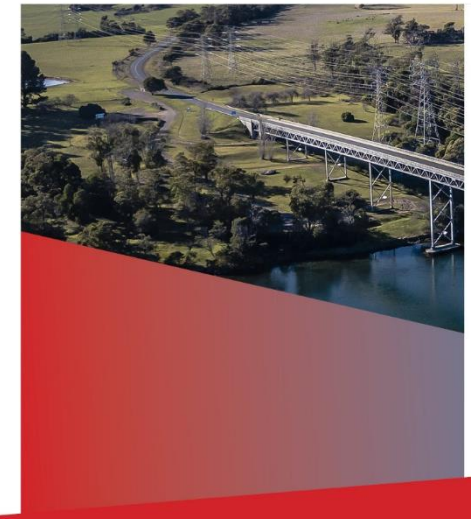
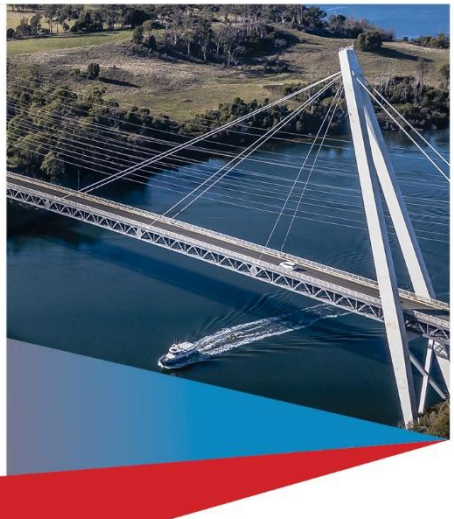
Second kanamaluka / River Tamar Crossing

Department of State Growth Business Case

19 March 2024





Transport Network Planning
Infrastructure Tasmania
Department of State Growth

Tasmanian Government

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Executive summary

The Department of State Growth Business Case (the Project) begins to investigate the case for investment in a multi-modal crossing over the kanamaluka / River Tamar. The Tasmanian Government has committed to investigate the viability and potential options for a second kanamaluka / River Tamar crossing.

Launceston is Tasmania's second largest city, and the population and commercial centre of Northern Tasmania. Located in the north of Tasmania, it supports and enables access to services for the adjacent municipal areas of West Tamar, Meander Valley, Northern Midlands, George Town, and Dorset. The transport network through and around Launceston is critical in catering for the growth of these neighbouring economies, as well as Tasmania overall.

Launceston has two main highways located either side of the kanamaluka / River Tamar, these being the West Tamar Highway and East Tamar Highway. The Bass Highway and Midland Highway are located to the south, connecting Launceston to Devonport and Hobart, respectively.

Figure 1 illustrates the Project area, which encompasses the areas surrounding West Tamar Highway and East Tamar Highway near Launceston, including the suburbs of Legana, Riverside, Invermay, and Mowbray.

