

Item 4: Transport Priorities Update

SESSION TYPE: Workshop

PURPOSE/DESIRED OUTCOME:

To brief the Wānaka-Upper Clutha Community Board (WUCCB) on the progress of the transport workstreams impacting Wānaka, and provide an opportunity for the WUCCB to provide feedback on the wayfinding and parking workstreams.

DATE/TIME:

Thursday, 7 August 2025 at 1.45pm

TIME BREAKDOWN:

Presentation: 3 x 10 minute presentations
Questions or Debate/Discussion: 3 x 10 minute discussions

Prepared by:



Name: Tony Pickard
Title: Strategy Planning Manager (Transport)

15 July 2025

Reviewed and Authorised by:



Name: Tony Avery
Title: General Manager Property & Infrastructure

30 July 2025

ATTACHMENTS:

A	Presentation
B	Wānaka Network Optimisation Part A
C	Wānaka Network Optimisation Part B

Wānaka-Upper Clutha Community Board Transport Update

- Tony Pickard
- Strategy Planning Manager (Transport)
- August 2025

Current workstreams Transport Strategy Team

- Arthurs Point Crossing
- Spatial Planning
 - Future Development Strategy
 - Structure Plans
 - Fast Tracks
- Strategic Review (gap analysis)
- Minor Projects
 - Speed
 - Transport Model
 - Monitoring

Wanaka- Upper Clutha workstreams

Wanaka Network Optimisation

Travel Demand Management

Wanaka Parking Management Plan

Wanaka Network Optimisation



RECAP ON THE
PURPOSE



FINDINGS



STRATEGIC
RESPONSES



NEXT STEPS

Purpose - Recap

- The workstream was to complete a business case following on from the masterplanning work. Network optimisation is an approach to make the best use of existing networks and services to improve efficiencies.
- During the project, the likelihood of funding for projects in the short term fell away from all three partners, for two consecutive LTP rounds.
- To make the best use of the work already in train, the focus was changed to provide strategic responses amounting to a programme of interventions that were likely to be needed over the long term.

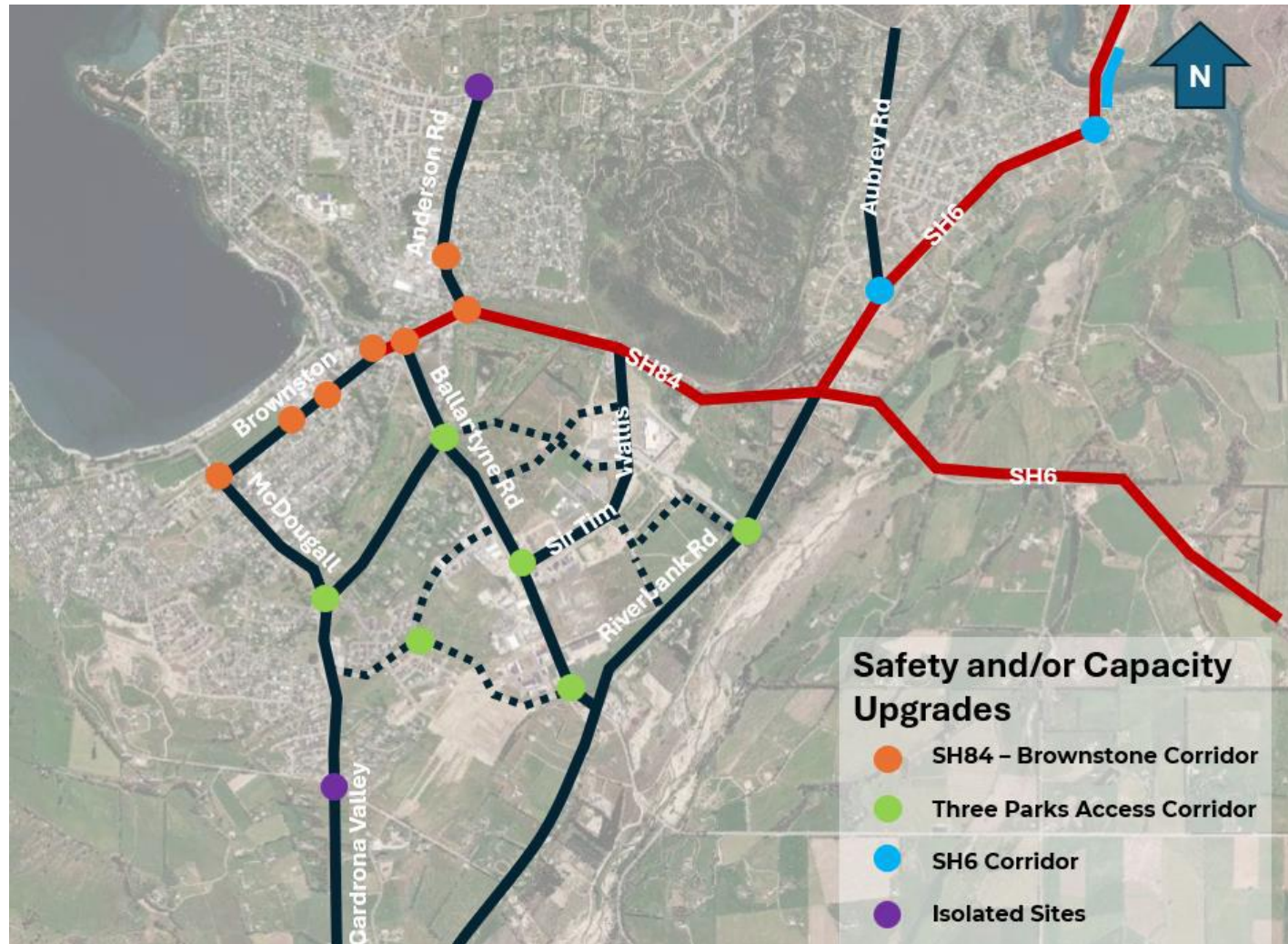
Findings

- The project has identified that the Wanaka township will need several multimodal interventions in the medium to long term.
- Implementations in the short term should still be actioned wherever opportunities are presented, i.e., through private developments, the Minor Improvement Programme or any other local, regional or national funding schemes (such as Transport Choices).
- Other programmes, such as parking management or Travel Demand Management may reduce the need for physical interventions and delay effects such as congestion.
- Accelerated growth however, with more private car movements, may require the implementations to be brought forward to maintain a better Level Of Service.

Findings

- Bulk of the implementations are split into those to allow the roading network to grow through safety or capacity issues over the programme, and to active travel interventions to assist with mode shift / mode choice opportunities.

Corridor Implementations





Strategic Responses Active Modes Corridors

1. Avalon Station Drive Shared Path
2. Schools to Pool Shared Path extension
3. Lakefront Shared Path Stage 4
4. Aubrey Road SP extension
5. SH84 & SH6 Shared Path
6. SH84 Shared Path
7. Ardmore Street Cycle Facilities
8. Ballantyne Road Shared Path
9. Beacon Point Road Shared Path
10. Brownston Street Shared Path
11. Cardrona Valley Road Shared Path Stage 1
12. Riverbank-Three Parks Link Cycle Facilities
13. Riverbank Road SP Stage 1
14. Wanaka Mount Aspiring Road Shared Path Stage 1
15. Riverbank Road SP Stage 2
16. McDougall Shared Path
17. Northlake Shared Paths Stage 1
18. Orchard Road Shared Path
19. Western Wānaka Shared Paths
20. Aubrey / Gunn Shared Path
21. SH6 (Albert Town) Shared Path
22. Cardrona Valley Road SP Stage 2
23. Riverbank Road SP Stage 3
24. Northlake Shared Paths Stage 2
25. SH6-Luggate Shared Path
26. Wānaka Mount Aspiring Road Shared Path Stage 2 (to Glendhu Bay)
27. Cardrona Valley Road Shared Path Stage 3 (to Cardrona)

Active Travel Implementations

Sequencing

- Appendix B to the Economic Case has been included to set out the indicative implementations, timings and costs. Again, the further out the implementation the more difficulty there is in predicting an exact delivery timeframe.

APPENDIX B – STRATEGIC RESPONSES TABLE

Project ID	Project Name	Package	Category	NLTP Period	P50 Cost Estimate (\$2025)	P50 Cost Estimate (NPV \$2024)	Model Period	Description	Notes
1.01	Ballantyne-Avalon Station Drive Intersection Upgrade	Three Parks Access	Safety and Capacity Upgrades	2024/25-2026/27	\$4.60M	N/A	2025	Turning improvements from Ballantyne Road towards west Wānaka via Avalon Station Drive extension (2.01).	Assumed Part of Do Minimum. Implementation underway. Implementation with developer support.
1.02	Ballantyne-Golf Course Capacity and Safety Upgrades	Three Parks Access	Safety and Capacity Upgrades	2030/31-2032/33	\$4.60M	N/A	2025	Capacity improvements to reduce turning delays at the Golf Course Road.	Assumed Part of Do Minimum. Developer funded. Previous designs developed to be implemented at this location.
2.01	Avalon Station Drive Extension	Three Parks Access	New Links	2024/25-2026/27	\$10.7M	N/A	N/A	Extension of Avalon Station Drive connecting to Ballantyne Road approximately 170m west of Riverbank Road. This link will decrease vehicle trips to and from west Wānaka to Three Parks travelling via Golf Course and Riverbank Road.	Assumed Part of Do Minimum. Implementation underway. Implementation with developer support.
2.02	Golf Course – Three Parks Link	Three Parks Access	New Links	2030/31-2032/33	\$10.7M	N/A	N/A	Connection into Three Parks from Ballantyne Road at Golf Course Road as per Masterplan.	Assumed Part of Do Minimum. Developer Funded. Implementation as part of 1.02.
3.01	Avalon Station Drive Shared Path	Three Parks Access	Shared Paths	2024/25-2026/27	\$950k	N/A	2025	Shared path from Cardrona Valley Road to Ballantyne Road via Avalon Station Drive and Fredrick Street.	Implementation underway.
3.02	Schools to Pools Shared Path extension	Do Minimum	Shared Paths	2024/25-2026/27	\$800k	N/A	2025	Extension of Schools to Pool from Golf Course Road to Sir Tim Wallis Drive.	Assumed Part of Do Minimum. Implementation alongside 1.02 and 2.02. Delivery through developer. 3.12 connects Sir Tim Wallis Drive to Riverbank Road. Other cycle links within Three Parks which are developer lead are not specifically included in this programme.
3.03	Lakefront Shared Path Stage 4	Do Minimum	Shared Paths	2024/25-2026/27	\$290k	N/A	2025	Completion of Stage 4 of the Lakefront Shared Path, connecting existing Stage 3 and Stage 5.	Assumed Part of Do Minimum as part of Town Centre Masterplan. Delivery through the Parks Team at QLDC.
1.03	Anderson-SH84 Capacity Upgrades	SH84 - Brownston Corridor	Safety and Capacity Upgrades	2027/28-2029/30	\$6.91M	\$6.37M	2028	High priority capacity upgrades at the existing roundabout. Right turn movements to and from Anderson and westbound movements under particular pressure.	Control mechanism of upgrade to be identified with further investigation of wider SH84 corridor scheme. Consider implementing alongside 1.21 (active mode crossing) and 3.06 (Anderson to Heddlith Shared Path), with larger SH84 scheme consideration of 1.06 (Ballantyne-Heddlith), 1.13 (Ardmore-Brownston), and 1.12 (Anderson side roads north of SH84).
1.21	SH84 and Anderson Separated Crossing	SH84 - Brownston	Safety Upgrades	2027/28-2029/30	\$760k	\$720k	2028	Active modes crossings of SH84 and Anderson Road, separated by time or space. Location of crossing on	Required to maintain travel choice as traffic volumes grow, placed in 2028 model period to align with intersection upgrade

Modelling



Timing of Impacts will be dictated by growth and the location of that growth. Earliest effects are likely to be seen on the SH84 / Ardmore Street area.



Effects of behavioural change have been included as we anticipate that the relatively high use of walking / cycling continues.



Public Transport has also been considered in the longer term.



A number of scenarios were tested but should not be considered to be comprehensive due to the amount of potential variables over the longer term.

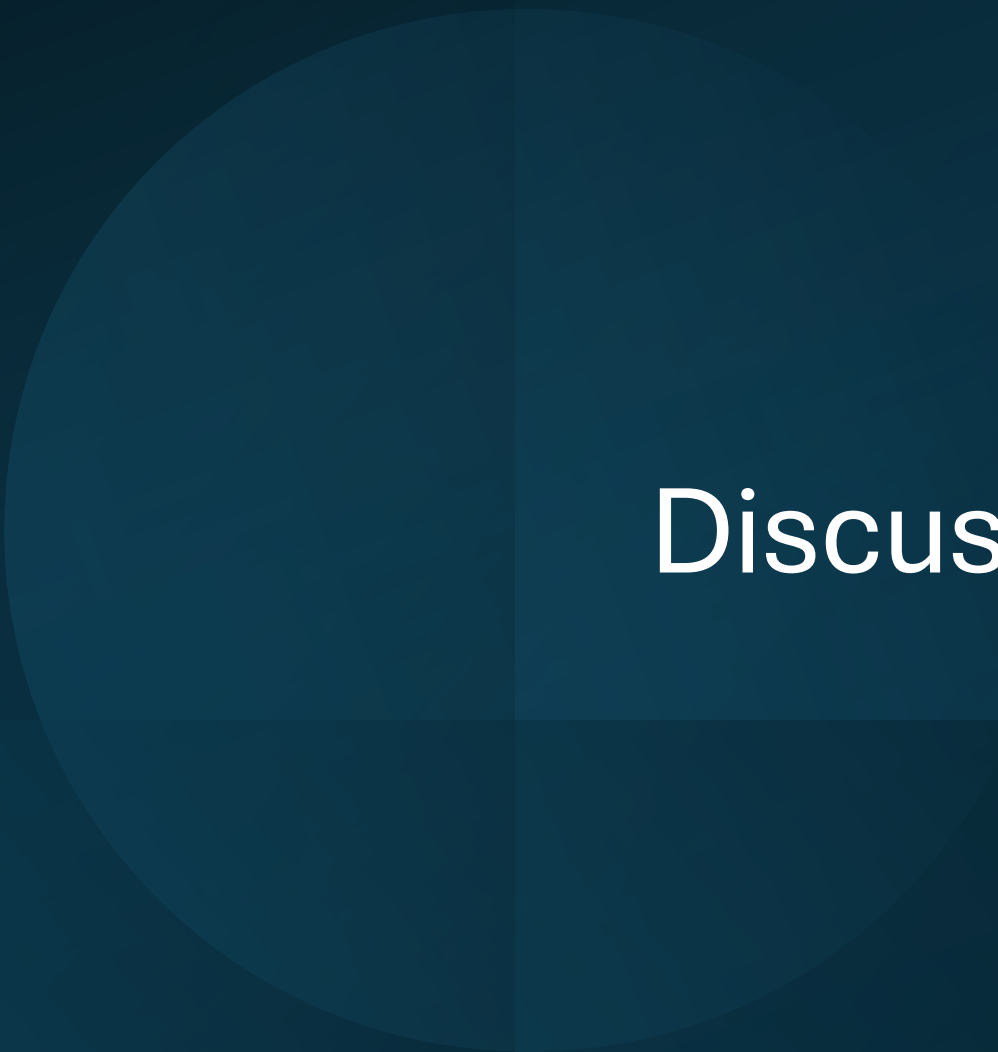
Costs / GPS priority

Indicative costs are given for the programme and for individual elements along with sequencing information.

The current scoring when considered against the GPS / IPM is unlikely to attract funding from NZTA in the current economic climate but if growth occurs faster, then the urgency will likely increase.

Next steps

- The real value of the work now complete is to inform any discussions for the 2027 LTP.
- It is acknowledged that costs may change, investment priorities may change, private developments may influence such a long-term programme.
- The programme should not be taken as an agreed or approved list but can be utilised best to inform those discussions which will be had over the next two years leading into those deliberations. Further work may be required on the larger interventions, but minor projects may have sufficient detail as some design work was incorporated.



Discussion

Travel Demand Management

Recap on the purpose

Tranches

Next Steps

Purpose - recap

- Travel Demand Management approach promotes behavioural change and better mode choice.
- Change is often seen as only for the end user but applies to the designers / land use planners / infrastructure and service providers.
- Reducing congestion and environmental effects at the same time, the benefits can be considerable and signify delay physical interventions.

Tranches

- Four tranches of interventions to be identified through detailed scoping, procurement, feasibility / further business cases as required.
- Planning to implement the programme if funding becomes available in 2027. The bulk of the funding was removed along with the Better Off Funding reversals.

Tranches

- Tranche 1 – Policy Review is complete. This was mainly an internal review of existing policies. Recommendations were shared to workstream owners to implement as policies are updated.
- Tranche 2 - Wayfinding is work in progress. Initial stages are to be completed by Q4 2025 / 2026.
- Tranche 3 – Travel Plans
- Tranche 4 – Transport Management Associations

Tranche 2 - Wayfinding

Makes travel via sustainable modes easier

Supports navigation for residents and visitors

Enhances the overall experience of public spaces

Promotes accessibility for people of all abilities

Aligns with the district's aesthetic and branding

This review through to implementation of wayfinding aims to reduce confusion, encourage sustainable transport options, and foster a more connected and welcoming community environment.

Tranche 2 - Wayfinding

Key elements of wayfinding include:

Signs and signage; clear, visible and informative signs that provide directional cues, locations and important information such as exit signs, street names or utility locations

Maps; visual representations of spaces such as geographic maps for outdoor navigation or detailed floor plans, which help individuals to understand the layout and locate their destination. Maps may be physical such as pocket paper maps, or large poster displays, or online through digital applications.

Tranche 2 - Wayfinding

Environmental cues; natural or architectural elements such as lighting, colour schemes or pathways that guide people through space without the need for explicit signage.

Digital wayfinding; technologies like GPS, mobile apps and interactive kiosks that provide real-time navigation assistance in both indoor and outdoor environments.

Scope of Wayfinding - Physical

- Audit of existing physical wayfinding signage to be conducted to establish the coverage and quality of the existing network
 - In person audit of main urban centres
 - Including both trail roading network and town centres
 - Digital audit via RAMM for rural areas
 - Identification of missing wayfinding gaps in the district: every decision point / intersection on key routes to have signage. Or separate KPI that at any time, a trail user will be within 250m of signage.
- Audit record to be produced and to include:
 - A record of tracks & trails in the district and their current wayfinding status
 - Recommendations for wayfinding in Wānaka town centre
 - Recommendations for wayfinding on Wānaka tracks & trails
 - List of identified gaps in the Queenstown town centre

Wayfinding – Physical

- Review of WATN Wayfinding Strategy
- Design work and signage location to be completed for identified wayfinding gaps. This is to result in a map outlining types of signage and locations, and corresponding artwork to match the Wayfinding Strategy for each route requiring installation of signage.
 - Signage design is to follow recommendations outlined in the Wayfinding Strategy. Some slight updates may be required to differentiate between signage in Wānaka against what is used in the Whakatipu.
 - Wayfinding plans to be created for routes requiring signage implementation
 - Some active travel routes in the Whakatipu have existing wayfinding plans to be followed. These routes include: C7, any others?
- Consultation with key identified stakeholders
- Consult with the public on proposed new physical wayfinding signage
- Implementation and installation of physical wayfinding

Wayfinding - Digital



Identify scope of existing digital wayfinding projects within QLDC



Audit of existing digital wayfinding options to be conducted to establish the coverage and quality of the existing network



Review of digital wayfinding options, including those used both locally and internationally



Run an Expression of Interest process to establish which providers have solutions

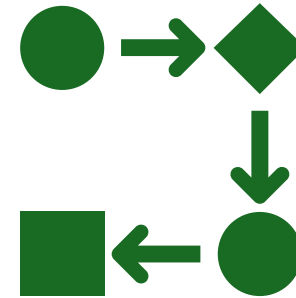


Recommendation made for best fit digital wayfinding solution

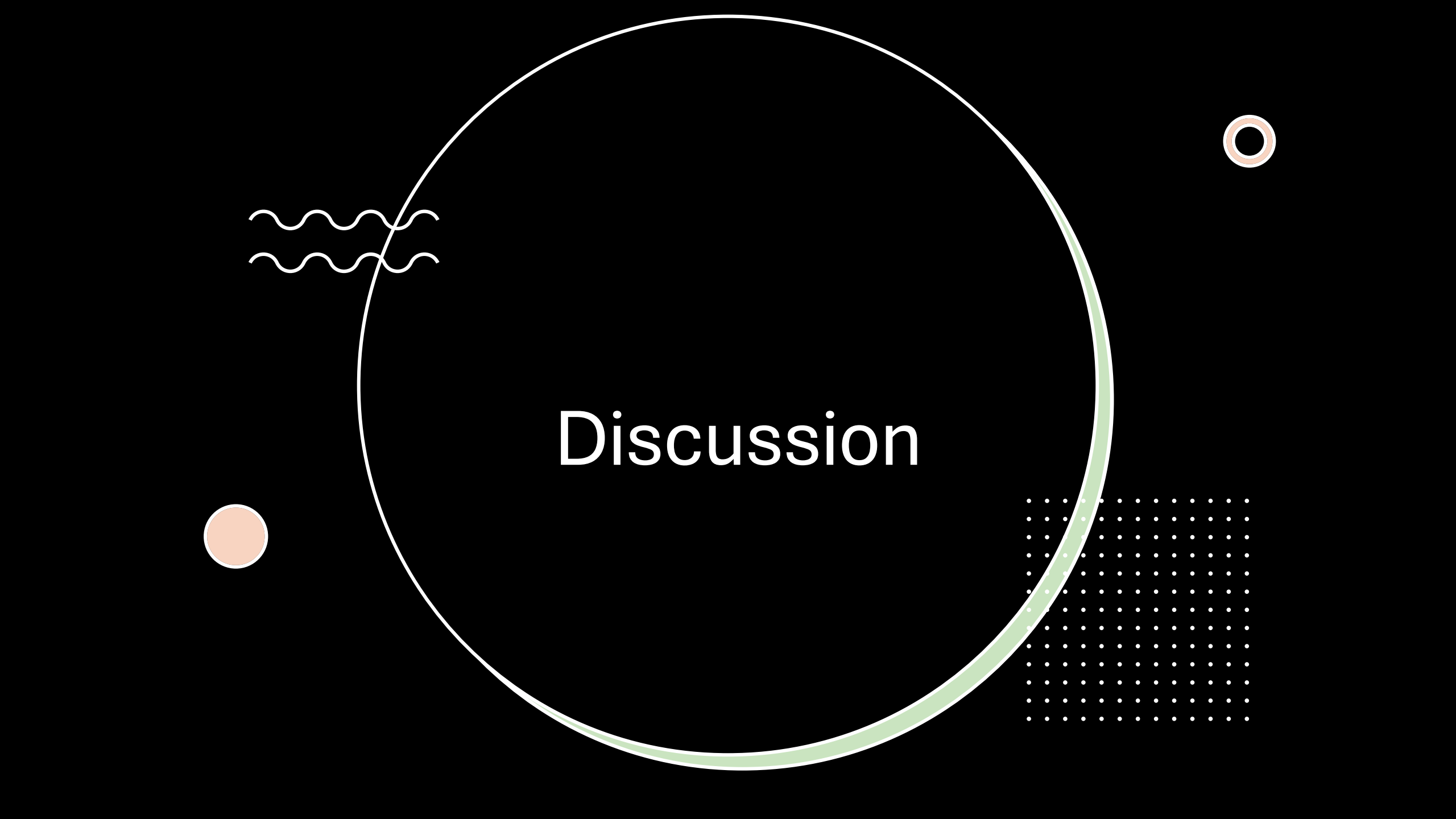
Wayfinding – Next Steps



Scoping phase for all tranches

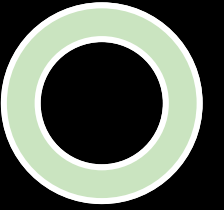


Enabling works if funding allows in this cycle (*may proceed to audits of wayfinding*)

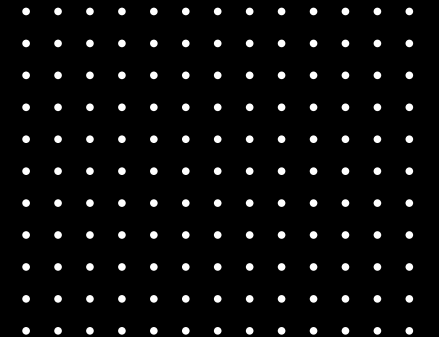
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Discussion

- Purpose
- Current progress
- Next steps



Wanaka PMP





Purpose - recap

- Purpose of the Comprehensive Parking Management Plan programme is to move away from reactive measures to a forward-looking approach, combining a central strategy and localised parking management plans.
- Parking management is an essential TDM measure for reducing congestion and maintaining effectiveness of transport networks.



Parking Management - objectives



Prioritise access according to user needs



Encourage mode shift and reduce emissions



Support a prosperous local economy



Support a safe and efficient transport network



Contribute to quality, people-focussed urban environments

Wanaka - PMP



The Wānaka Parking Management Plan (PMP) provides an overview of how public parking in Wānaka is currently managed and used, and provides actions to address some of the key parking issues in the town centre.



These actions aim to meet the needs of key users, which align with the principles and objectives established in Council's Parking Strategy.

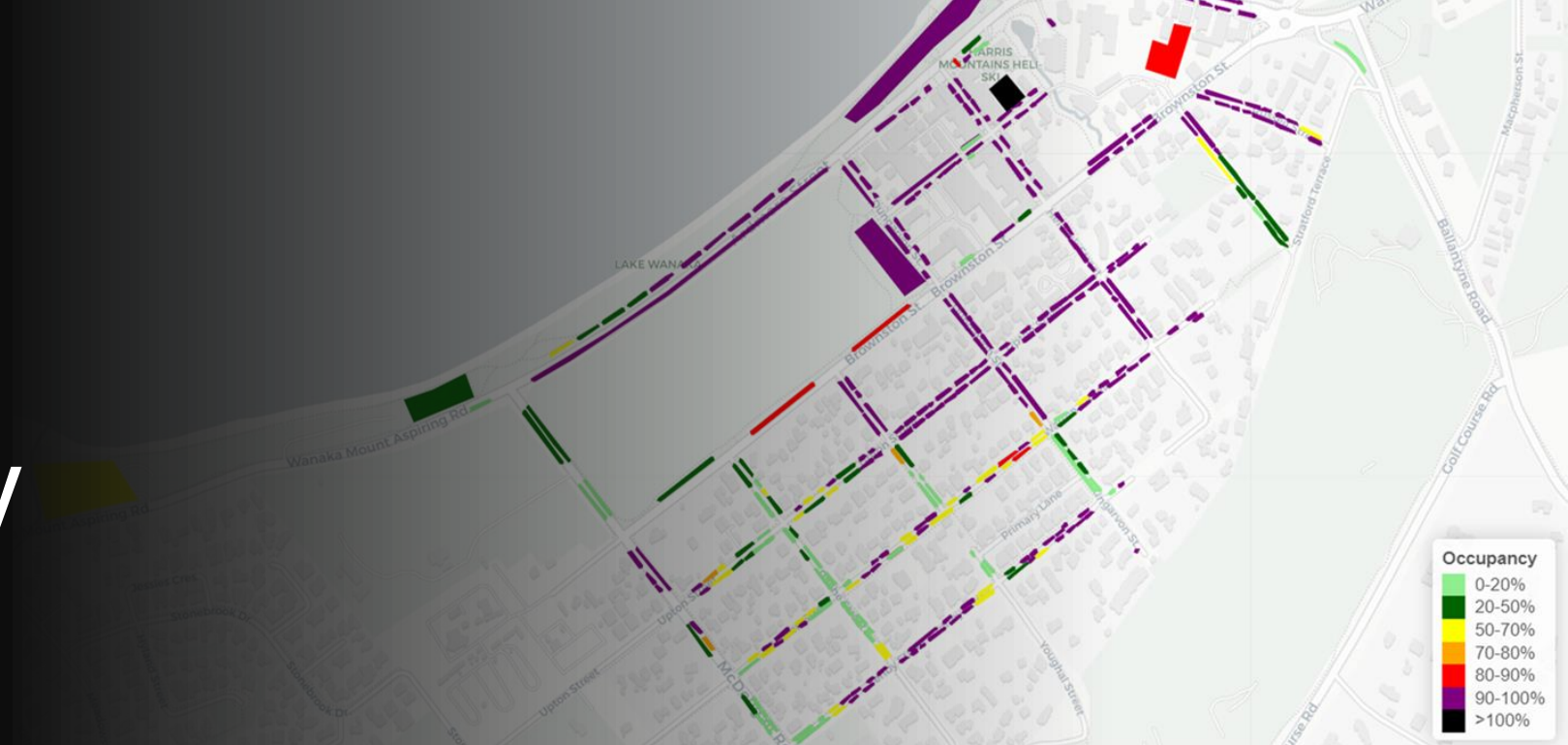


This PMP provides the direction for managing parking in the short term to medium term; future changes to parking will be directed by the triggers identified in our Parking Guidelines. These triggers for change include changes in the demand and supply of our parking resources, as well as changes to our transport network and land use.

Wanaka PMP – focus area



Parking survey results



	# car parks	700	900	1100	1300
park	75	56%	80%	83%	8
ark	40	33%	100%	110%	7
	80	8%	49%	96%	10
ark	136	18%	52%	99%	8
	70	10%	26%	27%	4
	70	21%	30%	53%	4
		23%	53%	79%	7

Key parking issues and opportunities

- Mobility Parking
- Loading Zones and rapid transaction parking
- Managing seasonal tourist demands
- Paid parking
- Commuter Parking
- Resident Parking
- Electric vehicle charging
- Motorcycle parking
- Bicycle parking
- Parking in Reserves
- Event Parking

Managing parking in precincts



Implementation Plan

- Each implementation will require detailed planning before it can be actioned.
- Ownership of assets, monitoring, enforcement, detailed design, costing, etc

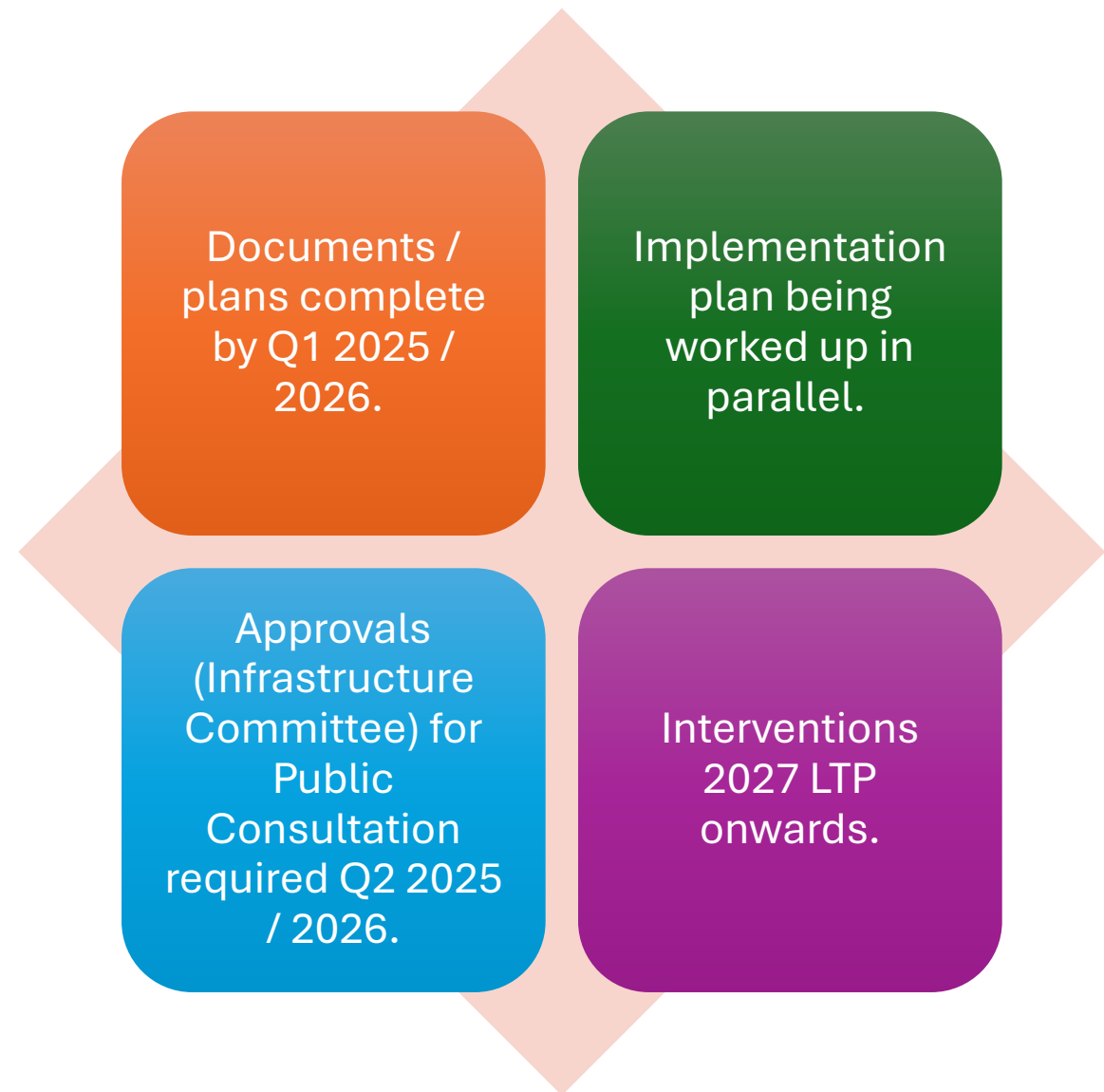
Actions

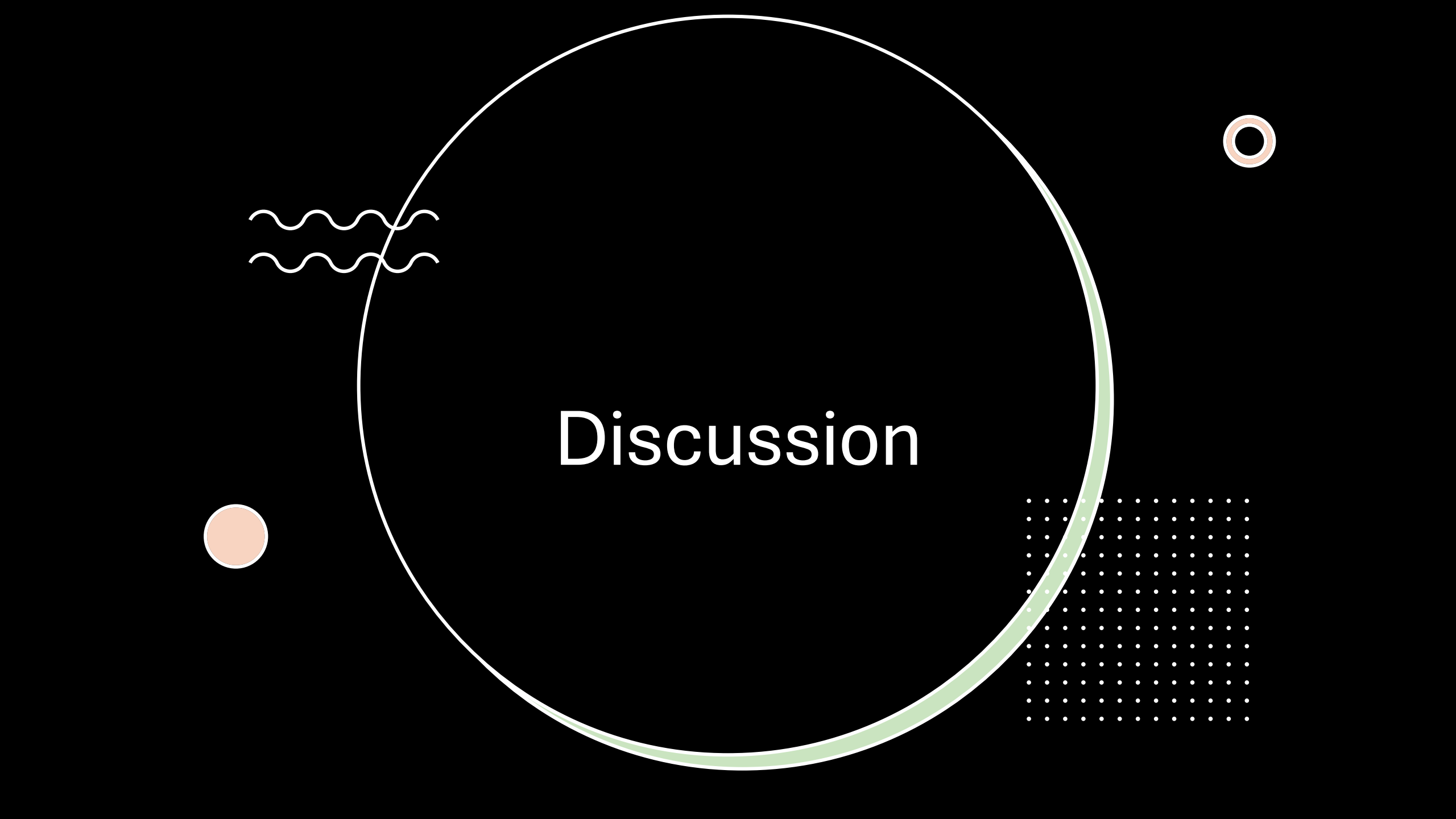
- Implement bicycle parking corrals and secure bicycle parking as part of town centre upgrades and the development of civic and community facility projects

Implementation Plan



Next steps



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Discussion

Queenstown Lakes District Council

WĀNAKA NETWORK OPTIMISATION BUSINESS CASE

SINGLE STAGE BUSINESS CASE:
STRATEGIC CASE

30 JUNE 2025



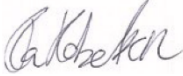


WĀNAKA NETWORK OPTIMISATION BUSINESS CASE

Queenstown Lakes District Council

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REV	DATE	DETAILS
Draft V1	17 November 2023	Draft for Client Review
Draft V2	12 January 2024	Revised Draft for Client Review
Draft V3	17 January 2024	Revised Draft with Additional Case for Change Section
0	30 June 2025	Final

	NAME	DATE	SIGNATURE
Prepared by:	Holly Keen-O'Leary, Hilary Fowler, Ian Robertson, Mark Gregory, Kaveesha Fernando	27 June 2025	
V2 Reviewed by:	Nerissa Harrison	12 January 2024	
V2 Approved by:	Haydn Gwilliam	12 January 2024	
Reviewed by:	Cherie Mason	30 June 2025	
Approved by:	Ryan Rolston	30 June 2025	

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STRATEGIC CASE

1 INTRODUCTION AND PURPOSE

The purpose of this Wānaka Network Optimisation Single Stage Business Case (SSBC) is to make a compelling case for change for investment in the transport network within Wānaka and the immediate surrounds. It is about preparing and optimising the transport system for future growth and development. The SSBC explains both the causes and effects of the problems and explores opportunities determined by Queenstown Lakes District Council (QLDC), its key stakeholders, and makes recommendations.

Scope of SSBC

This SSBC will take a detailed look at each of the road network options presented in the Master Plan and how future needs can be addressed by focussing on the optimisation of existing transport networks.

Following the 2019 Programme Business Case (PBC), different workstreams were developed to investigate and plan various aspects of the transport network (such as for the town centre etc.) As such, the section below highlights the components of the SSBC which are in and out of scope.

In Scope

- Active modes network.
- Public transport network.
- Road network improvements.
- Wānaka urban area (see Figure 2-1) including Brownston Street (but not the rest of the Town Centre).

Out of Scope

Items covered in the 2018 Master Plan PBC and Town Centre Master Plan not included in the scope of this SSBC are listed in Table 1-1.

Table 1-1: Out of Scope Elements from PBC (2018)

Out of Scope	Delivery of Out-of-Scope items
Parking Management	District Wide Parking strategy and Wānaka (town centre and surrounds) Parking Management Plan currently being developed by QLDC.
Town Centre (bordered by Ardmore Street, Brownstown Street, Dungarvon Street)	Town centre improvements along the lakefront are being progressed through the Wānaka Lakefront Development Plan 2016
Land Use Changes	Queenstown Lakes Spatial Plan 2021. Future Development Strategy (based on Spatial Plan) currently being prepared. Structure Plan changes planned from June 2024.

Areas around Lake Hāwea and Luggate are not within scope. However, growth in these areas is expected to have a significant impact on trips and movement within Wānaka.

2 BACKGROUND

This Strategic Case forms the case for change as part of the Wānaka Network Optimisation Single Stage Business Case (SSBC). This strategic case has been updated and builds on the 2018 Strategic Case (appended to the 2019 Wānaka Town Centre Master Plan) produced by Stantec for Queenstown Lakes District Council (QLDC). Most of the rationale and evidence included here is referenced from the 2018 Strategic Case with updated data where necessary and available.

The geographical extent for this SSBC is outlined in Figure 2-1 below.

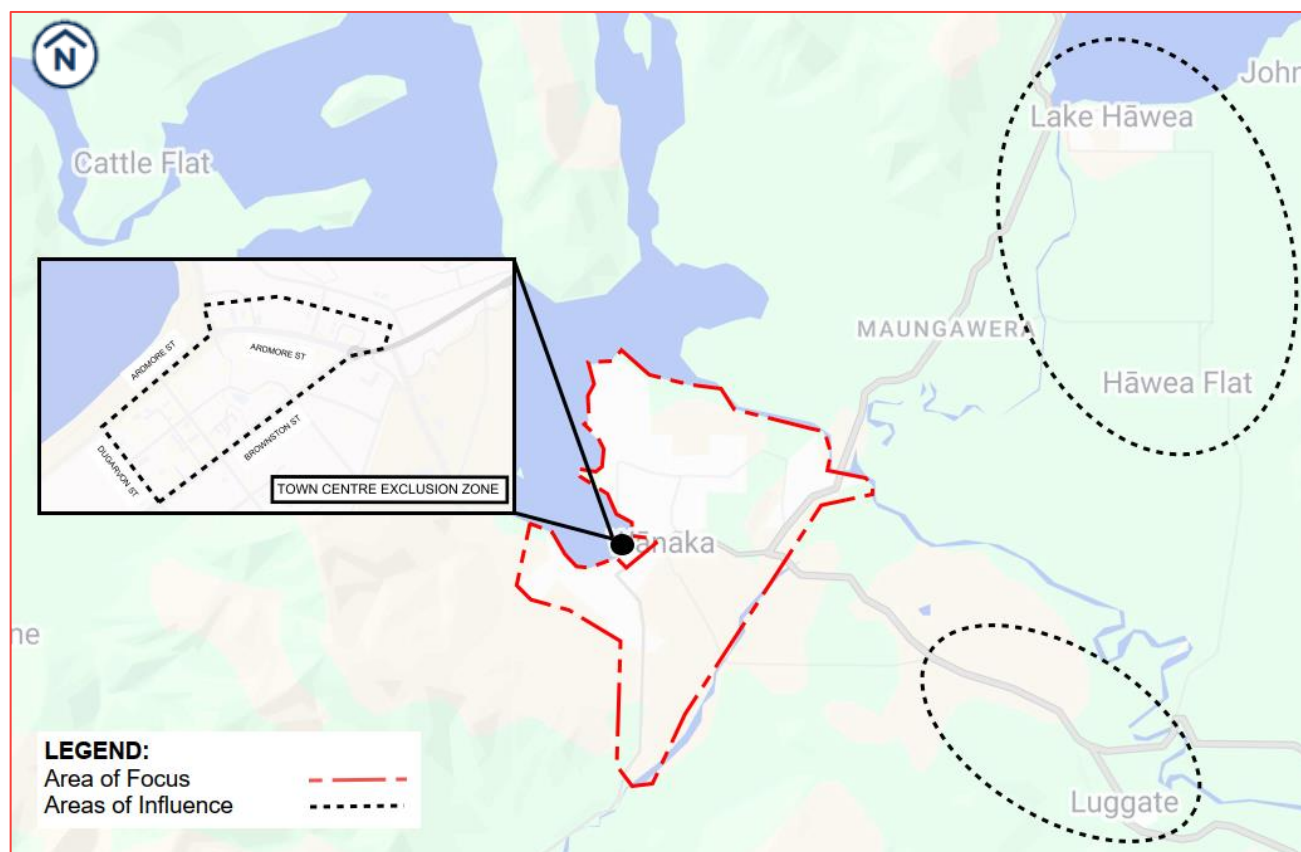


Figure 2-1: Geographical Scope of SSBC (Source: Google Maps)

2.1 HISTORY

This SSBC considers the following studies and decisions listed in Table 2-1.

Table 2-1: Timeline of Strategic Documentation relevant to SSBC (since 2015)

Year	Document	Comments
January 2015	Wānaka Programme Business Case	This PBC covered all of Wānaka including walking and cycling, intersection and corridor, and parking changes but was not supported by NZTA Waka Kotahi due to problems perceived to be small in scale and evidence base required strengthening if to support future problems.

Year	Document	Comments
June 2018	Wānaka Integrated Transport Programme Business Case and Town Centre Master Plan	Report established the need for Master Plan and Programme Business Case. This document further explored town centre improvements to maximise urban design, lake connectivity, and transport improvements to support growth and development within the wider Wānaka area.
July 2018	Wānaka Transport Point of Entry	Approved by NZTA Waka Kotahi which stated that town centre and wider Wānaka area transport improvements should be explored further.
August 2018	Wānaka Transport Strategic Case	Supported by NZTA Waka Kotahi as part of Point of Entry.
July 2019	Wānaka Master Plan Programme Business Case (PBC)	Developed in combination with the Town Centre Master Plan and included as an Appendix. Focused on transport needs within the wider Wānaka area, including changes to the transport network to support the Master Plan. This PBC was not endorsed by NZTA due to considerations and a recommendation to provide a more targeted SSBC to focus on the key short to mid-term transport priority investments.
August 2019	Wānaka Town Centre Master Plan	Focused on transport and public realm improvements within the Wānaka Town Centre.
August 2019	Wānaka Network Operating Framework (NOF)	Developed to support the Master Plan and PBC. The Wānaka NOF identified modal priority routes and conflict between modes. The NOF did not establish existing level of service or targeted level of service. Further work would be needed to use the NOF to establish operating gap assessment from the NOF.
November 2019	N/A	In November 2019 the Wānaka Community Board agreed to progress the Wānaka Network SSBC to implement the needs identified from the 2019 Wānaka Master Plan which included the 2019 PBC and 2018 Strategic Case.
July 2021	Queenstown Lakes Spatial Plan	A framework where and how the Queenstown Lakes District will grow out to 2050. Adopted by Queenstown Lakes District Council.

2.2 PROJECT PARTNERS

Table 2-2 below outlines the project partners and their focus area for this SSBC.

Table 2-2: Partners for SSBC

Project Partner	Focus Area
Queenstown Lakes District Council (QLDC)	Lead organisation responsible for developing this SSBC, strategic transport planning, managing and operating the local transport network, land use planning, recreation, and placemaking.
New Zealand Transport Agency Waka Kotahi (NZTA)	Responsible for managing and operating the state highway network and investing in the land transport system.
Otago Regional Council	Responsible for public transport planning, including the Regional Land Transport Plan
Wānaka Community Board	Elected representatives of the local community in Wānaka.
Kāi Tahu	Iwi of the Queenstown Lakes District.

3 STRATEGIC CONTEXT

Wānaka serves as the primary service hub for residents and tourists in the Wānaka-Upper Clutha Ward (Wānaka Ward). Wānaka services nearby townships such as Glendhu Bay, Lake Hāwea, Hāwea Flat, Luggate, and Cardrona as depicted in Figure 3-1.

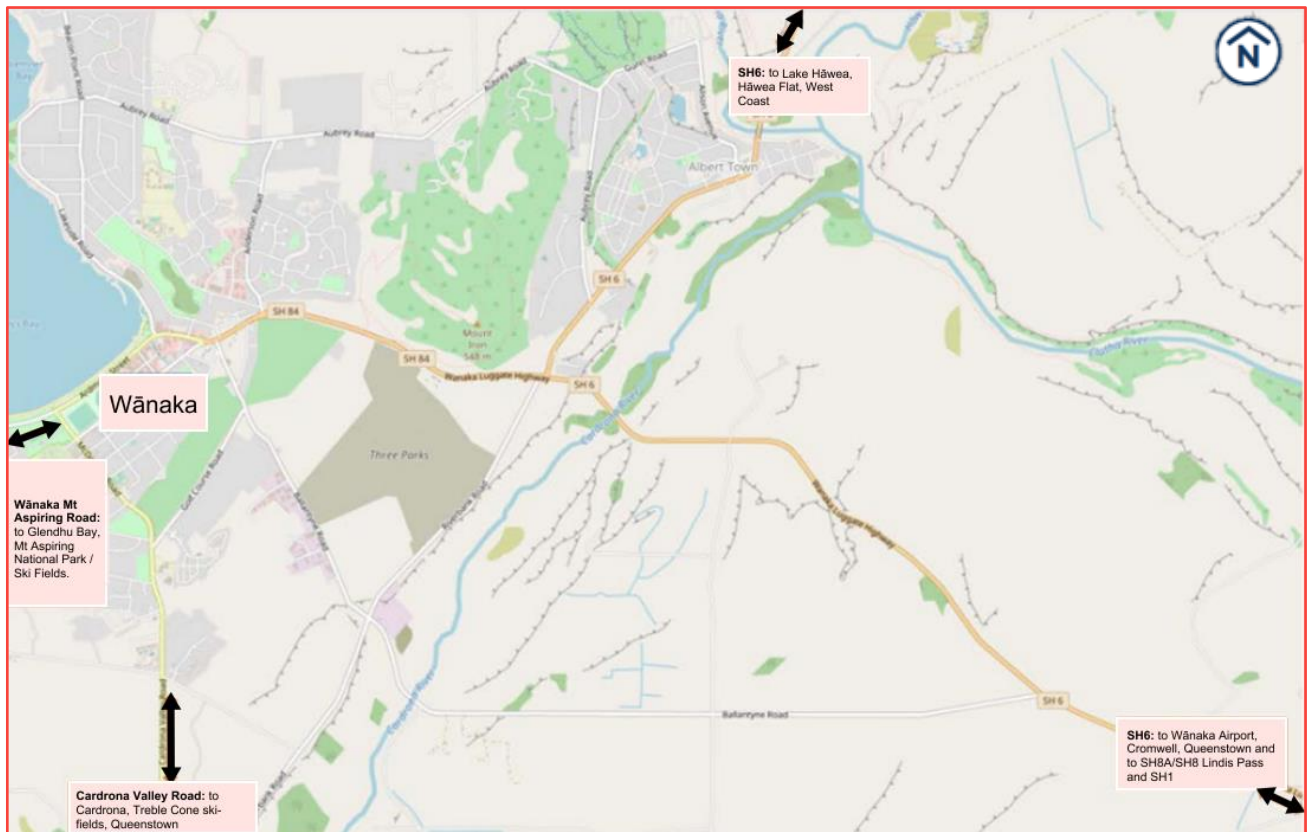


Figure 3-1: Wānaka Transport Network. (Source: 2018 Strategic Case)

Wānaka is undergoing rapid change with more people living and working in Wānaka with population growth increasing on average around 5% over the 5 years to 2024¹. It is also increasingly popular with domestic and international visitors. This significant growth in people living and using the area has led to pressures on existing infrastructure, including the transport network. Given the wider network and planned land use, along with limited public transport options or walking and cycling networks, this has created an over reliance on private vehicles for key journeys.

Historically, transport and land use planning has not been comprehensively integrated. With location and land use within the new development centres primarily developer-led. For example, two new centres, Three Parks and Northlake, are destinations for Wānaka residents and will require enhanced connectivity with surrounding residential areas to provide access for all modes. Three Parks is a mixture of commercial and retail buildings alongside social buildings such as Te Kura O Take Kārara school and Wānaka Recreation Centre and Swimming Pool. Northlake is a residential development with capacity for up to 1,500 homes north of the town centre. It includes a Village Centre which includes a restaurant, commercial centre, early childcare, and recreational reserve. Figure 3-2 shows how Wānaka and the surrounding area is expected to grow according to

¹ [Regional Economic Profile | Wānaka and surrounds | Population growth](#)

the 2021 Spatial Plan. Note that a new Spatial Plan / Future Growth Strategy is set to be published in 2025, but is currently on hold.

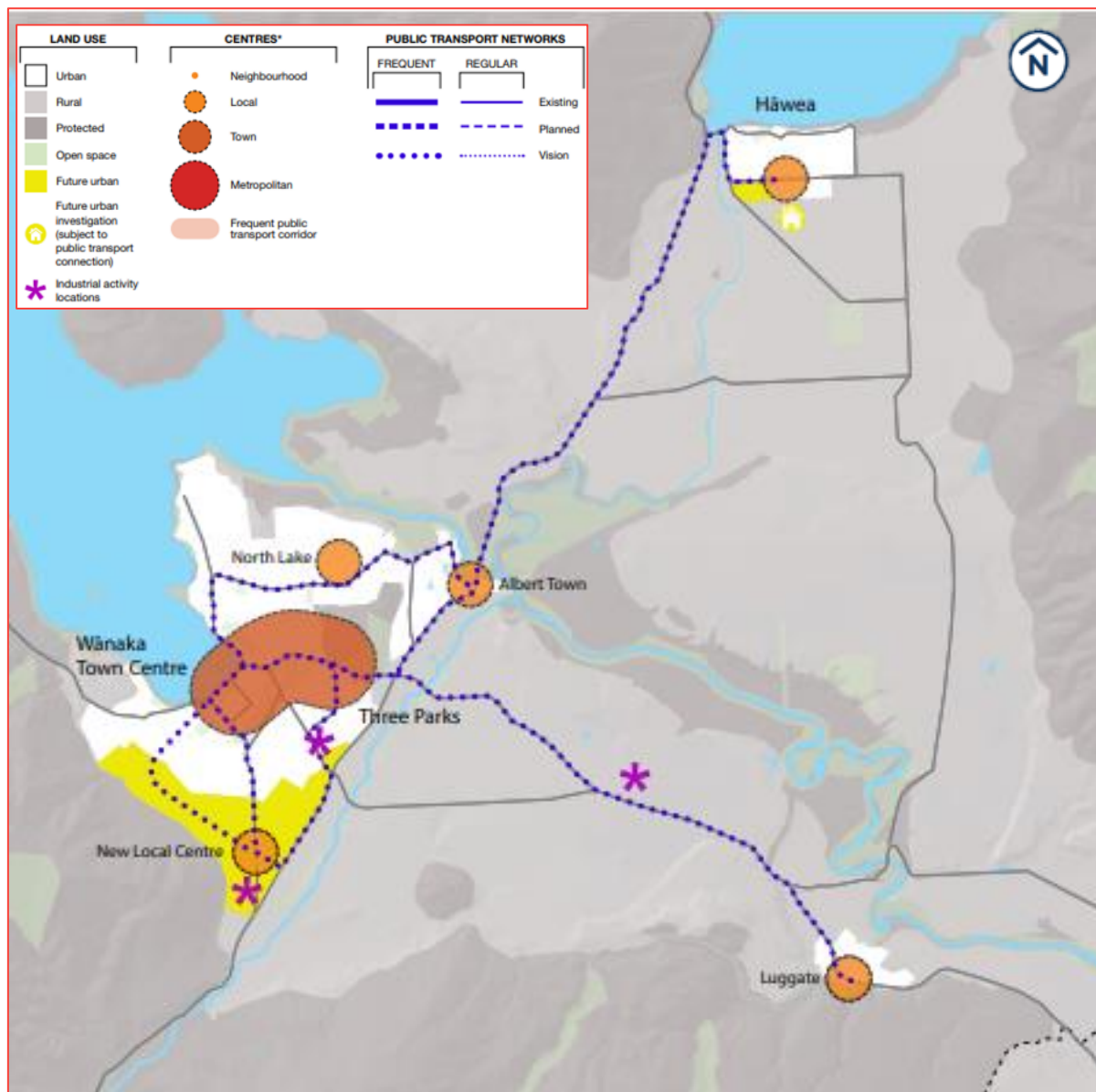


Figure 3-2: Spatial Elements for Wānaka and Upper Clutha. (Source: Queenstown Lakes Spatial Plan 2021)

Wānaka's goods and services are primarily located in the town centre between Ardmore and Brownston Streets. These roads are used as through routes for vehicles, but also form the heart of the public realm, in conjunction with the waterfront. The through route and place functions often mean potential conflict with vehicles and non-vehicular users leading to safety issues and erosion of amenity at the town centre.

The State Highway network provides Urban and Rural Connectors to the wider network via SH6 and SH84. Other Urban Connectors are parts of Ardmore Street, McDougall Street, Golf Course Road, Ballantyne Road, Anderson Road, Beacon Point Road, and Aubrey Road. Rural and Urban connectors typically support high levels of vehicles and freight to move people and goods. Figure 3-3 shows the ONF classifications for each of the transport corridors in and around Wānaka.



Figure 3-3: ONF Classification for Wānaka. (Source: NZTA Waka Kotahi MegaMaps)

3.1 CASE FOR CHANGE

The case for change is based around the need to manage and cater for growth within Wānaka with the following considerations below:

- **Population Growth** - A doubling of the population in the Wānaka Ward from 17,820 residents in 2023 to 30,250 residents by 2053.
- **Equitable Access for An Ageing Population** – An ageing population with decreased access to private motor vehicles. As a result, the mode share of vehicles within the Wānaka transport network will be impacted with alternative modes required for equitable access. Currently, limited public transport and micromobility options will deteriorate accessibility.
- **Increased Share of 'Permanent' Residents** – An increase in the ratio of permanent residents in comparison to tourists, meaning a further increase in daily traffic generation.
- **Settlement Pattern Changes** – It is anticipated that most capacity will be located in Wānaka West.
- **Three Parks Mixed Use Development** - A major mixed use and commercial hub, comparable to the Frankton centre in Queenstown, estimated to generate 25,000 trips per day.

Without intervention, core employment and economic areas will become less accessible, most notably within the town centre. Intervention can provide dedicated roles within an enhanced network, including maximising opportunities for access and maximum economic impact. As such, network optimisation which has an important role in enabling the transport network to fulfil its role in supporting a strong and well-functioning economy, society, and environment needs to be considered. Figure 3-4 depicts the key focus areas for further discussion about the Case for Change in section 3.1.1 and section 3.1.2.

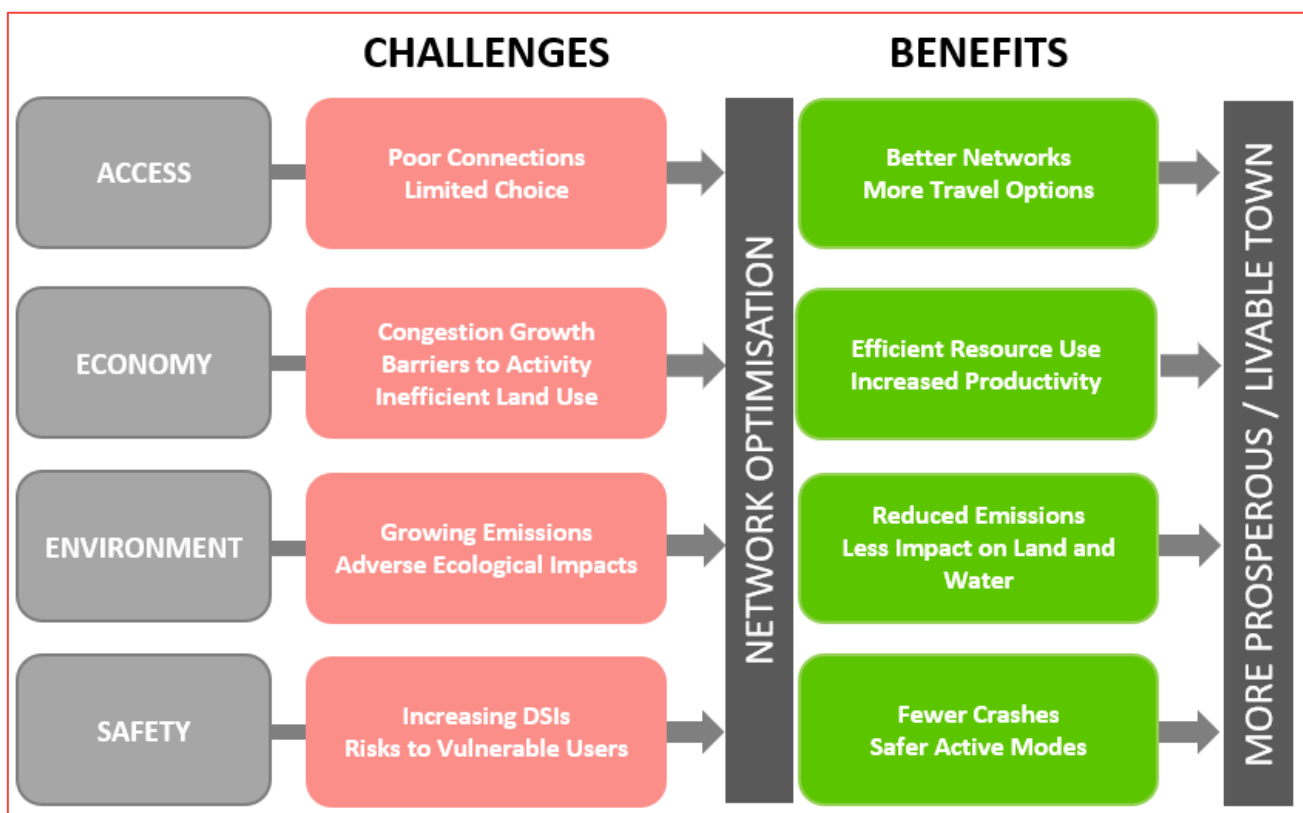


Figure 3-4: Challenges and Benefits of Network Optimisation in Wānaka

3.1.1 ACCESS

Wānaka contains two corridors which access the Town Centre, and a distinct settlement pattern around these corridors with the town centre as the sole commercial and economic centre.

Much of the network is 'sparse', meaning that it serves a wide area of low-density land use with comparatively few connections, similar to the Queenstown or Dunedin networks. A small number of intersections will be impacted by demand and will be unable to offer acceptable levels of services for any road user.

The Network Operating Framework (NOF) sets out modal priority conflicts (i.e. which mode should be given priority in a given road corridor or network), including the views of key stakeholders. The summary is that in Wānaka there is:

- 1) Too many functions being served on the current network.
- 2) The existing network is limited in extent and alignment with regards to separating out and managing different movement and access demands.

The existing convergence of routes (including State Highways) around the Town Centre creates a conflict between access to the Town Centre and movement. This conflict is currently processed efficiently, without an especially high crash record. However, although there is currently no high crash record, if growth is left unmanaged, the increasing conflict will result in congestion and increased potential road safety risk (potentially creating a 'barrier' to accessing the town centre). The development of Three Parks development will also intensify conflicts around the Town Centre and could also result in many shorter vehicular trips which could otherwise have been walked or cycled.

Wānaka is designed around car travel, with it likely remaining the dominant mode of transport given the wide rural network feeding into the area. Previous government policy included the ban of petrol car sales by 2035. However, Wānaka currently has a high rate of electric vehicle (EV) purchase, with 20% of sales, ranking Wānaka 24th out of 135 New Zealand towns.² This suggests potential for a more rapid shift to EVs, and the continued prevalence of car dominated mode of travel in Wānaka.

On this basis, the doubling of population would see a significant growth in car travel, even if some trips are substituted for other modes. Therefore, managing growth well including managing conflict points with other networks including active travel. Managing conflict points will support the benefit realisation associated with active travel, including opportunities to enhance the number of people who can access the Town Centre with other modes, to help optimise the network for longer and increase perception of safety and access.

Given Wānaka Town Centre is relatively compact, the amount of land available for car parking is limited, and demand is already reaching capacity at some locations.

Active mode travel options are currently limited with a mix of steep gradients and longer travel distances which acts as a deterrent and results in car dependency. The ageing population will need to be a consideration of network and urban design, especially noting that the most notable crash history stems from vehicle conflicts with pedestrian and cyclists in and around the Town Centre. Connection to growth areas, especially Three Parks and the Town Centre can maximise opportunities to improve connections for active modes.

² <https://evdb.nz/region>

3.1.2 ECONOMY

Enhancing access is essential to realising economic outcomes, as people cannot spend in a location that they are unable to reach. Most of the key economic and employment sites are distributed around / accessed from the Wānaka – Luggate (SH84) corridor. These include the Town Centre, Three Parks and Anderson Road industrial areas.

The route operates with a 'good' level of service, determined from observation and using existing tools. However, the design capacity of the corridor, including the existing roundabout intersections will likely not meet future design demands, associated with a doubling of population.

This growth is uneven, with the fastest population growth rate expected in Wānaka Central (at around 6% per year), and the forthcoming Three Parks development estimated to generate 25,000 trips per day³. For context, the current total Wānaka daily trip generation is estimated to be around 72,000 trips per day.

3.1.3 'MANAGING GROWTH

Wānaka is experiencing significant growth, how growth is managed is an opportunity to enhance outcomes for the community. There are measures to manage growth; for example, managing and controlling development and development effects through the District Plan. However, given the nature of the specific problems and substantial growth, an optimised approach is required to:

1. Provide 'right size' capacity for different travel modes, factoring in down-stream capacity constraints (including parking).
 - o *For example, Wānaka Town Centre could not accommodate visitor growth through car access alone, without substantial use of land for additional roads and car parking. This would not support the broader strategies for the town centre, to grow as a major cultural attraction.*
2. Provide a quality design response for each mode of transport, particularly providing suitable conflict point management, supporting the benefit realisation associated with each mode.
 - o *For example, active mode travel provides a means of overcoming capacity constraints to the town centre, compared to doubling the current supply of car parking. If active mode networks and their conflict points with vehicular traffic are not well and safely designed, people will choose not to access the town centre via active mode, hence not allowing the full benefit realisation of active travel.*
3. Develop coherent and well-planned networks, based on best practice design guidelines, which can effectively serve the different movement types and purposes, including freight.
 - o *For example, develop dedicated freight routes, ensuring a consistent approach to geometric design on these routes. Provide more dedicated movement and access functions to reduce conflicts between these purposes. Develop a network planning approach to control device selection and safety engineering.*
4. Stage in accordance with land use and work towards unlocking longer term land capacity.
 - o *For example, develop new or enhanced corridors to provide sufficient movement capacities between major growth areas, including better connections to Three Parks, and unlocking the land capacity in West Wānaka.*

³ Traffic Impacts Assessment prepared by MWH, 2008

4 DEFINING THE PROBLEM / OPPORTUNITY

4.1 ILM WORKSHOP

Stakeholders from QLDC, Otago Regional Council (ORC), and NZTA Waka Kotahi undertook a workshop in September 2023 to review the 2019 PBC Investment Logic Map (ILM) and if any updates were needed.

This discussion concluded that the intent and the problems remained, however there was need for some adjustment of the wording. Table 4-1 outlines the key differences between the 2019 PBC and 2023 SSBC Problem Statements. It was agreed that the weightings of the problem statements did not need to be adjusted.

Table 4-1: Change in Problem Statements between 2019 PBC and 2023 SSBC – 2023 Update

	2019 PBC	2023 SSBC	Rationale for change
Problem Statement One	Rapid population growth and the current approach to influencing new development is making it difficult to plan for the future, leading to disjointed infrastructure and creating barriers to accessing key destinations for residents and visitors (60%)	Rapid population growth and a lack of effective integration between transport and land use planning results in disjointed infrastructure, limiting equitable and sustainable transport choices across modes for residents and visitors. (60%)	Inclusion of equitable choice across a range of modes Focus on mode choice rather than mode shift
Problem Statement Two	Growth in travel and demand and limited options for accessing key activities by different modes results in over-reliance on certain routes, eroding levels of service on those routes and creating severance and conflict. (40%)	The current Wānaka network, and its existing links to surrounding satellite towns, are limited in their ability to accommodate expected growth in commuting and tourism, resulting in over-reliance on certain routes by motor vehicles, eroding levels of service on those routes and creating severance and conflict. (40%)	Inclusion of connectivity for tourism and linkages to satellite towns

Following these amendments to the Problem Statements, the 2023 NZTA Waka Kotahi Monetised Benefits and Cost Manual (MCBM) was used to update the mapping for the benefits, investment objectives and associated Key Performance Indicators (KPI's). This has resulted in considerable changes to the benefits mapping in the 2019 PBC.

Confirming the 2019 PBC opportunities remained the same:

- Preparing for future growth
- Connecting Ngā Haerenga NZ Cycle Trail routes
- Improving visitor and community satisfaction

- Protecting the character of Wānaka
- Increasing active mode transport participation

The 2023 SSBC ILM is shown in Figure 4-1 below.

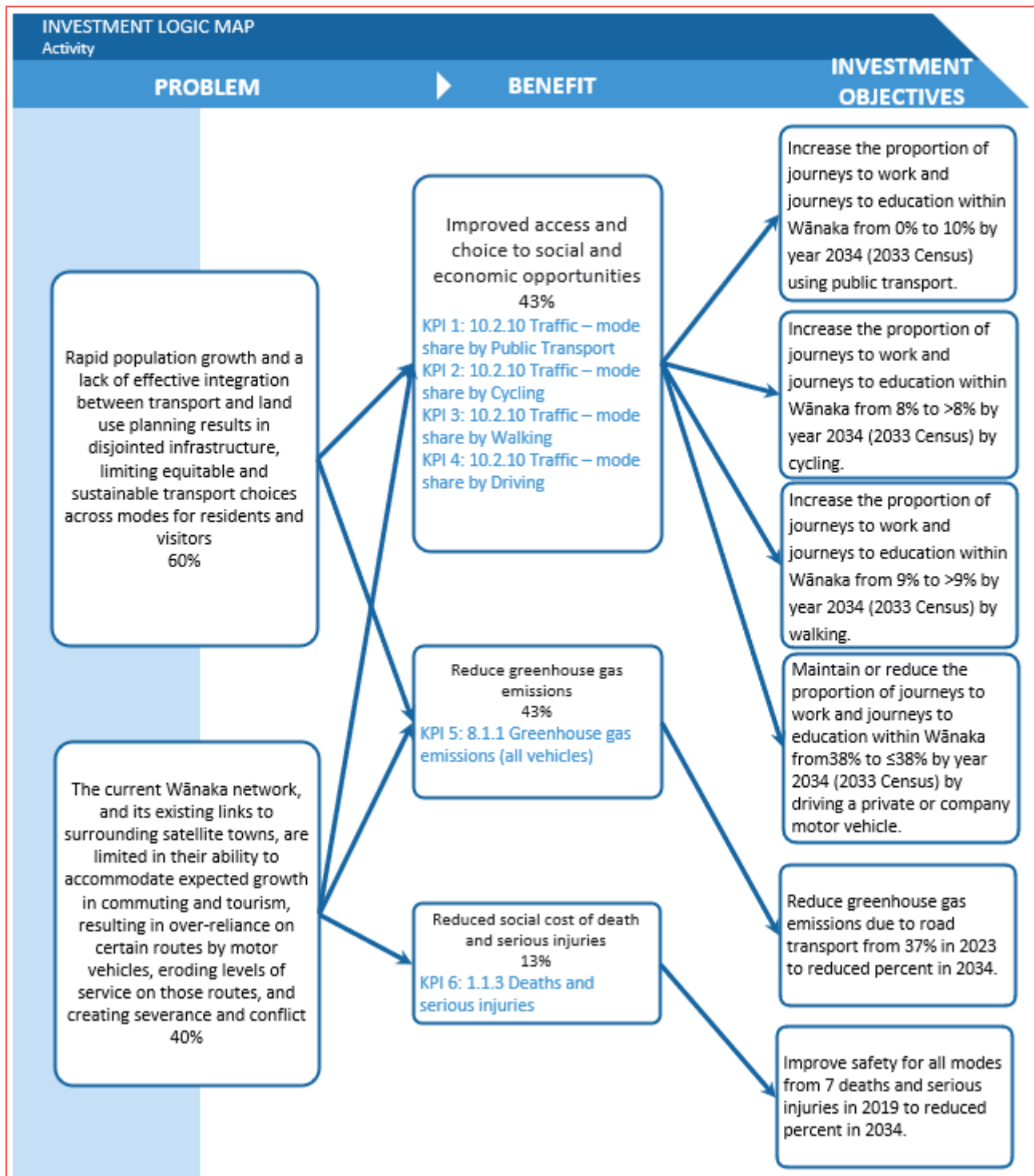


Figure 4-1: Investment Logic Map - 2023 Update

Further documentation on changes made to the ILM are summarised in Appendix B and Appendix C. The remainder of this section outlines the evidence for the problem statements identified in the workshop.

4.2 PROBLEM STATEMENT 1:

Rapid population growth and a lack of effective integration between transport and land use planning results in disjointed infrastructure, limiting equitable and sustainable transport choices across modes for residents and visitors (60%).

4.2.1 GROWTH IN WĀNAKA

HISTORICAL GROWTH

Wānaka has grown considerably over the last two decades. Figure 4-2 demonstrates that between 2006 and 2023, the resident population of Wānaka has more than doubled. In 2023 Wānaka had a resident population of 11,919 people. This was a 136% increase over the population recorded in the 2006 census. Wānaka also accounted for a quarter (24.9%) of the district's population, a slight increase from 24.4% since 2018.

