BayLink Scope Variation
MGI active mode recommendation

In partnership with BECA, Tauranga City Council (TCC) and Bay of Plenty Regional Council (BoPRC)

19th September 2018

CASE FOR SCOPE CHANGE

This paper requests that the Senior Manager OPPP, SD&D:

Endorse the cost scope change required and recommend the GM I&F approve funding to SH2: Baypark to Bayfair Link Upgrade (formerly Maunganui Girven Intersection (MGI) for a cost/scope increase of $13m at a funding assistance rate of 100% for implementation of the project variation (active mode underpass option) thereby increasing the approved total cost from $141m to $154m.

The recommended option is a combination of improving safety of at grade crossing points and providing a new underpass for grade separated movement beneath SH2 at MGI at an estimated cost of $13m. Realising the opportunity to implement this scope change will:

1. Provide a safe grade separated crossing facility for all active travel modes (pedestrian, cycling, mobility scooters and foreseeable future active modes)
2. Positively address significant community concern for vulnerable users at the removal of the existing underpass
3. Support the TTP active mode outcomes and TCC cycle plan by linking a pedestrian and priority cycle route across busy high volume State Highway
4. Provide efficient and safe crossing options for all users (novice and confident) and reduce disruption to general traffic.

5. Utilise an underpass (both existing and new) to provide an engineered safe solution for pedestrian and cycling crossings during next 2 years of construction.

The recommended option addresses a critical missing link in the strategic active mode network at an important multi-modal interchange. The recommended option achieves a very high priority rating in the IAF and aligns with the priorities in the GPS. This is supported by evidence of growing active mode users and contributes to safety outcomes and mode shift targets. Community consultation verifies that user groups including the elderly, family groups, school children and vulnerable users prefer the choice of using the under pass that is completely segregated from general traffic.

This is the first of two papers on SH2: Baypark to Bayfair Link Upgrade (was MGI) 60209881. A second variation paper is for bus priority.

Criticality of timing

There is time criticality to realise this opportunity. Construction has progressed and the intersection is on hold pending the outcome of this decision. The project could incorporate an underpass now using cost effective open cut construction techniques. If this opportunity is not realised now and desired in future an underpass will extremely complex and could cost 10x as much to try and retrofit a solution.

A critical decision is required in September 2018 to progress the opportunity now avoiding critical path delays and incorporation into the current construction activity.

BACKGROUND

Figure 1: The BayLink study area

Current BayLink Scheme

The current scheme of Baypark to Bayfair Link Upgrade (BayLink SAR) was approved December 2014. MGI is a key intersection along SH2 Eastern Corridor approach to Tauranga. As Part of the RONS, Tauranga Eastern LINK (TEL) was completed to support SH2 as the route choice of 40% of all road freight destined for export at the Port of Tauranga.

The BayLink SAR objectives were defined as two problems seeking one outcome:

> *Problem 1: Congestion at Bayfair will constrain the TEL benefits*
>
> *Problem 2: Competing traffic demands encourage unsafe behaviours at MGI*
>
> *Outcome sought: Reduce congestion at MGI and provide an efficient and safe freight route to the Port of Tauranga. This includes improving the Level of Service at MGI from the current level F to D to align with the TTS objectives*

The current option includes minimum requirements for on road cycle facilities and at grade cycle and pedestrian crossings. The current design removes active mode travel choices because the existing underpass needs to be removed.

Current Design Underpass Removal

Retaining an underpass facility was strongly debated at RMT/ DMT and VAC however CPTED[1] guidance at the time directed the project towards at grade crossing arrangements due to concerns with the length of a new underpass and personal safety concerns realised from use of existing underpass.

The key reasons for the approved at-grade provision for active modes were;

- a longer replacement underpass would be perceived as unsafe
- the growth in active mode users year on year had not been identified
- the cycle connectivity was unknown (A City Cycle Action Plan was not drafted)
- lower intersection traffic volumes were forecast
- the primary investment outcome sought was freight efficiency

Community consultation and concern

User groups including the elderly, family groups, school children and vulnerable users prefer the choice of using the under pass that is completely segregated from general traffic.