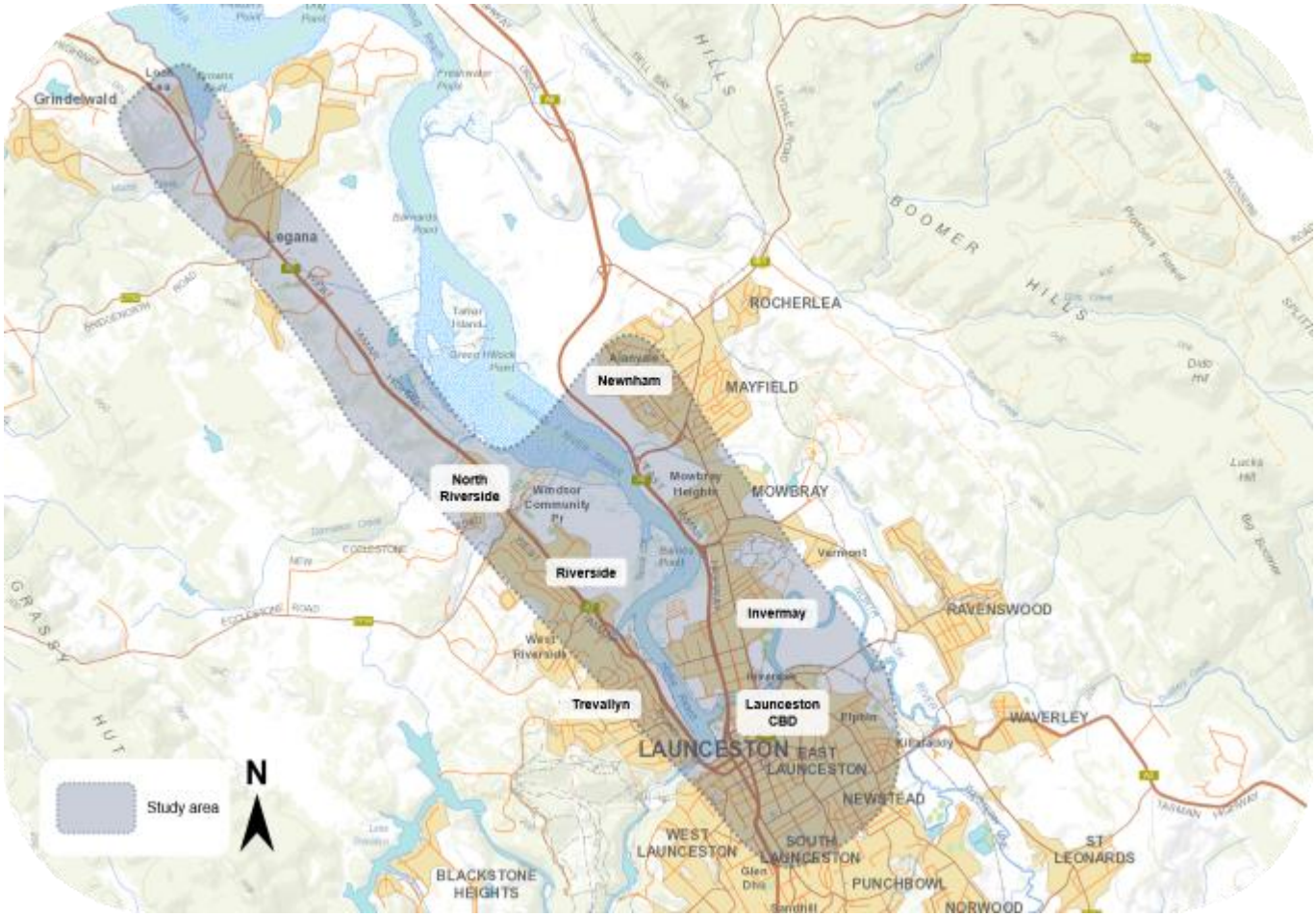


Figure 1 Project area[1]

[1] Base map obtained from LISTMap (LISTmap - Land Information System Tasmania (thelist.tas.gov.au)

The West Tamar Highway is increasingly serving an important commuter and freight function. The East Tamar Highway forms an important part of the freight network (being part of the National Land Transport Network), connecting industry and people living in the northeast region of Tasmania to the City of Launceston, and key destinations further afield. Additionally, the East Tamar Highway services the new campus of the University of Tasmania (UTAS) in Inveresk, the UTAS Stadium and Invermay industrial precinct.

The Batman Bridge is currently the only vehicle crossing of the kanamaluka / River Tamar. The Batman Bridge is located approximately 30 kilometres north of Launceston. As such, most people travel through Launceston CBD to access either side of the river (around kanamaluka / River Tamar, traveling over the South Esk River and North Esk River). This creates a natural severance between west and east Tamar.

Problems and opportunities

Figure 2 shows the key problems identified for the Project, and the key benefits sought through investment.

