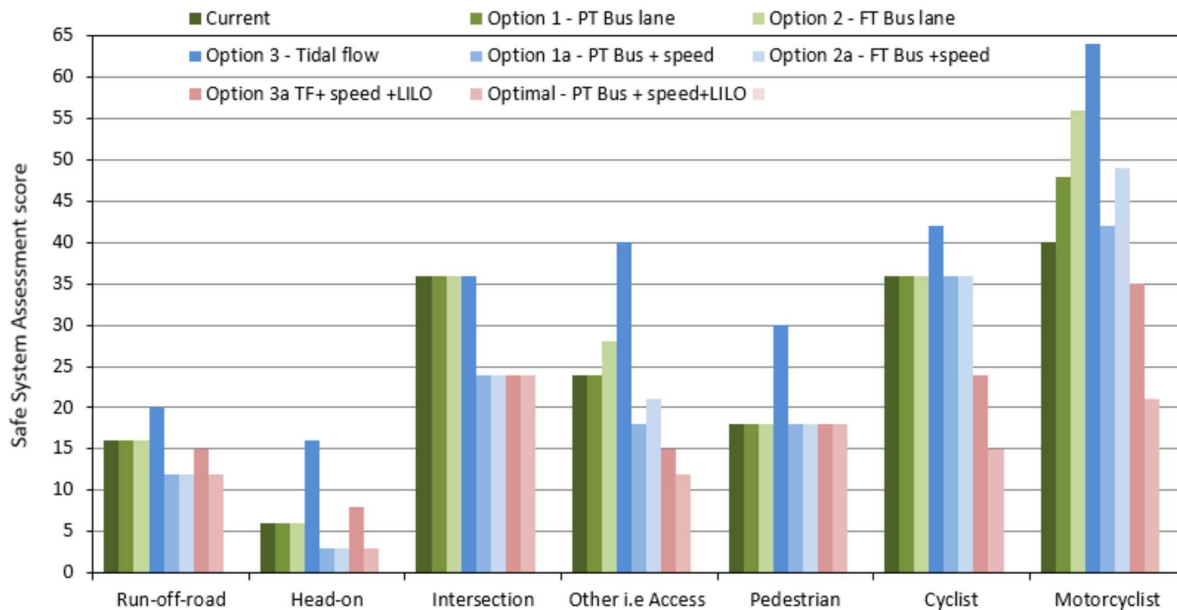
The key underlying issues noted in the assessment giving rise to higher risk were:

- Difficulty obtaining a suitable gap in traffic across multiple lanes to turn right (in or out) of accesses)
- Differential traffic speeds across the lanes making it difficult to judge a safe gap to turn (in or out) of accesses
- Masking of motorcyclists in bus lanes/ filtering lanes by other traffic presenting issues with right turning traffic
- Masking of cyclists using the shared path by multiple lanes of traffic for right turning traffic
- Less awareness of cyclists due to drivers focusing on attaining a gap in traffic.

It is noted that the current situation also exhibits issues with turning traffic conflicting with cyclists using the shared path.

It can be seen in the overall assessment (Figure 5-17) that with the addition of speed reduction (reducing potential impacts closer to safe system speeds) and/ or a left in/ left out arrangement it is possible to reduce the overall safe system score to below what is seen currently. However, when reviewing the detailed risk scores by each key user/ crash type (Figure 5-18) it is noted that the risk is not significantly different to affect the score for cyclists and does not significantly improve the risk score for motorcyclists through the addition of speed reduction alone.

Figure 5-18 Detailed Scores by User/ Crash Type



Overall, there is an increasing trend in crashes and a high proportion of cyclist and motorcyclist crashes which also make up the majority of serious crashes along this section of the corridor. While there have been ongoing cycling improvements, the increase in cyclist numbers expected will likely increase future crash occurrence. In the case of motorcyclists, increasing congestion on the route and the wider Wellington region is likely to result in an increased uptake which may in turn increase the number of crashes involving these users. Due to their vulnerability, cyclists and motorcyclists are at an elevated risk of increased serious injuries in the event of a crash which is evidenced in the crash history. The installation of further lanes without mitigation was concluded to likely exacerbate the existing crash risks.

The SSFA also highlights this as a key risk alongside that of motorcyclists. It also highlights intersection and access risk as being elevated, being the primary common factor in these risks are those associated with turning traffic. Only the options which include restrictions to access through the removal/ rationalisation of right turn movements by vehicles, reduce the safety risk significantly.

In addition to these issues, further mitigations not explicitly considered at this stage, were explored for the design of the preferred option, such as improvements to pedestrian crossing facilities or intersection refinements.

5.9.2 LGWM Multi Criteria Assessment Framework

A multi criteria assessment (MCA) framework¹⁴ was produced by LGWM in 2020 to provide direction and promote consistency in the assessment of other projects being considered in the LGWM programme. The framework sets out the recommended process to be followed in the assessment of options, including the criteria to be assessed and the scoring scales to be used.

The framework gives flexibility in the assessment approach by recognising that each project may apply effects or design and delivery criteria specific for the corridor/ issues being investigated. The framework can also help differentiate between options.

An eleven-point scoring scale was used, as recommended in the LGWM MCA process, and is summarised in Figure 5-19.

Figure 5-19 Long to Short List MCA Scoring Scale

Score	Scoring Description
5	Substantial benefits and a high degree of confidence of benefits being realised and/or long term / permanent benefits
4	High extent of benefits and confidence of benefit being realised and/or medium - long term benefits
3	Good benefits and/or medium term
2	Low or localised benefits and/or short term
1	Very low benefits and/or very short term
0	No change in benefits, impacts or difficulties from current situation
-1	Few difficulties, very low cost or low impact on some resources/values and/or very short term
-2	Minor difficulties, low cost or minor impacts on resources/values and/or short term
-3	Some difficulties, moderate cost or some impact on resources/values and/or medium term
-4	Clear difficulties, high cost or high impact on resources/values and/or medium - long term
-5	Substantial difficulties, very high cost or substantial impact on resources/values and/or long term / permanent

5.9.3 MCA Criteria

The LGWM MCA framework was tailored to be used for the assessment of the short-listed options identified for the TQHR corridor. The key criteria adopted for the short list assessment was the contribution of the options to the investment objectives, the effects and to delivery, maintenance and operations, as shown in Figure 5-20. The interpretation of each criterion has been tailored so that the evaluation will highlight the differences between the options.

¹⁴ Let's Get Wellington Moving - Proposed Multi Criteria Analysis Framework , May 2020

Figure 5-20 MCA Criteria



5.9.3.1 Effects Criteria

The main effects considered were:

- Tangata Whenua values
- Social: Effects on social and economic opportunities along and adjacent to the corridor
- Property Access: Effect of access for all modes on and to properties along the corridor
- Fit with LGWM Programme: Alignment with other committed projects, such as the Golden Mile project.

5.9.3.2 Delivery, Maintenance and Operations Criteria

The main delivery, maintenance and operations criteria considered were:

- Delivery Cost: considering the expected duration of construction of the project, and any impacts on businesses and the community during construction phase.
- Operation and Maintenance Costs: including the effect of the project on the operation of emergency services
- Timeframe for construction (delivery).

5.9.4 MCA Scoring

Each evaluation criteria were 'owned' and scored by a number specialists. They used various input information, including site assessments, information provided by stakeholders, calculations and data. The main information used is summarised in Table 5-2.

Wherever possible, assessments were based on available information and work already completed. A "rules based" assessment was incorporated within the methodology where possible.

Specialists collaborated and shared information with partner organisations and between one another for consistency. Individual meetings with the equivalent members of the partner organisations were held to promote this dialogue and to feed back into a series of MCA workshops. The workshop enabled challenge and questioning of each specialist. The specialist was given the opportunity to reconsider their score if new information became available at the workshop. The workshop enabled team members and LGWM officers to develop a deeper understanding of the key factors that differentiate the options and the conclusions resulting from the evaluation findings.

As part of option development and refinement, alternatives for avoiding significant adverse effects were considered and additional mitigation that may be required were identified. These additional mitigations were discussed in a workshop setting with all specialists being given the opportunity to determine whether the inclusion of the proposed mitigation could change their score and whether it should be considered further. If an alternative or option had any negative effects on vulnerable social groups (elderly, low income, disabled etc), the project team considered whether additional measures were needed to avoid, remedy or mitigate this.

Consideration was also given to the success factors when scoring the options against the criteria. It was important to understand how short-listed options perform against the success factors, and ensure this is reflected in the MCA scores, even if the option was unable to achieve them.

Table 5-2 MCA Considerations and Inputs

Criteria	Assessment Considerations	Inputs
Investment Objectives		
Investment Objective One: <ul style="list-style-type: none"> Improve level of service for bus users including improved access, journey times and reliability Provide sufficient capacity for growth in public transport 	<ul style="list-style-type: none"> Reduction in bus travel times (peak periods) Reduction in bus travel time variability (peak periods) Increased people carrying capacity of the corridor Reduction in distance to a bus stop Reduction in footway crowding at bus stops Legibility of bus stop locations and spacing 	<ul style="list-style-type: none"> Bus Spreadsheet Modelling outputs Aimsun modelling outputs Bus stop catchment modelling Site visit to identify effective width, pinch points etc, space at bus stops
Investment Objective Two: <ul style="list-style-type: none"> Improve level of service, and reduce the safety risk, for people walking and cycling along and across Thorndon Quay and Hutt Road 	<ul style="list-style-type: none"> Danish LOS measure Increase pedestrian level of service – crossing delays (signal controlled and uncontrolled) Wider footpaths Capacity for cycling growth Reduction in the likelihood of pedestrian and cyclist crashes (change in level of conflict) Reduction in the expected severity of pedestrian and cyclist crashes 	<ul style="list-style-type: none"> Healthy Streets Index Austrroads Part 6 SSAF Analysis of CAS data Safe and Appropriate Speed (SAAS) assessment High level safety review of options Waka Kotahi Ngauranga to Petone cycleway demand forecasts Traffic flow data Traffic speed data Aimsun modelling outputs
Investment Objective Three: <ul style="list-style-type: none"> Reduce the frequency and severity of crashes on Hutt Road 	<ul style="list-style-type: none"> Reduction in the expected frequency and severity of crashes 	<ul style="list-style-type: none"> SSAF Analysis of CAS data SAAS assessment of short-listed options High level safety review of options Bespoke / targeted crash history analysis Various data Traffic flow data Traffic speed data Aimsun modelling outputs
Investment Objective Four: <ul style="list-style-type: none"> Improve the amenity of Thorndon Quay to support the current and future place aspirations for the corridor/area 	<ul style="list-style-type: none"> Effect on character and place value Amenity Increased opportunity to enhance character and place value Increased opportunity to create vibrancy and human level street activity¹⁵ 	<ul style="list-style-type: none"> Surveys to identify location / amount of street furniture, planting, street art Traffic flow data

¹⁵ feels safe, relaxed, provides for dwelling, seating, events, identity contributors (like art works or celebrating heritage places), space for hospitality)

Criteria	Assessment Considerations	Inputs
	<ul style="list-style-type: none"> Improved environmental comfort (i.e. noise, air quality, adjacent motor vehicle volume, amount of vegetation) Changes in the likelihood of or consequences of crime 	
Investment Objective Five: <ul style="list-style-type: none"> Maintain similar access for people and freight to the ferry terminal 	<ul style="list-style-type: none"> Effect of options on freight movements versus existing situation Consider future effects of options plus Single User Ferry Terminal Consider people movement to the ferry terminal 	<ul style="list-style-type: none"> Forecast freight data Single User Ferry Terminal PBC WAU strategic transport model outputs Business surveys
Effects		
Social	<ul style="list-style-type: none"> Effect on equitable¹⁶ access¹⁷ to social and economic opportunities such as employment, retail, health and cultural opportunities Effect on social connectedness 	<ul style="list-style-type: none"> Stakeholder inputs
Property access	<ul style="list-style-type: none"> Effect on access to and servicing of private building (i.e. deliveries, removals, building maintenance) – long term 	<ul style="list-style-type: none"> Discussions with building owners Stakeholder feedback Loading bay / service requirements surveys
Fit with LGWM Programme	<ul style="list-style-type: none"> Alignment with linked projects such as Golden Mile and City Streets Flexibility to integrate with linked projects Ability to deliver the option incrementally Ability to scale the level of intervention 	<ul style="list-style-type: none"> LGWM Project Lead inputs
Mana Whenua Values	<ul style="list-style-type: none"> Seven values 	
Delivery, Maintenance and Operations		
Delivery	<ul style="list-style-type: none"> Duration of delivery Effect on pedestrians 	Emerging preliminary design

¹⁶ Considered different sectors of society, including mobility impaired, income groups, age groups etc.