Community feedback is that users feel unsafe with at grade crossing proposed due to the exposure of school children, and the difficulty of negotiating such crossings for elderly and mobility impaired (including mobility scooters). There is strong demand to reinstate a separate route from any traffic (i.e. grade separated crossing).

Current feedback on the existing underpass is that users have concerns for personal safety at night, and at times of low pedestrian movements, due to the design 'committing them to the underpass' before they can see who present, and undesirable behaviour is occurring at the underpass.

THE CHANGE IN STRATEGIC CONTEXT

Since 2014, the GPS 2018 has changed in direction, favouring a mode neutral approach that is not well reflected in the current project design which focussed predominantly on easing traffic congestion and freight efficiency. The new GPS supports reviewing the project design given the strong community opposition to losing safe grade separated crossing, and the high growth of cycle uptake in the area.

Cycle activity around the local area has more than tripled since 2011 and reflects a significant increase since the 2014 SAR option. A fit for purpose safe crossing options at MGI is expected to support growth trends for active mode choices.

User (per annum)	2011 p.a.	2018 p.a.	Change
Pedestrian	82,000	141,000	**72% increase**
Cyclist	14,000	44,000	**315% increase**
Mobility	Not measured	3,000	
Pram / Other	Not measured	5,000	
TOTAL	96,000	193,000	100 % increase

1CPTED design 'Crime Prevention Through Environmental Design'.

The Bayfair/Matapihi area is undergoing a fundamental change in character from previously an industrial area on one side with separated Bayfair shopping centre on the other, to an expanded shopping node with shopping on both sides of SH2. This is combined with increased high density residential development occurring on industrial sites and an improved public transport hub. Currently in construction are 140 high-density apartment dwellings located on the opposite side of SH2 within walking distance to Bayfair. Bayfair itself is undertaking a $115M expansion project adding additional cinemas and restaurants encouraging more pedestrian movements. Currently Bayfair has approximately 6 million visitations from customers per annum.

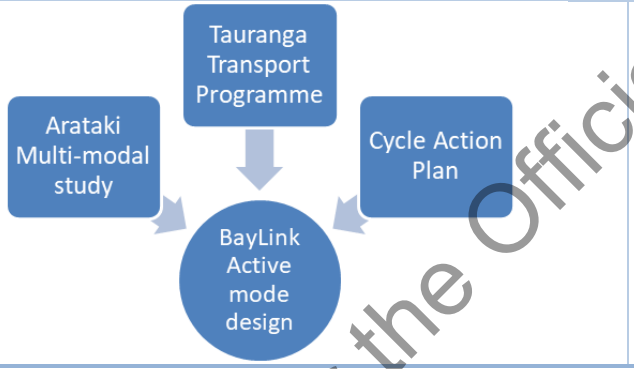
TCC and BOPRC are working with Bayfair to develop a regional transport hub close to Bayfair shopping centre. The BOPRC Public PT Blueprint identifies bus stops on both sides of SH2 in vicinity of MGI to support an 'express bus service'.

The 2018 GPS

The GPS sets out the Government's high-level strategic direction for investment in transport priorities for the next six years. The new GPS 2018 strategic priorities are:

- a commitment to safety,
- mode neutrality,
- livable cities,
- regional economic development,
- protecting the environment, and
- delivering the best value for money.

In particular reference to this project, the GPS priorities critical missing links in the strategic active mode network.



Since the approval of the 2014 SAR, three new strategic studies have concluded which are directly relevant to this project.

A similar exercise will be undertaken for PT / HOV priority treatment in the project area. This will be the subject of a separate paper.

Tauranga Transport Programme (TTP)

The Tauranga Transport Programme identifies investment choice and safety as problem areas in the central city. The benefits sought include:

- a resilient multi-modal transport system,
- increasing mode share and enable people to make safe,
- healthy travel choices.