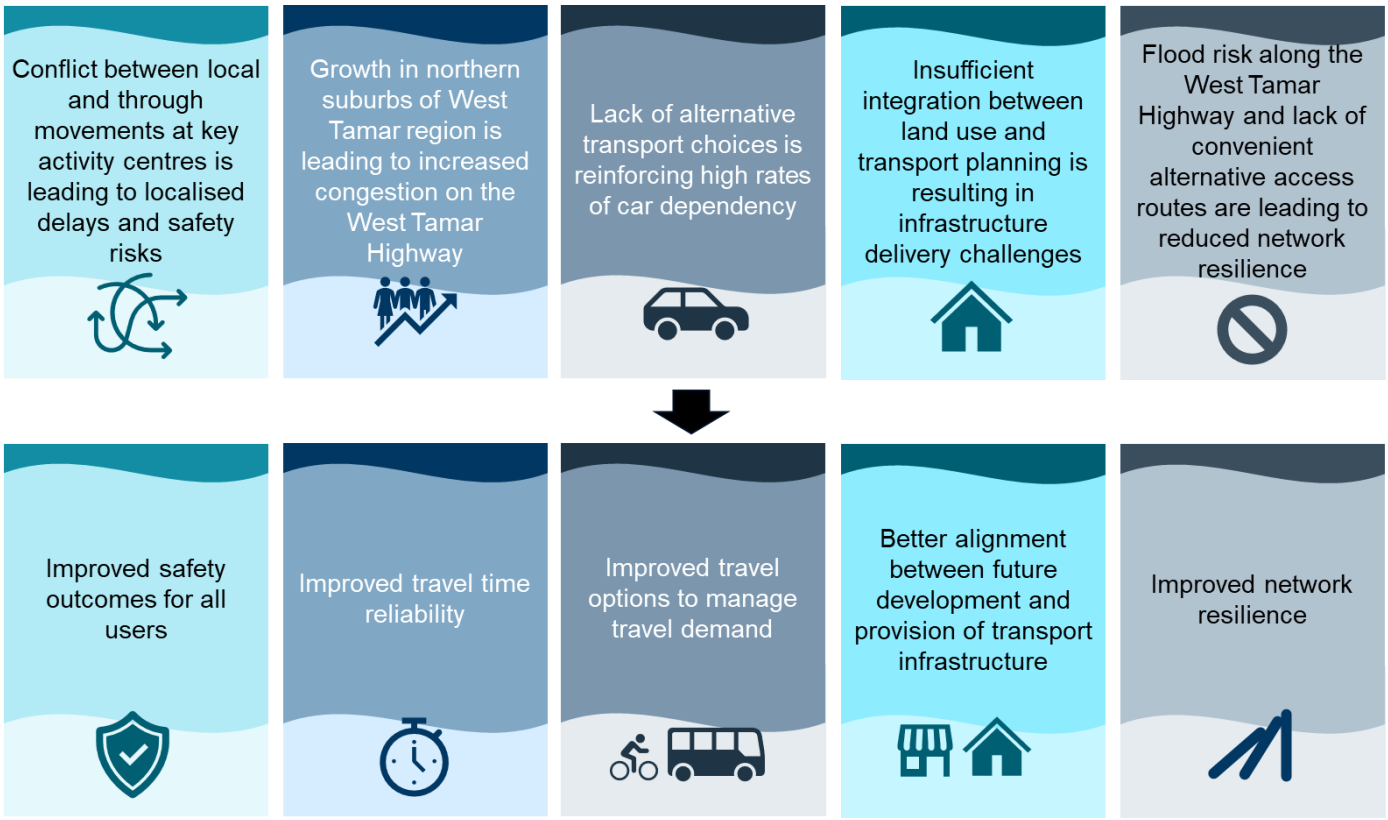


Figure 2 Problem and benefit statements

Project options

Following the option identification and assessment process, the following project options have been identified as variations of a multi-modal river crossing, for further investigation:

- **Orange option:** North Riverside-Newnham alignment with interchange ramps.
- **Purple option:** North Riverside-Newnham alignment via Windsor Drive with interchange ramp (east only).
- **Pink option:** Riverside-Invermay alignment with interchange ramps.
- **Blue option:** Riverside-Invermay alignment without interchange ramps.
- **Yellow Option:** Riverside-Invermay alignment with interchange ramp (east only).