¹⁷ Considered the likely changes in the number and location of mobility parks, bicycle parks, motorcycle parks, public on-street car parks, public off-street car parks, bus stop locations

Criteria	Assessment Considerations	Inputs
	<ul style="list-style-type: none"> ▪ Effect on cyclists ▪ Effect on bus operations ▪ Effect on retail ▪ Effect on parking ▪ Effect on access to and servicing¹⁸ of private building (i.e. deliveries, removals, building maintenance) 	
Operations and maintenance	<ul style="list-style-type: none"> ▪ Effect on public operational costs (maintenance, refuse collection, street cleansing, landscape maintenance) ▪ Effect on ability to accommodate utilities and services repairs and renewals ▪ Effect on ability to re-route bus services due to major planned and unplanned events ▪ Effect on the flexibility of future corridor use (movement and place) ▪ Effect on emergency services response times / effectiveness ▪ Qualitative assessment of effect on operational cost 	<ul style="list-style-type: none"> ▪ Discussions with WCC, service providers, utility providers and others
Timeframe for delivery	<ul style="list-style-type: none"> ▪ Ability to demonstrate tangible improvements (outputs) within the 2018-21 / 2021-24 period ▪ Ability to demonstrate tangible improvements (benefits) within the 2018-21 / 2021-24 period 	Emerging preliminary design

¹⁸ Considered the number and location of loading bays

5.9.5 High Level Cost Estimates

In order to inform the selection of the preferred option, high level (Indicative Business Case Estimates) (IBEs) were prepared for the four core options in November 2020. An estimate was also prepared for a variant of Option 4 (Option 4A), which include a left-in/ left-out access arrangement and some gaps in the median for cars to turn on Hutt Road, as well as alterations to the existing Aotea Quay to allow trucks to turn round. The cost estimates (IBEs) were prepared in accordance with the Waka Kotahi Cost Estimation Manual and are summarised in Table 5-3.

Table 5-3 Indicative Business Case Estimates of the Shortlisted Options (2020)

Option	Expected IBE Cost (\$000s)
1	\$25,400
2	\$27,700
3	\$23,800
4	\$28,100
4A (i.e. Option 4 with left-in / left-out access on Hutt Road and Aotea Quay Roundabout)	\$33,100

The estimates indicate that cost is not significantly different between options and is therefore not a major factor in the option selection process.

5.9.6 High Level Economic Analysis

This preliminary economic analysis was undertaken to provide an indicative understanding of the economic efficiency outcomes for the options assessed. This was undertaken simply to provide a high-level understanding of the economic efficiency outcomes for the options and help establish that the overall benefits of the TQHR project could exceed the costs. The analysis was based on a corridor model that was developed to provide an indication of changes in vehicle speeds based on the level of congestion (using volume/capacity speed flow curves) and intersection delays.

The economic analysis was undertaken in accordance with Waka Kotahi Economic Evaluation Manual (EEM)¹⁹, using a 40-year evaluation period and a 4% discount rate. This was the recommended approach at the time this analysis was undertaken. As the vehicle volumes differ slightly between options for similar sections, a variable trip evaluation method was applied to account for the change in road user surplus and resource cost correction.

From the corridor modelling outputs, the following primary transport impacts were assessed:

- Travel time and congestion costs and benefits
- Vehicle operating costs and benefits
- Active mode/ health costs and benefits
- Emission costs and benefits.

¹⁹ EEM was used as the SSBC process commenced prior to it being replaced by the Monetised and Non-monetised Benefits Manual

Further modelling will be done during subsequent phases of the project to inform the detailed design process.

5.9.6.1 Travel Time and Congestion Costs and Benefits

The travel time and congestion costs were assessed for each of the sub-sections of the corridor for the morning and evening peak periods. These were individually assessed for each user group (i.e. bus passengers, trucks, single occupant, two occupant and three occupant vehicles).

5.9.6.2 Vehicle Operating Costs and Benefits

Base vehicle operating costs were assessed based on the average speeds estimated for each sub-section and by vehicle type.

5.9.6.3 Active Mode Benefits

The active mode benefits have been estimated based on bus passengers walking and assumed an average length of 280m.

Cycle mode share was assumed to increase by 2%, based on the forecast increase in cycle mode share from northern suburbs to central area prepared by WCC. A conservative 30% of the health benefits was assumed from the estimated demand.

5.9.6.4 Emission Costs

Emission costs were estimated based on the vehicle type emission tonnage predicted from the base vehicle operating costs applied with the costs of CO₂ emissions.

5.9.6.5 Safety Benefits

A high-level safety benefits assessment was undertaken. This was based on baselining the safety impacts that are common across all the short-listed options (e.g. speed reduction), then accounting for differences between the options.

For this preliminary assessment, the total social crash costs were estimated to be around \$2.98 million per annum, or approximately \$80 million over a 40-year period. The short-listed options were estimated to reduce crashes by approximately 20% to 30%.

5.9.6.6 Summary of Economic Analysis

The results of the preliminary economic analysis for the four core options and Options 4A are summarised in Tables 5-4 and 5-5.

Table 5-4 Preliminary Economic Benefits for the Shortlisted Options (2020)

Option	Travel Time and Congestion Costs/Benefits (\$m)		Safety Benefits (\$m)	Active Mode Benefits (\$m)	Other (VOC, CO2 etc) Benefits (\$m)	TOTAL DISCOUNTED BENEFITS (\$m)
	Public Transport	Other Vehicles				
1	\$25.4	\$0.4	\$18.2	\$23.6	\$4.5	\$72.1
2	\$42.1	-\$25.4	\$20.2	\$23.6	\$3.9	\$64.5
3	\$25.4	\$0.4	\$23.4	\$23.6	\$4.5	\$77.3
4	\$42.1	-\$25.4	\$13.0	\$23.6	\$3.9	\$57.2
4A	\$42.1	-\$61.8	\$20.2	\$23.6	\$8.5	\$32.6

Table 5-5 Discounted Costs and Economic Benefits, and Overall Benefit to Cost Ratio for the Core Options

Option	Discounted Costs (\$m)	Discounted Benefits (\$m)	Benefit to Cost Ratio (BCR)
1	\$27.8	\$72.1	2.6
2	\$23.5	\$64.5	2.7
3	\$22.6	\$77.3	3.4
4	\$23.9	\$57.2	2.4
4A	\$27.9	\$32.6	1.2

In summary, the results of the preliminary economic analysis were found to be:

- The BCRs for the short-listed options ranges between 1.2 and 3.4
- Travel time savings for public transport users outweighs the disbenefits for other vehicle users.

It should be noted that this analysis was refined for the preferred option, as is explained later in this chapter of the SSBC.

5.10 Short List Assessment Conclusions (Prior to Stakeholder and Public Engagement)

Prior to receiving feedback from stakeholder and public engagement, and scores on the effects on mana whenua values, the highest scoring options from the MCA were Options 4A and 4B (see Alternative and Options Report in Appendix H for further details).

The MCA considered, amongst other things, the economic benefits generated from each option but only considered these at a high level (using coarse cost estimates). However, the economic performance of options did not determine the selection of the preferred option alone.

While Options 4A and 4B scored similarly overall, the provision of a service road (suboption B) was discounted as being more disruptive, fit less with other regional projects and carried larger implementation risk.

The provision of bidirectional or unidirectional cycling facilities was also discussed. It was noted that the provision of a bidirectional cycleway (i.e. Options 1 or 4) should be aligned with the wider LGWM programme as there are bidirectional facilities planned to the north and south of the TQHR corridor. This would provide a consistent cycle path and ease of connection.

It was also noted that while both unidirectional and bidirectional cycle facilities would improve safety and level of service, unidirectional cycleways (Options 2 or 3) scored better for safety, due to less risk with cyclists travelling with the direction of general traffic.

Following the interim MCA workshop, the Technical Advisory Group (TAG) met to discuss a recommended option. The TAG supported the highest scoring option of 4A while noting the additional safety risks inherent with bidirectional cycleways which will require consideration in the design phase.

The TAG recommended that Option 4A was the best option to take forward as the interim preferred option. This decision was supported by the LGWM Programme Steering Group.

5.11 Public Engagement on the Interim Preferred Option

Public engagement on the proposed changes to TQHR was undertaken between 11th May and 8th June 2021. Over 1,600 responses were received, largely via an online survey, which is considered as an adequate response rate.

The consultation also included an open day at Pipitea Marae on Thorndon Quay (on Friday 21st May and Saturday 22nd May 2021), which was attended by approximately 50 people, and two market days at Harbourside Market, Waitangi Park (on Sunday 23rd May 2021) and at Johnsonville Market (on Sunday 30th May 2021). Ongoing discussions were held with some key stakeholders.

Overall, the engagement was well received, and the feedback was supportive of the proposals, though there certainly were some views that we need to be very mindful of. For example, there was some strong opposition to the removal of angled parking, particularly from the business community, and some concern existed around the possible removal of trees. Some people's opposition to the proposals did reduce once the proposals had been explained to them in more detail.

A lot of feedback related to issues that will be addressed in the next phase of the design process such as safety aspects (children moving around, etc.) was received.

No fatal flaws were identified, though the Sky Stadium did say they need the ability to stop traffic for evacuation purposes. Hence, if a roundabout is implemented on Aotea Quay, it will require signalisation.

No additional options emerged from the process which had not been considered before. There were no options which had been rejected but some details that need to be considered further.

A report providing more details of the engagement findings was published in July 2021. A summary of this is provided in Appendix I.

5.11.1 Revisions to the MCA Following Stakeholder and Public Engagement

Following the close of stakeholder and public engagement, a second MCA workshop was held on 30 June 2021. The purpose of this workshop was to consider the impact of engagement feedback on the interim MCA scores, update scores based on any further information, as well as to incorporate the mana whenua values assessment into the MCA.

The implementation of a bus lane on the southbound side was preferred over both directions as the benefits were higher. Without the northbound bus lane, this would provide more ability to influence the design of the footpath on the northbound (or 'beach' side). Mana whenua noted that most of their land interests along the corridor were along this historical beach side.

The 'B' sub-options all scored higher than the 'A' and base options as they were considered to provide an opportunity to improve access and create a neighbourhood space for those properties along Hutt Road.

Mana whenua supported the bi-directional cycleway on the harbourside as it is consistent with other cycle projects north and south of Thorndon Quay and Hutt Road. It should be noted that the change to angle parking to parallel was not considered in their scoring as WCC had already voted in favour of the change at the time of scoring the options.

The delivery team noted that since the interim MCA, some preliminary design of Option 4A had progressed, including more detailed evaluation of the available width on Hutt Road and desired width for the various modes. Based on this further work, the delivery team considered that the service lane 'B' suboption does not physically fit within the corridor and property acquisition would be necessary. Discussion at the workshop confirmed that the delivery score for the service lane should be reduced to -5 (the lowest score possible).

As buildings would require alteration or demolition to implement the service lane suboptions, it was agreed that the service lane options, despite the scoring, should no longer be progressed due to the disproportionate cost and effect of land acquisition.

The discussion at the workshop noted that the Thorndon Quay Collective submission raised concerns about loss of parking and economic impact. It was noted that the submission addressed the loss of parking issue but did not offer other submissions that would differentiate between options. As all options involve the loss of and reconfiguration of on-street parking, the submission did not offer differentiators between the options and the scoring did not change from the interim MCA.

While the scoring for the MCA criteria did not change from the interim MCA as a result of engagement, the workshop noted that there were many detailed points to further discuss with stakeholders and property owners during design. It is anticipated that dialogue between LGWM and stakeholders will continue through the conclusion of the business case and into the design phase so that stakeholders, users and property owners can influence the design as it develops.

The introduction of the mana whenua values scores and the reduction of the delivery score for the service lane suboptions changed the relativity between options compared to the interim MCA. Options 4A and 4B still scored the highest, similar to the interim MCA. This scoring does not reflect the decision that the service lane suboptions should no longer be progressed. Option 4A is therefore recommended as the preferred option.

Table 5-6 summarises the final results of the MCA assessment of the options.

Table 5-6 Final MCA Scoring Summary

Option	Contribution to Investment Objectives					Contribution to Effects				Contribution to Delivery, Maintenance and Operations			Total	Option Rank
	IO1 – Bus Reliability / Attractiveness	IO2 – Walking & Cycling	IO3 – Hutt Road Safety	IO4 – Thorndon Quay Amenity	IO5 – Similar Freight Access*	Mana whenua values	Social	Property Access	Fit with LGWM Programme	Delivery	Operations & Maintenance	Timeframe for Delivery		
Option 1: Southbound bus lanes with Thorndon Quay bi-directional cycleway	3	1	1	3	2	3	3	-3	3	-1	-1	2	16	7
Option 1A: Southbound bus lanes with Thorndon Quay bi-directional cycleway	3	2	3	3	2	4	3	-2	4	-2	-2	0	18	3
Option 1B: Southbound bus lanes with Thorndon Quay bi-directional cycleway	3	2	3	1	2	5	3	4	2	-5	-2	-1	17	4
Option 2: Southbound and Northbound bus lanes with Thorndon Quay uni-directional cycleway	4	3	1	1	3	1	4	-3	3	-3	-2	0	12	11
Option 2A: Southbound and Northbound bus lanes with Thorndon Quay uni-directional cycleway	4	4	3	1	3	2	4	-3	4	-4	-3	-2	13	9
Option 2B: Southbound and Northbound bus lanes with Thorndon Quay uni-directional cycleway	4	4	3	1	3	3	4	4	2	-5	-3	-3	17	4
Option 3: Southbound bus lanes with Thorndon Quay uni-directional cycleway	3	3	1	2	2	2	3	-3	2	-4	-1	0	10	12

Option	Contribution to Investment Objectives					Contribution to Effects				Contribution to Delivery, Maintenance and Operations			Total	Option Rank
	IO1 – Bus Reliability / Attractiveness	IO2 – Walking & Cycling	IO3 – Hutt Road Safety	IO4 – Thorndon Quay Amenity	IO5 – Similar Freight Access*	Mana whenua values	Social	Property Access	Fit with LGWM Programme	Delivery	Operations & Maintenance	Timeframe for Delivery		
Option 3A: Southbound bus lanes with Thorndon Quay uni-directional cycleway	3	4	3	2	2	3	3	-2	3	-4	-2	-2	13	9
Option 3B: Southbound bus lanes with Thorndon Quay uni-directional cycleway	3	4	3	1	2	4	3	4	1	-5	-2	-3	15	8
Option 4: Southbound and Northbound bus lanes with Thorndon Quay bi-directional cycleway	4	1	1	4	3	2	3	-3	4	-1	-1	0	17	4
Option 4A: Southbound and Northbound bus lanes with Thorndon Quay bi-directional cycleway	4	2	3	4	3	3	3	-2	5	-2	-2	-2	19	1 Equal
Option 4B: Southbound and Northbound bus lanes with Thorndon Quay bi-directional cycleway	4	2	3	3	3	4	3	4	3	-5	-2	-3	19	1 Equal

*the assessment scores assume that only buses and trucks are permitted to use the proposed peak period SVLs on Hutt Road.

