Links to Glen Innes Cycleways

2022 Addendum to Single Stage Business Case

September 2022

flow
TRANSPORTATION SPECIALISTS

flow
TRANSPORTATION SPECIALISTS

Project: Links to Glen Innes Cycleways
Title: 2022 Addendum to Single Stage Business Case
Document Reference: P:\Stan\097 Links to Glen Innes- Business Case Addendum 2022 - SO\4.0 Reporting\R1B220929 Links to GI 2022 Addendum to Single Stage Business Case.docx
Prepared by: [redacted]
Reviewed by: [redacted]

Revisions:

Date	Status	Reference	Approved by	Initials
21 September 2022	Version A	R1A220921	[redacted]	KM
29 September 2022	Version B	R1B220929	[redacted]	KM

EXECUTIVE SUMMARY

Flow Transportation Specialists (Flow) has been commissioned by Auckland Transport to provide an addendum to the Links to Glen Innes Cycleways Single Stage Business Case (SSBC). The SSBC was completed for the project in 2020, and a previous addendum in 2021 included updates to:

- The Strategic Case following new and updated National and Regional Strategic documentation.
- Update on Stakeholder engagement and consultation
- Preferred option update and assessment
- Recommended option economic assessment
- Updated performance measures

This subsequent 2022 addendum provides an update to:

- Update on Stakeholder engagement and consultation
- Preferred option update and assessment
- Recommended option economic assessment

This addendum consolidates the previous investigations and options assessments and provides a clear and concise justification for the preferred option, which supports higher quality cycling facilities.

CONTENTS

1 BACKGROUND

The case for investing in cycling within Auckland was established by Auckland Transport's Auckland Cycling Programme Business Case (PBC) in 2017. The PBC gained funding for a 10-year programme of investment across the region, focussing on

- trips most likely to be undertaken by bike, being short trips to jobs and education
- communities with the greatest potential for cycling and the highest need

Glen Innes is a suburb located west of the Auckland CBD and borders Wai O Taiki Bay. The area is predominantly residential; however, it also includes several schools, community facilities, businesses, and a train station (Glen Innes Train Station). The area has recently been identified as a growth area with intensification planned. This will include more homes, people, schools, businesses, and traffic to be generated in the coming years. Therefore, alternative transport modes connecting the community to and from the Auckland CBD and other key destinations has been identified as a high priority for the area.

The key objective of the project is to improve cycling connections to public transport hubs (i.e. Glen Innes Train Station) and connect the suburbs of Glen Innes and Stonefields with the Urban Cycleway Network through the provision of a series of separated cycleways.

Figure 1: Geographic scope of the project

The Links to Glen Innes project proposes separated cycleways on approximately 7.3 km of Glen Innes's streets. The routes centre on the Glen Innes town centre and train station and connect to the terminus of the Glen Innes to Tāmaki Drive shared path. The project also includes a comprehensive series of pedestrian and general traffic safety improvements at intersections. Following completion of the SSBC, the routes shown in red in Figure 2 have undergone further design refinement, which will be covered further in later sections of this addendum.

Figure 2: Links to Glen Innes Cycleways map

1.1 Changes following completion of 2021 SSBC addendum

There have been several changes since completing the previous SSBC addendum in 2021. These include

- a public engagement process, which ran through December 2021 and January 2022, and that has resulted in modified designs on some routes
- revised designs for the project, with the one-direction cycle lanes previously proposed now replaced with bidirectional cycleways on
    - Stonefields Avenue (east side of street, College Road to Morrin Road)
    - Apirana Avenue (west side of street, Merton Road to Pilkington Road)
    - Line Road (west side of street, Taniwha Street to Eastview Reserve)
- updated cost estimates, reflecting the above design changes
- changes to the expected project delivery timeframes, with construction now coordinated around road maintenance contracts, where practicable. Construction is now proposed from January 2023 to June 2024.