Along with the project options, the base case has been identified and carried forward for comparative purposes. The base case is defined as the 'do minimum' scenario in which only required maintenance and committed and funded expenditure (as of 2017) are undertaken to maintain the status quo. Figure 3 illustrates the indicative locations of the project options.

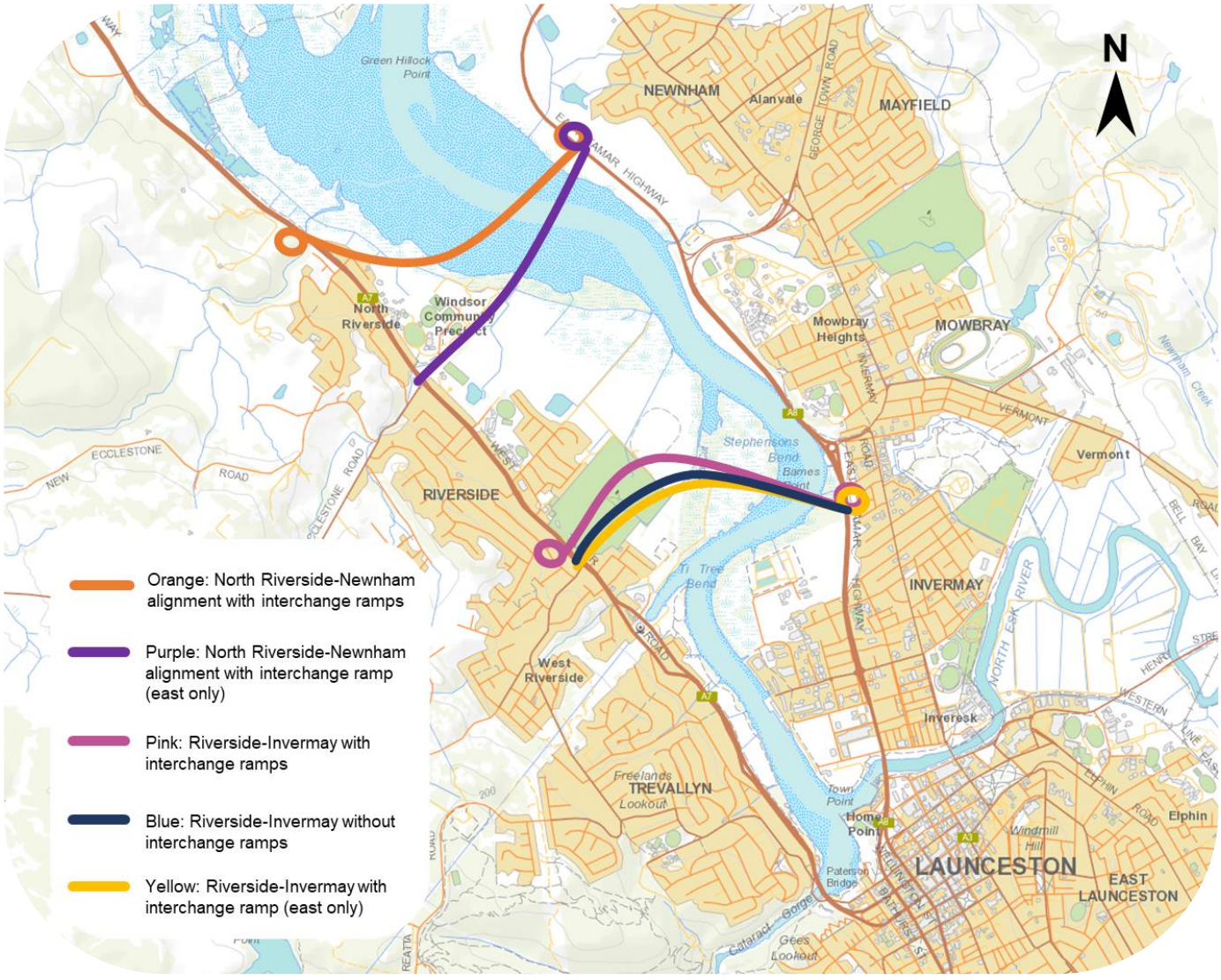


Figure 3 Project options

Project options investigations

For each project option the following high-level investigations have been undertaken:

- Preliminary design development.
- Desktop land use assessments including planning, environmental, and social under the two general alignments of North Riverside-Newnham and Riverside-Invermay.
- Qualitative assessment of the potential active transport, public transport and private transport outcomes.
- Assessment of the transport network performance of each option in comparison with the network without a new crossing.
- Indicative safety analysis based on a Safe System Assessment.
- Financial analysis.
- Economic analysis.