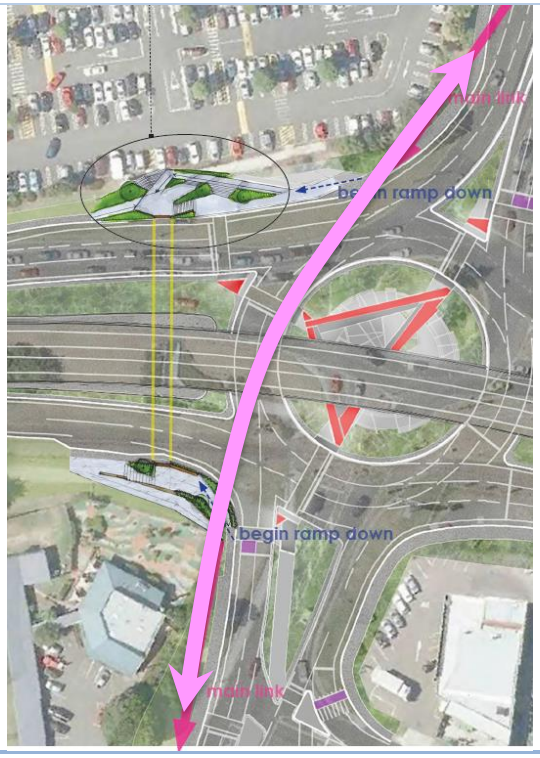
The Smartgrowth partners (TCC, WBoPDC, BoPRC together with NZTA and Iwi) have identified the Bayfair area for increased housing density in the Tauranga Future Development Plans. The Tauranga Transport Programme responds to this land use direction with an active mode AM peak mode share target of 14% for the city by 2031. This will defer significant investment in road capacity.

Tauranga Cycle Action Plan (CAP)

Tauranga City Council is seeking to provide a cycle network suitable for 'interested but concerned' cyclists aged 8 to 80. These users would like to cycle but have concerns about safety and lack confidence for complex on road cycle routes. In order to attract this user group to cycling cycle infrastructure needs to provide a greater level of safety and convenience/priority than is currently provided. The Tauranga Cycle Plan defines a priority cycle network for the city. One of the key cycle routes between major residential areas and Tauranga City crosses SH2 at MGI to better enable active

mode connections at Bayfair, provide cycle connectivity to CBD and provide better connections for the communities of Arataki and Matapihi.

Arataki Multi-Modal Corridor Study



The Arataki Multi-modal Corridor Study seeks to provide improved level of safety for people walking and cycling in Arataki whilst also achieving a high level of service for buses traveling through the corridor. The project has a core cycling route parallel to SH2 through the corridor connecting schools, residential and recreational areas.

The project is seeking to continue to ensure, and build upon, an already high cycling rate at the schools in the area. The intention of the city partners is to provide safe access on cycle desire lines for school children from Matapihi to primary, intermediate and secondary schools in Arataki and Mount Maunganui.

The pink line represents the direction of a priority cycle route in the Tauranga City Council cycle plan. SH2 (MGI) creates major severance to this route.

OUTCOMES SOUGHT

Safety: There have been three injury crashes involving pedestrians and cyclists at this intersection in the last five years whilst an underpass was in existence. In addition to separating vulnerable road users from traffic via an underpass, there is also a personal safety outcome to provide a fit for purpose solution providing the greatest level of personal safety combined with road safety.

The outcome is zero injury crashes involving pedestrians and cyclists at this intersection, and a safe crossing to address personal safety concerns at times of high risk.

Access and Economic benefit: The TCC cycle plan identifies this location as being on an important route to enable mode shift to support the direction and mode share outcomes sought in the Tauranga Transport Programme (TTP). Achieving a good Level of Service for pedestrians and cyclists across this intersection will contribute to positive social and economic outcomes.

The outcome seeks a Level of Service A for pedestrians and cyclists across Maunganui Road.

Mode shift: The TTP seeks a 14% active mode share (AM Peak) within the central city over the next 12 years.

The outcome is to double the number of pedestrians and cyclists crossing the intersection by 2025 with at least half of the additional users transferring from private vehicles.

ASSESSMENT CRITERIA

The assessment criteria builds on the 2014 Baylink SAR Objectives. The partners have identified 3 SMART objectives for assessing active mode connectivity at MGI that respond to the 2018 GPS priorities[2].