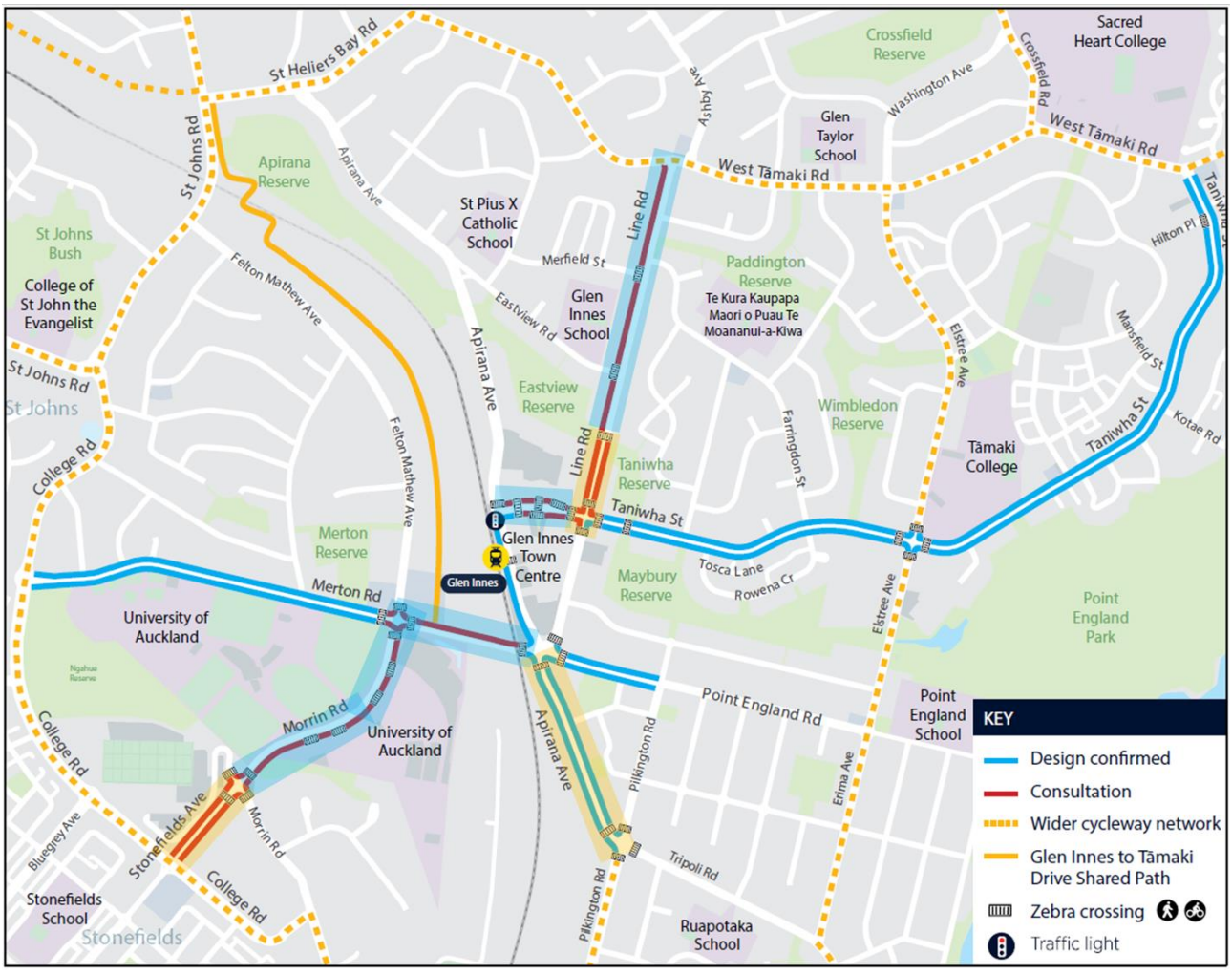
2 STAKEHOLDER AND PUBLIC CONSULTATION

2.1 Overview

Public consultation on the Links to Glen Innes project was undertaken between December 2021 and January 2022. A total of 243 responses were received, mainly in favour of the proposal, some of which included suggestions of how the proposed designs could be improved.

Figure 3 shows the routes taken to public consultation in December 2021. Designs for routes shown in blue had been confirmed previously, while designs for routes shown in red were the focus of the consultation. The designs taken to public consultation can be viewed on the project's webpage.[1]

Figure 3: Proposed Links to Glen Innes Cycleway routes



2.2 Feedback received

Following public consultation, a number of routes were confirmed to proceed to detailed design (highlighted blue in Figure 3), while a number were identified for further investigation based on feedback

[1] Auckland Transport. (2022). *Links to Glen Innes Cycleways.* https://at.govt.nz/about-us/have-your-say/east-auckland-consultations/links-to-glen-innes-cycleways/

from stakeholders and the community (highlighted yellow in Figure 3). One previously confirmed route was also identified for re-evaluation (Apirana Avenue between Merton Road and Pilkington Road).

The routes confirmed to proceed to detailed design (on top of routes with previously confirmed designs) were:

- Line Road between Eastview Reserve and West Tāmaki Road - an off-road bi-directional cycleway on the western side of Line Road
- Taniwha Street off-road between Apirana Avenue and Line Road – off-road uni-directional cycleways on either side of the road
- Merton Road between Apirana Avenue and Morrin Road – an off-road bi-directional cycleway on the northern side of the road
- Morrin Road between Merton Road and Stonefields Avenue – an on-road bi-directional cycleway on the eastern side of the road.

The matters identified for further investigation included:

- the feasibility of continuing the on-road bi-directional cycleway from Morrin Road onto Stonefields Avenue between Morrin Road and College Road instead of changing to on-road uni-directional cycleways on either side of the road. This would provide a more continuous and consistent facility along Morrin Road and Stonefields Avenue
- the feasibility of providing an off-road bi-directional cycleway on the western side of Line Road between Taniwha Street and Eastview Reserve (as opposed to off-road uni-directional cycleways on either side of the road). This would result in a more continuous and consistent facility along the length of Line Road, ensure sufficient buffer is provided between traffic and cyclists, and balance the parking loss
- potential to deliver a bi-directional on-road cycleway on the western side of Apirana Avenue between Merton Road and Pilkington Road (instead of the proposed uni-directional cycleways). This would result in a more continuous and consistent facility along the length of Apirana Avenue, and allow more width in the road corridor to enable freight movements
- opportunities to improve safety at driveways – particularly commercial driveways.