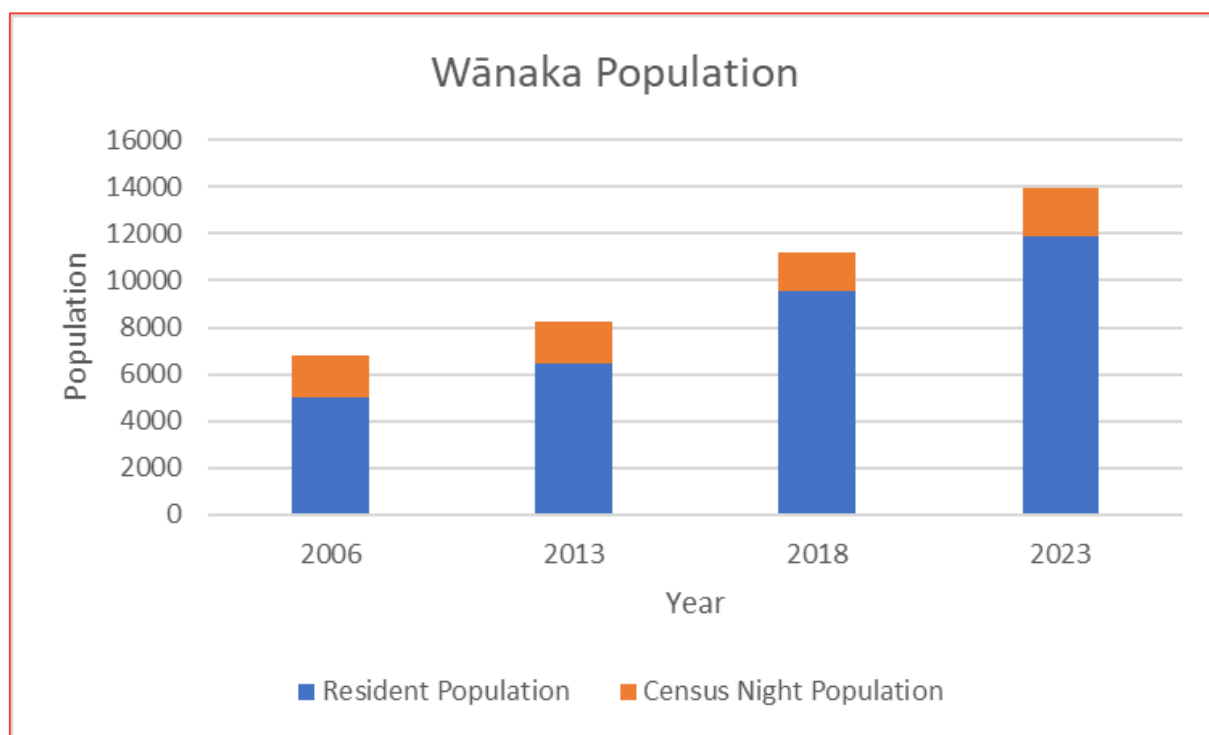


Figure 4-2: Growth in Wānaka Township Resident Population 2006-2023. (Source: StatsNZ Census)

PROJECTED GROWTH

Figure 4-3 depicts that the resident population of Wānaka township is forecast to reach 22,000 people by 2053 (which is a 130% increase on 2018). The nearby Lake Hāwea township is also expected to grow substantially, from about 2,000 residents in 2023 to over 4,000 in 2053⁴.

It is worth noting that there is some uncertainty in these projections and a range of scenarios could be considered when determining impacts. The QLDC projections are compared with Stats NZ, with Stats NZ producing a range of population projection scenarios which are noted as 'High',

⁴ Queenstown Lakes District Council, <https://www.qldc.govt.nz/community/population-and-demand/>

'Medium', and 'Low'. The QLDC resident projections align with the 'High' StatsNZ projections (which is the upper limit) from March 2021 and December 2022. These were both lower than the 2023 StatsNZ QLDC resident population count.

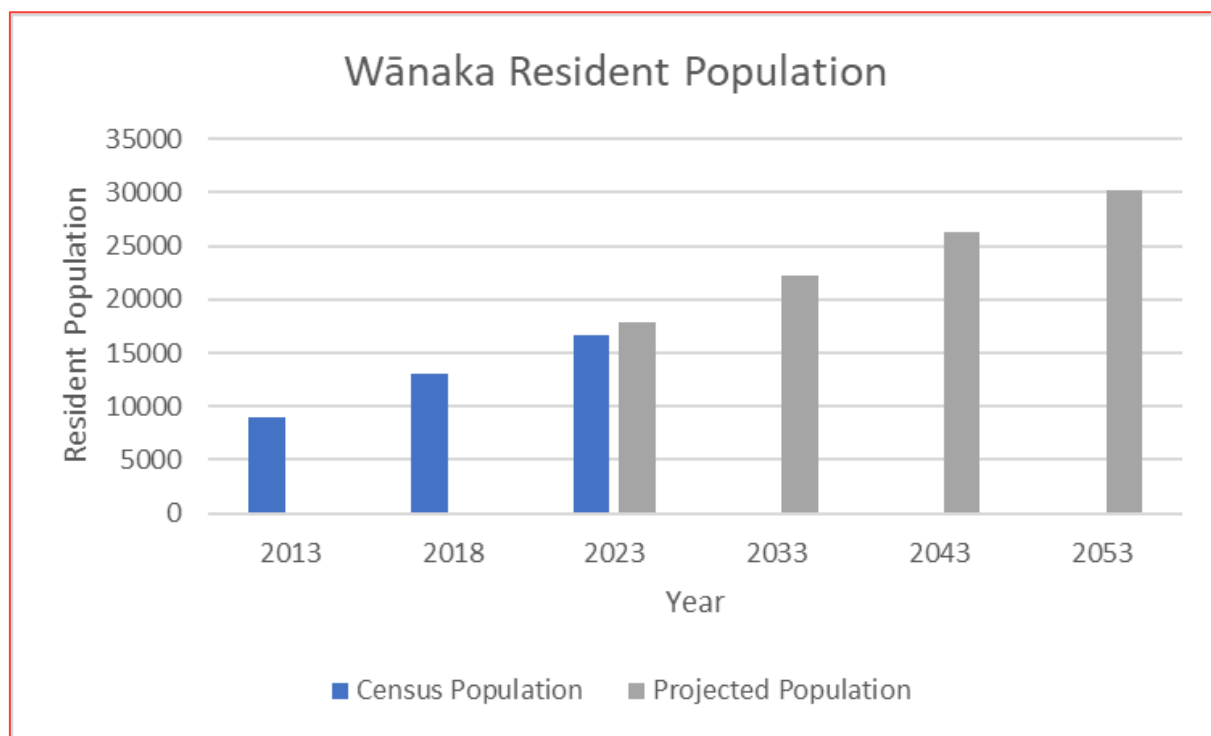


Figure 4-3: Projected Residents for Wānaka Township. (Source: QLDC 'Population and Demand')

The number of visitors to Wānaka also impacts the population. In 2023, QLDC population projections state that visitors increase the Wānaka Ward's population by 25 percent on an average day, and expected to grow to over 35 percent by 2033. The number of visitors is considerably larger during the peak summer and winter seasons with peak visitor numbers four times higher than average visitor numbers. The average resident and visitor population is estimated to be approximately 30,000 in 2033 and approximately 40,000 in 2053. Visitor numbers, particularly at peak times will increase strain on the transport infrastructure.

SCHOOL ROLL GROWTH

Population growth in the Wānaka population is reflected in school roll numbers showing an increase in numbers particularly for the Mt Aspiring College catchment as illustrated in Figure 4-3. In 2017, the Ministry of Education responded by providing two new classrooms for Mount Aspiring College and construction of a new primary school (Te Kura O Take Kārara) in Three Parks catering for up to 600 students. Census Data indicates that from 2018 to 2023, the number of people studying full-time or part-time increased from approximately 2,700 to 3,400 (including approximately 250 studying at home to over 400 studying at home).

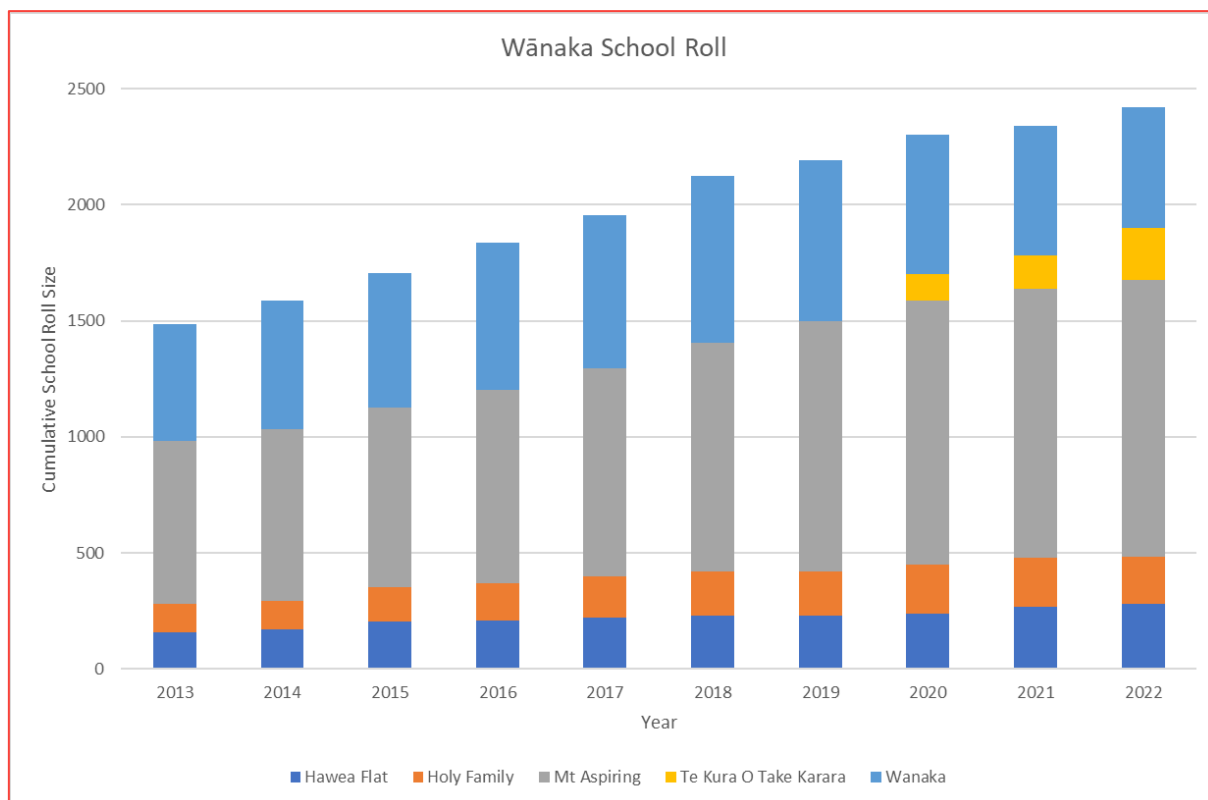


Figure 4-4: School Roll for Wānaka Schools. (Source: QLDC)

4.2.2 SUPRESSED DEMAND – ACTIVE TRAVEL

EXISTING ACTIVE MODE USE

Cycling as a mode choice to work has been increasingly popular with consistent growth of numbers of people who live in Wānaka cycling to work as depicted in Figure 4-5. Growth in cycling to workplaces within Wānaka has not been as strong, this shows that Wānaka Residents are cycling to areas outside of Wānaka for their journey to work. The dip in the proportion of people cycling is likely reflective of the rapid population growth, rather than the decline in popularity. Wānaka Central is the workplace destination with the strongest growth in cycling to work. Wānaka North, Wānaka West, and Albert Town as residential addresses each had growth of over 2% in cycling to work mode share. Cycling to work at Wānaka Central has grown as grown to 8% mode share, doubling since 2006.

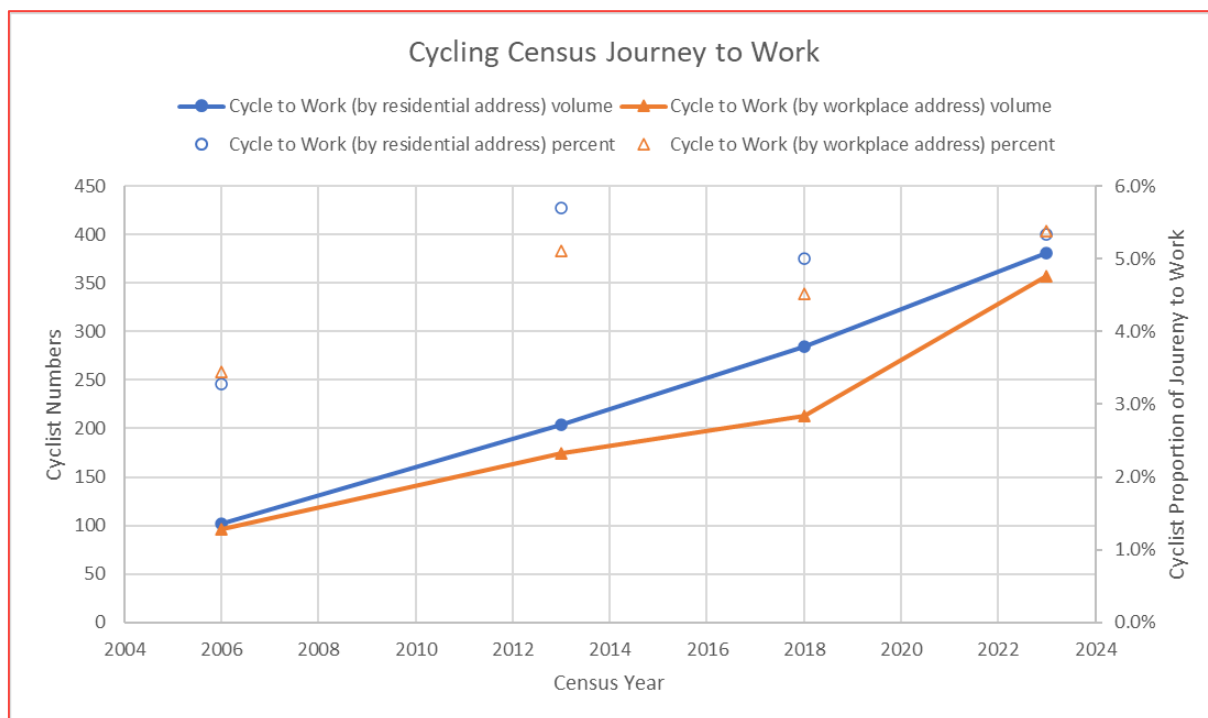


Figure 4-5: Journey to Work by Residential and Workplace Address. (Source: StatsNZ 2018 & 2023 Census.)

RECENTLY COMPLETED IMPROVEMENTS AND PLANNED NETWORK

Since the 2018 Strategic Case, there has been planning and construction of active travel projects within Wānaka which will improve access, and number of users. These include:

- Aubrey Road Shared Path.
- Anderson Road Shared Path.
- Schools to Pool Active Travel Route.
- SH84 Underpass (near Sir Tim Wallace Drive).
- Mt Iron Roundabout which includes a Separated Shared Path Facilities past the Roundabout.
- SH84 Ballantyne Road Signalised Crossing.

The map below shows the existing, planned, and proposed cycle network for Wānaka, as developed by Active Transport Wānaka in 2022. While the network is currently disjointed, there are projects currently planned or under construction to make connections between existing facilities. More connections are desirable to create a comprehensive network and provide travel choice

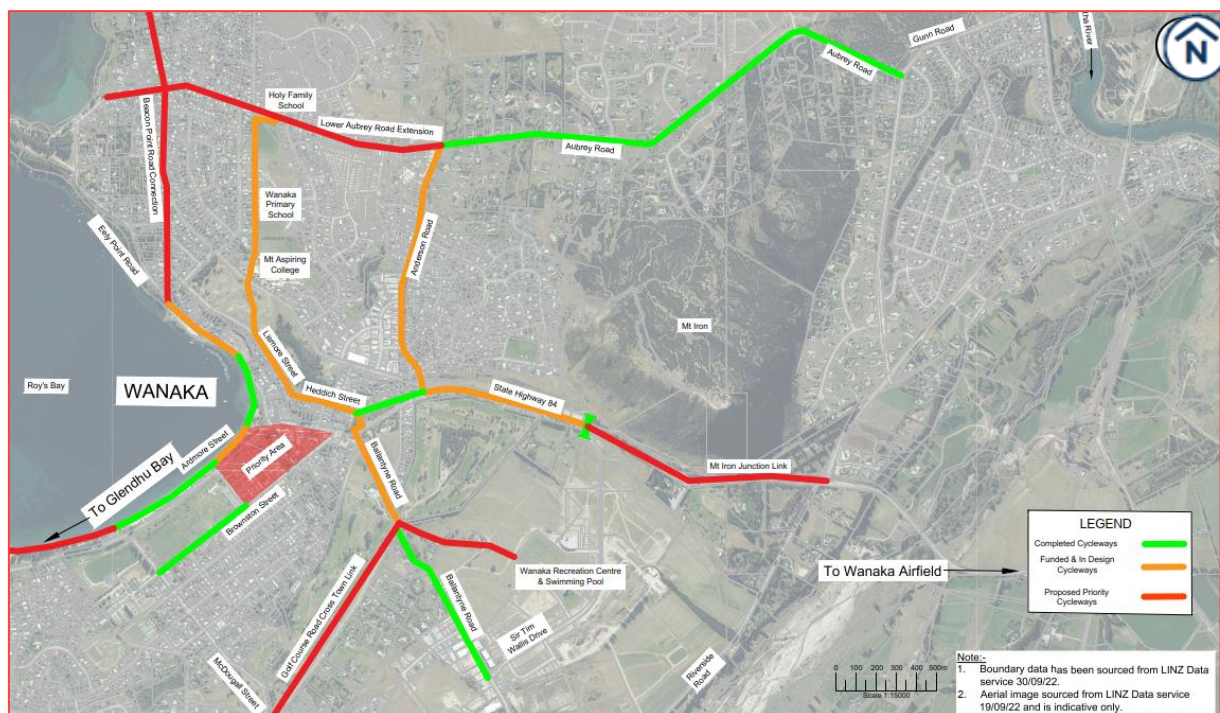


Figure 4-6: Existing, Planned, and Proposed Cycle Network for Wānaka. (Source: Active Transport Wānaka 2022)

EXISTING CYCLIST DEMAND

According to Stats NZ Census and Commuter View 2018 data, Wānaka has relatively high proportions of internal walking and cycling to work and school (eight percent and nine percent), compared with the national average (two percent and 10 percent). There is concern that as the population grows and spreads out, the walking and cycling trips will be less attractive due to increased traffic volumes affecting perception of safety, and the increased distances to travel.

Although active mode use for school travel is higher than the national average, there is evidence of suppressed demand for active travel (particularly cycling and scootering). Figure 4-7 in a 2017 survey of school children shows the number of students who would like to travel by bicycle or scooter but currently do not, with 29 percent of primary school students and 16 percent of high school students wanting to use active travel, Commuter View data identified 27 percent of journeys to Education (402) within Wānaka are by Active Modes in 2018.

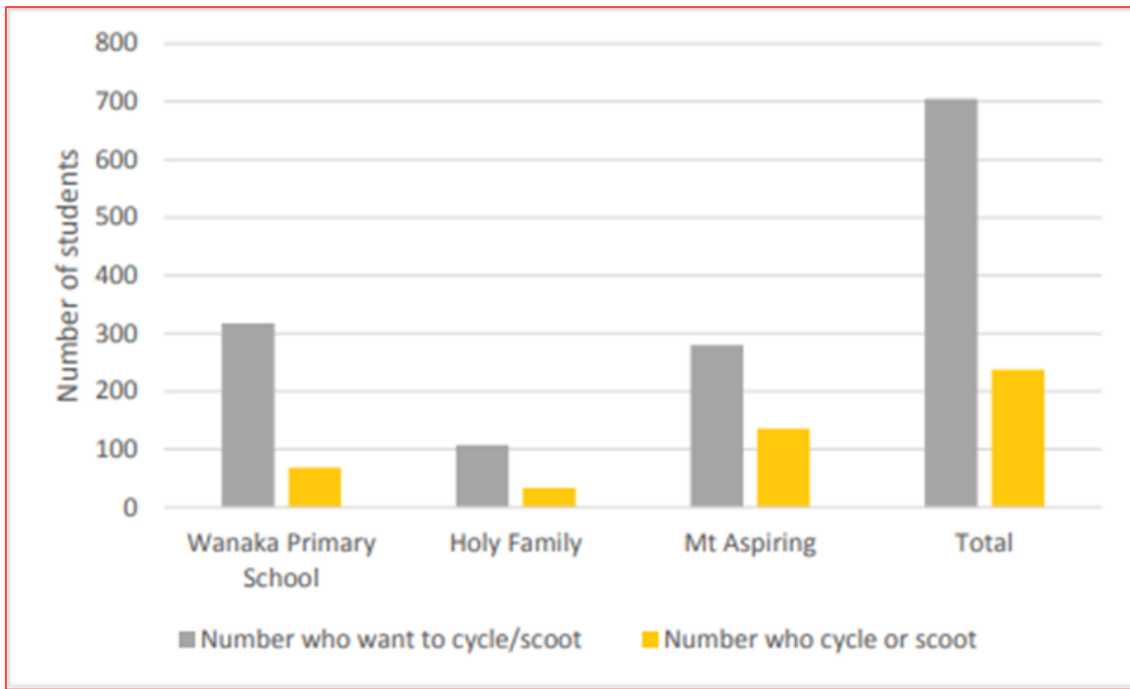


Figure 4-7: Latent Demand (Active Travel) - Wānaka School Students (Source: QLDC Student Surveys 2017)

In addition, QLDC maintains a range of cyclist count data sets on recently completed shared paths with Aubrey Road Shared Path count site having the longest duration of count data with no data outliers, see Figure 4-8 below. There is a data gap from February 2021 to November 2021, impacting the reporting of annual average values and other monthly values. December and January represent peak times with high numbers of visitors to Wānaka, May shows significant growth in cycling outside of peak times.

From 2020 to 2023 there was approximately 14% growth in annual average cyclist numbers recorded on Aubry Road Shared Path, as well as 14% growth in January (2020 to 2024) and December 2019 to 2023).

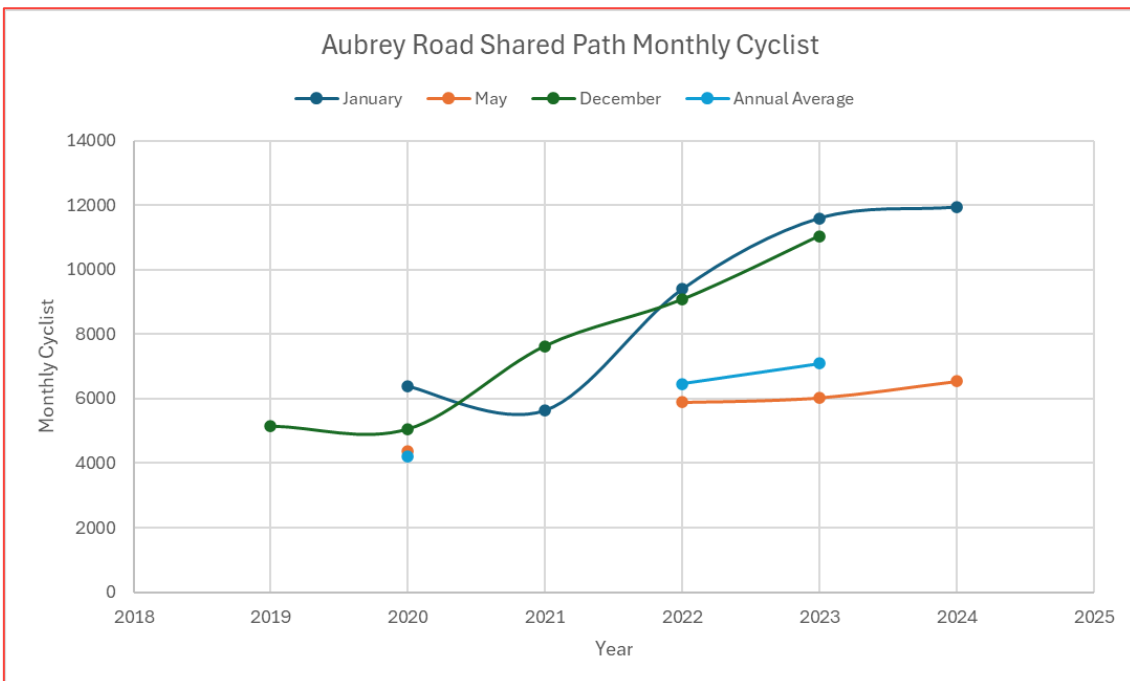


Figure 4-8: Monthly Cyclists Count on Aubrey Road Shared Path. (Source: QLDC EcoVisio)

There are currently (2025) no micro-mobility operators providing a service in Wānaka, however QLDC believes that a service could likely be provided in the future. Micro-mobility service providers will also provide an easy way for visitors to engage with active travel and reduce visitor reliance on private vehicles to access the town. Devices such as e-bikes reduce barriers to cycling through making trips quicker (increased average speed) and reduce the challenge of longer trips and of trips over elevation change. Active modes and micro-mobility options, such as e-bikes, and adaptive bicycles, will be particularly beneficial for an ageing population by prolonging and augmenting limited mobility.

Much of existing Wānaka is within a 15-minute cycle catchment of the town centre. Areas outside of the 15-minute catchment are Albert Town, Northlake and future development areas, and undeveloped areas south and west of Wānaka as depicted in Figure 4-9, potential for uptake could be substantial.

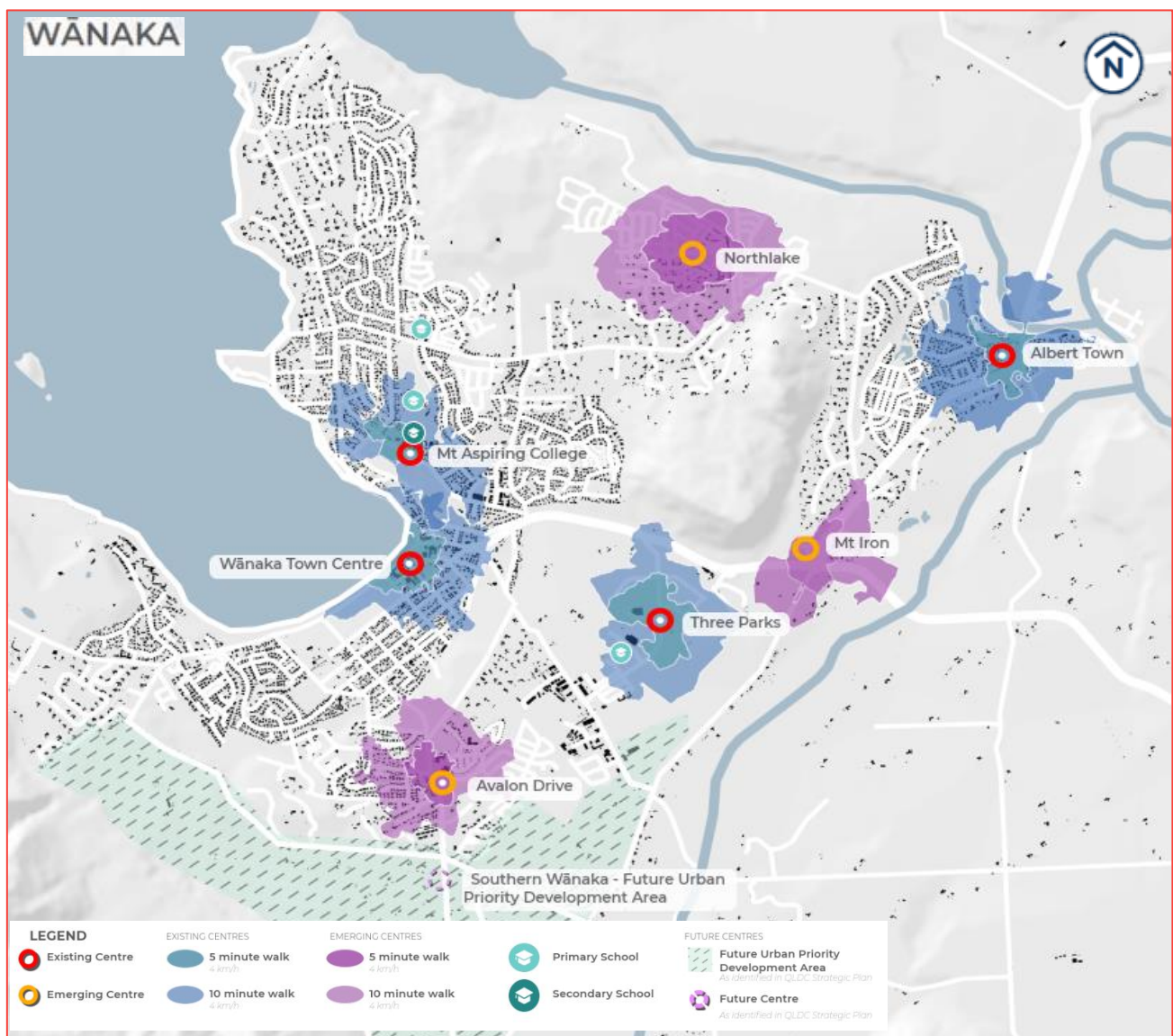


Figure 4-9: Walking Network Catchment (Source: SSBC Prepared Engagement Material)

4.2.3 SUPRESSED DEMAND – PUBLIC TRANSPORT

There are currently no public transport services within Wānaka and the wider Upper Clutha area provided by Otago Regional Council. There are commercial services serving Wānaka from Queenstown and Cromwell, which are booked in advance. There are also school bus services serving local schools.

As outlined in the Appendix A, regional and local planning documents have identified possible opportunities for public transport in Wānaka. This would broaden transport choice for residents and visitors in the area.

In the past two years, there have been two 3-month community-led trials of a shuttle service with financial support from Lake Wānaka Tourism and QLDC.⁵ Results showed patronage wasn't as high as expected; however, the trial showed that there would be demand for public transport, particularly in connecting other areas to Wānaka. There was growing patronage over the course of each trial. A more substantial trial was recommended from each trial evaluation assessment.

Trial 1 operated over 3 months, during Spring 2022, on 3 weekdays (Monday, Wednesday, Friday), it had six daily services connecting Wānaka with Lake Hāwea, with 25% on average occupancy, see Figure 4-10. Trial 2 operated over 3-month, during Winter 2023, on all weekdays, with four daily services connecting Wānaka with Lake Hāwea and five daily services on an intra-Wānaka loop. While Trial 2 had average occupancy of 12%, the peak service between Wānaka with Lake Hāwea had an average occupancy of 36%.⁶

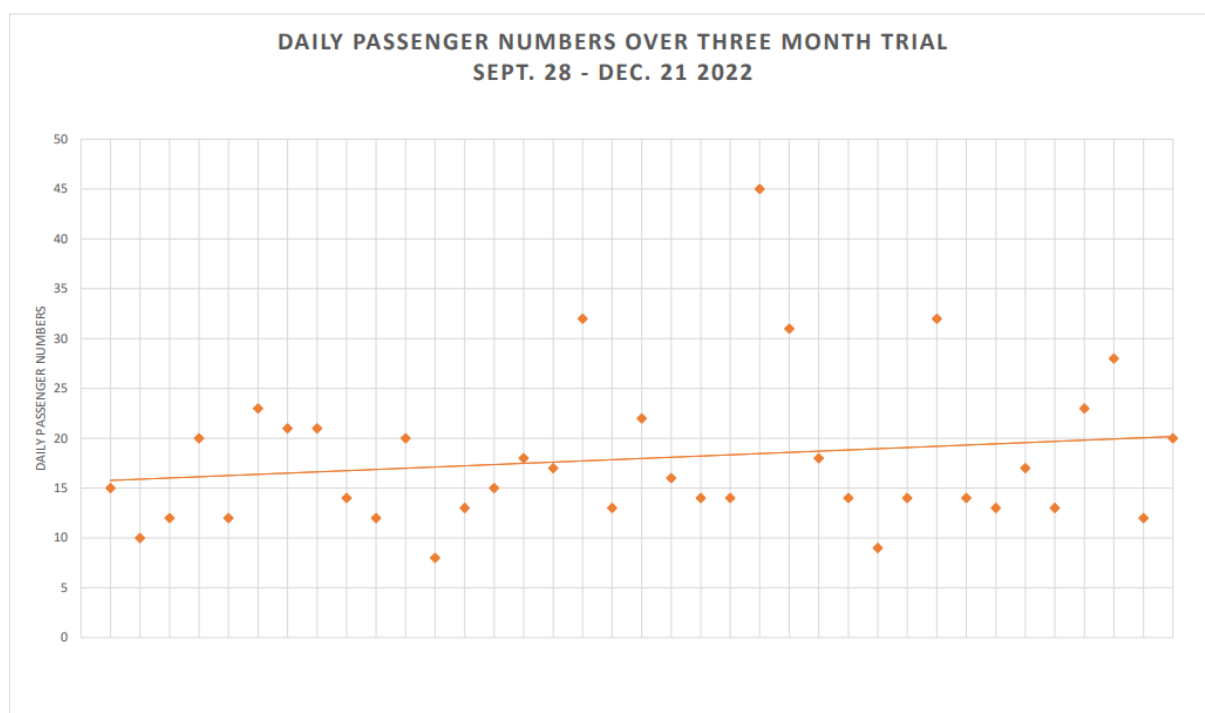


Figure 4-10: Public Transport Trial 1 Daily Passenger Numbers

⁵ <https://www.communitynetworks.co.nz/shuttle-trial>

⁶ Community Shuttle Trial Final Report November 2023, Community Networks/LINK

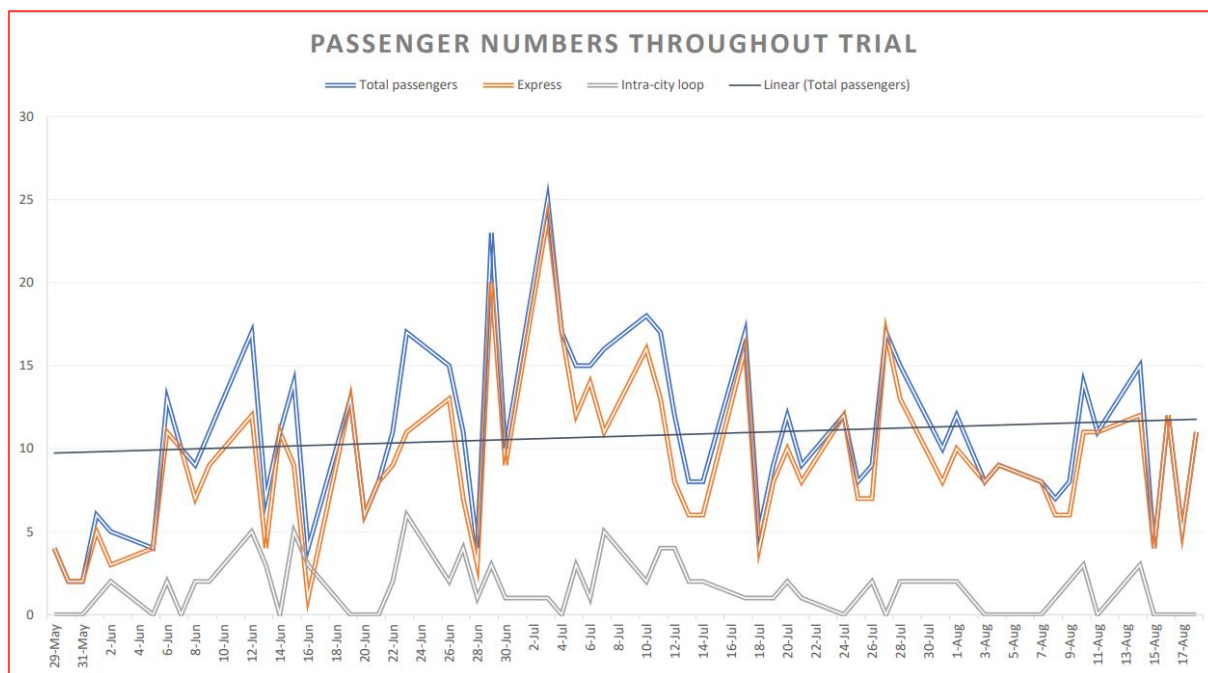


Figure 4-11: Public Transport Trial 2 Daily Passenger Numbers

With no public transport network and the population of the Wānaka Ward expected to be over 30,000 by 2053, along with an additional 10,000 on average visitor, this will lead to an increased demand on the transport network. The overall population will be comparable to the current Wakatipu basin which contains multiple public transport routes.

4.2.4 GREENHOUSE GAS AND VEHICLE EMISSIONS

The Otago Region Greenhouse Gas Profile (2021), prepared for Otago Regional Council, identifies 20.13% (120,895 tCO₂e) of Queenstown-Lakes District greenhouse gas emissions are from on-road transport. An additional 42,781 tCO₂e from off-road vehicle transport. This is not further broken down into smaller areas of the district. These estimates were based on fuel sales within the district.

The Greenhouse Gas Community Inventory (2019), prepared for Queenstown-Lakes District Council, identified 241,755 tCO₂e, this includes off-road vehicle use. This estimate is a slight increase from 2017 with 241,213 tCO₂e. These estimates were based on regional fuel sales and considered guest-nights and resident population of the district.

The Emissions Reduction Roadmap (2020), prepared for Queenstown-Lakes District Council, identified 37% (241,755t) of CO₂ equivalent emissions were from Road Transport.

4.3 PROBLEM STATEMENT 2:

The current Wānaka network, and its existing links to surrounding satellite towns, are limited in their ability to accommodate expected growth in commuting and tourism, resulting in over-reliance on certain routes by motor vehicles, eroding levels of service on those routes, and creating severance and conflict (40%).

4.3.1 ROUTE CHOICES AND DESTINATIONS

There are three main roads into Wānaka:

- Cardona Valley Road from Queenstown in the South.
- SH6/SH84 from Cromwell in the South-East.
- SH6 from Haast and the west coast in the North.

Figure 4-12 below shows the road network in and around Wānaka. Figure 4-13 shows the roading network in around the town centre, showing the average vehicles per day on key routes. Further information on traffic growth is reported in Section 4.3.3.

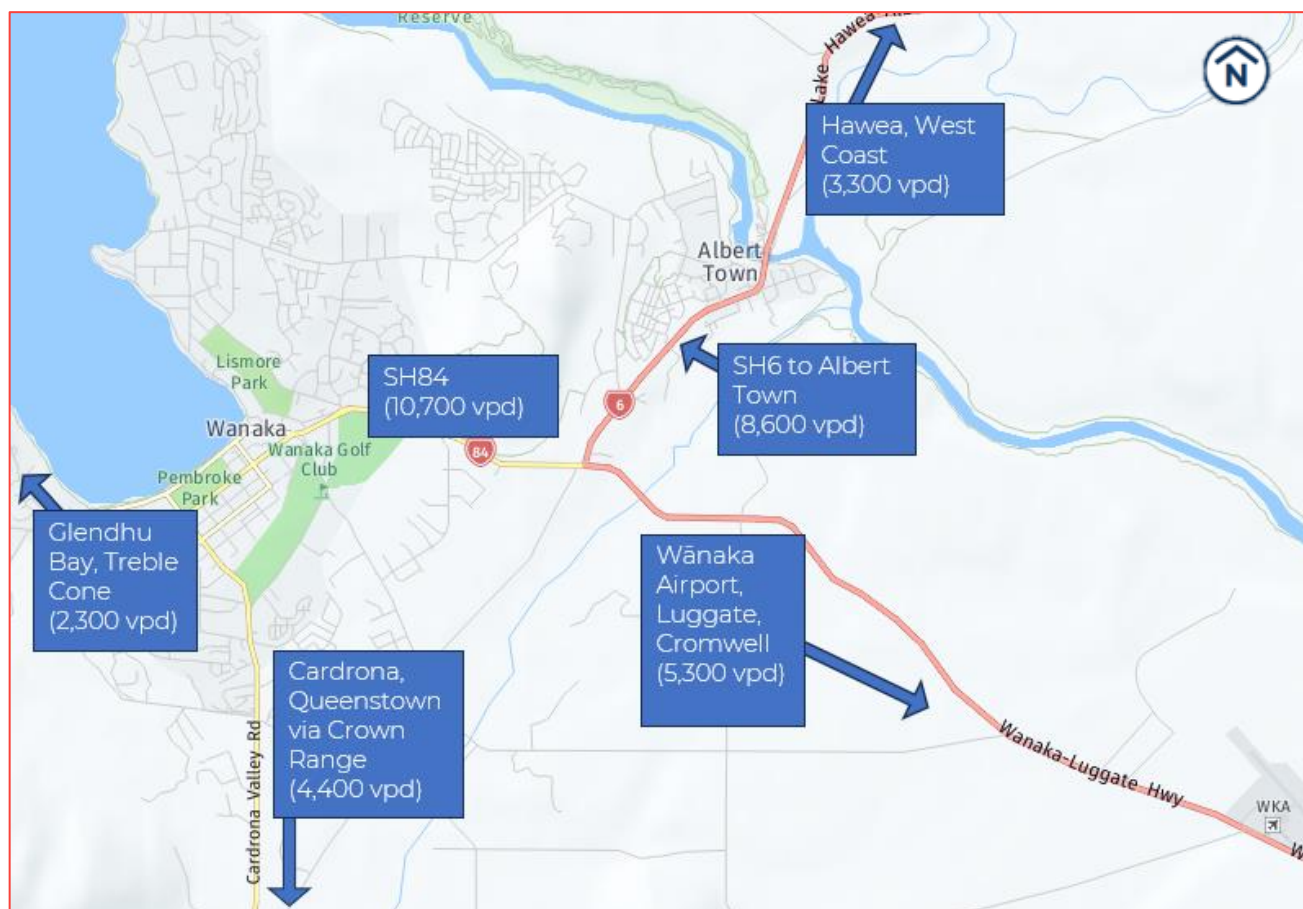


Figure 4-12: Wānaka Area Road Network. (Map source: NearMaps, Data source: MobileRoads)

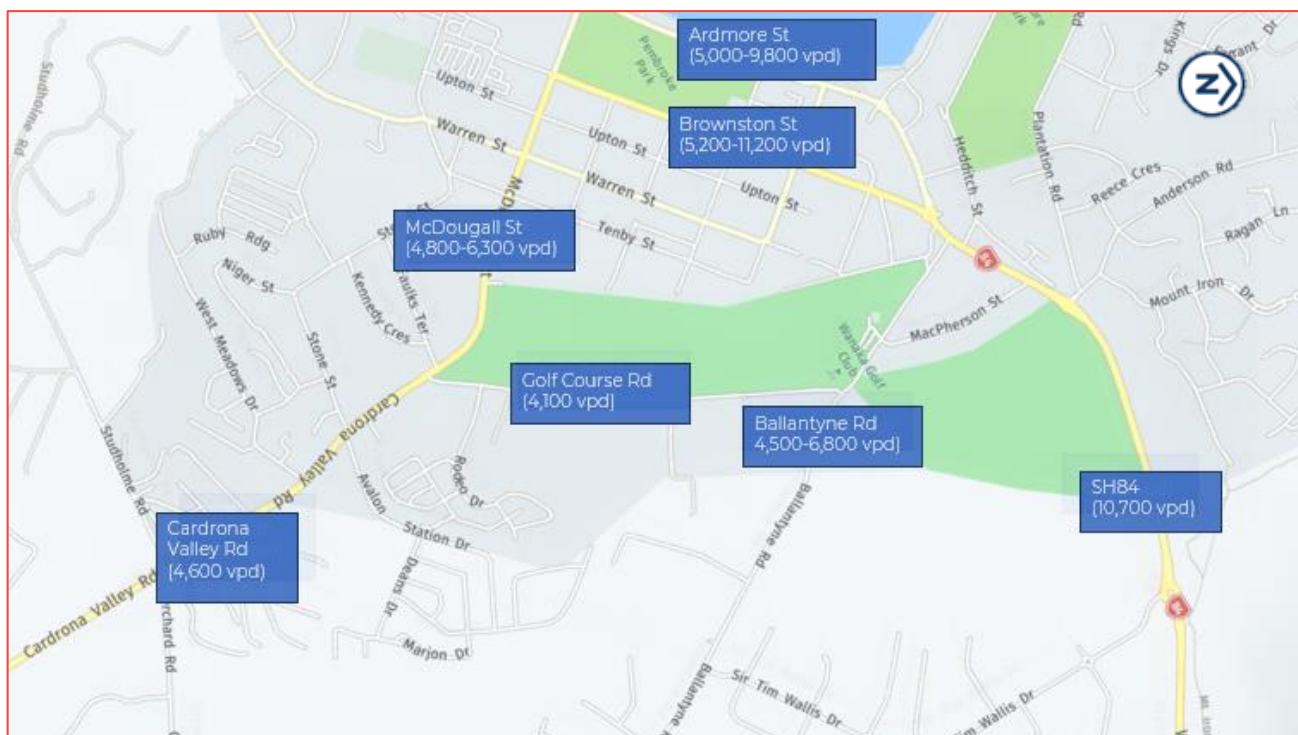


Figure 4-13: Wānaka Road Network – Town Centre. (Map source: NearMaps, Data source: Mobile Roads)

A description of the issues that are occurring on some key routes are described in Table 4-2.

Table 4-2: Key route functions and issues description

ROUTE	FUNCTIONS	ISSUES
Brownston Street	Description: Borders the town centre and connects East Wānaka to the West. Traffic Volumes: 11,000 vehicles per day at northern end ONF classification: Activity Street with Medium-High place and movement functions. Posted Speed: 50 kph	- Conflict between vehicles accessing the town centre and vehicles bypassing the town centre. - Conflict between medium-high movement and place function. - Primary or secondary route for all modes in Network Operating Framework (NOF). - Personal risk rating of 'Medium'. With increasing pedestrian, cyclist, and vehicle numbers crash risk will increase. - More pressure on Brownston Street through Lakefront Development Plan, which will change the place function of Ardmore Street to emphasise pedestrians and divert vehicles onto Brownston Street.

ROUTE	FUNCTIONS	ISSUES
SH84	• Description: Main road into Wānaka from the east. • Traffic Volumes: 11,000 vpd (2022) • ONF classification: Rural Connector between Anderson Road and SH6. Urban Connector between Brownston Street and Anderson Road. • Posted Speed: 80kph - rural section and 50kph - urban section East of Sir Tim Wallis Drive	• Intensifying land use will see greater length of the road become urban, rather than rural. Travel demand expected to increase accordingly, affecting safety and levels of service for all modes. • No separate cycling or walking facilities on SH84 east of Puzzling World. • Limited crossing opportunities for pedestrians in urban section such as kids, elderly, tourists. Increased risk of DSI on road network. • Primary route for traffic, freight, cycling, and public transport in NOF. • Personal risk rating of 'Low' between Brownston Street and Sir Tim Wallis Drive 'Medium' risk between Sir Tim Wallis Dr and SH6.
SH6 through Albert Town	• Description: Main road connecting Wānaka to Albert Town and further north to Lake Hāwea and the West Coast. • Traffic Volumes: 8,600 vpd • ONF classification: Rural Connector • Posted Speed: 70-80 kph	• Single lane bridge at Albert Town a pinch point on the network creating delays. In 2019 traffic signals were added to control traffic. • Primary route for traffic, freight, and public transport in the NOF, competing modal demands within the existing carriageway space will lead to increased conflict. • Personal risk rating of Medium.

4.3.2 TRAVEL DEMAND

POPULATION GROWTH

Population growth has increased travel demand. Traffic data from two traffic counting sites (SH6 South of Cardona River and SH84 near Mount Iron) shows a steady increase in traffic volumes since 2012, as shown in Figure 4-14.7. Note, that data for 2017 was unavailable.

Since 2012, traffic on SH84 has grown by 73% and on SH6 by 50%. Growth has flattened off since 2019 likely due to the Covid-19 pandemic where there were significant restrictions on travel from 2020 to 2022.

⁷ <https://maphub.nzta.govt.nz/public/?appid=31305d4c1c794c1188a87da0d3e85d04>

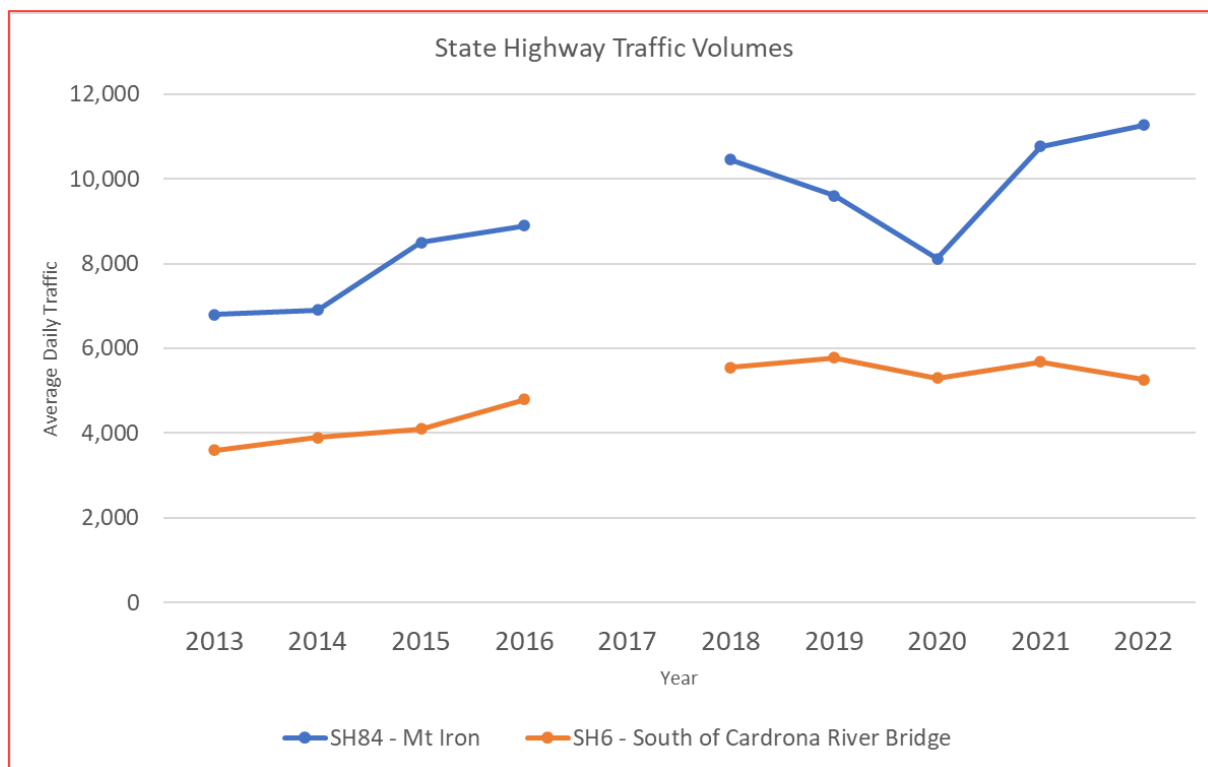


Figure 4-14: Average Daily Traffic Volumes at two state highway sites 2013-2022. (Source: NZTA Waka Kotahi 2023 and Strategic Case 2018)

MODE CHOICE – WORK AND EDUCATION

The 2018 Census shows a high reliance on driving for commuting, with 64% of residents in Wānaka as seen in Figure 4-15, however this is lower than Queenstown and all New Zealand. Cycling and walking are more popular than the national average. A large portion of the ‘Other’ category are people who worked from home. This is considerably higher than the national average. Car ownership data from Census 2018 indicates that 70% of Wānaka households have access to at least two motor vehicles.

Using CommuterView and Census data from StatsNZ shows how people travel to work and education within Wānaka as well as into and out of Wānaka. Some observations include:

- There is a much higher proportion of people driving to work and education into/out of Wānaka than within Wānaka.
- There is a high proportion of public transport usage into Wānaka from people journeying to education.
- Within Wānaka, there is a large proportion of people who work or participate in education at home (shown as ‘Other’). Continued high work from home proportions will help with maintaining vehicle LoS longer.

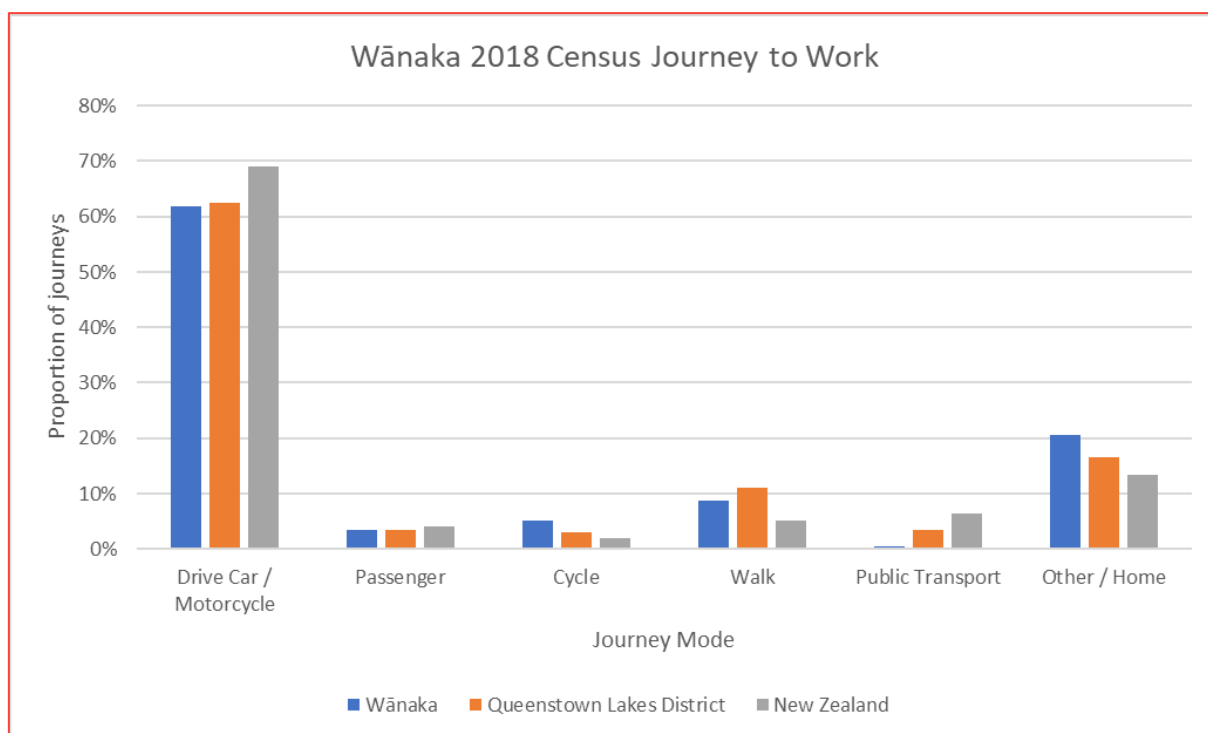


Figure 4-15: Travel to Work Data for Wānaka, (Regional and National) (Source: Census 2018)

Table 4-3 - Travel to Work / Education by Origin and Destination (Source: CommuterView and Census 2018)

	Drive	Passenger	Walk	Cycle	Public Transport	Other & Home	Un-reported
Within Wānaka	38%	12%	9%	8%	4%	25%	4%
Out of Wānaka	73%	12%	11%	7%	3%	3%	N/A
Into Wānaka	67%	15%	5%	4%	21%	3%	N/A
Nationally	51%	15%	10%	2%	10%	11%	N/A

In addition to the above, the Council undertook school travel surveys to understand how children travel to school in Wānaka. Data from 2017 is shown in Figure 4-16 with the following observations:

- 30% of all students use active modes to get to school.
- For high school students at Mount Aspiring College, 36% travelled by car and 36% used active modes.

There is a risk with increasing traffic volumes that there is an increase in perceived risk and or the desire or attractiveness to ride could likely affect the current relatively high level of active mode use. Maintaining this mode split will be a focus in the future to maintain LoS on the network.

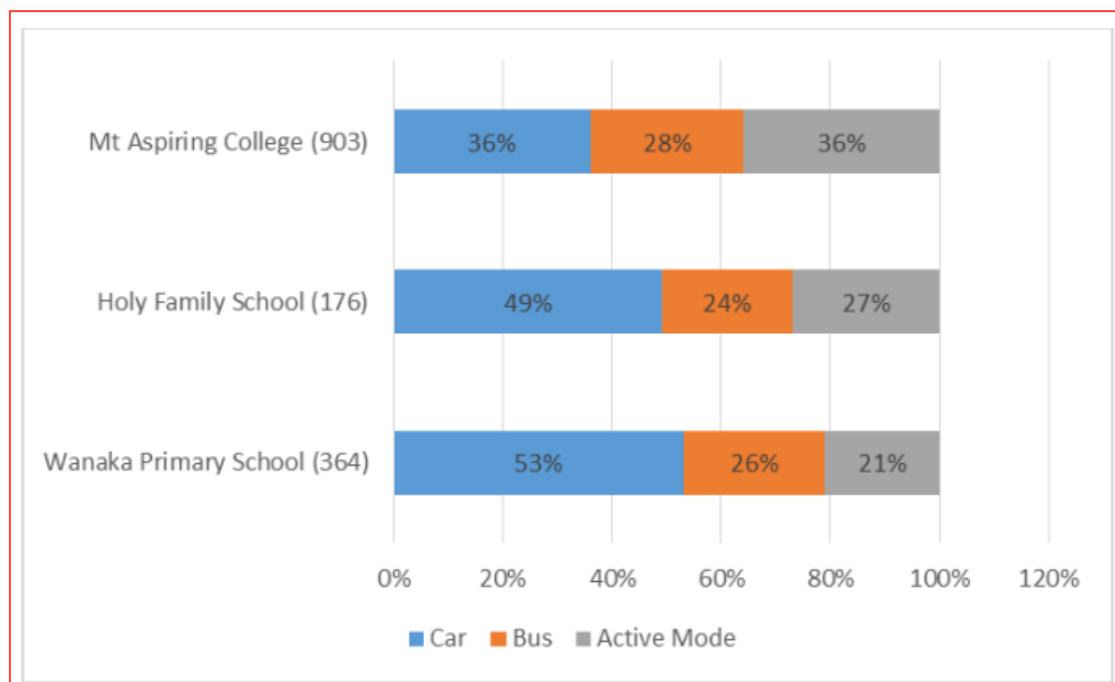


Figure 4-16: Percentage of Children travelling to School by Mode. (Source: QLDC School Travel Survey 2017)

4.3.3 TRAVEL TIMES, DELAYS AND LEVEL OF SERVICE

Travel time and delay data comes from two sets of sources: the 'QLDC Travel Time Survey' and TRAKs traffic model for Wānaka within the 2018 Strategic Case, and the 2024 Wānaka Paramics Traffic Model.

2018 STRATEGIC CASE

The 2018 Strategic Case includes travel time data from QLDC's travel time survey which has not been updated since. The daily profile for travel times between Brownston/McDougall Street intersection and Ardmore Street/Lakeside Road intersection is shown in Figure 4-17.



Figure 4-17: Daily Profile of Travel Times between the Brownston / McDougall intersection to Ardmore / Lakeside intersection (Source: 2018 Strategic Case)

Travel times and delays tend to be worse in summer with more visitors to Wānaka.

The transport model for Wānaka provides further information on levels of service across the network. The 2018 Strategic Case included output forecasts for 2025 and 2045 from the TRAKs model for Wānaka, showing levels of service in the evening peak becoming worse.

Level of service is typically six service levels, A to F, with LoS A representing the best operating conditions from the traveller's perspective and LoS F the worst (Table 4-4). Traffic LoS categories can have different metrics values depending on the category being measured.

Table 4-4: - Level of Service Values for 50km/h free flow speed (Source: HCM2023 Section 18)

Level of Service	Speed range (km/h)	Description
LOS A	>39 km/h	Free-flow operation
LOS B	32-39 km/h	Reasonably unimpeded operation
LOS C	24-32 km/h	Stable operation, manoeuvre and lane changing may be restricted
LOS D	19-24 km/h	Less stable operation, small increases in volume cause substantial increases in delay
LOS E	14-19 km/h	Unstable operation and significant delay
LOS F	<14 km/h	High delay and extensive queuing

At the time, it was modelled, on a typical day, the stretch of SH84 between Brownston Street and Anderson Road will be at LoS D. By 2045, this extends further along Ardmore Street to the intersection with Helwick Street, and levels of service at that intersection have degraded to LoS E. Also, at LoS E is the approach to the SH84/Anderson Road roundabout. In 2045, other parts of the network are at LoS D, such as the SH6/SH84 roundabout, and the section of Sir Tim Wallace Drive from SH84 south.

2024 WĀNAKA PARAMICS TRAFFIC MODEL

The 2024 traffic model provides evidence of the existing network performance and makes predictions of network performance under various growth scenarios. The 2024 traffic model for Wānaka is described in more detail in Appendix D of the Economic Case. Outputs of the future year scenario testing show decreases to level of service at key intersections and increases to travel time on the modelled network.

The traffic model represents a summer peak period, traffic volumes within Wānaka in other seasons traffic volumes are lower. The PM model period was the worst performing and so has been reported below.

Beyond the 2033 growth assumption scenario, future year growth assumption scenarios were unable to run without intervention due to excess congestion and gridlock within the network. Interventions applied were a 10% or 20% removal of trips originating within Wānaka. Key outputs from the micro-simulation model are noted in Table 4-5.

Table 4-5: Findings from Transport Model

Road Corridor	Outputs from Transport Model
SH84 / Anderson Road	- Critical part of the network, and is predicted to operate poorly, even with a significant (20%) TDM (trip reduction) assumptions. - Predicted to reach LoS F by 2028 and deteriorate further.

Road Corridor	Outputs from Transport Model
SH6 Albert Town Bridge	- Likely to reach capacity before 2038, requiring improvement to two-lane facility. - The existing bridge can accommodate the trips associated with around a 1,000 resident population increase in Lake Hāwea and/or Hāwea Flat.
Ballantyne Road / Sir Tim Wallis Drive	Predicted to reach LoS F by 2033.
Side Road Access from Ballantyne Road and MacPherson Street to SH84	- Problems indicated from 2028, and improvements required to form a better South-North link between Wānaka West, Golf Course Road, Anderson Road and Wānaka North. - Likely that any improvement should be considered in the context of improvements to the SH84 / Anderson Road intersection and adjacent SH84 corridor (from Brownston Street to Anderson Road).
Operation of Sir Tim Wallis Drive	Problematic beyond 2033, and it is likely that new connections into the Three Parks area would relieve this operation, and the Ballantyne Road / Sir Tim Wallis Drive intersection – most likely providing a link from the Ballantyne Road / Golf Course Road intersection (or nearby), which would be the direct route from trips to/from Wānaka West and Wānaka Central.

In the base year period, there is one intersection (SH84 and MacPherson Street) with a LoS F during the PM peak. By 2033 there are five intersections with LoS F, and by 2038 with 10% of traffic removed (through Travel Demand Management), there are seven intersections with LoS F. High level of service results in congestion and associated emissions as well as road users re-routing to less appropriate corridors for high vehicle volumes.

Based on links reported in Appendix D of the Economic Case; the 2024 modelled time-period through to the 2033 growth assumption scenario, has a 59% increase in peak hour traffic (vehicle kilometres travelled), a 67% increase in vehicle-time spent travelling, and a 4.6km/h decrease in average speed. In the 2038 period with 10% of traffic removed, there is a 91% increase in peak hour vehicle-time spent travelling with 618 vehicle-hours/hour during the PM peak. A summary of the LoS of key intersections is depicted in Figure 4-18 and **Error! Reference source not found..**

Critical intersections such as SH84 (Wānaka Luggate Highway) and Anderson Road that connect Albert Town, Wānaka North, and Wānaka Central (including Three Parks) are expected to quickly (2028 model period) deteriorate to LoS F. By 2038, the PM traffic model is unable to run due to “excess congestion and gridlock within the network”, see Appendix D of the Economic Case. When 10% of trips are removed from the 2038 model, travel times from Albert Town Bridge to the Brownston Street / Ardmore Street intersection doubles during the PM peak increasing from 5:42 minutes (average speed 63 km/h) to 11:21 minutes (31 km/h).

As well as increasing average journey times, a network near capacity has potentially high variability in travel time (less reliable). Journeys time variability will require earlier departures for people to manage uncertainty around arriving on time at work, education, and appointments.

Intersection	2024 Base	2028 Core	2033 Core	2033 10% TDM	2033 20% TDM	2038 10% TDM	2038 20% TDM	2043 20% TDM
Ardmore /Brownston	C	D	E	D	C	F	D	E
Lakeside Rd/Ardmore St	A	A	B	A	A	B	A	A
Wanaka Luggate/Anderson	D	F	F	F	F	F	F	F
Sir Tim Wallis Dr/Wanaka Luggate Hwy	A	B	F	D	C	F	F	F
Ardmore St/Dungarvon St	A	A	A	A	A	B	A	B
Brownston St/Dungarvon	A	B	C	B	B	C	C	C
SH6/SH84	A	A	A	A	A	A	A	B
Andersons/Aubrey	A	A	A	A	A	A	A	A
Riverbank/Ballantyne	A	A	A	A	A	A	A	A
Ardmore St/McDougall St	A	A	A	A	A	B	B	C
SH6 Albert Town Bridge	D	D	D	E	D	F	F	B
Brownston/McDougall	A	A	A	A	A	B	A	B
Ballantyne Road/Sir Tim Wallis Way St	A	C	F	D	B	F	F	F
Cadrona Valley Road/Golf Course Road	A	A	A	A	A	A	A	A
SH6/Aubrey Road	B	C	C	C	C	D	C	A
SH84/MacPherson St	F	F	F	F	F	F	F	F
SH84/Ballantyne Road	C	D	F	D	D	F	E	E
Golf Course Road/Ballantyne Road	A	A	A	A	A	A	A	A

Figure 4-18: Key Intersection Level of Service - PM Peak. (Source: 2024 Wānaka Traffic Model)

4.3.4 SEVERANCE

Active travel is popular, including recreational walking and cycling. Increasing demands for all forms of transport will increase conflict with road traffic, and this increase requires management, given the magnitude of estimated growth.

The population growth will include an aging population. It is estimated that 36% will be aged over 60 by 2051, compared to 21% presently, as depicted in Figure 4-19. This is the equivalent of an increase of 5,000 people aged 60 or over living within the project area – not accounting for visitors.

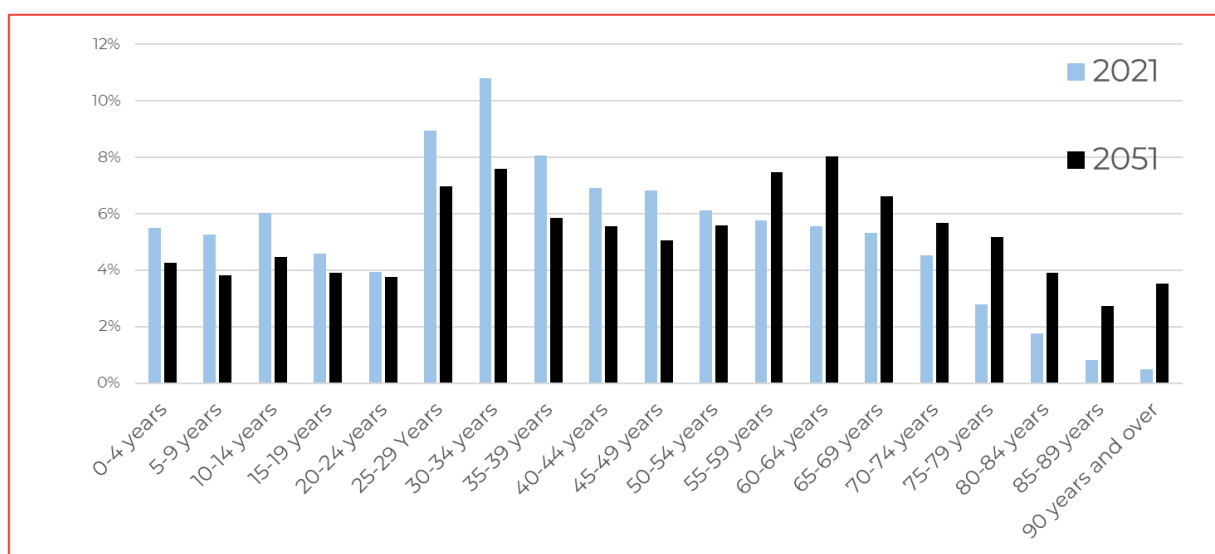


Figure 4-19: Wānaka forecast population by age, 2021 compared to 2051

This significant increase in ‘vulnerable’ users means:

- A different approach is needed to conflict point management, as vulnerable users require more time to get across roads.
- Vulnerable users are less likely to travel if they don't feel safe, limiting mode choice and accessibility.

The network is not designed to safely accommodate growth. There are many priority-controlled crossroads which have more conflict points than other control forms. Some of these include vertical and/or horizontal sight distance challenges. However, crash rates are currently low for most, as demands are presently low, although if there is an increase in demand then risk will increase the potential for crashes. As part of the detailed investigation (to inform the Economic Case) we will use crash prediction models to quantify the outcomes of exposing significant growth traffic to potential hazards.

4.3.5 CONFLICT AND CRASHES

The 2018 Strategic Case looked at the 2013-2017 period for crash data from NZTA Waka Kotahi's Crash Analysis System (CAS). The 2023 revision adds data from 2018-2022. Injury crash data from this 10-year period is shown in Figure 4-20.

There was an average of 43 recorded crashes per year over the 10-year period, with an average of 12 injury crashes per year. There were 25 Death and Serious Injuries (DSI) in this period from 24 fatal crashes and serious injury crashes as noted in Figure 4-20.

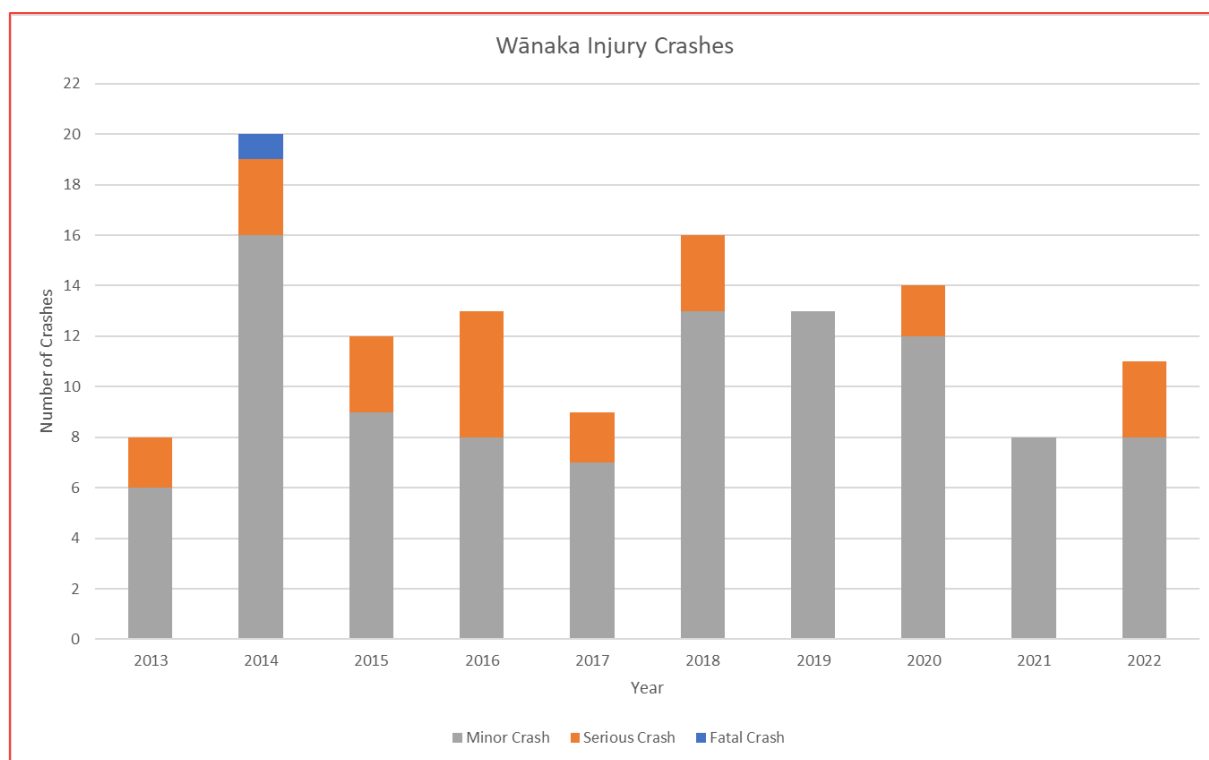


Figure 4-20: Injury Crash Data for Wānaka (2013-2022). (Source: NZTA Waka Kotahi's Crash Analysis System)

Figure 4-21 shows the location of recorded injury crashes and Figure 4-22 shows injury crashes by the crash type. Most minor injury crashes occur in or near the town centre with almost half of all injury crashes are crossing / turning crashes. Crashes resulting in serious injury or death are spread around Wānaka, on a mixture of higher speed roads, arterial and collector roads, and quiet low volume roads. Approximately 9% of crashes involve pedestrians or cyclists.