Criteria	Description	Outcome sought
SMART objective 1 Safety	There have been three injury crashes involving pedestrians and cyclists at this intersection in the last five years. The existing underpass separates pedestrian and cyclist crossing from traffic. There is a risk that changes could increase the number of crashes and casualties.	Zero injury crashes involving pedestrians and cyclists at this intersection. Maintain a low level of reported personal safety and security incidents.
SMART objective 2 Access and economic benefit	The SH2 Maunganui Road corridor bisects the Bayfair and Matapihi area and could act as a barrier for access between communities, a shopping centre, PT access and Schools. Achieving a good Level of Service for pedestrians and cyclists across this intersection will contribute to positive social and economic outcomes.	Achieve a Level of Service A for pedestrians and cyclists across Maunganui Road. (LOS A is described as < 10s delay – advanced sensors and high degree of Separation. Adapted from Austroads Level of Service Metrics 2014). High LOS will support non-car travel and achieve social and economic outcomes.
SMART objective 3 Mode enabler	The existing underpass is used by over 500 people per day. Increasing pedestrian and cycle crossings will reduce traffic demands and achieve positive health and wellbeing outcomes.	Double the number of pedestrians and cyclists crossing the intersection by 2025 with at least half of the additional users transferring from private vehicles.
Directness and coherence	Responds to journey desire lines	Competitive and convenient
Journey time	Active mode journey time	Prioritise active modes JT
Connectivity	Connectivity across the intersection	Enable active mode access
Attractiveness, personal security	Safe, aesthetically pleasing urban design	Good urban design outcomes
Operational and network impact	Disruption to the network	Minimise mode neutral impact (across all modes)
Cost	Cost of the option	Value for money
Programme	Incorporation into the programme	Do not delay programme
Stakeholders / Customers	Customer support or opposition to the option	Community buy in to the preferred option
Social	Health and wellbeing outcomes	Encourages healthy travel choices
Project BCR	Impact on the project BCR	Does not reduce current BCR rating of medium.
Overall ranking	Weighted score ranking	Best ranked is selected

MCA OPTIONS ASSESSMENT – LONG LIST AND SHORT LIST

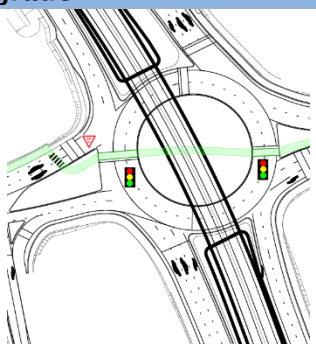
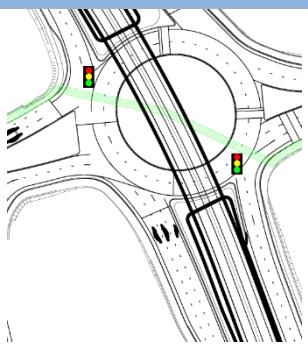
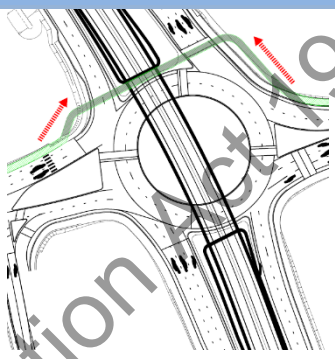
Option Development

A multi-criteria analysis (MCA) was completed against a long list of eight options to determine the performance of each relative to the investment objectives. From this 'Long List' three options were short listed including 2 at grade options and one underpass option. The full MCA on the long list is included as Appendix A.

2 The criteria in the table below following the SMART objectives have been derived from the Transport Agency Cycle Network Guidance information and the Christchurch Cycle Guide.

Short List Options

The short list assessment is summarised below. The full MCA is provided as Appendix B. The short list was scored on the +3 to -3 scale (using colour codes) as per the Transport Agency MCA Guidelines.