5.12 The Preferred Option

5.12.1 Thorndon Quay

The proposal for Thorndon Quay will provide part-time bus lanes in both directions and extend the two-way cycle path from Hutt Road to the bus interchange at Mulgrave Street. Footpaths and the streetscape will also be improved.

Changes will allow for future growth of bus users and cyclists and encourage more people to walk, shop and spend time on Thorndon Quay. Safety will be improved for everyone by improving pedestrian crossings and providing a dedicated cycle path.

5.12.1.1 Changes for people living, working, or owning a business:

- The streetscape will be improved to make it more pleasant for people to visit and spend time here
- Between 100 and 130 on street parking spaces will be available at all times
- Between 220 and 240 on street parking spaces will be available when bus lanes are not operating, which is more than the current peak demand for parking spaces
- Safety will be improved for everyone.

5.12.1.2 Changes for using the bus:

Bus lanes will be provided in both directions because it improves bus travel times and reliability during peak hours, encouraging more people to take the bus.

- During the morning peak period, there will be a dedicated bus lane into the city, which means buses will be able to bypass any morning peak traffic congestion, improving bus reliability and reducing travel time
- In the evening peak, there will be a dedicated bus lane out of the city
- At all other times of the day, buses will travel with other traffic (cars/ vans/ motorcyclists etc.)
- Priority will be given to buses at Mulgrave Street to improve journey times
- Some bus stop locations and layouts will be adjusted to better balance local walking access and travel time for people on the bus
- The streetscape will be improved to make it more pleasant when you are waiting for a bus
- Pedestrian crossings will be improved to make it safer to get to and from bus stops
- Changes for people living, working or owning a business.

5.12.1.3 Changes for people riding bikes

A two-way cycle path is proposed on the east side of Thorndon Quay as it will provide improved connectivity to Wellington city, allow space for people riding at different speeds, minimise conflict at the bus interchange and avoid intersections.

- There will be a new two-way cycle path on one side of the street connecting with the cycle path on Hutt Road
- The cycle path will be as wide as the space allows and will be separated from the footpath, to provide dedicated space for cyclists
- The design of the cycle path will make vehicle crossing points as safe as possible
- Signalised cyclist crossings will be included at signalised pedestrian crossings
- The streetscape will be improved, making cycling journeys more pleasant.

5.12.1.4 Changes for people walking, using skateboards, scooters or other mobility devices

- A footpath will be provided on both sides of the road; expected to be at least 2m wide
- The footpath will be separated from the cycle path to provide dedicated space
- The streetscape of the area will be improved with planting, seating, lighting, different surfaces
- Pedestrian crossings will be improved, including new crossings, making it safer and easier to cross the street.

5.12.1.5 Changes for people driving

- One lane of general traffic will be maintained in each direction at all times
- Lane widths will generally be at least as wide as they are now
- Angle parking will be converted to parallel parking making it safer to drive along Thorndon Quay (now implemented by WCC)
- Intersections will be improved at Mulgrave Street and Tinakori Road.

5.12.1.6 Changes for people parking

- On-street angle parking will be converted to parallel parking making it safer to park on Thorndon Quay (now implemented by WCC)
- When the bus lanes are not operating, between 220 and 240 parallel parking spaces will be available (this is more than the current peak demand for parking spaces)
- With one bus lane operating in the peak period direction, between 100 and 130 parking spaces will be available.

These changes have been informed by a parking utilisation study survey that was conducted earlier in the business case process. It is recommended that, alongside these changes, WCC undertake a parking management plan. The detailed design process will determine the precise number of on-street car parking spaces that will be removed.

5.12.2 Hutt Road

The proposal for Hutt Road includes providing part-time SVLs in both directions and at the Ngauranga/ Jarden Mile intersection. The SVLs will provide priority for buses and trucks. This decision, and whether or not other vehicles will be permitted to use the SVLs, will be confirmed during detailed design, informed by further transport modelling.

SVLs are proposed in both directions because this will improve bus and truck travel times and reliability during peak hours, and help make buses more reliable and attractive. The proposed changes to the intersection are also expected to increase the attractiveness of walking and cycling through increased safety and access.

The design also includes upgrading and extending the existing shared cycle and footpath north to the Ngauranga/ Jarden Mile intersection. This will provide a connection to the existing shared path that connects to Te Ara Tupua and the proposed cycle path on Thorndon Quay into the city. Options to upgrade the existing connection to Te Ara Tupua are being considered under a separate study which will be an addendum to this SSBC.

A significant safety risk for people walking, cycling or riding motorbikes and for vehicles on Hutt Road is people turning right across traffic to enter and leave properties.

To improve safety on this road, a central raised median is proposed to prevent traffic making right turns. A turnaround facility on Aotea Quay is required to provide a safe turning location for large vehicles wanting to travel north from a property on Hutt Road. This provides additional benefits of

reducing traffic, in particular trucks, on Hutt Road through the provision of an alternative access to the ferry terminal at Kaiwharawhara.

5.12.2.1 Changes for people living, working or owning a business

- Provide approximately ten parking spaces outside Storage One that will be available at all times
- Between 100 and 130 additional parking spaces will be available when the bus lane into the city is not operating
- Safety will be improved for all users
- Accessing properties may mean using a different route and increasing your journey time.

5.12.2.2 Changes for people using the bus

- During the morning peak period, there will be a bus lane/SVL into the city, which means buses will not be caught in morning peak traffic congestion, improving bus reliability, and reducing travel time
- In the evening peak, there will be a bus lane/SVL out of the city
- At all other times of the day, buses will travel with other traffic (cars/ vans/ motorcyclists etc.)
- Priority will be given to buses at the Ngauranga/ Jarden Mile intersection to improve journey times
- Some bus stop locations and layouts will be adjusted to better balance local walking access and travel time for people on the bus
- Some bus stops will be improved to make it more pleasant to wait for a bus
- Pedestrian crossings will be improved to make it safer to get to and from bus stops.

5.12.2.3 Changes for people riding bikes

- The existing two-way cycle path will be extended to the Ngauranga/ Jarden Mile intersection and connected to the existing shared path that connects to Te Ara Tupua and the proposed cycle path on Thorndon Quay
- Safety improvements will be made to the existing cycle path
- Cyclist crossings will be included at intersections including the Jarden Mile intersection, as well as at pedestrian crossings, making it safer to cross the road
- Motor vehicles will not be able to turn right into and out of properties on Hutt Road north of the Aotea Quay ramps, to make it safer when riding over vehicle crossing points
- With the introduction of a turnaround facility on Aotea Quay, less freight and other traffic will need to use Hutt Road to access the ferry terminal, ensuring a safer and more pleasant journey.

5.12.2.4 Changes for people walking, using skateboards, scooters or other mobility devices

- The existing shared cycle and footpath will be upgraded and extended north to the Ngauranga/ Jarden Mile intersection
- Pedestrian crossing improvements will make it safer to cross the road
- Pedestrian crossing facilities will be installed at Jarden Mile making it safer to cross the road
- Safety will be improved as motor vehicles will not be able to turn right into and out of properties on Hutt Road, north of the Aotea Quay ramps, due to the proposed raised median
- Less freight and other traffic will need to use Hutt Road to access the ferry terminal at Kaiwharawhara due to the introduction of a turnaround facility on Aotea Quay, which will create

a more pleasant and safer corridor along Hutt Road for people to walk, skate, scoot or otherwise.

5.12.2.5 Changes for people driving

- One lane of general traffic will be maintained in each direction at all times
- Improvements will be made to the intersections at Tinakori Road, Rangiora Avenue and Onslow Road
- Vehicles will not be able to turn right into properties across Hutt Road along the section of corridor between the Aotea Quay ramps and the Ngauranga/ Jarden Mile intersection, to increase safety for all road users (turnaround locations for smaller vehicles will be considered during the next phase of design).

5.12.2.6 Changes for freight and delivery vehicles

- Alternative access to the ferry terminal at Kaiwharawhara from SH1 will improve resilience to retain reliable access to the ferry
- Large vehicles will need to use the new turnaround facility on Aotea Quay or the existing turnaround facility, directly north of Ngauranga intersection, to turn around if required.

5.12.2.7 Changes for people parking

- Approximately ten parking spaces will be available at all times
- Between 100 and 120 additional parking spaces will be available when the bus lane into the city is not operating.

5.13 Development of the Preferred Option

A preliminary design was prepared following the confirmation of the preferred option, and further traffic modelling was undertaken to confirm the operation of key intersections. Separate transport modelling is being undertaken in conjunction with Waka Kotahi and KiwiRail on the turnaround facility on Aotea Quay to consider all potential changes in this area.

The key design parameters and assumptions used in the development of the preliminary design for the preferred option are contained in the Preliminary Design Philosophy Statement (PDPS (Appendix J). This includes details of the minimum and desirable widths for traffic lanes, bus lanes, cycleways, streetscape and landscape design elements and other infrastructure. It also provides details of any departures from design standards which are required.

A Road Safety Audit was completed on the preliminary design and changes incorporated into the design for the SSBC.

5.13.1 Key Design Features

The key design features of the preliminary design include:

- SVLs in both directions on Hutt Road and bus lanes in both directions on Thorndon Quay
- A bi-directional cycleway (i.e. off road) on Thorndon Quay to complement the existing bi-directional cycle path on Hutt Road and provide a link to the Te Ara Tupua (Wellington to Hutt Valley walking and cycling link)
- Improvements to the existing bi-directional cycle path on Hutt Road, as recommended in the Hutt Road Safety Audit
- A median on Hutt Road to address the safety issues caused by turning movements for property access

- A turnaround facility on Aotea Quay to permit traffic to turn around after the installation of a median on Hutt Road
- A speed review to consider lower posted speeds on Thorndon Quay (40km/hr), Hutt Road (50km/h south of Onslow Road and 60km/h north of Onslow Road) and Aotea Quay (50km/h)
- Intersection upgrades and pedestrian crossing improvements
- Bus stop rationalisation or rebalancing, as described in Appendix G
- Significant amenity improvements on Thorndon Quay, with some improvements to Hutt Road also, noting the opportunities to improve the experience are generally less than for Thorndon Quay.

The preliminary design is discussed in more detail below.

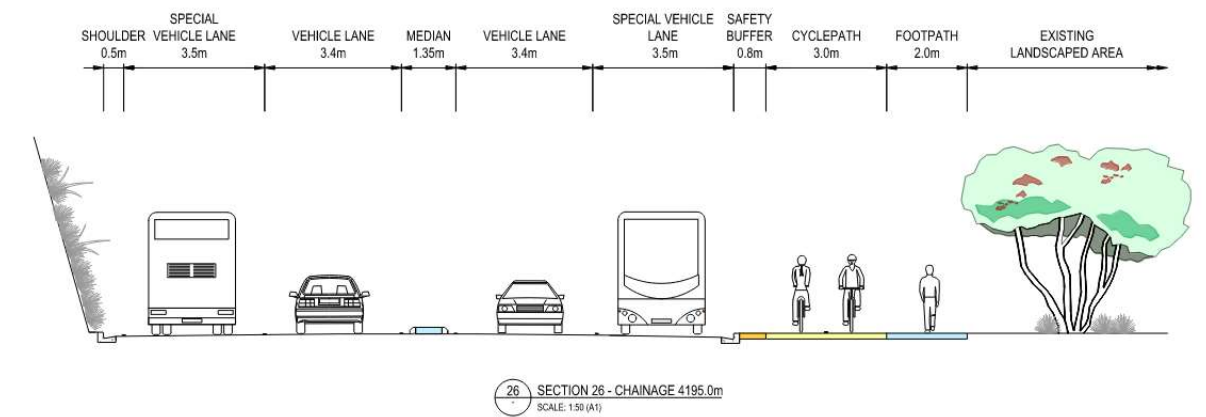
5.13.1.1 Hutt Road Design

The key elements of the project along Hutt Road are:

- One general traffic lane in each direction
- An SVL for buses and freight in the northern section (Aotea Quay to Jarden Mile) (note that the implications of this for buses and the legal and enforcement implications of this will be considered further during detailed design, and further modelling will be undertaken to inform this)
- A peak period bus lane in the southern section (Tinakori Road to Aotea Quay), which is available for on street parking during the off-peak period
- A raised central median to restrict right turns, except at clearly defined and controlled locations
- A 0.8m safety buffer, typically, to protect vulnerable users from traffic, from the wind blasts from large vehicles and from doors opening direct into the cycle path
- Widened cycle and pedestrian lanes tying into the newly constructed lengths at the southern end of Hutt Road, proposed to be at the same level along Hutt Road
- A 1.8m footpath and 3m minimum cycleway is proposed, but this is not possible at some pinch point locations (though this does not compromise the overall project).