2.3 Outcomes from stakeholder and public consultation

Auckland Transport have adopted the changes identified through public and stakeholder consultation, including converting the proposed uni-directional cycleways on Stonefields Avenue, Line Road and Apirana Avenue to bi-directional facilities on one side of the road (detailed in Section 4.2).

Adjustments to driveway treatments are also proposed, including installing speed humps at busy commercial driveways and providing clearer cyclist priority across driveways. This will ensure cyclists can smoothly travel across driveways, and that cyclist priority over driveway traffic is evident.

Additionally, further traffic calming features on Line Road (north of Taniwha Street) and West Tamaki Road (east of Line Road) are proposed as part of the revised plan.

3 PREFERRED OPTION

3.1 Description of the preferred option

The preferred option is described in detail in Table 1. Sections where the design has changed since the previous addendum in 2021, are highlighted in blue.

Table 1: Description of the Preferred Option

Route	Section	Preferred Option Description	
		Cycleway and Footpath Zone	Traffic Zone
1A	Line Rd - (West Tamaki Road to Eastview Reserve)	1.5 m wide cycleways as a 3.0 m off road bi-directional cycleway along the western side of the roadway; 0.7m cycleway separation; QoS 2; raised zebra crossings at side roads	3.8 m East; 3.2 m West and 2.4 m parking lane on western side (29 on-street parking spaces between Taniwha St and Taniwha Reserve and 16 on-street parking spaces north of Taniwha Reserve to West Tāmaki Rd)
1B	Line Rd - (Taniwha St to Eastview Reserve)	1.5 m wide cycleways as a 3.0 m off road bi-directional cycleway along the western side of the roadway; 0.7m cycleway separation; QoS 2; raised zebra crossings at side roads.	3.8 m East; 3.2 m West and 2.4 m parking lane on western side (29 on-street parking spaces between Taniwha St and Taniwha Reserve and 16 on-street parking spaces north of Taniwha Reserve to West Tāmaki Rd).
2A	Taniwha St town centre (Apirana Ave to Line Rd)	2.0 m wide raised cycleways; 0.6-0.8 m cycleway separation; QoS 1	3.2 m wide drive lanes; 2.1 m wide parking lane adjacent to cycleway on northern side
2B	Taniwha St residential west - (Line Rd to Kotae Rd)	1.5 m wide on-road cycleways; 0.7 m cycleway separation; QoS 2	3.2 m wide drive lanes; 2.0 m wide parking lane adjacent to cycleway on southern side
2B	Taniwha St residential east (Kotae Rd to Mansfield St.)	1.5 m wide on-road cycleways; 0.7 m cycleway separation; QoS 2	3.2 m wide drive lanes; no on-street parking
2B	Taniwha St residential east (Mansfield St. to West Tāmaki Rd)	1.5 m wide on-road cycleway, except outside properties no. 29-43 Taniwha St. (either side) and outside properties 5-13 Taniwha St. (northbound) off-road cycle path; 0.7 m cycleway separation; QoS 2	3.2 m wide drive lanes; on-street parking outside properties 29-43 and properties 5-13 Taniwha St
3	Pt. England Rd	1.5 m wide on-road cycleways; 0.7 m cycleway separation; QoS 2	3.2 m wide drive lanes; no on-street parking

Table 1: Description of the Preferred Option

Route	Section	Preferred Option Description	
		Cycleway and Footpath Zone	Traffic Zone
4A	Apirana Ave town centre - (Taniwha St to Merton Rd)	1.5m wide cycleways as a 3.0m on road bi-directional cycleway along the western side of the roadway; 0.6m cycleway separation; QoS 2	3.4 m wide drive lanes; floating bus stop on western side.
4B	Apirana Ave residential - (Merton Rd to Pilkington Rd)	1.55 m wide cycleways as a 3.1 m on road bi-directional cycleway along the western side of the roadway; 0.6 m cycleway separation; QoS 2	3.5 m wide drive lanes; 2.1-2.2 m wide parking lane along the eastern side of the roadway
5A	Morrin Rd	1.5m wide cycleways as a 3.0m on road bi-directional cycleway along the western side of the roadway; 0.6m cycleway separation; QoS 2. Raised zebra crossings at side roads	3.5 m wide drive lanes; 1.9 m wide flush median, floating bus stop on western side. 37 on-street parking spaces
5B	Stonefields Ave	1.5 m wide cycleways as a 3.0 m on road bi-directional cycleway along the eastern side of the roadway; 0.8m cycleway separation; QoS 2	3.2 m wide drive lanes; 2.1 m wide parking lane on the western side of the roadway
6A	Merton Rd east section - (Apirana Ave to Morrin Rd)	1.5 m wide cycleways as a 3 m wide bi-directional facility on western side; 0.8 m cycleway separation; QoS 2	3.2 m wide drive lanes; no on-street parking
6B	Merton Rd west section - (Morrin Rd to College Rd)	1.5 m wide on-road cycleways; 0.7 m cycleway separation; QoS 2	3.2 m wide drive lanes; 2.0 m wide parking lane adjacent to cycleway on southern side

The roundabout connecting Merton Road, Apirana Avenue and Point England Road plays a critical role in the transport network as the junction of 4 major routes through Glen Innes (with a fifth route, Line Road, joining Point England Road immediately east of the roundabout). The current layout is not however conducive to walking or cycling, with:

- Four busy intersection legs, each with two approach lanes
- a fifth leg joining Pt England Road immediately east of the roundabout
- a relatively tight roundabout geometry that encourages drivers to take small gaps
- no safe locations for pedestrians or cyclists to cross any of the five legs
- no dedicated cycling infrastructure on any of the five approach roads

As a result, the existing roundabout forms a significant barrier to walking and cycling trips. It significantly restricts east-west movements across the rail corridor, as well as movements to and from Glen Innes station and the town centre from the south. In addition, the roundabout restricts access to key destinations around it, including Tamaki College, the Auckland Netball Centre, and employment opportunities on either side of the rail corridor.