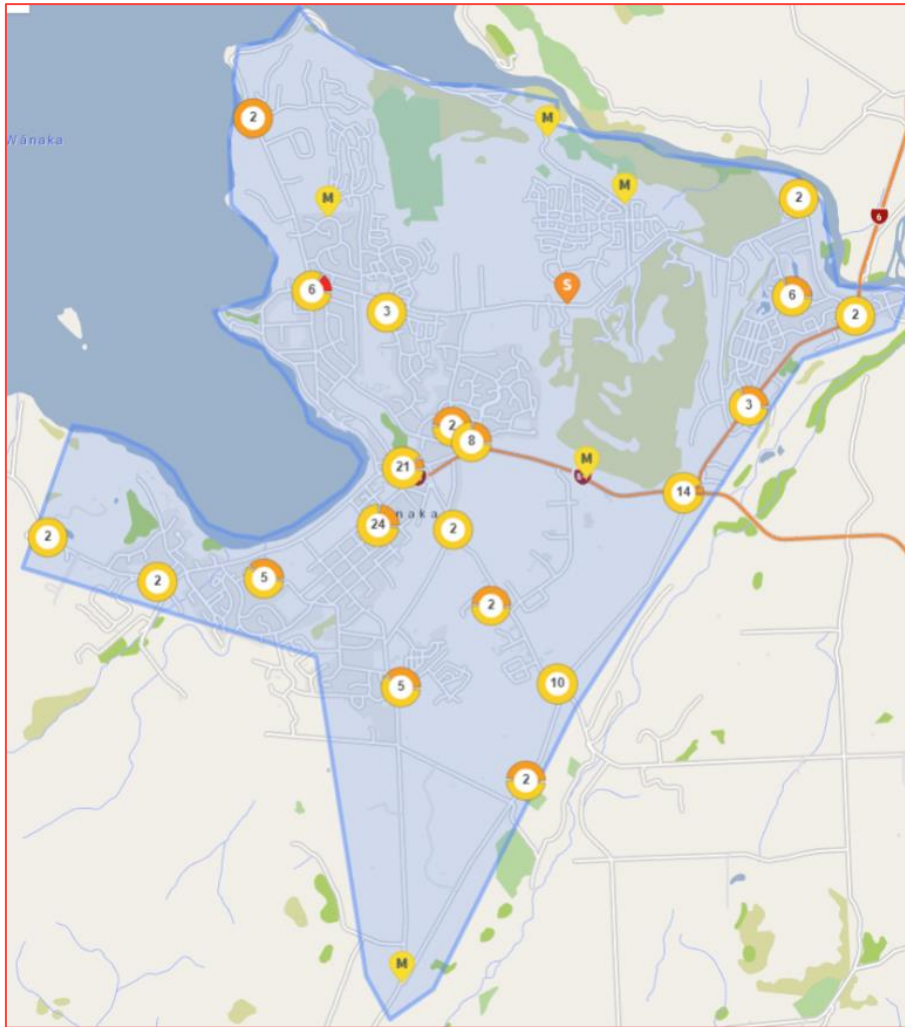


Figure 4-21: Injury crash locations for Wānaka study area 2013-2022. (Source: NZTA Waka Kotahi's CAS.)

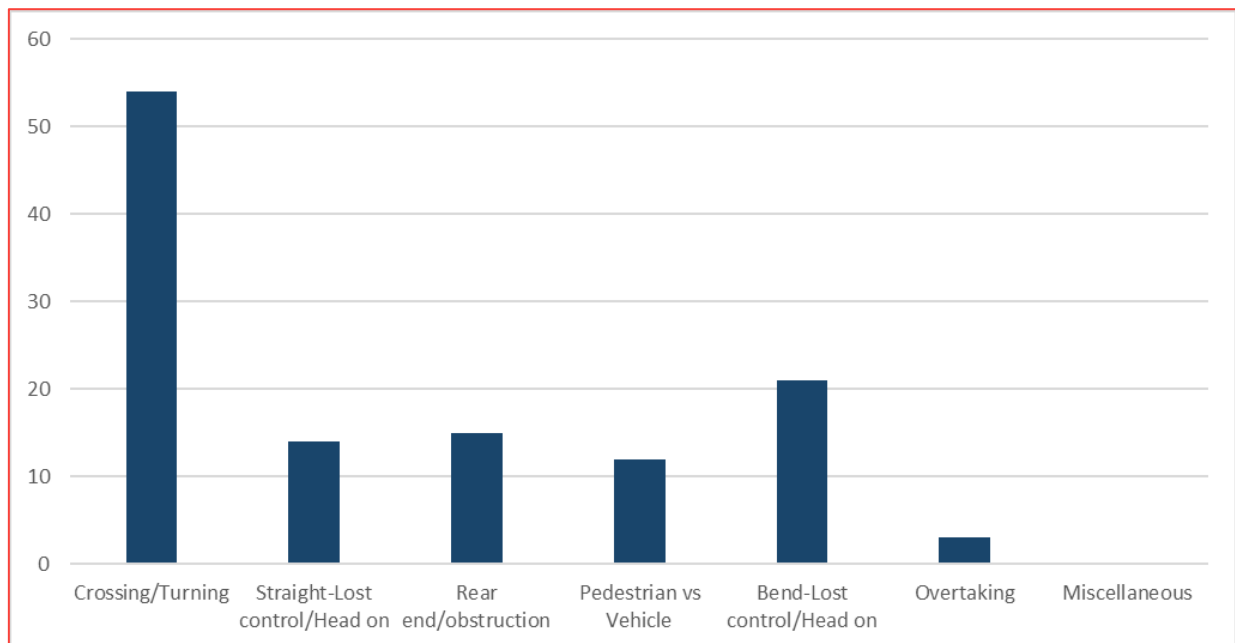


Figure 4-22: Injury Crashes by Movement for Wānaka (2013-2022) (Source: NZTA Waka Kotahi's CAS)

An analysis of the crash data shows that, cyclists are involved in 6% (25) of all reported crashes, 15% (19) of injury crashes and 31% (8) of deaths and serious injuries (DSI). Pedestrians are involved in 3% (14) of all reported crashes, 10% (12) of injury crashes and 28% (7) of DSI. It is clearly noted that there is an over-representation in the percentage of cyclists and pedestrians involved in injury crashes (25%) and DSI outcomes (60% - 15 deaths and serious injuries) in comparison to their mode share in the network.

NZTA Waka Kotahi's MegaMaps Tool includes road safety metrics such as Personal Risk, which is shown in Figure 4-23. There are three roads with a personal risk rating of high or medium high. They are:

- Ardmore Street between Dungarvon Street and Lakeside Road (out of scope for this SSBC),
- Golf Course Road, and
- Alison Avenue.

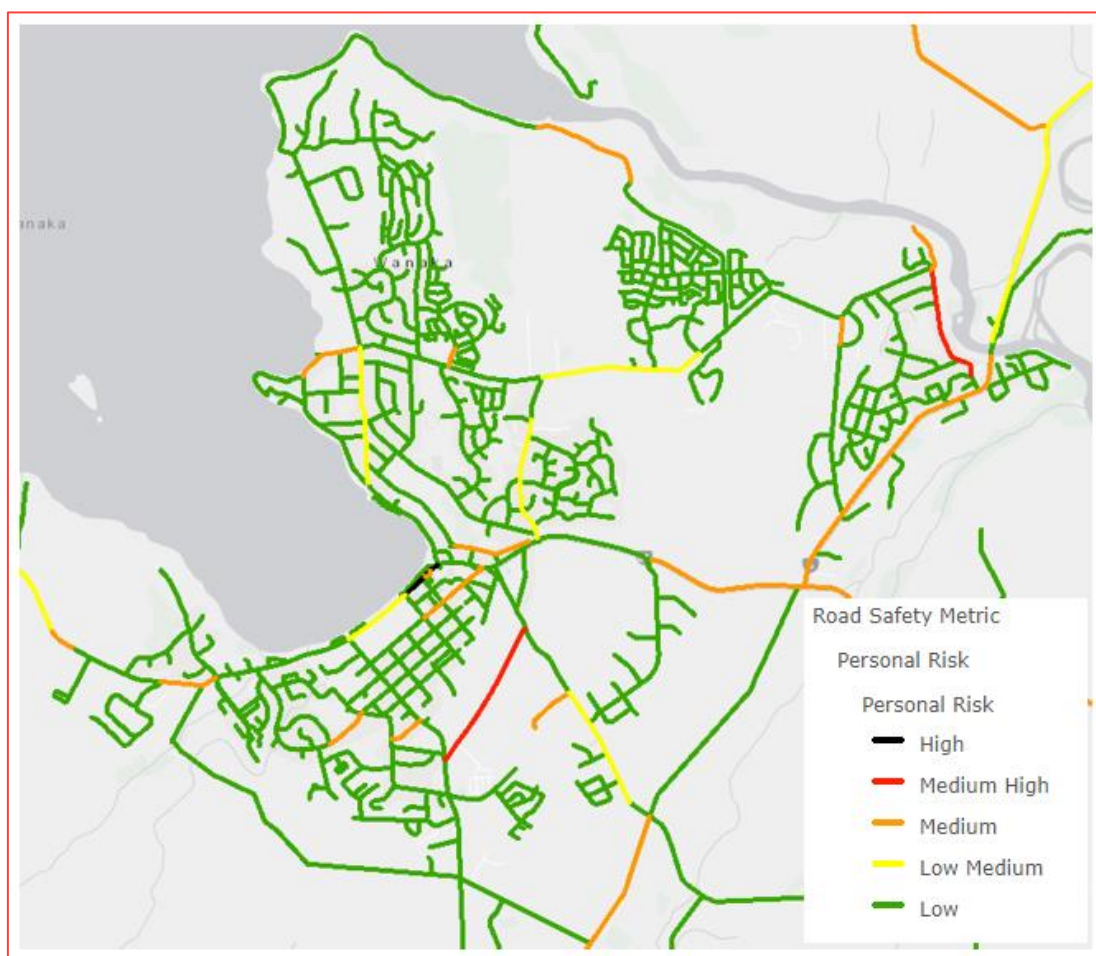


Figure 4-23: Personal Risk Map for Wānaka. (Source: NZTA Waka Kotahi's MegaMaps)

4.4 PROBLEM STATEMENT SUMMARY

Significant growth has occurred and is expected to continue in Wānaka with the resident population expected to reach 30,000 around 2050.

While active mode use is high in Wānaka, active mode use is growing and there is desire from residents to take up active modes. Public Transport trials have shown increasing ridership for their operation however further work is required to understand this more.

As travel demand increase, travel times will increase, with journey times doubling between Albert Town Bridge and Brownston Street/Ardmore Street over the next 15 years. This increase in average travel time will be accompanied by increased travel time variability.

Based on the predicted increase in traffic volumes, there is potential for increase in crash risk. The already high proportion of high severity active mode crashes will increase and an increase in perception of safety risk may dissuade more active mode users.

5 BENEFITS AND OPPORTUNITIES

5.1 BENEFIT DESCRIPTION

If the problems are considered, then there are opportunities to achieve certain benefits and outcomes.

A description of the Benefits noted in the Land Transport Benefits Framework⁸ which are relevant for this SSBC based on the Investment Logic Map in Section 4.1 have been listed below:

1. **Inclusive Access:**

Changes in Access to Social and Economic Opportunities - Impact on Access to Opportunities (by Public Transport, Walking, Cycling and Private Motor Vehicles)

- o This benefit concentrates on transport as an enabler, and on the integration of land use and transport. It focuses on the importance of destinations, services and/or activities that can be equitably accessed through transport to enable economic and community participation. This benefit may be of particular relevance for people or groups who experience transport disadvantage. The social and economic benefits of equitable access to transport are part of this benefit, enabling participation in employment, volunteer work, and social and leisure activities, thereby improving the overall wellbeing of communities. The beneficiaries of this benefit are all current and future users of the transport system for whom access allows them to fully participate in life and their community.

2. **Environmental Sustainability (Reduced Greenhouse Gases)**

Changes in Climate - Impact on greenhouse gas emissions

- o Land transport currently contributes nearly 20% of greenhouse gas emissions in New Zealand. The government's priority is to reduce emissions from the transport system. This benefit might be identified in transport investments or programmes that impact the number of greenhouse-gas emitting vehicles or the emissions generated through mode shift or other means.

3. **Healthy and Safe People (Reduced Death and Serious Injury)**

Changes in User Safety - Impact on social cost of deaths and serious injuries

- o This benefit is about the impact of reducing the number of deaths and serious injuries (DSIs) in all land transport modes and therefore reducing their social costs. The social cost of deaths and serious injuries includes the cost to individuals, as well as the cost on the health system and costs due to delays on the network.

5.2 INVESTMENT OBJECTIVES

The investment objectives were mapped following Workshop One, with further information outlined in Appendix B.

⁸ <https://www.nzta.govt.nz/assets/planning-and-investment/docs/Land-Transport-Benefits-Framework-overview-table.pdf>

Stakeholders agreed on the following investment objectives:

- **Investment Objective 1:** Increase the proportion of journeys to work and journeys to education within Wānaka from 0%⁹ to 10% by year 2034 (2033 Census) using public transport.
- **Investment Objective 2:** Increase the proportion of journeys to work and journeys to education within Wānaka from 8% to >8% by year 2034 (2033 Census) by cycling.
- **Investment Objective 3:** Increase the proportion of journeys to work and journeys to education within Wānaka from 9% to >9% by year 2034 (2033 Census) by walking.
- **Investment Objective 4:** Maintain or reduce the proportion of journeys to work and journeys to education within Wānaka from 38% to ≤38% by year 2034 (2033 Census) by driving a private or company motor vehicle.
- **Investment Objective 5:** Reduce greenhouse gas emissions due to road transport from 37% in 2023 to reduced percent in 2034.
- **Investment Objective 6:** Improve safety for all modes from 7 deaths and serious injuries in 2019 to reduced percent in 2034.

Following on from the benefits and investment objectives listed above, Table 5-1 has been developed to provide a link between the benefits, investment objectives, measures and post-implementation methodology which has been identified following the ILM workshop. Changes to the ILM are outlined in Appendix B, and the Benefits Realisation Plan is in Appendix C.

⁹ In 2018, 4% of journeys to work and journeys to education within Wānaka were via Bus or School Bus.

Table 5-1: Link between Benefits Framework and Investment Objectives

NZTA Waka Kotahi Benefits Framework	Benefits	Key Performance Indicators (KPI)			
		Proposed Measure Description	Baseline Measurement (Source)	Agreed Target	Post-Implementation Method
Changes in Access to Social and Economic Opportunities	Impact on access to opportunities by <u>public transport</u>	% of population using public transport to travel to work and education (within Wānaka).	0% (2024, 2018 0% Journey to Work).	10% 2034 (2033 Census)	2033 Census Journey to Work and Journey to Education for within Wānaka SA3 or SA2 Areas.
	Impact on access to opportunities by <u>cycling</u>	% of population cycling to work and education (within Wānaka).	8% (2018 Census, Journey to Work and to Education)	>8% 2034 (2033 Census)	2033 Census Journey to Work and Journey to Education for within Wānaka SA3 or SA2 Areas.
	Impact on access to opportunities by <u>walking</u>	% of population walking to work and education (within Wānaka).	9% (2018 Census, Journey to Work and to Education)	>9% 2034 (2033 Census)	2033 Census Journey to Work and Journey to Education for within Wānaka SA3 or SA2 Areas.
	Impact on access to opportunities by <u>private motor vehicles</u>	% of population driving to work and education (within Wānaka).	38% (2018 Census, Journey to Work and to Education)	<=38% 2034(2033 Census)	2033 Census Journey to Work and Journey to Education for within Wānaka SA3 or SA2 Areas.
Changes in Climate	Impact on <u>Greenhouse Gas Emissions</u>	Transport share (%) of district wide greenhouse gas emissions.	37% (2019, district wide)	Decrease (year on year reductions)	Queenstown Lakes District Council district wide Road Transport share of greenhouse gas emissions.
Changes in User Safety	Impact on <u>Social cost of Deaths and Serious Injuries</u>	Number of deaths and serious injuries	7 DSI 2019	Decrease (year on year reductions)	Annual 5-year DSI reporting.

5.3 CONSTRAINTS AND DEPENDENCIES

This SSBC is subject to the following constraints, dependencies, and assumptions.

Management strategies and registers have been developed to record management of these, and they will be carefully monitored and managed during the programme.

5.3.1 CONSTRAINTS

The data used in the SSBC may not be the latest data available or received. For example:

- QLDC Student Survey (2017) – no update available
- LOS Forecast (2017) – no update available
- Hourly traffic volumes.
- QLDC is in the process of updating their growth projections, growth data included is from 2022.
- Census (2018) – 2023 Census Data with applicable detail is not available at the time of writing.
- Greenhouse gas emissions from road transport only available at the district level.
- The Future Growth Strategy and updated Spatial Plan were not available at time of writing.

5.3.2 DEPENDENCIES

Following the publication of the Spatial Plan in 2021, there are changes to the District Plan which will allow for intensification in Wānaka being planned. A Future Development Strategy is being developed in response to the National Policy Statement on Urban Development which will inform on the updated Spatial Plan.

5.4 RISKS

The top five identified risks based on the strategic case are outlined in Table 5-2, along with consequences, mitigations implemented, and other possible mitigations to the risks. While some risks have had mitigations implemented, they may still have residual risks to be managed.

Table 5-2: Risks and Mitigations

Risk	Description	Consequence	Mitigation
Data availability	Due to the time-line of the business case development and Census data releases, key data sources are out of date.	Evidence in problem statements, benefit realisation values may not refer to the latest data. For example, journey to education school bus data from 2018 is no-longer valid with new primary schools reducing trip lengths. Out-of-date data may lead to investment objectives being inappropriate or challenging to meet.	Implemented: 2018 Census data was used for investment objectives within the Strategic Case. Implemented: 0% used in ILM as baseline for public transport as per instruction from QLDC. Possible: Future project evaluation and assessment to use updated data.
Strategic Case scope impact on evidence base	Strategic Case was limited to considering previously prepared documents	Existing evidence base was limited and often out of date.	Implemented: New Traffic Model Data, New 2018 Census Data, New CAS data, and Walking and Cycling Catchment data were developed to include as evidence.
Change in QLDC Strategic Document outcomes	The QLDC Spatial Plan and Future Development Strategy were written at the same time as the business case was developed. The business case has had to refer to the 2021 Spatial Plan.	Spatial plan directing growth into the near future may not be accurately reflected in traffic models causing different traffic growth on the network into future years.	Implemented: Discussions with QLDC staff on spatial planning assumptions which were included in the transport model.
Expectations of growth too high	Expected residential and/or visitor growth is high	Over-delivery of infrastructure and lower revenue to support infrastructure.	Implemented: Used a range of growth scenarios in transport model. Possible: Consider opportunities for growth and best use of available funds with future plan in place.

Risk	Description	Consequence	Mitigation
Greenhouse gas emissions attributed to Wānaka	Greenhouse gas emissions only available on a district wide level.	Challenging to achieve ILM targets for Wānaka-centric travel without specific detail.	Consider use of traffic model to estimate reduction.

6 LIMITATIONS

This report ('Wānaka Strategic Case') has been prepared by WSP New Zealand Limited ('WSP') exclusively for Queenstown Lakes District Council ('Client') in relation to the Wānaka Network Optimisation SSBC Strategic Case ('Purpose') and in accordance with the Conditions of Contract for Consultancy Services (CCCS) with the Client dated 18/08/2023 ('Agreement'). The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any use or reliance on this Report, in whole or in part, for any purpose other than the Purpose or for any use or reliance on this Report by any third party.

In preparing this Report, WSP has relied upon data, surveys, analyses, designs, plans and other information ('Client Data') provided by or on behalf of the Client. Except as otherwise stated in this Report, WSP has not verified the accuracy or completeness of the Client Data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this Report are based in whole or part on the Client Data, those conclusions are contingent upon the accuracy and completeness of the Client Data. WSP will not be liable for any incorrect conclusions or findings in the Report should any Client Data be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

APPENDIX A STRATEGIC CONTEXT

LOCAL CONTEXT

Multiple transport and land use plans and strategies have been developed for the Wānaka over the past decade or so. Key planning documents are the Queenstown Lakes Spatial Plan¹⁰ and the QLDC District Plan.

QUEENSTOWN LAKES SPATIAL PLAN

The Spatial Plan was developed, and adopted by QLDC in 2021 through the Whaiora Grow Well Partnership; It sets out the long-term approach to address the area's growth-related challenges

Approximately 80% of the growth over the next 30 years will be provided within and around the urban areas of Queenstown and Wānaka. This is anticipated to be mainly through intensification.

The Kai Tahu Values Framework is embedded within the Spatial Plan and is reproduced in Table A-1.

Table A-1: Kai Tahu Values Framework

Value	Description	Application
<i>Whanaukataka</i>	Family and community focussed	Ensuring consideration of the social implications of decisions to enable community and whanau connections and growth.
<i>Manaakitaka</i>	Hospitality	Demonstrating behaviour that acknowledges others, through the expressions of aroha, hospitality, generosity and mutual respect.
<i>Rakatirataka</i>	Leadership	Ensuring the treaty partnership is recognised to enable mana whenua leadership in decision making process.
<i>Haere whakamua</i>	Future focussed	Adopting a forward-looking orientation with future generations in mind.
<i>Tikaka</i>	Appropriate action	Ensuring consideration of the appropriateness of decisions that will have a bearing on social, economic, environmental and cultural outcomes.
<i>Kaitiakitaka</i>	Stewardship	Enabling the inherited responsibilities of mana whenua to support and protect people, the environment, knowledge, culture, language and resources on behalf of future generations.
<i>Mauri</i>	Life force	Recognising the life force in all lands, water and natural environment that stems from immemorial, requiring a high duty of care for kaitiaki (and others) to maintain an intact and healthy mauri, ensuring that what is gifted from the Atua is not neglected.

QLDC DISTRICT PLAN

The District Plan¹¹ guides land use development in the Queenstown Lakes District, setting the rules for what can and cannot be developed with or without a resource consent. QLDC are

¹⁰ <https://www.qldc.govt.nz/your-council/council-documents/queenstown-lakes-spatial-plan>

¹¹ <https://www.qldc.govt.nz/your-council/district-plan>

undergoing a District Plan review, with submissions on their Proposed District Plan (PDP) closing in October 2023.

The objective outlined in the Transport chapter of the PDP is an integrated, safe, and efficient transport network that:

- a. Provides for all transport modes and the transportation of freight;
- b. Provides for future growth needs and facilitates continued economic development;
- c. Reduces dependency on private motor vehicles and promotes the use of shared, public, and active transport;
- d. Contributes towards addressing the effects on climate change;
- e. Reduces the dominance and congestion of vehicles, particularly in the Town Centre zones; and
- f. Enables the significant benefits arising from public walking and cycling trails.

Changes to the District Plan have been directed through the National Policy Statement for Urban Development (NPS-UD). QLDC's Urban Intensification Variation¹² implements Policy 5 of the NPS-UD, which enables more intensification of development in certain areas. This applies to commercial areas in Queenstown, Frankton, and Wānaka.

QLDC LONG TERM PLAN (LTP) 2021-2031

The community outcomes that the transport (including roading, parking, and footpaths) activity contributes to are:

- Zero-carbon communities
 - Clean public transport
 - Active travel network
- Thriving people
 - Environments and services which promotes activity and wellbeing
 - Accessible and barrier-free
- Disaster-defying resilience
 - Resilient infrastructure

For Wānaka, transport funding in the LTP has been set aside for, among other things:

- Wānaka Masterplan update
- Primary cycle network
- Pool to School route
- Public transport

The LTP will be refreshed in 2024.

¹² <https://www.qldc.govt.nz/your-council/district-plan/national-policy-statement-urban-development-district-plan-amendments>

WĀNAKA TOWN CENTRE MASTER PLAN

In 2019, the draft Wānaka Town Centre Master Plan¹³ was consulted on with the community. It focuses on how the town centre will function in future. The plan has not been endorsed. Following strong feedback from the community, the Wānaka Community Board agreed to progress this Network Optimisation SSBC before the Master Plan can be endorsed. More detailed investigation and modelling is required.

Almost 1,300 submissions were made on the plan with 52% opposing the direction of the draft plan and 33% in support. Opposition was strongest amongst that aged over 45, with younger residents being more supportive. A proposed bypass adjacent to the golf course was a key driver behind opposition to the direction of the plan.

WĀNAKA NETWORK OPERATING FRAMEWORK (NOF) 2019¹⁴

The NOF was developed by GHD on behalf of QLDC to support the Master Plan and Programme Business Case. It considers all road users and the inter-relationship with land use, transport networks, and transport infrastructure and services. They provide a backbone to support the development of Network Operating Plans and business cases.

OTHER RELEVANT STRATEGIC DOCUMENTS

Other strategic documents relevant to this SSBC are listed in the Table A-2 below.

Table A-2: Local Context Strategic Documents

Strategic Document	Alignment with strategic outcomes
Local	
Better Ways to Go (QLDC Mode Shift Plan 2022)	Draws on the Spatial Plan and highlights importance of mode shift from private vehicles to public and active transport in a growing region.
Climate and Biodiversity Plan 2022-2025 ¹⁵	One of six outcomes is transport-focussed: 'Our transport system is low-emission and better connected.' Actions include development of this SSBC, public transport trials in the Upper Clutha, increased investment in active travel, improving road crossings for pedestrians, and expanding electric vehicle infrastructure.
Wānaka Lakefront Development Plan	The Plan has four key outcomes relating to ecology, access, land use, and facilities. Stage 1-3 are complete. These include new car parks, shared paths, cultural interpretation, and shared spaces for recreational activity.
Speed Management Plan 2024-2027 ¹⁶	Currently out for consultation, this Plan identifies roads requiring a reduced speed limit to reduce road trauma in the area. This includes roads included in the network optimisation SSBC.

¹³ <https://www.qldc.govt.nz/services/transport-and-parking/way-to-go/Wānaka-town-centre-masterplan>

¹⁴ <https://www.qldc.govt.nz/media/ffadaq0p/Wānaka-network-operating-framework-report.pdf>

¹⁵ <https://www.qldc.govt.nz/media/pr2hajmv/5a-climate-and-biodiversity-plan-2022-25.pdf>

¹⁶ <https://letstalk.qldc.govt.nz/safer-speeds-2024-2027>

In addition to documentation produced by project partners, advocacy groups within the community have recently developed some planning documents themselves including:

- Chamber of Commerce Aspiration Plan (2016) – includes a site analysis, assesses the redevelopment potential and provides a masterplan to coordinate future investment and development.
- Shaping Our Future Upper Clutha Transport Taskforce Report (2017) – includes a vision for a functional, innovative, integrated, multi-modal and sustainable transport system, and an action plan which includes:
 - identifying and protecting land for key future routes and hubs for public transport and parking;
 - a shared zone and progressive pedestrianisation of the Wānaka Lakefront and CBD
 - a parking strategy and connected walking and cycling network.
- Wānaka Active Transport Collective (2018) – produced a Masterplan for a \$6M cycle-walk network which included on-road and off-road cycleways and three underpasses (at the Aubrey/Anderson Road intersection, the SH6/SH84 intersection and outside Three Parks on SH84). The plan has a focus on safe routes for children to get to school, the recreation centre, and swimming pool.
- Heart of Wānaka Community Driven Town Centre Plan (2022) – led by a group of Upper Clutha residents. The vision of the Plan is 'providing a guide to optimise the lakeside heart of our Wānaka Community. They seek endorsement of their plan from the Wānaka Community Board and QLDC.

These plans indicate an active and vocal community.

REGIONAL CONTEXT

At a regional level, Otago's and Southland's regional councils combine to produce a Regional Land Transport Plan. Otago Regional Council produces the Regional Public Transport Plan. The most recent versions of each include the 2021-31 decade.

Table A-3: Regional strategic drivers

Strategic Driver	Alignment with strategic outcomes
Otago / Southland Regional Land Transport Plan 2021-2031 ¹⁷	Objectives are: • Prioritise high risk areas to create a safe transport system free of death and serious injury • Develop a range of travel choices that are used by communities and business to connect • Facilitate understanding and support responses that help meet environmental and emissions targets • Position the regions to ensure proactive responses to change and challenges

¹⁷ <https://www.orc.govt.nz/plans-policies-reports/transport-plans/regional-land-transport-plan-2021-2031>

Strategic Driver	Alignment with strategic outcomes
Otago Regional Public Transport Plan 2021-31 ¹⁸	Objectives are: • Contribute to carbon emission reduction • Integrated public transport network of infrastructure, services, and land use • Adaptable public transport • Safe, accessible, and attractive public transport Implementation of a Wānaka urban service identified as an opportunity, as well as services connecting to Queenstown and Cromwell. Development of trial services to rural centres such as Luggate and Makarora

NATIONAL CONTEXT

GOVERNMENT POLICY STATEMENT ON LAND TRANSPORT

During the writing of this SSBC, a change in government policy statement occurred. Strategic direction of the modal demands on the transport network has shifted from a focus on active modes and public transport to freight, housing, and economic productivity.

EMISSIONS REDUCTION PLAN

Published in 2022, New Zealand's first emissions reduction plan sets the direction for climate action for the next 15 years. For the transport sector the plan outlines actions aiming to reduce reliance on cars and to support people to walk, cycle, and use public transport.

NATIONAL POLICY STATEMENT - URBAN DEVELOPMENT 2020 (NPS-UD)¹⁹

The NPS-UD requires tier 1 and 2 local authorities to prepare a Future Development Strategy (FDS) every 6 years and in time to inform, or at the same time as, preparation of the next Ten Year Plan. The basis for QLDC's FDS is the current Spatial Plan.

¹⁸ <https://www.orc.govt.nz/plans-policies-reports/transport-plans/the-regional-public-transport-plan-2021-2031>

¹⁹ <https://environment.govt.nz/publications/national-policy-statement-on-urban-development-2020-updated-may-2022/>

APPENDIX B ILM UPDATES

Wānaka Network Optimisation ILM Updates

Stakeholders from QLDC, Otago Regional Council, and NZTA Waka Kotahi undertook a workshop in September 2023. The purpose of this workshop was to determine if the 2018 PBC Investment Logic Map (ILM) was fit-for-purpose, and what changes need to be made to this SSBC in consideration to any policy or development changes.

Changes to the ILM are outlined below.

2018 Masterplan PBC ILM

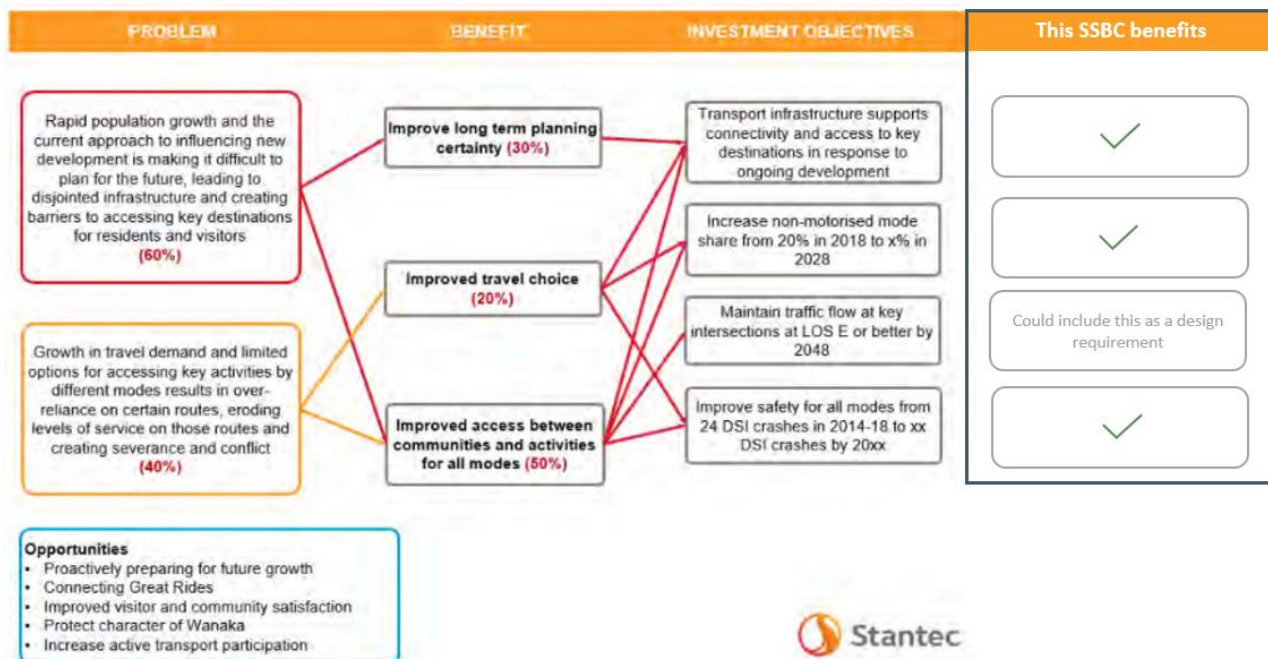
Table 5-1: Project Investment objectives and Key Performance Indicators (KPI's)

PROBLEM	INVESTMENT OBJECTIVE	MEASURE	BASELINE	TARGET
Rapid population growth and the current approach to influencing new development is making it difficult to plan for the future, leading to disjointed infrastructure and creating barriers to accessing key destinations for residents and visitors (60%)	Transport infrastructure supports connectivity and access to key destinations in response to ongoing development	Peak parking occupancy in the town centre	71% in 2018	<80% for xx days per year
		Average travel time between key destinations in the PM peak	Puzzling World to the Town Centre (SH84) 4 mins in 2018 Mt Aspiring College to 3 Parks Recreation centre Car = 6 mins Cycle= 12 mins	Puzzling World to the Town Centre (SH84) Car = x min Cycle= x mins Mt Aspiring College to 3 Parks Recreation centre Car = x mins Cycle= x mins
	Increase non-motorised mode share from 20% in 2018 to x% in 2028	Mode share for sustainable transport modes	20% walking and cycling journeys to work* 30% walking and cycling journeys to school* 0% journeys by public transport	xx walking and cycling journeys to work* by 20xx xx walking and cycling journeys to school* by 20xx xx% journeys by public transport by 20xx
	Maintain traffic flow key intersections at LOS E or better by 2048	Spatial coverage of sustainable transport networks	2km of sealed, separated primary cycle network in 2018 0% of households within 400m of bus stop in 2018	20.9 ^a km of sealed, separated primary cycle network in 2018 xx% of households within 400m of bus stop in 20xx
Growth in travel demand and limited options for accessing key activities by different modes results in over-reliance on certain routes, eroding levels of service on those routes and creating severance and conflict (40%)	Improve safety for all modes from 24 DSI crashes in 2014-18 to xx DSI crashes by 20xx	Measure of delays	7 intersections operating at LOS E of F by 2048 (Tracks model data)	3 intersections operating at LOS E of F by 2048 (Tracks model data)
		Deaths and serious injuries (DSI)	24 deaths and serious injuries between 2014-18	xx deaths and serious injuries between 20xx
		Length of road with high personal risk	4.5 kilometres in 2018	xx kilometres in 20xx

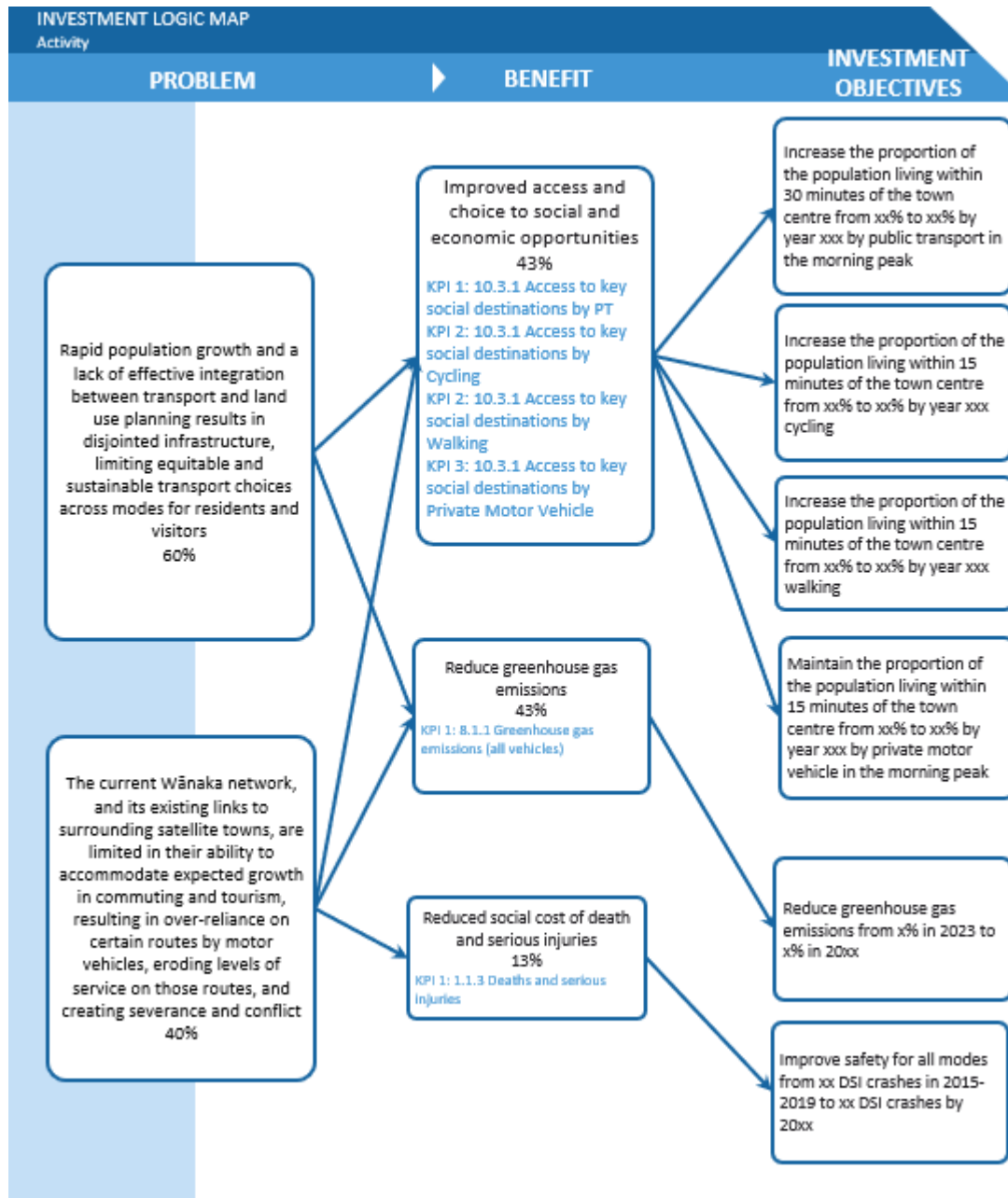
* 2013 census data

2017 school survey

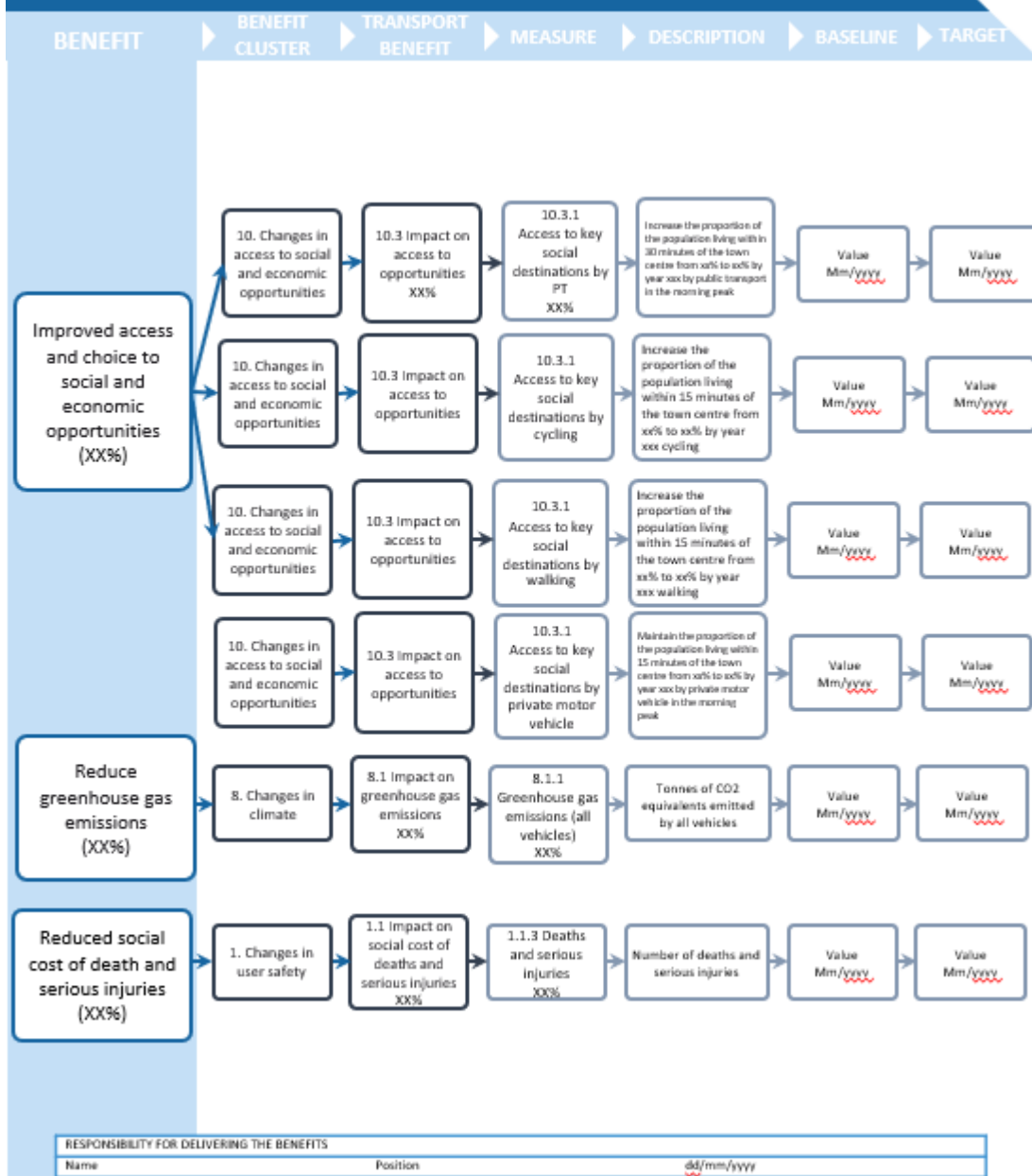
^a based on completion of primary cycle network



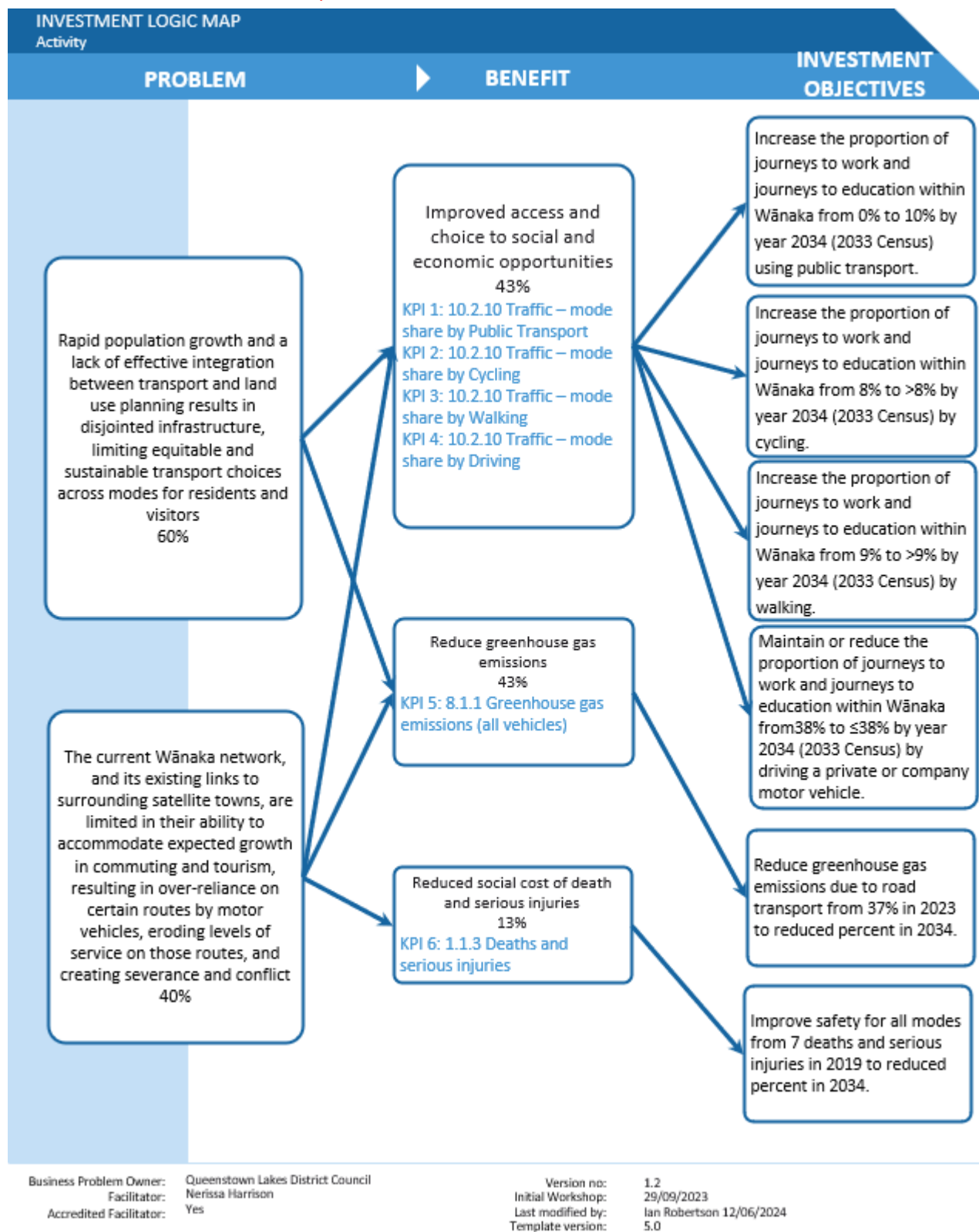
2023 Draft Wānaka Network Optimisation SSBC



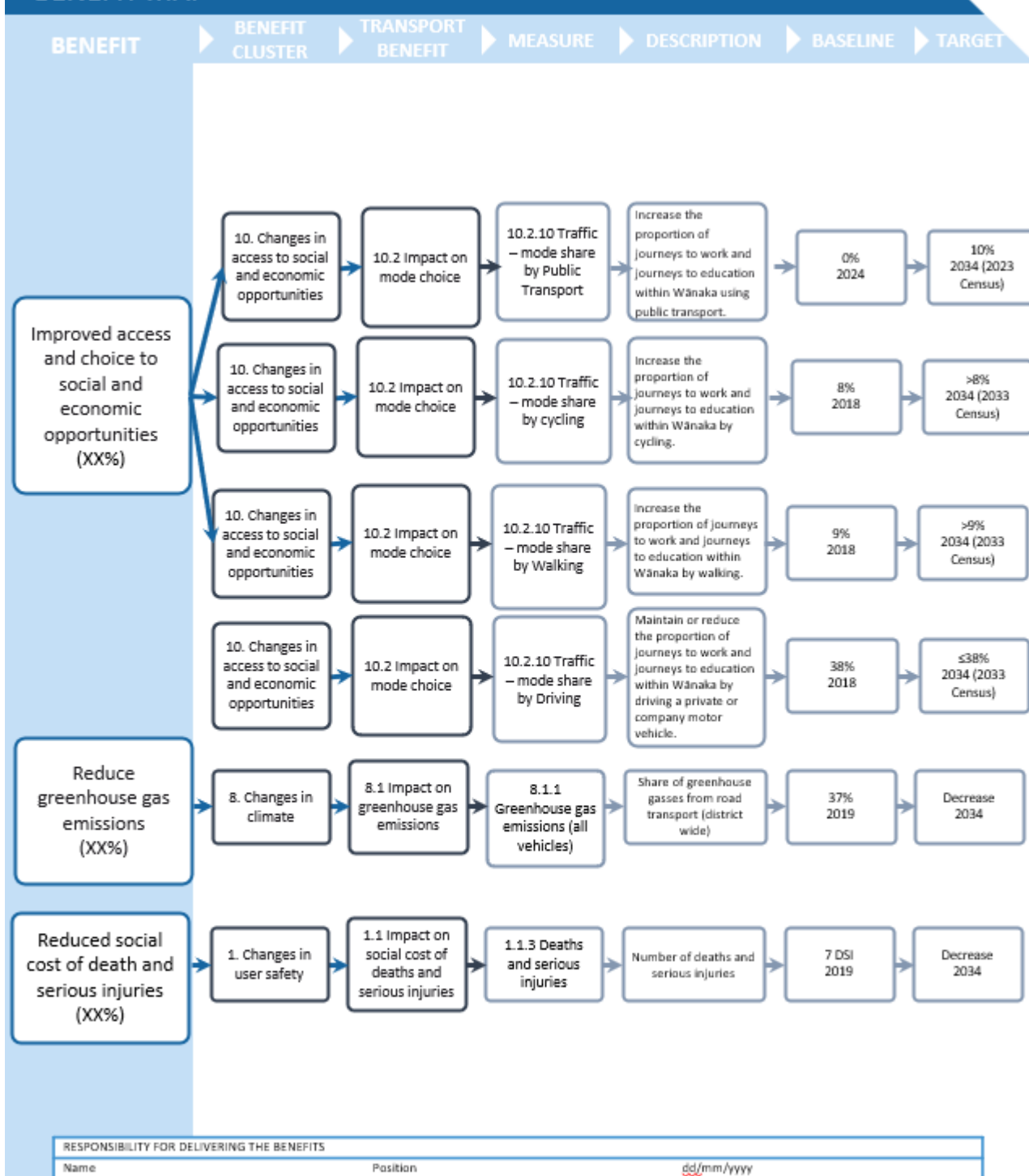
BENEFIT MAP



2024 Wānaka Network Optimisation SSBC



BENEFIT MAP



Business Problem Owner: Queenstown Lakes District Council
 Facilitator: Nerissa Harrison
 Accredited Facilitator: Yes

Version no: 1.2
 Initial Workshop: 29/09/2023
 Last modified by: Ian Robertson 12/06/2024
 Template version: 1.0

APPENDIX C BENEFIT REALISATION PLAN

Wānaka Network Optimisation Benefits Realisation Plan

Investment Objectives

Stakeholders agreed the following investment objectives:

- *Investment objective one:* Increase the proportion of journeys to work and journeys to education within Wānaka from 0%¹ to 10% by year 2034 (2033 Census) using public transport.
- *Investment objective two:* Increase the proportion of journeys to work and journeys to education within Wānaka from 8% to >8% by year 2034 (2033 Census) by cycling.
- *Investment objective three:* Increase the proportion of journeys to work and journeys to education within Wānaka from 9% to >9% by year 2034 (2033 Census) by walking.
- *Investment objective four:* Maintain or reduce the proportion of journeys to work and journeys to education within Wānaka from 38% to ≤38% by year 2034 (2033 Census) by driving a private or company motor vehicle.
- *Investment objective five:* Reduce greenhouse gas emissions due to road transport from 37% in 2023 to reduced percent in 2034.
- *Investment objective six:* Improve safety for all modes from 7 deaths and serious injuries in 2019 to reduced percent in 2034.

Benefits, Baselines, Targets

NZTA WAKA KOTAHI BENEFITS FRAMEWORK	BENEFITS	KPI	PROPOSED MEASURE DESCRIPTION	BASELINE MEASUREMENT AND SOURCE	AGREED TARGET	POST-IMPLEMENTATION METHOD
Changes in access to social and economic opportunities	Impact on access to opportunities by public transport	Access to key social destinations by PT	Proportion of the population using public transport for journey to work and education within Wānaka.	0% (2024, 2018 0% Journey to Work).	10% 2034 (2033 Census)	2033 Census Journey to Work and Journey to Education for within Wanaka SA3 or SA2 Areas.
Changes in access to social and economic opportunities	Impact on access to opportunities by cycling	Access to key social destinations by cycling	Proportion of the population cycling for journey to work and education within Wānaka..	8% (2018 Census, Journey to Work and to Education)	>8% 2034 (2033 Census)	2033 Census Journey to Work and Journey to Education for within Wanaka SA3 or SA2 Areas.

¹ In 2018, 4% of journeys to work and journeys to education within Wānaka were via Bus or School Bus.

NZTA WAKA KOTAHI BENEFITS FRAMEWORK	BENEFITS	KPI	PROPOSED MEASURE DESCRIPTION	BASELINE MEASUREMENT AND SOURCE	AGREED TARGET	POST-IMPLEMENTATION METHOD
Changes in access to social and economic opportunities	Impact on access to opportunities by walking	Access to key social destinations by walking	Proportion of the population walking for journey to work and education within Wānaka..	9% (2018 Census, Journey to Work and to Education)	>9% 2034 (2033 Census)	2033 Census Journey to Work and Journey to Education for within Wanaka SA3 or SA2 Areas.
Changes in access to social and economic opportunities	Impact on access to opportunities by private motor vehicle	Access to key social destinations by motor vehicle	Proportion of the population driving for journey to work and education within Wānaka.	38% (2018 Census, Journey to Work and to Education)	<=38% 2034(2033 Census)	2033 Census Journey to Work and Journey to Education for within Wanaka SA3 or SA2 Areas.
Changes in climate	Greenhouse gas emissions (all vehicles)	Transport related emissions	Transport share of district wide greenhouse gas emissions.	37% (2019, district wide)	Decrease (year on year reductions)	Queenstown Lakes District Council district wide Road Transport share of greenhouse gas emissions.
Changes in user safety	Deaths and serious injuries	Risk of death or serious injury	Number of deaths and serious injuries	7 DSI 2019	Decrease (year on year reductions)	Annual 5-year DSI reporting.

Benefit Measures

Benefit measures will be reported as; baseline value and year, target value and year, measure approach / source, baseline value target and quantity (if percentage target), progress measurement years.

Investment Objective One – Public Transport

Baseline: 0%, 2024, QLDC

Target: 10%, 2034, QLDC

Measure: StatsNZ Commuter View dataset for 2033 Census, Journeys to Work and Journeys to Education within and between Wānaka SA2's (Albert Town, Wanaka Central, Wanaka North, Wanaka Waterfront, Wanaka West) – these SA2 areas represent Wānaka SA3 area. Percentage includes “at Home” and unidentified movements. Measure includes Bus, Ferry, Train and School Bus modes.

2018: 4% (240 use public transport to travel to education).

Progress measurements 2023 Census, 2028 Census.

Investment Objective Two – Cycling

Baseline: 8%, Census 2018 (see measure below), QLDC

Target: >8%, 2034, QLDC



Measure: StatsNZ 2018 Commuter View dataset, Journeys to Work and Journeys to Education within and between Wānaka SA2's (Albert Town, Wanaka Central, Wanaka North, Wanaka Waterfront, Wanaka West) – these SA2 areas represent Wānaka SA3 area. Percentage includes “at Home” and unidentified movements.

2018: 8% (414 cycle to work or cycle to education)

Progress measurements 2023 Census, 2028 Census.

Investment Objective Three – Walking

Baseline: 9%, Census 2018 (see measure below), QLDC

Target: >9%, 2034, QLDC

Measure: StatsNZ 2018 Commuter View dataset, Journeys to Work and Journeys to Education within and between Wānaka SA2's (Albert Town, Wanaka Central, Wanaka North, Wanaka Waterfront, Wanaka West) – these SA2 areas represent Wānaka SA3 area. Percentage includes “at Home” and unidentified movements.

2018: 9% (504 walk to work or walk to education).

Progress measurements 2023 Census, 2028 Census.

Investment Objective Four – Driving

Baseline: 38%, Census 2018 (see measure below), QLDC

Target: ≤38%, 2034, QLDC

Measure: StatsNZ 2018 Commuter View dataset, Journeys to Work and Journeys to Education within and between Wānaka SA2's (Albert Town, Wanaka Central, Wanaka North, Wanaka Waterfront, Wanaka West) – these SA2 areas represent Wānaka SA3 area. Percentage includes “at Home” and unidentified movements. Measure includes Drive Private Vehicle and Drive Company Vehicle, excludes passenger.

2018: 38% (2,016 drive to work or drive to education)

Progress measurements 2023 Census, 2028 Census.

Investment Objective Five – Greenhouse Gasses

Baseline: 37%, 2019 (see measure below), QLDC

Target: reduced, 2034, QLDC

Measure: Queenstown Lakes District Council district wide Road Transport share of greenhouse gas emissions, Greenhouse Gas Community Inventory 2019 Update for Queenstown Lakes District, Tokin & Taylor November 2020 1005862.1000.v3.

2019: 37% (241,755tCO₂e).

Progress measurements to identified.

Investment Objective Six – Deaths and Serious Injuries

Baseline: 7, 2019, QLDC

Target: reduced, 2034, QLDC



Measure: New Zealand Transport Agency Waka Kotahi Crash Analysis System, sum of fatalities and serious injuries in a calendar year for the Wanaka area unit. Wanaka area unit aligns with the Wānaka SA2's and Wānaka SA3 area.

Progress measurements annually.

Queenstown Lakes District Council

Wānaka Network Optimisation Business Case

Single stage business case: Economics case

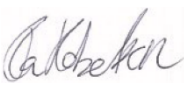
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REV	DATE	DETAILS
RevA	17/12/2024	DRAFT for Client Review
0	06/06/2025	Final
1	18/06/2025	Revision 1

	NAME	DATE	SIGNATURE
Prepared by:	Joanne Tan, Ian Robertson	18/06/2025	
Reviewed by:	Nerissa Harrison, Chris Groom	18/06/2025	
Approved by:	Ryan Rolston	18/06/2025	

This report ('Report') has been prepared by WSP exclusively for Queenstown Lakes District Council ('Client') in relation to progressing the PBC interventions to short list ('Purpose') and in accordance with the Wanaka Network Optimisation SSBC Contract with Queenstown Lakes District Council dated 18 August 2023. The findings in this Report are based on and are subject to the assumptions specified in the Report [Wanaka Network Optimisation SSBC Contract dated 18 August 2023 and the SSBC Strategic Case]. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

18 June 2025

DOCUMENT VERSION HISTORY

Date	Version	Author	Changes
17/12/2024	Rev A	Joanne Tan	N/A
06/06/2025	0	Ian Robertson	Strategic Responses Updated following QLDC discussion.
18/06/2025	1	Ian Robertson	Updated BCR.

DOCUMENT REVIEW

Role	Name	Review status
WSP Reviewer	Nerissa Harrison	Complete
WSP Reviewer	Chris Groom	Complete

RELATED DOCUMENTS

Title of document	Location
2019 Wānaka Town Centre Master Plan and Integrated Programme Business Case	Wānaka Town Centre Master Plan and Integrated Transport Programme Business Case
20241023 Wānaka Network Optimisation Workshop	Options Workshop 23 October 2024
NZTA Investment Prioritisation Method (IPM) 2024-27	IPM 2024 - 2027
Monetised Benefits and Costs Manual	NZTA – monetised benefits and costs manual
Wānaka Network Optimisation SSBC Strategic Case	With Queenstown-Lakes District Council
Wānaka Network Optimisation SSBC Economics Report	Appendix C
Technical Note - Wānaka Model Build	Appendix D

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GLOSSARY OF TERMS

Abbreviation	Term
CAS	NZTA Crash Analysis System
KPIs	Key Performance Indicators
MBCM	Monetised Benefits and Costs Manual
NLTP	National Land Transport Programme
NZTA	NZ Transport Agency Waka Kotahi
PBC	Programme Business Case
QLDC	Queenstown Lakes District Council
SSBC	Single Stage Business Case

1 ECONOMIC CASE

The purpose of the Economic Case is to identify and assess Strategic Responses (representing the Preferred Option in this business case) that provide the best value for money and achieve a proactive investment in transport to ensure Wānaka is ready for future growth. The Economic Case builds on the Strategic Case for Change, the themes and options developed in the 2015 Wānaka Programme Business Case (PBC), 2019 Wānaka Integrated Transport PBC. This Business Case has been prepared following the NZ Transport Agency Waka Kotahi (NZTA) guidelines, wherein the Economic Case:

- **Outlines the ‘do minimum’ base case.** As a benchmark to compare and assess options, the ‘Do Minimum’ base case assumes the existing base network with maintaining status quo service levels, and no added investment beyond what has already been committed and/or funded. The Do Minimum also includes recently completed and soon to be completed works.
- **Summarises the approach to option development.** The options development process adopted for this Single Stage Business Case (SSBC) is consistent with the NZTA guidelines, intervention hierarchy and optioneering process, which encourages making best use of the existing system, and then considering what new options for the road network, active mode and public transport network might be needed to ensure that the transport network is fit for its growing future role.
- **Presents the Long-List assessment.** The long-list of options were developed and evaluated through the 2015 Wānaka PBC and 2019 Wānaka Integrated Transport PBC. In the 2015 PBC, the recommended programme was developed and assessed against the investment key performance indicator (KPI)s. In the 2019 PBC, the long-list of interventions and work programmes were then developed and analysed through a multi-criteria assessment to select a short-list of three investment programmes. These three investment programmes were then discussed in a stakeholders’ workshop to generate a preferred programme of interventions.
- **Presents the Short-List assessment and identifies Strategic Responses.** A short-list of projects was identified for implementation in 2023, consisting of medium and high-level investment over varying timeframes. A series of Strategic Responses were developed and assessed to respond to current and future emerging needs instead of a short-list assessment which will support in understanding areas of investment prioritisation.

1.1 DO MINIMUM OPTION

The scope of this SSBC and the area modelled covers the majority of Wānaka (with no improvements proposed in Wānaka Central Business District (CBD) and no new entrances to Three Parks), shown in Figure 1 below.

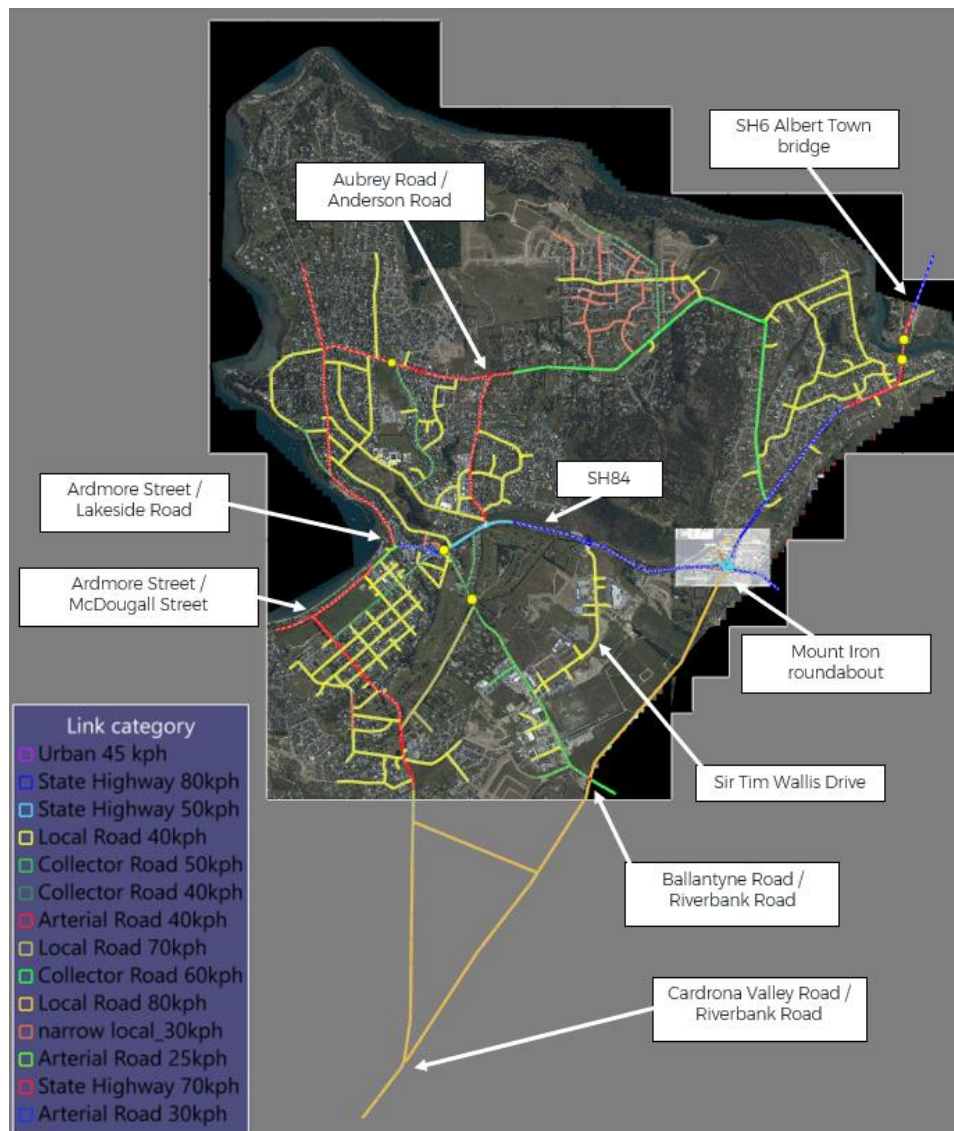


Figure 1-1. Geographical area covered in the Wānaka Model.

The Do Minimum scenario comprises of the existing base network, maintaining the status quo service levels with any planned maintenance and no additional investment beyond what is already committed and/or funded. In accordance with the NZTA Monetised Benefits and Costs Manual (MBCM), the Do Minimum does not take advantage of further change opportunities that may arise, such as the introduction of additional services. However, it should not be confused with a 'do nothing', as maintaining the current arrangements will have consequences and incur costs. Essentially, the Do Minimum scenario can be described as a 'do nothing beyond current practice' scenario.

The agreed assumptions for the Do Minimum based on the *Appendix D – Technical Note – Wānaka Model Build* are:

- Traffic signals added at Ardmore Street midblock crossing, Aubrey Road midblock crossing, Ballantyne Road midblock crossing.
- The existing traffic signals at the SH6 Clutha River (Albert Town) Bridge are continuously adjusted as traffic volumes grow. Prior to the 2043 traffic model period the bridge has been duplicated removing the need for traffic signals.
- Mount Iron Roundabout is complete.
- Ballantyne Road / Riverbank Road Roundabout is complete

- Minor road network – all roads in the town centre in general have been included, some roads in residential areas outside the town centre have been omitted for model simplicity
- Total demand for internal zones (70 zones) were estimated based on standard trip rates for the split of particular land use within each zone (residential, commercial, recreation, visitor accommodation, retail, mixed use etc.).

Following discussions with Queenstown-Lakes District Council (QLDC) and NZTA, projects included within the do-minimum include:

RECENTLY COMPLETED WORKS

- SH84 underpass (connecting existing walking and cycling trails) – completed in December 2020
- Ballantyne Road Upgrade includes seal extension and safer opportunities for walking and cycling – completed in late October 2021
- Aubrey Road and Anderson Road roundabout – completed November 2023
- Mt Iron Roundabout (SH6 / SH84 / Riverbank Road Roundabout) – completed in April 2024
- Schools to Pool active travel route – completed in September 2024
- Ballantyne Road and Riverbank Road Roundabout – completed in end November 2024
- SH84 midblock signalised crossing (west of Ballantyne Road)
- Future committed work outside of the scope of the SSBC extent: Northlake Development in Wānaka and Longview Development in Lake Hāwea

SOON TO BE COMPLETED WORKS

- Ballantyne Road / Avalon Station Drive Roundabout, Avalon Station Drive extension, and shared path connecting Avalon Station Drive and Ballantyne Road via Frederick Street (assumed prior to 1 July 2027).
- Ballantyne Road / Golf Course Road Roundabout, new road links into Three Parks from Ballantyne Road, and the completion of the Schools to Pool Shared Path (assumed prior to 1 July 2027).
- Lakefront Shared Path Stage 4 (assumed prior to 1 July 2027).
- SH6 Clutha River (Albert Town) Bridge:
 - Continual traffic signal optimisation to reduce proportion of “all red” phase.
 - Bridge duplication between 2038 and 2043.

1.2 LONG-LIST OPTIONS IDENTIFICATION

Previous business cases and planning activities (see section 1.2.1), have considered various options and alternatives and how they could combine to provide a long-list of options. These documents have adequately identified and assessed the long-list of options and guided the identification of a short-list of options for assessment within this SSBC. Note, as some elements within previous business cases have already been implemented, the extent of options that this SSBC covers is different from the extents that were covered by previous business cases.

1.2.1 *PREVIOUS BUSINESS CASES AND PLANNING ACTIVITIES*

A summary of the strategic documents that relate to the Wānaka transport system since 2015 are listed below. More information of the strategic documents is described in the Strategic Case.

BUSINESS CASES

Wānaka Programme Business Case – 10 January 2015

- A draft programme business case that builds upon the evidence of key transport problems in Wānaka (presented in the 2014 strategic case) and addresses the road network, cycling, walking and parking through a programme.

Wānaka Town Centre Masterplan and Integrated Transport Programme Business Case – August 2019 and July 2019

- A masterplan comprising of an interwoven package of placemaking and movement initiatives will strongly support Wānaka Town Centre as the “heart of the community” for locals and visitors while also encouraging mode shift to more sustainable modes for the community (walking, cycling and public transport)
- A preferred business case of integrated transport improvements and land use, aligns with the Masterplan and supports the transport needs of the wider Wānaka urban area.

PLANNING ACTIVITIES

Wānaka Network Operating Framework – August 2018

- The Network Operating Framework identifies transport mode priority for key links in Wānaka. It is structured to identify priority route hierarchies for walking, cycling, public transport, general traffic, and freight. Identification of route hierarchies was provided by council officers.

Wānaka Town Centre Masterplan – August 2019

- The Masterplan focuses on the Wānaka Town Centre’s future functions and provides a preferred programme of transport improvements to ensure good access to and around the town centre and wider urban areas. The Masterplan was not 100% completed with further specific transport projects identified as essential – including in particular parking management and transport network planning projects which QLDC has been actively working towards. The Masterplan also included extensive public transport trials and indicates strong desire for a future public transport network.

Queenstown Lakes Spatial Plan – July 2021

- The Spatial Plan provides a vision and framework for how and where the district will grow towards 2050, ensuring future growth occurs in appropriate locations and suitably supported by infrastructure. The 2021 Spatial Plan is being superseded by the Spatial Plan Gen 2.0. As of September 2024, the Spatial Plan Gen 2.0 programme is delayed due to the 2024 Housing and Business Capacity Assessment (HBA) being rescheduled to later completion dates. As of June 2025, the Spatial Plan Gen 2.0 development is on hold pending the outcome of government Regional Deals.
- The Spatial Plan indicates growth in “Three Parks” and towards the southern end of Wānaka.

Heart of Wānaka, a community-driven spatial plan – July 2023

- A holistic and living plan that represents the Wānaka community’s aspirations providing direction for the coordination of integrated development of the town centre. This is not a ‘council-adopted’ document and is seen as representing the Wānaka community’s views and aspirations.

Key Development / Growth Areas

- Three Parks – the primary purpose of the Three Parks Commercial Zone is to provide an urban centre which enables large format retail activities. The wider Three Parks ‘town centre’ and development area provides mixed-use, offices, fine-grain retail opportunities supported by key anchor tenants in its large-format retail quarter. Three Parks is approximately half-way through its overall development with additional growth anticipated to be realised over the coming 6-8 years.
- Northlake – is a recent development area situated between Wānaka, Three Parks, and Albert Town, with the ‘outlet’ area of Wānaka to the north of it. Northlake is predominantly a mixed-use residential development offering a range of residential housing options and a small local centre.
- Lake Hāwea settlement is situated approximately 15km from the Wānaka town centre at the edge of Lake Hāwea. Over the recent years, the Lake Hāwea settlement has experienced a substantial amount of growth which continues to expand the lake-side settlement. As a settlement, Lake Hāwea can be seen to function together with Hāwea Flat settlement, and both rely on Albert Town, Three Parks and Wānaka shops as their key service centres.

Plan Change: Proposed Urban Intensification Variation – current

- The proposed variation was publicly notified in 2024 with the submissions period closing in June 2024. The variation is currently in the public hearings phase running over June – July 2025. The proposed Urban Intensification Variation gives effect to central government’s National Policy Statement on Urban Development (NPS-UD). The NPS-UD sets national direction to ensure Aotearoa New Zealand has well-functioning urban environments that meet the diverse and changing needs of our communities and future generations. The variation enables additional growth in Wānaka.
- Particular relevance for the transport network economic case consideration includes the impact this variation will have on Wānaka’s urban form and growth patterns. The Queenstown-Lakes District Council is a ‘Tier 2’ local authority in the context of the NPS-UD. The purpose of the Urban Intensification Variation is to give effect to Policy 5 of the NPS-UD and the wider directive of the NPS-UD to ensure a well-functioning urban environment that responds to the diverse and changing needs of people, communities, and future generations.

1.2.2 OPTIONS AND ALTERNATIVES PREVIOUSLY EXPLORED

Options considered within the previous business cases and historical planning documents are outlined below.

2015 WĀNAKA PBC

Three broad themes of transport investments were considered in the 2015 PBC: road development, walking and cycling development, and parking development and management. A range of scenarios were explored across these themes:

Table 1-1. Range of themed scenarios considered in the 2015 PBC.