Criteria	Option 1: Signalised centre crossings at grade	Option 2: Diagonal crossings at grade	Option 6: Underpass on northern alignment
Rating Significantly positive Moderately positive Slightly positive Neutral Slightly adverse Moderately adverse Significantly adverse			
Safety SMART objective	At grade crossings increase ped/cycle vs vehicle conflict and risk of a crash occurring.	At grade crossings increase ped/cycle vs vehicle conflict and risk of a crash occurring.	Grade separated crossing facility provides safe crossing for peds/cycles and other users e.g. mobility impaired.
Economic Benefit SMART objective	No physical separation so won't achieve LOS A for peds and cyclists.	No physical separation so won't achieve LOS A for peds and cyclists.	No delay and physical separation, will achieve LOS A for peds and cyclists.
Mode enabler SMART objective	Improved priority will support cycling, but at grade crossings worse than existing for peds and cyclists.	Dedicated cycle crossing but at grade crossings worse than existing for peds and cyclists.	Grade separated crossing suitable for all user types will encourage mode shift.
Direct Route	Option 1 is direct but requires 4 crossings.	Option 2 provides a direct crossing with 2 crossing points.	Option 6 provides direct crossing on a well utilised existing route.
Journey time	Variable journey times for peds and cyclists due to 4 separate crossings.	Option 2 provides direct crossing for cyclists but still variable for peds.	Option 6 crosses unimpeded, very consistent journey times.
Connectivity to 4 points	All options provide full connectivity.	All options provide full connectivity.	All options provide full connectivity.
Attractiveness, personal security and comfort	Option 1 has shared pedestrian and cyclist crossings, poor user outcome.	Option 2 has separate ped/cycle crossings but across a very busy road.	Option 6 provides grade separation with a wide path, but some CPTED risk.
Operational and network impact	Option 1 prioritises cyclists through traffic lights.	Option 2 introduces a new cycle crossing / phase with high impacts.	Option 6 removes some peds/cyclists from at grade crossings, improving performance.
Cost	Cost of option 1 is not significant.	Cost of option 2 is not significant.	Option 6 cost is in the region of $13M.
Programme	Can be incorporated without extension to the end date.	Can be incorporated without extension to the end date.	Can be incorporated with minor extension to the project end date.
Stakeholders / Customers	Strong customer support for retaining underpass	Strong customer support for retaining underpass	Strong customer support for retaining underpass.
Social	No additional health and wellbeing outcomes	No additional health and wellbeing outcomes	Very good benefit for health and wellbeing outcomes.
Project BCR	No significant impact on the project BCR (above 2)	No significant impact on the project BCR (above 2)	No significant impact on the project BCR (above 2)
Overall ranking	3rd	2nd	1st

RECOMMENDED OPTION

The **recommended option is Option 6: Underpass on northern alignment.**

The recommended option achieves IAF 2018 ratings of very high for results alignment. The underpass addresses a critical missing link in the strategic active mode travel network at an important multi-modal interchange. It provides a high rating for walking and cycling access and safety, and addresses the outcomes sought.

The MCA supports the view that that the recommended option will encourage active mode growth, and retain the existing functionality. The strategic fit of the BayLink Project to the current GPS is greatly enhanced by the recommended option.

An underpass retains the current functionality, a newly designed CPTED compliant underpass supports safe active mode travel and strategic cycle crossing link between residential communities, commuter cycle routes, commercial businesses, CBD and Schools. Retaining the existing scope of at grade crossings provides user choice especially at times of low traffic but high personal safety risk (such as high visibility crossings late at night, rather than having no choice and being forced to use an underpass route).

Underpass design focus on user 'decision points' mean a choice can be made before commitment to use a low visibility underpass route. However conversely at times of high usage an underpass offers complete separation for vulnerable users from road traffic. Use of the underpass at peak times as a preference also allows traffic signalling to support optimised traffic movements above the underpass (aligning with original SAR objectives).

Consultation with local community and partners strongly favours this option to respond to safety concerns by active and vulnerable users.

Value for money is secured by including the option now and implementing solution at time of lowest cost.

COST

An initial cost estimate has been completed on the basis of a concept design at $13M. This estimate is +- 25% and is not based on detailed design, nor has any value engineering been completed. The project Team believe this estimate is likely to reflect the 75th percentile.

Opportunity cost:

The opportunity for the project is now. The construction is currently at a stage where an underpass could be constructed using cost effective open cut techniques with minor programme impact. If this opportunity is not realised the cost to retrofit an underpass solution under a new Bridge structure and within relocated service routes will be significantly more expensive (perhaps up to 10 times the cost) and very complex.