Four proposed safe cycle routes will meet at this roundabout on Merton Road, Point England Road, Apirana Avenue north and Apirana Ave south. As a result, the roundabout is a critical junction in the

walking and cycling networks, where multiple important routes intercept. Without the walking and cycling improvements proposed at this intersection, the benefits of these four proposed cycle routes would not be realised, as each would be disconnected from the other.

The roundabout is also critical to the general traffic network, as it provides access across the rail corridor via Merton Road. The alternative rail crossings for traffic are around 1.8 km away, at St Johns Road (to the north) and Morrin Road (south). Four bus services also pass through the roundabout, connecting Glen Innes station and town centre to areas west, south and east.

The proposed improvements to the roundabout include raised table crossings over the Merton Road, Line Road and Point England Road Apirana Avenue (south) legs, each linked by a network of footpaths and a bi-directional cycleway. Collectively, these improvements

- remove the barrier that this roundabout currently presents for people walking and cycling
- slow traffic speeds approaching the roundabout, improving safety for all road users
- link together the existing footpaths at this intersection via safe crossing facilities
- connect the four proposed cycle routes that meet at this intersection via safe crossing facilities

The improvements deliver the above while maintaining two short traffic lanes on each approach to the roundabout to minimise impacts on general traffic and bus services.

3.2 Preferred option assessment

Outcomes: Healthy and Safe People, Economic Prosperity and Inclusive Access

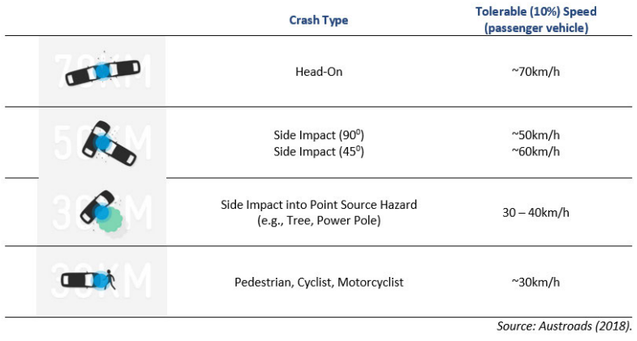
The desired outcomes of the project will be met for the following reasons:

- Fully separated cycleways will improve safety and accessibility for people on bicycles for a range of confidence levels and across all ages.
- The cycleways provide more transport choices for the community through easily accessible cycleway facilities.
- Speed calming measures such as raised zebra crossing facilities and lane reduction (at certain intersections) will improve safety at key intersections for both cyclists and pedestrians along the routes.
- Installation of a signalised mid-block crossing on Apirana Avenue will improve pedestrian and cyclist safety when crossing Apirana Avenue.
- The proposed cycleway routes improve the connection to the Glen Innes to Tāmaki Drive Shared Path from Merton Road.
- Provision for additional, more secure bicycle parking at the Glen Innes Train Station will encourage more people to bike to the Glen Innes Train Station

Table 2 presents an update of the project's assessment against Waka Kotahi's Land Transport Benefits Framework 2021. Where this assessment has changed since the 2021 Addendum, this has been highlighted.

Table 2: Assessment against Waka Kotahi Land Transport Benefits Framework 2021

<table>
<tr><th>Outcome</th><th>Benefit cluster</th><th>Benefit</th><th>Primary, co-benefit or secondary benefit</th><th>Investment Objective</th><th>Assessment</th></tr>
<tr><td rowspan="2">Healthy and safe people</td><td rowspan="2">1. Changes in user safety (30%)</td><td>1.1 Impact on social cost of deaths and serious injuries</td><td>Primary</td><td>Reduce deaths or serious injuries involving people using bikes by 20% by 2028