Themes	Scenarios
Road network planning	Separate commission undertaken for road network scenarios, involving the update of the strategic transport model with commentary on key community issues.
Parking	• Return on investment (commercial return) • Travel behaviour change (shape) • Predict and provide (increase supply with demand)

Walking and Cycling	• Suppress demand (active discouragement) • Vulnerable users (accommodated through network development) • Brand-led (Wānaka identity) • Reduce convenience of alternatives (discourage vehicular traffic) • Medium infrastructure (low cost on-road facilities) • High infrastructure (planned hierarchy)
Refined scenario theme list (including do minimum)	• Vulnerable users • Brand-led • Medium infrastructure (includes strong communication of walking & cycling network and use of parking and roading management). • High infrastructure (includes strong communication of walking & cycling network and use of parking and roading management).

2019 WĀNAKA MASTERPLAN AND INTEGRATED TRANSPORT PBC

A range of ideas were considered during the 2019 Wānaka Masterplan and Integrated Transport PBC. Interventions across a wide range of themes are summarised below:

Table 1-2. Themes and interventions considered in the 2019 Wānaka Masterplan and Integrated Transport PBC.

Themes	Interventions
Cycling interventions	Safe separated and accessible cycle network, EV and bike charging, bike parking, micro-mobility share service and cycle facilities.
Pedestrian network interventions	Quality footpaths, permeable town centre, pedestrianised areas (with emergency access), legible wayfinding, more crossing points, pedestrian network connectivity.
Public transport network interventions	Bus network for Wānaka, preserve bus corridors and bus hub locations, expand eligibility for school PT, mass rapid transit, transport hub for local and regional routes, commuter services to outlying settlements, adaptable and scalable public transport.
Other transport interventions	Mobility as a service, facilitated car-pooling, travel behaviour initiatives and transport planning, ferry / water-taxi, cycle rickshaws, drone delivery, traffic calming and speed management.
Proactive enforcement interventions	Footpath parking, negative behaviour towards vulnerable users, parking over driveways, and Bluetooth trigger to slow vehicles at gateways.
Planning and investment interventions	Prioritise active modes, paid parking to fund public transport, driver education, QLDC run public transport, encourage integrated investment (services)
Intersection improvement interventions	Anderson Road roundabout and SH84, Ballantyne Road and SH84, Cardrona Valley Road and Golf Course Road.
New transport link interventions	Wānaka outer ring road, cross town link, new Northlake from Aubrey, Three Parks to town-centre connection.

Corridor upgrades interventions	Anderson Road, Albert Town Bridge, Aubrey Road, Brownstone Street
Freight and heavy vehicle access interventions	Freight hub in Cromwell, freight link to industrial area, vehicle route for boat trailer access, relocate Ballantyne Road industrial area to near the airport.
Parking interventions	Additional parking areas, exclude campervans from town-centre, designated campervan parking, no parking in town-centre, increased disabled parking, free-parking reservoirs on town-centre fringe, designated coach parking, long-term parking management strategy.
Integrated transport and land use planning interventions	Airport masterplan, fast-track planning processes, development which aligns with long-term vision and transport network, adaptive and proactive planning to manage development, retain local experience and services, retain existing urban growth boundaries, urban boundary contained by 'rivers', infrastructure investment to meet current needs, visitor accommodation precinct, private accommodation rentals in designated areas only, designated future transport corridors, transit oriented development, developer education, developers to demonstrate wider benefits as part of the application and consent.
Revenue model interventions	Increase scope of developer contributions to pay for network improvements beyond area of scope, enable value capture from value uplift from changing land use, identify new funding streams, carpark 'eats itself' revenue model to develop space.
Governance interventions	Queenstown Lakes Unitary Authority, NZTA & QLDC long-term project co-ordination, Wānaka governance model for town-centre, new consultation mechanisms to engage with different groups.

1.2.3 LONG-LIST OPTIONS ASSESSMENT

The long-list of options was evaluated in business cases prior to this SSBC, details of the assessments are summarised below.

2015 WĀNAKA PBC

The three themes of road network, parking, and walking and cycling, and five scenarios (from the 2015 PBC) were discussed in a scenarios workshop held with key stakeholders in May 2015.

The recommended programme developed after the workshop, consisted of a street typology and proposed actions under three themed areas. The street typology was developed in consultation with the community board to aid the implementation of the programmes. The proposed actions were scheduled across short term (1 – 3 years), medium term (4 – 10 years) and long term (10 years+) periods. The proposed actions are listed in the table below.

Table 1-3. The proposed actions under the recommended programme from the 2015 PBC.

Programme themes	Proposed actions (options)
Roading, roadside and pathways	• Town Centre Shared Space • Cross town/State Highway connection at Ballantyne and Hedditch • Road network review • Intersection improvement • Ballantyne Road and Anderson Corridor improvements • Crown Range Road route safety study • 'Grey'-spot improvements • Cycling and walking catchment audits/minor improvements • Main school bike/walk routes • Main commuter bike/walk routes
Parking	• Parking and End of Trip facilities • Allocation of roadside space consistent with road typology • Provision of destination facilities • Hierarchical approach to parking with short term parking restrictions in central Wānaka • New off-street car parks to include revenue capture mechanisms
Transport information	• Transport information • School and business travel plans • On-street wayfinding • Transport communication plans

Conventional public transport services are unlikely to be possible due to the small size of Wānaka, however, niche services could be implemented for specific demands such as:

- Taxi and small passenger vehicle services
- Coach services bringing visitors to and through the ward
- Scheduled services between Wānaka and other nearby centres including Queenstown and Cromwell
- Total mobility services for people with disability

The proposed actions in the recommended programme were then assessed against the investment Key Performance indicators (KPIs) to ensure that they achieve the identified benefits in the short term, medium term, and long term.

Short term

- Focus was on progressing individual business cases
- With minor expenditure on elements such as parking reviews and installation of low cost improvements
- Continuation of resilience and winter maintenance programmes

Medium term

- Focus was on implementation of significant programme elements
- Such as roading improvements on Anderson Road, Ballantyne Road and cross-town/SH6 connection (Ballantyne Road/Hedditch Street/Lismore Street)
- Completion of the strategic cycle network through the implementation and improvement of the school and commuter networks
- Implementation of improved management options which will improve parking availability

Long term

- Key infrastructure projects will be completed

2019 Wānaka Integrated Transport PBC

A long-list of interventions focusing on the following four key themes were developed with stakeholders at the PBC workshop in November 2018:

- Improved Travel Choice
- Improved Access
- Improve Long Term Planning Certainty
- Wānaka Town Centre Master Plan

115 interventions¹ were generated from the stakeholder workshops and assigned to the following seven potential work programmes:

Table 1-4. Seven potential work programmes generated from the Integrated Transport PBC workshop.

Potential work programme	Summary of work programme
Do Minimum	Planned maintenance and minor upgrades provided for in the Long-Term Plan
Baseline Investment	Interventions shared by all programmes excluding Do Minimum
Efficient Movement	Aims to improve network efficiency and adopts Wānaka Network Operating Framework
Visitor Access	Enhance visitor journeys with an emphasis on safety and amenity improvements and improving access to parking and wayfinding, includes primary cycle network, ferry services and improved access to Wānaka airport.
Balanced Movement	Improve management of travel demand to relieve network pressure and improve safety of vulnerable road users, with an emphasis of modal shift. Elements include the implementation of a public transport network, primary and secondary cycling networks, parking management pricing and restrictions to manage demand
Enable Growth	Increasing network capacity to address existing constraints such as new corridor links, intersection upgrades, new parking facilities and investments to support access for all modes.
Do Maximum	Encompasses the widest range of initiatives that will increase corridor and network capacity for all modes.

A multi-criteria assessment of these seven programmes were undertaken analysis to identify a short-list of three potential investment programmes. The short-listed programmes were, Baseline, Efficient Movement and Balanced Movement, and were presented at a stakeholders' workshop in April 2019 to generate a stakeholder preferred programme.

¹ The full list of interventions can be found in the Wānaka Town Centre Master Plan and PBC – Appendix C.

This preferred programme was a modified version of the Balanced Movement programme with the following recommended interventions:

Table 1-5. Preferred programme with interventions for the 2019 Wānaka Integrated Transport PBC.

Themes in preferred programme	Interventions
Pedestrian network	Pedestrian network upgrades, safe crossing points, legible wayfinding for pedestrians, grade separated crossing at Tim Wallis Drive, provision of footpaths
Cycle network	Complete primary and secondary cycle network, cycle facility on Riverbank Road, Mt Aspiring Road cycleway to Glendhu Bay, improvements to existing shared paths, commuter cycleway to Airport/Luggate, safe cycle access between schools and Meadowstone
Cycle facilities	Bike and EV charging, bike parking, quality bike/scooter share service, 'End of trip' cycle hub
Public transport network	Local urban bus network; regional bus network to outlying settlements; airport links; central bus hub; preserve PT corridors, stops and hub
Intersection improvements	Upgrade intersections: • Brownston Street/Ardmore Street, Anderson Road/SH84, Aubrey/Anderson Road • Ballantyne Road/SH84, Ballantyne Road/Golf Course Road, Riverbank Road/Ballantyne Road, SH84/SH6/Riverbank Road • Golf Course Road/Cardrona Valley Road, Cardrona Valley/Orchard/Studholme Road
Corridor upgrades	Albert Town bridge upgrade for all modes, upgrade access and place function of Brownston Street, Wānaka outer bypass route
New links	Wānaka inner bypass route, Studholme Road link
Freight/HV access	Fit for purpose freight link to Ballantyne Road industrial area, vehicle route for boat trailer access
Parking	Parking management strategy, new/additional parking areas, parking enforcement
Other transport improvements	'Mobility as a service' initiatives, travel behaviour change, wayfinding, application of safe and appropriate speed limits, speed management, additional street lighting, gateway treatments

1.3 SHORTLISTED OPTIONS

The preferred programme from the 2019 Integrated Transport Business Case were then revised to align with the scope of this SSBC. At the commencement of this SSBC, a short-list of projects was identified by QLDC for implementation in 2023. The short-list consisted of medium and high-level of investment over varying timeframes, shown in the Figure 2 below.

Intervention scale			Feature
Base (existing)			Base network
Maximum Programme	Do Minimum		Travel Demand Management programmes
			SH84/SH6 roundabout
			Three Parks roundabout and network
			Anderson Road corridor - shared path
			Riverbank Road/Ballantyne Road - roundabout
	Medium Programme		Brownston Street corridor - Do Minimum
			Ardmore Street/Lakeside Road - permanent roundabout
			Ballantyne Road - Three Parks multi-modal corridor
			Anderson Road/Aubrey Road - improved roundabout
			Cardrona Valley Road/Avalon Station Drive
			Cardrona Valley Road/Golf Course Road
			McDougal Street/Brownston Street roundabout
			Cardrona Road multi-modal corridor
			Golf Course bypass - multi-modal corridor
			Golf Course bypass - multi-modal corridor
			Public transport network (incremental)
			Brownston Street corridor - major cycling route and major improvements
			Active travel - crossing upgrades

Figure 1-2. Short-list projects for implementation proposed over varying timeframes.

As the business case progressed, some of the short-listed projects were excluded based on the scale of investment. Following the mid-term NLTP update in 2024, with limited funding in the next three years for Wānaka, QLDC has requested that the short-list options were not assessed. A series of Strategic Responses were instead developed as a different approach to respond to current and future emerging needs, which will be detailed in the next section.

2 STRATEGIC RESPONSE

2.1 SELECTION OF STRATEGIC RESPONSE

A Network Optimisation Workshop was held on 23rd October 2024, where the updated traffic model, future growth scenarios, scenario testing and Strategic Responses were discussed.

The Strategic Responses were developed as high-level solutions that would support QLDC in understanding areas to prioritise investment while staying adaptable as Wānaka develops and priorities change.

2.2 STRATEGIC RESPONSES

The scope of the Strategic Responses covers three broad areas and includes elements from works underway, the do-minimum and business as usual activities.

- Strategic Spatial Planning
- Capacity and Safety Improvements on Critical Corridors
- Travel Choice

There is interaction and interdependency between the Strategic Responses. Findings from the Network Optimisation Workshop and the Wānaka traffic model (micro simulation model Paramics Discovery Software v26.0.3) were used to develop the Strategic Responses². Details of the Strategic Responses are included in Appendix B.

An overview of the geographical extents of the Strategic Responses are shown in the figure below.

² More detail can be found in the Appendix C – Technical Note – Wānaka Model Build, Wānaka Network Optimisation SSBC Economics Report and 20241023 Wānaka Network Optimisation Workshop.



Figure 2-1. Project extent of Wānaka Network Optimisation SSBC (Source: Wānaka Network Optimisation SSBC Economics Report).

2.2.1 STRATEGIC SPATIAL PLANNING

There are various spatial planning initiatives in respect of the Wānaka urban area, neighbouring townships and settlements, and the wider Upper Clutha ward. Wānaka and Albert Town have experienced a substantial amount of growth in the past decade, with the growth pressure now reaching near-by settlements such as Lake Hāwea and Luggate, and emerging rural neighbourhoods at Cardrona and Glendhu Bay. Wānaka specific spatial plans include:

- Spatial Plan Gen 2.0 – currently in development
- Draft Blue-Green Network Plan (in draft form)
- Town Centre Parking Strategy (in draft form)
- And intensification plan changes (plan variation) currently going through the statutory planning process to introduce brownfield redevelopment potential within the existing Wānaka town area.

There are also community led strategies such as the Heart of Wānaka community driven masterplan for the Wānaka Town Centre, as well as 'key development area' specific plans giving rise to new neighbourhoods such as Northlake and the emerging mixed-use centre at Three Parks.

Note: as of September 2024, the Spatial Plan 2024 Gen 2.0 (the 'Spatial Plan') programme has been delayed due to the Housing and Business Capacity Assessment (HBA) being rescheduled to later completion dates. The Spatial Plan is dependent on information from the HBA relating to Council's short-medium term infrastructure servicing and funding. This information will inform whether there are constraints which the Council needs to respond to because of a plan-enabled or infrastructure capacity issue. This information will enable QLDC to develop spatial options relating to the "call for urban growth sites" process run previously in 2023.

The 2024/25 HBA is expected to be adopted in February 2025, and it is anticipated that the Spatial Plan Gen 2.0 will be completed approximately six months after the HBA – indicatively being August/Sept 2025 (Source: QLDC 'let's talk' website - <https://letstalk.qldc.govt.nz/spatial-plan-2024-gen-2>).

Spatial planning approaches serve to improve land-use and infrastructure integration by:

- Building trigger points into development requirements for infrastructure improvements, including
 - Offering greater guidance on the 'roles of centres' which enables better understanding of trips between centres
 - Setting out 'key development areas' where existing development land could be intensified further
 - Ensuring essential infrastructure such as power, water, and sewerage can be efficiently provided
 - Ensuring 'critical infrastructure' resilience and protection is maintained by locating these in suitable locations (e.g. wastewater and water treatment plants).
- Taking into consideration the impacts of climate change, better enabling communities to adapt over time
- Establish 'local centre' strategies to guide more resilient provision of infrastructure and services in new development areas, emerging mixed-use and commercial centres, and better integrate with surrounding satellite communities which will continue to increasingly rely on Wānaka as its key urban centre.
- Aligning with the council's 30-year infrastructure strategy (and the district's spatial plan) to more efficiently integrate infrastructure delivery with Long Term Plan and three-yearly annual plan funding review cycles.

It is expected that QLDC will progress a spatial plan for Wānaka following the adoption of the Spatial Plan 2024 Gen 2.0.

2.2.2 CAPACITY AND SAFETY IMPROVEMENTS

Three critical corridors were identified for safety and capacity improvements, as well as two other isolated sites. The critical corridors are adjacent and/or interdependent sites which are expected (from the traffic model) to have significant delays or emerging safety concerns. The three corridors are:

- SH84 – Brownston Street corridor (McDougall Street to SH6)
- Better connections to Three Parks development (a mixed-use commercial precinct)
- SH6 improvements – SH84 to Albert Town Bridge.

SH84 – Brownston Street – improve safety and turning capacity along the SH84 – Brownston Street corridor:

- Development of the scheme of improvements including intersection form and exact timing of interventions at various locations.
- Capacity improvements at Anderson / SH84 intersection while considering all modes around 2028. Right turn movements to and from Anderson Road and westbound movements under particular pressure. This would include separated crossings of SH84 and Anderson Road to connect existing and proposed shared paths.
- Turning and safety improvements at McDougall / Brownston intersection. Improvements need to consider future cycle facilities along McDougall Street towards Wānaka Mt Aspiring Road and Cardona Valley Road and on Brownston Street.
- Side road access especially Ballantyne Road and MacPherson Street to improve south-north linkage between Wānaka West, Golf Course Road, Anderson Road and Wānaka North prior to 2033. There are significant delays in right turn movements to SH84 currently.
- Safety and turning improvements on Brownston Street at Helwick Street and Dungarvon Street.

- Ardmore Street / Brownston Street intersection traffic flow improvements prior to 2038. Improvements need to consider active mode users as well as connectivity to the town centre and lakefront.
- Right turn improvements to improve access from Anderson Road to Plantation Road or Link Way. Plantation Road is in close proximity to SH84 / Anderson intersection and could be implemented at the same time as part of the identified scheme.
- Strategic Planning, Travel Demand Management and alternative route choice may delay need for capacity improvements.

Improve access to Three Parks and reduce congestion:

- Improvements to access connecting various parts of Wānaka to Three Parks development. Many elements will be implemented as part of the Development, but some parts will be council led.
- Capacity improvement at Sir Tim Wallis/Ballantyne intersection prior to 2033 to facilitate right turn movements out of Sir Tim Wallis Drive. Implementation could be delayed depending on the performance of other access into Three Parks from Ballantyne Road in the near future as part of the Do Minimum.
- Providing additional connections into Three Parks from Riverbank Road and Ballantyne Road similar to those outlined in various structure plan documentation prior to 2038. This will alleviate pressure on the existing Sir Tim Wallis Drive intersections as well as SH84 and Ballantyne Road. Turning capacity improvements for the Riverbank Road link to “Road 2” within Three Parks.
- Turning improvements on Cardrona Valley Road at either Golf Course Road or Avalon Station Drive prior to 2038. These improvements are to support safety and turning capacity for journeys from western Wānaka towards Three Parks.
- Turning improvements within Avalon Station Drive providing choice towards Ballantyne Road.

SH6 (SH84 to Albert Town Bridge):

- Safety and capacity improvement for turning movements at Aubrey Road/SH6 intersection required prior to 2033 to connect Northlake and Three Parks east of Mt Iron.
- Safety improvements at Kingston and Alison Streets with SH6 near the Albert Town local centre in approximately 2038. Safety improvements are to maintain safe active mode movements as well as provide safe opportunities to turn right while traffic volumes on SH6 increase due to development in Lake Hāwea and Hāwea Flat.
- Note that these corridor options exclude changes on the SH6 Clutha River (Albert Town) Bridge described in the Do Minimum.

Two intersection safety and/or capacity upgrades have been identified in addition to the three “corridors”. These address isolated issues which may arise.

- Cardrona Valley Road at Orchard Road/Studholme Road safety improvements prior to 2033, this could be implemented sooner based on funding availability. Turning capacity improvements at this intersection prior to 2038 or as development occurs to support urban growth.
- Aubrey Road / Anderson Road intersection capacity improvements will be required prior to 2038 to manage traffic demands at the roundabout as development occurs at Northlake.
- Strategic Planning, Travel Demand Management and alternative route choice may delay need for capacity improvements.

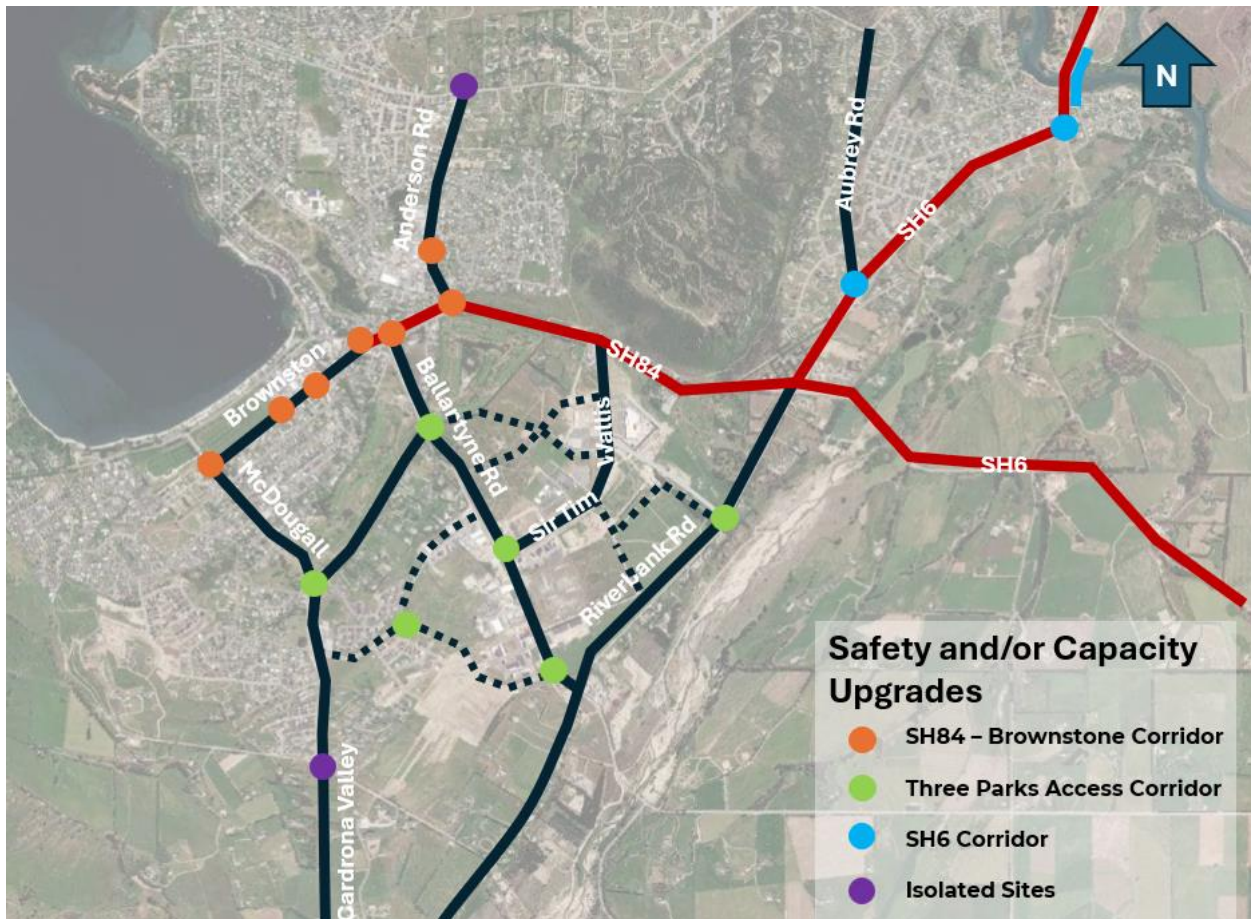


Figure 2-2. Strategic Responses Option - proposed intersection upgrades for safety and / or capacity issues (Base map source: Nearmaps)

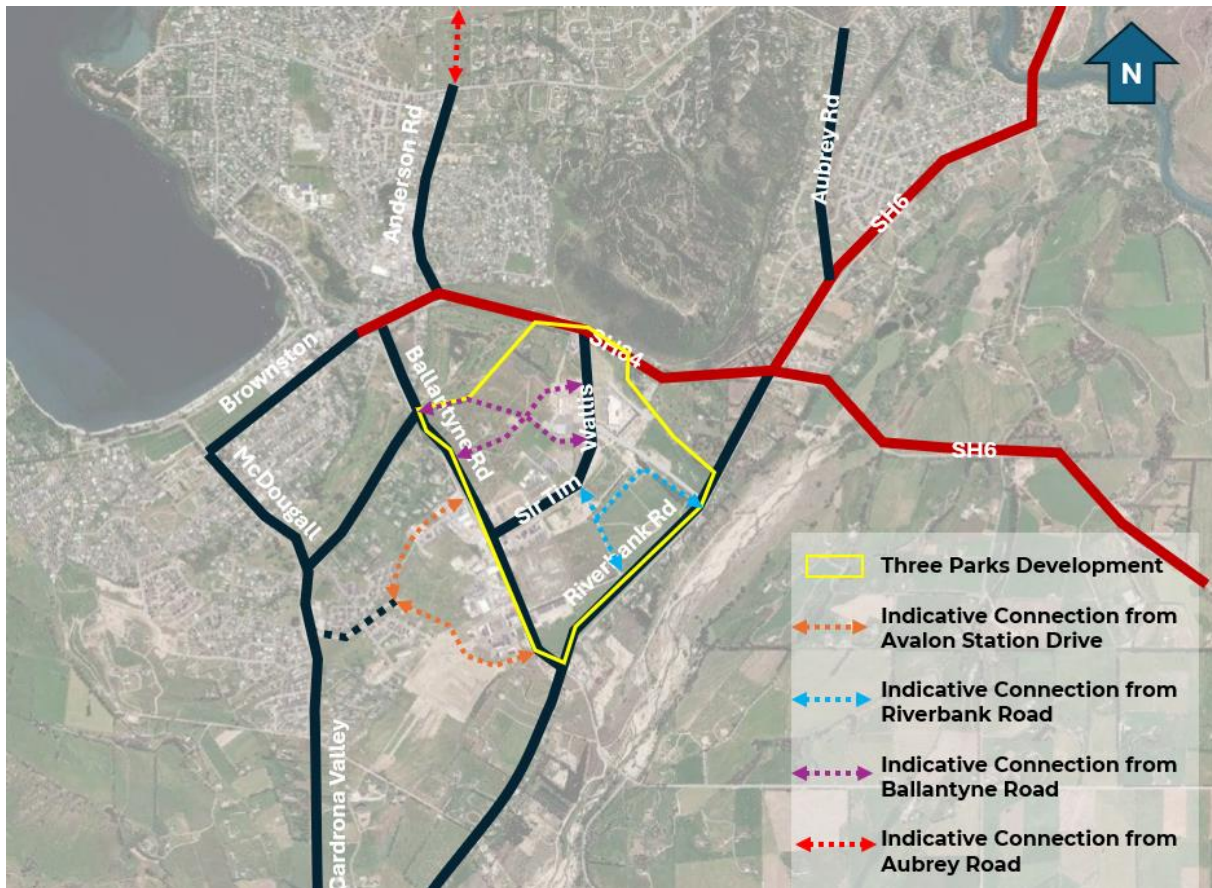


Figure 2-3. Indicative connections to Three Parks from Riverbank Road, Ballantyne Road and Avalon Station Drive (Base map source: Nearmaps).

2.2.3 TRAVEL CHOICE

There are three streams of travel choice strategic responses:

- Continued support for walking and cycling as a mode with a high share of all trips,
- introduction of public transport services, and
- other travel demand management initiatives such as parking management.

Support for walking and cycling:

Improvements to enable mode choice of walking and/or cycling can delay the need for vehicle traffic improvements, in particular in relation to traffic pressure to town centre and the lakefront destination. This response has considered work such as the developing QLDC blue-green network and strategic cycle network, which have a 'recreation' baseline whereas this strategic response is focused on commuter movements and connecting where people live with key destinations such as employment areas, retail commercial destinations, and social infrastructure such recreational facilities / sports fields, library, community facilities, and schools. Key benefits arise from connecting growing neighbourhoods, such as Northlake, with convenient, safe, and direct routes to the town centre, schools / college, and Three Parks commercial mixed-use precinct.

Error! Reference source not found. below outlines links to be considered. This strategic response includes:

- Expansion of the Strategic Network into development areas:
 - North-south and east-west links through the Northlake development area.
 - Completion of the cycling links within the Three Parks development area.

- Provision of safe crossings of Anderson and SH84, SH84 and SH6, and Ballantyne Road near Riverbank Road. These will complement existing crossings of SH84 at Ballantyne Road and Sir Tim Wallace Drive, and Ballantyne Road near Golf Course Road.
- Provision of safe and efficient commuter cycle routes to/from satellite communities.
 - Consider improvements to travel comfort and speed to Lake Hāwea and Hāwea Flat along existing routes.
 - Along SH6 to Wānaka Airport and Luggate.
 - Along Cardrona Valley Road beyond Riverbank Road to Cardrona.
 - Along Wānaka Mount Aspiring Road to Glendu Bay
- Provision of school zone catchment cycling connections (Te Kura O Take Karara to south-west Wānaka and Albert Town)
 - Connections along to and along SH6 from Sir Tim Wallis Drive to Albert Town and along Aubrey Road/Gun Road.
 - New links along Avalon Station Drive connecting to Cardrona Valley Road and beyond.



Figure 2-4. Strategic Responses for the Wānaka Strategic Active Modes Network (Base map source: Nearmaps).

Introduction of Public Transport:

- Public transport options support and provide transport choices to work and tourism from within Wānaka and to/from the satellite communities. Traditional public transport services are not feasible in the near future. On demand services or fixed routes shuttle services can support travel demand management as an efficient means to delay the implementation of other Strategic Responses and reduce congestion impacts. Public transport provides additional mode choice to meet the needs of Wānaka in the 2030's, 2040's, and 2050's as growth continues in and surrounding Wānaka.
- Offering public transport options from 2042/43 onwards will help mitigate traffic and congestion on the network. By the mid-2050's, the Wānaka basin will have similar resident and visitor population as the Wakatipu basin today. As development occurs in Lake Hāwea, and out towards Wānaka Airport and Luggate, all day services should be provided to these destinations. Commuter services to Cardrona and Glendu Bay will complement the network and provide transport mode choice.
- Providing public transport will require infrastructure provided by QLDC, this infrastructure includes central and local interchanges, and bus stop facilities. Local interchanges would be provided at stops where routes intersect or at significant local feature (e.g. medical centre, local centre, etc.)
- Identify a location for a future bus hub for local and inter-regional travel. Locations near the town-centre provide better connections for inter-regional travel and visitors to Wānaka, while a hub at Three Parks would provide improved access to community facilities, emerging and future mixed-use employment areas, and services provided at Three Parks.

Other Travel Demand Management:

- Parking Management Strategy impacts on parking availability in centres. Changes to parking are outside of the scope of this SSBC. Changes to parking, such as enforced time limits, space scarcity, changes to vehicle types allowed, provision of exceptions, or metered charges for parking can have significant impact on parking behaviours and influence mode choice. Outcomes of any initiatives underway should be monitored and revised as needed to achieve desired outcomes.

2.3 ECONOMIC ANALYSIS OF THE STRATEGIC RESPONSE

A detailed economic analysis was conducted for the Strategic Responses using the NZTA Monetised Benefits and Costs Manual. Details of the economic assessment process and results can be found in the *Appendix C – Wānaka Network Optimisation SSBC Economics Assessment Report*. Inputs for the economic assessments were obtained from the *Appendix C – Technical Note – Wānaka Model Build* to inform travel time, vehicle operating costs and greenhouse gas emissions and NZTA Crash Analysis System (CAS) to evaluate crash cost savings. The Strategic Responses have a low BCR of 1.1.

Table 2-1. BCR of the Strategic Responses.

OPTIONS	DO MINIMUM	STRATEGIC RESPONSES	STRATEGIC RESPONSES AGAINST DO MINIMUM
Benefit Type	Present Value User Costs		NET BENEFIT
Travel Time Savings (TTC)	\$2.64B	\$2.51B	\$136M (35%)
Vehicle Operating Cost Savings (VOC)	\$971M	\$861M	\$111M (28%)
Crash Cost Savings (ACC)	\$257M	\$236M	\$21.0M (5%)

Cycling travel time-amenity savings (WCB)	\$88.2M	\$59.6M	\$28.6 (7%)
Walking and cycling health benefits (WCB)	-\$5.7M	-\$56.9M	\$51.2M (13%)
Greenhouse gas emission benefit	\$94.1M	\$84.1M	\$10.1M (3%)
Air Emissions on Health	\$753M	\$699M	\$53.2M (14%)
TOTAL USER COSTS	\$4.80B	\$4.39B	\$390M
Construction Costs	\$0	\$152M	\$152M
Maintenance	\$0	\$68.4.0M	\$68.4.0M
Public Transport Operating Costs	\$0	\$87.2M	\$87.2M
TOTAL COST	\$0	\$307M	\$307M
BENEFIT TO COST RATIO	n/a	n/a	1.3

The non-monetised benefits that are expected from the shortlisted programmes are:

- Business benefits (retail sales growth). These can be quantified using the VURT method developed for Transport for London but have been excluded from this analysis because of the level of uncertainty.
- Liveability benefits. These are not easily quantified except indirectly and partially through calculation of travel time and reliability benefits. The project will result in more travel choice across modes, and travel time reduction resulting in more places accessible (within commutable distances) for customers.
- Amenity benefits. Active mode improvements particularly in areas of high place function is expected to positively affect amenity and therefore how customers feel when using the road network.
- Public Transport benefit. The public transport improvements are high-level under the Strategic Responses. As result, this has been excluded from this analysis due to the level of uncertainty.
- Vehicle operating costs due to congestion and speed change cycles were not monetised.
- Other customer experience benefits (reduced driver frustration etc).

2.4 PROGRAMME COSTS

The cost for the Strategic Responses Option is summarised in Table 2-2, in \$2024 values and in Net Present Value as discounted in Appendix B – Wānaka Network Optimisation SSBC Economics Assessment Report.

Table 2-2: CAPEX and OPEX costs in \$2024 and in Net Present Value

Strategic Responses	Costs (\$2024)	Net Present Value
CAPEX	\$185M	\$152M
OPEX – Maintenance	\$110M	\$68.4M
OPEX – Public Transport Operation (ORC)	\$157M	\$87.2m
Total costs	\$452M	\$307M

The Public Transport Operation cost excludes farebox recovery.

Table 2-3 shows the CAPEX in \$2024 for the different activity types under the Strategic Responses (i.e. intersection improvements, active mode facilities and new road links), categorised based on road controlling authority and time periods.

Table 2-3: P50 CAPEX in \$2024 broken down based on time periods, activity type and road controlling authority.

Road Controlling Authority	Activity Type	2027/28 - 29/30	2030/31 – 32/33	2033/34 – 38/39	2039/40 – 2053/54	Total
QLDC – Local Roads	Intersections	\$4.5M	\$9.0M	\$12.4M	\$0	\$25.9M
QLDC – Local Road / Developer	Intersections	\$0	\$4.5M	\$7.5M	\$0	\$12.0M
NZTA – State Highway	Intersections	\$10.5M	\$9.0M	\$14.3M	\$0M	\$33.8M
QLDC – Local Road	Active Modes Facilities	\$2.7M	\$4.9M	\$8.0M	\$22.2M	\$38.0M
QLDC – Other / Developer	Active Modes Facilities	\$0.7M	\$1.3M	\$1.7M	\$0	\$3.8M
NZTA – State Highway	Active Modes Facilities	\$1.9M	\$0	\$1.8M	\$8.1M	\$11.8M
QLDC – Local Road / Developer	New Road Links	\$6.2M	\$26.2M	\$23.1M	\$0	\$55.4M
QLDC – Local Road	PT Infrastructure	\$0	\$0	\$0	\$4.7M	\$4.7M
TOTAL		\$26.5M	\$55.0M	\$68.9M	\$35.1M	\$185M

QLDC – Local Road / Developer or QLDC – Other / Developer may not be eligible for NZTA funding assistance for the full amount.

2.5 SENSITIVITY TESTS

A high-level sensitivity analysis on the Strategic Responses has been conducted to evaluate the sensitivity of the economic assessment.

The largest source of benefits is Travel Time (see Table 2.1) with 35% of all benefits. While 35% is a moderate proportion of all benefits, it derives from the traffic model analysis along with VOC (28%) and Emissions (16%) benefits. Combined the traffic model analysis informs on 80% of all benefits, and the BCR is highly sensitive to the outcomes.

Table 2-4. Sensitivity tests

Scenario	Strategic Responses Option against Do Minimum BCR
BASE	1.3
CONSTRUCTION COSTS	
P95 cost	1.0
TRAFFIC GROWTH	
1%	1.2
3%	1.4
DISCOUNT RATE	
3%	1.3
4%	1.2
6%	1.0
8%	0.9
ANALYSIS PERIOD	
60 years	1.6
WALKING AND CYCLING BENEFITS	
without walking and cycling benefits	1.1
CRASH COST SAVINGS	
50% Increase	1.4
50% Reduction	1.3
ALL TRAFFIC MODEL BENEFITS	
50% Reduction	0.8

2.6 INVESTMENT PRIORITISATION METHOD PROFILE

This SSBC was assessed against the Investment Prioritisation Method (IPM) 2024 – 27 to ensure the alignment of the proposed activities to the Government Policy Statement on Land Transport 2024 through the National Land Transport Programme (Table).

GPS Alignment

A rating of **medium** is given based on the alignment with the GPS, as shown in the table below.

Table 2-5. Alignment of the Wānaka SSBC with the GPS.

GPS Strategic Priority	Commentary	Alignment
Economic growth and productivity	The activity will improve network efficiency by addressing a network constraints of intersection capacity of various local corridors in the network and improving vehicle travel time on a regionally significant corridor.	Medium
	The activity will provide network capacity within Wānaka to enable development to occur within the Hāwea Special Housing Area.	Medium
	Walking and cycling improvements in Wānaka have an existing demand with growing use. Proposed improvements will enable safe movement of cyclists and pedestrians as traffic volumes increase on roads due to significant population growth.	Low
Increased maintenance and resilience – Maintenance focus	The activity will improve the efficiency and productivity of maintenance and operations by improving the level of service throughout the project area through intersection upgrades.	Low
Safety	The activity addresses safety issues in medium-high collective risk intersections by upgrading priority-controlled intersections to roundabouts	Medium
Value for money	The activity aligns to an extent with value for money direction in the GPS.	Medium

Scheduling

The Strategic Responses have a **low** scheduling rating:

- *Criticality* – rated as very low, although the proposed Strategic Responses are important for guiding key improvements to the network, they are for a subsequent NLTP period and were designed to allow QLDC to understand areas of investment priority while remaining adaptable as Wānaka develops and priorities change until funding capacity and/or delivery can be ascertained.
- *Interdependency* – no rating as other improvements within the roading network are occurring irrespective of this SSBC. The non-delivery of the proposed Strategic Responses would have minimal impact on other current and future transport improvements committed.

Efficiency

The efficiency rating of the Strategic Responses is **Low** as the BCR within the 1 – <3 band.

Priority Ranking

The priority ranking for the Strategic Responses is **9** with **M-L-L** for GPS alignment, scheduling and efficiency, as shown in the figure below.

Proposed 2024–27 NLTP Priority Ranking					
GPS alignment	Scheduling	Efficiency			
		VL* (BCR<1)	L (BCR 1 - <3)	M (BCR 3 - <6)	H (BCR 6+) or (PV of Costs for end-of-life replacement)
VH	H	7	2	1	1
VH	M	8	3	2	1
H	H	9	3	3	2
H	M	9	4	4	3
M	H	10	5	4	3
M	M	10	6	5	4
VH	L	11	8	7	6
H	L	11	8	7	6
M	L	11	9	8	7
L	H/M/L	12	11	10	9
VL	H/M/L	12	12	12	12
VH/H/M/L/VL	VL	13	13	13	13

*Proposals that have a Very Low (BCR<1) Efficiency rating may be included in the 2024–27 NLTP with a Low Efficiency rating where there is uncertainty about the calculation or there are other benefits not included in the calculation. Such decisions would be made by exception at the appropriate level of delegation, usually the NZTA Board.

Figure 2-5. Investment Prioritisation Method for project improvement activities.

APPENDIX A – APPRAISAL SUMMARY TABLE

Appraisal Summary Table Template

Date: 9/12/2024	Evaluation Period: (baseline and forecast year) e.g 2020 - 20602024 - 2043	Option Name: Strategic Responses (including intersection upgrades)	This is the preferred option ☒
Problem/opportunity statement: 1. Rapid population growth and a lack of effective integration between transport and land use planning results in disjointed infrastructure, limiting equitable and sustainable transport choices across modes for residents and visitors (60%). 2. The current Wānaka network, and its existing links to surrounding satellite towns, are limited in their ability to accommodate expected growth in commuting and tourism, resulting in over-reliance on certain routes by motor vehicles, eroding levels of service on those routes, and creating severance and conflict (40%).	Investment objectives: 1. Increase the proportion of journeys to work and journeys to education within Wānaka from 0% to 10% by year 2034 (2033 Census) using public transport. 2. Increase the proportion of journeys to work and journeys to education within Wānaka from 8% to >8% by year 2034 (2033 Census) by cycling. 3. Increase the porportion of journeys to work and journeys to eudcation within Wānaka from 9% to >9% by year 2034 (2033 Census) by walking. 4. Maintain or reduce the proportion of journeys to work and journeys to education within Wānaka from 38% to ≤38% by year 2034 (2033 Census) by driving a private or company motor vehicle. 5. Reduce greenhouse gas emissions due to road transport from 37% in 2023 to reduced percent in 2034. 6. Improve safety for all modes from 7 deaths and serious injuries in 2019 to reduced percent in	How project gives effect to GPS: Applying the 2024-27 IPM prioritisation matrix with Medium for GPS alignment, Low for scheduling, and M for efficiency, this proposal has an overall investment priority score of 8 .	How project gives effect to local community outcomes: The project helps to improve: 1. land-use integration 2. turning capacity and safety improvements on critical corridor areas 3. mode choice by identifying key gaps and capacity and safety improvements needed in the network and critical corridors, through proposing strategic responses and intersection upgrades to address these.

1. Summary of Non-Monetised Impacts (Description)	2. Summary of Financial Impacts (nominal, non-discounted)		3. Summary of Monetised Option Impacts (present value, discounted)	
> Business benefits (retail sales growth). These can be quantified using the VURT method developed for Transport for London but have been excluded from this analysis because of the level of uncertainty. > Liveability benefits. These are not easily quantified except indirectly and partially through calculation of travel time and reliability benefits. The project will result in more travel choice across modes, and travel time reduction resulting in more places accessible (within commutable distances) for customers. > Amenity benefits. Active mode improvements particularly in areas of high place function is expected to positively affect amenity and therefore how customers feel when using the road network. > Public transport benefit. The public transport improvements are very high-level under the Strategic Responses. As result, this has been excluded from this analysis due to the level of uncertainty. > Other customer experience benefits (reduced driver frustration etc).	Capital Costs (Present value)	\$185,479,823	Total Monetised Benefits, <u>excluding</u> Wider Economic Benefits (WEBs)	\$389,957,680
	Operating Costs (Present value)	\$266,871,441	Total Monetised Benefits, <u>including</u> Wider Economic Benefits (WEBs)	N/A
			Total Economic Costs	\$307,412,155
	Total Financial Costs	\$452,351,264	BCR (excluding WEBs)	1.3
			BCR (including WEBs)	N/A

Transport Outcomes	Non-Monetised Impact: (description in numerical or narrative terms)				Monetised Impact: (description in dollar terms in real terms, non-discounted)	
	Name of Measure:	Baseline:	Do Minimum Impact:	Option Impact:	Do Minimum Impact:	Option Impact:

Healthy and safe people (Please copy the row below to add an additional benefit or measure, and delete rows as appropriate)

1.1 Impact on social cost and incidents of crashes	1.1.3 Deaths and serious injuries	Over the last 10 years, there were 13 fatal crashes, 62 serious crashes and 237 minor crashes (312 crashes) within the study area. In 2019, there were 2 fatal crashes, 5 serious crashes and 31 minor crashes (38 injury crashes) within the study area.	Existing network with no change in speed limits and intersections and therefore has no impact on DSI.	Upgrading priority controlled intersections with safety and capacity upgrades will help to reduce speeds through the intersections and severe types of intersection crashes. On average there is two fewer injury crashes per year.	Injury Crash Costs rising from \$5.9M per year to \$11.8M per year	Strategic response sees reduction of crash costs to \$10.2M per year after 40 years, with a total benefit of approximatley \$20.9M
3.1 Impact of mode on physical and mental health	3.1.1 Physical health benefits from active modes	Existing cycle network runs through the north and northeastern part of Wanaka, such as Ballantyne Road and Anderson Road and towards Lake Hawea.	Do minimum is not expected to increase active mode share as there are no changes to existing base network and therefore does not increase physical health benefits.	connections throughout Wanaka out to Glendhu Bay, Cardrona, Luggate and Hawea, providing more travel choice to commuters. Expected 887 new walkers and cyclists (based on current population).	Do minimum is estimated to have \$5.7M in health benefits over 40 years.	Increase in active modes (including full cycle network) will result in \$51.2M in combined health benefits beyound the do Minimum.

Resilience and security (Please copy the row below to add an additional benefit or measure, and delete rows as appropriate)

N/A	N/A	N/A	N/A	N/A	N/A	N/A
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Economic prosperity (Please copy the row below to add an additional benefit or measure, and delete rows as appropriate)

5.1 Impact on system reliability	5.1.2 Travel time reliability - motor vehicles	Baseline uses travel time from 2024, 265 hours in the AM peak period, 325 hours in the PM peak period and 265 hours during the weekend.	Do minimum is not expected to reduce congestion hours or improve travel time as there are no changes to the existing base network.	Intersection upgrades will reduce congestion hours (90,000 per year) and improve travel time reliability for motor vehicles.	Do minimum is not expected to reduce congestion hours or improve travel time as there are no changes to the existing base network.	Option will improve travel time reliability, where there are \$136M in travel time savings.
5.2 Impact on network productivity and utilisation	5.2.6 Access to key economic destinations (all modes)	From 2018 Census, mode shares for trips within Wanaka for travel to work and education: 20% work from home, 43% by private motor vehicle, 11% as passengers, 7% by public transport, 6% by cycling, 7% by walking.	Do minimum is not expected to impact access to key economic destinations as there are no changes to existing base network	Intersection upgrades and increase in cycle connections will improve level of service and increase connectivity to key economic destinations for all modes.	Do minimum has increased access to key economic destinations compared to the baseline 2018 census but not expected to have mode shift as there are no changes to existing base network. Mode share for trips within Wanaka (excluding work from home) of: 57% by private motor vehicle, 15% as passengers, 10% by public transport, 8% by cycling and 10% by walking.	Option is expected to result in mode shift, with mode shares for trips within Wanaka (excluding work from home) of: 53% by private motor vehicle, 11% as passengers, 0% by public transport, 20% by cycling and 17% by walking

Environmental sustainability

8.1 Impact on greenhouse gas emissions	8.1.1 CO2 emissions	Based on 2019 district wide road transport share of greenhouse gas emissions, 37%	Do minimum is not expected to increase cycle mode share as there are no changes to existing base network and therefore will not decrease GHG emissions.	Intersection upgrades and increase in cycle connections will improve level of service and reduce speeds which will make cycling more attractive as an alternative which reduces GHGs. Approximately 1900 tonnes of CO2eq saved per year.	Do minimum is not expected to impact CO2 emissions above general trends through fleet electrification as there are no changes to existing base network. The Do Minimum has a cost of 94.1M	Forecast new users of 557 cyclists and 330 pedestrians avoids 12,913 tonnes of GHGs from being emitted over the 19 year evaluation period, results in \$10.1M of GHG cost savings.
8.1 Impact on greenhouse gas emissions	8.1.2 Mode shift from single occupancy private vehicle	2024 Vehicle Kilometres Travelled per day, which is 165,869km	Do minimum is not expected to impact on VKT reduction as there are no changes to existing base network	Intersection upgrades and increase in cycle connections will improve level of service and reduce speeds which will make active modes more attractive and help with mode shift.	Do minimum is not expected to reduce VKT as there are no changes to existing base network.	Option will result in 17.0M fewer VKT per year. This will result in vehicle operating cost savings of \$111M over 40 years.

Inclusive access

10.1 Impact on user experience of the transport sy	10.1.9 Travel time	Baseline uses travel time from 2024, 265 hours in the AM peak period, 325 hours in the PM peak period and 265 hours during the weekend.	Do minimum is not expected to impact on travel time as there are no changes to existing base network	Intersection upgrades will reduce congestion hours and improve travel experience for motor vehicles.	Do minimum is not expected to improve travel time as there are no changes to existing base network	Option will improve travel time reliability, where there are \$136M in travel time savings and \$28.6M cycling travel time-amenity savings.
10.3 Impact on access to opportunities Please copy the row above to add an additional benefit or measure, and delete rows as appropriate.	10.3.1 Access to key social destinations (all modes)	From 2018 Census, mode shares for trips within Wanaka for travel to work and education: 20% work from home, 43% by private motor vehicle, 11% as passengers, 7% by public transport, 6% by cycling, 7% by walking.	Do minimum is not expected to impact on access to key social destinations (all modes)	Intersection upgrades and increase in cycle connections will improve level of service and increase connectivity to key social destinations for all modes.	Do minimum has increased access to key social destinations compared to the baseline 2018 census but not expected to have mode shift as there are no changes to existing base network. Mode share for trips within Wanaka (excluding work from home) of: 57% by private motor vehicle, 15% as passengers, 10% by public transport, 8% by cycling and 10% by walking.	Option is expected to result in mode shift, with mode shares for trips within Wanaka (excluding work from home) of: 53% by private motor vehicle, 11% as passengers, 0% by public transport, 20% by cycling and 17% by walking

Rationale for option selection decision

As the business case progressed, some of the short-listed projects were excluded based on the scale of investment. Following the mid-term NLTP update in 2024, with limited funding in the next three years for Wānaka, QLDC has requested that the short list options were not assessed. The Strategic Responses were developed as high-level solutions which would support QLDC in understanding areas to prioritise investment while remaining adaptable as Wānaka develops and priorities change.

APPENDIX B – STRATEGIC RESPONSES TABLE

Project ID	Project Name	Package	Category	NLTP Period	P50 Cost Estimate (\$2025)	P50 Cost Estimate (NPV \$2024)	Model Period	Description	Notes
1.01	Ballantyne-Avalon Station Drive Intersection Upgrade	Three Parks Access	Safety and Capacity Upgrades	2024/25-2026/27	\$4.60M	N/A	2025	Turning improvements from Ballantyne Road towards west Wānaka via Avalon Station Drive extension (2.01).	Assumed Part of Do Minimum. Implementation underway. Implementation with developer support.
1.02	Ballantyne-Golf Course Capacity and Safety Upgrades	Three Parks Access	Safety and Capacity Upgrades	2030/31-2032/33	\$4.60M	N/A	2025	Capacity improvements to reduce turning delays at the Golf Course Road.	Assumed Part of Do Minimum. Developer funded. Previous designs developed to be implemented at this location.
2.01	Avalon Station Drive Extension	Three Parks Access	New Links	2024/25-2026/27	\$10.7M	N/A	N/A	Extension of Avalon Station Drive connecting to Ballantyne Road approximately 170m west of Riverbank Road. This link will decrease vehicle trips to and from west Wānaka to Three Parks travelling via Golf Course and Riverbank Road.	Assumed Part of Do Minimum. Implementation underway. Implementation with developer support.
2.02	Golf Course – Three Parks Link	Three Parks Access	New Links	2030/31-2032/33	\$10.7M	N/A	N/A	Connection into Three Parks from Ballantyne Road at Golf Course Road as per Masterplan.	Assumed Part of Do Minimum. Developer Funded. Implementation as part of 1.02.
3.01	Avalon Station Drive Shared Path	Three Parks Access	Shared Paths	2024/25-2026/27	\$950k	N/A	2025	Shared path from Cardrona Valley Road to Ballantyne Road via Avalon Station Drive and Fredrick Street.	Implementation underway.
3.02	Schools to Pools Shared Path extension	Do Minimum	Shared Paths	2024/25-2026/27	\$800k	N/A	2025	Extension of Schools to Pool from Golf Course Road to Sir Tim Wallis Drive.	Assumed Part of Do Minimum. Implementation alongside 1.02 and 2.02. Delivery through developer. 3.12 connects Sir Tim Wallis Drive to Riverbank Road. Other cycle links within Three Parks which are developer lead are not specifically included in this programme.
3.03	Lakefront Shared Path Stage 4	Do Minimum	Shared Paths	2024/25-2026/27	\$290k	N/A	2025	Completion of Stage 4 of the Lakefront Shared Path, connecting existing Stage 3 and Stage 5.	Assumed Part of Do Minimum as part of Town Centre Masterplan. Delivery through the Parks Team at QLDC.
1.03	Anderson-SH84 Capacity Upgrades	SH84 - Brownston Corridor	Safety and Capacity Upgrades	2027/28-2029/30	\$6.91M	\$6.37M	2028	High priority capacity upgrades at the existing roundabout. Right turn movements to and from Anderson and westbound movements under particular pressure.	Control mechanism of upgrade to be identified with further investigation of wider SH84 corridor scheme. Consider implementing alongside 1.21 (active mode crossing) and 3.06 (Anderson to Hedditch Shared Path), with larger SH84 scheme consideration of 1.06 (Ballantyne-Hedditch), 1.13 (Ardmore-Brownston), and 1.12 (Anderson side roads north of SH84).
1.21	SH84 and Anderson Separated Crossing	SH84 - Brownston Corridor / Travel Choice	Safety Upgrades	2027/28-2029/30	\$760k	\$720k	2028	Active modes crossings of SH84 and Anderson Road separated by time or space. Location of crossing on eastern approach and northern side to align with existing and proposed Anderson and SH84 Shared Paths.	Required to maintain travel choice as traffic volumes grow, placed in 2028 model period to align with intersection upgrade. Could be deferred. Consider alongside 1.01, 3.06 and wider SH84 corridor scheme.

Project ID	Project Name	Package	Category	NLTP Period	P50 Cost Estimate (\$2025)	P50 Cost Estimate (NPV \$2024)	Model Period	Description	Notes
1.04	Brownston-McDougall Safety and Capacity Upgrades	SH84 - Brownston Corridor	Safety and Capacity Upgrades	2027/28-2029/30	\$3.07M	\$2.83M	2028	Safety improvements at McDougall Street and Brownston Street, focusing on safe turning movements and active modes.	Control mechanism of upgrade to be identified with further investigation. Available space will be a consideration on the improvements at this location. Surrounding shared path network should be considered during scheme development (3.10, 3.15, 3.17 and 3.20). Consider other intersections along Brownston Street (1.09 and 1.10) and McDougall Street (1.15).
1.05	Ballantyne-Sir Tim Wallis capacity upgrades.	Three Parks Access	Three Parks Access - Safety and Capacity Upgrades	2027/28-2029/30	\$4.60M	\$4.25M	2028	Turning capacity improvements at Sir Tim Wallis intersection. Sir Tim Wallis Drive is expected to continue to be the primary access to Three Parks from Ballantyne Road. Control mechanism and need of upgrade to be identified with further investigation following other improvements.	Implementation scheduled to co-inside with 3.08. Need for this project should be re-evaluated considering the new links implemented into Three Parks (1.02 & 2.02) and potentially differed.
2.03	Avalon Station Drive to Gordon Road Link	Three Parks Access	New Links	2027/28-2029/30	\$6.11M	\$5.80M	N/A	New connection between Avalon Station Drive and Gordon Road to improve access between western Wānaka and Three Parks.	Implementation with developer support. Could be deferred as parallel vehicle and cycle routes implemented.
3.04	Aubrey Road Shared Path extension	Travel Choice	Shared Paths	2027/28-2029/30	\$580k	\$550k	2028	Extension of Aubrey Road Shared Path westward to the Lakefront Shared Path.	Consider 3.09 while implementing corridor.
3.05	SH84 & SH6 Shared Path	SH84 - Brownston Corridor / Travel Choice / SH6 Corridor	Shared Paths	2027/28-2029/30	\$1.31M	\$1.25M	2028	Extension of shared path on northern side of SH84 from Sir Tim Wallis Drive to Aubrey Road improving connectivity of Albert Town to Wānaka.	
3.06	SH84 Shared Path (Anderson to Hedditch)	SH84 Corridor	Shared Paths	2027/28-2029/30	\$290k	\$280k	2028	Shared Path along the northern side SH84 from Anderson Road to Hedditch Street. Connecting Anderson Shared Path with Schools to Pools Shared Path.	Consideration of form of the Separated Active Modes Crossing at Anderson/SH84 (1.21) and cycle route on Ardmore Street (3.07) will influence the route and improvements.
3.07	Ardmore Cycle Facilities	SH84 - Brownston Corridor / Travel Choice	Shared Paths	2027/28-2029/30	\$360k	\$350k	2028	Cycle Facilities along Ardmore Street from SH84 Shared Path to Lakefront Shared Path.	Facilities type to be confirmed. Implementation alongside 3.06.
3.08	Ballantyne Road Shared Path	Three Parks Access / Travel Choice	Shared Paths	2027/28-2029/30	\$620k	\$600k	2028	Shared Path extension along Ballantyne Road to Riverbank Road.	Consider implementation along side 1.06, and interactions with 3.01, 3.02, 3.14, and 1.23. Partially delivery through the Parks Team at QLDC for connections as future sports facilities at Three Parks.
3.09	Beacon Point Road Shared Path	Travel Choice	Shared Paths	2027/28-2029/30	\$2.04M	\$1.94M	2028	Shared path or on-street cycle facilities along Beacon Point Road to provide direct commuter access to the cycle network.	Cycle facilities for an existing community, interaction with 3.04.

Project ID	Project Name	Package	Category	NLTP Period	P50 Cost Estimate (\$2025)	P50 Cost Estimate (NPV \$2024)	Model Period	Description	Notes
1.06	SH84-Hedditch/Ballantyne Capacity Upgrades	SH84 - Brownston Corridor / Three Parks Access	Safety and Capacity Upgrades	2030/31-2032/33	\$4.47M	\$4.00M	2033	High priority right-turn capacity improvements to reduce delays at Ballantyne Road and including Hedditch Street turning movements. Ballantyne Road is the preferred route from Wānaka West to Wānaka North (over McPherson Road).	Control mechanism of upgrade to be identified with further investigation as part of SH84 corridor scheme. Consider impacts of recently completed crossing on SH84 on intersection performance and timing of improvements.
1.07	SH6-Aubrey Road Safety Upgrade	SH6 Corridor	Safety and Capacity Upgrades	2030/31-2032/33	\$4.47M	\$4.00M	2033	Safety and turning upgrades at Aubrey Road and SH6.	The existing speed environment will not allow for safe movement when traffic volumes increase with developments in Lake Hāwea.
1.08	Cardrona Valley Road-Orchard Road Safety Improvements	Isolated Safety	Safety and Capacity Upgrades	2030/31-2032/33	\$2.98M	\$2.67M	N/A	Safety Improvements at this intersection prior to development requiring capacity and turning improvements.	Could be brought forward in response to crash trends. Implement alongside 3.11. Capacity Improvements (1.18) provisionally in 2036/37-2038/39 period to co-inside with development..
1.09	Brownston-Helwick Safety and Capacity Upgrades	SH84 - Brownston Corridor	Safety and Capacity Upgrades	2030/31-2032/33	\$2.98M	\$2.67M	2033	Safety improvements at intersections on Brownston Street, focusing on turning movements and active modes.	Control mechanism of upgrade to be identified with further investigation. Available space will be a consideration on the improvements at this location. Implemented alongside other intersections (1.10) and Shared Path (3.10)
1.10	Brownston-Dungavron Safety and Capacity Upgrades	SH84 - Brownston Corridor	Safety and Capacity Upgrades	2030/31-2032/33	\$2.98M	\$2.67M	2033	Safety improvements at intersections on Brownston Street, focusing on turning movements and active modes.	Control mechanism of upgrade to be identified with further investigation. Available space will be a consideration on the improvements at this location. Implemented alongside other intersections (1.09) and Shared Path (3.10)
1.11	Riverbank Road-Three Parks intersection improvements	Three Parks Access	Safety and Capacity	2030/31-2032/33	\$4.47M	\$4.00M	2033	Safety and turning capacity improvements form Riverbank Road into Three Parks. Provisionally Identified on Road 2 (Three Parks – Alternative B).	Improvements provisionally identified the main entry location for Riverbank Road. Control mechanism of upgrade to be identified with further investigation following other improvements. Implement alongside 3.12, and considering 3.15 with the scheme.
2.04	Riverbank Road-Three Parks Link (North)	Three Parks Access	Three Parks Access – New Link	2030/31-2032/33	\$16.8M	\$15.0M	2033	Extension of Sir Cliff Skeggs Drive or Massey Drive (Three Parks – Alternative B) to Riverbank Road to provide alternative access into Three Parks.	Could be implemented sooner through developer implementation. Consider alongside 1.11 and 3.13.
2.05	Ballantyne Road-Three Parks Link (South)	Three Parks Access	Three Parks Access – New Link	2030/31-2032/33	\$9.16M	\$8.20M	N/A	Connection between Three Parks and Ballantyne Road as per Masterplan between Golf Course Road and Gordon Road.	Could be implemented sooner through developer requirements.
3.10	Brownston Street Cycle Facilities	SH84 - Brownston Corridor / Travel Choice	Shared Paths	2030/31-2032/33	\$880k	\$780k	2033	Shared path or other cycle facilities along Brownston Street from McDougall Street to Ardmore Street.	Treatment options could include a shared path, cycle lanes, or significant traffic calming to reduce operating speeds to safe cycling speeds. Implement alongside 1.09, 1.10.

Project ID	Project Name	Package	Category	NLTP Period	P50 Cost Estimate (\$2025)	P50 Cost Estimate (NPV \$2024)	Model Period	Description	Notes
3.11	Cardrona Valley Road Shared Path Stage 1	Travel Choice	Shared Paths	2030/31-2032/33	\$660k	\$590k	2033	Shared path along Cardrona Valley Road from Golf Course Road to Orchard Road.	Implement alongside 1.08 Safety improvements.
3.12	Aubrey/Gunn Shared Path	Travel Choice	Shared Paths	2033/34-2035/36	\$2.04M	\$1.83M	2033	Shared path connecting SH6 and pathways around Mt Iron with along Aubrey Road and Gunn Road to Alison Avenue and the existing Aubrey Road Shared Path.	Connecting existing shared path with proposed shared paths (3.05)
3.13	Riverbank Road-Three Parks Link Cycle Connection	Three Parks Access / Travel Choice	Shared Paths / Three Parks Access	2030/31-2032/33	\$510k	\$460k	2033	Shared path or cycle enabling facilities along new road Link from Riverbank Road to enable active mode access through Three Parks.	Implementation alongside 2.04. Timing on Developer implementation.
3.14	Riverbank Road SP Stage 1	Travel Choice	Shared Paths	2030/31-2032/33	\$800k	\$720k	2033	Shared path facilities along Riverbank Road from Ballantyne Road to Orchard Road.	Implementation to align with development on Riverbank Road. Consider implementation regarding 3.08, and implementation timeframes with 1.23.
3.15	Wānaka Mount Aspiring Shared Path Stage 1	Travel Choice	Shared Paths	2030/31-2032/33	\$1.31M	\$1.18M	2033	Cycle facilities along the urban section of Wānaka Mount Aspiring Road from McDougall Street to Bills Way to enable access for existing communities to the cycle network.	Shared path or on-road cycle facilities.
1.12	Anderson Road-Link Way Improvements	SH84 - Brownston Corridor	Safety and Capacity	2033/34-2035/36	\$2.98M	\$2.51M	2033	Safety and turning improvements at the preferred access to the activity area around Reece Crescent and Plantation Road from Anderson Road.	Control mechanism of upgrade to be identified with further investigation following other improvements. Monitoring of access should occur following Anderson / SH84 improvements (1.03). Timings could change based on intersection impacts and investigation.
1.13	Ardmore-Brownston-SH84 Capacity Upgrades	SH84 - Brownston Corridor	SH84 Corridor - Safety and Capacity Upgrades	2033/34-2035/36	\$6.70M	\$5.66M	2033	Capacity upgrades at this intersection while not reducing safety for active mode users. Control mechanism of upgrade to be identified with further investigation.	Western end of the SH84 Corridor Scheme needs to be considered collectively.
1.14	Aubrey-Anderson Intersection Improvements	Isolated Capacity	Safety and Capacity	2033/34-2035/36	\$4.47M	\$3.77M	2033	Safety and turning capacity improvements at Aubrey Road and Anderson Road intersection.	Control mechanism of upgrade to be identified with further investigation. Consider impacts of potential developer provided access to Northlake (2.07 and 3.18).
1.15	McDougall-Cardona Valley Road Upgrade.	Three Parks Access	Safety and Capacity Upgrades	2033/34-2035/36	\$4.47M	\$3.77M	2033	Safety and turning upgrades at the intersection of McDougall / Cardrona Valley Road with Golf Course & Faulks Terrace.	Control mechanism and need of upgrade to be identified with further investigation. Timing dependent on development in west and south-west Wānaka. Other Wānaka improvements may change preferences on SW-NE route choice within Wānaka. These changes may shift upgrades to Stone Street / Avalon Station Drive intersection instead.
1.22	SH84 & SH6 Separated Crossing	SH6 Corridor / Travel Choice	Safety and Capacity Upgrades	2033/34-2035/36	\$760k	\$640k	2033	Active modes crossing of SH84 and SH6 at Mt Iron Roundabout.	Currently aligned to 3.16 upgrades on Riverbank Road. Crossing of SH6 could be brought forward or deferred to align with 3.25, which may resemble improvement carried out under different programmes such as Great Rides.

Project ID	Project Name	Package	Category	NLTP Period	P50 Cost Estimate (\$2025)	P50 Cost Estimate (NPV \$2024)	Model Period	Description	Notes
1.23	Ballantyne Road Separated Crossing	Three Parks Access / Travel Choice	Safety and Capacity Upgrades	2033/34-2035/36	\$380k	\$320k	2033	Active modes crossing of Ballantyne Road at Riverbank Road.	Aligned with 3.16 upgrades on Riverbank Road. Could be brought forward to align with 3.14 upgrades on Riverbank Road depending on the form of 3.08.
2.06	Riverbank Road-Three Parks Link (South)	Three Parks Access	Three Parks Access – New Link	2033/34-2035/36	\$7.63M	\$6.44M	2033	Additional links into Three Parks from Riverbank Road. Provisionally on Road 6 (Three Parks – Alternative B)	Could be implemented sooner through developer requirements.
2.07	Northlake-Anderson Link		New Links	2033/34-2035/36	\$15.3M	\$12.9M	2033	New Road link into Northlake from Aubrey Road at or near Anderson Road.	Implementation alongside 1.14 and 3.18. Developer implementation.
3.16	Riverbank Road Shared Path Stage 2	Three Parks Access / Travel Choice	Shared Paths	2036/37-2038/39	\$1.60M	\$1.35M	2033	Shared Path along Riverbank Road from SH6/SH84 intersection to Orchard Road.	Consider implementation as a single scheme on Southern Wānaka alongside 3.14, 3.15, and 1.23
3.17	McDougall Shared Path	Travel Choice	Shared Paths	2033/34-2035/36	\$880k	\$740k	2033	Shared path or cycle facilities on McDougall Street connecting Lakefront and Brownston paths with Golf Course and Cardrona Valley Road Shared Paths.	Shared path or on-road cycle facilities. Consider implementation with 3.11.
3.18	Northlake Shared Paths Stage 1	Travel Choice	Shared Paths	2033/34-2035/36	\$950k	\$8080k	2033	A north-south shared path into the Northlake development from Aubrey Road near Anderson Road. East-west links within the Northlake development connecting to other shared paths on on-street cycle facilities.	Consider cycling facilities along with developer requirements for the on-going development at Northlake (2.07).
3.19	Orchard Road Shared Path	Travel Choice	Shared Paths	2033/34-2035/36	\$800M	\$680k	2033	Shared path or on-street cycle facilities along Orchard Road	Could be considered as part of a combined scheme with 3.23 and 3.22 for cycle connectivity to south-west Wānaka. Timing could be altered as development in west and south-west Wānaka occurs.
3.20	West Wānaka Shared Paths	Travel Choice	Shared Paths	2033/34-2035/36	\$1.75M	\$1.48M	2033	North-south and east-west shared path or cycle facility project through western Wānaka enabling access to local roads between McDougall Road, Wānaka Mount Aspiring Road, and Cardrona Valley Road.	Consider scheme with alignment to development in western Wānaka. Provisionally identified route as Meadowstone Drive and West Meadow Drive. Additional consideration is required as development occurs in western Wānaka to consider alternative connections such as Studholme Road.
4.01	SH6 Clutha River (Albert Town) Bridge Duplication	SH6 Corridor		2033/34-2035/36	N/A	N/A	2042	Duplication or replacement of the SH6 Cutha River Bridge at Albert Town to provide additional capacity to provide two-directional traffic flow while maintaining walking/cycling access.	Outside of Scope of this SSBC and is part of the Do Minimum. Capacity constraints start at 2033 model period but may be managed through traffic signal modifications. Required by 2042 model period. Implementation influenced by Lake Hāwea development.
1.16	Avalon Station Drive – Gordon Road Link intersection improvements	Three Parks Access	Safety and Capacity	2036/37-2038/39	\$2.98M	\$2.37M	2038	Safety and turning capacity improvements at the future intersection of Avalon Station Drive and Gordon Road extension (See 2.03).	Implementation underway. Implementation with developer support.

Project ID	Project Name	Package	Category	NLTP Period	P50 Cost Estimate (\$2025)	P50 Cost Estimate (NPV \$2024)	Model Period	Description	Notes
1.17	SH6-Alison & Kingston Intersection Improvements	SH6 Corridor	Safety and Capacity	2036/37-2038/39	\$6.70M	\$5.33M	2038	Turning and safety improvements on SH6 at Alison Avenue and Kingston Street to facilitate the safe access of pedestrians and vehicles between the Albert Town local centre and surrounding residential areas.	Need for improvements impacted by development timeframes at Lake Hāwea. Consider implementation as a single scheme in Albert Town alongside 3.21.
1.18	Cardrona Valley-Orchard / Studholme Capacity Upgrade	Isolated Capacity	Safety and Capacity	2036/37-2038/39	\$4.47M	\$3.55M	2038	Safety and Capacity upgrades at this intersection to facilitate and enable future growth in western Wānaka.	Should align with development of western Wānaka.
3.21	SH6 (Albert Town) Shared Path	SH6 Corridor	Shared Paths	2036/37-2038/39	\$1.82M	\$1.45M	2038	Shared Path along SH6 from Aubrey Road intersection to Albert Town Bridge.	Consider implementation as a single scheme in Albert Town alongside 1.17.
3.22	Cardrona Valley Road Shared Path Stage 2	Travel Choice	Shared Paths	2036/37-2038/39	\$1.53M	\$1.22M	2038	Continuation of the Shared Path along Cardrona Valley Road as far as Riverbank Road.	Could be considered as part of a combined scheme with 3.23 for cycle connectivity to south-west Wānaka. Implementation along side 1.18. Timing could be altered as development in west and south-west Wānaka occurs.
3.23	Riverbank Road Shared Path Stage 3	Travel Choice	Shared Paths	2036/37-2038/39	\$1.39M	\$1.10M	2038	Continuation of the Shared Path along Riverbank Road as far as Cardrona Valley Road.	Could be considered as part of a combined scheme with 3.22 for cycle connectivity to south-west Wānaka. Timing could be altered as development in west and south-west Wānaka occurs.
3.24	Northlake Stage 2	Travel Choice	Shared Paths	2036/37-2038/39	\$800k	\$640k	2028	Shared path on Northlake Drive and Joe Brown Drive from Aubrey Road enabling easier access to Aubrey Road Shared Path and the cycle network.	Shared path or on-road cycle facilities to enable access. Could be implemented earlier to tie in with development in Northlake.
3.25	SH6-Luggate Shared Path	Travel Choice	Shared Paths	2039/40-2041/42	\$8.02M	\$6.01M	2042	11 km direct shared path from Riverbank Road to Luggage along the northern side of SH6, suitable for commuters. Providing access to Wānaka Airport. (Outside of Scope of SSBC).	Consider implementation in stages to Wānaka Airport (based on development levels at Wānaka Airport) and then Luggate. Part of Cromwell to Wanaka Great Ride.
5.01	Public Transport Hub and Bus Depot	Travel Choice	Public Transport	2039/40-2041/42	\$2.24M	\$1.69M	N/A	Central Public Transport Hub and Bus Depot.	
3.26	Wānaka Mount Aspiring Shared Path Stage 2	Travel Choice	Shared Paths	2042/43-2044/45	\$8.97M	\$6.33M	2042	12 km direct shared path from the urban boundary of Wānaka to Glendhu Bay. (Outside of Scope of SSBC)	
5.02	Route 1 Stops	Travel Choice	Public Transport	2042/43-2044/45	\$940k	\$660k	2042+	Bus Route 1 infrastructure including five major stops at key locations and numerous sign-only stops.	Assumes Route 1 stops at several key destinations within Wānaka and Lake Hāwea. Route 1 commences in the 2042/43 to 2044/45 period.
3.27	Cardrona Valley Road Shared Path Stage 3	Travel Choice	Shared Paths	2045/46-2047/48	\$13.1M	\$8.74M	2042+	18 km extension of the Cardrona Valley Shared path to Cardrona Village. (Outside of Scope of SSBC)	
5.03	Route 2 Stops	Travel Choice	Public Transport	2045/46-2047/48	\$750k	\$500k	2042+	Bus Route 2 infrastructure including four additional major stops at key locations and numerous sign only stops.	Assumes Route 2 stops at several key destinations within Wānaka as a two-way loop, and has some overlap with Route 1.