The proposed typical cross section for Hutt Road is shown in Figure 5-21.

Figure 5-21 Proposed Hutt Road Cross Section



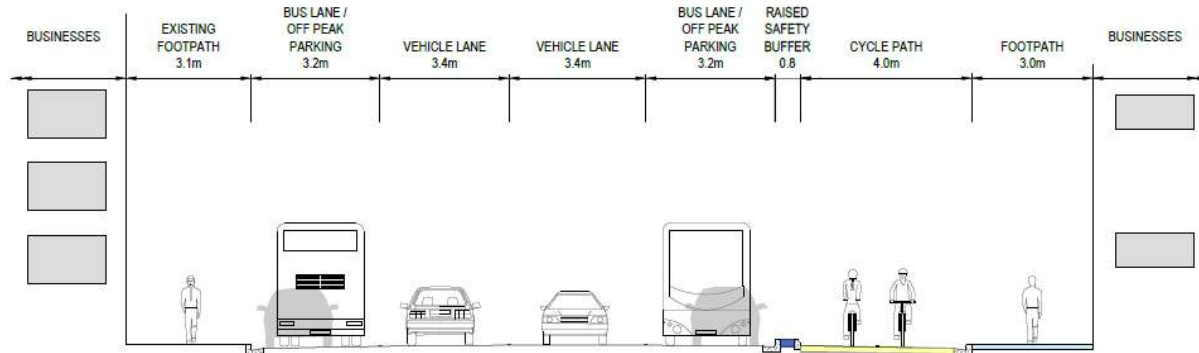
5.13.1.2 Thorndon Quay Design

The general proposal for Thorndon Quay is to reallocate road space to provide:

- One general traffic lane in each direction
- A peak period bus lane in each direction which will be available for car parking in off peak periods
- A dedicated, off-road cycle path on the eastern side
- Raised buffers and amenity areas.

The proposed typical cross section for Thorndon Quay is shown in Figure 5-22.

Figure 5-22 Proposed Thorndon Quay Cross Section



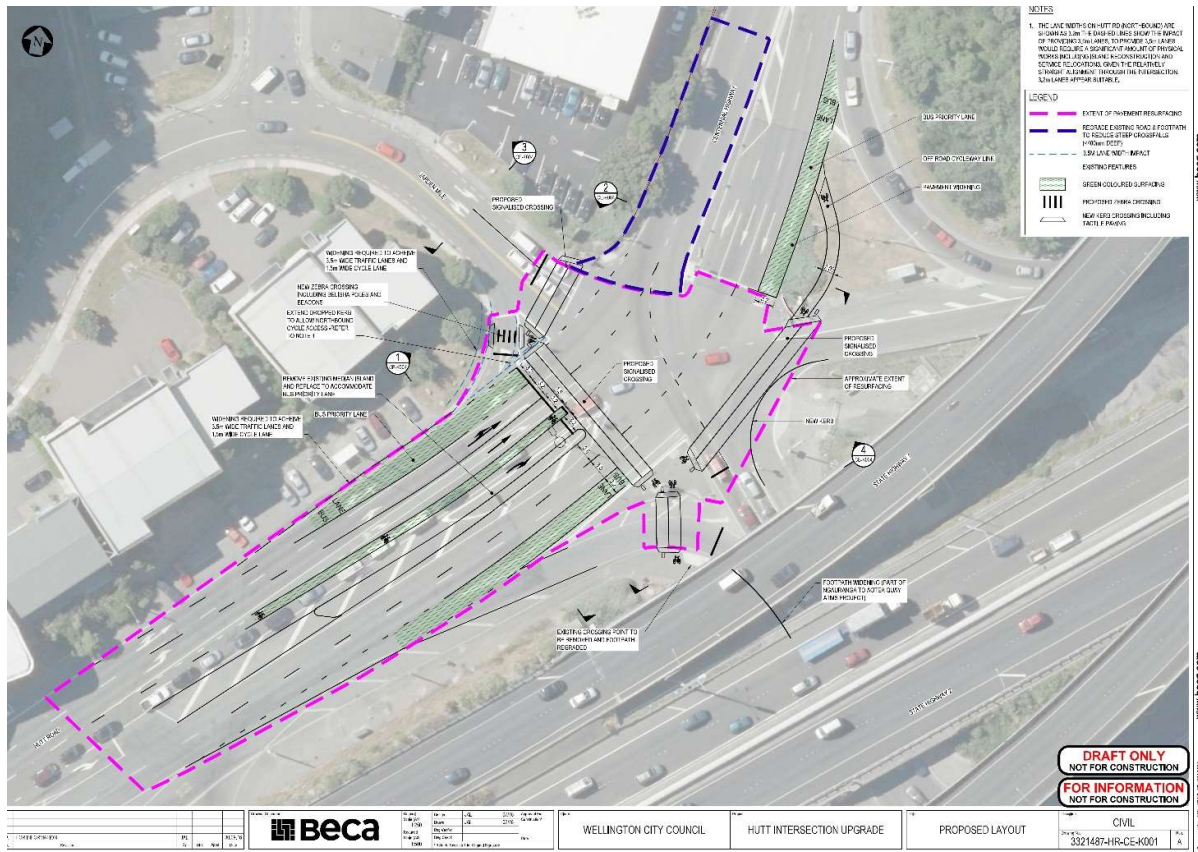
Pedestrian and cycle crossings of Thorndon Quay will also be improved (incorporating raised signalised crossings), as well as the addition of landscaping and other amenity improvements. The precise design of the crossings will be reviewed during detailed design.

The locations of most pedestrian crossings will tie in with relocated bus stop locations. The crossings are proposed to be located prior to the bus stop in each direction. This results in passengers crossing behind the buses and hence reducing potential delays to the onward journeys of the buses once those passengers have alighted. This will also improve safety, as it makes pedestrians more visible as they cross and are not hidden by the departing buses. To improve the attractiveness and experience of waiting times, increased amenity around bus stops will be provided where possible.

5.13.1.3 Hutt Road/ Jarden Mile Intersection Upgrade

The preliminary design for the upgrade of the Jarden Mile intersection was based on a specimen design of the Hutt Road interchange prepared for WCC in 2016. This is shown in Figure 5-23.

Figure 5-23 Specimen Design for the Hutt Road / Jarden Mile Intersection



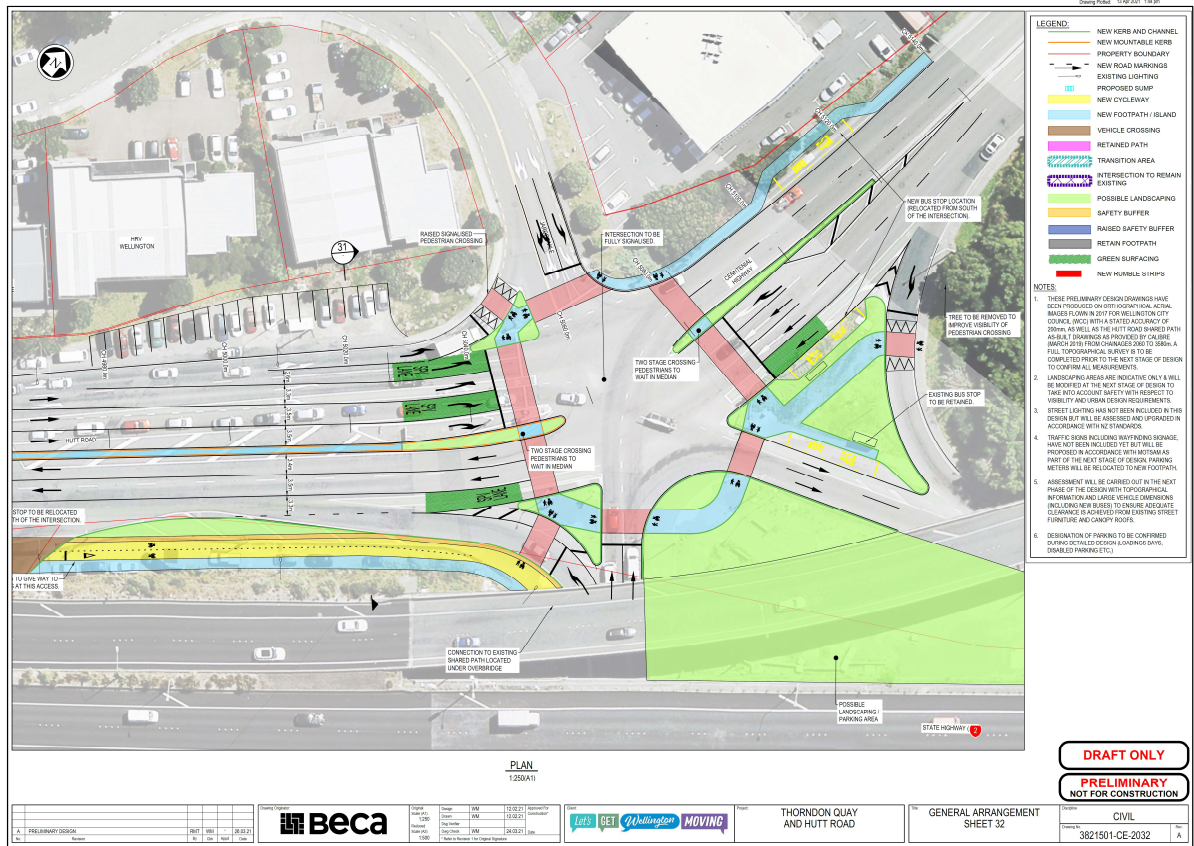
This design was reviewed to check for consistency with the current proposals for the corridor, and a number of revisions made as follows:

- Bus stops relocated
- The northbound approach lanes were reassigned, including the removal of the central cycle lane converting to a bus lane
- Pedestrian and cyclist crossing facilities have been improved by providing designated crossings and increasing the sizes of the islands
- The northbound SVL lane on Hutt Road was terminated approximately 200m prior to the intersection, to allow for safe lane changing/weaving prior to the development of the multiple lanes at the intersection.
- Raised crossings have been incorporated in the design.

The revised design proposed is shown in Figure 5-24. It should be noted that consideration will be given to making the pedestrian crossings on Hutt Road and Centennial Highway staggered in detailed design. This is to reduce the risk of a pedestrian or cyclist on the crossing proceeding straight through from one half to the other thinking that it was a continuous crossing.

The decision on whether a raised crossings are to be provided, how this is best done (e.g. raising individual crossings or raising the whole intersection), and a consideration of any safety consequences of the changes, will be considered further during detailed design.

Figure 5-24 Proposed Preliminary Design for the Hutt Road / Jarden Mile Intersection



5.13.1.4 Hutt Road/ Onslow Road Intersection

The current seagull layout at the Onslow Road intersection is proposed to be fully signalled providing a secure crossing for cyclists who are currently not catered for. This will address safety issues associated with the right-hand merge with southbound traffic. The revised design will provide a secure crossing for cyclists who are currently not catered for. The main cycle/ pedestrian pathway will also be widened.

It is proposed to combine the southbound through and right movements into one lane since space at this intersection is constrained. Split phasing will be necessary at the intersection to restrict right turn filter movements. Further design and discussions will need to take place during next phase of design to confirm this arrangement is safe and explore whether a right-turn lane could be retained by narrowing the shared path through the intersection.

The intersection requires future-proofing to enable a future pedestrian connection to the pedestrian footpath further up Onslow Road. Connecting Onslow Road footpaths is currently being investigated by WCC, and is a high priority project in its Long Term Plan.

5.13.1.5 Hutt Road/ Tinakori Road Intersection

Raised crossings are proposed at the Tinakori Road intersection to provide a safer crossing environment for both pedestrians and cyclists.

5.13.1.6 Mulgrave Street/ Thorndon Quay/ Thorndon Quay Intersection

This intersection is proposed to be fully signalled, in order to reduce the safety risk for the currently unsignalled left turn movement from Mulgrave Street to Thorndon Quay which has

reduced visibility due to the acute angle of the intersection as well as mature trees. The proposed revisions will also assist bus movements in and out of the adjacent Lambton Quay Bus Interchange.

5.13.1.7 Aotea Quay Turnaround Facility

A roundabout on Aotea Quay is proposed to allow trucks to turn around following installation of the median on Hutt Road which will restrict the ability for all traffic to turn right.

An existing WCC proposal for a roundabout design (see Figure 5-25) was reviewed to check if there are any issues that may impact upon the integration into the preliminary design. This identified that there is no space to provide a footpath on the seaward side of the road/ roundabout, as the fence line is hard up to the existing road with rail sidings on the other side. There were also safety concerns associated with the seagull configuration due to the nature of the vehicles that will be pulling into the fast, through lane.