Reduce total number of injuries involving cyclists and pedestrians by 20% by 2028</td><td>The preferred option provides separated cycleway facilities exclusively for cycling and micromobilty; the option provides some form of physical separation on all routes from motor traffic, reducing and removing the likelihood of motor vehicle conflicts with vulnerable users. The cycleways offer different levels of service reflected in QoS assessment both in terms of actual safety (i.e. in terms of crash risk) and perceived safety (i.e. in terms of people's subjective evaluations). The preferred option also includes improvements for all vulnerable users, including raised zebra crossing facilities, lane reduction (at certain intersections), a signalised mid-block crossing on Apirana Avenue and overall general traffic calming.
The Waka Kotahi's Monetised Benefits and Costs Manual (MBCM) Crash Estimation Compendium provides the following crash reduction rates that have been applied to the economic analysis of the preferred option:
◆ a 50% reduction in cycling crashes due to protected cycle lanes. The Crash Estimation Compendium provides a rate of 20% for painted cycle lanes but no further reduction for protected cycle lanes due to a lack of data. Recent international research provides a rate of 50%-60% for protected lanes relative to painted cycle lanes. Combining these results in a net 64% crash reduction (100% - 80% x 55%). We have applied a 50% reduction, which we consider conservative given that the project will result in almost complete separation of cyclists from general traffic
◆ a 20% reduction in pedestrian crashes for raised tables and 35% for kerb extensions. Both have been applied to the analysis (a net 48% reduction, i.e. 100% - 80% x 65%)
◆ a 20% reduction in general traffic crashes for traffic calming. Other relevant factors not applied include a 35% reduction for a "road diet" and an implied reduction of 40% when changing a multi-lane roundabout to a single lane roundabout (i.e. when comparing the crash prediction models for the two roundabout types in table 15). We consider the assessment conservative by applying only the lower factor
In total, discounted safety benefits are estimated to be $2.6 million for cyclists, $6.1 million for pedestrians, and $1.8 million for general traffic. In total, this accounts for 11% of the overall project benefits.</td></tr>
<tr><td>1.2 Impact on a safe system</td><td>Primary</td><td>The provision of separated cycleways and other enhancements to improve safety for all vulnerable users will significantly reduce the level of risk to those users. As the speed limit on the routes is 50 km/h, the supporting treatments included in the preferred option will reduce the risk and consequence of crashes involving vulnerable users as tolerable speeds for these types of users can be exceeded due to potential operating speeds following implementation.
Safe System Kinetic Energy
 

Source: Austroads (2018).
Safe Systems assessments have been carried out for all areas of the preferred option, and there is a significant reduction in SSAF scores for all routes.</td></tr>
</table>

	3. Changes in human health (20%)	3.1 Impact of mode on physical and mental health	Primary	Triple cycle volumes in dense activity centres by 2028	Forecast cycling outcomes have been assessed using the Auckland Cycle Model (ACM). Below summarises the estimated trips by bike and e-bike on each of the 8 Links to Glenn Innes routes. Two forecast scenarios are presented without the Links to Glen Innes project (but with other proposed and funded Auckland cycle infrastructure projects) with the Links to Glenn Innes project. Forecast trips are the averages along each route. Each route is generally expected to have busier and less busy sections. **Forecast trips on Links to Glen Innes routes by bike and e-bike** **Route** / **2028 predicted** / **2038 predicted** **Without Links to Glen Innes** / **Links to Glen Innes** / **Without Links to Glen Innes** / **Links to Glen Innes** 1 Line Road: 40 / 500 / 40 / 600 2A Taniwha Street (west): 80 / 700 / 100 / 900 2B Taniwha Street (east): 40 / 300 / 50 / 400 3 Pt England Road: 60 / 200 / 70 / 250 4A Apirana Avenue (north): 20 / 300 / 20 / 350 4B Apirana Avenue (south): 100 / 500 / 120 / 650 5 Morrin Rd and Stonefields Ave: 100 / 400 / 130 / 500 6A Merton Road (east): 90 / 400 / 110 / 450 6B Merton Road (west): 20 / 100 / 20 / 100 The following table presents modelled cycling statistics for the Auckland region showing the increased number of trips and trip lengths created by the preferred option. **Modelled cycle network statistics** **“Existing”** / **2028 predicted** / **2038 predicted** **2016 base model** / **Without Links to Glen Innes** / **Links to Glen Innes** / **Without Links to Glen Innes** / **Links to Glen Innes** Predicted daily cycle trips: 18,600 / 44,300 / 45,800 (+1,500) / 53,400 / 55,300 (+1,900) Predicted daily cycle-km: 98,000 / 265,000 / 270,000 (+5,000) / 332,000 / 338,000 (+6,000) Average cycle trip length: 5.3 km / 6.0 km / 5.9 km / 6.2 km / 6.1 km Health benefits for cyclists Health benefits are also gained from additional cycling activity that the preferred option provides. Cyclist health benefits have been calculated for the full length of each new cyclist trip. Discounted over the 40-year evaluation period of the project, this benefit stream equates to $42.5 million Health benefits for pedestrians and wheeled pedestrians The MBCM also calculates health benefits for new pedestrian trips as the preferred option will improve pedestrian connectivity across busy multi-lane roundabouts that currently lack pedestrian crossing facilities. Addressing these crossings will reduce barriers to walking trips and encourage more people within Glen Innes to walk. These benefits have been estimated based on the preferred option resulting in a 20% increase in these pedestrian trips; discounted pedestrian health benefits are estimated to be $20.9 million in total.
		3.2 Impact of air emissions on health	Primary		Emissions reductions associated with the preferred option come from two sources ◆ direct emission reductions, where a private car driver chooses not to drive but to walk or cycle instead