Project ID	Project Name	Package	Category	NLTP Period	P50 Cost Estimate (\$2025)	P50 Cost Estimate (NPV \$2024)	Model Period	Description	Notes
5.04	Route 3 Stops	Travel Choice	Public Transport	2048/49-2050/51	\$370k	\$240k	2042+	Bus Route 3 infrastructure including two additional major stops at Wānaka Airport and Luggate, and other sign only stops.	Assumes Route 3 stops at several key destinations within Wānaka and Luggate, has some overlap with Route 1 and 2.
5.05	Route 4 and Route 5 Stops	Travel Choice	Public Transport	2051/52-2053/53	\$370k	\$220k	2042+	Bus Route 4 and Route 5 infrastructure including two additional major stops at Glendu Bay and Cardrona, and other sign only stops.	Assumes Route 4 and Route 5 provide commuter access to Glendu Bay and Cardrona and stopping at the central hub.

APPENDIX C – ECONOMIC ASSESSMENT REPORT

Queenstown Lakes District Council

WĀNAKA NETWORK OPTIMISATION SSBC ECONOMICS ASSESSMENT REPORT

18 JUNE 2025

FINAL



WĀNAKA NETWORK OPTIMISATION SSBC
ECONOMIC REPORT

Queenstown Lakes District Council

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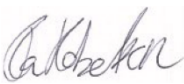
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ABBREVIATIONS

AADT	Average Annual Daily Traffic
ACC	Crash Cost Savings
BCR	Benefit Cost Ratio
CAS	Crash Analysis System
FYR	First Year Rate of Return
MBCM	Monetized Benefit Cost Manual
NLTP	National Land Transport Programme
NZTA	New Zealand Transport Agency Waka Kotahi
PT	Public Transport
QLDC	Queenstown Lakes District Council
SH	State Highway
SSBC	Single Stage Business Case
TT	Travel Time
VKT	Vehicle Kilometres Travelled
VOC	Vehicle Operating Costs
WCB	Walking and Cycling Benefits

1 INTRODUCTION

1.1 PURPOSE

An economics assessment has been carried out as part of the Wānaka Network Optimisation Single Stage Business Case (SSBC) to assess the costs and benefits for the Do Minimum Option and the Strategic Responses Option.

The purpose of this economics evaluation report is to:

- document the benefit-cost analysis completed of the two options
- determine if the Strategic Responses Option is economically viable (i.e. Benefit Cost Ratio (BCR) above 1.0).

1.1.1 PROJECT SCOPE AND PROJECT STUDY AREA

The scope of the Wānaka SSBC involves looking at optimising the existing transport networks in Wānaka through the provision of active modes and public transport network options, alongside road network options.

The project extent of the Wānaka Network Optimisation SSBC is shown below in Figure 1-1 and is generally bounded by the following roads:

- Aubrey Road in the north
- State Highway (SH) 6 Clutha River (Albert Town) Bridge in the northeast
- SH6 and Riverbank Road in the east
- Cardrona Valley Road and McDougall Street in the southwest
- Ardmore Street in the west
- Lakeside Road in the northwest.

The study area was chosen to cover the major route choices within Wānaka area as listed above. The study area is also the traffic model extent which was used for the Wānaka SSBC (see section 2.3).

Areas such as Lake Hawea, Hawea Flat, Glendhu Bay, Luggate and Cardrona are outside of the project scope. However, as growth is anticipated in these areas, the SSBC does suggest looking at future connections to these areas, as growth occurs.



Figure 1-1: Project extent of Wānaka Network Optimisation SSBC (Base map source: Nearmaps)

1.1.2 EVOLUTION OF THE WĀNAKA NETWORK OPTIMISATION SSBC SHORT LIST OPTIONS

At the commencement of the Wānaka SSBC, a short list of projects was identified by Queenstown Lakes District Council (QLDC) for implementation based on the revision of the 2019 Integrated Transport Business Case. However, as the SSBC progressed in 2024, several of the short-listed projects were excluded based on the scale of investment. Additionally, the mid-term National Land Transport Programme (NLTP) update for 2024 indicated that there was limited funding for Wānaka over the next three years.

Consequently, this resulted in QLDC asking for a different approach to be taken for the optioneering process. QLDC asked WSP to develop high-level solutions to respond to current and future emerging needs of Wānaka, which are referred to as Strategic Responses. The intention of the Strategic Responses are to help support QLDC in understanding areas to prioritise investment while remaining adaptable as Wānaka develops and priorities change.

As a result, for the purposes of this economics evaluation, only two options are assessed – Do Minimum Option and the Strategic Responses Option. Appendix A provides detail of the two options.

2 METHODOLOGY

Transport economics evaluation has been undertaken in accordance with the NZ Transport Agency Waka Kotahi (NZTA) Monetised Benefits and Costs Manual (MBCM) v1.7.3, May 2025. Values throughout this document are in \$2024.

2.1 ECONOMIC ASSESSMENT APPROACH

The following benefits have been calculated based on user costs for the Do Minimum Option and estimated cost reductions for the Strategic Responses Option:

- Travel Time Saving (TT)
- Vehicle Operating Cost Savings (VOC)
- Crash Cost Savings (ACC)
- Walking and Cycling Health Benefits (WCB)
- Vehicle emissions reduction benefits

The Wānaka Transport Model was used to inform estimates for:

- Travel Time Savings,
- Vehicle Operating Cost savings,
- Vehicle emissions cost savings
- Changes in traffic volumes used in crash cost prediction models.

The transport model was developed in Paramics Discovery Software v26.0.3 (Paramics) and has AM and PM peak models. The model has a base year of 2025. Future year, Do Minimum, models have been developed for 2028, 2033, 2038, and 2043.

The future year models for 2038 and 2043 Do Minimum models cannot run through. They signal that without a change in travel behaviour or traffic patterns, the Wānaka Road Network will gridlock at peak times. For this reason, a 10% or 20% reduction in trip generation within Wānaka was assumed for the 2038 and 2043 forecasts years respectively. While model growth scenarios have been labelled as future years, development and growth may occur quicker or slower pace.

User costs from the traffic model considered traffic volumes and travel times between key nodes. To enable the economic evaluation, expansion factors have been used to adjust the modelled peak periods to represent all day travel. Expansion factors cover 7am to 7pm, which is the majority of all trips. Outside of these periods traffic volumes have near free-flow conditions and so travel time impacts are negligible.

Strategic Responses were not processed through the traffic model, instead the Do Minimum growth scenarios traffic volumes or travel times were adjusted to reflect the Strategic Responses. Where new routes have been established to key designations, we have assumed a 10% route shift in existing traffic numbers (for example planned connection from Avalon Station Drive to Ballantyne Road has been assumed to pull 10% of trips on Ballantyne Road from Sir Tim Wallis Drive to Golf Course Road).

Where mode change is expected, from Walking, Cycling, or Public Transport, link volumes have been left unchanged. However, network vehicle kilometres travelled (VKT) has been reduced down by the estimated mode change, this impacts the user costs for Vehicle Operating Costs and Vehicle Emissions. This only considers the modelled network, and so is conservatively high.

The traffic model has been used to inform intersection specific crash models. Peak volumes on links have been adjusted to an AADT. Each intersection with an upgrade has been assessed via Method C in the MBCM using product of flow crash prediction models.

Crashes in Wānaka not at an intersection with a prediction model were included via a Method A assessment, this included all injury crashes over the last five years, and half the walking and cycling injury crashes from the preceding 5-year period. Non-injury crashes were not considered.

Walking and cycling benefits are focused on cycling benefits. Cycling uptake has been based on population-catchment information. Cyclists estimated have been based on the previous population-based methodology rather than the current worker based methodology due to the high number of visitors and resident population compared with workers. Estimates on the cyclists uptake was fed back into the vehicle kilometres travelled, this was done based on the percentage of the overall network completed rather than specific route inclusions.

Mode change to public transport has been assumed to be approximately 5% of trips following the 2043 modelled period.

The benefit of public transport initiatives included in the Strategic Responses Option have not been monetised as the possible interventions have not been developed with sufficient detail to enable an assessment. Any public transport benefits derived would be too uncertain.

Vehicle Emissions costs have been based on the modelled network and include impacts to human health and climate. They have been estimated using NZTA's VEMP tool and the average network trip length.

2.2 INPUTS

- Wānaka Transport Model (Paramics)
- Crash data between 2019 to 2023 extracted from NZTA Crash Analysis System (CAS) .
- NZTA's Traffic Monitoring System.
- QLDC Cyclist Count Stations.
- StatsNZ 2018 Census Data¹.

¹ 2023 Census data was not available for several months after the start of the analysis. Final updates to the calculations occurred while 2023 Census data was being published.

2.3 ASSUMPTIONS

This section presents the general assumptions used for this transport economic evaluation. For more information, refer to Appendix A.

2.3.1 DERIVING DAILY TRAFFIC FROM PEAK HOUR COUNTS / FORECASTS

Traffic inputs (peak hour traffic flow, network travel times, corridor distances) were extracted from the Wānaka Traffic Model micro simulation model Paramics Discovery Software v26.0.3 (Paramics). As inputs were only provided for the morning and afternoon peaks, the following expansion factors were used to convert the peak hours to represent a full day:

Table 2-1: Expansion factors used.

Period	Expansion Factor
7:00 AM – 3:00 PM & 6:00 PM – 7:00 PM	The morning peak hour Multiplied by 9
3:00 PM – 6:00 PM	The afternoon peak hour Multiplied by 3

Expansion factors are based on recent historic daily traffic profile extracted from the SH84 NZTA Telemetry Site 08400002 (Mt Iron - near entrance to reserve) as shown in Figure 2-1. The data was extracted from Wednesday 27th February 2024 to 29th February 2024 and uses the average between the three weekdays. The expansion factors will cover 87% of the AADT.

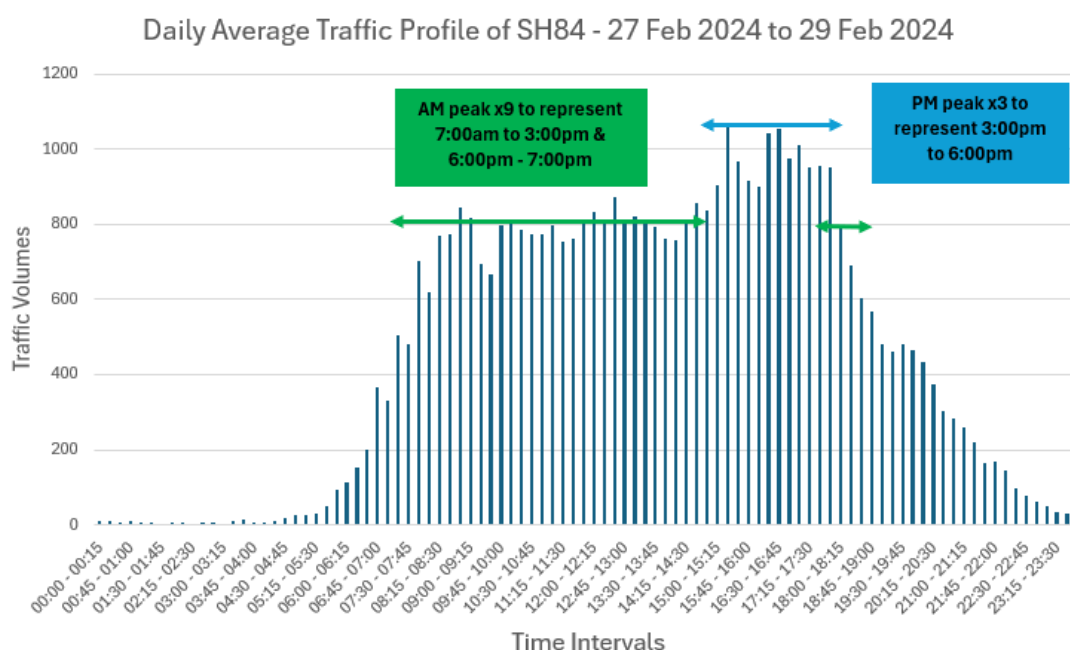


Figure 2-1: Daily Traffic Profile of Wānaka Weekday extracted from NZTA Telemetry Site SH84 08400002

For the Do Minimum Option, where available traffic model scenarios were limited to those with travel demand management factors, daily traffic was scaled up by the TDM reduction to estimate 100% volumes.

2.3.2 GROWTH

Traffic growth was assumed to be 2% per annum. This is based on NZTA historic Average Annual Daily Traffic (AADT) Growth from 2000 to 2023 along SH84 (Telemetry Site: 08400002 Mt Iron - near entrance to reserve). Traffic growth has been applied for values beyond the modelled periods.

Time zero is 1st July 2024.

Discount period is 40 years with a 4% discount factor.

2.3.3 CONSTRUCTION DURATION

Individual projects are assumed to involve a 12-month construction period. This is represented by a 12-month delay between costs occurring and benefits starting.

The timing and a sequencing for implementation of the proposed strategic response is outlined in Appendix B of the Economic Case..

2.4 MONETISED BENEFITS INPUTS

2.4.1 TRAVEL TIME COST SAVINGS

The methodology for calculating travel time cost savings was as follows:

- Paramics was used to determine morning and afternoon hourly travel time for the Do Minimum for the five future year scenarios (2024, 2028, 2033, 2038 and 2043).
 - The morning peak is the 8am to 9am model.
 - The afternoon peak is the 4pm to 5pm model.
 - The 7am to 8am Base 2024 model was used to represent free-flow (congestion free) travel time.
- The Travel Time for the Do Minimum Option for the 2028 future year and beyond was updated to reflect committed works between 2025 and 2028 within Wānaka which were not included within the model. This update included:
 - Adding travel time to links with new roundabouts (Ballantyne Road)
 - 10% of traffic assumed to be re-routed where new connections are established (Avalon Station Drive connection to Ballantyne Road).
- The impacts of Strategic Responses were derived from the outputs of the Do Minimum models.
 - We have assumed that the proposed road safety and capacity improvements will limit future year travel time increases by 50%. This was the assumption applied without detailed option analysis.
 - We have applied similar updates for new roundabouts and links as the do minimum when new intersections were added to existing links (such as Riverbank Road access to Three Parks).
- Table 16 from the MBCM was used to identify the travel time costs and costs associated with congestion.

- Urban Other is the road category used to represent the whole Wānaka SSBC network given as most roads in Wānaka fit under the Urban Other category.

2.4.2 VEHICLE OPERATING COST SAVINGS

The following assumptions were used to calculate vehicle operating costs:

- Vehicle operating costs (VOC) were calculated from vehicle kilometres travelled (VKT)
- VKT and the mean operating speeds were extracted for key links from the Do Minimum Paramics modelled Wānaka network for all (2024, 2028, 2033, 2038 and 2043).
- For the Strategic Response, calculated VKT and operating speeds were adjusted based on the estimated effect of the interventions included within the Strategic Response.
- Speed Gradient and Roughness were considered for vehicle operating costs. Tables A86 and A91 from the MCBM were used to calculate vehicle operating costs.
 - Roughness conservatively assumed to be 62.8 (NAASRA),
 - Gradients conservatively assumed to be 0%, and
 - Average network speed was based on link length and travel time weighted by link usage.
- When considering the Strategic Responses option, where new intersections would result in trip re-routing, link volumes were adjusted (see Section 2.4.2) and incorporated into the Strategic Responses network VKT.
- The Strategic Responses network VKT was reduced in the future years to account for the reduction of volumes expected to result from the mode change to cycling and public transport.
 - The reduction in VKT based on the existing and new cyclists estimated from the Walking and Cycling Benefits, is discussed in Section 2.4.4.
 - The estimated number of new cyclists are then applied to the 2018 Census Travel to Work and Education Mode Share Split to determine the reduction of vehicle trips (found to be a 10.7% reduction in vehicle trips in 2043).
 - We have assumed that from 2033, the percentage of vehicle trips reduced from cycling is applied in thirds in 2033, 2038, and 2043.
 - An additional model forecast period (2043+) was added to include the impacts of public transport on vehicle kilometres travelled.

2.4.3 CRASH COST SAVINGS

Two crash assessments were included, savings expected to result from intersection improvements, and crash cost savings attributable to traffic reduction resulting from demand suppression and mode shift.

In accordance with the MCBM, Crash data from the past five years from 2019 to 2023 was used and was extracted from NZTA CAS, with 50% of pedestrian and cyclist injury crashes included from 2014 to 2019.

Intersection Improvements

All intersections upgraded were assessed to calculate crash cost savings except for

- The Do Minimum which is expected to have the same crash costs as the base; and
- Avalon Station Drive and Gordon Road which are new intersections where the future traffic demands are unknown

For the purposes of providing crash cost change we have assumed that these intersections are changed from priority intersections to single lane roundabouts. Exceptions include:

- SH84 / Anderson as multi-lane roundabout.
- SH84 / Ballantyne / Hedditch as traffic signals.
- SH84 / Ardmore / Brownston as traffic signals.
- SH6 / Kingston / Alison as traffic signals.
- Cardrona Valley Road / Orchard / Studholme as safety upgrades and then a roundabout.

In accordance with the MBCM these change in the form of intersection are considered a transformational change. On this basis, Method C was used for the Do Minimum option and Method B was used for the Strategic Responses Option.

We have not accounted for significant re-distribution of traffic as the result of the network changes on crash rates.

The NZTA Crash Cost Compendium v2 was also used to aid with the calculations for crash cost savings. All intersections are treated as Urban intersections when calculating crash cost savings.

Traffic Reduction

For crashes in Wānaka which were not at intersections considered, Method A (for injury crashes only) was used to predict the change in crash numbers over all of Wānaka based on the change of modelled VKT on the network.

Crash Trend

As Crashes in Wanaka are mostly urban, the urban crash trend adjustment factor of -1% has been applied to the traffic growth rate to adjust the crash prediction model and other crash social costs.

2.4.4 WALKING AND CYCLING BENEFITS

The following assumptions were used to calculate the walking and cycling benefits:

- To calculate the cycle demand for the new / upgraded cycling facilities proposed under the Strategic Responses option, the old version of the SP11 Worksheet 7 was used which estimates cycle demand based on population. This is because Wānaka is a tourist destination with a high number of seasonal workers. As a result, using the latest SP11 Worksheet 7 to determine cycle demand, which is based on the number of jobs, does not reflect the current nature of Wānaka and may underestimate potential cycle demand.
- The number of new pedestrian users was estimated based on the proportion of new cyclists calculated from the old SP11.
- 50% of new cyclists are assumed to be E-bike users.

- The 2018 Census (and Commuter Waka) was used to determine the existing population and existing walking and cycling users in Wānaka.
- As the cycling facilities under the Strategic Responses Option are high level and are to remain adaptable, for the purposes of this economics evaluation, all cycling facilities under the Strategic Responses Option are treated as a shared path with a width of 3m.
- Worksheet 4 from SP11 was used to calculate the cycling travel time cost savings for the shared path facilities.
- Table 14 and Table 35 from the MBCM were also used to calculate cycling travel time amenity cost savings.
- For walking and cycling health benefits, Table 6 and Table 7 from the MBCM were used for this calculation.
- New walking and cycling uses are based on existing population and do not account for population growth.

2.4.5 *VEHICLE EMISSIONS REDUCTION BENEFITS*

Vehicle Emissions reduction benefits were calculated using the latest NZTA VEPM v7.0 as well as Table 9 and 11 from the MBCM based on change in VKT and speed used in travel time and vehicle operating costs calculations.

Vehicle emission reduction benefits include human health benefits as well as greenhouse gas emission benefits.

2.5 SENSITIVITY TEST

The BCR value of the Strategic Responses Option has been sensitivity tested to consider benefit and cost risks and identify the robustness of the economic evaluation.

Sensitivity tests were carried out for the following critical factors:

- P50 and P95 of the construction costs
- Discount rate of 3% and 6% - with sensitivity tests of 2%/1.5% and 8%.
- Growth rate assumptions of 1%, and 3%
- With and without walking and cycling benefits
- +/- 50% of the Crash Cost Savings
- -50% of all related benefits using inputs from the traffic model.

The detailed sensitivity test results are included in Section 5.1 and in Appendix A.

3 NON-MONETISED BENEFITS

The MBCM provides values and procedures for calculating standard transport benefits, but does not capture all benefits that transport projects will generate. This is particularly the case with walking and cycling improvements, which can see additional benefits such as liveability and retail sales growth from increased foot traffic. We have split the benefits below into benefits which were not monetised due to lack of data, and benefits which cannot be monetised.

Benefits not monetised due to lack of data:

- Vehicle operating costs due to congestion and speed change cycles were not monetised.
- Public Transport benefit. The public transport improvements were not considered directly, instead a reduction in VKT was applied to account for estimated public transport mode change. Consequently, patronage numbers are not available to estimate public transport benefit.
- Amenity benefits (retail sales growth). These can be quantified using the VURT method developed for Transport for London but have been excluded from this analysis because of the level of uncertainty.

Other benefits which cannot be monetised that are expected from the Strategic Response are:

- Liveability benefits. These are not easily quantified except indirectly and partially through calculation of travel time and reliability benefits. The project will result in more travel choice across modes, and travel time reduction resulting in more places accessible (within commutable distances) for customers.
- Other customer experience benefits (reduced driver frustration etc).

4 COSTS

4.1 CAPITAL COSTS

High level cost estimates were prepared for Wānaka SSBC to support the economics assessment. The cost estimates only cover the Strategic Responses option.

4.1.1 SCHEDULE OF ITEMS

The timing and sequencing of improvement works for the Strategic Response are outlined in Appendix B of the Economic Case.

4.1.2 RATES

The high-level cost estimates are based on the unit rates set out in Table 4-1. The rates for the two-lane road and shared user path are measured in NZD per square metre (m²), while the rate for the single lane roundabout is a flat rate for the entire roundabout. Mini-roundabout and multilane roundabout were based on adjustments to the single lane roundabout cost.

The rates set out in Table 4-1 make no allowance for the following:

- Preliminary and General costs
- Environmental Controls
- Temporary Traffic Management
- Contingencies.

We have applied a 50% multiplier to the base rates in Table 4-1 to account for Preliminary and General Costs, Environmental considerations, traffic management, and other costs. We have then applied a 30% Contingency to adjust the base values to a P50 Estimate.

Table 4-1: Base cost estimate rates used

Description	Rate (\$2023)	Assumptions
Standard Two-Lane Road	\$381.74 (NZD/m ²)	Assumes width of the road is 10m
Shared Path	\$122.07 (NZD/m ²)	Assumes the width of the shared path is 3m
Mid-block Signalised Crossing	\$190,000	
Mini Roundabout	\$1,496,299.50	Uses the rate of the single lane roundabout and divided by 1.5.
Single Lane Roundabout	\$2,244,449.25	Assumes a 15m radius island with 4x 60m approaches that are 14m wide.
Multi-lane Roundabout	\$3,366,673.88	Uses the rate of the single lane roundabout, and multiples rates by 1.5.
Public Transport Hub	\$1,122,800	Queenstown Public Transport Business Case, Remarkables and Five Mile Interchange

Description	Rate (\$2023)	Assumptions
Major Bus Stop	\$94,111.11	Queenstown Public Transport Business Case, Nine Bus Stop Changes (divided by 9)

4.1.3 CAPITAL COST SUMMARY

Table 4-2 shows the total cost estimates for the Strategic Responses Options.

Table 4-2: Summary of Cost Estimates

Strategic Responses Option	Total
Base Estimate	\$142,676,787
Expected Estimate (includes 30% Contingency)	\$185,479,823
95 th Percentile Estimate (30% funding risk)	\$241,123,770

4.2 OPERATIONAL COSTS

4.2.1 MAINTENANCE COSTS

The maintenance costs do not consider existing network maintenance costs. Maintenance costs outlined are increased costs with the Do-Minimum assumed to have \$0 cost increase.

The maintenance cost of the Strategic Responses option assumes 2% of the construction costs (Base Estimate and 30% contingency) per year. The maintenance cost is estimated to increase by \$3,709,596 per year.

The maintenance costs for the Strategic Response option are assessed to increase in proportion to the amount of the Strategic Response that is implemented.

4.2.2 PUBLIC TRANSPORT SERVICE COSTS

Public Transport Service costs have been based on route lengths, assumed bus frequency, and hours of operation. We have estimated that the five routes will require 2,383,360 bus kilometres per year, with 90,748 hours, requiring 28 buses. Once all five routes are operating there will be a base cost of \$8,206,137 per year.

We have not included farebox recovery against cost of providing the service as patronage numbers are not fully established.

Table 4-3: Bus Operating Cost Estimate Components

Bus Operating Costs	Rate (\$2023)
Bus Costs	\$60,000/bus/year
Time	\$40/bus/hour

Bus Operating Costs	Rate (\$2023)
Distance – Fuel	\$0.74/bus/km
Distance – Other	\$0.63/bus/km
Maintenance	\$7,000/bus/year

Table 4-4: Total annual OPEX at completion.

	Cost per year (\$2024)
Infrastructure Maintenance Costs	\$3,709,596
Public Transport Operating Costs	\$8,206,137

5 ECONOMICS EVALUATION

A Summary of the impacts of the strategic response is outlines below in Table 5-1

Table 5-1: Impacts on the Strategic Responses Option

	Gross Change	Percentage Change
Travel Time	90,300 vehicle-hours saved per year (by 2043)	3.7% travel time saving
Vehicle Kilometres Travelled	16,990,900 km saved per year (2054)	15% VKT reduced
Crashes	2.0 fewer Injury crashes per year (2054)	10% crash reduction
Cycling Uptake	557 new cyclists (2046)	135% increase
Pedestrian Uptake	330 new pedestrians (2046)	65% increase
Emissions Reduction	1900 tonnes reduced CO ₂ -EQ (2054)	18%
	1.9 tonnes reduced CO (2054)	16%
	0.019 tonnes volatile organic compounds reduced (2054)	28%
	2.6 tonnes NO _x reduced (2054)	19%
	0.017 tonnes PM _{2.5} reduced (2054)	15%

Table 5-2 summarises the total BCR of the Do Minimum option and the Strategic Responses Option. Overall, the Strategic Responses Option has benefits in the order of \$390 million, and a low overall BCR of 1.3.

Table 5-2: Tangible BCR of the Do Minimum and the Strategic Responses Option

	DO MINIMUM USER COST	STRATEGIC RESPONSE USER COST	DIFFERENCE / BENEFIT
Travel Time Savings (TTC)	\$2,641,219,529	\$2,505,012,116	\$136,207,413
Vehicle Operating Cost (VOC)	\$971,335,933	\$860,615,567	\$110,720,366
Crash Costs (ACC)	\$257,226,589	\$236,262,116	\$20,964,473
Cycling Travel Time-Amenity (WCB)	\$88,171,038	\$59,573,096	\$28,597,942
Walking and Cycling ² (WCB)	(\$5,725,240)	(\$56,875,330)	\$51,150,090

² Walking and Cycling Health Benefits are presented in this “costs” table as negative costs.

Greenhouse Gas Emission Costs	\$94,139,072	\$84,081,505	\$10,057,566
Air Emissions on Health Costs	\$752,672,669	\$699,448,366	\$53,224,303
USER COSTS	\$4,799,039,589	\$4,388,117,436	\$389,957,680
Construction Costs	\$0	\$151,850,322	\$151,850,322
Maintenance	\$0	\$68,371,297	\$68,371,297
Public Transport Operating	\$0	\$87,190,535	\$87,190,535
CAPITAL AND OPERATIONAL COSTS	\$0	\$307,412,155	\$307,412,155
TANGIBLE BENEFIT TO COST RATIO	n/a	n/a	1.3

5.1 SENSITIVITY TEST

Table 5-3 summarises the sensitivity tests undertaken as outlined in Section 2.5 for the benefits and costs.

As noted in Table 5-2, the largest benefit gain is from travel time cost savings making up 35% of the benefits. However as the inputs used for travel time cost savings are also linked to VOC, greenhouse gases and air emissions, all benefits based on the inputs from Paramics was tested together. This test showed that the BCR is highly dependent on the traffic model outputs for the Strategic Response.

Table 5-3: Sensitivity Testing

Scenario	Strategic Responses Option against Do Minimum BCR
BASE	1.3
CONSTRUCTION COSTS	
P95 cost	1.0
TRAFFIC GROWTH	
1%	1.2
3%	1.4
DISCOUNT RATE	
3%	1.3
4%	1.2
6%	1.0
8%	0.9
ANALYSIS PERIOD	
60 years	1.6
WALKING AND CYCLING BENEFITS	
without walking and cycling benefits	1.1
CRASH COST SAVINGS	
additional 50% (x 1.5)	1.4
50% fewer (x 0.5)	1.3
TRAVEL TIME, VEHICLE OPERATING COSTS, VEHICLE EMISSIONS	
-50%	0.8

5.2 FIRST YEAR RATE OF RETURN

First Year Rate of Return (FYRR) is not a particularly helpful calculation considering a multi-year programme of improvements. We have used 2054 for the first year once all improvements have been completed.

FYRR of the Strategic Responses Option is determined to be 20%. As a general rule, if the FYRR is less than the BCR divided by 15.4, then it potentially should be delayed. The BCR divided by 15.4 is 8%.

6 SUMMARY

The Strategic Responses collectively have benefits in the order of \$390M from 2025 to 2064 with costs of approximately \$310M and a BCR of 1.3.

Based on the level of information which the economics has been based upon and the projected population and traffic growth, the sensitivity tests indicate a greater confidence in achieving a BCR>1 for the Strategic Responses Option.

7 LIMITATIONS

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APPENDIX A

Do Minimum and Strategic Response Treatments

DO MINIMUM OPTION

The Do Minimum Option has relied on the Wānaka Traffic Model described in the Wānaka Model Build Technical Note. The Do Minimum Option uses Growth Scenarios and Network Changes.

The Do Minimum was tested for the following Growth Scenarios:

- Base 2024 Model
- 2028 Core Scenario
- 2033 Core Scenario
- 2038 Core Scenario 10% TDM – this growth scenario model assumed 10% reduction in trips originating in Wānaka (see Technical Note Modelling Memorandum). The traffic volumes were then adjusted to approximate 100% volumes.
- 2043 Core Scenario 20% TDM – this growth scenario model assumed 20% reduction in trips originating in Wānaka (see Technical Note Modelling Memorandum). The traffic volumes were then adjusted to approximate 100% volumes.

For the Do Minimum, it is assumed that the following network changes are all implemented by 2028 model period (unless otherwise noted):

- The current existing network and any planned maintenance by QLDC to maintain status quo on the road network.
- Traffic signals added on SH84 as a midblock crossing between Ardmore Street and Ballantyne Road.
- Mount Iron roundabout is complete.
- Ballantyne Road / Riverbank Road roundabout is complete.
- Traffic Signals at SH6 Clutha River (Albert Town) Bridge are adjusted to minimised all red time throughout all model periods.
- SH6 Clutha River (Albert Town) Bridge is duplicated prior to 2043.
- Ballantyne Road / Avalon Station Drive roundabout.
- Extension of Avalon Station Drive to Ballantyne Road.
- Shared path from Avalon Station Drive to Ballantyne Road via Frederick Street.
- Ballantyne Road / Golf Course Road roundabout.
- New link into Three Parks from Ballantyne Road / Golf Course Road roundabout.
- Schools to Pool shared path completion.
- Lakefront shared path stage 4 completion.

STRATEGIC RESPONSES OPTION

The Strategic Responses Option looks at a combination of the following activities:

- Capacity and safety upgrades in key intersections
- Additional road connections into key development areas
- Active Modes improvements
- Public transport improvements
- Additional travel demand initiatives
- Strategic spatial planning initiatives.

Details regarding each activity are described in the section below.

CAPACITY AND SAFETY UPGRADES AT KEY INTERSECTIONS

The Strategic Responses Option will look to improve the turning capacity and / or safety at intersections in Figure A-1 See also the Appendix B of the Economic Case.

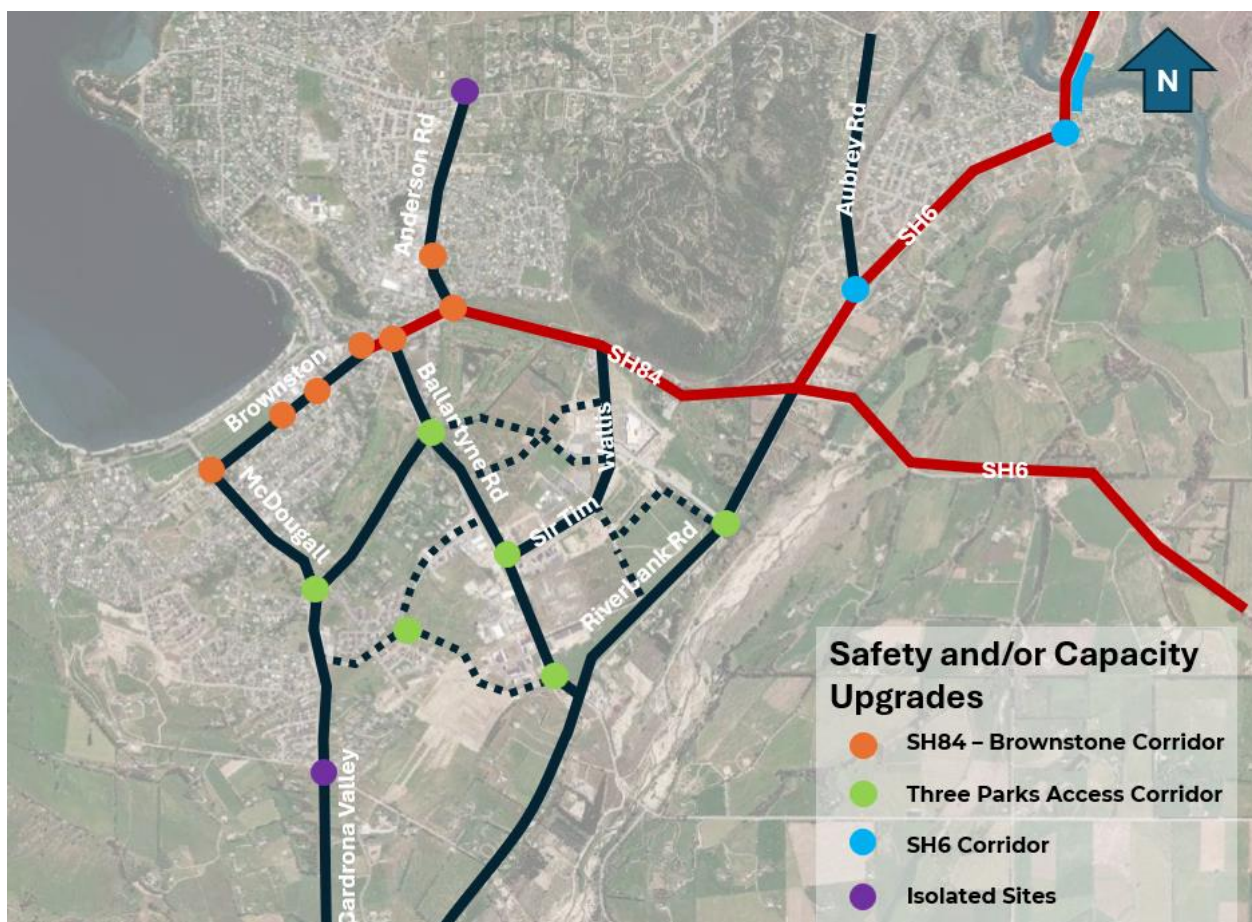


Figure A-1: Strategic Responses Option - proposed intersection upgrades for safety and / or capacity issues
(Base map source: Nearmaps)

NEW ROAD CONNECTIONS INTO KEY DEVELOPMENT AREAS

New connections to Three Parks and Northlake are shown in Figure A-2 (See also Appendix B of the Economic Case)

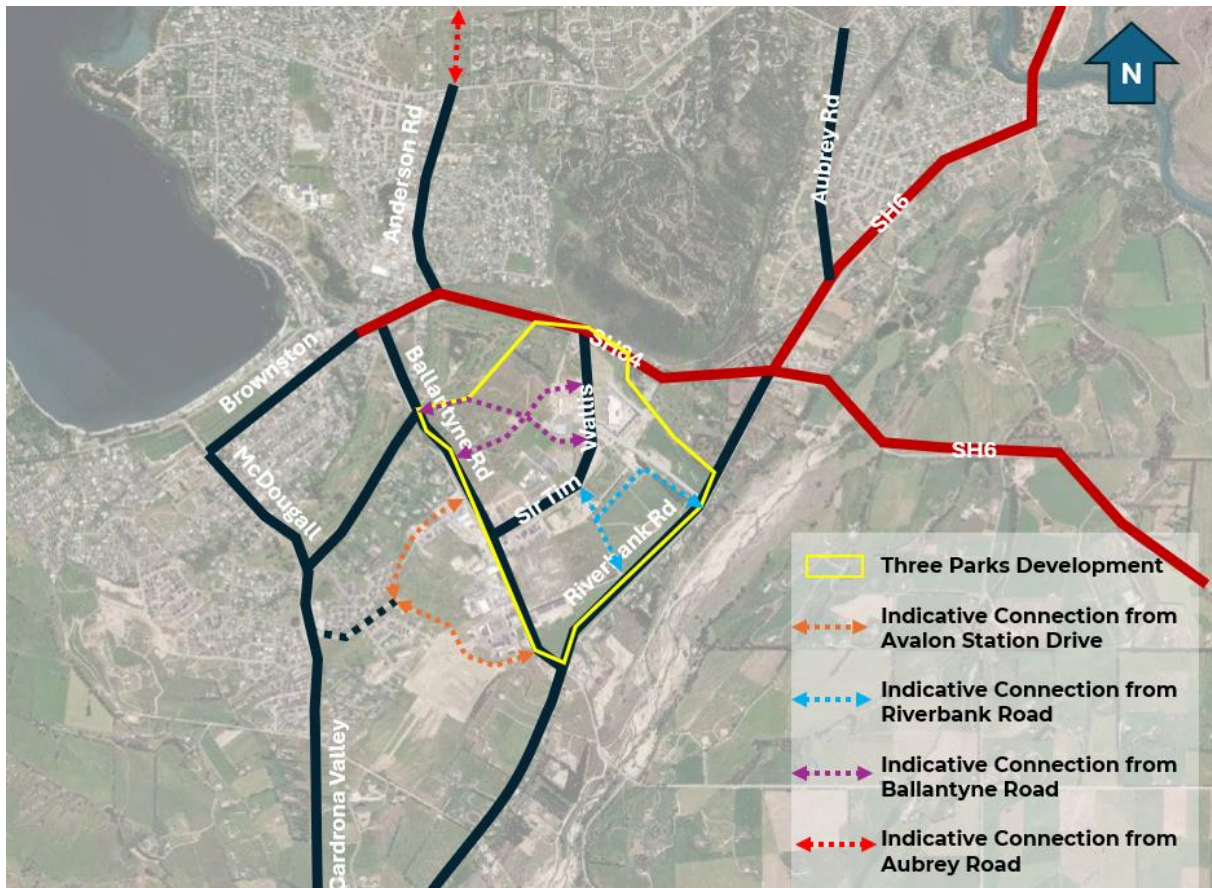


Figure A-2: Indicative connections to Three Parks from Riverbank Road, Ballantyne Road and Avalon Station Drive (Base map source: Nearmaps).

ACTIVE MODES IMPROVEMENTS

The Strategic Responses Option will look at active modes improvements in Wānaka to enable mode choice and delay the need for capacity improvements to the road network.

The proposed strategic active modes network is indicated in Table A-1 and Figure A-3 below. The proposed active modes facilities are based on completing the missing Primary and Secondary active modes links identified in the Wānaka Network Operating Framework³ as well as looking at safe cycling facilities to key satellite communities such as Luggate, Cardrona and Glendhu Bay. Safe cycling facilities to Lake Hawea and Hawea Flat have been excluded from the proposed network as there is an existing cycling recreational trail. Connections to Three Parks and the Northlake development area have been included to provide access to the new residential development areas.

Figure A-3 Also includes the existing cycling network for the purpose of indicating how the Strategic Responses Option builds upon the existing network however it should be noted that this is not part of the Strategic Responses option.

In summary, the active modes corridors assessed for the Strategic Responses option are listed in Table A-1. We have assumed that shared path facilities are provided.

³ <https://webadmin.qldc.govt.nz/media/ulrjmalj/wanaka-network-operating-framework-report.pdf>

Table A-1: List of active mode corridors assessed for the Strategic Responses Option

Active modes corridor name	Location
Aubrey Road	Between Rata Street & Lakeside Road
SH84 and Ardmore Street	Between Anderson Road and Lakeside Road.
SH84 and SH6	Between Sir Tim Wallis Drive and Aubrey Road
Ballantyne Road (Three Parks)	Gold Course Road to Riverbank Road
Beacon Point Road	From Lakeside Road to end of Penrith Park Drive
Brownston Street	From SH84 to McDougall Street
Cardrona Valley Road	Three Stages; Golf Course Road to Orchard Road, Orchard Road to Riverbank Road, and Riverbank Road to Cardrona.
Aubrey Road / Gunn Road	From SH6 to end of Gunn Road
Three Parks internal links	Internal links within Three Parks.
Riverbank Road	Three Stages; Ballantyne Road to Orchard Road, Riverbank Road to Ballantyne Road, Orchard Road to Cardrona Valley Road.
Wānaka Mount Aspiring Road (to Glendhu Bay)	Two Stages; Brownston Road to Bills Way (via McDougall Street and Wānaka Mount Aspiring Road), and Wānaka Mount Aspiring Road to Glendhu Bay.
Northlake Connections	New share paths north-south into Northlake from the new road link, and east-west within Northlake.
McDougall Street	Between Brownston Street to Cardrona Valley Road
Orchard Road	Between Riverbank Road and Cardrona Valley Road
Western Wānaka Shared Paths	New shared paths through western Wānaka.
SH6 Albert Town	From Aubrey Road to Albert Town bridge via SH6
SH6 (to Luggate)	To Luggate Township via SH6



Figure A-3: Strategic Responses for the Wānaka Strategic Active Modes Network (Base map source: Nearmaps).

PUBLIC TRANSPORT IMPROVEMENTS AND TRAVEL DEMAND MANAGEMENT INITIATIVES

The Strategic Responses Option includes other travel demand management and public transport initiatives such as:

- Parking Management Strategy impacts on parking availability in centres
- Introduction of up to five routes within Wānaka and surrounding townships (Hāwea and Lake Hāwea, Luggate, Glendhu Bay, Cardrona).
 - Higher Frequency bi-directional Loop of Wānaka connecting the Town Centre, Western Wānaka, Three Parks, Albert Town, Northlake, Lakefront Wānaka.
 - All day service connecting Wānaka Town Centre and Three Parks with Hāwea Flat and Lake Hāwea.
 - All day service connecting Wānaka Town Centre and Three Parks with Wānaka Airport and Luggate.
 - Commuter Service to Glendhu Bay.
 - Commuter Service to Cardrona.

APPENDIX B

Economics Assessment Spreadsheets

Table B-1: Economic Calculation Sheet Content

Page Number	Description	Comments
1	Inputs Tab	Details on timing on timing and reference documents used in calculation.
2	Cost Benefit Analysis Summary	BCR, User Costs and Benefits, and Implementation Costs
3	Sensitivity Testing Results	
4	First Year Rate of Return	
5-7	NPV Calculations of cost streams	4% discount rate shown, other discount rates on sensitivity tests excluded.
8	Crash Assessment Intersection Summary	
9-11	Intersection Crash Rate Calculations	Traffic Volumes and Prediction Models with crash costs
12	Crash Assessment Intersection social cost	
13	Method A assessment of other crashes baseline	Baseline assessment of non-intersection crashes impacted by VKT change.
14-16	Crash Cost NPV Calculation	Considers growth rate and crash rate trend.
17	Walking & Cycling Inputs	Route Details and estimation of walking and cycling uptake
18-20	Walking & Cycling Amenity-Time Benefits	
21	Walking & Cycling Health Benefits	
22	Travel Time & Vehicle Operating Costs	Calculations on model outputs
23-26	AM and PM Model Outputs	
27	Vehicle Emissions Benefits	
28	Programme Costs and Timing	
29	Public Transport Operating Costs	
30-31	Cost Rate Details	

Wanaka Network Optimisation SSBC
Full Procedure Economic Analysis
Wanaka
Queenstown Lakes District Council

Evaluation Summary

Manual:	Waka Kotahi MBCTM
Manual Version:	Version 1.7.3 May 2025
Evaluation Revision/Status:	2.0 Final
Date of Evaluation:	17-Jun-25
Evaluator(s)	Ivy Wong, Ian Robertson
Reviewer(s)	Chris Groom, Roger Burra

Project Details

Project Name	Wanaka Network Optimisation SSBC		
Organisation	Queenstown Lakes District Council		
Project Reference	1-C2389.00		
Project Description	Identifies a series of strategic responses to respond to current and future emerging needs of Wanaka.		
Problem being addressed	Range of issues such as improving capacity issues at key intersections (i.e SH6 and SH84), reducing congestion at Three Parks, enabling mode choice through developing a strategic cycling network, and other travel demand management strategies.		
Location	Wanaka, Otago Region		
Base Date	2023	1-Jul	
Time Zero	2024	1-Jul	
Discount Rate	4%		
Earliest Start of Construction is	1-Jul-2027		ie at Time = 3.00
Construction Period	12	months	ie at Time = 4.00
Construction Period ends	1-Jul-2028		i.e. Time= 40.00
Analysis Period (years)			

Alternatives/Options Details

Option Names	Do Minimum
Option Description	Business as usual, status quo road maintenance in Wanaka
Option Names	Strategic Responses
Option Description	See Strategic Responses Options Sheet for more info

Benefits Claimed

Land Transport Benefits Framework	Monetised Benefit	Notes:
Impact on network productivity and utilisation	Travel Time Savings (TTC)	
Impact on network productivity and utilisation	Vehicle Operating Cost Savings (VOC)	
Impact on social cost of DSIs	Crash Cost Savings (ACC)	
Impact on network productivity and utilisation	Walking and cycling travel time savings (WCB)	
Impact of mode on physical and mental health	Walking and cycling health benefits (WCB)	
Impact on greenhouse gas emissions	Vehicle emission reduction benefits	
Impact on air emissions on health	Vehicle emission reduction benefits	

Construction and Maintenance Costs

Cost Component	Do Minimum	Strategic Response (P50)	Strategic Response (P95)
Capital Costs		\$ 185,479,823	\$ 241,123,770
	Do Minimum	Strategic Response per year	Strategic Response (total period)
Maintenance Costs (at 100%)	\$ 3,709,596	\$ 109,935,173	
PT Operating Costs (at 100%)	\$ 8,206,137	\$ 156,936,268	
	TOTAL COST \$2023 - Undiscounted	\$ 452,351,264	

General Costs Assumptions

Capital costs derived from cost estimates including construction cost and 30% contingency
Annual maintenance is based on using 2% of the construction costs

Update Factors

Based on May 2024 MBCTM

Benefit Update Factors

	1.12	Base Date:
Travel time cost savings (TT)	2021	
Vehicle operating cost savings (VOC)	2015	
Crash cost savings (ACC)	2021	
Walking and cycling benefits (WCB)	2021	
Passenger Transport user benefits	2021	
Emissions Reduction benefits	2021	

Cost Update Factors

Calendar year when cost estimate was prepared	2023
Cost update factor	1.03

Travel Time (TT) & Congestion (CRV) cost per hour Based on April 2024 MBCTM - Table 16

URBAN OTHER

Period		Hours Per Day	Days Per Year	\$/hr/vehicle	\$/hr/vehicle
1	Weekday all periods	24.00	245	35.66	25.76
2	Weekend/holiday	24.00	120	36.36	27.33
3	All periods	1.0	365	36.14	26.38

Road Category	Urban Other	Note: Road category for the entire network is assumed to be Urban Other as this represents a majority of the road types in Wanaka. Wanaka mainly consists of roads with less than 7000 AADT
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Network-wide inputs

Source: Wanaka Network Optimisation SSBC micro-simulation model (Paramics)

	Do Minimum 2024	Do Minimum 2028	Do Minimum 2033	Do Minimum 2038	Do Minimum 2043
Travel Time AM (hours)	265	321	409	545	646
Travel Time PM (hours)	325	407	539	721	743
Uncongested AM (hours)	256	296	332	410	467
Uncongested PM (hours)	296	336	374	450	500
Vehicle Kilometres Travelled (VKT) AM	13275	15408	17319	21665	24791
Vehicle Kilometres Travelled (VKT) PM	15465	17654	19805	24060	26871
Mean operating speed (km/h)	49	49	46	42	40

	Strategic Response 2024	Strategic Response 2028	Strategic Response 2033	Strategic Response 2038	Strategic Response 2043
Travel Time AM (hours)	265	321	403	522	622
Travel Time PM (hours)	325	407	513	660	715
Uncongested AM (hours)	256	296	332	412	468
Uncongested PM (hours)	296	336	374	450	500
Vehicle Kilometres Travelled (VKT) AM	13275	15408	16698	20286	22278
Vehicle Kilometres Travelled (VKT) PM	15465	17654	19096	22430	23982
Mean operating speed (km/h)	50	48	46	43	43

Traffic Growth

Traffic Growth	2%	Based on historic AADT on SH84 from 2000 to 2023
Walking and Cycling Growth	2%	

Refer to:

Travel Time Comparison_v1_ECO.xlsx
2.5%

Expansion Factor

7:00 AM – 3:00 PM & 6:00 PM – 7:00 PM	9
3:00 PM – 6:00 PM	3

Crash Cost

Crash Trend Adjustment factor - Table A21	0.9	Based on 2% traffic growth
Growth rate adjustment factor - Table A22	-1%	
Accident growth rate	1%	Urban roads

COST BENEFIT ANALYSIS SUMMARY

Project: Wanaka Network Op	Time Zero: 2024
Evaluator: Ivy Wong, Ian Robel	Base Date: 2023
Reviewer: Chris Groom, Roger Burra	

	Do Minimum Full Network	Strategic Response (full network)	Strategic Response (full network) NET against Do Minimum Full Network	
Present Value Benefits				
Travel Time Savings (TTC)	\$2,641,219,529	\$2,505,012,116	\$136,207,413	
Vehicle Operating Cost Savings (VOC)	\$971,335,933	\$860,615,567	\$110,720,366	
Crash Cost Savings (ACC)	\$257,226,589	\$236,262,116	\$20,964,473	
Cycling travel time-amenity savings (WCB)	\$88,171,038	\$59,573,096	\$28,597,942	
Walking and cycling health benefits (WCB)	(\$5,725,240)	(\$56,875,330)	\$51,150,090	
Greenhouse gas emission benefit	\$94,139,072	\$84,081,505	\$10,057,566	
Air Emission on Health	\$752,672,669	\$699,448,366	\$53,224,303	
Total Benefits	\$4,799,039,589	\$4,388,117,436	\$389,957,680	Benefit
Present Value Costs				
Capital Costs	\$0	\$151,850,322	\$151,850,322	
Maintenance Costs	\$0	\$68,371,297	\$68,371,297	
PT Operating Costs	\$0	\$87,190,535	\$87,190,535	
Total Costs		\$307,412,155	\$307,412,155	Cost

Percentage of Benefit

35%
28%
5%
7%
13%
3%
14%

Percentage of Cost

49%
22%
28%

BCR	1.3
-----	-----

FIRST YEAR RATE OF RETURN

Based on Worksheet 5 from EEM

First year rate of return

Worksheet 5

1	Preferred project option	Strategic Response Option
2	Present value of total net costs	\$151,850,322
3	Mid point of first year of benefits (relative to time zero)	4.50
4	Discount factor (SPPWF) for first year of benefits	0.8381

Benefit From discount sheet	Annual benefits of do minimum	Annual benefits of preferred option	Net annual benefit (at time zero) (7)	Growth rate (decimal) (8)	PV of benefits in first year (9)=[1.0+(3)x (8)]x(4)x(7)
Travel Time Savings (TTC)	\$71,074,286	\$67,244,258	\$3,830,028	2.0%	\$3,499,077
Vehicle Operating Cost Savings (VOC)	\$23,512,197	\$0	\$23,512,197	2.0%	\$21,480,523
Crash Cost Savings (ACC)	\$5,945,331	\$5,156,507	\$788,824	2.0%	\$720,662
Cycling travel time-amenity savings (WCB)	\$2,039,638	\$1,159,380	\$880,257	2.0%	\$804,195
Walking and cycling health benefits (WCB)	(\$138,990)	(\$1,702,623)	\$1,563,634	2.0%	\$1,428,521
Greenhouse gas emission benefit	\$2,045,766	\$1,686,276	\$359,490	2.0%	\$328,427
Air Emission on Health	\$8,756,719	\$7,115,641	\$1,641,078	2.0%	\$1,499,273

10	Sum of present value of benefits in first year	\$29,760,679
11	First year rate of return [(8)/(2) x 100]	20%
	Preferred Option BCR 1 1.3 divide by 15.4	8%

As a general rule, if the FYRR is less than the BCR divided by 15.4, then it potentially should be delayed.

SENSITIVITY RESULTS

Project: Wanaka SSBC	Time Zero: 2024
Evaluator: Ivy Wong, Ian Roberston	Base Date: 2023
Reviewer: Chris Groom, Roger Burra	

Scenario	Strategic Responses Option against Do Minimum	
Base	1.3	
Construction costs		
P95 cost	1.0	
Traffic growth		
1%	1.2	
3%	1.4	
Discount factor		
4%	1.2	New 2025 Value
3%	1.3	
6%	1.0	
8%	0.9	New 2025 Sensitivity Test
Analysis Period		
60 years	1.6	
Walking and cycling benefits		
without W&C benefits	1.1	
Crash Cost Savings		
Plus 50%	1.4	
-50%	1.3	
All Traffic Model Related Benefits		
-50%	0.8	

Discount Rate: 2% 30 years, 1.5% 31-40 years

Discount Factors		
Year	Time	Discount
1st July	Year	Factor (SPPWf)
2024	0	1.000
2025	1	0.9804
2026	2	0.9612
2027	3	0.9423
2028	4	0.9238
2029	5	0.9057
2030	6	0.8880
2031	7	0.8706
2032	8	0.8535
2033	9	0.8368
2034	10	0.8203
2035	11	0.8043
2036	12	0.7885
2037	13	0.7730
2038	14	0.7579
2039	15	0.7430
2040	16	0.7284
2041	17	0.7142
2042	18	0.7002
2043	19	0.6864
2044	20	0.6730
2045	21	0.6598
2046	22	0.6468
2047	23	0.6342
2048	24	0.6217
2049	25	0.6095
2050	26	0.5976
2051	27	0.5859
2052	28	0.5744
2053	29	0.5631
2054	30	0.5521
2055	31	0.5439
2056	32	0.5359
2057	33	0.5280
2058	34	0.5202
2059	35	0.5125
2060	36	0.5049
2061	37	0.4974
2062	38	0.4901
2063	39	0.4828
2064	40	0.4828

[illegible]

% Implemented		
	Annual Maintenance	
	Annual Amount	Discounted Amount
0%	\$ -	\$ -
0%	\$ -	\$ -
0%	\$ -	\$ -
0%	\$ -	\$ -
5%	\$ 176,630	\$ 163,179
10%	\$ 353,261	\$ 319,959
14%	\$ 529,891	\$ 470,528
24%	\$ 896,367	\$ 780,341
34%	\$ 1,262,843	\$ 1,077,824
44%	\$ 1,629,318	\$ 1,363,341
53%	\$ 1,956,378	\$ 1,604,911
62%	\$ 2,283,438	\$ 1,836,485
70%	\$ 2,610,497	\$ 2,058,359
74%	\$ 2,742,933	\$ 2,120,376
78%	\$ 2,875,368	\$ 2,179,170
81%	\$ 3,007,804	\$ 2,234,842
83%	\$ 3,076,777	\$ 2,241,265
85%	\$ 3,145,750	\$ 2,246,577
87%	\$ 3,214,724	\$ 2,250,819
88%	\$ 3,281,337	\$ 2,252,411
90%	\$ 3,347,951	\$ 2,253,075
92%	\$ 3,414,565	\$ 2,252,847
95%	\$ 3,507,869	\$ 2,269,026
97%	\$ 3,601,173	\$ 2,283,705
100%	\$ 3,694,476	\$ 2,296,935
100%	\$ 3,696,996	\$ 2,253,433
100%	\$ 3,702,036	\$ 2,212,260
100%	\$ 3,704,556	\$ 2,170,359
100%	\$ 3,707,076	\$ 2,129,250
100%	\$ 3,709,596	\$ 2,088,919
100%	\$ 3,709,596	\$ 2,047,960
100%	\$ 3,709,596	\$ 2,017,695
100%	\$ 3,709,596	\$ 1,987,877
100%	\$ 3,709,596	\$ 1,958,499
100%	\$ 3,709,596	\$ 1,929,556
100%	\$ 3,709,596	\$ 1,901,040
100%	\$ 3,709,596	\$ 1,872,946
100%	\$ 3,709,596	\$ 1,845,267
100%	\$ 3,709,596	\$ 1,817,997
100%	\$ 3,709,596	\$ 1,791,130
100%	\$ 3,709,596	\$ 1,791,130

[illegible]

Do Minimum				Strategic	
Crash Cost Savings				Crash Cost	
Annual		Discounted		Annual	
Amount		Amount		Amount	
\$	5,970,440	\$	5,970,440	\$	5,970,440
\$	6,173,125	\$	6,052,084	\$	6,173,125
\$	6,375,810	\$	6,128,230	\$	6,375,810
\$	6,578,495	\$	6,199,063	\$	6,578,495
\$	6,781,180	\$	6,264,762	\$	6,781,180
\$	6,930,722	\$	6,277,368	\$	6,934,484
\$	7,080,263	\$	6,287,071	\$	6,984,352
\$	7,229,805	\$	6,293,980	\$	7,071,614
\$	7,379,346	\$	6,298,201	\$	7,142,186
\$	7,528,888	\$	6,299,837	\$	7,164,861
\$	7,836,797	\$	6,428,903	\$	7,478,926
\$	8,144,706	\$	6,550,486	\$	7,738,795
\$	8,452,615	\$	6,664,829	\$	8,124,793
\$	8,760,524	\$	6,772,170	\$	8,408,542
\$	9,068,433	\$	6,872,739	\$	8,610,081
\$	9,286,660	\$	6,900,125	\$	8,746,518
\$	9,504,888	\$	6,923,796	\$	8,882,956
\$	9,723,115	\$	6,943,885	\$	9,019,393
\$	9,941,343	\$	6,960,524	\$	9,155,830
\$	10,159,570	\$	6,973,842	\$	9,292,268
\$	10,159,570	\$	6,837,100	\$	9,196,135
\$	10,159,570	\$	6,703,039	\$	9,100,002
\$	10,159,570	\$	6,571,607	\$	9,003,869
\$	10,159,570	\$	6,442,752	\$	8,907,736
\$	10,159,570	\$	6,316,423	\$	8,811,602
\$	10,261,166	\$	6,254,497	\$	8,899,718
\$	10,362,762	\$	6,192,572	\$	8,987,834
\$	10,464,357	\$	6,130,670	\$	9,075,950
\$	10,565,953	\$	6,068,815	\$	9,164,067
\$	10,667,549	\$	6,007,028	\$	9,252,183
\$	10,769,145	\$	5,945,331	\$	9,340,299
\$	10,870,740	\$	5,912,728	\$	9,428,415
\$	10,972,336	\$	5,879,791	\$	9,516,531
\$	11,073,932	\$	5,846,535	\$	9,604,647
\$	11,175,527	\$	5,812,978	\$	9,692,763
\$	11,277,123	\$	5,779,137	\$	9,780,879
\$	11,378,719	\$	5,745,025	\$	9,868,995
\$	11,480,314	\$	5,710,660	\$	9,957,111
\$	11,581,910	\$	5,676,056	\$	10,045,227
\$	11,683,506	\$	5,641,228	\$	10,133,343
\$	11,785,102	\$	5,690,282	\$	10,221,459

	\$ 185,479,823	\$ 151,850,322
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\$	109,935,173	\$	68,371,297
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\$	156,936,268	\$	87,190,535
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\$ 257,226,589

APPLY
GROWTH
RATE

Yes

Response	GROWTH RATE		Do Minimum		Strategic Response				Do Minimum		Strategic Response				Do Minimum		Strategic Response			
st Savings			Travel Time		Travel Time				VOC		VOC				Total CO ₂ -e		Total CO ₂ -e			
			Annual Amount	Discounted Amount	Annual Amount	Discounted Amount			Annual Amount	Discounted Amount	Annual Amount	Discounted Amount			Annual Amount	Discounted Amount	Annual Amount	Discounted Amount		
\$ 5,970,440		2%	\$ 37,584,664	\$ 37,584,664	\$ 37,584,664	\$ 37,584,664			\$ 20,160,573	\$ 20,160,573	\$ 20,160,573	\$ 20,160,573			\$ 1,744,082	\$ 1,744,082	\$ 1,733,243	\$ 1,733,243		
\$ 6,052,084		2%	\$ 40,109,678	\$ 39,323,214	\$ 40,109,678	\$ 39,323,214			\$ 20,943,519	\$ 20,532,862	\$ 20,943,519	\$ 20,532,862			\$ 1,911,532	\$ 1,874,051	\$ 1,907,129	\$ 1,869,734		
\$ 6,128,230		2%	\$ 42,634,692	\$ 40,979,135	\$ 42,634,692	\$ 40,979,135			\$ 21,726,465	\$ 20,882,800	\$ 21,726,465	\$ 20,882,800			\$ 2,078,981	\$ 1,998,252	\$ 2,081,015	\$ 2,000,207		
\$ 6,199,063		2%	\$ 45,159,706	\$ 42,555,000	\$ 45,159,706	\$ 42,555,000			\$ 22,509,411	\$ 21,211,121	\$ 22,509,411	\$ 21,211,121			\$ 2,246,431	\$ 2,116,862	\$ 2,254,902	\$ 2,124,844		
\$ 6,264,762		2%	\$ 47,684,720	\$ 44,053,311	\$ 47,684,720	\$ 44,053,311			\$ 23,292,357	\$ 21,518,538	\$ 23,292,357	\$ 21,518,538			\$ 2,413,881	\$ 2,230,053	\$ 2,428,788	\$ 2,243,825		
\$ 6,280,776		2%	\$ 51,362,216	\$ 46,520,341	\$ 50,911,294	\$ 46,111,928			\$ 23,930,062	\$ 21,674,195	\$ 23,740,371	\$ 21,502,386			\$ 2,545,708	\$ 2,305,726	\$ 2,535,621	\$ 2,296,590		
\$ 6,201,905		2%	\$ 55,039,711	\$ 48,873,688	\$ 54,137,869	\$ 48,072,878			\$ 24,567,768	\$ 21,815,474	\$ 24,188,385	\$ 21,478,594			\$ 2,677,534	\$ 2,377,574	\$ 2,642,453	\$ 2,346,423		
\$ 6,156,266		2%	\$ 58,717,207	\$ 51,116,862	\$ 57,364,443	\$ 49,939,200			\$ 25,205,473	\$ 21,942,881	\$ 24,636,399	\$ 21,447,468			\$ 2,809,361	\$ 2,445,718	\$ 2,749,285	\$ 2,393,418		
\$ 6,095,787		2%	\$ 62,394,702	\$ 53,253,277	\$ 60,591,017	\$ 51,713,850			\$ 25,843,178	\$ 22,056,904	\$ 25,084,413	\$ 21,409,305			\$ 2,941,188	\$ 2,510,276	\$ 2,856,118	\$ 2,437,669		
\$ 5,995,235		2%	\$ 66,072,197	\$ 55,286,259	\$ 63,817,591	\$ 53,399,706			\$ 26,480,883	\$ 22,158,018	\$ 25,532,428	\$ 21,364,393			\$ 3,073,015	\$ 2,571,361	\$ 2,962,950	\$ 2,479,264		
\$ 6,135,324		2%	\$ 71,141,387	\$ 58,360,716	\$ 67,044,166	\$ 54,999,567			\$ 27,874,203	\$ 22,866,555	\$ 26,572,844	\$ 21,798,988			\$ 3,219,269	\$ 2,640,922	\$ 3,076,119	\$ 2,523,489		
\$ 6,224,027		2%	\$ 76,210,577	\$ 61,293,350	\$ 70,270,740	\$ 56,516,159			\$ 29,267,523	\$ 23,538,787	\$ 27,613,261	\$ 22,208,325			\$ 3,365,524	\$ 2,706,767	\$ 3,189,288	\$ 2,565,027		
\$ 6,406,344		2%	\$ 81,279,767	\$ 64,088,541	\$ 73,497,314	\$ 57,952,131			\$ 30,660,844	\$ 24,175,866	\$ 28,653,678	\$ 22,593,229			\$ 3,511,779	\$ 2,769,014	\$ 3,302,458	\$ 2,603,965		
\$ 6,500,077		2%	\$ 86,348,956	\$ 66,750,552	\$ 76,723,888	\$ 59,310,061			\$ 32,054,164	\$ 24,778,911	\$ 29,694,094	\$ 22,954,501			\$ 3,658,033	\$ 2,827,779	\$ 3,415,627	\$ 2,640,391		
\$ 6,525,365		2%	\$ 91,418,146	\$ 69,283,530	\$ 84,409,500	\$ 63,971,852			\$ 33,447,484	\$ 25,349,013	\$ 30,734,511	\$ 23,292,918			\$ 3,804,288	\$ 2,883,175	\$ 3,528,796	\$ 2,674,386		
\$ 6,498,792		2%	\$ 94,239,637	\$ 70,021,438	\$ 87,495,414	\$ 65,010,381			\$ 34,363,182	\$ 25,532,350	\$ 31,290,046	\$ 23,248,965			\$ 3,813,836	\$ 2,833,737	\$ 3,496,204	\$ 2,597,731		
\$ 6,470,752		2%	\$ 97,061,127	\$ 70,703,772	\$ 90,581,328	\$ 65,983,589			\$ 35,278,880	\$ 25,698,752	\$ 31,845,580	\$ 23,197,780			\$ 3,823,385	\$ 2,785,129	\$ 3,463,612	\$ 2,523,054		
\$ 6,441,313		2%	\$ 99,882,618	\$ 71,332,426	\$ 93,667,242	\$ 66,893,638			\$ 36,194,578	\$ 25,848,813	\$ 32,401,115	\$ 23,139,663			\$ 3,832,933	\$ 2,737,337	\$ 3,431,020	\$ 2,450,306		
\$ 6,410,541		2%	\$ 102,704,109	\$ 71,909,244	\$ 96,753,156	\$ 67,742,629			\$ 37,110,276	\$ 25,983,108	\$ 32,956,650	\$ 23,074,907			\$ 3,842,481	\$ 2,690,349	\$ 3,398,429	\$ 2,379,442		
\$ 6,378,499		2%	\$ 105,525,599	\$ 72,436,017	\$ 99,839,070	\$ 68,532,609			\$ 38,025,974	\$ 26,102,198	\$ 33,512,184	\$ 23,003,794			\$ 3,852,030	\$ 2,644,152	\$ 3,365,837	\$ 2,310,414		
\$ 6,188,735		2%	\$ 107,636,111	\$ 72,436,017	\$ 101,835,852	\$ 68,532,609			\$ 38,786,494	\$ 26,102,198	\$ 33,136,719	\$ 22,300,062			\$ 3,743,342	\$ 2,519,162	\$ 3,238,108	\$ 2,179,154		
\$ 6,003,961		2%	\$ 109,746,623	\$ 72,408,168	\$ 103,832,633	\$ 68,506,260			\$ 39,547,013	\$ 26,092,163	\$ 32,761,253	\$ 21,615,083			\$ 3,634,654	\$ 2,398,057	\$ 3,110,379	\$ 2,052,153		
\$ 5,824,054		2%	\$ 111,857,135	\$ 72,353,561	\$ 105,829,415	\$ 68,454,597			\$ 40,307,533	\$ 26,072,485	\$ 32,385,788	\$ 20,948,392			\$ 3,525,966	\$ 2,280,733	\$ 2,982,650	\$ 1,929,294		
\$ 5,648,893		2%	\$ 113,967,647	\$ 72,273,258	\$ 107,826,196	\$ 68,378,620			\$ 41,068,052	\$ 26,043,548	\$ 32,010,322	\$ 20,299,535			\$ 3,417,278	\$ 2,167,087	\$ 2,854,921	\$ 1,810,465		
\$ 5,478,363		2%	\$ 116,078,159	\$ 72,168,286	\$ 109,822,977	\$ 68,279,305			\$ 38,025,974	\$ 23,641,565	\$ 31,634,857	\$ 19,668,070			\$ 3,308,591	\$ 2,057,022	\$ 2,727,192	\$ 1,695,554		
\$ 5,424,653		2%	\$ 118,188,671	\$ 72,039,644	\$ 111,819,759	\$ 68,157,595			\$ 38,786,494	\$ 23,641,565	\$ 32,267,554	\$ 19,668,070			\$ 3,374,762	\$ 2,057,022	\$ 2,781,736	\$ 1,695,554		
\$ 5,370,944		2%	\$ 120,299,183	\$ 71,888,300	\$ 113,816,540	\$ 68,014,407			\$ 39,547,013	\$ 23,632,476	\$ 32,900,251	\$ 19,660,508			\$ 3,440,934	\$ 2,056,231	\$ 2,836,279	\$ 1,694,902		
\$ 5,317,255		2%	\$ 122,409,695	\$ 71,715,194	\$ 115,813,322	\$ 67,850,629			\$ 40,307,533	\$ 23,614,653	\$ 33,532,948	\$ 19,645,681			\$ 3,507,106	\$ 2,054,680	\$ 2,890,823	\$ 1,693,624		
\$ 5,263,607		2%	\$ 124,520,207	\$ 71,521,238	\$ 117,810,103	\$ 67,667,125			\$ 41,068,052	\$ 23,588,444	\$ 34,165,645	\$ 19,623,877			\$ 3,573,278	\$ 2,052,400	\$ 2,945,367	\$ 1,691,744		
\$ 5,210,018		2%	\$ 126,630,719	\$ 71,307,316	\$ 119,806,884	\$ 67,464,731			\$ 41,828,571	\$ 23,554,183	\$ 34,798,342	\$ 19,595,375			\$ 3,639,450	\$ 2,049,419	\$ 2,999,911	\$ 1,689,287		
\$ 5,156,507		2%	\$ 128,741,231	\$ 71,074,286	\$ 121,803,666	\$ 67,244,258			\$ 42,589,091	\$ 23,512,197	\$ 35,431,039	\$ 19,560,445			\$ 3,705,622	\$ 2,045,766	\$ 3,054,455	\$ 1,686,276		
\$ 5,128,230		2%	\$ 130,851,743	\$ 71,171,860	\$ 123,800,447	\$ 67,336,574			\$ 43,349,610	\$ 23,578,382	\$ 36,063,736	\$ 19,615,506			\$ 3,771,793	\$ 2,051,524	\$ 3,108,999	\$ 1,691,022		
\$ 5,099,662		2%	\$ 132,962,255	\$ 71,251,028	\$ 125,797,229	\$ 67,411,476			\$ 44,110,130	\$ 23,637,476	\$ 36,696,434	\$ 19,664,668			\$ 3,837,965	\$ 2,056,666	\$ 3,163,542	\$ 1,695,260		
\$ 5,070,819		2%	\$ 135,072,767	\$ 71,312,312	\$ 127,794,010	\$ 67,469,458			\$ 44,870,649	\$ 23,689,674	\$ 37,329,131	\$ 19,708,093			\$ 3,904,137	\$ 2,061,208	\$ 3,218,086	\$ 1,699,004		
\$ 5,041,715		2%	\$ 137,183,279	\$ 71,356,223	\$ 129,790,791	\$ 67,511,003			\$ 45,631,169	\$ 23,735,166	\$ 37,961,828	\$ 19,745,939			\$ 3,970,309	\$ 2,065,166	\$ 3,272,630	\$ 1,702,267		
\$ 5,012,363		2%	\$ 139,293,791	\$ 71,383,263	\$ 131,787,573	\$ 67,536,585			\$ 46,391,688	\$ 23,774,140	\$ 38,594,525	\$ 19,778,363			\$ 4,036,481	\$ 2,068,557	\$ 3,327,174	\$ 1,705,062		
\$ 4,982,778		2%	\$ 141,404,303	\$ 71,393,918	\$ 133,784,354	\$ 67,546,666			\$ 47,152,208	\$ 23,806,778	\$ 39,227,222	\$ 19,805,515			\$ 4,102,652	\$ 2,071,397	\$ 3,381,718	\$ 1,707,403		
\$ 4,952,972		2%	\$ 143,514,815	\$ 71,388,669</																