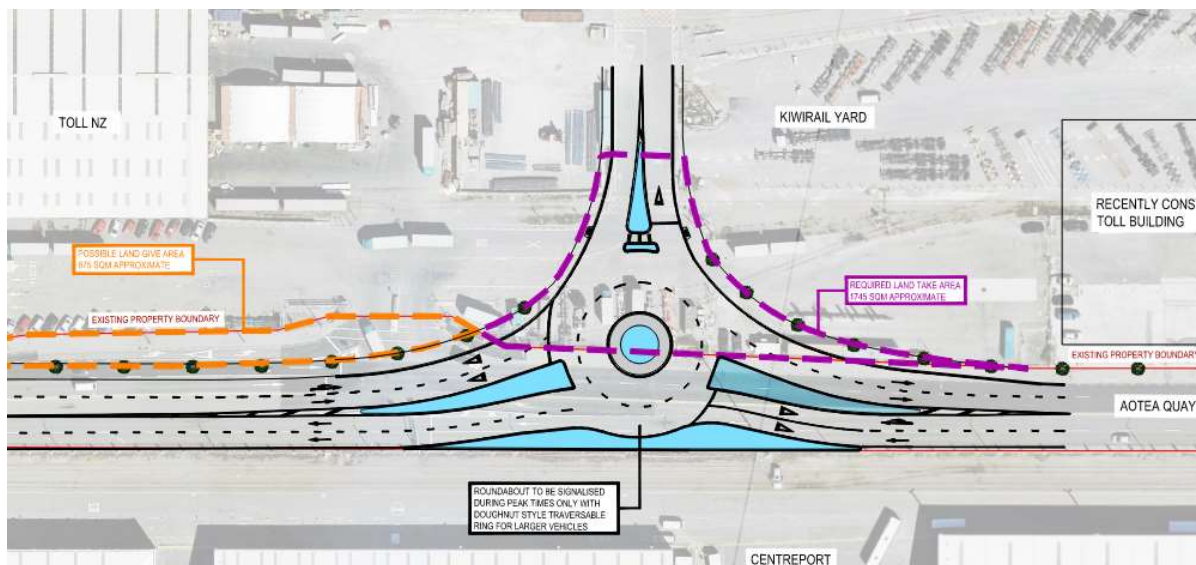
A full roundabout design controlling all movements is therefore proposed, as shown on Figure 5-25. A speed review will be undertaken during detailed design to confirm whether the posted speed limit along Aotea Quay should be reduced from the current 70km/h to 50km/h.

The roundabout design will incorporate part-time traffic signals which will typically only be used when emergency events take place at the nearby Sky Stadium. The requirement to stop traffic is understood to be an existing emergency management operation. Pedestrian crossing provision will be determined during detailed design.

Changes to Aotea Quay will be done in conjunction with KiwiRail and Waka Kotahi, to align with the Single User Terminal project. It is possible that an alternative turn around facility is adopted if this is found to be a better overall solution.

The exact design of the roundabout will be confirmed in detailed design. There may be opportunities to change to a hook turn arrangement or other solution. As part of the detailed design, pedestrian facilities will also be confirmed.

Figure 5-25 Proposed Aotea Quay Roundabout (Revised Design)



5.13.1.8 Improvements to Pedestrian Crossing

It is proposed that all existing pedestrian crossings on Hutt Road will be raised. The locations of most pedestrian crossings will be adjusted to tie in with the relocated bus stop locations. As part of these improvements, it is envisaged that sufficient space for pedestrians waiting to cross be made.

The existing pedestrian crossing on Hutt Road near Rangiora Avenue is proposed to be signalised and have a raised pedestrian crossing.

5.13.1.9 Improvements to the Hutt Road Cycleway

The potential conflict between cyclists on the cycleway and vehicles entering/ leaving properties on the eastern side of Hutt Road is a key issue that has been considered during the preliminary design phase. A number of serious or significant issues as well as minor issues were identified in the recent WCC safety audit of the Hutt Road cycleway. The more serious issues focused on access/ egress to businesses along the south-eastern side of the corridor. These predominantly identified issues with vulnerable users on the shared use facility and for cyclists.

One of the key recommendations in the Hutt Road cycleway safety audit was to investigate improving cyclist safety at accesses through the installation of passive and active warning measures to raise awareness and mitigate the risk. Identifying and improving visibility lines has also been a key consideration. This issue will be addressed by limiting all vehicles exiting the businesses units along the south-eastern side of the corridor to turn left only. U turns will only be permitted at designated locations, where designated right turn lanes are provided within the central median. Vehicle tracking indicates that only a car with a trailer can perform U turns, whereas an 8m rigid truck would not be able to perform this manoeuvre.

It is proposed to retain the flush median from Sar Street to Aotea Quay. A raised median is proposed from Aotea Quay through to Jarden Mile with strategically placed breaks to allow for business access and to control the locations of U-turns. The U-turning risk could potentially be mitigated further through the use of electronic warning signs triggered by the presence of vehicles in the U-turn bays.

5.13.1.10 Structures

No additional structures are currently proposed, and the proposed design does not impact on these structures. It is proposed to have only a single lane under the overbridge section at the Aotea Quay overbridge.

5.13.1.11 Land and Property Acquisition

All road design changes are proposed to take place within the existing legal boundary of the road, with the exception of works on Aotea Quay. Hence no land or property acquisition is required for the majority of the project.

5.13.1.12 Parking Provision

The removal of existing angle parking on Thorndon Quay and replacing with parallel parking has now been implemented. The project will involve some further reduction in the number of, and changes to the design of, existing on street parking.

The overall effect of the project on the number of parking spaces in the future is estimated to be:

- Thorndon Quay – 382 spaces (i.e. prior to the recent WCC angle parking changes which removed around 140 spaces) / proposed 250-260 spaces
- Hutt Road – existing 133 spaces / proposed 110-130 spaces.

Analysis of demand for parking provision prior to the removal of angle parking in Thorndon Quay indicated the reduction in provision would be accommodated. The number of spaces provided will be confirmed after detailed design is completed. It is anticipated these changes will be supported by a parking management plan.

5.13.1.13 Urban and Landscape Design Considerations

LGWM is currently developing a programme wide Urban Design Framework (UDF) that will be developed in parallel to the TQHR masterplan work being undertaken through detailed design. The urban and landscape masterplan for TQHR will be important to guiding solutions to meet the project's intent and vision.

The preliminary design proposals will need to be tested through the next design phase to reflect the developing LGWM UDF, as well as the more detailed thinking that will occur in detailed design.

The UDF will not be completed in full prior to detailed design starting. Therefore, the designers will be required to work collaboratively with LGWM and its partners to ensure adequate urban design and landscape elements have been considered throughout the design process including the early phases.

Urban design, landscape and aesthetic considerations will need to be developed through solutions that deliver value for money through detailed design. CPTED, Safety in Design, Maintenance in Design and Whole of Life Costs (i.e. not just capital costs) will also need to be considered within the urban design and landscape detailed design process.

The detailed design will need to be prepared in accordance with contract requirements.

5.14 Construction Methodology

The nature of the works primarily consists of the relocation of kerb lines, some patch structural changes to suit the new alignments, followed by the resurfacing and new lining. As such it should be relatively easy to split the works into linear sections for phasing.

The key constructability issues will exist around accommodating and managing high traffic volumes expected during construction. The project is likely to be broken up into construction areas such as the upgrade of existing roads/ intersections (Thorndon Quay), and the upgrade of existing roads/ intersections (Hutt Road) with associated tie-ins to existing roads. Works on Aotea Quay are anticipated to be constructed first, prior to works on Thorndon Quay or Hutt Road, in order to minimise impacts on traffic operations during construction. Night construction will take place on Aotea Quay, where this is practical and cost effective.

Performance criteria can be set for all traffic management plans including for sealing surfaces, minimum paved width, maximum delays for all traffic, particularly the traffic on SH1 and minimum standards for pedestrian and cyclist facilities in conjunction with the LGWM partners.

A workable construction sequence including temporary intersection and road arrangements will be developed at the detailed phase to demonstrate the feasibility and set baseline performance criteria for traffic management.

5.15 Property Impacts

It is currently proposed to keep within the existing legal boundary of Thorndon Quay and Hutt Road. The proposed Aotea Quay roundabout will extend outside the existing road boundary. No land acquisition is considered necessary other than at this location.

The impact on Crown Land currently held by KiwiRail and extents needed to implement works on Aotea Quay will be determined as the overall design progresses. The current defined impact is indicated on the preliminary design drawings.

5.16 Performance of the Preferred Option Against Investment Objectives

The performance of the preferred option has been considered against the Investment Objectives and associated KPIs defined in Chapter 4. This is summarised in Table 5-7 and indicates that the project will largely achieve the investment objectives.

| Economic Case – Options Development and Assessment |

Table 5-7 – Performance of the Preferred Option Against Investment Objectives

Investment Objective	Measure	Baseline	Target	Predicted Impact	Achieves Investment Objective?
1	Increased demand for bus services by 2026	950 passengers in the morning peak 2-hour period (southbound), and 1,000 in the evening peak 2-hour period (northbound)	1,000 passengers in the morning peak 2-hour period (southbound), and 1,100 in the evening peak 2-hour period (northbound)	1,100 passengers (a 17% increase) in the morning peak 2-hour (southbound), and 1,190 (an 18% increase) in the evening peak (northbound)	Yes
	Improved bus service travel times by 2026	14 minutes travel time in the morning peak 2-hour period (southbound) and 9 minutes travel time in the evening peak 2-hour period (northbound) n.b. These times exclude bus stop dwell time	Reduce by 5 minutes in the morning peak 2-hour period (southbound) and by 1 minute in the evening peak 2-hour period (northbound) n.b. These times also exclude bus stop dwell times	8 minutes in the morning peak 2-hour period (southbound) and 9 minutes in the evening peak 2-hour period (northbound) <i>A further 2.5 minutes time saving at bus stops is predicted to occur in the morning and evening peak 2-hour periods</i>	Yes (when bus stop time savings are included)
2	Improved Level of Service for non-car modes by 2026	LoS D for walking	LoS C on Hutt Road; LoS C/D on Thorndon Quay (Northbound/Southbound)	LoS C on Hutt Road; LoS C/D on Thorndon Quay (i.e. Northbound/Southbound)	Yes
		LoS F for cycling	LoS F/B on Hutt Road (Northbound/Southbound); LoS F/C on Thorndon Quay (Northbound/Southbound).	LoS F/B on Hutt Road (Northbound/Southbound); LoS F/C on Thorndon Quay (Northbound/Southbound).	Yes
		300-1,600 cyclists/day on Thorndon Quay	50% increase	1200-3,000 cyclists/day on Thorndon Quay	Yes
3	Reduce the safety risk along Thorndon Quay and Hutt Road for all road users by 2026	2.6 DSI crashes per year for vulnerable users	Reduce vulnerable user DSI crash risk by 20%	1.9 DSI crashes per year (28% reduction)	Yes
		1.5 DSI crashes per year for all vehicles	Reduce vehicle DSI crash risk by 10%	1.3 DSI crashes per year (10% reduction)	Yes
4	Improved Amenity/Healthy Streets index by 2026	M3/P1	M3/P2	MP3/P2	Yes
		2-3,000 pedestrians/day on Thorndon Quay	20% increase	Likely to be a 30-50% increased on Thorndon Quay	Yes
5	Broadly maintain truck travel times between Jarden	7 minutes travel time in the morning peak 2-hour period (southbound); 5 minutes travel	Maintain	5 minutes in the morning peak 2-hour period (southbound); 5	Yes

| Economic Case – Options Development and Assessment |

Investment Objective	Measure	Baseline	Target	Predicted Impact	Achieves Investment Objective?
	Mile and Aotea Quay by 2026	time in the evening peak 2-hour period (northbound)		minutes in the evening peak 2-hour period (northbound)	

5.16.1 Economic Analysis of the Preferred Option

An economic appraisal of the preferred option has been undertaken in accordance with the Waka Kotahi EEM procedures (2019 Update)²⁰. The appraisal also incorporates key changes included in the new Waka Kotahi Investment Decision Making Framework (IDMF), which consists of the Monetised Benefits and Costs Manual (MBCM). The purpose of the economic evaluation is to calculate the benefit to cost ratio (BCR) for the project.

The further transport modelling and analysis which formed the basis of the economic evaluation is described in the report contained in Appendix K. The assumption which underpin the results summarised below are explained in Appendix L. The following key benefit streams have been assessed for the recommended option:

- Cyclist crash cost savings
- Health benefits for cyclists
- Vehicle operating cost (VOC), travel time and bottleneck delay savings for all motorised vehicles on the corridor, as well as those diverting onto alternative routes
- External delays for southbound traffic in the morning peak period associated with increased traffic on the re-routing onto SH1 which is currently at capacity (the average delay has been attributed to all SH1 for the purposes of simplifying the assessment)
- Travel time savings for existing and additional bus users using bus lanes/ SVLs and from the improved bus stop designs and reduction in the number of bus stops
- Bus reliability benefits
- Pedestrian amenity benefits.

It should be noted that there are anticipated benefits associated with the expected increase in theoretical capacity of the corridor resulting from a greater number of people moved along the corridor (in particular via public transport). However, these benefits have not been formally calculated as it falls outside of the MBCM framework, and would require consideration of wider network issues.

The economic analysis has been undertaken based on the modelling outputs where there is no change in trip departure time for traffic travelling on SH1 between the SH1/SH2 interchange and the Hawkestone Street off-ramps over the modelled AM peak periods (6am-10pm). The cost of this additional delay has been accounted for as part of the external delay assessment and added to SH1 traffic. This represents the “opportunity cost” for someone travelling earlier / later than their ideal departure time. In reality, these trips may be undertaken earlier or later than the current traffic flow profile in order to avoid the peak where SH1 is at capacity.

It is anticipated that traffic will re-route from TQHR to SH1 as a result of the reduction in capacity on TQHR. The extent of the re-routing will be dependent on factors such as the level of congestion, location of destination in the CBD and user preferences, therefore two scenarios have been assessed to understand the range of potential impacts:

- ‘Top End’ Scenario – modelled level of diversion from TQHR to SH1 and alternative routes; people travel at the same time, but some choose a different route to avoid congestion on TQHR

²⁰ Waka Kotahi NZ Transport Agency have released updated economic guidance as of August 2020. This business case uses the previous EEM procedures, as per recommendations from Waka Kotahi.