Table 2: Assessment against Waka Kotahi Land Transport Benefits Framework 2021

<table>
<tr><th>Outcome</th><th>Benefit cluster</th><th>Benefit</th><th>Primary, co-benefit or secondary benefit</th><th>Investment Objective</th><th>Assessment</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>◆ indirect emission reductions accrued by general traffic that continues to drive but experiences reduced congestion due to the reduction in traffic from the above.
In total, discounted emissions benefits are estimated to be $0.7 million (low CO2 cost) to $1.1 million (high CO2 cost)</td></tr>
<tr><td>Economic prosperity</td><td>5. Changes in transport costs (20%)</td><td>5.2 Impact on network productivity and utilisation</td><td>Primary</td><td>Triple the number of people accessing the train station by active modes by 2028.</td><td>Network productivity and utilisation are about efficient use of the land transport network. The preferred option enables optimisation of existing road space to enable enhanced utilisation and optimal use for all modes and contribute to the community and economic welfare. The preferred option provides optimisation opportunities for increased access to the whole transportation system, particularly through improving links to the train station. The ACM considers complete trips, representing trips that take place entirely by bike or e-bike. It is not normally able to estimate cycling legs of multimodal trips, such as cycle trips to train stations; however, they can be estimated based on existing and forecast boardings at Glen Innes Station and that the existing cycle mode share to Glen Innes station is 0%, based on 2013, 2015 and 2020 survey samples. This methodology estimates 10% mode share equates to 800 weekday, one-way bike trips in 2028 and 1,020 trips in 2038.</td></tr>
<tr><td rowspan="3">Inclusive access</td><td rowspan="3">10. Changes in access to social and economic opportunities (30%)</td><td>10.1 Impact on user experience of the land transport system</td><td>Primary</td><td rowspan="3">Triple cycle mode share of total journey to work/education trips by 2028</td><td>User experience of the land transport system is a wide-ranging benefit and considers how all people experience the transport system, including vulnerable groups, and how different modes are experienced.
Perceptions of safety also impact user experience, as discussed in 2.1 Impact on perceptions of safety and security. The preferred option will improve vulnerable users' comfort, ease and convenience by providing enhanced facilities and priority over other users. Travel time for vulnerable users will also improve, reflected in the preferred option's economic benefits.
For cyclists, this has been estimated to be 17 cyclist-hr per day with net discounted cyclist travel time cost savings are $3.3 million.
The preferred option also introduces zebra crossings in a number of locations where currently there are none. In each case, this will prioritise pedestrians over traffic, reducing the delays experienced by pedestrians. In some instances, the travel time saving to pedestrians will be significant, as in the case of Glen Innes' multi-lane roundabouts, where pedestrians are known to have difficulty crossing. The net discounted pedestrian travel time cost savings are $1.0 million.</td></tr>
<tr><td>10.2 Impact on mode choice</td><td>Primary</td><td>The following table presents estimated cycle to work mode shares for the Auckland region and for the Auckland Council Local Boards most affected by the preferred option.
Estimate commute to work mode shares by bike and e-bike
<table>
<tr><th rowspan="2">Area</th><th colspan="2">Existing</th><th colspan="2">2028 predicted</th><th colspan="2">2038 predicted</th></tr>
<tr><th>2016 base model</th><th>2018 census[2]</th><th>Without Links to GI</th><th>Links to Glen Innes</th><th>Without Links to GI</th><th>Links to Glen Innes</th></tr>
<tr><td>Maungakiekie-Tāmaki</td><td>1.7%</td><td>1.2%</td><td>3.1%</td><td>4.4%</td><td>3.3%</td><td>4.7%</td></tr>
<tr><td>Ōrākei Local Board</td><td>2.3%</td><td>2.4%</td><td>3.1%</td><td>3.8%</td><td>3.2%</td><td>4.0%</td></tr>
<tr><td>Central Auckland [3]</td><td>2.6%</td><td>2.3%</td><td>4.6%</td><td>4.9%</td><td>4.7%</td><td>5.1%</td></tr>
<tr><td>Auckland region</td><td>1.3%</td><td>1.1%</td><td>2.6%</td><td>2.7%</td><td>2.8%</td><td>2.9%</td></tr>
</table></td></tr>
<tr><td>10.3 Impact on access to opportunities</td><td>Primary</td><td>The preferred option is an enabler of increased active mode use of the wider transportation network providing enhanced and safer access to both local amenities and the wider transport system, including the Glen Innes Train Station and GI to Tāmaki Drive shared path from the suburbs of Glen Innes, Pt England, Stonefields and St John. The preferred option will provide safe, continuous, connected and appealing cycle routes for both confident and less confident cyclists. It focuses on the importance of all destinations, services and/or activities that can be equitably accessed through transport to enable economic and community participation.
Currently, vulnerable users experience transport disadvantage, but the preferred option provides more equitable access to transport, enabling participation in employment, volunteer work, and social and leisure activities, thereby improving the overall well-being of communities.</td></tr>
</table>

[2] The 2018 census is thought to have underestimated actual bike mode shares, as the wording of the question excluded respondents who cycle to work less than 50% of the time
[3] Former Auckland City Council area

Table 2: Assessment against Waka Kotahi Land Transport Benefits Framework 2021

Outcome	Benefit cluster	Benefit	Primary, co-benefit or secondary benefit	Investment Objective	Assessment
		10.4 Impact on community cohesion	Secondary Benefit		The preferred option provides improved community cohesion to enable and maintain the normal functions of a community by improving facilities for vulnerable uses and remedying the impact on system vulnerabilities for individuals and the overall community caused by heavy volumes of general traffic. In addition, the preferred option improves users' safety and perceptions of safety and accessibility through enhanced crossing facilities and connectivity locally and to the wider transport system.