Intersection Look Up

Intersections

Intersection Location	Existing Form	Option Form	Injury Crashes	Corridor Name	Method	Notes	Year implemented
SH84/Hedditch/Brownston/Ballantyne	Priority T	Roundabout	2	SH84	Method C - Do Min; Method B - Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)	Staggered Four-Way intersection Priority - due to close proximity with each other (intersections within 50m radius), I have combined this into one.	2031
Brownston/McDougall	Priority X	Roundabout	0	Brownston Corridor	Method C - Do Min; Method B - Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)		2029
Brownston/Helwick	Priority X	Roundabout	1	Brownston Corridor	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)	Mini RAB	2032
McDougall/Cardrona/GolfCourse/Faulks Terrace	Priority X	Roundabout	0	Cardrona Road Corridor	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)	Staggered Four-Way intersection Priority - due to close proximity with each other (intersections within 50m radius), I have combined this into one	2036
Ballantyne/Sir Tim Wallis Dr	Priority T	Roundabout	1	Three Parks	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)	Part of Improving access and capacity at Sir Tim Wallis / Ballantyne intersection	2030
Cardrona Valley/Orchard/Studholme	Priority X	Priority X	0	Cardrona Road Corridor	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)	Staggered Four-Way intersection Priority - due to close proximity with each other (intersections within 50m radius), I have combined this into one	2032
Ardmore/Brownston/SH84	Roundabout	Roundabout	2	SH84	Method C for Do Min and Option; Does not meet injury crash threshold, not transformational as intersection form stays the same.	Part of the SH84 improvements to turning capacity	2035
SH6/Aubrey Rd	Priority T	Roundabout	0	SH6	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)	Part of Improvement to turning movements at Aubrey Road/SH6 intersection required prior to 2038 to connect Northlake and Three Parks	2031
Kingston/SH6	Priority T	Signalised X	1	SH6	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)	SH6 / Kingston and SH6 / Alison	2037
SH84/Anderson	Roundabout	Roundabout	4	SH84	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)		2028
Brownston/Dungarvon	Priority X	Roundabout	0	Brownston Corridor	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)		2033
Riverbank Road - Three Parks Link	Priority T	Roundabout		Three Parks	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)		2033
Aubrey/Anderson	Roundabout	Roundabout	0	Isolated	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)		2036
Anderson-Link	Priority T	Roundabout	2	SH84	Method C - Do Min; Method B Project Option; Does not meet injury crash threshold, Transformational Change (change in intersection form: Priority controlled to RAB)		2034

CRASH RATE

SOURCES

[MBCM](#)

[Crash Estimation Compendium](#)

Notes / Assumptions

All roundabouts are single lane except for Ardmore/Brownston/SH84
All sites are in urban environments

	b0	b1	b2	K		50	70
Roundabout Single	0.000443	0.58		2.2		420000	445000
Roundabout Multi	0.000795	0.58			2.2	420000	445000
Uncontrolled T	0.00208	0.19	0.36	2.6		520000	676000
Priority X	0.00113	0.51	0.21	2.3		469000	623000
Priority T	0.0000468	0.2	0.76	3.8		514000	689000
Traffic Signal X	0.00226	0.14	0.46	4.8		451000	662000
Traffic Signal T	0.121	0.12	0.04	4.6		518000	759000

CMF	
Throat Island - Rural	0.65
RTL - signal	0.7
RTL - unsignalised	0.65
LTL	0.8
Street Lighting	0.9
Urban Crash Adjustme	0.9

Intersections: Existing Volumes

Do Minimum 2 way AADT inputs						
Approach Volumes	2024	2028	2033	2038	2043	2043+
SH84/Anderson						
SH84 (E of Anderson)	13853	15474	16121	19398	20536	20536
SH84 (E of Ballantyne)	16106	18338	20041	23603	25757	25757
Anderson (S)	9948	10747	10596	12331	12769	12769
SH84/Hedditch/Brownston/Ballantyne						
SH84 (W of Ballantyne)	14383	16673	18480	21813	23978	23978
SH84 (E of Ballantyne)	16106	18338	20041	23603	25757	25757
Ballantyne (S of SH84)	4055	4517	4907	5768	6495	6495
Hedditch	1674	1835	2138	2249	2338	2338
Brownston/McDougall						
Brownston (E)	7889	9002	9684	11427	12637	12637
Brownston (cul-de-sac)	233	235	237	239	241	241
McDougall (N)	4664	5873	7225	9071	10710	10710
McDougall (S)	2568	3288	4171	5404	6608	6608
Brownston/Helwick						
Brownston (E)	7889	9002	9684	11427	12637	12637
Brownston (E)	7889	9002	9684	11427	12637	12637
Helwick (N)	3245	3556	4145	4359	4532	4532
Helwick (S)	789	797	805	813	821	821
Ardmore/Brownston/SH84						
Ardmore (W of SH84 R)	6879	7808	8807	10312	11377	11377
Brownston (E)	7889	9002	9684	11427	12637	12637
SH84 (W of Ballantyne)	14383	16673	18480	21813	23978	23978
McDougall/Cardrona/Golf Course/Faulks Terrace						
McDougall (S)	2568	3288	4171	5404	6608	6608
Cardrona Valley	3897	4417	4812	6158	7065	7065
Gold Course	4408	5096	5686	6799	7466	7466
Faulks Terrace	190	208	242	255	265	265
Ballantyne/Sir Tim Wallis Dr						
Ballantyne (N of STW)	4483	4728	5730	6810	8014	8014
Ballantyne (S of STW)	4378	6288	8353	10910	12965	12965
Sir Tim Wallis (S)	3842	5142	7334	9115	10528	10528
Cardrona Valley/Orchard/Studholme						
Cardrona Valley	3897	4417	4812	6158	7065	7065
Cardrona Valley	3897	4417	4812	6158	7065	7065
Orchard	1197	1312	1529	1608	1672	1672
Studholme Rd (S)	624	684	797	838	871	871
SH6/Aubrey Rd						
SH6 (Albert Town)	6533	7910	8965	12144	14490	14490
SH6 (S of Aubrey)	12154	13635	14856	18170	20270	20270
Aubrey (S of Gunn)	3010	3547	4365	4971	6005	6005
Kingston/SH6						
SH6 (External)	6961	8183	9104	11793	12856	12856
SH6 (Albert Town)	6533	7910	8965	12144	14490	14490
Kingston	788	864	1007	1059	1101	1101
Alison Ave	3073	3368	3926	4129	4293	4293
Brownston/Dungarvon						
Brownston (E)	7889	9002	9684	11427	12637	12637
Brownston (E)	7889	9002	9684	11427	12637	12637
Dungarvon (N)	4684	5133	5983	6292	6542	6542
Dungarvon (S)	866	875	884	893	902	902
Riverbank Road - Three Parks Link						
Riverbank	4076	5233	7246	9871	13064	13064
Riverbank	4076	5233	7246	9871	13064	13064
Riverbank-Three Parks	0	0	0	0	0	0
Aubrey/Anderson						
Aubrey (E)	9722	10547	11608	12897	14366	14366
Aubrey (W)	7645	8186	8311	9370	10035	10035
Anderson (N)	6639	7274	7264	8593	9144	9144
Anderson-Link						
Anderson (S)	9948	10747	10596	12331	12769	12769
Anderson (N)	6639	7274	7264	8593	9144	9144
Plantation	3309	3473	3332	3738	3625	3625

Intersections: Future Volumes

Option 2 way AADT inputs						
Approach Volumes	2024	2028	2033	2038	2043	2043+
SH84/Anderson						
SH84 (E of Anderson)	13853	15474	15544	18008	18329	17303
SH84 (E of Ballantyne)	18338	18338	19322	21912	22987	21701
Anderson (S)	9948	10747	10216	11448	11397	10759
SH84/Hedditch/Brownston/Ballantyne						
SH84 (W of Ballantyne)	14383	16673	17818	20250	21401	20204
SH84 (E of Ballantyne)	18338	18338	19322	21912	22987	21701
Ballantyne (S of SH84)	4055	4517	4730	5354	5796	5473
Hedditch	1674	1835	2062	2088	2087	1970
Brownston/McDougall						
Brownston (E)	7889	9002	9337	10608	11278	10647
Brownston (cul-de-sac)	233	235	229	222	215	203
McDougall (N)	4664	5873	6966	8422	9559	9024
McDougall (S)	2568	3288	4021	5017	5898	5568
Brownston/Helwick						
Brownston (E)	7889	9002	9337	10608	11278	10647
Brownston (E)	7889	9002	9337	10608	11278	10647
Helwick (N)	3245	3556	3997	4047	4045	3818
Helwick (S)	789	797	776	755	733	692
Ardmore/Brownston/SH84						
Ardmore (W of SH84 R)	6879	7808	8491	9573	10155	9586
Brownston (E)	7889	9002	9337	10608	11278	10647
SH84 (W of Ballantyne)	14383	16673	17818	20250	21401	20204
McDougall/Cardrona/Golf Course/Faulks Terrace						
McDougall (S)	2568	3288	4021	5017	5898	5568
Cardrona Valley	3897	4417	4639	5717	6306	5953
Gold Course	4408	5096	5482	5459	5903	5573
Faulks Terrace	190	208	233	237	237	223
Ballantyne/Sir Tim Wallis Dr						
Ballantyne (N of STW)	4483	4728	5525	5628	6719	6343
Ballantyne (S of STW)	4378	6288	8054	10129	11571	10923
Sir Tim Wallis (S)	3842	5142	7072	8462	9396	8870
Cardrona Valley/Orchard/Studholme						
Cardrona Valley	3897	4417	4639	5717	6306	5953
Cardrona Valley	3897	4417	4639	5717	6306	5953
Orchard	1197	1312	1474	1493	1492	1409
Studholme Rd (S)	624	684	768	778	777	734
SH6/Aubrey Rd						
SH6 (Albert Town)	6533	7910	8643	11274	12932	12208
SH6 (S of Aubrey)	12154	13635	14323	16869	18092	17078
Aubrey (S of Gunn)	3010	3547	4208	4615	5360	5060
Kingston/SH6						
SH6 (External)	6961	8183	8778	13378	13320	12574
SH6 (Albert Town)	6533	7910	8643	11274	12932	12208
Kingston	788	864	971	983	983	928
Alison Ave	3073	3368	3785	3833	3832	3617
Brownston/Dungarvon						
Brownston (E)	7889	9002	9337	10608	11278	10647
Brownston (E)	7889	9002	9337	10608	11278	10647
Dungarvon (N)	4684	5133	5769	5841	5839	5512
Dungarvon (S)	866	875	852	829	805	760
Riverbank Road - Three Parks Link						
Riverbank	4076	5233	6986	11593	13505	12748
Riverbank	4076	5233	6986	11593	13505	12748
Riverbank-Three Parks	0	0	2	132	141	133
Aubrey/Anderson						
Aubrey (E)	9722	10547	11192	11973	12821	12103
Aubrey (W)	7645	8186	8013	8699	8455	8455
Anderson (N)	6639	7274	7003	7977	8161	7704
Anderson-Link						
Anderson (S)	9948	10747	10216	11448	11397	10759
Anderson (N)	6639	7274	7003	7977	8161	7704
Plantation	3309	3473	3213	3471	3236	3055

Existing Intersection: Crash Prediction

Injury Crashes

3.538

Injury Crashes

3.9404

Do Minimum		METHOD C				
SH84/Anderson						
	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
	2024	2028	2033	2038	2043	2043+
Qapproach	13,853	15,474	16,121	19,398	20,536	20,536
Qapproach	16,106	18,338	20,041	23,603	25,757	25,757
Qapproach	9,948	10,747	10,596	12,331	12,769	12,769
Qapproach						
b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
CMF	1	1	1	1	1	1
Predicted Crash Rate	0.3261	0.3473	0.3563	0.3928	0.4074	0.4074
Actual	4	4	4	4	4	4
Site Crash Rate	0.72	0.72	0.72	0.72	0.72	0.72
K	2.2	2.2	2.2	2.2	2.2	2.2
Weighted Rate	0.494	0.512	0.519	0.547	0.558	0.558
Cost per Crash	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0
Cost per Year	\$207,389.43	\$214,917.17	\$218,005.36	\$229,778.44	\$234,220.01	\$234,220.01
SH84/Hedditch/Brownston/Ballantyne						
Priority T	Priority T	Priority T	Priority T	Priority T	Priority T	Priority T
	2024	2028	2033	2038	2043	2043+
Qmajor	16,106	18,338	20,041	23,603	25,757	25,757
Qminor	4,055	4,517	4,907	5,768	6,495	6,495
Qminor	1,674	1,835	2,138	2,249	2,338	2,338
b0	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
b1	0.20000	0.20000	0.20000	0.20000	0.20000	0.20000
b2	0.76	0.76	0.76	0.76	0.76	0.76
CMF	1	1	1	1	1	1
At	0.2709	0.3005	0.3318	0.3767	0.4115	0.4115
Actual	2	2	2	2	2	2
Site Crash Rate	0.36	0.36	0.36	0.36	0.36	0.36
K	3.8	3.8	3.8	3.8	3.8	3.8
Weighted Rate	0.294	0.317	0.340	0.371	0.393	0.393
Cost per Crash	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0
Cost per Year	\$151,283.21	\$163,138.58	\$174,950.75	\$190,794.63	\$202,205.22	\$202,205.22
Notes: Staggered T intersections						
Brownston/McDougall						

	Priority X	Priority X	Priority X	Priority X	Priority X	Priority X	Priority X
		2024	2028	2033	2038	2043	2043+
1	Qmajor	7,889	9,002	9,684	11,427	12,637	12,637
2	Qminor	2,568	3,288	4,171	5,404	6,608	6,608
3							
4							
5	b0	0.00113	0.00113	0.00113	0.00113	0.00113	0.00113
6	b1	0.51000	0.51000	0.51000	0.51000	0.51000	0.51000
7	b2	0.21	0.21	0.21	0.21	0.21	0.21
8	CMF	1	1	1	1	1	1
9	At	0.5709	0.6432	0.7018	0.8063	0.8854	0.8854
10	Actual	0	0	0	0	0	0
11	Site Crash Rate	0	0	0	0	0	0
12	K	2.3	2.3	2.3	2.3	2.3	2.3
13	Weighted Rate	0.255	0.268	0.278	0.293	0.303	0.303
14	Cost per Crash	469,000.0	469,000.0	469,000.0	469,000.0	469,000.0	469,000.0
15	Cost per Year	\$119,476.00	\$125,783.27	\$130,320.89	\$137,369.34	\$141,976.37	\$141,976.37

Brownston/Helwick

	Priority X	Priority X	Priority X	Priority X	Priority X	Priority X	Priority X
		2024	2028	2033	2038	2043	2043+
1	Qmajor	7,889	9,002	9,684	11,427	12,637	12,637
2	Qminor	789	797	805	813	821	821
3							
4							
5	b0	0.00113	0.00113	0.00113	0.00113	0.00113	0.00113
6	b1	0.51000	0.51000	0.51000	0.51000	0.51000	0.51000
7	b2	0.21	0.21	0.21	0.21	0.21	0.21
8	CMF	1	1	1	1	1	1
9	At	0.4456	0.4776	0.4968	0.5417	0.5714	0.5714
10	Actual	1	1	1	1	1	1
11	Site Crash Rate	0.18	0.18	0.18	0.18	0.18	0.18
12	K	2.3	2.3	2.3	2.3	2.3	2.3
13	Weighted Rate	0.315	0.326	0.332	0.346	0.355	0.355
14	Cost per Crash	469,000.0	469,000.0	469,000.0	469,000.0	469,000.0	469,000.0
15	Cost per Year	\$147,693.68	\$152,902.95	\$155,852.64	\$162,317.99	\$166,287.99	\$166,287.99

Ardmore/Brownston/SH84

	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
		2024	2028	2033	2038	2043 2043+
1	Qapproach	6,879	7,808	8,807	10,312	11,377
2	Qapproach	7,889	9,002	9,684	11,427	12,637
3	Qapproach	14,383	16,673	18,480	21,813	23,978
4	Qapproach					
5	b0	0.00044	0.00044	0.00044	0.00044	0.00044
6	b1	0.58000	0.58000	0.58000	0.58000	0.58000
7						
8	CMF	1	1	1	1	1
9	At	0.2694	0.2918	0.3090	0.3397	0.3595
10	Actual	2	2	2	2	2
11	Site Crash Rate	0.36	0.36	0.36	0.36	0.36
12	K	2.2	2.2	2.2	2.2	2.2
13	Weighted Rate	0.304	0.319	0.330	0.349	0.360
14	Cost per Crash	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0
15	Cost per Year	\$127,610.82	\$133,967.39	\$138,613.27	\$146,393.34	\$151,076.82

McDougall/Cardrona/GolfCourse/Faulks Terrace

	Priority T	Priority T	Priority T	Priority T	Priority T	Priority T
		2024	2028	2033	2038	2043 2043+
Qmajor	3,897	4,417	4,812	6,158	7,065	7,065
Qminor	4,408	5,096	5,686	6,799	7,466	7,466
Qminor	190	208	242	255	265	265
b0	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
b1	0.20000	0.20000	0.20000	0.20000	0.20000	0.20000
b2	0.76	0.76	0.76	0.76	0.76	0.76
CMF	1	1	1	1	1	1
At	0.1571	0.1792	0.1987	0.2373	0.2610	0.2610
10	Actual	0	0	0	0	0
11	Site Crash Rate	0	0	0	0	0
12	K	3.8	3.8	3.8	3.8	3.8
13	Weighted Rate	0.130	0.145	0.157	0.181	0.194
14	Cost per Crash	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0
15	Cost per Year	\$66,908.14	\$74,539.44	\$80,950.41	\$92,935.39	\$99,865.49

Notes: Staggered T intersections

Ballantyne/Sir Tim Wallis Dr

	Priority T	Priority T	Priority T	Priority T	Priority T	Priority T
		2024	2028	2033	2038	2043 2043+
Qmajor	4,483	6,288	8,353	10,910	12,965	12,965
Qminor	3,842	5,142	7,334	9,115	10,528	10,528
Qminor						
b0	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
b1	0.20000	0.20000	0.20000	0.20000	0.20000	0.20000
b2	0.76	0.76	0.76	0.76	0.76	0.76
CMF	1	1	1	1	1	1
At	0.1333	0.1780	0.2468	0.3071	0.3546	0.3546
10	Actual	1	1	1	1	1
11	Site Crash Rate	0.18	0.18	0.18	0.18	0.18
12	K	3.8	3.8	3.8	3.8	3.8
13	Weighted Rate	0.140	0.178	0.230	0.270	0.299
14	Cost per Crash	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0
15	Cost per Year	\$72,097.11	\$91,685.15	\$118,423.74	\$139,036.00	\$153,723.76

Cardrona Valley/Orchard/Studholme

	Priority T	Priority T	Priority T	Priority T	Priority T	Priority T
		2024	2028	2033	2038	2043 2043+
Qmajor	3,897	4,417	4,812	6,158	7,065	7,065
Qminor	1,197	1,312	1,529	1,608	1,672	1,672
Qminor	624	684	797	838	871	871
b0	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
b1	0.20000	0.20000	0.20000	0.20000	0.20000	0.20000
b2	0.76	0.76	0.76	0.76	0.76	0.76
CMF	0.65	0.65	0.65	0.24336	0.24336	0.24336
At	0.0559	0.0614	0.0702	0.0287	0.0304	0.0304
10	Actual	0	0	0	0	0
11	Site Crash Rate	0	0	0	0	0
12	K	3.8	3.8	3.8	3.8	3.8
13	Weighted Rate	0.052	0.057	0.064	0.028	0.029
14	Cost per Crash	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0
15	Cost per Year	\$26,760.69	\$29,222.40	\$33,040.22	\$14,213.01	\$15,015.02

Notes: Staggered T intersections

SH6/Aubrey R

	Priority T	Priority T	Priority T	Priority T	Priority T	Priority T
		2024	2028	2033	2038	2043 2043+
Qmajor	12,154	13,635	14,856	18,170	20,270	20,270
Qminor	3,010	3,547	4,365	4,971	6,005	6,005
Qminor						
b0	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
b1	0.20000	0.20000	0.20000	0.20000	0.20000	0.20000
b2	0.76	0.76	0.76	0.76	0.76	0.76
CMF	1	1	1	1	1	1
At	0.1352	0.1567	0.1866	0.2145	0.2531	0.2531
10	Actual	0	0	0	0	0
11	Site Crash Rate	0	0	0	0	0
12	K	3.8	3.8	3.8	3.8	3.8
13	Weighted Rate	0.115	0.130	0.150	0.167	0.190
14	Cost per Crash	689,000.0	689,000.0	689,000.0	689,000.0	689,000.0
15	Cost per Year	\$79,072.33	\$89,511.03	\$103,242.94	\$115,257.18	\$130,818.27

Kingston/SH6

	Priority T	Priority T	Priority T	Priority T	Priority T	Priority T
		2024	2028	2033	2038	2043 2043+
Qmajor	6,961	8,183	9,104	12,144	14,490	14,490

	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
		2024	2028	2033	2038	2043 2043+
Qapproach	7,889	9,002	9,337	10,608	11,278	10,647
Qapproach	233	235	229	222	215	203
Qapproach	4,664	5,873	6,966	8,422	9,559	9,024
Qapproach	2,568.00	3,288.00	4,021.00	5,017.00	5,898.00	5,568.00
b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
CMF	1	1	1	1	1	1
At	0.1506	0.1656	0.1743	0.1897	0.1994	0.1928

Brownston/Helwick

	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
		2024	2028	2033	2038	2043 2043+
Qapproach	7,889	9,002	9,337	10,608	11,278	10,647
Qapproach	7,889	9,002	9,337	10,608	11,278	10,647
Qapproach	3,245	3,556	3,997	4,047	4,045	3,818
Qapproach	789.00	797.00	776.00	755.00	733.00	692.00
b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
CMF	1	1	1	1	1	1
At	0.2095	0.2250	0.2323	0.2463	0.2532	0.2449

Ardmore/Brownston/SH84

	Traffic Signal X	Traffic Signal X	Traffic Signal X	Traffic Signal X	Traffic Signal X	Traffic Signal X
		2024	2028	2033	2038	2043 2043+
Qmajor	14,383	16,673	17,818	20,250	21,401	20,204
Qminor	6,879	7,808	8,491	9,573	10,155	9,586
Qminor						
b0	0.00226	0.00226	0.00226	0.00226	0.00226	0.00226
b1	0.14000	0.14000	0.14000	0.14000	0.14000	0.14000
b2	0.46	0.46	0.46	0.46	0.46	0.46
CMF	1	1	1	1	1	1
At	0.5029	0.5442	0.5709	0.6142	0.6360	0.6144

McDougall/Cardrona/GolfCourse/Faulks Terrace

	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
		2024	2028	2033	2038	2043 2043+
Qapproach	2,568	3,288	4,021	5,017	5,898	5,568
Qapproach	3,897	4,417	4,639	5,717	6,306	5,953
Qapproach	4,408	5,096	5,482	5,459	5,903	5,573
Qapproach	190.00	208.00	233.00	237.00	237.00	223.00
b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
CMF	1	1	1	1	1	1
At	0.1532	0.1688	0.1792	0.1941	0.2072	0.2004
Cost per Crash	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0
Cost per Year	\$64,346.16	\$70,886.64	\$75,247.07	\$81,526.86	\$87,004.63	\$84,147.43

Ballantyne/Sir Tim Wallis Dr

Qminor	788	864	1,007	1,059	1,101	1,101
Qminor	3,073	3,368	3,926	4,129	4,293	4,293
b0	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
b1	0.20000	0.20000	0.20000	0.20000	0.20000	0.20000
b2	0.76	0.76	0.76	0.76	0.76	0.76
CMF	1	1	1	1	1	1
At	0.1665	0.1844	0.2116	0.2330	0.2486	0.2486
10 Actual	1	1	1	1	1	1
11 Site Crash Rate	0.18	0.18	0.18	0.18	0.18	0.18
12 K	3.8	3.8	3.8	3.8	3.8	3.8
13 Weighted Rate	0.169	0.184	0.205	0.221	0.232	0.232
14 Cost per Crash	689,000.0	689,000.0	689,000.0	689,000.0	689,000.0	689,000.0
15 Cost per Year	\$116,391.35	\$126,459.21	\$141,074.65	\$151,945.58	\$159,624.77	\$159,624.77
Notes: Staggered T Intersections						
Brownston/Dungarvon						
Priority X	Priority X	Priority X	Priority X	Priority X	Priority X	Priority X
	2024	2028	2033	2038	2043	2043+
1 Qmajor	7,889	9,002	9,684	11,427	12,637	12,637
2 Qminor	866	875	884	893	902	902
3						
4						
5 b0	0.00113	0.00113	0.00113	0.00113	0.00113	0.00113
6 b1	0.51000	0.51000	0.51000	0.51000	0.51000	0.51000
7 b2	0.21	0.21	0.21	0.21	0.21	0.21
8 CMF	1	1	1	1	1	1
9 At	0.4544	0.4871	0.5067	0.5525	0.5828	0.5828
10 Actual	0	0	0	0	0	0
11 Site Crash Rate	0	0	0	0	0	0
12 K	2.3	2.3	2.3	2.3	2.3	2.3
13 Weighted Rate	0.229	0.237	0.241	0.251	0.257	0.257
14 Cost per Crash	469,000.0	469,000.0	469,000.0	469,000.0	469,000.0	469,000.0
15 Cost per Year	\$107,209.39	\$110,955.92	\$113,077.40	\$117,721.15	\$120,571.62	\$120,571.62
Riverbank Road - Three Parks Link						
Priority T	Priority T	Priority T	Priority T	Priority T	Priority T	Priority T
	2024	2028	2033	2038	2043	2043+
1 Qmajor	4,076	5,233	7,246	9,871	13,064	13,064
2 Qminor	0	0	0	0	0	0
3						
4						
5 b0	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
6 b1	0.20000	0.20000	0.20000	0.20000	0.20000	0.20000
7 b2	0.76	0.76	0.76	0.76	0.76	0.76
8 CMF	1	1	1	1	1	1
9 At	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10 Actual	0	0	0	0	0	0
11 Site Crash Rate	0	0	0	0	0	0
12 K	3.8	3.8	3.8	3.8	3.8	3.8
13 Weighted Rate	0.000	0.000	0.000	0.000	0.000	0.000
14 Cost per Crash	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0
15 Cost per Year	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Aubrey/Anderson						
	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
	2024	2028	2033	2038	2043	2043+
1 Qapproach	9,722	10,547	11,608	12,897	14,366	14,366
2 Qapproach	7,645	8,186	8,311	9,370	10,035	10,035
3 Qapproach	6,639	7,274	7,264	8,593	9,144	9,144
4						
5 b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
6 b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
7						
8 CMF	1	1	1	1	1	1
9 At	0.2432	0.2548	0.2609	0.2812	0.2948	0.2948
10 Actual	0	0	0	0	0	0
11 Site Crash Rate	0	0	0	0	0	0
12 K	2.2	2.2	2.2	2.2	2.2	2.2
13 Weighted Rate	0.157	0.161	0.164	0.172	0.177	0.177
14 Cost per Crash	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0
15 Cost per Year	\$65,791.40	\$67,774.78	\$68,797.12	\$72,048.82	\$74,143.73	\$74,143.73
Anderson-Link						
Priority T	Priority T	Priority T	Priority T	Priority T	Priority T	Priority T
	2024	2028	2033	2038	2043	2043+
1 Qmajor	9,948	10,747	10,596	12,331	12,769	12,769
2 Qminor	3,309	3,473	3,332	3,738	3,625	3,625
3						
4						
5 b0	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
6 b1	0.20000	0.20000	0.20000	0.20000	0.20000	0.20000
7 b2	0.76	0.76	0.76	0.76	0.76	0.76
8 CMF	1	1	1	1	1	1
9 At	0.1396	0.1470	0.1421	0.1598	0.1572	0.1572
10 Actual	2	2	2	2	2	2
11 Site Crash Rate	0.36	0.36	0.36	0.36	0.36	0.36
12 K	3.8	3.8	3.8	3.8	3.8	3.8
13 Weighted Rate	0.174	0.182	0.176	0.195	0.192	0.192
14 Cost per Crash	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0	514,000.0
15 Cost per Year	\$89,312.72	\$93,323.94	\$90,670.62	\$100,029.05	\$98,685.08	\$98,685.08

Qminor	788	864	971	983	983	928
Qminor						
b0	0.00226	0.00226	0.00226	0.00226	0.00226	0.00226
b1	0.14000	0.14000	0.14000	0.14000	0.14000	0.14000
b2	0.46	0.46	0.46	0.46	0.46	0.46
CMF	1	1	1	1	1	1
At	0.1677	0.1789	0.1907	0.2034	0.2033	0.1964
Cost per Crash	451,000.0	451,000.0	451,000.0	451,000.0	451,000.0	451,000.0
Cost per Year	\$75,624.25	\$80,702.88	\$85,996.59	\$91,739.08	\$91,683.29	\$88,569.32
Brownston/Dungarvon						
	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
	2024	2028	2033	2038	2043	2043+
Qapproach	7,889	9,002	9,337	10,608	11,278	10,647
Qapproach	7,889	9,002	9,337	10,608	11,278	10,647
Qapproach	4,684	5,133	5,769	5,841	5,839	5,512
Qapproach	866.00	875.00	852.00	829.00	805.00	760.00
b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
CMF	1	1	1	1	1	1
At	0.2209	0.2370	0.2452	0.2593	0.2662	0.2575
Cost per Crash	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0
Cost per Year	\$92,795.89	\$99,551.44	\$102,968.96	\$108,913.26	\$111,816.91	\$108,143.66
Riverbank Road - Three Parks Link						
	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
	2024	2028	2033	2038	2043	2043+
Qapproach	4,076	5,233	6,986	11,593	13,505	12,748
Qapproach	4,076	5,233	6,986	11,593	13,505	12,748
Qapproach	0	0	2	132	141	133
Qapproach	9,722.00	10,547.00	11,192.00	11,973.00	12,821.00	12,103.00
b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
CMF	1	1	1	1	1	1
At	0.1100	0.1271	0.1510	0.2092	0.2282	0.2207
Cost per Crash	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0
Cost per Year	\$46,197.54	\$53,402.11	\$63,422.64	\$87,865.74	\$95,831.07	\$92,676.50
Aubrey/Anderson						
	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
	2024	2028	2033	2038	2043	2043+
Qapproach	6,481	7,031	7,461	7,982	8,547	8,069
Qapproach	7,645	8,186	8,013	8,699	8,956	8,455
Qapproach	6,639	7,274	7,003	7,977	8,161	7,704
Qapproach	3,240.67	3,515.67	3,730.67	3,991.00	4,273.67	4,034.33
b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
CMF	1	1	1	1	1	1
At	0.2242	0.2348	0.2348	0.2478	0.2536	0.2453
Cost per Crash	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0
Cost per Year	\$94,148.46	\$98,624.31	\$98,604.22	\$104,061.62	\$106,507.25	\$103,007.39
Anderson-Link						
	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single	Roundabout Single
	2024	2028	2033	2038	2043	2043+
Qapproach	9,948	10,747	10,216	11,448	11,397	10,759
Qapproach	6,639	7,274	7,003	7,977	8,161	7,704
Qapproach	3,309	3,473	3,213	3,471	3,236	3,055
Qapproach	0.00	0.00	0.00	0.00	0.00	0.00
b0	0.00044	0.00044	0.00044	0.00044	0.00044	0.00044
b1	0.58000	0.58000	0.58000	0.58000	0.58000	0.58000
CMF	1	1	1	1	1	1
At	0.2140	0.2236	0.2169	0.2314	0.2302	0.2227
Cost per Crash	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0	420,000.0
Cost per Year	\$89,877.13	\$93,903.38	\$91,096.60	\$97,185.92	\$96,692.68	\$93,515.50

CRASH COST SAVINGS

OUTPUTS

Option Component	Year Implemented	Do Minimum	Do Minimum	Do Minimum	Do Minimum	Do Minimum	Do Minimum	Strategic Response	Strategic Response	Strategic Response	Strategic Response	Strategic Response	Strategic Response
		2024	2028	2033	2038	2043	2048	2024	2028	2033	2038	2043	2048
SH84/Hedditch/Brownston/Ballantyne	2031	\$ 151,283	\$ 163,139	\$ 174,951	\$ 190,795	\$ 202,205	\$ 202,205	\$ 122,485	\$ 127,769	\$ 135,802	\$ 139,013	\$ 139,918	\$ 135,160
Brownston/McDougall	2029	\$ 119,476	\$ 125,783	\$ 130,321	\$ 137,369	\$ 141,976	\$ 141,976	\$ 63,248	\$ 69,537	\$ 73,226	\$ 79,686	\$ 83,744	\$ 80,994
Brownston/Helwick	2032	\$ 147,694	\$ 152,903	\$ 155,853	\$ 162,318	\$ 166,288	\$ 166,288	\$ 87,995	\$ 94,488	\$ 97,552	\$ 103,458	\$ 106,361	\$ 102,865
McDougall/Cardrona/GolfCourse/Faulks Terrace	2036	\$ 66,908	\$ 74,539	\$ 80,950	\$ 92,935	\$ 99,865	\$ 99,865	\$ 64,346	\$ 70,887	\$ 75,247	\$ 81,527	\$ 87,005	\$ 84,147
Ballantyne/Sir Tim Wallis Dr	2030	\$ 72,097	\$ 91,685	\$ 118,424	\$ 139,036	\$ 153,724	\$ 153,724	\$ 70,806	\$ 81,308	\$ 93,640	\$ 102,300	\$ 110,667	\$ 107,030
Cardrona Valley/Orchard/Studholme	2032	\$ 26,761	\$ 29,222	\$ 33,040	\$ 14,213	\$ 15,015	\$ 15,015	\$ 10,756	\$ 11,825	\$ 13,045	\$ 15,138	\$ 15,857	\$ 15,337
Ardmore/Brownston/SH84	2035	\$ 127,611	\$ 133,967	\$ 138,613	\$ 146,393	\$ 151,077	\$ 151,077	\$ 226,801	\$ 245,434	\$ 257,470	\$ 276,992	\$ 286,826	\$ 277,076
SH6/Aubrey Rd	2031	\$ 79,072	\$ 89,511	\$ 103,243	\$ 115,257	\$ 130,818	\$ 130,818	\$ 93,272	\$ 101,772	\$ 107,130	\$ 119,143	\$ 127,027	\$ 122,851
Kingston/SH6	2037	\$ 116,391	\$ 126,459	\$ 141,075	\$ 151,946	\$ 159,625	\$ 159,625	\$ 75,624	\$ 80,703	\$ 85,997	\$ 91,739	\$ 91,683	\$ 88,569
SH84/Anderson	2028	\$ 207,389	\$ 214,917	\$ 218,005	\$ 229,778	\$ 234,220	\$ 234,220	\$ 252,994	\$ 261,768	\$ 262,949	\$ 283,534	\$ 287,447	\$ 278,004
Brownston/Dungarvon	2033	\$ 107,209	\$ 110,956	\$ 113,077	\$ 117,721	\$ 120,572	\$ 120,572	\$ 92,796	\$ 99,551	\$ 102,969	\$ 108,913	\$ 111,817	\$ 108,144
Riverbank Road - Three Parks Link	2033	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 46,198	\$ 53,402	\$ 63,423	\$ 87,866	\$ 95,831	\$ 92,676
Aubrey/Anderson	2036	\$ 65,791	\$ 67,775	\$ 68,797	\$ 72,049	\$ 74,144	\$ 74,144	\$ 94,148	\$ 98,624	\$ 98,604	\$ 104,062	\$ 106,507	\$ 103,007
Anderson-Link	2034	\$ 89,313	\$ 93,324	\$ 90,671	\$ 100,029	\$ 98,685	\$ 98,685	\$ 89,877	\$ 93,903	\$ 91,097	\$ 97,186	\$ 96,693	\$ 93,516

SP3 General road improvements

Spreadsheet May 2025

Worksheet 6 - Crash cost savings

These simplified procedures are **suitable only** for **crash-by-crash analysis** (method A in Appendix 2). There must be 5 years or more crash data for the site and the number and types of crashes must meet the specifications set out in Figure A1. If not, either the crash rate analysis (method B) or weighted crash procedure (method C) described in Appendix 2 should be used. The annual crash cost savings determined from such an evaluation are multiplied by the appropriate discount factor and entered in worksheet 1 as total E. Evidence to support alternative analysis must be attached.

	Movement category	All movements	Vehicle involvement	All vehicles	
1	Do-minimum mean speed	50	Road category	Urban Other	
	Posted speed limit	50	Traffic growth rate	0.0%	
2	Option mean speed	50			

Do-minimum	Severity				
	Fatal	Serious	Minor	Non- injury	
3	Number of years of typical crash rate records	5			
4	Number of reported crashes over period	0.5	8.5	42.5	
5	Fatal/serious severity ratio (Tables A23, A24 and A25)	0.07	0.93	1.0	1.0
6	Number of reported crashes adjusted by severity (4) x (5)	0.63	8.37	42.5	
7	Crashes per year = (6)/(3)	0.13	1.67	8.50	
8	Adjustment factor for crash trend (Table A21)	0.83			
9	Adjusted crashes per year = (7) x (8)	0.105	1.389	7.055	
10	Under-reporting factors (Tables A26 and A27)	1	1.5	2.8	
11	Total estimated crashes per year = (9) x (10)	0.105	2.084	19.754	
12	Crash cost, 80-110km/h limit (Tables A32 to A35)	14,500,000	830,000	90,000	4,000
13	Crash cost, 30-50km/h limit (Tables A28 to A31)	12,900,000	770,000	83,000	3,000
14	Mean speed adjustment (between 50 and 80km/h) = ((1) - 50)/30	0			
15	Cost per crash = (12) or (13) or (13) + (14) x [(12) - (13)]	12,900,000	770,000	83,000	3,000
16	Crash cost per year = (11) x (15)	1,349,082	1,604,780	1,639,582	
17	Total cost of crashes per year (sum of columns in row (16) fatal + serious + minor + non-injury)	\$4,593,444			
	Option				
18	Percentage crash reduction in percentage				
19	Percentage of crashes 'remaining' [1 - (18)]	100%	100%	100%	100%
20	Predicted crashes per year (11) x (19)	0.105	2.084	19.754	
21	Crash cost, 80-110km/h limit (Tables A32 to A35)	14,500,000	830,000	90,000	4,000
22	Crash cost, 30-50km/h limit (Tables A28 to A31)	12,900,000	770,000	83,000	3,000
23	Mean speed adjustment (between 50 and 80km/h) = ((2) - 50)/30	0			
24	Cost per crash = (21) or (22) or (22) + (23) x [(21) - (22)]	12,900,000	770,000	83,000	3,000
25	Crash cost per year = (20) x (24)	1,349,082	1,604,780	1,639,582	
26	Total cost of crashes per year (sum of columns in row (25) fatal + serious + minor + non-injury)	\$4,593,444			
27	Annual crash cost savings = (17) - (26)	\$0			
28	PV crash cost savings = (27) x DF	\$0			

E

Discount Rate: 2% 30 years, 1.5% 31-40 years

0 Year Implem Do Minimum Do Minimum Do Minimu Do Minimu Do Minimu Do Minimu Strategic Res Strategic Res Strategic Res Strategic Re Strategic F Strategic Response													
Option Component	0	2024	2028	2033	2038	2043	2048	2024	2028	2033	2038	2043	2048
SH84/Hedditch/Brownston/Ballantyne	2031	\$151,283.21	\$163,138.58	\$174,950.75	\$190,794.63	\$202,205.22	\$202,205.22	\$122,484.68	\$127,769.40	\$135,801.65	\$139,013.34	\$139,917.76	\$135,159.51
Brownston/McDougall	2029	\$119,476.00	\$125,783.27	\$130,320.89	\$137,369.34	\$141,976.37	\$141,976.37	\$63,247.78	\$69,537.23	\$73,225.59	\$79,686.28	\$83,744.09	\$80,993.64
Brownston/Helwick	2032	\$147,693.68	\$152,902.95	\$155,852.64	\$162,317.99	\$166,287.99	\$166,287.99	\$87,994.78	\$94,488.33	\$97,552.26	\$103,457.83	\$106,360.54	\$102,865.08
McDougall/Cardrona/GolfCourse	2036	\$66,908.14	\$74,539.44	\$80,950.41	\$92,935.39	\$99,865.49	\$99,865.49	\$64,346.16	\$70,886.64	\$75,247.07	\$81,526.86	\$87,004.63	\$84,147.43
Ballantyne/Sir Tim Wallis Dr	2030	\$72,097.11	\$91,685.15	\$118,423.74	\$139,036.00	\$153,723.76	\$153,723.76	\$70,806.31	\$81,307.87	\$93,640.25	\$102,300.42	\$110,667.11	\$107,030.30
Cardrona Valley/Orchard/Studholme	2032	\$26,760.69	\$29,222.40	\$33,040.22	\$14,213.01	\$15,015.02	\$15,015.02	\$10,756.04	\$11,825.49	\$13,044.65	\$15,137.63	\$15,857.06	\$15,336.59
Ardmore/Brownston/SH84	2035	\$127,610.82	\$133,967.39	\$138,613.27	\$146,393.34	\$151,076.82	\$151,076.82	\$226,801.31	\$245,434.28	\$257,469.80	\$276,991.60	\$286,826.00	\$277,076.33
SH6/Aubrey Rd	2031	\$79,072.33	\$89,511.03	\$103,242.94	\$115,257.18	\$130,818.27	\$130,818.27	\$93,272.40	\$101,772.50	\$107,130.15	\$119,143.32	\$127,027.30	\$122,850.95
Kingston/SH6	2037	\$116,391.35	\$126,459.21	\$141,074.65	\$151,945.58	\$159,624.77	\$159,624.77	\$75,624.25	\$80,702.88	\$85,996.59	\$91,739.08	\$91,683.29	\$88,569.32
SH84/Anderson	2028	\$207,389.43	\$214,917.17	\$218,005.36	\$229,778.44	\$234,220.01	\$234,220.01	\$252,993.99	\$261,767.81	\$262,949.06	\$283,534.30	\$287,447.10	\$278,004.01
Brownston/Dungarvon	2033	\$107,209.39	\$110,955.92	\$113,077.40	\$117,721.15	\$120,571.62	\$120,571.62	\$92,795.89	\$99,551.44	\$102,968.96	\$108,913.26	\$111,816.91	\$108,143.66
Riverbank Road - Three Parks Link	2033	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46,197.54	\$53,402.11	\$63,422.64	\$87,865.74	\$95,831.07	\$92,676.50
Aubrey/Anderson	2036	\$65,791.40	\$67,774.78	\$68,797.12	\$72,048.82	\$74,143.73	\$74,143.73	\$94,148.46	\$98,624.31	\$98,604.22	\$104,061.62	\$106,507.25	\$103,007.39
Anderson-Link	2034	\$89,312.72	\$93,323.94	\$90,670.62	\$100,029.05	\$98,685.08	\$98,685.08	\$89,877.13	\$93,903.38	\$91,096.60	\$97,185.92	\$96,692.68	\$93,515.50
General Crashes		\$ 4,593,444	\$ 5,306,999	\$ 5,961,868	\$ 7,398,593	\$ 8,411,356	\$ 8,411,356	\$ 4,593,444	\$ 5,306,999	\$ 5,748,334	\$ 6,919,524	\$ 7,544,885	\$ 7,122,226

2024	1
2028	2
2033	3
2038	4
2043	5
2048	6
Do Minimum	2
Strategic Response	8

VKT Changes 165869.2063 191635.6668 215282.9813 267163.0965 303733.9677 303733.9677 165869.2063 191635.6668 207572.274 249863.9172 272445.7081 257183.501

Reported Injury Crashes 8.5 19.2 17.2

2.0 10% Crash Changes

APPLY GROWTH RATE Yes

2031

2029

2032

2036

2030

Discount Factors			Growth Rate	Do Minimum		Strategic Response		Do Minimum		Strategic Response		Do Minimum		Strategic Response		Do Minimum		Strategic Response		Do Minimum		Strategic Response	
Year	Time	Discount		SH84/Hedditch/Brownston/Ballantyne				Brownston/McDougall				Brownston/Helwick				McDougall/Cardrona/GolfCourse/Faulks Terrace				Ballantyne/Sir Tim Wallis Dr			
1st July	Year	Factor		Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount
2024	0	1.000	\$ 151,283	\$ 151,283	\$ 122,485	\$ 122,485	\$ 119,476	\$ 119,476	\$ 63,248	\$ 63,248	\$ 147,694	\$ 147,694	\$ 87,995	\$ 87,995	\$ 66,908	\$ 66,908	\$ 64,346	\$ 64,346	\$ 72,097	\$ 72,097	\$ 70,806	\$ 70,806	
2025	1	0.980	\$ 154,247	\$ 151,223	\$ 123,806	\$ 121,378	\$ 121,053	\$ 118,679	\$ 64,820	\$ 63,549	\$ 148,996	\$ 146,075	\$ 89,618	\$ 87,861	\$ 68,816	\$ 67,467	\$ 65,981	\$ 64,688	\$ 76,994	\$ 75,484	\$ 73,432	\$ 71,992	
2026	2	0.961	\$ 157,211	\$ 151,106	\$ 125,127	\$ 120,268	\$ 122,630	\$ 117,868	\$ 66,393	\$ 63,814	\$ 150,298	\$ 144,462	\$ 91,242	\$ 87,699	\$ 70,724	\$ 67,977	\$ 67,616	\$ 64,991	\$ 81,891	\$ 78,711	\$ 76,057	\$ 73,104	
2027	3	0.942	\$ 160,175	\$ 150,936	\$ 126,448	\$ 119,155	\$ 124,206	\$ 117,043	\$ 67,965	\$ 64,045	\$ 151,601	\$ 142,857	\$ 92,865	\$ 87,509	\$ 72,632	\$ 68,442	\$ 69,252	\$ 65,257	\$ 86,788	\$ 81,782	\$ 78,682	\$ 74,144	
2028	4	0.924	\$ 163,139	\$ 150,715	\$ 127,769	\$ 118,039	\$ 125,783	\$ 116,204	\$ 69,537	\$ 64,242	\$ 152,903	\$ 141,259	\$ 94,488	\$ 87,293	\$ 74,539	\$ 68,863	\$ 70,887	\$ 65,488	\$ 91,685	\$ 84,703	\$ 81,308	\$ 75,116	
2029	5	0.906	\$ 165,501	\$ 149,899	\$ 129,376	\$ 117,180	\$ 126,691	\$ 114,748	\$ 70,275	\$ 63,650	\$ 153,493	\$ 139,023	\$ 95,101	\$ 86,136	\$ 75,822	\$ 68,674	\$ 71,759	\$ 64,994	\$ 97,033	\$ 87,886	\$ 83,774	\$ 75,877	
2030	6	0.888	\$ 167,863	\$ 149,058	\$ 130,982	\$ 116,309	\$ 127,598	\$ 113,304	\$ 71,013	\$ 63,057	\$ 154,083	\$ 136,821	\$ 95,714	\$ 84,991	\$ 77,104	\$ 68,466	\$ 72,631	\$ 64,494	\$ 102,381	\$ 90,911	\$ 86,241	\$ 76,579	
2031	7	0.871	\$ 170,226	\$ 148,192	\$ 132,589	\$ 115,426	\$ 128,506	\$ 111,872	\$ 71,750	\$ 62,463	\$ 154,673	\$ 134,652	\$ 96,327	\$ 83,858	\$ 78,386	\$ 68,240	\$ 73,503	\$ 63,989	\$ 107,728	\$ 93,784	\$ 88,707	\$ 77,225	
2032	8	0.853	\$ 172,588	\$ 147,302	\$ 134,195	\$ 114,534	\$ 129,413	\$ 110,453	\$ 72,488	\$ 61,868	\$ 155,263	\$ 132,515	\$ 96,939	\$ 82,737	\$ 79,668	\$ 67,996	\$ 74,375	\$ 63,478	\$ 113,076	\$ 96,509	\$ 91,174	\$ 77,816	
2033	9	0.837	\$ 174,951	\$ 146,391	\$ 135,802	\$ 113,633	\$ 130,321	\$ 109,047	\$ 73,226	\$ 61,272	\$ 155,853	\$ 130,411	\$ 97,552	\$ 81,627	\$ 80,950	\$ 67,736	\$ 75,247	\$ 62,963	\$ 118,424	\$ 99,092	\$ 93,640	\$ 78,354	
2034	10	0.820	\$ 178,120	\$ 146,120	\$ 136,444	\$ 111,932	\$ 131,731	\$ 108,065	\$ 74,518	\$ 61,130	\$ 157,146	\$ 128,914	\$ 98,733	\$ 80,996	\$ 83,347	\$ 68,374	\$ 76,503	\$ 62,759	\$ 122,546	\$ 100,531	\$ 95,372	\$ 78,238	
2035	11	0.804	\$ 181,288	\$ 145,803	\$ 137,086	\$ 110,253	\$ 133,140	\$ 107,080	\$ 75,810	\$ 60,971	\$ 158,439	\$ 127,426	\$ 99,914	\$ 80,358	\$ 85,744	\$ 68,961	\$ 77,759	\$ 62,539	\$ 126,669	\$ 101,875	\$ 97,104	\$ 78,097	
2036	12	0.788	\$ 184,457	\$ 145,443	\$ 137,729	\$ 108,598	\$ 134,550	\$ 106,092	\$ 77,102	\$ 60,794	\$ 159,732	\$ 125,947	\$ 101,096	\$ 79,713	\$ 88,141	\$ 69,499	\$ 79,015	\$ 62,303	\$ 130,791	\$ 103,128	\$ 98,836	\$ 77,932	
2037	13	0.773	\$ 187,626	\$ 145,041	\$ 138,371	\$ 106,965	\$ 135,960	\$ 105,101	\$ 78,394	\$ 60,601	\$ 161,025	\$ 124,478	\$ 102,277	\$ 79,063	\$ 90,538	\$ 69,989	\$ 80,271	\$ 62,052	\$ 134,914	\$ 104,293	\$ 100,568	\$ 77,743	
2038	14	0.758	\$ 190,795	\$ 144,598	\$ 139,013	\$ 105,355	\$ 137,369	\$ 104,109	\$ 79,686	\$ 60,392	\$ 162,318	\$ 123,017	\$ 103,458	\$ 78,408	\$ 92,935	\$ 70,433	\$ 81,527	\$ 61,787	\$ 139,036	\$ 105,372	\$ 102,300	\$ 77,531	
2039	15	0.743	\$ 193,077	\$ 143,459	\$ 139,194	\$ 103,423	\$ 138,291	\$ 102,752	\$ 80,498	\$ 59,811	\$ 163,112	\$ 121,195	\$ 104,038	\$ 77,302	\$ 94,321	\$ 70,082	\$ 82,622	\$ 61,390	\$ 141,974	\$ 105,488	\$ 103,974	\$ 77,254	
2040	16	0.728	\$ 195,359	\$ 142,308	\$ 139,375	\$ 101,527	\$ 139,212	\$ 101,409	\$ 81,309	\$ 59,229	\$ 163,906	\$ 119,397	\$ 104,619	\$ 76,209	\$ 95,707	\$ 69,718	\$ 83,718	\$ 60,984	\$ 144,911	\$ 105,560	\$ 105,647	\$ 76,958	
2041	17	0.714	\$ 197,641	\$ 141,148	\$ 139,556	\$ 99,666	\$ 140,134	\$ 100,078	\$ 82,121	\$ 58,648	\$ 164,700	\$ 117,623	\$ 105,199	\$ 75,130	\$ 97,093	\$ 69,341	\$ 84,814	\$ 60,571	\$ 147,849	\$ 105,588	\$ 107,320	\$ 76,644	
2042	18	0.700	\$ 199,923	\$ 139,978	\$ 139,737	\$ 97,838	\$ 141,055	\$ 98,761	\$ 82,933	\$ 58,066	\$ 165,494	\$ 115,872	\$ 105,780	\$ 74,063	\$ 98,479	\$ 68,951	\$ 85,909	\$ 60,150	\$ 150,786	\$ 105,574	\$ 108,994	\$ 76,313	
2043	19	0.686	\$ 202,205	\$ 138,800	\$ 139,918	\$ 96,044	\$ 141,976	\$ 97,457	\$ 83,744	\$ 57,485	\$ 166,288	\$ 114,145	\$ 106,361	\$ 73,009	\$ 99,865	\$ 68,551	\$ 87,005	\$ 59,723	\$ 153,724	\$ 105,521	\$ 110,667	\$ 75,965	
2044	20	0.673	\$ 202,205	\$ 136,078	\$ 138,966	\$ 93,520	\$ 141,976	\$ 95,546	\$ 83,194	\$ 55,987	\$ 166,288	\$ 111,907	\$ 105,661	\$ 71,107	\$ 99,865	\$ 67,207	\$ 86,433	\$ 58,167	\$ 153,724	\$ 103,452	\$ 109,940	\$ 73,986	
2045	21	0.660	\$ 202,205	\$ 133,410	\$ 138,014	\$ 91,059	\$ 141,976	\$ 93,673	\$ 82,644	\$ 54,526	\$ 166,288	\$ 109,713	\$ 104,962	\$ 69,252	\$ 99,865	\$ 65,889	\$ 85,862	\$ 56,650	\$ 153,724	\$ 101,423	\$ 109,212	\$ 72,056	
2046	22	0.647	\$ 202,205	\$ 130,794	\$ 137,063	\$ 88,658	\$ 141,976	\$ 91,836	\$ 82,094	\$ 53,101	\$ 166,288	\$ 107,562	\$ 104,263	\$ 67,442	\$ 99,865	\$ 64,597	\$ 85,290	\$ 55,169	\$ 153,724	\$ 99,435	\$ 108,485	\$ 70,172	
2047	23	0.634	\$ 202,205	\$ 128,230	\$ 136,111	\$ 86,316	\$ 141,976	\$ 90,035	\$ 81,544	\$ 51,711	\$ 166,288	\$ 105,453	\$ 103,564	\$ 65,676	\$ 99,865	\$ 63,330	\$ 84,719	\$ 53,725	\$ 153,724	\$ 97,485	\$ 107,758	\$ 68,335	
2048	24	0.622	\$ 202,205	\$ 125,715	\$ 135,160	\$ 84,032	\$ 141,976	\$ 88,270	\$ 80,994	\$ 50,355	\$ 166,288	\$ 103,385	\$ 102,865	\$ 63,953	\$ 99,865	\$ 62,089	\$ 84,147	\$ 52,316	\$ 153,724	\$ 95,573	\$ 107,030	\$ 66,543	
2049	25	0.610	1% \$ 204,227	\$ 124,483	\$ 136,511	\$ 83,208	\$ 143,396	\$ 87,404	\$ 81,804	\$ 49,862	\$ 167,951	\$ 102,371	\$ 103,894	\$ 63,326	\$ 100,864	\$ 61,480	\$ 84,989	\$ 51,803	\$ 155,261	\$ 94,636	\$ 108,101	\$ 65,891	
2050	26	0.598	1% \$ 206,249	\$ 123,250	\$ 137,863	\$ 82,384	\$ 144,816	\$ 86,539	\$ 82,614	\$ 48,368	\$ 169,614	\$ 101,358	\$ 104,922	\$ 62,699	\$ 101,863	\$ 60,871	\$ 85,830	\$ 51,290	\$ 156,798	\$ 93,699	\$ 109,171	\$ 65,238	
2051	27	0.586	1% \$ 208,271	\$ 122,018	\$ 139,214	\$ 81,560	\$ 146,236	\$ 85,674	\$ 83,423	\$ 48,875	\$ 171,277	\$ 100,344	\$ 105,951	\$ 62,073	\$ 102,861	\$ 60,263	\$ 86,672	\$ 50,778	\$ 158,335	\$ 92,763	\$ 110,241	\$ 64,586	
2052	28	0.574	1% \$ 210,293	\$ 120,787	\$ 140,566	\$ 80,737	\$ 147,655	\$ 84,810	\$ 84,233	\$ 48,382	\$ 172,940	\$ 99,332	\$ 106,980	\$ 61,446	\$ 103,860	\$ 59,655	\$ 87,513	\$ 50,265	\$ 159,873	\$ 91,827	\$ 111,312	\$ 63,934	
2053	29	0.563	1% \$ 212,315	\$ 119,557	\$ 141,917	\$ 79,915	\$ 149,075	\$ 83,946	\$ 85,043	\$ 47,889	\$ 174,602	\$ 98,321	\$ 108,008	\$ 60,821	\$ 104,859	\$ 59,047	\$ 88,355	\$ 49,754	\$ 161,410	\$ 90,892	\$ 112,382	\$ 63,284	
2054	30	0.552	1% \$ 214,338	\$ 118,330	\$ 143,269	\$ 79,095	\$ 150,495	\$ 83,084	\$ 85,853	\$ 47,397	\$ 176,265	\$ 97,311	\$ 109,037	\$ 60,196	\$ 105,857	\$ 58,441	\$ 89,196	\$ 49,243	\$ 162,947	\$ 89,958	\$ 113,452	\$ 62,634	
2055	31	0.544	1% \$ 216,360	\$ 117,681	\$ 144,621	\$ 78,661	\$ 151,915	\$ 82,628	\$ 86,663	\$ 47,137	\$ 177,928	\$ 96,777	\$ 110,066	\$ 59,866	\$ 106,856	\$ 58,120	\$ 90,038	\$ 48,973	\$ 164,484	\$ 89,465	\$ 114,522	\$ 62,290	
2056	32	0.536	1% \$ 218,382	\$ 117,025	\$ 145,972	\$ 78,223	\$ 153,334	\$ 82,168	\$ 87,473	\$ 46,875	\$ 179,591	\$ 96,238	\$ 111,094	\$ 59,533	\$ 107,855	\$ 57,797	\$ 90,879	\$ 48,700	\$ 166,022	\$ 88,967	\$ 115,593	\$ 61,943	
2057	33	0.528	1% \$ 220,404	\$ 116,363	\$ 147,324	\$ 77,780	\$ 154,754	\$ 81,703	\$ 88,283	\$ 46,609	\$ 181,254	\$ 95,694	\$ 112,123	\$ 59,196	\$ 108,853	\$ 57,470	\$ 91,721	\$ 48,424	\$ 167,559	\$ 88,464	\$ 116,663	\$ 61,593	
2058	34	0.520	1% \$ 222,426	\$ 115,695	\$ 148,675	\$ 77,334	\$ 156,174	\$ 81,234	\$ 89,093	\$ 46,342	\$ 182,917	\$ 95,145	\$ 113,152	\$ 58,856	\$ 109,852	\$ 57,140	\$ 92,562	\$ 48,146	\$ 169,096	\$ 87,956	\$ 117,733	\$ 61,239	
2059	35	0.512	1% \$ 224,448	\$ 115,022	\$ 150,027	\$ 76,884	\$ 157,594	\$ 80,761	\$ 89,903	\$ 46,072	\$ 184,580	\$ 94,591	\$ 114,180	\$ 58,513	\$ 110,851	\$ 56,807	\$ 93,404	\$ 47,866	\$ 170,633	\$ 87,444	\$ 118,804	\$ 60,883	
2060	36	0.505	1% \$ 226,470	\$ 114,343	\$ 151,379	\$ 76,430	\$ 159,014	\$ 80,285	\$ 90,713	\$ 45,800	\$ 186,243	\$ 94,032	\$ 115,209	\$ 58,168	\$ 111,849	\$ 56,472	\$ 94,245	\$ 47,584	\$ 172,171	\$ 86,928	\$ 119,874	\$ 60,523	
2061	37	0.497	1% \$ 228,492	\$ 113,659	\$ 152,730	\$ 75,973	\$ 160,433	\$ 79,804	\$ 91,523	\$ 45,526	\$ 187,905	\$ 93,470	\$ 116,238	\$ 57,820	\$ 112,848	\$ 56,134	\$ 95,087	\$ 47,299	\$ 173,708	\$ 86,408	\$ 120,944	\$ 60,161	
2062	38	0.490	1% \$ 230,514	\$ 112,970	\$ 154,082	\$ 75,512	\$ 161,853	\$ 79,321	\$ 92,333	\$ 45,250	\$ 189,568	\$ 92,904	\$ 117,266	\$ 57,470	\$ 113,847	\$ 55,794	\$ 95,928	\$ 47,012	\$ 175,245	\$ 85,884	\$ 122,015	\$ 59,797	
2063	39	0.483	1% \$ 232,536	\$ 112,277	\$ 155,433	\$ 75,049	\$ 163,273	\$ 78,834	\$ 93,143	\$ 44,973	\$ 191,231	\$ 92,333	\$ 118,295	\$ 57,117	\$ 114,845	\$ 55,452	\$ 96,770	\$ 46,724	\$ 176,782	\$ 85,357	\$ 123,085	\$ 59,430	
2064	40	0.483	1% \$ 234,558	\$ 113,253	\$ 156,785	\$ 75,702	\$ 164,693	\$ 79,520	\$ 93,953	\$ 45,364	\$ 192,894	\$ 93,136	\$ 119,323	\$ 57,614	\$ 115,844	\$ 55,934	\$ 97,611	\$ 47,130	\$ 178,320	\$ 86,099	\$ 124,155	\$ 59,940	

2032

2035

2031

2037

2028

Strategic Response				Strategic Response				Strategic Response				Strategic Response				Strategic Response				Strategic			
Cardrona Valley/Orchard/Studholme				Ardmore/Brownston/SH84				SH84/Aubrey Rd				Kingston/SH6				SH84/Anderson				Brownston/Dungarvon			
Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount	Discounted Amount	Annual Amount			
\$ 26,761	\$ 26,761	\$ 10,756	\$ 10,756	\$ 127,611	\$ 127,611	\$ 226,801	\$ 226,801	\$ 79,072	\$ 79,072	\$ 93,272	\$ 93,272	\$ 116,391	\$ 116,391	\$ 75,624	\$ 75,624	\$ 207,389	\$ 207,389	\$ 252,994	\$ 252,994	\$ 107,209	\$ 107,209	\$ 92,796	
\$ 27,376	\$ 26,839	\$ 11,023	\$ 10,807	\$ 129,200	\$ 126,667	\$ 231,460	\$ 226,921	\$ 81,682	\$ 80,080	\$ 95,397	\$ 93,527	\$ 118,908	\$ 116,577	\$ 76,894	\$ 75,386	\$ 209,271	\$ 205,168	\$ 255,187	\$ 250,184	\$ 108,146	\$ 106,026	\$ 94,485	
\$ 27,992	\$ 26,905	\$ 11,291	\$ 10,852	\$ 130,789	\$ 125,710	\$ 236,118	\$ 226,949	\$ 84,292	\$ 81,019	\$ 97,522	\$ 93,736	\$ 121,425	\$ 116,710	\$ 78,164	\$ 75,128	\$ 211,153	\$ 202,954	\$ 257,381	\$ 247,386	\$ 109,083	\$ 104,847	\$ 96,174	
\$ 28,607	\$ 26,957	\$ 11,558	\$ 10,891	\$ 132,378	\$ 124,743	\$ 240,776	\$ 226,889	\$ 86,901	\$ 81,889	\$ 99,647	\$ 93,900	\$ 123,942	\$ 116,794	\$ 79,433	\$ 74,852	\$ 213,035	\$ 200,748	\$ 259,574	\$ 244,603	\$ 110,019	\$ 103,674	\$ 97,863	
\$ 29,222	\$ 26,997	\$ 11,825	\$ 10,925	\$ 133,967	\$ 123,765	\$ 245,434	\$ 226,743	\$ 89,511	\$ 82,694	\$ 101,772	\$ 94,022	\$ 126,459	\$ 116,829	\$ 80,703	\$ 74,557	\$ 214,917	\$ 198,550	\$ 261,768	\$ 241,833	\$ 110,956	\$ 102,506	\$ 99,551	
\$ 29,986	\$ 27,159	\$ 12,069	\$ 10,932	\$ 134,897	\$ 122,180	\$ 247,841	\$ 224,478	\$ 92,257	\$ 83,560	\$ 102,844	\$ 93,149	\$ 129,382	\$ 117,186	\$ 81,762	\$ 74,054	\$ 215,535	\$ 195,217	\$ 262,004	\$ 237,305	\$ 111,380	\$ 100,880	\$ 100,235	
\$ 30,750	\$ 27,305	\$ 12,313	\$ 10,934	\$ 135,826	\$ 120,609	\$ 250,248	\$ 222,213	\$ 95,004	\$ 84,361	\$ 103,916	\$ 92,274	\$ 132,305	\$ 117,483	\$ 82,820	\$ 73,542	\$ 216,152	\$ 191,937	\$ 262,240	\$ 232,862	\$ 111,805	\$ 99,279	\$ 100,918	
\$ 31,513	\$ 27,434	\$ 12,557	\$ 10,932	\$ 136,755	\$ 119,053	\$ 252,656	\$ 219,952	\$ 97,750	\$ 85,097	\$ 104,987	\$ 91,398	\$ 135,228	\$ 117,725	\$ 83,879	\$ 73,022	\$ 216,770	\$ 188,711	\$ 262,477	\$ 228,502	\$ 112,229	\$ 97,702	\$ 101,602	
\$ 32,277	\$ 27,548	\$ 12,801	\$ 10,925	\$ 137,684	\$ 117,512	\$ 255,063	\$ 217,694	\$ 100,497	\$ 85,773	\$ 106,059	\$ 90,520	\$ 138,152	\$ 117,911	\$ 84,938	\$ 72,494	\$ 217,388	\$ 185,538	\$ 262,713	\$ 224,223	\$ 112,653	\$ 96,148	\$ 102,285	
\$ 33,040	\$ 27,647	\$ 13,045	\$ 10,915	\$ 138,613	\$ 115,985	\$ 257,470	\$ 215,439	\$ 103,243	\$ 86,389	\$ 107,130	\$ 89,842	\$ 141,075	\$ 118,045	\$ 85,997	\$ 71,958	\$ 218,005	\$ 182,417	\$ 262,949	\$ 220,024	\$ 113,077	\$ 94,618	\$ 102,969	
\$ 29,275	\$ 24,016	\$ 13,463	\$ 11,045	\$ 140,169	\$ 114,988	\$ 261,374	\$ 214,418	\$ 105,646	\$ 86,666	\$ 109,533	\$ 89,855	\$ 143,249	\$ 117,514	\$ 87,145	\$ 71,489	\$ 220,360	\$ 180,772	\$ 267,066	\$ 219,087	\$ 114,006	\$ 93,525	\$ 104,158	
\$ 25,509	\$ 20,516	\$ 13,882	\$ 11,165	\$ 141,725	\$ 113,984	\$ 265,279	\$ 213,354	\$ 108,049	\$ 86,900	\$ 111,935	\$ 90,026	\$ 145,423	\$ 116,958	\$ 88,294	\$ 71,011	\$ 222,715	\$ 179,121	\$ 271,183	\$ 218,103	\$ 114,935	\$ 92,438	\$ 105,347	
\$ 21,744	\$ 17,145	\$ 14,300	\$ 11,276	\$ 143,281	\$ 112,976	\$ 269,183	\$ 212,449	\$ 110,451	\$ 87,090	\$ 114,338	\$ 90,155	\$ 147,597	\$ 116,379	\$ 89,442	\$ 70,524	\$ 225,069	\$ 177,466	\$ 275,300	\$ 217,072	\$ 115,864	\$ 91,358	\$ 106,536	
\$ 17,978	\$ 13,988	\$ 14,719	\$ 11,378	\$ 144,837	\$ 111,964	\$ 273,087	\$ 211,105	\$ 112,854	\$ 87,240	\$ 116,741	\$ 90,244	\$ 149,771	\$ 115,778	\$ 90,591	\$ 70,029	\$ 227,424	\$ 175,806	\$ 279,417	\$ 215,999	\$ 116,792	\$ 90,284	\$ 107,724	
\$ 14,213	\$ 10,772	\$ 15,138	\$ 11,472	\$ 146,393	\$ 110,948	\$ 276,992	\$ 209,925	\$ 115,257	\$ 87,351	\$ 119,143	\$ 90,296	\$ 151,946	\$ 115,156	\$ 91,739	\$ 69,527	\$ 229,778	\$ 174,143	\$ 283,534	\$ 214,884	\$ 117,721	\$ 89,218	\$ 108,913	
\$ 14,373	\$ 10,680	\$ 15,282	\$ 11,354	\$ 147,330	\$ 109,468	\$ 278,958	\$ 207,270	\$ 118,369	\$ 87,950	\$ 120,720	\$ 89,697	\$ 153,481	\$ 114,039	\$ 91,728	\$ 68,155	\$ 230,667	\$ 171,389	\$ 284,317	\$ 211,252	\$ 118,291	\$ 87,892	\$ 109,494	
\$ 14,534	\$ 10,587	\$ 15,425	\$ 11,237	\$ 148,267	\$ 108,004	\$ 280,925	\$ 204,639	\$ 122,482	\$ 88,493	\$ 122,297	\$ 89,087	\$ 155,017	\$ 112,922	\$ 91,717	\$ 66,811	\$ 231,555	\$ 168,675	\$ 285,099	\$ 207,679	\$ 118,861	\$ 86,584	\$ 110,075	
\$ 14,694	\$ 10,494	\$ 15,569	\$ 11,119	\$ 149,203	\$ 106,556	\$ 282,892	\$ 202,031	\$ 124,594	\$ 88,980	\$ 123,874	\$ 88,466	\$ 156,553	\$ 111,804	\$ 91,706	\$ 65,493	\$ 232,443	\$ 166,002	\$ 285,882	\$ 204,166	\$ 119,431	\$ 85,293	\$ 110,655	
\$ 14,855	\$ 10,401	\$ 15,713	\$ 11,002	\$ 150,140	\$ 105,122	\$ 284,859	\$ 199,447	\$ 127,706	\$ 89,415	\$ 125,451	\$ 87,835	\$ 158,089	\$ 110,687	\$ 91,694	\$ 64,201	\$ 233,332	\$ 163,369	\$ 286,665	\$ 200,711	\$ 120,002	\$ 84,020	\$ 111,236	
\$ 15,015	\$ 10,307	\$ 15,857	\$ 10,885	\$ 151,077	\$ 103,704	\$ 286,826	\$ 196,886	\$ 130,818	\$ 89,798	\$ 127,027	\$ 87,195	\$ 159,625	\$ 109,571	\$ 91,683	\$ 62,934	\$ 234,220	\$ 160,776	\$ 287,447	\$ 197,313	\$ 120,572	\$ 82,764	\$ 111,817	
\$ 15,015	\$ 10,105	\$ 15,753	\$ 10,601	\$ 151,077	\$ 101,670	\$ 284,786	\$ 191,713	\$ 130,818	\$ 88,037	\$ 126,192	\$ 84,924	\$ 159,625	\$ 107,423	\$ 91,060	\$ 61,281	\$ 234,220	\$ 157,623	\$ 285,558	\$ 192,173	\$ 120,572	\$ 81,141	\$ 111,082	
\$ 15,015	\$ 9,907	\$ 15,649	\$ 10,325	\$ 151,077	\$ 99,677	\$ 282,926	\$ 186,668	\$ 130,818	\$ 86,311	\$ 125,357	\$ 82,707	\$ 159,625	\$ 105,317	\$ 90,438	\$ 59,669	\$ 234,220	\$ 154,533	\$ 283,670	\$ 187,159	\$ 120,572	\$ 79,550	\$ 110,348	
\$ 15,015	\$ 9,712	\$ 15,545	\$ 10,055	\$ 151,077	\$ 97,722	\$ 280,976	\$ 181,746	\$ 130,818	\$ 84,618	\$ 124,521	\$ 80,545	\$ 159,625	\$ 103,252	\$ 89,815	\$ 58,096	\$ 234,220	\$ 151,503	\$ 281,781	\$ 182,267	\$ 120,572	\$ 77,990	\$ 109,613	
\$ 15,015	\$ 9,522	\$ 15,441	\$ 9,792	\$ 151,077	\$ 95,806	\$ 279,026	\$ 176,946	\$ 130,818	\$ 82,959	\$ 123,686	\$ 78,436	\$ 159,625	\$ 101,227	\$ 89,192	\$ 56,562	\$ 234,220	\$ 148,532	\$ 279,893	\$ 177,496	\$ 120,572	\$ 76,461	\$ 108,878	
\$ 15,015	\$ 9,335	\$ 15,337	\$ 9,535	\$ 151,077	\$ 93,928	\$ 277,076	\$ 172,264	\$ 130,818	\$ 81,333	\$ 122,851	\$ 76,379	\$ 159,625	\$ 99,242	\$ 88,569	\$ 55,065	\$ 234,220	\$ 145,620	\$ 278,004	\$ 172,841	\$ 120,572	\$ 74,962	\$ 108,144	
\$ 15,165	\$ 9,244	\$ 15,490	\$ 9,442	\$ 152,588	\$ 93,007	\$ 279,847	\$ 170,575	\$ 132,125	\$ 80,535	\$ 124,079	\$ 75,630	\$ 161,221	\$ 98,269	\$ 89,455	\$ 54,526	\$ 236,562	\$ 144,192	\$ 280,784	\$ 171,147	\$ 121,777	\$ 74,227	\$ 109,225	
\$ 15,315	\$ 9,152	\$ 15,643	\$ 9,348	\$ 154,098	\$ 92,086	\$ 282,618	\$ 168,887	\$ 133,435	\$ 79,738	\$ 125,308	\$ 74,881	\$ 162,817	\$ 97,296	\$ 90,341	\$ 53,986	\$ 238,904	\$ 142,764	\$ 283,584	\$ 169,452	\$ 122,983	\$ 73,492	\$ 110,307	
\$ 15,465	\$ 9,061	\$ 15,797	\$ 9,255	\$ 155,609	\$ 91,165	\$ 285,389	\$ 167,198	\$ 134,743	\$ 78,941	\$ 126,536	\$ 74,133	\$ 164,414	\$ 96,324	\$ 91,226	\$ 53,446	\$ 241,247	\$ 141,337	\$ 286,344	\$ 167,758	\$ 124,189	\$ 72,757	\$ 111,388	
\$ 15,616	\$ 8,969	\$ 15,950	\$ 9,161	\$ 157,120	\$ 90,246	\$ 288,159	\$ 165,511	\$ 136,051	\$ 78,144	\$ 127,765	\$ 73,385	\$ 166,010	\$ 95,352	\$ 92,112	\$ 52,907	\$ 243,589	\$ 139,911	\$ 289,124	\$ 166,066	\$ 125,394	\$ 72,023	\$ 112,469	
\$ 15,766	\$ 8,878	\$ 16,103	\$ 9,068	\$ 158,631	\$ 89,327	\$ 290,930	\$ 163,826	\$ 137,359	\$ 77,349	\$ 128,994	\$ 72,638	\$ 167,606	\$ 94,381	\$ 92,998	\$ 52,368	\$ 245,931	\$ 138,487	\$ 291,904	\$ 164,375	\$ 126,600	\$ 71,290	\$ 113,551	
\$ 15,916	\$ 8,787	\$ 16,257	\$ 8,975	\$ 160,141	\$ 88,409	\$ 293,701	\$ 162,144	\$ 138,667	\$ 76,554	\$ 130,222	\$ 71,892	\$ 168,202	\$ 93,412	\$ 93,883	\$ 51,830	\$ 248,273	\$ 137,064	\$ 294,684	\$ 162,687	\$ 127,806	\$ 70,558	\$ 114,632	
\$ 16,066	\$ 8,739	\$ 16,410	\$ 8,926	\$ 161,652	\$ 87,925	\$ 296,472	\$ 161,255	\$ 139,976	\$ 76,134	\$ 131,451	\$ 71,498	\$ 170,799	\$ 92,899	\$ 94,769	\$ 51,546	\$ 250,615	\$ 136,313	\$ 297,464	\$ 161,794	\$ 129,012	\$ 70,171	\$ 115,714	
\$ 16,216	\$ 8,690	\$ 16,564	\$ 8,876	\$ 163,163	\$ 87,435	\$ 299,242	\$ 160,356	\$ 141,284	\$ 75,710	\$ 132,679	\$ 71,099	\$ 172,395	\$ 92,382	\$ 95,655	\$ 51,259	\$ 252,958	\$ 135,553	\$ 300,244	\$ 160,893	\$ 130,217	\$ 69,780	\$ 116,795	
\$ 16,366	\$ 8,641	\$ 16,717	\$ 8,826	\$ 164,674	\$ 86,940	\$ 302,013	\$ 159,449	\$ 142,592	\$ 75,282	\$ 133,908	\$ 70,697	\$ 173,991	\$ 91,859	\$ 96,541	\$ 50,969	\$ 255,300	\$ 134,787	\$ 303,024	\$ 159,983	\$ 131,423	\$ 69,385	\$ 117,877	
\$ 16,517	\$ 8,591	\$ 16,870	\$ 8,775	\$ 166,184	\$ 86,441	\$ 304,784	\$ 158,534	\$ 143,900	\$ 74,850	\$ 135,136	\$ 70,291	\$ 175,587	\$ 91,332	\$ 97,426	\$ 50,677	\$ 257,642	\$ 134,013	\$ 305,804	\$ 159,065	\$ 132,629	\$ 68,987	\$ 118,958	
\$ 16,667	\$ 8,541	\$ 17,024	\$ 8,724	\$ 167,695	\$ 85,938	\$ 307,555	\$ 157,611	\$ 145,208	\$ 74,414	\$ 136,365	\$ 69,882	\$ 177,183	\$ 90,800	\$ 98,312	\$ 50,381	\$ 259,984	\$ 133,233	\$ 308,584	\$ 158,139	\$ 133,834	\$ 68,586	\$ 120,039	
\$ 16,817	\$ 8,491	\$ 17,177	\$ 8,673	\$ 169,206	\$ 85,431	\$ 310,325	\$ 156,681	\$ 146,516	\$ 73,975	\$ 137,593	\$ 69,470	\$ 178,780	\$ 90,264	\$ 99,198	\$ 50,084	\$ 262,326	\$ 132,447	\$ 311,364	\$ 157,205	\$ 135,040	\$ 68,181	\$ 121,121	
\$ 16,967	\$ 8,440	\$ 17,330	\$ 8,621	\$ 170,717	\$ 84,920	\$ 313,096	\$ 155,744	\$ 147,825	\$ 73,533	\$ 138,822	\$ 69,054	\$ 180,376	\$ 89,725	\$ 100,083	\$ 49,785	\$ 264,669	\$ 131,654	\$ 314,145	\$ 156,265	\$ 136,246	\$ 67,773	\$ 122,202	
\$ 17,117	\$ 8,389	\$ 17,484	\$ 8,568	\$ 172,228	\$ 84,405	\$ 315,867	\$ 154,800	\$ 149,133	\$ 73,087	\$ 140,050	\$ 68,636	\$ 181,972	\$ 89,181	\$ 100,969	\$ 49,483	\$ 267,011	\$ 130,857	\$ 316,925	\$ 155,318	\$ 137,452	\$ 67,362	\$ 123,284	
\$ 17,267	\$ 8,337	\$ 17,637	\$ 8,516	\$ 173,738	\$ 83,887	\$ 318,638	\$ 153,850	\$ 150,441	\$ 72,638	\$ 141,279	\$ 68,215	\$ 183,568	\$ 88,634	\$ 101,855	\$ 49,179	\$ 269,353	\$ 130,054	\$ 319,705	\$ 154,365	\$ 138,657	\$ 66,949	\$ 124,365	
\$ 17,417	\$ 8,280	\$ 17,790	\$ 8,460	\$ 175,249	\$ 83,367	\$ 321,409	\$ 152,897	\$ 151,749	\$ 72,170	\$ 142,507	\$ 67,700	\$ 185,165	\$ 88,008	\$ 102,740	\$ 48,877	\$ 271,695	\$ 131,184	\$ 322,485	\$ 153,707	\$ 139,863	\$ 66,531	\$ 125,447	