- 'Bottom End' Scenario – No diversion from TQHR to SH1 and alternative route; people travel at the same time and continue to take the route they currently use (Hutt Road).

Table 5-8 summarises the total discounted benefits predicted for the preferred option and indicates that the BCR sits between 0.4 and 1.8. This range represents the likely lower and upper bound assessments of the project.

Table 5-8 Benefit Streams and Overall Benefit to Cost Ratio (Based on a 40-year evaluation period)

Benefit Stream	'Bottom End' Scenario (\$M) unless otherwise stated	'Top End' Scenario (\$M) unless otherwise stated
Crash cost savings	5.5M	5.5M
Cyclists' health benefits	72.2M	72.2M
General traffic travel time and bottleneck delay savings – Thorndon Quay Hutt Road	-87.8M	79.8M
General traffic travel time and bottleneck delay savings – SH1 + Alternative Routes	0	-105.8M
General traffic VOC savings	-0.6M	13.4M
Bus travel time savings	20.3M	20.9M
Bus reliability benefits	8.7M	8.7M
Pedestrian amenity benefits	1.7M	1.7M
Total Benefits (NPV)	20.0M	96.4M
Total Costs (NPV)	54.8M	54.8M
First-Year Rate of Return (FYRR)	-0.7%	4.2%
Benefit to Cost Ratio (BCR)	0.4	1.8

A BCR of 0.4 is considered to be conservative, as some diversion away from Hutt Road is to be expected, given the congestion that is predicted to occur (along Hutt Road) if no rerouting occurs. The travel time forecasts also do not reflect any significant mode shift (i.e. the demand assumed is fixed), which is also likely to result in an underestimate of economic benefits.

5.16.1.1 Wider Economic Benefits

WEBs refer to the indirect impacts of transport improvements on economic productivity and output that are additional to benefits that accrue directly to transport users. They may include agglomeration benefits brought about by providing a quality cycle route into Wellington and benefits from increased spend on accommodation, food, and other activities by tourists.

WEBs have traditionally not been measured for projects which provide bus lanes/ SVLs and walking and cycling improvements. This project is likely to support some WEBs, such as improved agglomeration economies and increased labour supply benefits, however, they have not been quantified. If they were included, this would only increase the BCR, it is therefore a conservative assumption to exclude these benefits. It should also be noted that LGWM are currently examining WEBs at a programme wide level.

5.16.1.2 Sensitivity Testing

Whilst the modelling and economics has used 2026 as the primary evaluation year, the transformational nature of the LGWM programme, and the resulting land use change in the CBD (i.e. more residential/employment use and less parking provision) is also likely to further encourage greater use of bus services. A number of other potential ‘up-side’ factors exist, with the expected wider network improved level of bus service, land use change, e-bike uptake, TDM tools like pricing and parking supply etc. It is likely therefore that the benefits of the whole (the LGWM programme) will be greater than the benefits from the sum of the parts (of which TQHR is just one part).

Sensitivity tests have been undertaken of the evaluation of the preferred option as per the modelled results (i.e. ‘Top End’ scenario only), and these are summarised in Table 5-9.

The sensitivity testing suggests that there is a strong likelihood that the recommended option would retain a positive BCR under the sensitivity testing scenarios considered. If there were greater benefits or reduced costs, an increased BCR can be achieved.

It is acknowledged that the connection to Te Ara Tupia is currently unfunded and is not provided for within the funded Ngā Ūranga to Pito-one project. This lack of connection could therefore potentially reduce the growth in the number of cyclists which have been assumed to use the TQHR project.

It should be noted that, even if multiple down-side risk materialised, such as lower growth in bus patronage, lower growth in cycle demand, or even slightly negative general traffic benefits, the BCR is likely to still remain above one. Conversely, a BCR well in excess of five could arise if multiple up-side risk materialised.

Table 5-9 Sensitivity Test Results – Impact on BCR

Sensitivity Test	BCR
Base BCR for ‘Top End’ Scenario (see Table 5-8)	1.8
95 th Percentile Capital cost	1.6
High cycle growth / Low cycle growth	4.5 / 1.0
Bus patronage (+/-20%)	1.9 / 1.7
25% reduction in traffic diverting to SH1	1.5
60 year evaluation period	2.1
3% discount rate / 6% discount rate	2.1 / 1.3

5.16.1.3 Additional Sensitivity Test of Effect of Potential Changes in Trip Departure Time

The economic analysis has been undertaken based on the modelling outputs where there is no change in trip departure time for traffic travelling on SH1 (i.e. the ‘Top End’ scenario). The cost of this additional delay has been accounted for as part of the external delay assessment and added to SH1 traffic. However, in reality, these trips may be undertaken earlier or later than the current traffic flow profile in order to avoid the peak where SH1 is at capacity. An additional sensitivity test has therefore been undertaken such that trips are delayed to a time where there is no impact of external delays on the scheme (i.e. there is no additional cost associated with spreading the peak). This additional sensitivity test is summarised in Table 5-10.

Table 5-10 Additional Sensitivity Test for Trip Departure Time Changes

Benefit Stream	'Top End' Economic Analysis (\$M)	No Costs Associated with Peak Spreading (\$M)
Crash cost savings	5.5M	5.5M
Cyclists' health benefits	72.2M	72.2M
Non bus travel time and bottleneck delay savings – Thorndon Quay Hutt Road	79.8M	79.8M
Non bus travel time and bottleneck delay savings – SH1 + Alternative Routes	-105.8M	-53.2M
Non bus VOC savings	13.4M	13.4M
Bus travel time savings	20.9M	20.9M
Bus reliability benefits	8.7M	8.7M
Pedestrian amenity benefits	1.7M	1.7M
Total Benefits (NPV)	96.4M	148.9M
Total Costs (NPV)	54.8M	54.8M
First-Year Rate of Return (FYRR)	4.2%	8.6%
Benefit to Cost Ratio (BCR)	1.8	2.7

5.16.1.4 Additional Sensitivity Test of SH1 Travel Time Changes

Given the potential range of diversion for SH1 traffic, a further additional sensitivity test has been undertaken on the external delay for SH1 traffic required to result in a BCR of 1.0. The results of this additional sensitivity test is provided in Table 5-11. The indicates that on average approximately 150 seconds of external delay is required for all SH1 traffic is required to result in a BCR of 1.0. This equates to approximately a 35% additional travel time between the SH1/SH2 interchange and Hawkestone Street off-ramps during the modelled AM peak (6am-10am).

Table 5-11 Sensitivity Test of SH1 Travel Time Changes – Impact on BCR

Benefit Stream	'Top End' Scenario (\$M)	SH1 Travel Time Increased to BCR=1.0 (\$M)
<i>External delay for SH1 traffic</i>	<i>90 seconds</i>	<i>150 seconds</i>
Crash cost savings	5.5M	5.5M
Cyclists' health benefits	72.2M	72.2M
Non bus travel time and bottleneck delay savings	-26.1M	-52.9M
Non bus VOC savings	13.4M	0
Bus travel time savings	20.9M	20.9M
Bus reliability benefits	8.7M	8.7M
Pedestrian amenity benefits	1.7M	1.7M
Total Benefits (NPV)	96.4M	56.1M
Total Costs (NPV)	54.8M	54.8M
Benefit to Cost Ratio (BCR)	1.8	1.0

It is important to note that that average delay has been apportioned to all SH1 traffic during the modelled AM peak (6am-10pm), whereas, in reality this delay would only be experienced by those during the peak periods when SH1 is at capacity resulting in greater potential delays than stated for these vehicles.

It should also be noted that a 60-90 second increase in SH1 travel time, in the context of a 30-minute trip that has highly variable travel times on a day-to-day basis, is considered to be so small that it would not be perceived by the average road user. Conversely, if travel times were to increase by ten minutes for a journey that currently takes 20 minutes, then this would be material.

5.16.2 Investment Profile

When evaluating the investment case for this project, the GPS requires Waka Kotahi and those applying for Waka Kotahi funding to demonstrate how investment shows alignment with the outcomes and priorities sought through the GPS. The Waka Kotahi Investment Prioritisation Method (2021-24) has been used for this assessment.

5.16.2.1 GPS Alignment

Results alignment is an assessment against the outcomes sought from the GPS. There are four rating bands – Low, Medium, High, and Very High – each with criteria specific to the activity class. Given the multi-modal nature of the project, the improvements have been assessed against several activity classes including public transport, walking, and cycling. The results alignment is summarised in Table 5-12.

Table 5-12 GPS Results Alignment

GPS Strategic Priority	Assessment
Safety	High - The Recommended Option will provide both pedestrians and cyclists with dedicated facilities that will increase safety and improve the level of service and in effect attractiveness and convenience of these modes. This will contribute to eliminating pedestrian and cycling interactions with higher-speed traffic volumes and reduce the likelihood and severity of incidents.
Better travel options	High - An assessment of existing Level of Service and future Level of Service under the Recommended Option was undertaken to understand how the option will contribute to addressing several objectives including perceived deficiencies. The Recommended Option addresses these deficiencies as part of the design and process, and significant gaps prioritized for delivery.
Climate change	High - As detailed in the Economic Case, the Recommended Option is forecast to generate a growth in cycling numbers from the current situation.

5.16.2.2 Scheduling

Scheduling indicates the criticality or interdependency of the proposed activity or combination of activities with other activities in a programme or package or as part of a network. Table 5-13 shows the assessment against the Recommended Option.

Table 5-13 Scheduling Assessment

	Assessment
Criticality	Medium - Need to undertake this activity in order to deliver/ prepare for remainder of programme/package where its implementation is to begin in 2024 NLTP
Interdependency	Medium - Activity/combination of activities is part of a programme, package or another investment, but relies on the delivery of another phase or activity in the 2021 NLTP period before being actioned • Non-delivery of proposed activity in the 2021

5.16.2.3 Cost-Benefit Appraisal

The IAF 2018-21 classifies BCR ratings into the following bands:

- Low (BCR of between 1 to 2.9)
- Medium (BCR of between 3 to 4.9)
- High (BCR of between 5 to 9.9)
- Very high (BCR of 10 and above).

The preferred option has an overall BCR of between 0.4 and 1.8, classifying it as Low against these criteria if the 'Top End' scenario is assumed.

5.16.2.4 Overall Priority

The preferred option has been assessed as having a high results alignment in accordance with Waka Kotahi's IPM, scheduling assessment of Medium, and is forecast to have a low BCR rating. This gives the investment proposal a priority order rating of six in the improvement category scale of one to eight, placing the project with an investment profile of HM Priority 6.

6 Financial Case

The financial case outlines the costs and funding requirements for the preferred option of the TQHR project. It provides assurance that this option is affordable, considering all potential funding sources, and highlights what elements will be funded by the partnering organisations. A cost peer review has been undertaken on the findings presented.

6.1 LGWM Context

Following the development of the RPI for the LGWM programme in October 2018, financial analysis was undertaken by LGWM to understand if the full RPI was affordable in the medium term. While the full programme was supported as a long-term vision, this analysis showed it was not likely to be affordable and would need to be staged.

An Indicative Package (IP) of work was developed for the first stage of the programme, following discussion between the funding partners and the Crown. This IP represented a \$3.7b capital investment and a \$6.4b funding requirement including operating and financing costs (before accounting for Council financing costs) over 30 years.

In March 2019, the IP was endorsed by the Cabinet and in May 2019 the IP was announced by the Minister of Transport supported by the Mayor of Wellington and the Chair of the GWRC.

The March Cabinet paper anticipated detailed business cases would be developed. It made a range of assumptions which would need to be explored in more detail through the subsequent phases, including:

- A cost share of 60% central government and 40% local government
- The central government share was anticipated to come from the NLTF
- Financing was anticipated for the MRT project
- NLTF funding projections included petrol excise duty and road user charges increasing broadly in line with inflation over the 30 years.

6.1.1 Funding Partner Affordability

Due to the scale of the LGWM programme, and other financial pressures facing the partners, it is anticipated affordability will be reassessed at each phase as the programme progresses. The two funding partners, WCC and Waka Kotahi, will fund this project under the interim RFA arrangements being used.

The indicated total cost range exceeds the funding partners budgeted allowance. Both partners will need to confirm how and if this project can be funded.

The indicated costs do not include costings for any upgrades to the existing shared path connecting Hutt Road to Te Ara Tupua. None of the programme's funding partners have made budgetary allowance for this upgrade, so this element remains undeliverable without funding approval.

6.1.2 Financing

The LGWM programme is not the only funding pressure which funding partners have, and hence, funding partners will need to make wider decisions around their cashflow and financing.

For the projects within the three-year programme, of which the TQHR project is one, a central financing mechanism operated by LGWM programme is not intended to be used. This may be revisited as the programme progresses through later phases.

Therefore, the cash funding required of each funding partner will be provided, and it will be up to that partner to determine the financing arrangements for their own cashflow management, if any.

It is expected Councils will debt fund the next phase and Waka Kotahi use the NLTF on a pay-go basis.

6.1.3 Funding

The LGWM programme has completed a comprehensive inventory of funding tools in use across the globe. This includes funding tools which fall under the broad categories of “value capture” and “user charging”.

Any use of new funding tools will need to go through the appropriate approvals and in some cases legislative change. No decisions about any potential new funding tools are expected at this stage. It is expected that further investigations into new funding tools will occur ahead of the start of construction. This will involve investigating higher cost components of the programme, as part of clarifying the level of spend the funding partners can commit to.