4 RECOMMENDED OPTION ECONOMIC EVALUATION

4.1 Economic Summary of Project

The proposed investment's economic efficiency has been assessed using forecast demands from the Auckland Cycle Model and Waka Kotahi's economic procedures from the MBCM. Both the discounted benefits and costs are summarised in Table 3 below.

Table 3: Economic evaluation summary – Links to Glen Innes Cycleways

Economic input	Net Present Value
Total discounted benefits	$75.8 – $76.2 m
Discounted costs	$32.8 m
Benefit Cost Ratio	**2.3**

We note that our assessment is conservative in that it includes $25 million in dis-benefits associated with reduced general traffic capacity at affected roundabouts. This dis-benefit is unlikely to eventuate in full, and the total discounted benefits may be higher.

We have reviewed the most significant assumptions behind the active mode demand estimates and the economic evaluation and tested these impacts through a series of sensitivity tests. The resulting sensitivity tests BCRs range from 1.9 to 3.6.

4.2 Changes since the previous assessment

There have been several design changes since the 2021 addendum. These include:

- the one-direction cycle lanes previously proposed for Stonefields Avenue (College Road to Morrin Road) are now replaced with a bidirectional cycleway (east side of street)
- the one-direction cycle lanes previously proposed on Apirana Avenue (Merton Road to Pilkington Road) are now replaced with a bidirectional cycleway (west side of street)
- the one-direction cycle lanes previously proposed on Line Road (west side of street) are now replaced with a bidirectional cycleway (west side of street)
- additional traffic calming features on Line Road (north of Taniwha Street) and West Tamaki Road (east of Line Road)

These changes will not have significantly affected the project benefits, as:

- the bidirectional cycle facilities now proposed will provide safety and quality of service outcomes for cyclists that are comparable to the previously proposed one-direction cycle lanes
- the two additional traffic calming features are not significant across a programme of works that includes comprehensive traffic calming across multiple routes.

However, the revised construction timeframes have marginally affected the discounting of the project's benefits. Therefore, our updated assessment also updates the time-zero to July 2022 and applies current MBCM update factors.

4.3 Benefit Streams

The economic evaluation has been updated in accordance with Waka Kotahi's MBCM. As a result, revised project benefits are presented below in Table 4, reflecting the updated project construction timeframes and an updated time-zero of July 2022.

Table 4: Discounted economic benefits (Net Present Value – NPV)

Economic input		Links to GI project
Cycling benefits	Health benefits	$42.5 m
	Perceived travel time benefits	$3.3 m
	Safety benefits	$2.6 m
Pedestrian benefits	Health benefits	$20.9 m
	Travel time benefits	$1.0 m
	Safety benefits	$6.2 m
General traffic benefits	General traffic reduction benefits	$22.1 m
	General traffic dis-benefits	-$25.4 m
	Safety benefits	$1.8 m
	Emissions reduction benefits [4]	$0.7 – $1.1 m
Total discounted benefits		**$75.8 – $76.2 m**

We note that the estimated project benefits of $75.8-$76.2 million are only marginally different from the previous (2021 addendum) benefits of $71.7-$72.1 million. The difference results from the slightly changed construction timeframes, updated time-zero, and revised MBCM update factors.

We also note that the estimated project benefits continue to include $25 million of travel time dis-benefits for general traffic. Most of this is a result of the reduced traffic capacity at the Merton Road/Morrin Road roundabout. As per the 2021 addendum, we consider this calculation to be conservative: actual travel time dis-benefits will be smaller if some car users respond to the project by changing their mode, their route, their time of travel, or their destination.

4.4 Project Costs

Project costs have been supplied by Auckland Transport and include expected (P50) implementation costs of $32.5 million (including Auckland Transport's admin costs). This includes

- $6.6 million for Separable Portion 1 (Taniwha Street east)

[4] Waka Kotahi require emissions benefits to be calculated using a low and high carbon cost range.

- $7.2 million for Separable Portion 2 (Pt England Road, Apirana Avenue and Merton Road west)
- $16.4 million for Separable Portion 3 (Line Road, Taniwha Street west, Morrin Road, Stonefields Avenue and Merton Road east)
- $2.3 million for Separable Portion 4 (the Apirana Avenue/Line Road/Pt England Road/Merton Road roundabout)

Estimated annual maintenance and operational costs of $0.16 million have been applied to the analysis, based on 0.5% of the implementation costs.

Discounted over the 40-year evaluation period, the above costs sum to a Net Present Value of $32.8 million.

Sensitivity testing has been carried out using the P95 cost estimate of $35.9 million (undiscounted).

4.5 Benefit Cost Ratio

Based on the discounted benefits and costs presented above, the project is estimated to have the following benefit cost ratio (BCR).