2033

2033

2036

2034

DM NPV
\$ 257,226,589

OPTION NPV
\$ 236,262,116

Benefit
\$ 20,964,473

Response	Do Minimum				Strategic Response				Do Minimum				Strategic Response				Do Minimum				Strategic Response											
	Riverbank Road - Three Parks Link								Aubrey/Anderson								Anderson-Link								General Crashes							
	Annual		Discounted		Annual		Discounted		Annual		Discounted		Annual		Discounted		Annual		Discounted		Annual		Discounted		Annual		Discounted					
	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount				
\$ 92,796	\$ -	\$ -	\$ -	\$ -	\$ 46,198	\$ 46,198	\$ 65,791	\$ 65,791	\$ 94,148	\$ 94,148	\$ 89,313	\$ 89,313	\$ 89,877	\$ 89,877	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444	\$ 4,593,444					
\$ 92,632	\$ -	\$ -	\$ -	\$ -	\$ 47,999	\$ 47,058	\$ 66,287	\$ 64,987	\$ 95,267	\$ 93,399	\$ 90,316	\$ 88,545	\$ 90,884	\$ 89,102	\$ 4,771,833	\$ 4,678,267	\$ 4,771,833	\$ 4,678,267	\$ 4,771,833	\$ 4,678,267	\$ 4,771,833	\$ 4,678,267	\$ 4,771,833	\$ 4,678,267	\$ 4,771,833	\$ 4,678,267	\$ 4,771,833					
\$ 92,439	\$ -	\$ -	\$ -	\$ -	\$ 49,800	\$ 47,866	\$ 66,783	\$ 64,190	\$ 96,386	\$ 92,644	\$ 91,318	\$ 87,772	\$ 91,890	\$ 88,322	\$ 4,950,221	\$ 4,757,998	\$ 4,950,221	\$ 4,757,998	\$ 4,950,221	\$ 4,757,998	\$ 4,950,221	\$ 4,757,998	\$ 4,950,221	\$ 4,757,998	\$ 4,950,221	\$ 4,757,998	\$ 4,950,221					
\$ 92,218	\$ -	\$ -	\$ -	\$ -	\$ 51,601	\$ 48,625	\$ 67,279	\$ 63,398	\$ 97,505	\$ 91,881	\$ 92,321	\$ 86,996	\$ 92,897	\$ 87,539	\$ 5,128,610	\$ 4,832,804	\$ 5,128,610	\$ 4,832,804	\$ 5,128,610	\$ 4,832,804	\$ 5,128,610	\$ 4,832,804	\$ 5,128,610	\$ 4,832,804	\$ 5,128,610	\$ 4,832,804	\$ 5,128,610					
\$ 91,970	\$ -	\$ -	\$ -	\$ -	\$ 53,402	\$ 49,335	\$ 67,775	\$ 62,613	\$ 98,624	\$ 91,114	\$ 93,324	\$ 86,217	\$ 93,903	\$ 86,752	\$ 5,306,999	\$ 4,902,847	\$ 5,306,999	\$ 4,902,847	\$ 5,306,999	\$ 4,902,847	\$ 5,306,999	\$ 4,902,847	\$ 5,306,999	\$ 4,902,847	\$ 5,306,999	\$ 4,902,847	\$ 5,306,999					
\$ 90,786	\$ -	\$ -	\$ -	\$ -	\$ 55,406	\$ 50,183	\$ 67,979	\$ 61,571	\$ 98,620	\$ 89,323	\$ 92,793	\$ 84,046	\$ 93,342	\$ 84,543	\$ 5,437,973	\$ 4,925,339	\$ 5,395,266	\$ 4,886,659	\$ 5,395,266	\$ 4,886,659	\$ 5,395,266	\$ 4,886,659	\$ 5,395,266	\$ 4,886,659	\$ 5,395,266	\$ 4,886,659	\$ 5,395,266					
\$ 89,613	\$ -	\$ -	\$ -	\$ -	\$ 57,410	\$ 50,979	\$ 68,184	\$ 60,545	\$ 98,616	\$ 87,568	\$ 92,263	\$ 81,927	\$ 92,781	\$ 82,387	\$ 5,568,947	\$ 4,945,065	\$ 5,483,533	\$ 4,869,220	\$ 5,483,533	\$ 4,869,220	\$ 5,483,533	\$ 4,869,220	\$ 5,483,533	\$ 4,869,220	\$ 5,483,533	\$ 4,869,220	\$ 5,483,533					
\$ 88,451	\$ -	\$ -	\$ -	\$ -	\$ 59,414	\$ 51,724	\$ 68,388	\$ 59,536	\$ 98,612	\$ 85,848	\$ 91,732	\$ 79,858	\$ 92,219	\$ 80,282	\$ 5,699,920	\$ 4,962,124	\$ 5,571,800	\$ 4,850,587	\$ 5,571,800	\$ 4,850,587	\$ 5,571,800	\$ 4,850,587	\$ 5,571,800	\$ 4,850,587	\$ 5,571,800	\$ 4,850,587	\$ 5,571,800					
\$ 87,300	\$ -	\$ -	\$ -	\$ -	\$ 61,419	\$ 52,420	\$ 68,593	\$ 58,543	\$ 98,608	\$ 84,161	\$ 91,201	\$ 77,839	\$ 91,658	\$ 78,229	\$ 5,830,894	\$ 4,976,612	\$ 5,660,067	\$ 4,830,813	\$ 5,660,067	\$ 4,830,813	\$ 5,660,067	\$ 4,830,813	\$ 5,660,067	\$ 4,830,813	\$ 5,660,067	\$ 4,830,813	\$ 5,660,067					
\$ 86,160	\$ -	\$ -	\$ -	\$ -	\$ 63,423	\$ 53,069	\$ 68,797	\$ 57,566	\$ 98,604	\$ 82,508	\$ 90,671	\$ 75,869	\$ 91,097	\$ 76,226	\$ 5,961,868	\$ 4,988,624	\$ 5,748,334	\$ 4,809,949	\$ 5,748,334	\$ 4,809,949	\$ 5,748,334	\$ 4,809,949	\$ 5,748,334	\$ 4,809,949	\$ 5,748,334	\$ 4,809,949	\$ 5,748,334					
\$ 85,446	\$ -	\$ -	\$ -	\$ -	\$ 68,311	\$ 56,039	\$ 69,447	\$ 56,971	\$ 99,696	\$ 81,785	\$ 92,542	\$ 75,917	\$ 92,314	\$ 75,730	\$ 6,249,213	\$ 5,126,531	\$ 5,982,572	\$ 4,907,793	\$ 5,982,572	\$ 4,907,793	\$ 5,982,572	\$ 4,907,793	\$ 5,982,572	\$ 4,907,793	\$ 5,982,572	\$ 4,907,793	\$ 5,982,572					
\$ 84,726	\$ -	\$ -	\$ -	\$ -	\$ 73,200	\$ 58,872	\$ 70,098	\$ 56,377	\$ 100,787	\$ 81,059	\$ 94,414	\$ 75,934	\$ 93,532	\$ 75,225	\$ 6,536,558	\$ 5,257,112	\$ 6,216,810	\$ 4,999,950	\$ 6,216,810	\$ 4,999,950	\$ 6,216,810	\$ 4,999,950	\$ 6,216,810	\$ 4,999,950	\$ 6,216,810	\$ 4,999,950	\$ 6,216,810					
\$ 84,003	\$ -	\$ -	\$ -	\$ -	\$ 78,088	\$ 61,572	\$ 70,748	\$ 55,784	\$ 101,879	\$ 80,331	\$ 96,286	\$ 75,921	\$ 94,750	\$ 74,710	\$ 6,823,903	\$ 5,380,601	\$ 6,451,048	\$ 5,086,607	\$ 6,451,048	\$ 5,086,607	\$ 6,451,048	\$ 5,086,607	\$ 6,451,048	\$ 5,086,607	\$ 6,451,048	\$ 5,086,607	\$ 6,451,048					
\$ 83,274	\$ -	\$ -	\$ -	\$ -	\$ 82,977	\$ 64,144	\$ 71,398	\$ 55,193	\$ 102,970	\$ 79,599	\$ 98,157	\$ 75,879	\$ 95,968	\$ 74,186	\$ 7,111,248	\$ 5,497,226	\$ 6,685,286	\$ 5,167,943	\$ 6,685,286	\$ 5,167,943	\$ 6,685,286	\$ 5,167,943	\$ 6,685,286	\$ 5,167,943	\$ 6,685,286	\$ 5,167,943	\$ 6,685,286					
\$ 82,543	\$ -	\$ -	\$ -	\$ -	\$ 87,866	\$ 66,591	\$ 72,049	\$ 54,604	\$ 104,062	\$ 78,866	\$ 100,029	\$ 75,810	\$ 97,186	\$ 73,655	\$ 7,398,593	\$ 5,607,209	\$ 6,919,524	\$ 5,244,134	\$ 6,919,524	\$ 5,244,134	\$ 6,919,524	\$ 5,244,134	\$ 6,919,524	\$ 5,244,134	\$ 6,919,524	\$ 5,244,134	\$ 6,919,524					
\$ 81,356	\$ -	\$ -	\$ -	\$ -	\$ 89,459	\$ 66,469	\$ 72,468	\$ 53,845	\$ 104,551	\$ 77,683	\$ 99,760	\$ 74,123	\$ 97,087	\$ 72,137	\$ 7,601,146	\$ 5,647,763	\$ 7,044,596	\$ 5,234,239	\$ 7,044,596	\$ 5,234,239	\$ 7,044,596	\$ 5,234,239	\$ 7,044,596	\$ 5,234,239	\$ 7,044,596	\$ 5,234,239	\$ 7,044,596					
\$ 80,183	\$ -	\$ -	\$ -	\$ -	\$ 91,052	\$ 66,326	\$ 72,887	\$ 53,094	\$ 105,040	\$ 76,516	\$ 99,491	\$ 72,474	\$ 96,989	\$ 70,651	\$ 7,803,698	\$ 5,684,571	\$ 7,169,668	\$ 5,222,715	\$ 7,169,668	\$ 5,222,715	\$ 7,169,668	\$ 5,222,715	\$ 7,169,668	\$ 5,222,715	\$ 7,169,668	\$ 5,222,715	\$ 7,169,668					
\$ 79,026	\$ -	\$ -	\$ -	\$ -	\$ 92,645	\$ 66,164	\$ 73,306	\$ 52,352	\$ 105,529	\$ 75,365	\$ 99,223	\$ 70,861	\$ 96,890	\$ 69,195	\$ 8,006,251	\$ 5,717,765	\$ 7,294,741	\$ 5,209,631	\$ 7,294,741	\$ 5,209,631	\$ 7,294,741	\$ 5,209,631	\$ 7,294,741	\$ 5,209,631	\$ 7,294,741	\$ 5,209,631	\$ 7,294,741					
\$ 77,883	\$ -	\$ -	\$ -	\$ -	\$ 94,238	\$ 65,982	\$ 73,725	\$ 51,619	\$ 106,018	\$ 74,230	\$ 98,954	\$ 69,283	\$ 96,791	\$ 67,769	\$ 8,208,804	\$ 5,747,471	\$ 7,419,813	\$ 5,195,052	\$ 7,419,813	\$ 5,195,052	\$ 7,419,813	\$ 5,195,052	\$ 7,419,813	\$ 5,195,052	\$ 7,419,813	\$ 5,195,052	\$ 7,419,813					
\$ 76,755	\$ -	\$ -	\$ -	\$ -	\$ 95,831	\$ 65,781	\$ 74,144	\$ 50,895	\$ 106,507	\$ 73,110	\$ 98,685	\$ 67,740	\$ 96,693	\$ 66,373	\$ 8,411,356	\$ 5,773,814	\$ 7,544,885	\$ 5,179,041	\$ 7,544,885	\$ 5,179,041	\$ 7,544,885	\$ 5,179,041	\$ 7,544,885	\$ 5,179,041	\$ 7,544,885	\$ 5,179,041	\$ 7,544,885					
\$ 74,755	\$ -	\$ -	\$ -	\$ -	\$ 95,200	\$ 64,067	\$ 74,144	\$ 49,897	\$ 105,807	\$ 71,205	\$ 98,685	\$ 66,412	\$ 96,057	\$ 64,644	\$ 8,411,356	\$ 5,660,602	\$ 7,460,353	\$ 5,020,604	\$ 7,460,353	\$ 5,020,604	\$ 7,460,353	\$ 5,020,604	\$ 7,460,353	\$ 5,020,604	\$ 7,460,353	\$ 5,020,604	\$ 7,460,353					
\$ 72,805	\$ -	\$ -	\$ -	\$ -	\$ 94,569	\$ 62,394	\$ 74,144	\$ 48,918	\$ 105,107	\$ 69,347	\$ 98,685	\$ 65,110	\$ 95,422	\$ 62,957	\$ 8,411,356	\$ 5,549,609	\$ 7,375,822	\$ 4,866,389	\$ 7,375,822	\$ 4,866,389	\$ 7,375,822	\$ 4,866,389	\$ 7,375,822	\$ 4,866,389	\$ 7,375,822	\$ 4,866,389	\$ 7,375,822					
\$ 70,902	\$ -	\$ -	\$ -	\$ -	\$ 93,938	\$ 60,763	\$ 74,144	\$ 47,959	\$ 104,407	\$ 67,535	\$ 98,685	\$ 63,833	\$ 94,786	\$ 61,312	\$ 8,411,356	\$ 5,440,794	\$ 7,291,290	\$ 4,716,291	\$ 7,291,290	\$ 4,716,291	\$ 7,291,290	\$ 4,716,291	\$ 7,291,290	\$ 4,716,291	\$ 7,291,290	\$ 4,716,291	\$ 7,291,290					
\$ 69,046	\$ -	\$ -	\$ -	\$ -	\$ 93,307	\$ 59,171	\$ 74,144	\$ 47,019	\$ 103,707	\$ 65,767	\$ 98,685	\$ 62,582	\$ 94,151	\$ 59,706	\$ 8,411,356	\$ 5,334,111	\$ 7,206,758	\$ 4,570,208	\$ 7,206,758	\$ 4,570,208	\$ 7,206,758	\$ 4,570,208	\$ 7,206,758	\$ 4,570,208	\$ 7,206,758	\$ 4,570,208	\$ 7,206,758					
\$ 67,235	\$ -	\$ -	\$ -	\$ -	\$ 92,676	\$ 57,619	\$ 74,144	\$ 46,097	\$ 103,007	\$ 64,042	\$ 98,685	\$ 61,355	\$ 93,516	\$ 58,141	\$ 8,411,356	\$ 5,229,521	\$ 7,122,226	\$ 4,428,041	\$ 7,122,226	\$ 4,428,041	\$ 7,122,226	\$ 4,428,041	\$ 7,122,226	\$ 4,428,041	\$ 7,122,226	\$ 4,428,041	\$ 7,122,226					
\$ 66,576	\$ -	\$ -	\$ -	\$ -	\$ 93,603	\$ 57,054	\$ 74,885	\$ 45,645	\$ 104,037	\$ 63,414	\$ 99,672	\$ 60,753	\$ 94,451	\$ 57,571	\$ 8,495,470	\$ 5,178,251	\$ 7,193,448	\$ 4,384,629	\$ 7,193,448	\$ 4,384,629	\$ 7,193,448	\$ 4,384,629	\$ 7,193,448	\$ 4,384,629	\$ 7,193,448	\$ 4,384,629	\$ 7,193,448					
\$ 65,917	\$ -	\$ -	\$ -	\$ -	\$ 94,530	\$ 56,489	\$ 75,627	\$ 45,193	\$ 105,068	\$ 62,786	\$ 100,659	\$ 60,152	\$ 95,386	\$ 57,001	\$ 8,579,583	\$ 5,126,981	\$ 7,264,671	\$ 4,341,217	\$ 7,264,671	\$ 4,341,217	\$ 7,264,671	\$ 4,341,217	\$ 7,264,671	\$ 4,341,217	\$ 7,264,671	\$ 4,341,217	\$ 7,264,671					
\$ 65,258	\$ -	\$ -	\$ -	\$ -	\$ 95,457	\$ 55,925	\$ 76,368	\$ 44,741	\$ 106,098	\$ 62,159	\$ 101,646	\$ 59,550	\$ 96,321	\$ 56,431	\$ 8,663,697	\$ 5,075,731	\$ 7,335,893	\$ 4,297,821	\$ 7,335,893	\$ 4,297,821	\$ 7,335,893	\$ 4,297,821	\$ 7,335,893	\$ 4,297,821	\$ 7,335,893	\$ 4,297,821	\$ 7,335,893					
\$ 64,940	\$ -	\$ -	\$ -	\$ -	\$ 96,384	\$ 55,360	\$ 77,109	\$ 44,290	\$ 107,128	\$ 61,531	\$ 102,632	\$ 58,949	\$ 97,256	\$ 55,861	\$ 8,747,810	\$ 5,024,520	\$ 7,407,115	\$ 4,254,459	\$ 7,407,115	\$ 4,254,459	\$ 7,407,115	\$ 4,254,459	\$ 7,407,115	\$ 4,254,459	\$ 7,407,115	\$ 4,254,459	\$ 7,407,115					
\$ 63,942	\$ -	\$ -	\$ -	\$ -	\$ 97,310	\$ 54,797	\$ 77,851	\$ 43,839	\$ 108,15																							

Do Minimum		Strategic Response	
Safety- Benefit		Safety-	
Annual Amount	Discounted Amount	Annual Amount	
\$ 5,970,440	\$ 5,970,440	\$ 5,970,440	
\$ 6,173,125	\$ 6,052,084	\$ 6,173,125	
\$ 6,375,810	\$ 6,128,230	\$ 6,375,810	
\$ 6,578,495	\$ 6,199,063	\$ 6,578,495	
\$ 6,781,180	\$ 6,264,762	\$ 6,781,180	
\$ 6,930,722	\$ 6,277,368	\$ 6,934,484	
\$ 7,080,263	\$ 6,287,071	\$ 6,984,352	
\$ 7,229,805	\$ 6,293,980	\$ 7,071,614	
\$ 7,379,346	\$ 6,298,201	\$ 7,142,186	
\$ 7,528,888	\$ 6,299,837	\$ 7,164,861	
\$ 7,836,797	\$ 6,428,903	\$ 7,478,926	
\$ 8,144,706	\$ 6,550,486	\$ 7,738,795	
\$ 8,452,615	\$ 6,664,829	\$ 8,124,793	
\$ 8,760,524	\$ 6,772,170	\$ 8,408,542	
\$ 9,068,433	\$ 6,872,739	\$ 8,610,081	
\$ 9,286,660	\$ 6,900,125	\$ 8,746,518	
\$ 9,504,888	\$ 6,923,796	\$ 8,882,956	
\$ 9,723,115	\$ 6,943,885	\$ 9,019,393	
\$ 9,941,343	\$ 6,960,524	\$ 9,155,830	
\$ 10,159,570	\$ 6,973,842	\$ 9,292,268	
\$ 10,159,570	\$ 6,837,100	\$ 9,196,135	
\$ 10,159,570	\$ 6,703,039	\$ 9,100,002	
\$ 10,159,570	\$ 6,571,607	\$ 9,003,869	
\$ 10,159,570	\$ 6,442,752	\$ 8,907,736	
\$ 10,159,570	\$ 6,316,423	\$ 8,811,602	
\$ 10,261,166	\$ 6,254,497	\$ 8,899,718	
\$ 10,362,762	\$ 6,192,572	\$ 8,987,834	
\$ 10,464,357	\$ 6,130,670	\$ 9,075,950	
\$ 10,565,953	\$ 6,068,815	\$ 9,164,067	
\$ 10,667,549	\$ 6,007,028	\$ 9,252,183	
\$ 10,769,145	\$ 5,945,331	\$ 9,340,299	
\$ 10,870,740	\$ 5,912,728	\$ 9,428,415	
\$ 10,972,336	\$ 5,879,791	\$ 9,516,531	
\$ 11,073,932	\$ 5,846,535	\$ 9,604,647	
\$ 11,175,527	\$ 5,812,978	\$ 9,692,763	
\$ 11,277,123	\$ 5,779,137	\$ 9,780,879	
\$ 11,378,719	\$ 5,745,025	\$ 9,868,995	
\$ 11,480,314	\$ 5,710,660	\$ 9,957,111	
\$ 11,581,910	\$ 5,676,056	\$ 10,045,227	
\$ 11,683,506	\$ 5,641,228	\$ 10,133,343	
\$ 11,785,102	\$ 5,606,282	\$ 10,221,459	

Walking and Cycling Benefit Inputs

	1	2	3	4	5	6	7
	Corridor Name	Location	Cycling Facility Description	Cycling Facility (MBCM)	Width	Length (km)	New and Existing Cyclists
1	Avalon Station Connection (indica	New road to connect to Three Parks	Shared Path (one side)	Off-street cycle path	3m		Part of the Do Minimum
2	Schools to Pools Extension	Ballantyne Road to Pool	Shared Path (one side)	Off-street cycle path	3m		Part of the Do Minimum
3	Lakefront SP Stage 4						Assumes all of cyclists from Wanaka Waterfront and 20% from Wanaka North and Wanaka Central
4	Aubrey Road	Between Rata St & Lakeside	Shared Path (one side)	Off-street cycle path	3m	0.7	282
5	SH84 & SH6	Sir Tin Wallace to Aubrey	Shared Path (one side)	Off-street cycle path / On-street with parking	3m		Parallel to existing cycle track and so benefits limited and excluded.
6 & 7	SH84 & Ardmore	Anderson to Lakefront	Shared Path (one side) / Cycle Lanes				Parallel to existing cycle track and so benefits limited and excluded.
8	Ballantyne Rd (Three Parks)	Gold Course to Riverbank	Shared Path (one side)	Off-street cycle path	3m	0.9	231
9	Beacon Point Rd	from Lakeside to end of Perith Park	Shared Path (one side)	Off-street cycle path	3m	3.7	282
10	Brownston St	From SH84 to McDougall	Shared Path (one side)	Off-street cycle path	3m	1.1	231
11	Cardrona Valley Rd	Between McDougall and Orchard	Shared Path (one side)	Off-street cycle path	3m	0.4	152
12	Tim Wallis Dr & Sir Cliff Skeggs	New connections at Three Parks	Shared Path (one side)	Off-street cycle path	3m	1.8	122
13, 15, 23	Riverbank Rd	From SH6 to Cardrona	Shared Path (one side)	Off-street cycle path	3m	5	157
14 & 26	Wanaka Mount Aspiring Road (to	To Glendhu Bay Township via Wanz	Shared Path (one side)	Off-street cycle path	3m	5	103
16	McDougall St	Between Brownston to Cardrona Val	Shared Path (one side)	Off-street cycle path	3m	1.2	231
17	Northlake E-W Connection (indica	New road	Shared Path (one side)	Off-street cycle path	3m	2	88
18	Orchard Road	Between Riverbank and Cardrona	Shared Path (one side)	Off-street cycle path	3m	1.1	31
19	Western Wanaka Shared Paths	Meadowstone / West Meadow	Shared Path (one side)	Off-street cycle path	3m	2.4	104
20	Aubrey Rd / Gunn Rd	From SH6 to end of Gunn	Shared Path (one side)	Off-street cycle path	3m	2.7	180
21	SH6 Albert Town	To Albert Town bridge via SH6	Shared Path (one side)	Off-street cycle path	3m	2.5	180
22	Cardrona Valley Rd (to Riverbank)	Between Orchard to Riverbank	Shared Path (one side)	Off-street cycle path	3m	2.1	59
24	Northlake N-S Connection (indica	New road	Shared Path (one side)	Off-street cycle path	3m	1.8	88
25	SH6 (to Luggate)	To Luggate Township via SH6	Shared Path (one side)	Off-street cycle path	3m	10	11
27	Cardrona Valley to Cardrona	From Riverbank to Cardrona Townsl	Shared Path (one side)	Off-street cycle path	3m	17	11

Mode Share Split for Travel to Work and Education (extract from Waka Commute / Census 2018)						Refer to link:	Commuter View DataSet - Wanakav2.xlsx
Wanaka Trips	Work/Study from home	Private Vehicle	Passenger	Public Transport	Cycle	Walk	Total
Trips	1344	2031	774	489	414	2031	504
Percentage	20%	42%	11%	7%	8.0%	7%	6888

DO MIN Census areas used: Wanaka West, Wanaka Central, Albert Town, Wanaka North, Wanaka Waterfront

Growth Rate	2%						
Cycling Growth Rate:							

Strategic Responses	1344	0.791	0.613	0	398	834	6295
		2,616	530		971	13%	
		89.3%			15%		
		10.7% Reduction in Vehicle Trips.					

Do Min Mode Share:	57%	15%	10%	8%	10%
Strategic Response Mode Share:	53%	11%	0%	20%	17%

Existing Cycling Routes - Sensitivity Test

OLD SP11 Sensitivity Test - Previous Approach MBCM 1.4			
Buffers	<0.4	0.4 to <0.8	0.8 to <= 1.6
Population in each Buffer	2,737	5,404	7,322
Population in each buffer (annular shape)	2,737	2,667	1,918
Likelihood of new cyclist multiplier	1.04	0.54	0.21

Weighted Residents	4,689	SP11 calc
Actual Cyclists	0	Actual Cyclists
Mode Share	6.0%	
Cyclists Rate	6.1%	5 * .96 + 0.032%
New Daily Cyclists	286	
Total Cyclists	286	

		1.04	0.54	0.21			
2018 Census	Population	Population within 400m of proposed cycle lanes	Population within 800m of proposed cycle lanes	Population within 1600m of proposed	Weighted Cyclists Potential	Proportion of Cyclists	
Wanaka Waterfront	2121	20%	50%	80%	829	20%	
Wanaka North	2412	45%	70%	95%	1353	33%	
Albert Town	2031	30%	80%	100%	1139	28%	
Wanaka Central	1263	45%	75%	90%	716	17%	
Wanaka West	1,725	0%	0%	0%	0	0%	
Cardrona	7633	0%	0%	0%	0	0%	
Upper Cultha Valley	1,257	3%	5%	10%	58	1%	
Outer Wanaka	399	3%	5%	10%	18	0%	
Total	18841	2736.93	5403.75	7321.5			

MBCM Table 35 Relative Attractiveness

Facility Types	Facility Types
On-street with parking (no marked cycle lane)	1
On-street with parking (marked cycle lane)	1.8
On-street without parking (marked cycle lane)	1.9
Off-street cycle path	2
Footpath	
NA	0

Existing and Proposed Cycling Network Wanaka



New and Existing Cyclists based on Strategic Response

OLD SP11 Sensitivity Test - Previous Approach MBCM 1.4			
Buffers	<0.4	0.4 to <0.8	0.8 to <= 1.6
Population in each Buffer	7,736	9,693	9,909
Population in each buffer (annular shape)	7,736	1,957	216
Likelihood of new cyclist multiplier	1.04	0.54	0.21

Weighted Residents	9,148	SP11 calc
Actual Cyclists	414	Used 2018 Census numbers
Mode Share	6.0%	2018 Census
Cyclists Rate	6.1%	5 * .96 + 0.032%
New Daily Cyclists	557	
Total Cyclists	971	135%

New and Existing pedestrians based on Strategic Response

Actual Pedestrians	504
New Daily Pedestrians	330
Total Pedestrians	834

		1.04	0.54	0.21			
2018 Census	Population	Population within 400m of proposed cycle lanes	Population within 800m of proposed cycle lanes	Population within 1600m of proposed cycle lanes	Cycle Distance	Weighted Cyclists	Proportion of Cyclists
Wanaka Waterfront	2121	80%	100%	100%	2.3	1637	22%
Wanaka North	2412	60%	100%	100%	2.7	1722	23%
Albert Town	2031	95%	100%	100%	3	1656	22%
Wanaka Central	1263	90%	100%	100%	2	1012	13%
Wanaka West	1,725	80%	95%	100%	0.6	1303	17%
Cardrona	633	10%	15%	25%	3	83	1%
Upper Cultha Valley	1,257	5%	8%	12%	3	83	1%
Outer Wanaka	399	5%	8%	12%	3	26	0%
Total	11841	7736	9693	9909	2.23		

211	Wanaka Waterfr
222	Wanaka North
214	Albert Town
131	Wanaka Central
168	Wanaka West
11	Cardrona
11	Upper Cultha Va
3	Outer Wanaka

CYCLING BENEFITS

OUTPUTS

Option	Total Cycling TT cost savings for all users
Do Minimum (Full Cycle Network)	\$ 2,347,753
Strategic Response (Full Cycle Network)	\$ 1,312,536
Benefit	\$1,035,217

Table 14: Equalised values of travel time for all road categories, all time periods, all users* (\$/hr/person July 2021)

Vehicle occupants, pedestrians, cyclists	Work travel purpose	Commuting to/from work	Other non-work travel purposes
Values of time for uncongested traffic (\$/h/person)	37.92	19.53	18.91
Maximum increments for congestion (\$/h/person)	26.34	16.65	14.83

* All users means: vehicle drivers and passengers, sitting and standing PT users, pedestrians and cyclists

Different types of pedestrian and cycling facilities

Where a quality improvement (amenity, comfort or security) is proposed to existing walking and cycling facilities, or where new walking and cycling facilities are proposed, the value of different levels of quality must be assessed. The valuation should be based on a stated preference (SP) survey or information from similar improvements to facilities in other areas.

The *Pedestrian planning and design guide* describes a SP methodology and study to identify preferences for different types of cycling facilities. The study determined the additional time that cyclists would spend traveling on each type of facility (the incremental attractiveness of that type of facility) compared with a base case of 20 minutes of travel in traffic with road-side parking. The study gave the values in [Table 35](#). The relative benefit values should be used in an incremental analysis.

Table 35: Relative benefit for different types of cycle facilities

Type of cycle facility	Relative benefit
On-street with parking (no marked cycle lane)	1.0
On-street with parking (marked cycle lane)	1.8
On-street without parking (marked cycle lane)	1.9
Off-street cycle path	2.0

Cycling Travel Time Cost Brownston St

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC)	Table 14		2021NZD	231 2% \$19.53
		Do-minimum	Option		
	Length of trip (km)	L ^{dm}	L ^{opt}	1.10	1.10
	Mean cycling/walking speed	VS ^{dm}	V ^{opt}	15.00	15.00
	Relative attractiveness (Table 35)			1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	120,534 (a)
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	60,267 (B)
5	Value of annual TTC savings	(a) - (b) = \$		60,267	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	60,267	

Cycling Travel Time Cost Aubrev Rd / Gunn Rd

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC)	Table 14		2021NZD	180 2% \$19.53
		Do-minimum	Option		
	Length of trip (km)	L ^{dm}	L ^{opt}	2.70	2.70
	Mean cycling/walking speed	VS ^{dm}	V ^{opt}	15.00	15.00
	Relative attractiveness (Table 35)			1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	231,348 (a)
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	115,674 (B)
5	Value of annual TTC savings	(a) - (b) = \$		115,674	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	115,674	

Cycling Travel Time Cost Wanaka Mount Aspiring Road (to Glendhu Bay)

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC)	Table 14		2021NZD	103 2% \$19.53
		Do-minimum	Option		
	Length of trip (km)	L ^{dm}	L ^{opt}	5.00	5.00
	Mean cycling/walking speed	VS ^{dm}	V ^{opt}	15.00	15.00
	Relative attractiveness (Table 35)			1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	243,610 (a)
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	121,805 (B)
5	Value of annual TTC savings	(a) - (b) = \$		121,805	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	121,805	

Cycling Travel Time Cost McDougall St

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC)	Table 14		2021NZD	231 2% \$19.53
		Do-minimum	Option		
	Length of trip (km)	L ^{dm}	L ^{opt}	1.20	1.20
	Mean cycling/walking speed	VS ^{dm}	V ^{opt}	15.00	15.00
	Relative attractiveness (Table 35)			1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	131,491 (a)
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	65,746 (B)
5	Value of annual TTC savings	(a) - (b) = \$		65,746	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	65,746	

Cycling Travel Time Cost Beacon Point Rd

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC)	Table 14		2021NZD	282 2% \$19.53
		Do-minimum	Option		
	Length of trip (km)	L ^{dm}	L ^{opt}	3.70	3.70
	Mean cycling/walking speed	VS ^{dm}	V ^{opt}	15.00	15.00
	Relative attractiveness (Table 35)			1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	495,746 (a)
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	247,873 (B)
5	Value of annual TTC savings	(a) - (b) = \$		247,873	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	247,873	

Cycling Travel Time Cost Northlake N-S Connection (indicative)

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC)	Table 14		2021NZD	88 2% \$19.53
		Do-minimum	Option		
	Length of trip (km)	L ^{dm}	L ^{opt}	0.00	1.80
	Mean cycling/walking speed	VS ^{dm}	V ^{opt}	15.00	15.00
	Relative attractiveness (Table 35)			1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	0 (a)
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}}$		= \$	37,668 (B)
5	Value of annual TTC savings	(a) - (b) = \$		-37,668	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	-37,668	

Cycling Travel Time Cost Cardrona Valley Rd

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.

	Do Min	Option
1 Facility Type	On-street with parking (no marked cycle lane)	Off-street cycle path
2 Travel time data		
Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement)		152
Walking or Cycling growth rate (per annum)		2%
Travel time cost (TTC) Table 14		2021NZD \$19.53
	Do-minimum	Option
Length of trip (km)	L ^{dm} 0.40	L ^{opt} 0.40
Mean cycling/walking speed	VS ^{dm} 15.00	Vopt 15.00
Relative attractiveness (Table 35)	1.00	2.00
3 Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 28,808$ (a)	
3 Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 14,404$ (B)	
5 Value of annual TTC savings	(a) - (b) = \$ 14,404 (c)	
6 PV of travel time cost savings	DF 1	(c) x DF = \$ 14,404

Cycling Travel Time Cost SH6 Albert Town

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.

1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14		180 2% 2021NZD \$19.53
		Do-minimum	Option
	Length of trip (km)	L ^{dm} 2.50	L ^{opt} 2.50
	Mean cycling/walking speed	VS ^{dm} 15.00	Vopt 15.00
	Relative attractiveness (Table 35)	1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 214,212$ (a)	
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 107,106$ (B)	
5	Value of annual TTC savings	(a) - (b) = \$ 107,106 (c)	
6	PV of travel time cost savings	DF 1	(c) x DF = \$ 107,106

Cycling Travel Time Cost Western Wānaka Shared Paths

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.

1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14		104 2% 2021NZD \$19.53
		Do-minimum	Option
	Length of trip (km)	L ^{dm} 0.00	L ^{opt} 2.40
	Mean cycling/walking speed	VS ^{dm} 15.00	Vopt 15.00
	Relative attractiveness (Table 35)	1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 0$ (a)	
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 59,138$ (B)	
5	Value of annual TTC savings	(a) - (b) = \$ -59,138 (c)	
6	PV of travel time cost savings	DF 1	(c) x DF = \$ -59,138

Cycling Travel Time Cost Cardrona Valley Rd (to Riverbank)

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.

1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14		59 2% 2021NZD \$19.53
		Do-minimum	Option
	Length of trip (km)	L ^{dm} 2.10	L ^{opt} 2.10
	Mean cycling/walking speed	VS ^{dm} 15.00	Vopt 15.00
	Relative attractiveness (Table 35)	1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 58,922$ (a)	
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 29,461$ (B)	
5	Value of annual TTC savings	(a) - (b) = \$ 29,461 (c)	
6	PV of travel time cost savings	DF 1	(c) x DF = \$ 29,461

Cycling Travel Time Cost Ballantyne Rd (Three Parks)

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.

1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14		231 2% 2021NZD \$19.53
		Do-minimum	Option
	Length of trip (km)	L ^{dm} 0.90	L ^{opt} 0.90
	Mean cycling/walking speed	VS ^{dm} 15.00	Vopt 15.00
	Relative attractiveness (Table 35)	1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 98,618$ (a)	
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 49,309$ (B)	
5	Value of annual TTC savings	(a) - (b) = \$ 49,309 (c)	
6	PV of travel time cost savings	DF 1	(c) x DF = \$ 49,309

Cycling Travel Time Cost Northlake E-W Connection (indicative)

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.

1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path	
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14	88 2% 2021NZD \$19.53		
		Do-minimum	Option	
	Length of trip (km)	L ^{dm} 0.00	L ^{opt} 2.00	
	Mean cycling/walking speed	VS ^{dm} 15.00	Vopt 15.00	
	Relative attractiveness (Table 35)	1.00	2.00	
3	Annual TTC for Do-Minimum	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 0$		(a)
3	Annual TTC for Option	$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm} \times RA^{dm}} = \$ 41,853$		(B)
5	Value of annual TTC savings	(a) - (b) = \$ -41,853		(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$ -41,853	

Cycling Travel Time Cost Riverbank Rd

Cycling Travel Time Cost Aubrey Road

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14			157 2% 2021NZD \$19.53	
		Do-minimum	Option		
Length of trip (km)		L ^{dm}	L ^{opt}	5.00	5.00
Mean cycling/walking speed		VS ^{dm}	V ^{opt}	15.00	15.00
Relative attractiveness (Table 35)				1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	372,577 (a)
3	Annual TTC for Option	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	186,289 (B)
5	Value of annual TTC savings	(a) - (b) = \$		186,289	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	186,289	

Cycling Travel Time Cost Tim Wallis Dr & Sir Cliff Skeggs

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14			122 2% 2021NZD \$19.53	
		Do-minimum	Option		
Length of trip (km)		L ^{dm}	L ^{opt}	1.80	1.80
Mean cycling/walking speed		VS ^{dm}	V ^{opt}	15.00	15.00
Relative attractiveness (Table 35)				1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	104,202 (a)
3	Annual TTC for Option	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	52,101 (B)
5	Value of annual TTC savings	(a) - (b) = \$		52,101	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	52,101	

Cycling Travel Time Cost SH6 (to Luqgate)

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14			11 2% 2021NZD \$19.53	
		Do-minimum	Option		
Length of trip (km)		L ^{dm}	L ^{opt}	10.00	10.00
Mean cycling/walking speed		VS ^{dm}	V ^{opt}	15.00	15.00
Relative attractiveness (Table 35)				1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	50,969 (a)
3	Annual TTC for Option	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	25,484 (B)
5	Value of annual TTC savings	(a) - (b) = \$		25,484	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	25,484	

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14			282 2% 2021NZD \$19.53	
		Do-minimum	Option		
Length of trip (km)		L ^{dm}	L ^{opt}	0.70	0.70
Mean cycling/walking speed		VS ^{dm}	V ^{opt}	15.00	15.00
Relative attractiveness (Table 35)				1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	93,790 (a)
3	Annual TTC for Option	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	46,895 (B)
5	Value of annual TTC savings	(a) - (b) = \$		46,895	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	46,895	

Cycling Travel Time Cost Orchard Road

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14			31 2% 2021NZD \$19.53	
		Do-minimum	Option		
Length of trip (km)		L ^{dm}	L ^{opt}	1.10	1.10
Mean cycling/walking speed		VS ^{dm}	V ^{opt}	15.00	15.00
Relative attractiveness (Table 35)				1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	16,451 (a)
3	Annual TTC for Option	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	8,225 (B)
5	Value of annual TTC savings	(a) - (b) = \$		8,225	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	8,225	

Cycling Travel Time Cost Cardrona Valley to Cardrona

SP11 Walking and cycling facilities

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.					
1	Facility Type	Do Min On-street with parking (no marked cycle lane)	Option Off-street cycle path		
2	Travel time data Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement) Walking or Cycling growth rate (per annum) Travel time cost (TTC) Table 14			11 2% 2021NZD \$19.53	
		Do-minimum	Option		
Length of trip (km)		L ^{dm}	L ^{opt}	17.00	17.00
Mean cycling/walking speed		VS ^{dm}	V ^{opt}	15.00	15.00
Relative attractiveness (Table 35)				1.00	2.00
3	Annual TTC for Do-Minimum	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	86,475 (a)
3	Annual TTC for Option	$\frac{\text{AADT} \times 365 \times \text{L}^{\text{dm}} \times \text{TTC}}{\text{VS}^{\text{dm}} \times \text{RA}^{\text{dm}}}$		= \$	43,238 (B)
5	Value of annual TTC savings	(a) - (b) = \$		43,238	(c)
6	PV of travel time cost savings	DF 1	(c) x DF = \$	43,238	

WALKING AND CYCLING BENEFITS

OUTPUTS

Option	Total Cycling Health Benefits for all users	Total Walking Health Benefits for all users	Total Combined
Do Minimum (Full Cycle Network)	\$ -	\$0	\$ -
Strategic Response (Full Cycle Network)	\$ 1,127,127	\$ 800,415	\$ 1,927,542
Benefit	\$ 1,127,127	\$ 800,415	

Cycling Health Benefits

Average distance cycled	2.23	Population weighted average trip length (km)
Working days	245	Assumes 5 days given 5 day work / school week
New Ecyclist ratio	0.5	
Health Benefit per cyclist	\$4.90	
Health Benefit per E-cyclist	\$2.50	
Maximum annual benefits per new user	\$6,200	
Maximum annual benefits per new user	\$4,600	
Total		
Number of existing Cyclists	414	\$1,109,259
Number of new cyclists	557	\$1,127,127

Cap Check

Days Cycled/week		Annual health benefits (uncapped)	Health Benefits Cap	Annual Health benefits after capping
1	52	\$568.68	No	\$569
2	52	\$1,137.36	No	\$1,137
3	52	\$1,706.05	No	\$1,706
4	52	\$2,274.73	No	\$2,275
5	52	\$2,843.41	No	\$2,843

Cycling distances

Statistics on cycling provided are based on the [New Zealand Household Travel Survey](#). The current average cycle trip length is estimated at 3km. This applies equally to new and existing users.

Table 7: New cycle facility benefits (\$/cyclist km – 2021)

Benefit	Health benefits for new user (\$/km)	Maximum annual benefit per new user
Conventional cycling benefit	\$4.90	\$6,200
Electric-assisted cycling benefit	\$2.50	\$4,600

Where a new facility eliminates or improves a site that is an impediment to safe cycling, a benefit of \$14.70 may be ascribed to cyclists using the facility. The benefit is irrespective of the length of the improvement. It uses the average cycle trip length of 3 km times the composite benefit given above. The benefit is ascribed to users not users' trips.

The annual benefit calculated for each new individual cyclist cannot exceed the maximum annual benefit in [Table 7](#), which is the total estimated economic health benefit for converting an inactive person to an active person either using conventional cycling or electric-assisted cycling. The maximum annual benefit is irrespective of the cyclist trip length because of diminishing returns, from a national perspective, an already active person cycling additional kilometres won't deliver additional health benefit.

A worked example of [cycling benefits](#) is provided in [Appendix 8: Worked examples](#).

Cycling benefits

For this example calculation, assume:

- an average (two-way) distance cycled per user: 10km
- cycling specific number of days per week for 52 weeks per year
- \$4.90/km health benefit per cyclist (no e-bikes) with \$5200/user/year health benefit cap
- cyclist has over 100 users per day
- health benefits capping calculations based on frequency of use as shown below.

Days cycled/week	Annual health benefits (uncapped)	Health benefits cap	Annual health benefits after capping
1	\$2,548	No	\$2,548
2	\$5,096	No	\$5,096
3	\$7,644	Yes	\$6,200
4	\$10,192	Yes	\$6,200
5	\$12,740	Yes	\$6,200

In this example, the health benefits are capped for new individual users cycling three or more days per week.

[Back to 3.2 Impact of mode on physical and mental health >>](#)

Walking Health Benefits

Average distance walked	1	as per MBCM - current average trip length (km)
Working days	245	Assumes 5 days given 5 day work / school week
Health Benefit per pedestrian	\$ 9.90	
Maximum annual benefits per new user	3100	
Total All users		
Number of existing pedestri	504	\$1,222,452
Number of new Pedestrians	330	\$800,415

Cap Check

Days Cycled/week		Annual health benefits (uncapped)	Health Benefits Cap	Annual Health benefits after capping
1	52	\$514.80	No	\$515
2	52	\$1,029.60	No	\$1,030
3	52	\$1,544.40	No	\$1,544
4	52	\$2,059.20	No	\$2,059
5	52	\$2,574.00	No	\$2,574

Walking

The health benefits value for new pedestrian users is shown in [Table 6](#).

Table 6: New pedestrian facility benefits (\$/pedestrian km – 2021)

Benefit	Health benefits for new user (\$/km)	Maximum annual benefit per new user
Pedestrian benefit	\$9.90	\$3,100

Where a new facility eliminates or improves a site (eg an underpass) that is an impediment to safe walking, a health benefit shown in [Table 6](#) may be ascribed to new pedestrians using the facility. The benefit is irrespective of the length of the improvement. It is calculated using the average pedestrian trip length of 1 km times the value given above. The benefit is ascribed to users not users' trips.

The annual benefit calculated for each new individual pedestrian cannot exceed the maximum annual benefit shown in [Table 6](#), which is the total estimated economic health benefit for converting an inactive person to an active person. The maximum annual benefit is irrespective of the pedestrian trip length because of diminishing returns, from a national perspective, an already active person walking additional kilometres won't deliver additional health benefit.

TRAVEL TIME & VEHICLE OPERATING COSTS - MIDBLOCK

OUTPUTS

Annual Travel Time Cost (undiscounted)		Annual Travel Time Cost	
Do Minimum		Strategic Response	
2024 Do Minimum	\$ 37,584,664	2024 Strategic Response	\$ 37,584,664
2028 Do Minimum	\$ 47,684,720	2028 Strategic Response	\$ 47,684,720
2033 Do Minimum	\$ 66,072,197	2033 Strategic Response	\$ 63,817,591
2038 Do Minimum	\$ 91,418,146	2038 Strategic Response	\$ 84,409,500
2043 Do Minimum	\$ 105,525,599	2043 Strategic Response	\$ 99,839,070

Benefits
-
-
2,254,606
7,008,646
5,686,529

Annual vehicle Operating Costs (undiscounted)			
Do Minimum		Strategic Response	
2024 Do Minimum	\$ 20,160,573	2024 Strategic Response	\$ 20,160,573
2028 Do Minimum	\$ 23,292,357	2028 Strategic Response	\$ 23,292,357
2033 Do Minimum	\$ 26,480,883	2033 Strategic Response	\$ 25,532,428
2038 Do Minimum	\$ 33,447,484	2038 Strategic Response	\$ 30,734,511
2043 Do Minimum	\$ 38,025,974	2043 Strategic Response	\$ 33,512,184
2043+ Do Minimum	\$ 38,025,974	2043+ Strategic Response	\$ 31,634,857

Benefits
-
-
948,456
2,712,973
4,513,790
6,391,118

Travel Time Cost (TT)

Note: Road category for the entire network is assumed to be Urban Other as this represents a majority of the road types in Wanaka. Wanaka mainly consists of roads with less than 7000 AADT

MBCM Table 16							MBCM Table 16						
Do Minimum	Travel Time (Hours per Hour)	Expansion Factor	Days Per year	\$ per hour	Total (peak period)	Total (year)	Uncongested Hours (Hrs/Hr)	Congested Hours (Hrs/Hr)	CRV \$/h/vehicle	Multipled by expansion factors	Total (year)	Total Combined (year)	
2024 AM	265.2		9	245	\$ 35.66	\$ 20,856,676.15	256	10	\$ 25.76	\$ 540,603.59			
2024 PM	324.6		3	245	\$ 35.66	\$ 8,506,879.29	296	29	\$ 25.76	\$ 549,193.72			
2024 Weekend	265.2		6	120	\$ 36.36	\$ 6,944,029.16	\$ 36,307,584.60	256	10	\$ 27.33	\$ 187,282.24	\$ 1,277,079.55	\$ 37,584,664.15
2028 AM	321.4		9	245	\$ 35.66	\$ 25,272,237.78	296	26	\$ 25.76	\$ 1,458,729.84			
2028 PM	407.4		3	245	\$ 35.66	\$ 10,678,181.44	336	72	\$ 25.76	\$ 1,356,073.02			
2028 Weekend	321.4		6	120	\$ 36.36	\$ 8,414,147.82	\$ 44,364,567.04	296	26	\$ 27.33	\$ 505,350.32	\$ 3,320,153.18	\$ 47,684,720.22
2033 AM	409.3		9	245	\$ 35.66	\$ 32,183,675.02	332	78	\$ 25.76	\$ 4,414,300.99			
2033 PM	538.7		3	245	\$ 35.66	\$ 14,118,421.47	374	164	\$ 25.76	\$ 3,111,301.79			
2033 Weekend	409.3		6	120	\$ 36.36	\$ 10,715,244.19	\$ 57,017,340.67	332	78	\$ 27.33	\$ 1,529,253.98	\$ 9,054,856.76	\$ 66,072,197.43
2038 AM	544.6		9	245	\$ 35.66	\$ 42,821,172.95	410	135	\$ 25.76	\$ 7,640,201.26			
2038 PM	721.5		3	245	\$ 35.66	\$ 18,909,436.08	450	272	\$ 25.76	\$ 5,143,631.10			
2038 Weekend	544.6		6	120	\$ 36.36	\$ 14,256,896.53	\$ 75,987,505.56	410	135	\$ 27.33	\$ 2,646,808.22	\$ 15,430,640.57	\$ 91,418,146.13
2043 AM	646.3		9	245	\$ 35.66	\$ 50,819,562.84	467	179	\$ 25.76	\$ 10,192,152.01			
2043 PM	742.7		3	245	\$ 35.66	\$ 19,464,976.44	500	243	\$ 25.76	\$ 4,598,139.56			
2043 Weekend	646.3		6	120	\$ 36.36	\$ 16,919,883.30	\$ 87,204,422.58	467	179	\$ 27.33	\$ 3,530,884.96	\$ 18,321,176.53	\$ 105,525,599.11

Strategic Response	Travel Time (Hours per Hours)	Expansion Factor	Days Per year	\$ per hour	Total (peak period)	Total (year)	Uncongested Hours	Congested Hours	CRV \$/h/vehicle	Multipled by expansion factors	Total (year)	Total Combined (year)
2024 AM	265.2		9	245	\$ 35.66	\$ 20,856,676.15	256	10	\$ 25.76	\$ 540,603.59		
2024 PM	324.6		3	245	\$ 35.66	\$ 8,506,879.29	296	29	\$ 25.76	\$ 549,193.72		
2024 Weekend	265.2		6	120	\$ 36.36	\$ 6,944,029.16	256	10	\$ 27.33	\$ 187,282.24	\$ 1,277,079.55	\$ 37,584,664.15
2028 AM	321.4		9	245	\$ 35.66	\$ 25,272,237.78	296	26	\$ 25.76	\$ 1,458,729.84		
2028 PM	407.4		3	245	\$ 35.66	\$ 10,678,181.44	336	72	\$ 25.76	\$ 1,356,073.02		
2028 Weekend	321.4		6	120	\$ 36.36	\$ 8,414,147.82	296	26	\$ 27.33	\$ 505,350.32	\$ 3,320,153.18	\$ 47,684,720.22
2033 AM	403.2		9	245	\$ 35.66	\$ 31,706,095.80	332	72	\$ 25.76	\$ 4,069,308.27		
2033 PM	513.1		3	245	\$ 35.66	\$ 13,448,700.77	374	139	\$ 25.76	\$ 2,627,510.27		
2033 Weekend	403.2		6	120	\$ 36.36	\$ 10,556,238.79	332	72	\$ 27.33	\$ 1,409,737.55	\$ 8,106,556.09	\$ 63,817,591.45
2038 AM	522.0		9	245	\$ 35.66	\$ 41,044,245.59	412	110	\$ 25.76	\$ 6,252,686.50		
2038 PM	660.0		3	245	\$ 35.66	\$ 17,297,927.09	450	210	\$ 25.76	\$ 3,983,224.92		
2038 Weekend	522.0		6	120	\$ 36.36	\$ 13,665,285.70	412	110	\$ 27.33	\$ 2,166,129.07	\$ 12,402,040.49	\$ 84,409,499.68
2043 AM	622.4		9	245	\$ 35.66	\$ 48,940,806.24	468	154	\$ 25.76	\$ 8,760,709.62		
2043 PM	714.8		3	245	\$ 35.66	\$ 18,735,884.19	500	215	\$ 25.76	\$ 4,072,313.04		
2043 Weekend	622.4		6	120	\$ 36.36	\$ 16,294,369.40	468	154	\$ 27.33	\$ 3,034,987.88	\$ 15,868,010.53	\$ 99,839,070.36

Travel Time Savings 90334
Travel Time Savings 0.037 Hours / Year %

Vehicle Operating Cost (VOC)

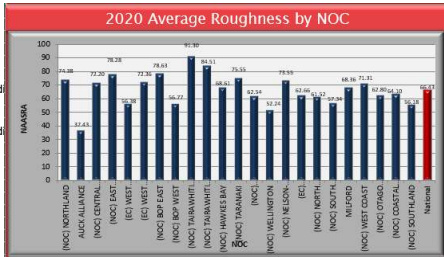
Base Data

Traffic Growth Rate	2%						
VKT AM	13275	15408	17319	21665	24791	24791	
VKT PM	15465	17654	19805	24060	26871	26871	
VKT Per Day	165869	191636	215283	267163	303734	303734	
	2024 DM	2028 DM	2033 DM	2038 DM	2043 DM		
Roughness (IRI/NAASRA)	62.8	62.8	62.8	62.8	62.8	62.8	NAASRA
Roughness cost	0	0	0	0	0	0	see MBCM Appendix 4 VOC Table A91
Mean vehicle speed	49	49	46	42	40	40	km/h
Gradient	0	0	0	0	0	0	m/km
Base cost	33.3	33.3	33.7	34.3	34.3	34.3	see MBCM Appendix 4 VOC tables A86
Annual vehicle operation cost	\$ 20,160,573	\$ 23,292,357	\$ 26,480,883	\$ 33,447,484	\$ 38,025,974	\$ 38,025,974	

Base Data

Traffic Growth Rate	2%						
VKT AM	13275	15408	16698	20286	22278	21030	
VKT PM	15465	17654	19096	22430	23982	22638	
VKT Per Day	165869	191636	207572	249864	272446	257184	
	2024 SR	2028 SR	2033 SR	2038 SR	2043 SR		
Roughness (IRI/NAASRA)	62.8	62.8	62.8	62.8	62.8	62.8	NAASRA
Roughness cost	0	0	0	0	0	0	see MBCM Appendix 4 VOC Table A91
Mean vehicle speed	50	48	46	43	43	43	km/h
Gradient	0	0	0	0	0	0	m/km
Base cost	33.3	33.3	33.7	33.7	33.7	33.7	see MBCM Appendix 4 VOC tables A86
Annual vehicle operation cost	\$ 20,160,573	\$ 23,292,357	\$ 25,532,428	\$ 30,734,511	\$ 33,512,184	\$ 31,634,857	

16,990,920 km / year
15% Percent Benefit Change



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	20	21	22
																																33	34	35
																																DO MINIMUM		
				AM Peak Hour - travel time (sec)											2024 base - free flow	Distance (m)	AM Peak Hour - volumes (vph)												VOLUMES					
	From	To	2024 free flow (7am to 8)	2024 Base	2028 Core	2033 Core	2033 10% TDM	2033 20% TDM	2038 10% TDM	2038 20% TDM	2038 MED	2038 HIGH	2043 20% TDM	2043 MED			2043 HIGH	2024 Base	2028 Core	2033 Core	2033 10% TDM	2033 20% TDM	2038 10% TDM	2038 20% TDM	2038 MED	2038 HIGH	2043 20% TDM	2043 MED	2043 HIGH	2024 Base	2028 Core	2033 Core		
1	SH6 Albert Town Bridge	SH6/Aubrey	141	147	156	187	187	197	188	186	152	157	143	123		125	57	2636	392	478	536	537	540	620	620	443	510	722	472	552	392	478	536	
2	Aubrey/Northburn	Aubrey/Anderson	69	74	82	124	86	75	120	84	91	226	87	139	260	191	873	571	644	712	644	568	716	640	688	737	710	721	754	571	644	712		
3	Aubrey/Gunn	SH6/Aubrey	96	98	102	106	104	103	113	104	103	119	95	109	151	55	1510	94	100	127	119	108	130	118	122	144	149	138	144	94	100	127		
4	SH6 (East external)	SH6/SH84	23	25	27	29	29	28	43	34	27	32	129	29	40	106	492	316	376	426	429	425	471	473	398	429	453	423	463	316	376	426		
5	SH6/Aubrey	SH6 Albert Town Bridge	148	152	157	174	177	167	168	163	161	163	120	113	114	30	2638	133	163	187	189	186	207	212	156	180	228	169	187	133	163	187		
6	Aubrey/Gunn	Aubrey/Gunn	93	94	94	94	94	94	94	94	94	94	95	95	95	2	1509	118	146	164	154	136	175	165	143	149	189	155	158	118	146	164		
7	SH6/Aubrey	SH6/SH84	34	35	36	37	36	37	40	38	36	39	53	36	41	19	636	682	764	821	806	786	880	862	783	912	946	833	993	682	764	821		
8	SH6/SH84	SH6 (East external)	23	23	24	24	24	24	24	24	24	24	24	24	24	1	493	230	269	294	297	302	320	326	295	320	354	309	345	230	269	294		
9	SH6/SH84	SH6/Aubrey	29	30	29	29	29	29	30	30	30	29	30	30	30	1	635	269	295	307	304	296	314	312	318	353	310	329	367	269	295	307		
10	SH6/SH84	Riverbank/Ballantyne	111	112	113	117	115	114	124	119	113	116	142	114	119	31	2153	255	346	501	420	385	662	568	349	477	774	406	557	255	346	501		
11	SH6/SH84	SH84/Sir Tim Wallis	66	73	111	221	168	137	267	218	90	167	357	124	202	291	1223	680	755	707	757	782	668	739	788	792	630	800	807	680	755	707		
12	Riverbank/Ballantyne	SH6/SH84	112	113	114	113	113	113	113	113	113	114	116	114	114	5	2145	86	98	112	101	108	106	115	104	117	114	118	131	86	98	112		
13	Riverbank/Ballantyne	Ballantyne/Sir Tim Wallis	68	68	69	69	69	69	70	69	69	69	70	69	69	2	891	230	317	468	407	381	588	531	293	407	658	329	472	230	344	501		
14	Riverbank/Ballantyne	Ballantyne Road (East external)	10	10	10	10	10	10	10	10	10	10	10	10	10	0	255	100	118	130	131	129	137	141	128	137	147	135	148	100	118	130		
15	Riverbank/Ballantyne	Riverbank/Cardrona Valley	141	143	145	146	146	146	148	148	146	147	150	146	150	9	2844	202	244	274	281	279	285	297	268	293	308	287	313	202	244	274		
16	SH84/Sir Tim Wallis	SH6/SH84	61	62	62	63	63	63	64	63	62	63	63	62	63	3	1256	353	380	410	403	399	495	464	402	445	555	411	463	353	380	410		
17	SH84/Sir Tim Wallis	SH84/Anderson	57	70	70	88	89	79	85	82	104	142	79	129	171	115	926	469	512	505	502	511	500	502	531	520	491	532	528	469	512	505		
18	SH84/Sir Tim Wallis	Sir Tim Wallis/Grace Wright	111	115	122	154	149	130	194	160	118	121	224	120	130	113	1080	121	118	91	95	111	71	90	123	107	66	114	94	121	118	91		
19	Ballantyne/Sir Tim Wallis	Riverbank/Ballantyne	67	68	72	101	77	73	166	127	70	75	176	71	93	110	863	131	166	187	194	195	158	190	165	176	157	172	184	131	177	202		
20	Ballantyne/Sir Tim Wallis	Ballantyne/Golf Course	71	71	72	72	72	72	72	72	72	72	72	71	73	3	879	97	109	151	132	124	175	158	106	160	184	112	189	97	98	120		
21	Ballantyne/Sir Tim Wallis	Sir Tim Wallis/Grace Wright	48	49	49	50	49	49	52	50	48	49	51	49	49	4	489	50	74	168	118	93	258	197	64	92	317	71	124	50	74	168		
22	Ballantyne/Golf Course	Ballantyne/Sir Tim Wallis	68	68	72	73	72	72	78	69	70	89	70	74	74	21	866	207	263	327	312	278	354	317	238	263	374	250	287	207	211	261		
23	Ballantyne/Golf Course	Cardrona Valley/Golf Course	69	71	73	76	76	74	93	78	74	73	127	74	76	58	1183	197	214	227	221	219	228	224	232	257	206	235	261	197	214	227		
24	Ballantyne/Golf Course	Ardmore/Brownston	71	72	75	76	78	73	75	74	77	72	74	74	77	7	642	13	12	15	13	15	23	14	5	16	27	12	33	13	12	15		
25	Ballantyne/Golf Course	SH84/Anderson	89	98	104	114	107	105	115	111	107	109	110	102	129	40	802	55	53	59	54	54	60	52	55	75	65	63	65	55	53	59		
26	Cardrona Valley/Golf Course	Ballantyne/Golf Course	70	71	72	74	73	73	75	74	72	74	78	72	74	8	1184	158	191	228	212	201	259	227	189	210	297	201	223	158	191	228		
27	Cardrona Valley/Golf Course	Brownston/McDougall	90	90	91	92	92	91	94	93	90	91	96	91	92	6	955	91	117	156	139	133	168	157	116	133	176	128	150	91	117	156		
28	Cardrona Valley/Golf Course	Riverbank/Cardrona Valley	155	156	156	156	156	156	156	156	156	155	156	156	156	2	2808	207	233	250	254	251	271	270	257	276	283	268	300	207	233	250		
29	Brownston/McDougall	Cardrona Valley/Golf Course	89	89	89	90	89	89	89	89	89	89	90	89	89	1	958	101	132	167	156	158	208	189	132	142	248	134	166	101	132	167		
30	Brownston/McDougall	Ardmore/McDougall	27	29	32	37	41	33	44	43	33	39	58	32	37	31	252	144	187	239	211	204	244	225	188	204	250	195	226	144	187	239		
31	Brownston/McDougall	Ardmore/Brownston	44	47	48	56	52	50	58	53	48	50	59	50	60	16	407	346	411	455	444	413	469	451	395	433	482	421	431	346	411	455		
32	Ardmore/Mc																																	

25	29	29
36	37	38
VOLUMES		

VOLUMES

2038	2043	2043+
100%	100%	100%
732	902	902
798	888	888
146	186	186
557	567	567
248	285	285
200	236	236
1028	1183	1183
381	442	442
369	387	387
722	968	968
833	787	787
130	142	142
698	869	869
164	183	183
344	385	385
565	693	693
591	613	613
95	82	82
226	219	219
156	184	184
266	396	396
316	374	374
266	257	257
21	33	33
66	81	81
286	371	371
191	220	220
319	353	353
233	309	309
276	312	312
542	602	602
429	534	534
206	223	223
234	268	268
227	250	250
197	248	248
411	468	468
216	230	230
919	1022	1022
130	142	142
391	434	434
373	402	402
797	903	903
226	233	233
780	836	836
257	280	280
172	172	172
338	381	381
448	475	475
420	453	453
32	76	76
545	552	552
302	327	327
188	235	235
588	681	681
441	508	508
192	178	178
442	472	472

40	41	42	43	44	45
STRATEGIC RESPONSE VOLUMES					

0.0%	0.0%	3.6%	7.2%	10.7%	15.7%
2024	2028	2033	2038	2043	2043+
Base	Core	Core	100%	100%	100%
392	478	536	732	902	902
571	644	712	798	888	888
94	100	127	146	186	186
316	376	426	557	567	567
133	163	187	248	285	285
118	146	164	200	236	236
682	764	821	1028	1183	1183
230	269	294	600	672	672
269	295	307	369	387	387
255	346	501	722	968	968
680	755	707	621	575	575
86	98	112	349	372	372
230	344	501	698	869	869
100	118	130	164	183	183
202	244	274	344	385	385
353	380	410	565	693	693
469	512	505	591	613	613
121	118	91	95	82	82
131	177	202	226	219	219
97	98	120	112	130	130
50	74	168	266	396	396
207	211	261	316	374	374
197	214	227	266	257	257
13	12	15	21	33	33
55	53	59	66	81	81
158	191	228	215	277	277
91	117	156	191	220	220
207	233	250	319	353	353
101	132	167	233	309	309
144	187	239	276	312	312
346	411	455	542	602	602
210	262	319	429	534	534
126	146	186	206	223	223
138	165	182	234	268	268
129	154	173	227	250	250
112	132	153	197	248	248
257	297	353	411	468	468
163	183	201	216	230	230
585	679	764	919	1022	1022
87	102	111	130	142	142
280	322	344	391	434	434
265	290	320	373	402	402
481	565	665	797	903	903
166	183	190	226	233	233
545	635	677	780	836	836
200	217	215	257	280	280
157	158	161	172	172	172
255	268	301	338	381	381
306	358	369	448	475	475
329	362	370	420	453	453
2	3	5	25	58	58
285	367	474	545	552	552
168	195	231	302	327	327
112	131	147	188	235	235
328	395	447	588	681	681
286	320	371	441	508	508
158	180	163	192	178	178
357	380	387	442	472	472

47	48	49	50	51	52
STRATEGIC RESPONSE TT					

TRAVEL TIME						
2024	2028	2033	2038	2043	2043+	
Base	Core	Core	100%	100%	100%	
147	156	171	172	149	149	
74	82	124	120	82	82	
98	102	104	107	99	99	
25	27	29	43	129	129	
152	157	174	168	130	130	
94	94	94	94	95	95	
35	36	37	40	53	53	
23	24	24	24	24	24	
30	29	29	30	39	39	
112	113	117	129	147	147	
73	111	221	267	357	357	
113	114	113	113	116	116	
68	74	74	74	75	75	
10	10	10	10	10	10	
143	145	146	148	150	150	
62	62	63	64	63	63	
70	70	79	78	75	75	
115	122	154	194	224	224	
68	77	106	171	181	181	
71	72	72	72	72	72	
49	49	50	52	51	51	
68	72	71	77	80	80	
71	73	76	84	101	101	
72	75	75	75	74	74	
98	104	109	106	105	105	
71	72	72	73	74	74	
90	91	92	93	93	93	
156	156	156	156	161	161	
89	89	90	89	90	90	
29	32	37	44	58	58	
47	48	56	64	65	65	
23	23	23	33	33	33	
104	105	105	106	106	106	
7	7	7	7	7	7	
18	20	27	48	95	95	
104	105	106	107	108	108	
49	50	54	54	55	55	
77	77	77	77	77	77	
54	55	56	61	73	73	
80	82	85	85	87	87	
40	40	41	51	51	51	
48	47	48	48	49	49	
46	46	46	46	46	46	
88	89	90	91	93	93	
47	47	48	49	48	48	
132	133	133	133	131	131	
75	73	74	75	73	73	
65	65	65	65	65	65	
133	138	147	151	151	151	
80	79	79	79	81	81	
104	102	105	105	107	107	
48	48	53	88	109	109	
140	142	146	167	197	197	
157	159	161	165	175	175	
24	26	26	28	29	29	
81	82	83	83	83	83	
116	116	148	131	129	129	
75	76	76	76	76	76	

Avg Speed

50	49	47	44	43
----	----	----	----	----

5	6	7	10	14	14
60	61	62	63	64	65
Do Min TT					

TRAVEL TIME						
2024	2028	2033	2038	2043	2043+	
Base	Core	Core	100%	100%	100%	
147	156	187	188	143	143	
74	82	124	120	87	87	
98	102	106	113	95	95	
25	27	29	43	129	129	
152	157	174	168	120	120	
94	94	94	94	95	95	
35	36	37	40	53	53	
23	24	24	24	24	24	
30	29	29	30	30	30	
112	113	117	124	142	142	
73	111	221	267	357	357	
113	114	113	113	116	116	
68	74	74	75	75	75	
10	10	10	10	10	10	
143	145	146	148	150	150	
62	62	63	64	63	63	
70	70	88	85	79	79	
115	122	154	194	224	224	
68	77	106	171	181	181	
71	72	72	72	72	72	
49	49	50	52	51	51	
68	72	70	82	89	89	
71	73	76	93	127	127	
72	75	76	75	74	74	
98	104	114	115	110	110	
71	72	72	73	74	74	
90	91	92	94	96	96	
156	156	156	156	156	156	
89	89	90	89	90	90	
29	32	37	44	58	58	
47	48	56	58	59	59	
23	23	23	23	23	23	
104	105	105	106	106	106	
7	7	7	7	7	7	
18	20	27	48	95	95	
104	105	106	107	108	108	
49	50	54	55	56	56	
77	77	77	77	77	77	
54	55	56	61	73	73	
80	82	85	85	87	87	
40	40	42	42	42	42	
48	47	48	48	49	49	
46	46	47	46	46	46	
88	89	90	91	93	93	
47	47	48	49	48	48	
132	133	133	133	131	131	
75	73	74	75	73	73	
65	65	65	65	65	65	
133	138	156	165	164	164	
80	79	79	79	81	81	
104	102	105	105	107	107	
48	48	58	129	170	170	
140	142	146	167	197	197	
157	159	161	169	180	180	
24	26	26	28	29	29	
81	82	83	83	83	83	
116	116	159	177	170	170	
75	76	76	76	76	76	