Transport modelling

The Launceston Hybrid Traffic Model (the model) has been used to assess the projected number of vehicles that would use the bridge and the comparative performance of the transport network with the project options against the base case.

The location of the project options and design of the interchanges add variability to route choice. The modelled project options shift demand from existing routes onto the crossing, as outlined in Table 1.

Table 1 Summary of peak period projected volumes on the crossing

Project option	2019				2033			
	Eastbound		Westbound		Eastbound		Westbound	
	AM	PM	AM	PM	AM	PM	AM	PM
Orange option	945	474	762	1,552	1,101	643	869	1,420
Purple option	873	480	824	1,511	973	647	920	1,486
Pink option	1,339	913	1,034	1,793	1,418	1,002	1,074	1,912
Blue option	1,324	967	1,078	2,053	1,414	1,155	1,126	2,141
Yellow option	1,314	942	1,087	1,862	1,499	969	1,182	1,924

Based on the peak period modelling results, projected AADT may be obtained by applying a peak period factor of 2.5, as shown in Table 2. This suggests that the Riverside-Invermay alignment project options (Pink, Blue and Yellow) result in higher crossing volumes than the North Riverside-Newnham alignment project options (Orange and Purple), with the Blue option expected to result in the highest crossing volumes overall.

Table 2 Summary of projected AADT on the crossing

Project option	2019	2033
Orange option	9,333	10,083
Purple option	9,220	10,065
Pink option	12,698	13,515
Blue option	13,555	14,590
Yellow option	13,013	13,935

Results of the modelling suggest that the project options generally reduce trips on the West Tamar Highway and the Bathurst / Wellington couplet to varying degrees, with some increased travel demand on the East Tamar Highway expected as a result, causing minimal changes in average speed across the network. To accommodate the additional traffic, the section of the East Tamar Highway on approach to and south of Mowbray Link may need to be upgraded or the configuration reviewed to accommodate increased demand.

The project options generally result in slightly higher travel times on the East Tamar Highway, except for the Pink option, which results in higher travel times in only one of the peak hours assessed (7:30 – 8:30 am in 2033), and the Yellow option to a smaller extent, which generally resulted in higher travel times during the am peak.

Table 3 provides a summary of general overall network speed and travel time trends of the project options compared with the base case. It is noted that as these are general trends and may not be applicable to all time periods and demand conditions assessed.

Table 3 Summary of general overall network speed and travel time trends in project options compared with the base

Project option	East Tamar Highway trips	West Tamar Highway trips	Bathurst / Wellington couplet	Average speed	East Tamar Highway travel times	West Tamar Highway travel times
Orange option	Increase	Decrease	Decrease	Similar	Increase	Decrease
Purple option	Increase	Decrease	Decrease	Similar	Increase	Increase
Pink option	Varies	Decrease	Decrease	Similar	Decrease	Decrease
Blue option	Varies	Decrease	Decrease	Similar	Increase	Varies
Yellow option	Increase	Decrease	Decrease	Similar	Varies	Varies

Transport planning considerations

Each project option has been qualitatively assessed based on the likely outcomes for users of the different modes of active transport (walking and bicycle riding), public transport, and private transport and freight (private vehicles, trucks, rideshare services). The following are the findings from this assessment for each mode.