The Council partners have included funding for the next phases of work expected over the next few years in their long-term plans using their existing rating tools. Sufficient pre-implementation costs are within the Council partners allowance, but implementation (and any upgrades to the connection to Te Ara Tupua) costs are not. WCC will need to confirm if implementation (and upgrades to the Te Ara Tupua connection) costs can be funded.

Waka Kotahi is expected to fund the central government share from the NLTF for the next phase of work. Insufficient funding has been allowed for the costs indicated in the SSBC and Waka Kotahi will need to confirm if both pre-implementation and implementation can be funded. Similarly, no allowance has been made for upgrades to the connection between Hutt Road and Te Ara Tupua.

6.1.4 Funding Partner Cost Shares

Project costs need to be allocated to funding partners, including each local Council (the split of which was not determined for each Council at the IP stage). This allocation sets out what each funding partner must fund and over what period. Cost shares may vary by phase (e.g. business case development, implementation and on-going). A final decision on cost allocation, across the programme, has not yet been made.

There is an explicit LGWM programme work stream to provide funding partners with analysis to assist them in agreeing on the more enduring arrangement for cost allocation. This analysis and partner agreement is expected to be developed using the SSBC analysis once preferred options have been identified. This cost allocation is expected to consider the implications for various groups, including who benefits and who should bear costs.

For the next phase of work the programme will use the interim agreed funding arrangement documented in Schedule 5 of the 2020 LGWM Relationship and Funding Agreement (RFA) to allocate cost shares to funding partners. The RFA is used to allocate costs to partners, on an interim basis, for early delivery programme. For pre-implementation and implementation costs the asset owner bears the project costs with normal FAR (Financial Assistance rates) applying. The split is 49%:51% WCC: Waka Kotahi. Property costs fall to the asset owner, so WCC will fund 100% of property costs.

6.2 Project Delivery Costs

A risk-based cost estimate has been prepared for the recommended option. The financial analysis for the project has been developed in accordance with the Waka Kotahi Project Cost Estimation Manual. The costs have also been subject to a parallel cost estimation review.

The cost estimate for the project in base year values (2021) is summarised in Table 6-1 and in more detail in the Cost Report in Appendix M. This shows that the project has a pre-implementation/ implementation cost in the range of \$55.3m (P50) to \$66.8m (P95).

Table 6-1 – Summary of Capital Costs

Description	Cost (\$)
Property Costs	1,260,000
Pre-Implementation Costs	6,800,000
Base Implementation Fees	4,720,000
Base physical works	29,730,000
Total Base Estimate	42,510,000
Contingency (Analysed/Assessed)	12,753,000
Total Expected Estimate (P50)	55,263,000
Funding Risk (Analysed/Assessed)	11,550,520
Total 95th Percentile Cost Estimate (P95)	66,820,000

The estimate includes a notional \$1.260m (base estimate) (\$1.755m including contingency(P50) / \$2.106m including contingency and an allowance for funding risk (P95)) for property acquisition in the vicinity of the Aotea Quay roundabout. The cost estimate excludes:

- GST
- Escalation from May 2021
- Major market fluctuations
- Central LGWM programme and cross-programme costs (i.e. costs shared across all projects during the business case development and implementation).

6.3 Ongoing Maintenance Costs

These ongoing maintenance costs are additionally captured in the programme level model to provide consistency of assumptions and take account of the additional maintenance cost imposed by the programme on partners and factor into the cost sharing arrangements.

Any lost parking revenue is excluded for this estimate. Who bears the on-going costs will be factored into the final cost sharing agreement between the LGWM partners.

6.4 Cashflow

Costs have not been scheduled in detail, at this stage. The anticipated cashflow for construction of the project is summarised in Table 6-2 (base estimate only). This projection assumes that construction starts in the financial year of 2022/ 23 and takes two years to complete construction.

Cash funding forecasts and requests to the funding partners will need to be developed further during detailed phase of the project. The timing of these funding requests should be manageable, given the relative size of this project to the funding partners’ working cashflows.

Table 6-2 Project Capital Funding Plan (\$ Millions)

	2022/23	2023/24	2024/25	TOTAL
Base Estimate	11,274,000	18,735,000	12,501,000	42,510,000

7 Commercial Case

The commercial case for implementing the preferred option involves commercial and financial analysis considering the capacity demand and attractiveness, accessibility and network linkages, affordability of delivering the option and the associated implications. The commercial case is underpinned by the implementation, procurement, and consenting strategies for the project.

7.1 Implementation Strategy

It is recommended that there is a robust pre-implementation phase to confirm procurement and the implementation strategy, including considering staging options if financial constraints dictate. There is a strong motivation, need and support for LGWM to deliver the project as soon as possible, and the implementation strategy will consider how this can be achieved most effectively and efficiently. The strategy will also consider how to gain community support for the project.

The project will need strong ongoing local support throughout implementation. Design and construction will need to commence within the 2021/ 24 NLTP funding round.

The primary activities to be undertaken during the pre-implementation phase are:

- Detailed design and construction support services
- Consenting and traffic resolutions
- Collaboration with Waka Kotahi regarding interface with the Te Ara Tupua Cycleway.

It is estimated that the project will have a construction period of no more than 30 months. This assumes that changes to Aotea Quay are constructed separately to improvements to Thorndon Quay and Hutt Road, in order to avoid unacceptable disruption to traffic operations.

7.2 Implementation Options Considered

Two main implementation options are likely to be practical:

- Full delivery of the entire project (with works on Aotea Quay being constructed separately)
- Staged delivery, such as constructing improvements to Hutt Road ahead of improvements to Thorndon Quay.

A staged approach provides an opportunity to decouple the risks associated with each stage, as delays or issues in one stage would not impact on the other. However, a staged delivery approach could take longer to construct, increases the risk that the project may not have the continuity, and could be more costly due to the doubling up of some services and materials. As such, with the exception of works on Aotea Quay, staged delivery is not recommended unless funding constraints dictate the need for this.

A single professional design, engineering and consents services supplier is recommended to be utilised for project. Pre-implementation services would have a duration in the order of twelve months from the award and will be required to provide design information to support the statutory applications.

7.3 Procurement Strategy

The procurement for the TQHR project is based on LGWM's Three-Year Programme Procurement Strategy, which has been developed by LGWM's Procurement Team. A key focus of the current procurement approach is to ensure the pre-implementation phase progresses with speed, so the LGWM programme timeline can be met.

7.3.1 Pre-Implementation Procurement Options

In accordance with LGWM's Procurement Strategy, the preference of procurement pathway options is to look to vary existing contracts where services are similar, prior to approaching the market.

The right to vary subsequent phases was signalled in the original SSBC contract, subject to a number of caveats (supplier performance, timing and expected cost of projects, market conditions approved funding). Outside of enacting this option, direct appointment of the pre-implementation phase is also a viable option, due to market conditions and the need to accelerate due to the construction start timeframes late-2022.

Improvements to Aotea Quay will be carved off from the TQHR scope and procured as a separate package to ensure the pre-implementation is progressed independently of the main contract.

WCC will be the Procuring Party and Principal for the pre-implementation contract. The recommended pre-implementation procurement pathway will be confirmed in a separate procurement memo to WCC's Delegated Authority.

7.3.2 Implementation Procurement Options

An initial assessment of delivery models indicates the project will likely be delivered via a variant of the Early Contractor Involvement (ECI) model. Suppliers will be selected based on quality and price through the Price Quality Method.

Aotea Quay will be delivered as a separate package to ensure early completion ahead of works on Hutt Road and Thorndon Quay.

The implantation procurement details are further outlined in LGWM's Golden Mile and TQHR Procurement Plan.

7.3.3 Interdependencies and Risks

The project shares some similar objectives to the Waka Kotahi Ngā Ūranga ki Pito-One (Ngauranga to Petone) shared path project, such as to improve active mode facilities, connections, and accessibility for a range of customers. There will be common stakeholders, and their delivery timeframes could be similar too. Whilst both projects will be delivered independently, there are opportunities and benefits for the project teams to collaborate to share information, ideas, learnings and expertise. There may be scope advantages to seek optimisation and collaboration between the two projects, subject to the confirmation of the delivery timing of the Ngā Ūranga ki Pito-One shared path project and any funding agreements.

7.3.4 Communication

The Procurement Plan for the project needs to be communicated to the supplier market. This will aid with obtaining early involvement of contractors both into the early design requirements as well as enabling them to plan adequately to resource the delivery.

An Advanced Notice was advertised on the Government's Electronic Tenders System (GETS) late August 2021 to advise of the upcoming procurement opportunity.

7.3.5 Contract Management

The contracts for pre-implementation and implementation shall be managed in accordance with WCC's standard for of contract.

7.3.6 Consenting Strategy

A consenting strategy has been prepared which identifies project consenting, statutory approvals, environmental considerations and key mitigation areas.

The strategy identifies that the works required to deliver the project will likely be permitted under the Resource Management Act 1991 (RMA). However, the disturbance of potentially contaminated soil could require resource consent under the National Environmental Standards for Assessing and Managing Contaminants in Soil for the Protection of Human Health (NESCS). The use of potentially contaminated soil could require resource consent under Rule 32.2.1 of the WCDP. A site-specific contaminated land investigation at detailed design will confirm this.

Traffic Resolutions and a formal review of speed limit changes will need to be prepared during detailed design.

Further public engagement and public participation on the proposed design will assist LGWM in determining how any adverse effects could be mitigated. It is also recommended that the detailed design is discussed with Mana Whenua to provide a better understanding of any potential cultural effects associated with the proposals.

7.4 Property and Land Acquisition

There is no property acquisition required, other than land to implement the proposed changes to Aotea Quay. A draft property agreement exists between WCC and KiwiRail for the original design of the Aotea Quay roundabout. The land is identified as being Crown land. Further assessments on property acquisition will be undertaken at pre-implementation.

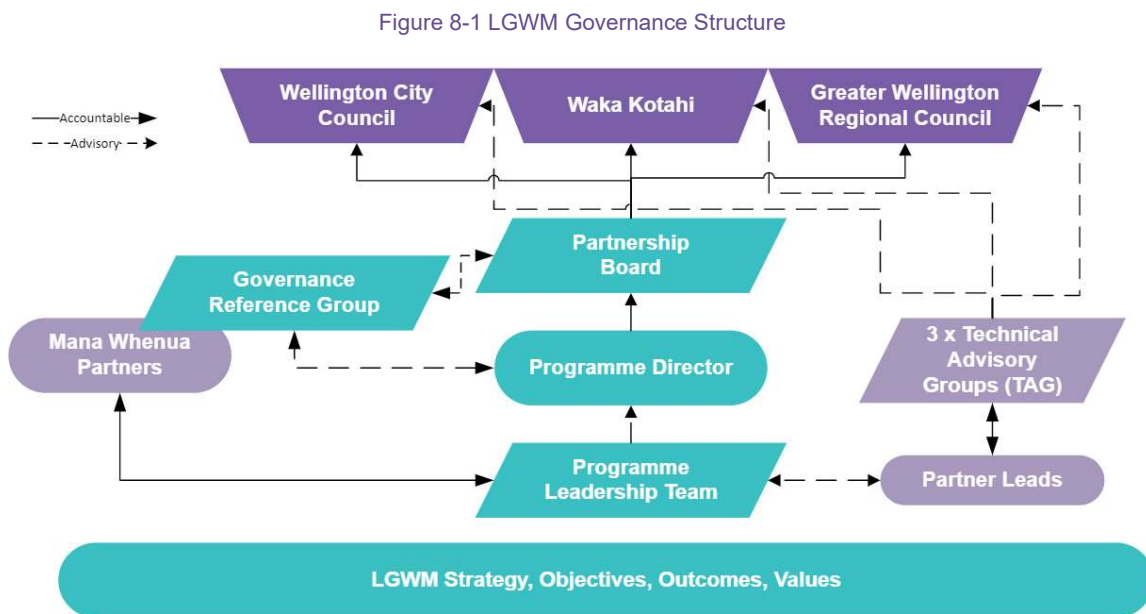
8 Management Case

The management case addresses the achievability of the investment proposal and the planning management required to ensure successful delivery, and to manage project risk. It provides the proposed programme, intended governance structure and key project activities through to implementation. Within the broader intent of the project, the planning and project management will align with and adopt the practices within the LGWM programme.

This management case details the arrangements that will be put in place to successfully deliver the preferred option. These have been developed from the LGWM Programme that considers the planning, development and delivery elements of the TQHR project.

8.1 LGWM Governance and Management

The LGWM governance structure is set out in Figure 8-1.



The LGWM Three-Year Programme Director reports to the Programme Director and is a member of the Programme Leadership Team. The Programme Director is responsible for overseeing the delivery of the LGWM programme.

The TQHR Project Manager reports to the LGWM Three-Year Programme Director and is responsible for the delivery of the project.

8.2 Implementation Programme

A construction phasing strategy will need to be developed during detailed design. Careful consideration will need to be given to the likely construction impacts of the project given the importance of keeping the TQHR corridor operational during the construction of works. As the only full diversionary routes available is the motorway, complete closure of the corridor will be extremely problematic. Works on Aotea Quay will be constructed separately from the works on Thorndon Quay and Hutt Road.

Night-time working will be considered, and may be a cost effective option for works at the Aotea Quay roundabout and some parts of Hutt Road, but is unlikely to be necessary for most of the works.

Consideration will need to be given at later phases of project to details of the vehicles permitted to use the SVL, the operational and enforcement arrangements, and how it will be delivered. Further traffic modelling will be undertaken to inform this matter.