Table 5: Project benefit cost ratio

	Links to Glen Innes project
Discounted benefits (NPV)	$75.8 – $76.2 m
Discounted costs (NPV)	$32.8 m
Benefit cost ratio (BCR)	**2.3**

4.6 Sensitivity analysis

The following table documents the main assumptions made in the demand assessment and economic evaluation. It presents a range of sensitivity tests carried out on the base evaluation through changes to the underlying assumptions—the sensitivity test BCRs range from 1.9 to 3.6.

Table 6: Project BCR sensitivity testing

Input	**Assumption**	**Sensitivity test**	**Sensitivity test BCR**
Default BCR			**2.3**
Demand growth	2028 & 2038 forecasts developed. Linear growth is assumed up to the end of the evaluation period (2061).	Benefits capped from 2048	2.3
		Benefits capped from 2038	2.2
Micro mobility	E-bike uptake (40% of bike trips in 2028, 60% in 2038)	Low e-bike uptake (30% 2028, 40% 2038)	2.2
		High e-bike uptake (50% 2028, 80% 2038)	2.4

Table 6: Project BCR sensitivity testing

Input	Assumption	Sensitivity test	Sensitivity test BCR
	E-scooters are assumed to account for 20% of pedestrian trips by 2028, 40% by 2038.	Low e-scooter proportion (10% 2028, 20% 2038)	2.5
		High e-scooter proportion (30% 2028, 60% 2038)	2.2
	E-scooters assumed to generate the same health benefit per km as e-bikes	E-scooter rides accrue the same health benefits per km as walkers	2.6
Health benefits	Walking and cycling health benefits are capped by factoring by 60% (40% of Auckland population already meets Ministry of Health exercise guidelines)	50% cap (50% of New Zealand population meets MoH guidelines)	2.0
		No cap	3.6
	20% increase in pedestrian trips assumed following project	Low increase: 10%	2.0
		High increase: 30%	2.6
General traffic benefits	Economic evaluation applies a flat $1.97/km benefit rate for peak period car trips removed from the MBCM. This rate does not change over time. Other central Auckland projects have developed project specific rates, using traffic models that reflect local traffic conditions. These rates can be as high as $5/km in 2028 and $7/km in 2038.	Assume a $3/km benefit rate in 2028, $4/km in 2038.	3.0
	Traffic benefits calculated for weekday commuter periods only	Include interpeak period traffic benefits	2.5
Congestion charging and other changes in generalised costs	Cycle demand modelling assumes no future changes in generalised costs of travel by public transport or car. In practice, generalised costs may increase due to changes such as congestion charging, increased parking and public transport costs, or increased fuel costs. In these cases, cycle demands would be expected to increase. Conversely, generalised costs may decrease due to improvements in public transport infrastructure. In this instance, cycle demands may reduce.	Sensitivity test higher cycle demand (+20%), reflecting higher generalised cost of travel by car and public transport	2.8
		Sensitivity test lower cycle demand (-20%), reflecting lower generalised cost of travel by car and public transport	1.9

Table 6: Project BCR sensitivity testing

Input	Assumption	Sensitivity test	Sensitivity test BCR
Cycle infrastructure	2028 forecasts assume the completion of cycle projects with RLTP funding. 2038 forecasts assume no further background investment in cycling. Future, connecting cycle infrastructure projects would likely increase cycle demand on the project.	Tested through +20% cycle demand test above	n/a
Pedestrian demands	Pedestrian demands based on count data from 2016 survey data	20% higher pedestrian demands	2.5
		20% lower pedestrian demands	2.2
	Pedestrian growth: 5% annual growth assumed	Low growth in pedestrian demands: 3%, matching forecast population growth	2.1
		High growth in pedestrian demands: 8%, matching forecast GI station patronage growth	2.6
Trips to GI station	10% cycle mode share estimated with project	Low mode share: 5%	2.2
		High mode share: 20%	2.6
	20% of the above cycle-train trips are assumed to be diverted car trips (i.e. Glen Innes to CBD or similar)	Low proportion of diverted car trips: 10%	2.2
		High proportion of diverted car trips: 30%	2.5
General traffic dis-benefits	Calculated for travel time, congestion and vehicle operating costs during peak periods at roundabouts where traffic capacity is being reduced. Fixed demands assumed.	Some vehicle trips change route /time /mode: 50% dis-benefits	2.7
		More vehicle trips change route /time /mode: 0% dis-benefits	3.1
	Calculated for commuter peaks, weekday interpeak and weekend peak periods.	Omit interpeak and weekend peak traffic effects, consistent with the calculation of general traffic decongestion benefits	2.5
Costs	Calculated using expected (P50) costs	Undiscounted P95 construction costs of $31.0 million	2.1

4.7 Investment assessment framework rating

The 2021 addendum assessed the project against Waka Kotahi's Investment Prioritisation Method for the 2021–24 National Land Transport Programme. It found that the project had a Priority Order of 6 (1 being the highest, 12 being the lowest), based on a

- High GPS alignment
- Medium scheduling rating
- Low efficiency, with a BCR at the time of 2.1

The ratings for GPS Alignment and Scheduling remain unchanged. However, the BCR is now 2.3 due to cost savings. The new BCR, however, remains within the 1 to 3 range for a Low Efficiency rating. As a result, the project's Priority Order remains unchanged at 6.

4.8 Investment performance measures

The project's investment performance measures remain unchanged relative to the 2021 Addendum.