Active transport

The Orange option could limit usability due to its longer length (approximately 1.6 kilometres) and its location further away from the CBD and other key amenities. While the Purple option has a shorter length of 1 kilometre, similarly, it is located further from the CBD. The Pink, Blue and Yellow options could improve usability as they are located closer towards the CBD and would require a shorter river crossing length. However, the length of the Purple, Pink, Blue and Yellow options are still relatively long particularly for people walking, with a bridge length of approximately 1 kilometre.

All project options align to routes identified in the *Launceston Network Operating Framework (NOF)* for people walking or riding, that show aspirational and existing routes either side of kanamaluka / River Tamar and through Launceston CBD. The Pink, Blue and Yellow options are located closer to the Launceston CBD compared to the Orange and Purple options, thus providing better access and connectivity to key attractions and amenities around the CBD.

Public transport

The Pink, Blue and Yellow options are located closer to the Launceston CBD compared to the Orange and Purple options, thus providing better access and connectivity to key attractions and amenities around the CBD. The Pink option has been assessed as likely to deliver the greatest improvement to general vehicle travel times on the West Tamar Highway.

Private transport and freight

All alignments redirect through-movements from the Launceston CBD to between the East Tamar Highway and West Tamar Highway, reducing the number of conflicting movements and overall traffic traveling through Launceston CBD.

Safety analysis

A Safe System Assessment (SSA) was conducted for the project options, based on locations and configurations of the crossing tie-ins to West Tamar Highway and East Tamar Highway only. The purpose of the SSA was to assess the project options against three risk components (road user exposure, crash likelihood, and crash severity) under seven different major crash types (run-off-road, head-on, intersection, pedestrian (people walking), cyclist (people riding), motorcyclist and other). The purpose of the SSA was to assess the project options against three risk components (road user exposure, crash likelihood, and crash severity) under seven different major crash types (run-off-road, head-on, intersection, pedestrian (people walking), cyclist (people riding), motorcyclist and other).

Based on the evaluation, existing conditions demonstrate better alignment with Safe System principles than the project options. The principal factors influencing lower scores are the absence or simplicity of intersections in the existing conditions. Among the proposed options, the Orange Option has the lowest score, primarily due to its minimal exposure of pedestrians. Conversely, the Pink Option records the highest score, indicating the lowest alignment with Safe System principles. The primary contributing factor to this outcome is the heightened complexity introduced to intersection arrangements.

As part of subsequent project stages, it is recommended that additional components that comprise the Safe System (i.e. road users, vehicles and post-crash care) are considered. Additionally, this would also need to be considered on balance with any impacts to crash exposure risk as a result of decreased trips on southern sections of the West Tamar Highway and through key sections of the Launceston CBD, and a corresponding increase in trips on southern sections of the East Tamar Highway.

Planning

A preliminary planning assessment has been undertaken to review relevant data and issues impacting the project options, and to identify constraints that may have the potential to affect the feasibility of the options.

Overall, the desktop analysis shows that all project options could present issues with the planning approval pathway. This is primarily due to the various authorities involved, land tenure types and acquisition that may be required. There are also ongoing planning reforms with finalisation of the Tasmanian Planning Policies, new guidelines for writing the Regional Land Use Strategies, and updated Regional Land Use Strategies to be prepared and adopted.

All project options cross the Tamar Conservation Area and include development within mapped areas with natural assets. The Tamar Conservation Area does not have a Reserve Management Plan and there is unknown risk associated with assessment of this aspect, specifically the potential for a Reserve

Activity Assessment (that is, additional investigation is recommended to better understand the approvals process).

Environmental

A high-level desktop environmental assessment has been undertaken on the two general river crossing alignments, North Riverside-Newnham (Orange and Purple options), and Riverside-Invermay (Pink, Blue and Yellow options). This assessment shows that all project options involve traversing land with Threatened Native Vegetation Communities which are likely to harbor protected species of animals and plants.

The Orange and Purple options have impacts to agricultural land and threatened wetland communities. There are potential impacts on six threatened flora and five threatened flora species. The Pink, Blue and Yellow options also have impacts to threatened wetland communities and there are potential impacts on three threatened flora and four threatened flora species.