An indicative programme, which is the basis of the Financial and Management Case, is summarised in Table 8-1.

Table 8-1 Project Programme

Activity	Completion Date
LGWM Board Approval of SSBC	Q1 2022
Detailed Design commences	Q1 2022
Apply for RMA statutory approvals (including traffic resolutions)	Q4 2022
Detailed Design complete and statutory approvals approved	Q1 2023
Construction starts	Q4 2022 for Aotea Quay and Q1 2023 for TQHR
Implementation complete (to practical completion)	Q1 2023 for Aotea Quay and Q1 2025 for TQHR
Implementation phase complete (including 1-year defects liability period)	Q1 2024 for Aotea Quay and Q1 2026 for TQHR

8.3 Ongoing Engagement

The development of a Communications and Engagement Plan for the pre-implementation and implementation phases of the project will form the starting point for ongoing engagement. There are diverse views and conflicting demands between different stakeholders that need to be reconciled. A high level of awareness of these potential interactions is necessary, particularly with the business community.

The project will continue with the approaches established to support this SSBC process, developing these further for the pre-implementation phase. These plans remain living documents and will be amended in response to information gathered through stakeholder, partner and community related engagement.

Key focus areas for ongoing engagement are to seek feedback on detailed design and highlight key changes or enhancements from a design perspective. As part of the implementation phase, it considers how the final design will be presented back and seeking additional feedback on how the proposed construction activities approach and timeframes would occur. It also provides for testing how well certain treatment and responses inter-play.

A number of the tools and processes established will be redeployed for future phases to address the concerns identified to date, particularly the pre-implementation phase, this includes:

- Briefings and presentations
- Updating the LGWM project webpage
- Distribution of information packs
- Advertising and hosting information sessions
- Preparation and distribution of media releases.

8.3.1 Other Projects

When detailed design for the project is progressed, liaison with the project team involved in engagement on a number of current projects, notably the Low Cost Low Risk projects on Ngauranga Gorge, Single User Terminal and the City Streets project, needs to occur.

Consideration needs to be given to catering for cycle movements to/from the Wakely Road path, and take into account previous investigations into the provision of raised tables at the SH2 intersection slip lane. Engagement with Waka Kotahi's safety team will also need to consider how best to address issues with drivers jumping the queue and turning left avoiding the slip lane across the path of cyclists in the detailed design phase.

8.4 Assurance and Acceptance

Waka Kotahi has documented processes and policies for independent road safety audits, design reviews, etc. These will be used where appropriate in detailed design.

8.5 Contract Management

Contract Management will be undertaken by the obligations set out in the relevant Contracts. These will combine requirements from both WCC and Waka Kotahi contracts as appropriate. On-going contracts will be procured by WCC on behalf of LGWM.

8.6 Cost Management

The LGWM Project Manager is responsible for on budget delivery and the services of a Cost Manager will be necessary during implementation to manage construction expenditure.

Financial management shall be undertaken in accordance with the relevant procedures. As a minimum the consultant/ contractor shall provide the following information in each month of the respective contract(s) for the LGWM Project Manager to update internal financial systems (e.g. SAP) and to support its claims:

- Budgeted cashflow
- Value of work completed in the preceding month and contract to date (including rates and quantities for all items within the contract)
- Forecast value of work completed and revised cashflow through to project completion
- Exception reports outlining the reasons for not meeting any financial targets.

The anticipated target performance measures, on a monthly basis, are that the claim should be within +/- 5% from the previous month's forecast and within the boundary of the agreed cash flow.

8.7 Project Risks and Mitigation Measures

Risk management is a dynamic process throughout the life of a project. A project risk register has been developed and regularly reviewed throughout the SSBC process to manage risks appropriately. This was undertaken in accordance with the General and Advanced Approach of Minimum Standard Z/44 of Amendment 8 of SM030. A risk workshop was held in February 2021 to identify and agree key risks to guide the development of the preliminary design. Project risks were populated as far as possible in real time during the workshop and then finalised following the workshop. A key output of this workshop was identifying and agreeing risks that stakeholders see as being of main concern.

Risk pricing has been undertaken in the @Risk software, using Monte Carlo analysis technique.

The preliminary design was developed following the Waka Kotahi Safety in Design (SiD) guidelines. A SiD workshop was held on 29 April 2021 during the preliminary design phase. A SiD register has been prepared and updated regularly and is included in the Design Philosophy report.

In the pre-implementation phase, it is likely that the majority of the technical risks associated with obtaining statutory approvals will be transferred to the professional service providers on award. The transfer of risk for detailed design and implementation phases will be determined in the project planning and the finalised in the Procurement Strategy.

The main risks associated with the project, and the current status of mitigation/ treatment, is contained in the risk register included in the PDPS in Appendix J and summarised in Table 8-2. A key risk is that the project cost exceeds the level of affordability.

Table 8-2 Key Project Risks

Risk	Rating	Risk Type	Treatment
Stakeholder	High	The perceived impacts of the project such as visual impacts, proximity to private property, concerns around on-street car parking removal could affect ongoing support for the project.	Ongoing engagement with stakeholders to understand concerns and continue to explore avenues to address community concerns
Financial	High	There is a risk that funding is insufficient for the project. This could be due to assumptions included in the estimate being incorrect; errors or omissions; and/or due to changes in market conditions (including potential Covid related supply chain issues).	Cost estimates have been developed in accordance with Waka Kotahi standards (SM014 and Z/44). Estimate have been independently assessed through a parallel estimate on commencement of detailed design
Operations/ Enforcement of Cycle lanes, bus Lanes and SVLs	Medium	There are risks associated with providing a safe and appropriate environment for a cycle lane and bus lane/SVL users associated with keeping customers informed and managing safe operations and access.	An Operations Plan will need to be developed in the pre-implementation phase. Further transport modelling will be done in detailed design to inform operational decisions of the SVL.
Design	Low	Partners not agreeing on sub-standard designs e.g. due to limited corridor width and range of strategic uses along the corridor.	Detailed design process to identify early on any impingements to design process by corridor width/required departures from minimum standards.
Design uncertainty	Low	There are several areas of uncertainty that require more attention at/before next phase - corridor operation, signal operation, any upgrades to the connection between Hutt Road and Te Ara Tupua and Jarden Mile signal operation and design, modelling revision, and freight in bus lanes.	Detailed design to address uncertainty issues.
Construction	Low	There is a threat that unforeseen issues are discovered during construction. A potential cause of this risk is that incorrect as-built information or insufficient investigation completed. The consequence of the threat is the project cannot be constructed in	Ongoing engagement and consultation with key stakeholders to present construction methodology and identify and resolve issues early. Communication with the public via open days, media coverage and

		accordance with the resource consent with associated delays, negative media coverage and additional cost	consultation to present construction methodology.
Modelling	Medium	Transport modelling identifies operational/safety issues that require late changes to design, causing additional late costs for rework or construction, unsafe solutions on the corridor, reputational impacts.	Review the intersection design model, design approach is agreed / compliance to required standards within limited corridor widths - gain approvals.

It is recommended that further work be undertaken to address these risks and maximise the successful delivery of the project in detailed design. The Project Manager will be responsible for managing project risk and will maintain the risk register. Risk will need to be managed in accordance with the LGWM programme management plan and will allow for any specific requirements for risk management planning and reporting.

It is anticipated that as part of pre-implementation phase, risk will be managed in accordance with the LGWM project risk framework. A risk workshop and comprehensive risk register will be developed and then maintained for the duration of the project. Risk activities include:

- Risk evaluation (matrix)
- Risk treatment and treatment planning
- Risk escalation, reporting and monitoring
- Integration with WCC’s project management systems.

8.8 Change Control and Issue Management

LGWM has documented procedures on scope change with defined financial delegations. These change control will be adhered to during the delivery of the project. Escalation to LGWM project governance will be undertaken as required to ensure that any initiated scope change is given full value-for-money considerations.

Change control and issues register shall operate as an extension to the risk register and track issues as they arise. It is anticipated that a change control and issues management process will be included in the contract documents for the project. Change control and issues management will be undertaken in accordance with the:

- LGWM Programme Management Plan
- Conditions of contract for project-specific issues.

Each issue shall be logged in an issue register, which includes the following information:

- Title and description of the issue
- Date raised
- Status (open, escalated, transferred to the risk register, resolved)
- Primary impact area for the issue (project, personnel, health and safety, corporate risk, stakeholder management etc.)
- Delegated authority for closing out the issue
- Whether the issue is a project-specific issue or another issue
- Level of significance
- Whether the issue requires transferring to the project risk register

- Remedial action proposed to address the issue
- The date that the issue has been resolved.

8.9 Benefits Realisation and Performance Management

Table 8-3 shows the proposed Benefits Realisation Management Plan. This is aligned to the LGWM Programme plan. It is expected that benefit owners form part of the existing partner group, therefore for consistency, it is proposed that the approach for measuring and realising benefits through and post the project is agreed at pre-implementation phase.

Consideration should be given to integration of benefits realisation reporting with existing reporting and the reporting of other projects being implemented on or adjacent to the TQHR corridor. Reporting of the proposed SVLs, which are a relatively new concept for New Zealand, will be valuable for the wider industry to understand.

Table 8-3: Benefits Management Plan

KPI Measure	Baseline	Expected Outcome	Monitoring	Achieved by
Increase demand for bus services by 2026 and the speed of bus services by 2026.	950 passengers in the morning peak 2-hour period (southbound); 1,000 passengers in the evening peak 2-hour period (northbound)	1,000 in the morning peak 2-hour period (southbound); and 1,100 in the evening peak 2-hour period (northbound)	Post-implementation via boardings data	2026
Increase demand for bus services by 2026 and the speed of bus services by 2026.	14 minutes travel time in the morning peak 2-hour period (southbound); 9 minutes travel time in the evening peak 2-hour period (northbound)	Reduce bus transit times by 5 minutes in the morning peak 2-hour period (southbound) and by 1 minute in the evening peak 2-hour period (northbound)	Post-implementation via journey time data	2026
Improve Level of Service for non-car modes by 2026.	<ul style="list-style-type: none"> ▪ Baseline Walking LoS D ▪ Baseline Cycling LoS F ▪ Baseline Cycling Demand on Thorndon Quay of 300 -1,600/day 	<ul style="list-style-type: none"> ▪ Walking – LoS (C on Hutt Road; C/D on Thorndon Quay (Northbound/Southbound) ▪ Cycling LoS (F/B on Hutt Road; F/C on Thorndon Quay). ▪ Cycle Demand on Thorndon Quay of 1,200-3,000/day 	Post-implementation qualitative assessment / Cycle demand surveys	2026
Reduce the safety risk along Thorndon Quay and Hutt Road for all road users by 2026.	<ul style="list-style-type: none"> ▪ Baseline for vulnerable users is 2.6 DSI crashes per year ▪ Baseline for all vehicles is 1.5 DSI crashes per year 	<ul style="list-style-type: none"> ▪ Reduce vulnerable user DSI crash risk by 20% within ten years using measures aligned with Safe System Principles. ▪ Reduce Vehicle DSIs by 10% within ten years using measures aligned with Safe System Principles. 	Post implementation review of CAS data	2026
Amenity index/ Healthy Streets index aligns with Movement	<ul style="list-style-type: none"> ▪ Baseline for Thorndon Quay is M3/P1 in the Movement and Place Framework. 	<ul style="list-style-type: none"> ▪ Thorndon Quay to be M3/P2 in the Movement and Place Framework by 2026 	Post-implementation qualitative assessment of amenity /	2026

KPI Measure	Baseline	Expected Outcome	Monitoring	Achieved by
Framework criteria for Thorndon Quay by 2026.	<ul style="list-style-type: none"> ▪ Pedestrian demand on Thorndon Quay of 2-3,000 per day 	<ul style="list-style-type: none"> ▪ Pedestrian demand on Thorndon Quay likely to be 30-50% higher 	pedestrian demand surveys	
Maintain truck travel times between Jarden Mile and Aotea Quay off ramp by 2026	<ul style="list-style-type: none"> ▪ Baseline: 7 minutes travel time in the morning peak 2-hour period (southbound); 5 minutes travel time in the evening peak 2-hour period (northbound) 	<ul style="list-style-type: none"> ▪ Maintain truck travel times. 	Post-implementation via journey time data	2026

8.10 Lessons Learned

Lessons learnt from the project will be fed back into the LGWM project development and delivery lifecycle through several mechanisms and levels of project and LGWM management. It will be the responsibility of the LGWM project manager for this SSBC to complete these reviews with the respective suppliers.

8.11 Reporting Arrangements

The project will be required to report weekly into the LGWM programme through all future phases of development and delivery. Reporting and information transfer is covered with the project management plan, namely: schedule, cost, risk/ issues, health and safety, resourcing, and benefits. On a monthly basis the project manager will provide updates.

8.12 Next Steps

The following elements have been identified as the key next steps for the project:

- Confirming endorsement of the SSBC for the TQHR project
- Procurement of services and progress with pre-implementation, and implementation of the Recommended Option, with an initial focus on critical path activities including land acquisition and statutory approvals
- Engagement with owners and occupiers of properties regarding the proposed changes and engagement feedback
- Undertaking detailed design, including details of accessways and turning points
- Consideration of consider all of the community engagement feedback received and use it to inform the preferred option detailed design
- Engagement with the teams and governance bodies delivering parallel projects which may impact on this project, in particular the Single User Terminal for work on Aotea Quay
- Further modelling/analysis on the potential use of SVLs on Hutt Road prior to implementation
- Confirming the bus lane/SVL times of operation