BCA and Sensitivity Analysis

The project BCR is 2.1. This is a reduction on the current BCR of 2.4. This is 'low' for efficiency. The greatest sensitivity to the BCR is cost. A cost increase to $15m would remain at 2.1. The BCR remains as a 'low' for efficiency. The mode shift benefits have a low elasticity to the BCR. Any increase on the possible mode shift achieved would provide improved benefit for the TTP and the CAP.

DELIVERING THE RECOMMENDED OPTION

Funding Strategy

There is an opportunity to jointly fund this scope change. This is seen as an extremely critical scope change in support of the TCC Cycle Action Plan and therefore TCC have indicated an initial willingness to provide **$1M funding contribution** in support of the scope change to enable good access to the underpass. This is not confirmed so it is not included in the PAA.

TIO and SAP have been updated and supporting documents attached.

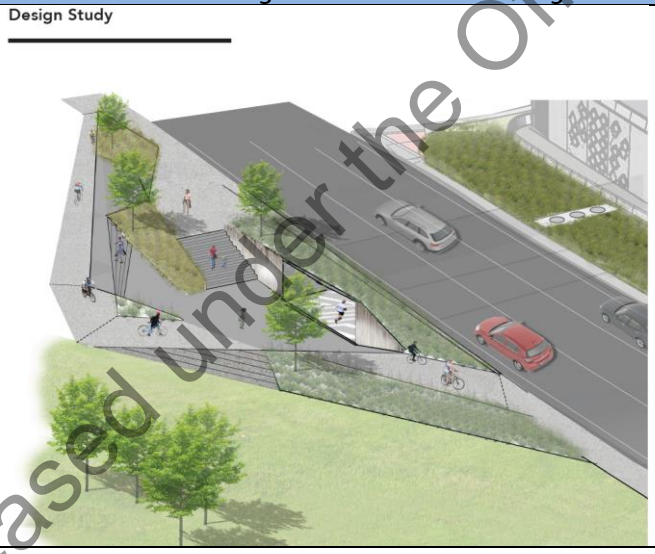
The Partners (TCC and BoPRC) support the proposal but request that the underpass does not negate the requirement for safety of the at grade treatments. BoPRC and NZTA are not seeking a variation to the RLTP or the NLTP as this is considered a variation to an existing scope.

Design concept for the new underpass

A concept design for a new underpass option has been actively tested to best meet the guidelines for CPTED design 'Crime Prevention through Environmental Design'. The current concept fits within existing designation and road reserve boundaries and does not require additional land purchase. The concept design addresses many of the concerns raised by the community and provides off road grade separated cycle continuity and shared pedestrian access.

The fundamental principles of the concept design have been:

- User safety through 'Decision points' & route alternatives
- CPTED good practice
- Maximise daylighting
- Urban design shared spaces
- Cyclist clear sight and movement lines

New design – Best meet the guidelines for CPTED design 'Crime Prevention Through Environmental Design'.	**Existing** – Low fit with CPTED and good urban design outcomes
	

Project Management and Delivery

The recommendation is to deliver the underpass as a variation to the existing D&C contract with CPB Contractors.

Currently the northbound pavement is being completed. Adding the scope to the project now would enable a minor modification to the sequencing to permit open cut construction of the underpass and provide most cost-effective construction methodology.

The existing project management governance structure and reporting regime applies to this variation. The project will feedback and engage the community to communicate recommended option and seek further feedback on final detailed design.

During detailed design a value engineering exercise will occur to optimise the design, and minimise cost.

Programme

The project needs a decision before a major traffic switch in mid-October when the project will either progress work on bridge approach ramp foundations or adjust activities to install new underpass box sections before construction of the approach ramps over the top (of the new underpass).

An approval of this scope change will enable the design to be integrated into the existing BayLink programme with a minor delay to the final delivery of up to five months. This means the completion currently scheduled for December 2020 could move to May 2021.

Risk

The two key areas of concern that dominated concept design were could an underpass design fit inside the existing designation and how could it best meet CPTED guidelines, these two constraints are now largely considered to have been met.

Future key risks remaining with detailed design engineering are:

- Design and construction within the identified high water table
- Integration of the underpass into the existing seismic geotechnical design
- Balance of depth of underpass below the approach embankment with regards to approach ramp gradients