Strategic Responses High Level Cost Estimate

Rate Multiplier (CAP)
Rate Multiplier (OP)
Update Factor

1.3
1.03

2024

212% Q2 2024 to Q1 2025 (G)

18/06/2025

https://www.treasury.gov.au/money/policy/about-monetary-policy/inflation-calculator

Rates provided by cost estimator (see rates Tab)

Item

Standard 2 lane road (10m in width)

3m Shared Path

Roundabout (mini)

Roundabout (single lane)

Roundabout (multi lane)

Traffic Signal Midblock Crossing

\$

\$

\$

\$

\$

\$

381.74

122.07

1,496,299.50

2,244,449.25

3,366,673.88

190,000.00

Intersection Capacity/ Safety upgrades

LINKS

Project List

Intersection

Qty

Rate

Cost

Model Year

NLTP Year/Period

SH or LR

NPV Cost (2% / 1.5%)

\$2,025

1.01

Ballantyne / Avalon Station [LINK]

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2028

2024

LR-D

\$

4,507,976

4,600,000

2028

\$

18,831,666

9%

Intersections

\$

80,797,660.58

1.02

Ballantyne / Gait Course / [LINK]

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2028

2024

LR-D

\$

4,507,976

4,600,000

2028

\$

128,744,760

64%

New Links

\$

76,998,718.76

1.03

Anderson/SH84

Roundabout (multi lane)

1

\$

6,761,964.48

6,761,964.48

2028

2027

SH

\$

6,71,950

6,910,000

2038

\$

24,373,284

12%

Shared Paths

\$

55,606,278.55

1.04

Brownston/McDougall

Roundabout (mini)

1

\$

3,005,317.55

3,005,317.55

2028

2027

SH

\$

2,831,978

3,070,000

2038

\$

18,783,235

35%

1.05

Ballantyne/Sir Tim Wallea Dr

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2038

2027

LR

\$

4,247,967

4,600,000

2043

\$

-

0%

1.06

SH84/Heddicth/Brownston/Ballantyne

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2038

2030

SH

\$

4,002,954

4,470,000

2038

\$

-

0%

1.07

SH6/Aubrey Rd

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2038

2030

SH

\$

4,002,954

4,470,000

2038

\$

71,781,708

33,833,624

25,926,814

12,021,270

1.08

Cardona Valley/Orchard/Studholme Safety Im

Roundabout (mini)

1

\$

3,005,317.55

3,005,317.55

2033

2030

LR

\$

2,668,636

2,980,000

2039

\$

0

0

0

\$0.00

0%

1.09

Brownston/Helwick

Roundabout (mini)

1

\$

3,005,317.55

3,005,317.55

2033

2030

LR

\$

2,668,636

2,980,000

2042

\$

0

0

0

\$0.00

0%

1.1

Brownston / Dargavon

Roundabout (mini)

1

\$

3,005,317.55

3,005,317.55

2033

2030

LR

\$

2,668,636

2,980,000

2043

\$

0

0

0

\$0.00

0%

1.11

Riverbank / Sir Cliff Staggis or New (LINK)

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2033

2030

LR-D

\$

4,002,954

4,470,000

2048

\$

0

0

0

\$0.00

0%

1.12

Anderson / Link

Roundabout (mini)

1

\$

3,005,317.55

3,005,317.55

2038

2033

LR

\$

2,514,715

2,980,000

2051

\$

0

0

0

\$0.00

0%

1.13

Andmore Street/Brownston Street Intersection

Roundabout (multi lane)

1

\$

6,761,964.48

6,761,964.48

2033

2033

SH

\$

5,658,109

6,700,000

2054

\$

0

0

0

\$0.00

0%

1.14

Aubrey/Anderson

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2033

2033

LR-D

\$

3,772,073

4,470,000

1.15

McDougall/Cardona/OldCourse/Faulks Terr

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2033

2033

LR

\$

3,772,073

4,470,000

1.16

Avalon Station / Gordon (LINK)

Roundabout (mini)

1

\$

3,005,317.55

3,005,317.55

2038

2036

LR-D

\$

2,369,672

2,980,000

1.17

SH6 / Alison & Kingstion

Roundabout (multi lane)

1

\$

6,761,964.48

6,761,964.48

2038

2036

SH

\$

5,331,763

6,700,000

1.18

Cardona Valley/Orchard/Studholme Capacity

Roundabout (single lane)

1

\$

4,507,976.32

4,507,976.32

2038

2036

LR

\$

3,554,509

4,470,000

1.21

Safe Crossing (Anderson & SH84)

Traffic Signal Midblock Crossing

2

\$

381,615.00

763,230.00

2028

2027

SH

\$

719,209

760,000

1.22

Safe Crossing (SH6/SH84)

Traffic Signal Midblock Crossing

2

\$

381,615.00

763,230.00

2033

2033

SH

\$

638,637

760,000

1.23

Safe Crossing (Riverbank/Ballantyne)

Traffic Signal Midblock Crossing

1

\$

381,615.00

381,615.00

2033

2033

LR

\$

319,318

380,000

\$

80,797,660.58

New Road Links (2 lane road, 10m in width)

\$

71,781,707.94

LINKS

Project List

Length (m)

Qty

Rate (m2)

Cost

Model Year

NLTP Year/Period

SH or LR

Notes / Assumptions

2.01

New road connection from Three Parks to Avalon Station Drive (South)

700

1

\$

766.72

10,779,767.19

2033

2024

LR-D

\$

10,779,767

10,690,000

SH

LR

2.02

New road connection from Three Parks to Ballantyne (North)

700

1

\$

766.72

10,779,767.19

2033

2024

LR-D

\$

10,779,767

10,690,000

Assumes connection between Sir Cliff Staggis Drive to Ballantyne at Gold coarse road intersection

2.03

New road connection from Three Parks to Avalon Station Drive (North)

400

1

\$

766.72

6,160,248.70

2033

2027

LR-D

\$

5,804,940

6,110,000

Assumes connection frt

2028

\$

-

\$

-

\$

-

2.04

New road connection from Three Parks to Riverbank (North)

1100

1

\$

766.72

16,939,634.15

2033

2030

LR-D

\$

15,541,910

16,790,000

Continues connection f

2033

\$

-

\$

-

\$

-

2.05

New road connection from Three Parks to Ballantyne (South)

600

1

\$

766.72

9,239,800.44

2033

2030

LR-D

\$

8,204,678

9,160,000

2038

\$

-

\$

-

\$

-

2.06

New road connection from Three Parks to Riverbank (South)

500

1

\$

766.72

7,699,833.70

2033

2033

LR-D

\$

6,442,876

7,630,000

2043

\$

-

\$

-

\$

-

2.07

New Road connection into Northlake

1000

1

\$

766.72

15,399,667.41

2033

2033

LR

\$

12,885,753

15,270,000

\$

76,998,718.78

Shared Path Facilities

\$

55,439,184.41

Priority LINKS

LINKS

Project List

Length (m)

Qty

Rate (m2)

Cost

Model Year

NLTP Year/Period

SH or LR

State Highway

Local Road (Transport)

Local Road (partial Developer Contributions or non-Transport)

SH

LR

LR-D

Total

Percentage of Type

Percent of Year

3.01

Avalon Station Connection (indicative)

1300

1

\$

245.18

956,192.62

2025

2024

LR-D

\$

956,193

950,000

Approved Do-Minimum, quantity zero

2025

\$

-

4%

\$

-

\$

-

3.02

Schools to Pools Extension

1100

1

\$

245.18

809,086.06

2025

2024

LR-D

\$

809,086

800,000

Approved Do-Minimum, quantity zero

2025

\$

-

10%

\$

-

\$

-

3.03

Waterford Stage 4

400

1

\$

245.18

294,213.11

2025

2024

LR-D

\$

294,213

290,000

Parks Team

2028

\$

2,059,492

4%

\$

-

\$

-

3.04

Aubrey Road Extension to LF

800

1

\$

245.18

588,426.23

2028

2027

SH

\$

954,487

980,000

1.912,385

\$

2,721,471

10%

\$

1,912,385

\$

2,721,471

2028

\$

5,295,836

10%

\$

661,980

\$

5,295,836.05

21%

20%

3.05

SH84 & SH6 STW to Aubrey Road

1800

1

\$

245.18

1,323,959.01

2028

2027

SH

\$

1,247,596

1,310,000

2032

\$

12,283,398

23%

\$

9,194,160

\$

9,194,160

2032

\$

12,283,398

23%

\$

9,194,160

\$

9,194,160

2032

\$

12,283,398

23%

\$

9,194,160

\$

9,194,160

2032

\$

12,283,398

23%

\$

9,194,160

\$

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Peak Hour		Departure Frequency (one way)	Trips Per Day (one way)	Length (one way)	Distance per day (two way)	Total Kilometres (per Year)	Hours Per Trip	Time per Day	Operating Hours per year	Busses Needed	Cost
Route 1	6	4	24	26	1248	305760	0.75	36	8820	4	
Route 2	14	4	56	21	2352	576240	0.75	84	20580	4	
Route 3	6	4	24	23	1104	270480	0.8	38.4	9408	4	
Route 4	8	2	16	23	736	180320	0.5	16	3920	2	
Route 5	8	2	16	16	512	125440	0.5	16	3920	2	
						1458240			46648		

Off-Peak		Departure Frequency (one way)	Trips Per Day (one way)	Length (one way)	Distance per day (two way)	Total Kilometres (per Year)	Hours Per Trip	Time per Day	Operating Hours per year	Busses Needed	
Route 1	8	2	16	26	832	203840	0.75	24	5880	4	
Route 2	2	2	4	21	168	41160	0.75	6	1470	4	
Route 3	8	2	16	23	736	180320	0.8	25.6	6272	4	
Route 4	8	0.5	4	23	184	45080	0.5	4	980	2	
Route 5	8	0.5	4	16	128	31360	0.5	4	980	2	
						501760			15582		

Weekend		Departure Frequency (one way)	Trips Per Day (one way)	Length (one way)	Distance per day (two way)	Total Kilometres (per Year)	Hours Per Trip	Time per Day	Operating Hours per year	Busses Needed	
Route 1	12	2	24	26	1248	149760	0.75	36	8820	4	
Route 2	14	2	28	21	1176	141120	0.75	42	10290	4	
Route 3	12	2	24	23	1104	132480	0.8	38.4	9408	4	
Route 4	0		0	23	0	0	0.5	0	0	0	
Route 5	0		0	16	0	0	0.5	0	0	0	
						423360			28518	0	

Route 1						659360			23520	4	\$ 2,112,123.20
Route 2						758520			32340	4	\$ 2,600,772.40
Route 3						583280			25088	4	\$ 2,070,613.60
Route 4						225400			4900	2	\$ 638,798.00
Route 5						156800			4900	2	\$ 544,816.00
						2,383,360			90,748	16	7,967,123

As per Table 89 (picture below)			Composite no ferry	
Cost categories	Cost rate notes	Values		
A - time	Cost per large bus	\$60,000 / annum (10% of typical diesel bus price)	\$	60,000.000
	Operating cost per hour	\$40/hour (driver salary)	\$	40.0
B - distance:	Cost per kilometer	Assumes \$2 per litre and 37 litres consumed per 100km	\$	0.740
C - distance: other	Operating cost per bus km	Inflation adjusted Waka Kotahi numbers	\$	0.630
	Operating cost per bus yearly	Inflation adjusted Waka Kotahi numbers	\$	7,000.00
Total peak only unit costs per year				
Total A-D Operating costs			\$0	
Total A-E			\$0	
% mark up on items A - D				
E - overheads			10%	\$0
F - profit margin % mark up on items A - E			5%	\$0
G - capital charges: vehicles			\$0	
Total			\$0	

B - distance:	Cost per kil	Consumption 1.8 kwh, cost \$0.195 per kwh with 20% lost during charging	\$ 0.420
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Item	Description	Qty	Unit	Unit Rates	Assumption
1	Standard 2 lane road	1	m2	381.74	Width - 10 meter
					Cut to waste of site Depth :580mm
					Shoulder - 2 meter
					Sugrade preparation
					Subbase 200mm
					Base course - 200mm
					AC 20 120mm
					Surfacing - 60mm
2	3 Meter Share Path	1	m2	122.07	3 meter wide
					Cut to waste off site Depth : 200mm
					Subgrade Preparation
					100mm Base course
					100mm 25Mpa Concrete
3	Roundabout	1	LS	2,244,449.25	15met.radius Island
					4x 60 meter approach 14meter width
					Cut to waste off site Depth 580mm
					subgrade preparation
					200mm subbase
					200mm base course
					120mm AC 20
					60mm SMA
					standard kerb
					300mm drainage
					catch pit
					1050 Manhole
					150mm Ap40+ 150mm concrete island
					road marking & signages
					grass on landscape and swale

EXCLUSION

No allowance for Preliminary and General
No allowance for Environmental Consideration
No allowance for Traffic Management
No allowance for any Contingencies

PROJECT : Wanaka networks Optimisation
Subject : High Level Cost

Item	Description	Qty	Unit	Unit Cost	Remarks
1	Traffic Signal- Single Lane Crossing				
1.1	Controller				
1.1.1	Controller (Supply, Test, and Commission)				
1.1.2	New Software - Burn, Test, Install and Commission				
1.1.3	Traffic Controller and Cabinet - Supply and Install, including all hardware, firmware and software, cabinet, load rack, fittings, etc, including a minimum of 16 signal groups and 32 Detectors, including control base	1	LS	\$45,000.00	
1.1.4	A/T supply and install				
1.1.5	Supply and installation of communications device				
2	Supply and Install Lanterns				
2.1	LED Lantern 200mm 3 Aspect with open visor, backing board, mounting straps etc.	1	No.	\$1,725.00	
2.2	LED Lantern 200mm 6 Aspect with open visor, backing board, mounting straps etc.	1	No.	\$3,450.00	
2.3	LED Lantern 200mm 4 Aspect with closed visor, backing board, mounting straps etc.	1	No.	\$2,300.00	
2.4	LED Lantern 200mm 6 Aspect with closed visor, backing board, mounting straps etc.	1	No.	\$4,600.00	
2.5	LED Lantern 300mm 6 Aspect with open visor, backing board, mounting straps etc.	1	No.	\$2,300.00	
2.6	LED Lantern 300mm 6 Aspect with closed visor, backing board, mounting straps etc.	1	No.	\$4,600.00	
2.7	LED Pedestrian Lantern 2 Aspect with backing board, mounting straps, visors etc.	1	No.	\$2,300.00	
	Pedestrian Aspect with Visor	1	No.	\$1,350.00	
	Pedestrian Aspect with Visor	1	No.	\$1,350.00	
3	Supply and Install Pedestrian Facilities	1		\$4,600.00	
3.1	A/T Pedestrian Callbox and ATAC Driver Unit including push button	1	No.	\$2,300.00	
3.2	Cycle push Button	1	No.	\$2,300.00	
4	Supply and Install Traffic Signal Cable				
4.1	36 Core Cable	1	m	\$32.00	
4.2	Loop feeder cable - 1pr	1	m	\$15.00	
5	Supply and Install Traffic Signal Poles				

5.1	5m pole painted with SUMB, LMB, Finial Cap, Pole Top Assembly	1	No.	\$5,900.00	
5.2	Mastarm pole with 5m outreach	1	No.	\$6,000.00	
5.3	Mastarm pole with 7m outreach	1	No.	\$7,500.00	
5.4	Joint Use Signal Pole (JUSP) with 1m curved out reach 10m high	1	No.	\$19,250.00	
5.5	Joint Use Signal Pole (JUSP) with 1m curved out reach 12m high single	1	No.	\$21,570.00	
5.6	Joint Use Signal Pole (JUSP) with 1m curved out reach 12m high double	1	No.	\$22,505.00	
6 Supply and Install Traffic Signal Detectors					
6.1	SCATS Stop line or 11m Loop including control cabinet and tail to KIB	1	No.	\$1,495.00	
6.2	1m Lane Loop - Advance and count	1	No.	\$278.00	
6.3	Cycle Loop	1	No.	\$980.00	
6.4	Kerbside Junction Box with 50m approach detector loop	1	No.	\$1,215.00	
6.5	CCTV camera with control box	1	No.	\$7,800.00	
7 Supply and Install Ducting					
7.1	Duct 50mm in Berm	1	m	\$80.00	
7.2	50mm 90deg. Bend	1	ea	\$366.00	
7.3	Duct 100mm in Berm	1	m	\$120.00	
7.4	100mm 90deg. Bend	1	ea	\$236.00	
7.5	Duct 100mm under Carriageway	1	m	\$120.00	
7.6	Chamber 600mm diameter - Plastic	1	ea	\$1,040.00	
7.7	Pull Pit	1	ea	\$3,000.00	
8 Power Supply- Liaison with supply contractor					
8.1	Supply and install power cabling (Power Authority from supply point to controller)	1	LS	\$5,800.00	
8.2	Supply, install and terminate a power cable into the controller cabinet, including an isolation pillar.	1	LS	\$5,500.00	
8.3	Supply and install pole top cable termination assemblies (including upper and lower mounting hardware)	1	LS	\$5,500.00	
9 ITS Infrastructure					
9.1	50mm Electrical Ducting Only	1	m	13.018	
9.2	100mm Electrical Ducting Only	1	m	23.644	
9.3	50mm Communication Ducting Only	1	m	13.018	
9.4	100mm Communication Ducting Only	1	m	23.644	
9.5	Fiber Junction Box	1	ea	1676.7	

\$ 185,228.02

\$ 190,000.00

APPENDIX D – TECHNICAL NOTE MODELLING MEMO

Technical Note – Wānaka Model Build

1 Introduction and Model Overview

This technical note set out the development a micro-simulation model for Wānaka, and the use of the model to test future growth projections.

Figure 1 shows the extent of the micro simulation model, which was developed in the Paramics Discovery software (version 26.0.3).

This covers the majority of Wānaka, and the modelled area is generally bounded by:

- Aubrey Road in the north
- SH6 Albert Town bridge in the northeast
- SH6 and Riverbank Road in the east
- Cardrona Valley Road and McDougall Street in the southwest
- Ardmore Street in the west
- Lakeside Road in the northwest

The geographical scope of the model was chosen to include all major route choice within the town.

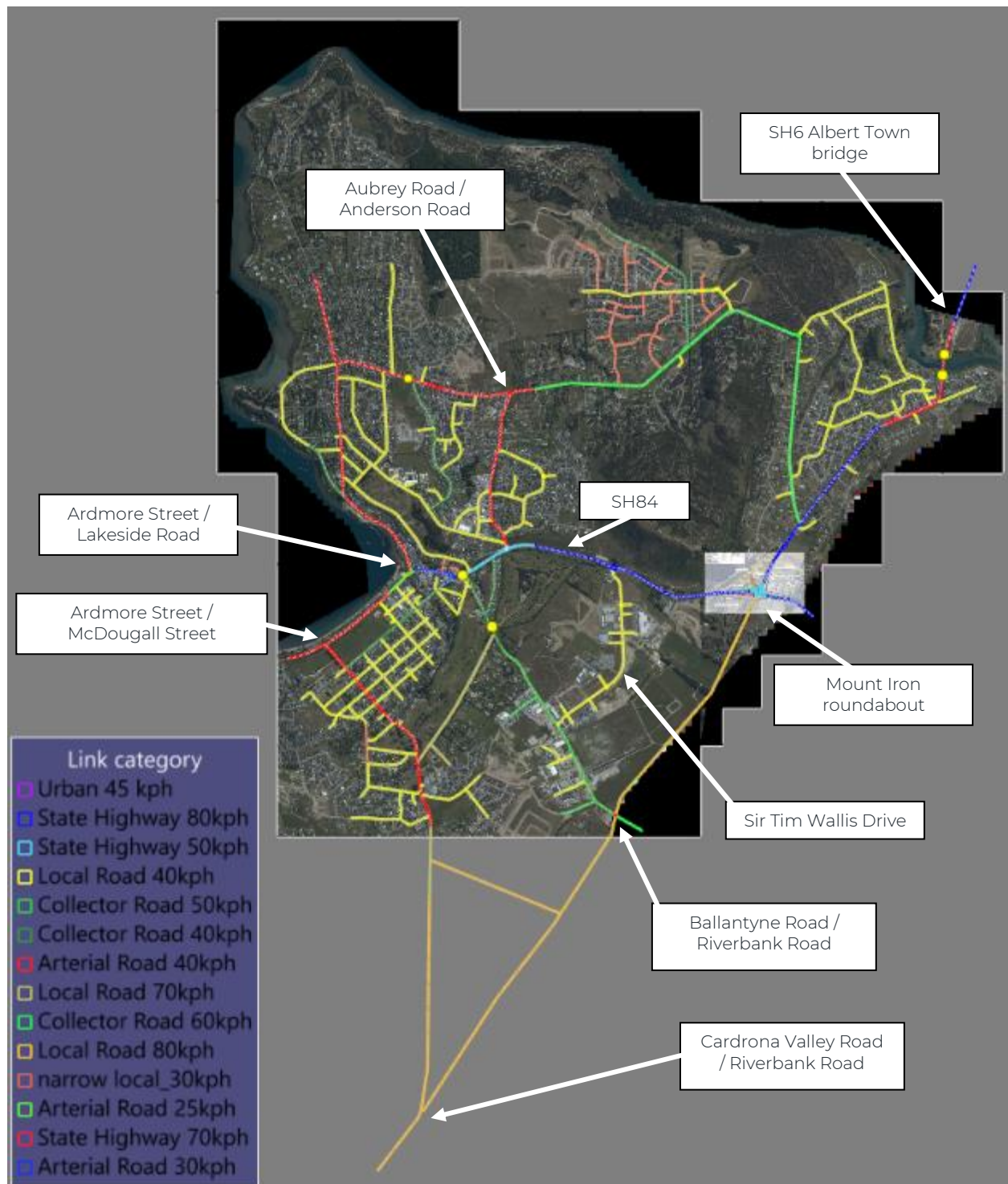
Morning and evening peak models were built:

- 07:00 – 09:15
- 15:00 – 18:15

Traffic was calibrated in five-minute time slices for internal and external zones. A one hour warm up and 30-minute warm down was included for each period. The evaluation hour for each period was set as 08:00-09:00 and 1700:-18:00, although output for other periods and sub-periods of the full modelled periods can be obtained.

The modelled base year was February 2024, representing the summer seasonal period traffic conditions. Future models were developed in 5-year intervals from 2028 to 2043 (but demand for other future years can be interpolated and extrapolated).

Figure 1: Model Coverage



2 Base 2024 Model Network

The model network was built from tracing the background aerial images, as well as checking against Google Streetview and on-site observations.

Some items of the network are worthy of note:

- Link categories (shown in Figure 1) – based on QLDC link classification
- Link speeds – based on posted speed limits, but adjusted where necessary when observed speeds (or assumed use of the link) was not reflective of the posted speed. This is in areas such as Ardmore Street and Tim Wallis Drive where speed tables lower the actual speed, as well as other areas within the town centre where on-street parking and other kerbside activity results in slower speeds

- Traffic signals – added at:
 - SH6 Albert Town bridge (one-way working)
 - Ardmore Street midblock crossing (east of the Brownston Street roundabout)
 - Aubrey Road midblock crossing (west of Kings Drive)
 - Ballantyne Road midblock crossing (north of Golf Course Road)
- Mount Iron roundabout – coded as the completed roundabout upgrade
- Ballantyne Road/Riverbank Road – added as the completed version of the roundabout (this enables all base and future models to have a consistent network)
- Minor road network – in the town centre, generally all roads have been included. In residential areas outside of the town centre, some minor roads have been omitted for simplicity of the model – as these areas are less critical, as long as the road network and zone structure results in traffic entering and exiting the Collector, Arterial and State Highway links in the realistic locations, then no drop in model accuracy is achieved
- Traffic Zones – see Appendix A and next section on base traffic demand

3 Base 2024 Model Traffic Demand

3.1 Demand Sources and Inputs

Traffic demand was obtained from a number of sources:

- Link count data from QLDC counts (see Figure 2)
- Link count data from NZTA TMS locations (see Figure 3)
- Turn count data at a few locations (Mount Iron, Aubrey Road / Anderson Road and Ballantyne Road / Riverbank Road)
- Estimates of trip generation from land use within the model area
- Strategic model output (for initial trip distribution only)

As QLDC count data was provided across many months and years, the permanent NZTA TMS data was used to develop a profiled relationship between months and years, as shown in Figure 4, which enabled factors to be calculated with which to convert all data to a February 2024 baseline (note that in 2020, data was not used due to the impact of COVID-19). It can be noted that there has still been a large increase in traffic volumes from 2019 to 2024.

Traffic count data is generally useful to calibrate demands at intersections and at external points of the network – however, for internal traffic circulation, the general shape of demand has to be built up from estimates of trips rates for various land use within each specific traffic zone.

The model was split into 75 traffic zones, which are origin and destination points for vehicle being loaded and unloaded from the road network. These consisted of 70 internal zones, and 5 external zones:

- Zone 8 – SH6 Albert Town bridge (north side)
- Zone 9 – SH6 (East of Mount Iron)
- Zone 10 – Ballantyne Road (east of Riverbank Road)
- Zone 11 – Cardrona Valley Road (south of Riverbank Road)
- Zone 18 – Wānaka Mount Aspiring Road (west of McDougall Street)

All other zones were considered internal, and estimates on total demand for these zones were estimated based on standard trip rates for the split of particular lane use within each zone (residential, commercial, recreation, visitor accommodation, retail, mixed use etc).

Appendix A shows the location of zones within the model.

Figure 2: QLDC link count locations (AADT and date shown)

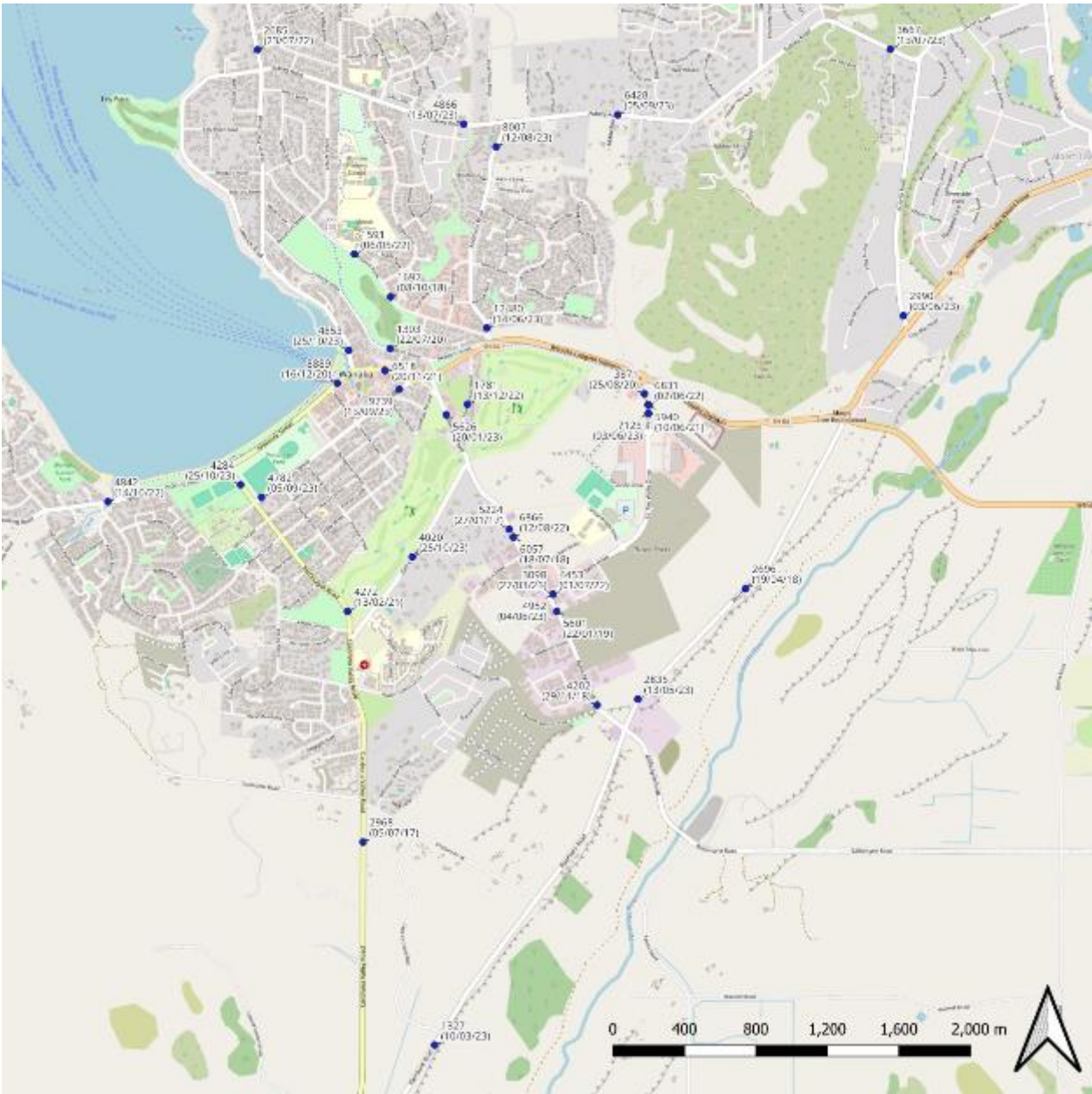


Figure 3: NZTA Traffic Monitoring Sites (TMS)

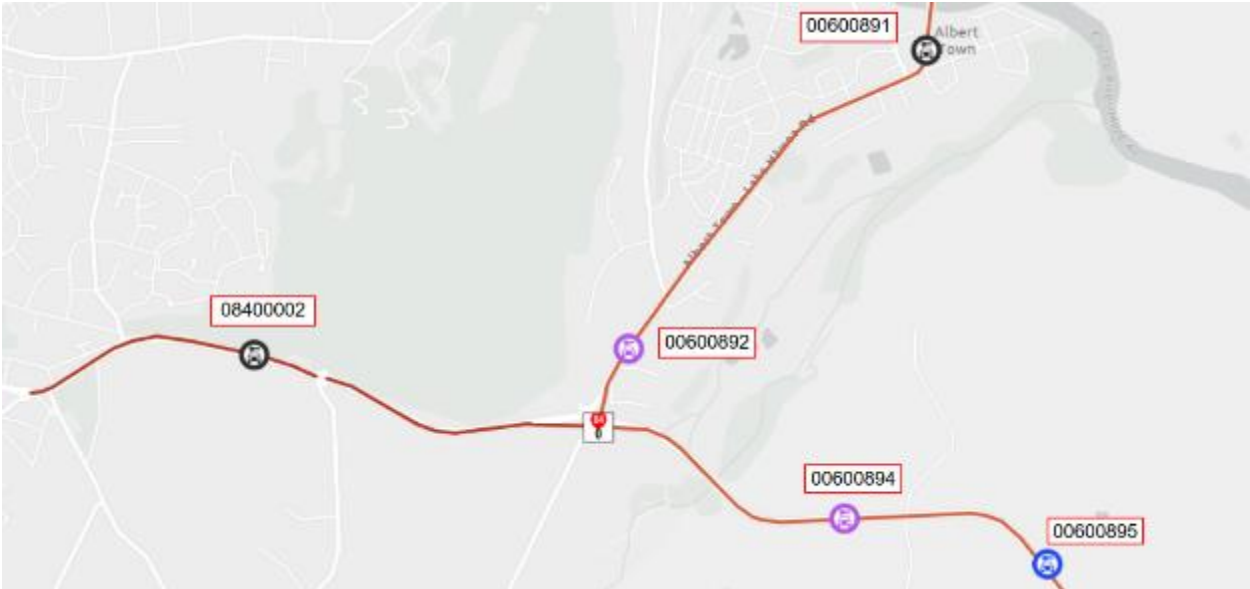
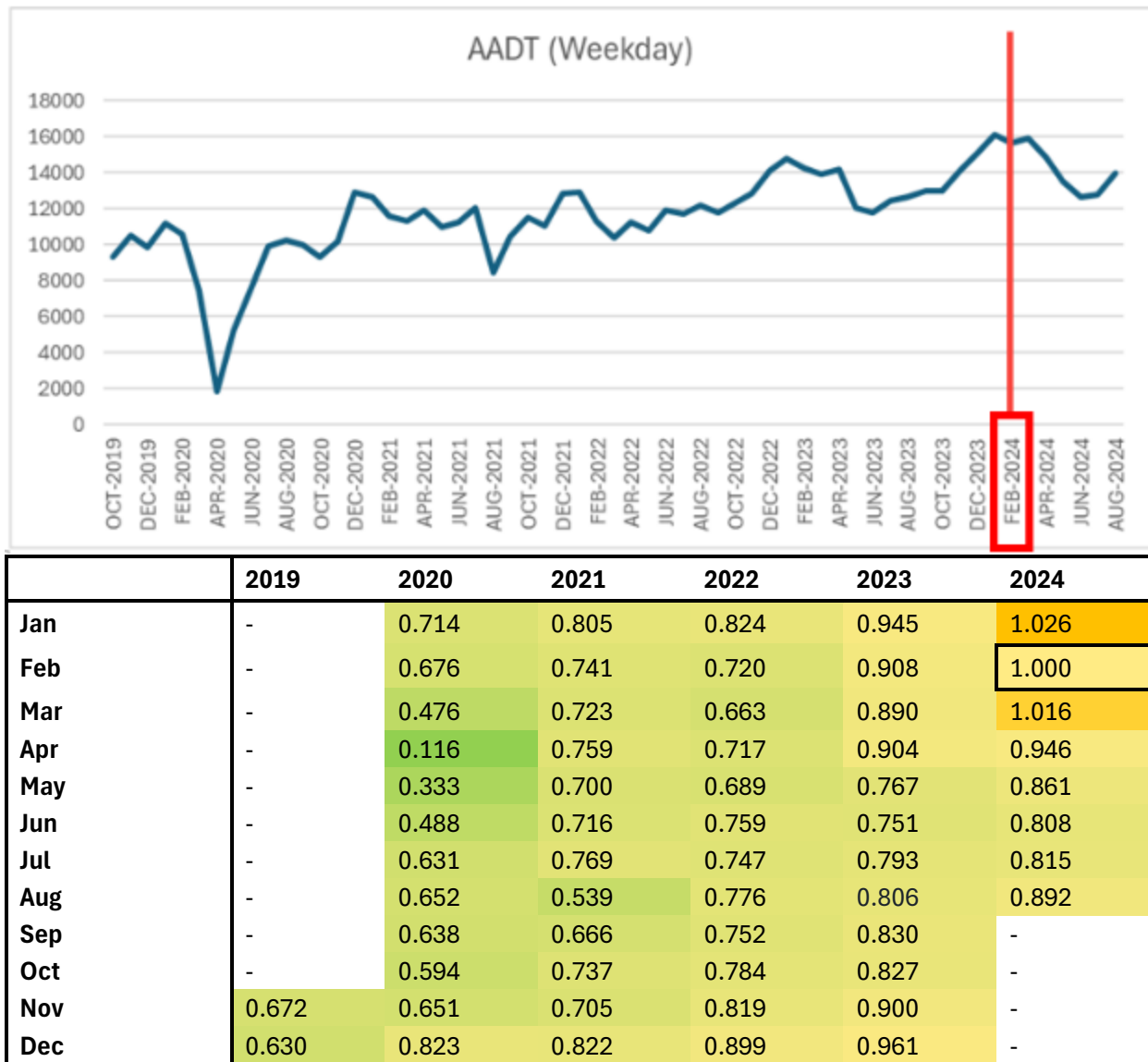


Figure 4: Month to month demand profile on SH84



3.2 Demand Estimation

In order to develop 75 row by 75 column Origin-Destination matrices for both the AM and PM peak hour periods, the following method was used:

- 1 Create a prior matrix – this was developed from a previous cordon of the QLDC TRACKS strategic model, and just provides a starting point for the matrix estimation procedure
- 2 Calculate Target Origin and Destination peak hour totals for each zone – these are developed from either the count data (in the respect of external zones) or the land use calculations (in the respect of internal zones)
- 3 Carry out a “furnessing” procedure on the matrix – this is done by scaling of individual cells in **each row** of the prior matrix, by the ratio of the prior matrix origin total (from step 1) and the target origin total (from step 2). Then a similar scaling of the of individual cells in **each column** of the prior matrix, by the ratio of the prior matrix destination total (from step 1) and the target Destination total (from step 2). This process is then repeated, until convergence is reached. This matrix is the new prior
- 4 Matrix estimation is then undertaken within the Paramics model in several stages:
 - (a) Create a route information file by running the new prior matrix through the model network. This creates routes between each zone-to-zone movement, with a

- proportion of traffic (from the new prior matrix) using each route, and then subsequently which links and turns throughout the network
- Create a survey data file of all the link and turn peak hour counts to act as targets for the matrix estimation
 - Create a constraints file for each zone origin and destination total (to provide bounds on the scale of changes that the matrix estimation can make to the new prior matrix)
 - These three inputs are then applied to the new prior matrix and a revised matrix generated through the model's matrix estimation procedure
- The new matrix is then run within the Paramics model and the resultant traffic assignment checked against the traffic count data for accuracy
 - Steps 4 and 5 are repeated until the traffic assignment is sufficiently accurate against the traffic data, at which point the base model is complete.

Table 1 sets out the resultant matrix sizes for the AM and PM peak hours.

Table 1: Matrix Sizes (total peak hour trips)

	AM Peak Hour	PM Peak Hour
Initial Prior	6,122	6,528
New Prior (post-furnessing)	6,253	7,710
Change	+2.1%	+18.1%
Final (post matrix estimation)	6,525	7,254
Change	+4.3%	-5.9%

The PM peak hour demand is around 11% higher than the AM equivalent, which is expected given the (generally) higher traffic volumes in the PM peak period.

Table 2 and Table 3 show some sector analysis of how the distribution of the matrix changes from the post-furnished matrix to the final matrix – for this analysis the 75 zones are grouped into 10 geographical sectors covering the network.

Table 2: AM peak hour - sector analysis

ORIGINAL	North	SH6 North	SH6 East	Cadrona	Golf/3-Park	South	CBD	Central	Albert Town	Northlake	TOTAL
AM Peak	6.0%	2.0%	1.4%	2.8%	6.2%	4.9%	3.6%	1.6%	2.4%	1.9%	32.8%
North	3.8%	0.0%	0.2%	0.5%	1.0%	0.8%	0.6%	0.3%	0.1%	0.1%	7.4%
SH6 North	1.1%	0.1%	0.0%	0.4%	0.6%	0.7%	0.4%	0.3%	0.4%	0.3%	4.3%
SH6 East	2.1%	0.1%	0.2%	0.2%	1.1%	0.9%	0.6%	0.3%	0.5%	0.4%	6.5%
Cadrona	2.3%	0.2%	0.3%	0.6%	1.0%	1.0%	0.7%	0.3%	0.6%	0.5%	7.3%
Golf/3-Park	4.6%	0.3%	0.5%	1.1%	2.4%	1.7%	1.4%	0.6%	1.2%	0.9%	14.9%
South	1.9%	0.1%	0.2%	0.5%	1.0%	0.8%	0.5%	0.3%	0.5%	0.4%	6.2%
CBD	1.6%	0.1%	0.2%	0.4%	0.9%	0.7%	0.5%	0.2%	0.4%	0.3%	5.3%
Central	2.6%	0.0%	0.4%	0.7%	1.6%	1.3%	1.0%	0.4%	0.1%	0.2%	8.3%
Albert Town	1.7%	0.0%	0.3%	0.7%	1.5%	1.2%	0.9%	0.4%	0.1%	0.1%	7.0%
Northlake	27.8%	3.1%	3.7%	7.8%	17.4%	13.9%	10.3%	4.6%	6.2%	5.2%	100.0%
NEW											
AM Peak	9.7%	1.5%	0.8%	3.3%	3.9%	2.9%	4.4%	1.2%	1.8%	1.5%	31.1%
North	2.7%	0.0%	0.4%	0.7%	1.6%	0.4%	0.1%	0.1%	1.3%	0.1%	7.3%
SH6 North	0.9%	0.3%	0.0%	0.2%	2.2%	0.5%	0.2%	0.1%	0.3%	0.1%	4.8%
SH6 East	1.0%	0.1%	0.2%	0.3%	1.9%	2.1%	0.4%	0.3%	0.2%	0.3%	6.8%
Cadrona	0.7%	0.0%	0.9%	1.5%	1.3%	2.7%	0.9%	0.1%	0.0%	0.0%	8.2%
Golf/3-Park	2.6%	0.1%	0.5%	0.5%	1.8%	3.2%	2.7%	1.4%	0.3%	0.7%	13.7%
South	1.1%	0.0%	0.1%	0.5%	0.3%	0.6%	1.5%	1.7%	0.0%	0.2%	6.1%
CBD	1.3%	0.0%	0.1%	0.4%	0.4%	0.6%	1.1%	0.3%	0.1%	0.3%	4.5%
Central	2.0%	0.8%	0.5%	0.6%	2.1%	0.6%	0.1%	0.1%	1.0%	1.6%	9.3%
Albert Town	6.5%	0.2%	0.1%	0.1%	0.1%	0.1%	0.3%	0.1%	0.8%	0.0%	8.2%
Northlake	28.5%	2.9%	3.6%	8.1%	15.5%	13.8%	11.7%	5.2%	5.9%	4.9%	100.0%

Table 3: PM peak hour - sector analysis

ORIGINAL											
AM Peak	North	SH6 North	SH6 East	Cadrona	Golf/3-Park	South	CBD	Central	Albert Town	Northlake	TOTAL
North	3.5%	1.4%	0.8%	1.3%	3.9%	2.7%	2.2%	1.1%	1.1%	1.0%	19.0%
SH6 North	1.1%	0.0%	0.2%	0.3%	1.0%	0.7%	0.6%	0.3%	0.0%	0.0%	4.2%
SH6 East	1.3%	0.4%	0.0%	0.3%	0.9%	0.6%	0.5%	0.2%	0.5%	0.4%	5.1%
Cadrona	1.9%	0.6%	0.3%	0.2%	1.3%	0.9%	0.7%	0.4%	0.8%	0.5%	7.5%
Golf/3-Park	6.0%	1.8%	0.8%	1.3%	3.0%	2.8%	2.2%	1.1%	2.4%	1.7%	23.3%
South	3.4%	1.0%	0.5%	0.8%	2.3%	1.4%	1.3%	0.6%	1.4%	1.0%	13.6%
CBD	2.8%	0.9%	0.4%	0.6%	1.9%	1.3%	0.9%	0.5%	1.2%	0.8%	11.3%
Central	1.1%	0.3%	0.2%	0.3%	0.8%	0.5%	0.4%	0.2%	0.5%	0.3%	4.5%
Albert Town	1.7%	0.1%	0.3%	0.5%	1.5%	1.1%	0.9%	0.4%	0.0%	0.1%	6.6%
Northlake	0.8%	0.0%	0.3%	0.4%	1.2%	0.9%	0.7%	0.4%	0.0%	0.0%	4.7%
TOTAL	23.7%	6.5%	3.7%	6.1%	17.8%	12.9%	10.3%	5.3%	7.9%	5.9%	100.0%
New											
AM Peak	North	SH6 North	SH6 East	Cadrona	Golf/3-Park	South	CBD	Central	Albert Town	Northlake	TOTAL
North	6.8%	1.1%	1.3%	0.9%	3.0%	2.0%	2.6%	0.6%	1.0%	2.4%	21.6%
SH6 North	1.3%	0.0%	0.3%	0.1%	0.5%	0.3%	0.2%	0.0%	1.3%	0.1%	4.1%
SH6 East	1.5%	0.6%	0.0%	0.1%	0.9%	0.6%	0.7%	0.1%	0.8%	0.2%	5.5%
Cadrona	0.6%	0.2%	0.1%	0.3%	2.3%	2.0%	1.0%	0.2%	0.3%	0.3%	7.2%
Golf/3-Park	3.3%	1.2%	1.0%	1.9%	4.5%	1.8%	0.3%	0.1%	1.6%	2.5%	18.3%
South	2.6%	0.6%	0.4%	2.3%	3.2%	2.5%	0.7%	0.3%	0.6%	0.8%	13.9%
CBD	2.6%	0.3%	0.3%	0.2%	0.3%	2.1%	2.2%	4.1%	0.4%	0.4%	13.0%
Central	1.5%	0.2%	0.2%	0.3%	0.2%	1.2%	1.0%	0.1%	0.3%	0.3%	5.2%
Albert Town	1.7%	2.3%	0.1%	0.0%	0.4%	0.3%	0.1%	0.0%	0.8%	0.0%	5.8%
Northlake	0.7%	0.4%	0.2%	0.2%	1.4%	0.5%	0.7%	0.1%	1.1%	0.0%	5.5%
TOTAL	22.6%	6.9%	4.0%	6.2%	16.7%	13.3%	9.3%	5.8%	8.2%	6.9%	100.0%

The analysis shows that the overall trip distribution has only changed moderately through the matrix estimation process. The largest changes are around a change in distribution of trips to and from the north sector (which is roughly synonymous with the Wānaka North SA2) in both periods – this is predominantly due to the original prior matrix (and associated model network) not including the Aubrey Road link, and therefore missing any trips using this link between Wānaka North and areas to the east.

The matrices were then converted to the full modelled period matrices by applying one of two profiles to each matrix cell:

- Trips to and from external zones used a profile from TMS (State Highway) data
- All remaining internal to internal zone trips used a profile from the Aubrey / Anderson intersection count

Global vehicle proportions were then applied to the matrices based on proportions of vehicle classifications from a combination of the traffic count data.

Table 4: Vehicle Classification Proportions

	AM Peak	PM Peak
Car	80%	90%
Light Goods	12%	5%
Medium Goods	4%	3%
Heavy Goods	4%	2%
Total	100%	100%

4 2024 Base Model Calibration and Validation

4.1 Traffic demand comparisons

The AM and PM 2024 base model was run and then compared against observed (count) data. For the purposes of model calibration and validation, the model has been classified as **Purpose Type E: Small Area/Corridor** model under the definition of the NZTA Transport Model

Development Guidelines (TMDG)¹. The following sections compare the model results with the criteria in the TMDG.

Firstly, the link and turn volumes in the model were compared against the count data, for the AM and PM peak hour periods. The GEH statistic is a form of Chi-squared statistic that can be used to compare observed and modelled counts. It is useful for these comparisons because it is tolerant of relative and absolute errors. Table 5 shows the results.

Table 5: Link and Turn Count GEH Comparison

	Percentage of comparisons achieving target				
	AM Peak Hour		PM Peak Hour		Target (E: Small Area)
Criterion	Links	Turns	Links	Turns	
GEH <5.0	85%	97%	88%	97%	>80%
GEH <7.5	95%	97%	97%	97%	>85%
GEH <10.0	97%	97%	100%	97%	>90%
Number of Comparisons	65	30	65	30	-

Table 5 shows that all criteria are met for both link and turn model volumes in both peak hour periods, showing a good correlation between the observed and model flows.

Table 6 shows a scatter plot of all link and count data against the model output in each peak hour period, with a resultant line-of-best fit and R-squared value calculated.

Table 6: Link and turn scatter line-of-best fit and R-squared

	Line of Best Fit		R-squared	
	Model	Target	Model	Target
AM Peak Hour	$y = 0.94x$	$y = 0.95x$ to $1.05x$	0.97	>0.95
PM Peak Hour	$y = 1.02x$	$y = 0.95x$ to $1.05x$	0.98	>0.95

Table 6 shows that the correlation is generally good, with the line-of-best-fit in the AM peak just outside the target criteria.

4.2 Travel Time Comparisons

Bliptrack (Bluetooth vehicle tracking data) was obtained for February 2023 in order to compare against the model travel time output. The routes covered in the Bliptrack monitors are shown in Figure 5.

¹ <https://www.nzta.govt.nz/assets/resources/transport-model-development-guidelines/docs/tmd.pdf>

Figure 5: Bliptack travel time sections



Model output was obtained for the two peak hour periods, to compare against the observed travel times, the results of which are shown in Table 7 and Table 8.

As per the TMDG, two criterium are listed:

- >90% of comparisons should be within 15% or 1 minute (if higher) – Criterium 1
- >95% of comparisons should be within 25% or 1.5 minutes (if higher) – Criterium 2

The tables show that full criteria are not met in either peak period. However, there are a number of mitigating factors for this:

- Model travel times passing through Mount Iron (SH6 / SH84 roundabout) are not directly comparable with the observed:
 - The model includes the new completed roundabout in operation, whereas the observed data is for a period during construction of the roundabout, with the existing priority intersection in place
 - Consequently, routes passing through the roundabout (and especially on journeys approaching from SH6 (north) and Riverbank Road) are expected to have a significantly higher delay in the observed data compared to the model (in the model, the vehicles experience little delay at the roundabout on any approach)

Table 7: Travel time comparison for the AM Peak Hour

From	To	Travel times (seconds)				Travel Time Comparison			
		Obs	Modelled			Abs. Diff (sec)	% Diff	Passes Criteria 1	Passes Criteria 2
		Ave	Min	Max	Avg				
SH6 Albert Town/Ash Avenue	SH84/SH6	199.8	65.5	105.3	84.8	-115.1	-57.6%	No	No
SH84/SH6	SH6 Albert Town/Ash Avenue	118.5	58.3	94.8	75.0	-43.5	-36.7%	Yes	Yes
SH84/SH6	Ardmore/Brownston	291.9	145.0	260.0	189.3	-102.6	-35.2%	No	No
Ardmore/Brownston	SH84/SH6	196.7	138.0	200.3	162.3	-34.4	-17.5%	Yes	Yes
Ardmore/Brownston	Ardmore/Lakeside	59.9	42.0	60.3	47.5	-12.4	-20.7%	Yes	Yes
Ardmore/Lakeside	Ardmore/Brownston	69.4	43.5	68.8	49.3	-20.1	-29.0%	Yes	Yes
Ardmore/Lakeside	Brownston/McDougall	138.8	119.5	140.0	127.0	-11.8	-8.5%	Yes	Yes
Brownston/McDougall	Ardmore/Lakeside	248.1	125.3	169.5	138.3	-109.9	-44.3%	No	No
Ardmore/Brownston	Brownston/McDougall	142.9	109.8	173.0	121.8	-21.1	-14.8%	Yes	Yes
Brownston/McDougall	Ardmore/Brownston	131.2	102.8	139.3	115.5	-15.7	-11.9%	Yes	Yes
Brownston/McDougall	Cadrona/Riverbank	238.1	236.5	266.0	249.0	10.9	4.6%	Yes	Yes
Cadrona/Riverbank	Brownston/McDougall	224.3	236.5	270.0	249.8	25.5	11.3%	Yes	Yes
SH84/SH6	Cadrona/Riverbank	294.0	244.5	286.3	263.3	-30.8	-10.5%	Yes	Yes
Cadrona/Riverbank	SH84/SH6	317.5	247.5	290.5	265.5	-52.0	-16.4%	Yes	Yes

Table 8: Travel time comparison for the PM Peak Hour

From	To	Travel times (seconds)				Travel Time Comparison			
		Obs	Modelled			Abs. Diff (sec)	% Diff	Passes Criteria 1	Passes Criteria 2
		Ave	Min	Max	Avg				
SH6 Albert Town/Ash Avenue	SH84/SH6	142.9	67.3	110.3	85.3	-57.7	-40.3%	Yes	Yes
SH84/SH6	SH6 Albert Town/Ash Avenue	117.7	60.3	97.0	77.0	-40.7	-34.6%	Yes	Yes
SH84/SH6	Ardmore/Brownston	309.0	148.3	392.8	247.8	-61.3	-19.8%	No	Yes
Ardmore/Brownston	SH84/SH6	199.5	142.3	220.8	173.5	-26.0	-13.0%	Yes	Yes
Ardmore/Brownston	Ardmore/Lakeside	65.7	42.0	63.8	48.0	-17.7	-26.9%	Yes	Yes
Ardmore/Lakeside	Ardmore/Brownston	71.7	43.8	101.3	54.8	-16.9	-23.6%	Yes	Yes
Ardmore/Lakeside	Brownston/McDougall	314.1	117.5	145.0	127.0	-187.1	-59.6%	No	No
Brownston/McDougall	Ardmore/Lakeside	176.4	124.3	161.5	137.8	-38.7	-21.9%	Yes	Yes
Ardmore/Brownston	Brownston/McDougall	129.7	109.5	169.8	123.0	-6.7	-5.2%	Yes	Yes
Brownston/McDougall	Ardmore/Brownston	240.7	105.3	181.3	126.3	-114.4	-47.5%	No	No
Brownston/McDougall	Cadrona/Riverbank	236.2	230.0	267.5	247.8	11.6	4.9%	Yes	Yes
Cadrona/Riverbank	Brownston/McDougall	233.6	232.3	271.0	249.3	15.7	6.7%	Yes	Yes
SH84/SH6	Cadrona/Riverbank	349.6	245.0	276.8	260.3	-89.4	-25.6%	No	Yes
Cadrona/Riverbank	SH84/SH6	705.1	247.5	285.8	265.0	-440.1	-62.4%	No	No

- Travel times within the central town area are generally significantly lower in the model compared with observed. As part of the model development, vehicle speeds were reduced to represent actual speeds rather than posted speeds, but it is not appropriate to lower the speeds further. It is likely that some trips within the town centre include observed travel times that include some circulation for parking spaces, or pick-up and/or drop-off activity, which pushes the average observed travel times upwards (but is not reflective of true delay on the section)

Interrogation of Google Maps travel time estimates show a better comparison against the model data, with only four locations indicated where travel times are highlighted as being noticeable slower than free-flow journeys:

- Westbound approach on SH84 to the Anderson Road intersection (due to yielding to right turns from Anderson Road), which is predicted to add 1-2 minutes of delay to the journey in peak times, which is similar to that represented in the model. Some delay is also experienced on the Anderson Road approach.
- Delay at the SH6 Albert Town bridge due to signal control, with again typically 1-2 minutes of additional travel time compared to a free-flow journey
- Brownston Street approach to the Ardmore Street roundabout, particularly in the PM peak
- MacPherson Street and Ballantyne Road approaches to SH84, with some delay for right turning movements onto SH84 due to yielding to relatively high traffic volumes on SH84 itself

Given the above, it is considered that the model represents a reasonable reflection of travel times within the network.

5 2024 Base Model Operation

5.1 Travel times

Figure 6 and Figure 7 show output from the 2024 base model for average vehicle delay on link sections across the network for the AM and PM peak hours respectively:

- Delays (in seconds) are shown adjacent to the associated link (in the direction of normal travel along the link), between a pair of yellow nodes
- The delay given is the difference between the minimum travel time recorded for the section (across all time periods), and the average travel time recorded within each specified peak hour
- Colour coding indicates where delay is minimal (dark green), moving towards higher delay (yellow through to red)

A few trends can be identified from the figures:

- Vehicle delay in the PM peak hour are generally higher than in the AM peak hour at critical locations – this is to be expected given the higher traffic volumes in this period, and is consistent with observation of network operation
- Delay is still relatively low even in the busier PM peak period (compared to other locations in the District such as Queenstown), generally centred around:
 - SH84 / Anderson Road intersection
 - SH6 Albert Town bridge
 - Eastbound Brownston Street approach to the Ardmore Street roundabout
 - Right turns onto SH84 at Ballantyne Road and MacPherson Street

5.2 Level of Service (delay)

At selected intersections within the network, Level of Service (LOS) output has been obtained. LOS is a measure of turning movement or total intersection delay, categorised into 6 bands, as shown in Table 9. The LOS measure is a reasonable high level indication of relative intersection operation, although it is not a direct measure of intersection capacity – particularly at signalised intersections where average vehicle delay can be in the LOS E-F range at an intersection with significant space capacity (i.e. where the delay can be also related to the number of signal phases, rather than vehicle demand)

Table 9: Level of Service (LOS) definitions

LOS	Definition	Signalised intersection	Unsignalised intersection
A	Free flow	<= 10 seconds	<= 10 seconds
B	Reasonably free flow	10-20 seconds	10-15 seconds
C	Stable flow	20-35 seconds	15-25 seconds
D	Approaching unstable flow	35-55 seconds	25-35 seconds
E	Unstable flow (at capacity)	55-80 seconds	35-50 seconds
F	Forced or breakdown flow (demand > capacity)	>80 seconds	>50 seconds

Figure 6: 2024 base model section delays (in seconds) - AM Peak Hour

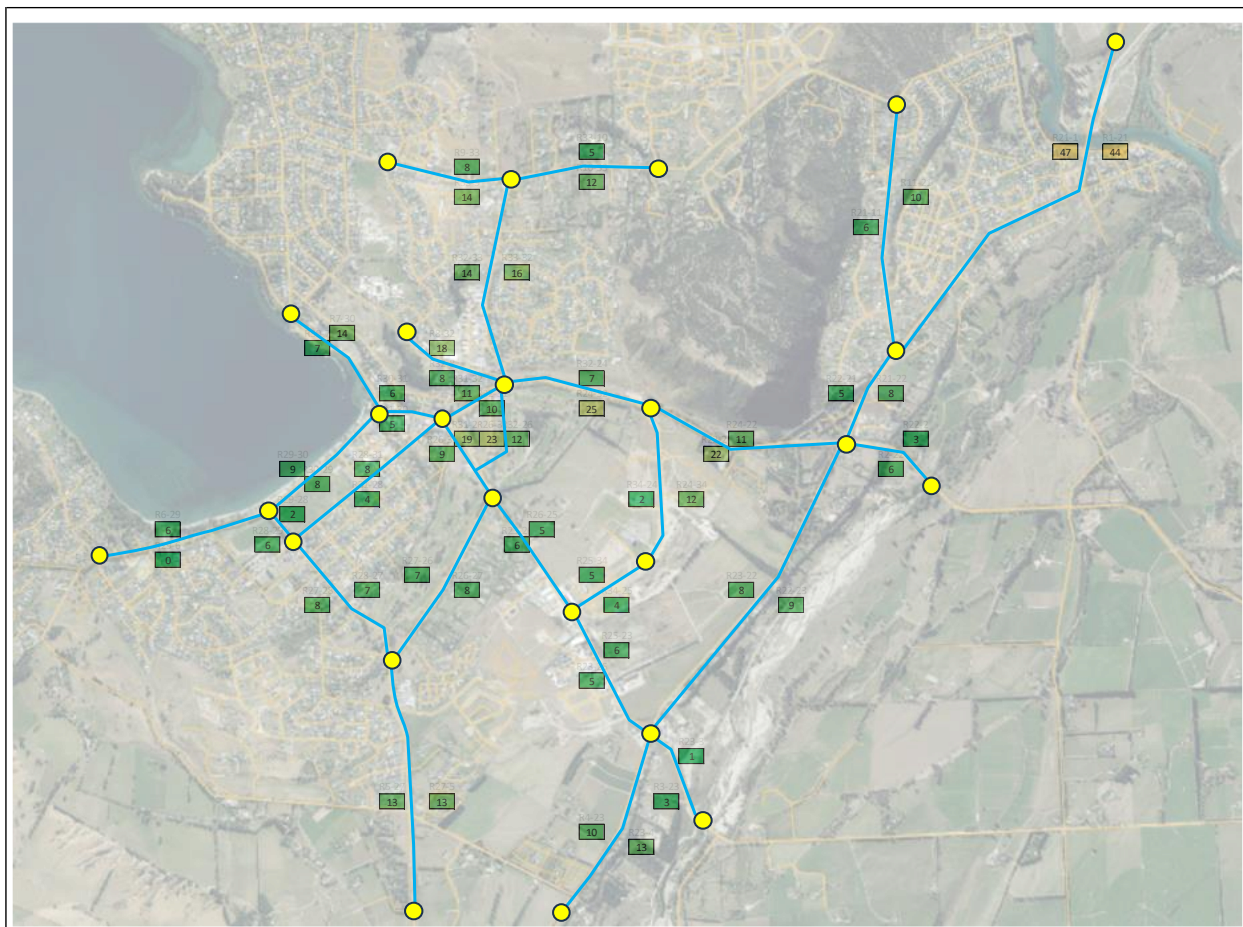
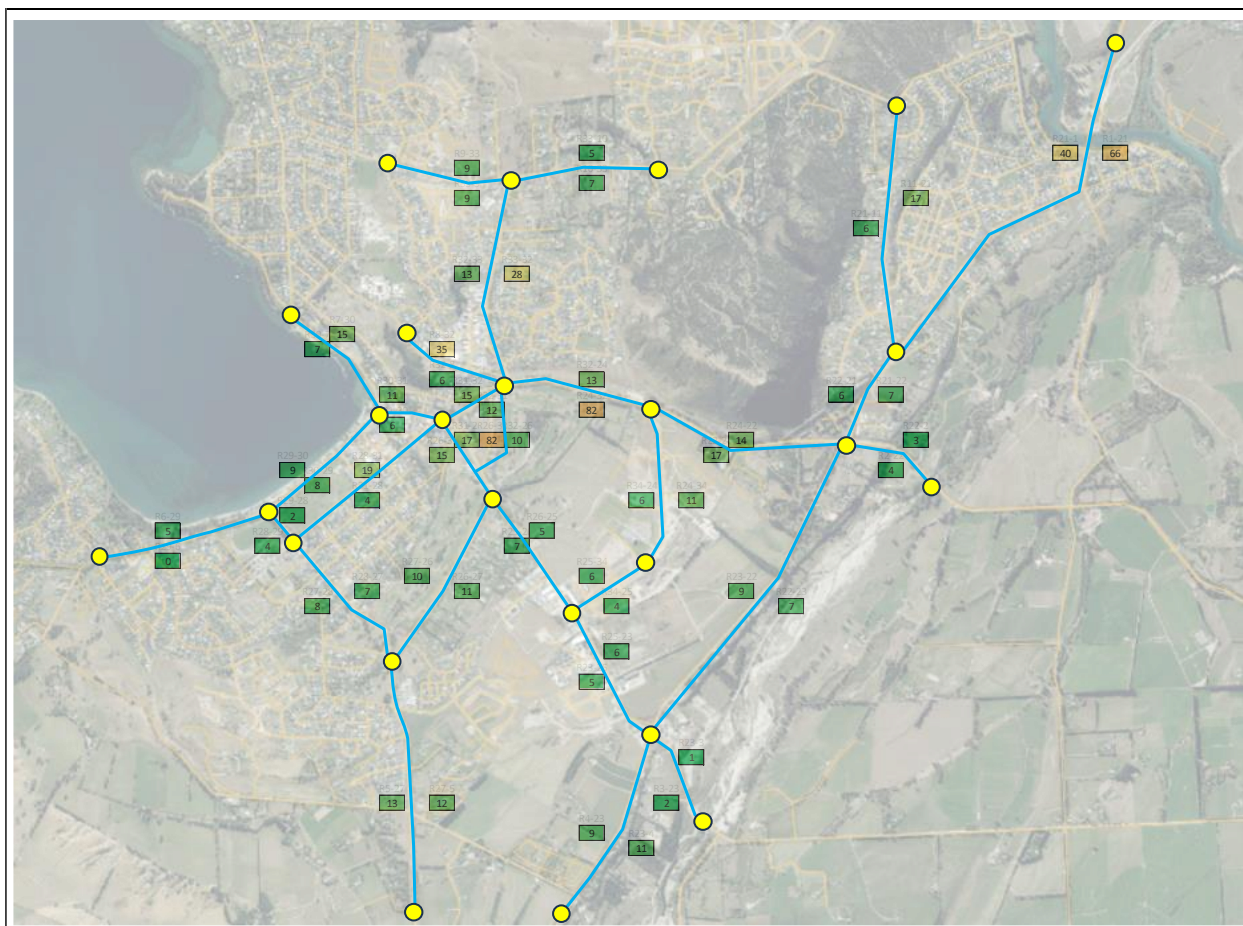
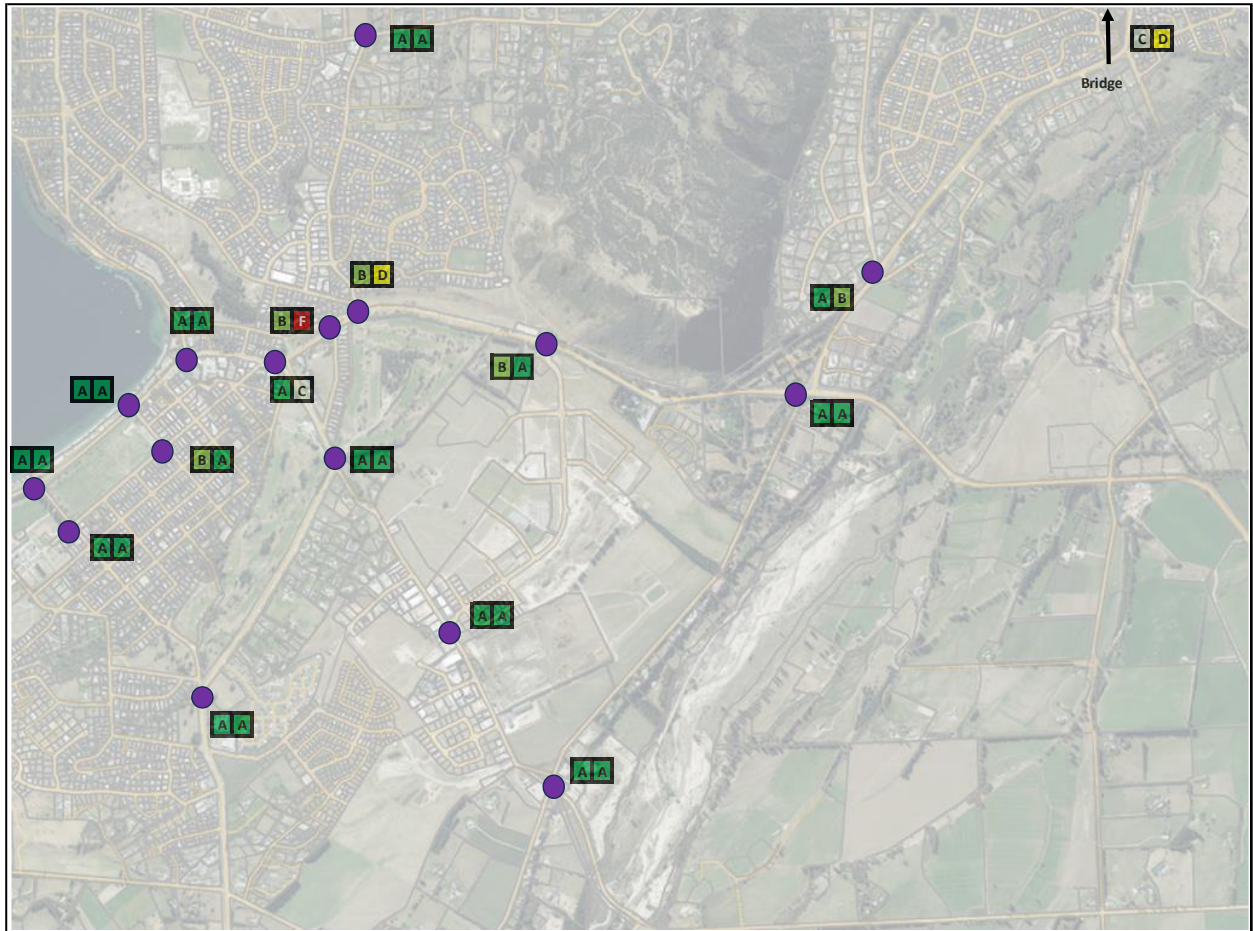


Figure 7: 2024 base model section delays (in seconds) - PM Peak Hour



Error! Not a valid bookmark self-reference. shows the AM and PM peak hour LOS results for key intersections within the network, with each intersection box showing the AM peak hour LOS on the left, and the PM peak hour LOS on the right-hand side.

Figure 8: 2024 base model Level of Service results (AM and PM peak hour)



As would be expected, the PM peak period shows poorer levels of service, albeit centred around the section of SH85 between Ardmore Street and Anderson Road, which is consistent with the travel time model results.

5.3 Model Visuals

The additional benefit of a micro-simulation model is that the model can show a visual representation of the operational level through time. Figure 9 shows a screenshot at around 17:15 in the 2024 base model, centred around SH84.

The screenshot includes a “heatmap” of where queues of vehicles (or slow moving traffic) are being predicted – the locations in the screenshot are consistent with the LOS and travel time results in the previous sections.

In summary, it is considered the 2024 base model is a reasonable representation of the existing network operation, and can be used for testing future growth scenarios.

Figure 9: Screenshot of typical operation in the 2024 base PM peak hour, centred around SH84



6 Future Growth Scenarios

A range of future growth scenarios have been developed to assess the operation of the existing Wānaka road network, a summary of these are set out in

Table 10.

In order to stress test the operation of network under various conditions, different underlying growth assumptions were used and combined to create the growth scenarios:

- The “Core” demand population and visitor projections were those provided by QLDC, as the March 2022 release² (more recent projections from early in 2024 are still under review), at Statistical area 2 level
- NZ Stats Statistical area 2 population projections release in April 2023, for medium and high growth scenarios
- A post-growth adjustment to represent a change in travel behaviour to reduce overall trips. This is a fixed input to the model (rather than calculated via other means) to reduce trip levels by a given percentage, in order to represent one or more of the following effects:
 - Mode shift towards walk/cycle modes
 - Mode shift towards public transport mode
 - Peak spreading (a temporal change in trip distribution due to increasing congestion or delay)
 - Increased level of working from home
 - Increased car occupancy (including car sharing)
 - Reduction in vehicle trips due to land use changes (e.g. mixed use developments)
 - Introduction of road user charging which may drive a reduction in total trips through other behaviour (mode shift to other modes, more car sharing, greater level of linked trips etc)

Table 11 sets out the projections of resident population (average day) for each SA2, from 2024 (base year) through to 2043 in 5-year increments. Figure 10 shows a graphical representation of the difference between the QLDC and NZ Stats projections at 2038 (as an example, but broadly consistent with other years) in terms of spatial growth variations.

It can be seen that:

- the QLDC forecasts are higher than the NZ Stats Medium and High projections, growing the resident population at around 11% every 5 years
- The QLDC growth is higher in Wānaka Central, Wānaka West and Lake Hāwea – whilst the NZ Stats projections are weighted towards Wānaka North and Albert Town (including Northlake - this difference provides a useful spatial difference in terms of the assignment of additional traffic onto the network in the model)

² <https://www.qldc.govt.nz/media/iqhudlg/demand-projections-summary-march-2022.pdf>

Table 10: Future Growth Scenarios

Scenario	Representative Year	TDM % increase	Growth Projection		
			QLDC 2022	NZ Stats Medium	NZ Stats High
Base 2024	2024	0%	-	-	-
Core 2028	2028	0%	✓	-	-
Core 2033	2033	0%	✓	-	-
Core 2033 + 10% TDM		10%	✓	-	-
Core 2033 + 20% TDM		20%	✓	-	-
Core 2038	2038	0%	✓	-	-
Core 2038 + 10% TDM		10%	✓	-	-
Core 2038 + 20% TDM		20%	✓	-	-
2038 Med		0%	-	✓	-
2038 High		0%	-	-	✓
2043 Core	2043	0%	✓	-	-
2043 Core + 10% TDM		10%	✓		
2043 Core + 20% TDM		20%	✓	-	-
2043 Med		0%	-	✓	
2043 High		0%	-		✓

The process for applying the growth projections to the models was as below, for each scenario.

- 1 Calculate the percentage change in resident population in each SA2 between the future scenario and 2024 baseline
- 2 Distribute this growth across each traffic zone within the model (origin and destination) – generally pro rata against existing land use, but with exceptions within certain areas where extra growth is likely to be associated with specific brownfield/greenfield sites
- 3 For trips to and from external zones, visitor growth projections were also applied
- 4 Carry out another matrix manipulation exercise (furnessing) to balance origin and destination trips, within the fixed constraints of the new zone trip totals
- 5 If applicable for the scenario, a TDM reduction factor was applied to all internal-to-internal trips to represent some form of behaviour change. This was not applied to external trips as it is considered that these trips are less likely to be able to change behaviour (although in practice some reduction may be possible)
- 6 This process created new future year matrices, for running in the models

Note that due to the highly variable nature of land use development (uncertainties in terms of both spatial distribution of growth, and the rate of growth, as well as future changes to the District Plan and/or Government policy), the scenarios represent a best-guess at distributing the additional population from larger SA2 areas to the more disaggregated Wānaka traffic model zones.

This simplified method above could be further developed in the future to be linked to specific land parcels and/or zones within the District Plan. The model has been set up with a finely grained zone structure, with trip rates assumptions applied to specific buildings within each zone – so calculations on how land use changes result in different trip patterns could be applied at a detailed level. For the purposes of this higher level network assessment however, with the use of growth at as SA2 level, a more generic spread of population/visitor growth was applied across each individual zone.