Social

A high-level desktop social assessment has been undertaken on the two general river crossing alignments, North Riverside-Newnham (Orange and Purple options), and Riverside-Invermay (Pink, Blue and Yellow options). For the North Riverside-Newnham alignment, there are several schools that could be impacted, along with the Windsor Park Community Precinct and Riverside Olympic Football Club. For the Riverside-Invermay alignment, there are also several schools that could be impacted as well as the Riverside Golf Club. Additionally, there are significant expected impacts to residents and businesses in the area from property acquisitions under all project options. Commercial and residential property acquisition can have significant social impacts under all alignments, including stress, disruption, and relocation of homes / business operations. However, there is an opportunity for new development to occur in these areas.

Cost estimation

Risk analysis and cost estimation has been undertaken for each project option over an assumed three year construction period from 2025/26 financial year. Table 4 summarises the indicative P90 total outturn capital cost estimates for the five project options.

Table 4 Indicative P90 total estimated project outturn capital cost estimates ($ million)

Project option	Orange option	Purple option	Pink option	Blue option	Yellow option
Indicative P90 total outturn capital cost estimate	$1,154	$712	$1,006	$846	$875

Financial analysis

Financial analysis has been undertaken to assess the net financial impact of the options during construction and over the lifecycle. Table 5 summarises the key findings from the financial analysis for each project option, including the outturn dollar cost and Net Present Cost (NPC), assuming a construction start of 2025/26 financial year.

Table 5 Financial analysis – key findings ($ million)

Project option	Outturn Dollar: P90 whole-of-life costs	NPC: P90 whole-of-life costs
Orange option	$1,372	$1,106
Purple option	$867	$691
Pink option	$1,200	$965
Blue option	$1,022	$818
Yellow option	$1,043	$840

Economic

Economic analysis has been undertaken on the project options to understand the relative readily monetisable benefits and costs. Table 6 summarises the key findings for each project option, outlining the P50 cost and benefit estimates, along with the Net Present Value (NPV) and the Benefit Cost Ratio (BCR).

Table 6 Cost benefit analysis – P50 (7% discount rate) (Sep-23$)

Result	P50 Cost	P50 benefits	NPV (7% discount rate)	BCR (7% discount rate)
Orange option	$1,033 million	$336 million	-$650 million	0.3
Purple option	$635 million	$279 million	-$330 million	0.5
Pink option	$903 million	$332 million	-$530 million	0.4
Blue option	$758 million	$100 million	-$625 million	0.1
Yellow option	$783 million	$318 million	-$430 million	0.4

Alongside these monetary parameters, qualitative benefits (and dis-benefits) that have not been monetised or quantified also need to be considered. These include:

- Risks due to operational impacts, delays and / or disruption during construction, including disbenefits from bridge structure traversing through vegetation, threatened flora and fauna area, or areas with biodiversity values, and disbenefits from acid sulphate soils and potential contamination issues.
- Commercial and residential property acquisition can have significant social impacts under all alignments, including stress, disruption, and relocation of homes / business operations. However, there is an opportunity for new development to occur in these areas.
- Safety benefits from potential reduction in near misses that are not reported, potential reduction of exposure of people walking and riding to vehicles, and potential reduction in stress and improved wellbeing.
- Benefits for people walking and riding for all alignments through redistribution of vehicles in the network.
- Active transport benefits from providing direct connections to key amenities.
- Some active transport disbenefits from longer bridge structure which could limit people walking across the bridge.
- Potential provision of new bus routes across the bridge, directly connecting suburbs north of the Launceston CBD to key amenities.

- Urban amenity benefits for residential areas south of the crossing on the west such as Trevallyn, where traffic can be diverted across the bridge instead of being channelled through the suburb.
- Potential urban amenity disbenefits from impacts to visual and aesthetic qualities, and increased noise in the area. Separation of active modes and increased public transport routes could increase accessibility and connectivity of shops, employment, and green spaces.
- Urban amenity benefits from potentially reduced traffic on West Tamar Highway south of the project options and through the CBD.
- Improved network and flood resilience through providing redundancy for users accessing the Launceston CBD and between areas to the east and west of kanamaluka / River Tamar, particularly in the event where King's Bridge and West Tamar Bridge is closed due to flooding.
- Wider economic benefits through the creation of jobs during construction, better connection to employment hubs for businesses, and provision of redundancy for freight vehicles.

Summary and next steps

While there are benefits of a new kanamaluka / River Tamar crossing, the economic analysis shows that at this stage the costs outweigh the readily available monetised benefits. However, it is recognised that the envisioned benefits extend beyond the monetised benefits and beyond transport improvements.

The qualitative evaluations underscore the transformative potential of a new kanamaluka / River Tamar crossing, presenting opportunities for regional economic growth. A multi-modal crossing could serve as a catalyst for development, foster connectivity between essential hubs such as shopping centres and educational institutions, provide improved network resilience, and optimise logistics for goods and services. A strategic rerouting of traffic and freight could reshape the urban landscape, offering prospects for placemaking in the CBD and potential value uplift benefits.

As such, any future stages of the Project will need to further assess whether the qualitative benefits associated with the Project, in addition to the monetised benefits, provide sufficient justification for investment. The broader implications for accommodating growth, facilitating development, and contributing to the regional and national economy requires a holistic assessment. While the initial analysis suggests that transport-related costs may outweigh the expected transport benefits, the likely broader socio-economic advantages highlight the need to further evaluate these wider factors in potential future assessments. If in these assessments it is found that the overall benefits do not justify the costs at this time, the Project could be considered a longer-term, potential future investment for Launceston as the city grows over time.

If the project proceeds, the following additional activities should be considered to further support the development of a second kanamaluka / River Tamar crossing:

- Perform additional technical investigations, including:
    - Additional design development and associated technical investigations.
    - Additional traffic modelling.
    - Detailed safety analysis.
    - Additional planning, environmental and social investigations.
    - Additional economic analysis.
- Further investigation into complementary placemaking opportunities in the CBD.
- Undertake consultation with key stakeholders and the community on the project options.
- Engage with Infrastructure Australia to discuss potential funding scenarios and requirements for Australian Government funding support.
- Identify options for further investigation.

1 Introduction

The Department of State Growth (State Growth) has prepared a Business Case to begin investigating the potential benefits, costs and risks of investment in a new kanamaluka / River Tamar crossing (the Project). The Project was identified in response to increasing congestion, and poor safety and travel time reliability outcomes along West Tamar Highway, as part of the *Launceston and Tamar Valley Traffic Vision*. This report begins to investigate the investment case of a proposed multi-modal crossing of kanamaluka / River Tamar to service the growing transport task more effectively in the Greater Launceston area.

1.1 Launceston's strategic importance

Launceston is Tasmania's second largest city, and the population and commercial centre of Northern Tasmania. Situated at the confluence of the North and South Esk Rivers forming the kanamaluka / River Tamar estuary, Launceston is approximately two hours' drive north of the state capital, Hobart, and an hour from the port of Devonport.

Located between the West Tamar Highway, East Tamar Highway, Bass Highway and Midland Highway, it has direct air connections to Melbourne, Adelaide, Sydney, Perth, Brisbane and Gold Coast, and is close to the Spirit of Tasmania Devonport Terminal. Its population of approximately 70,000 people in 2021[2] is projected to grow by approximately 5%[3] to 75,000 in 2042.

Launceston is a regional hub, supporting and enabling access to services for the adjacent local government areas of West Tamar, Meander Valley, Northern Midlands, George Town, and Dorset. The transport network through and around Launceston is critical in catering for the growth of these neighbouring areas, as well as that of Tasmania overall.

There is a need to support Launceston's growth and development through investment in the local economy and tourism. The challenge facing Launceston is to embrace and facilitate this growth in a way that retains and enhances its character and amenity.

Figure 4 shows the Regional Framework Plan, which illustrates the strategic direction for the Greater Launceston Area, including the identified areas for urban growth.

[2] Australian Bureau of Statistics Estimated Resident Population, Launceston LGA, 2021

[3] 2023 Draft medium series population projections for Tasmania – Department of Treasury and Finance

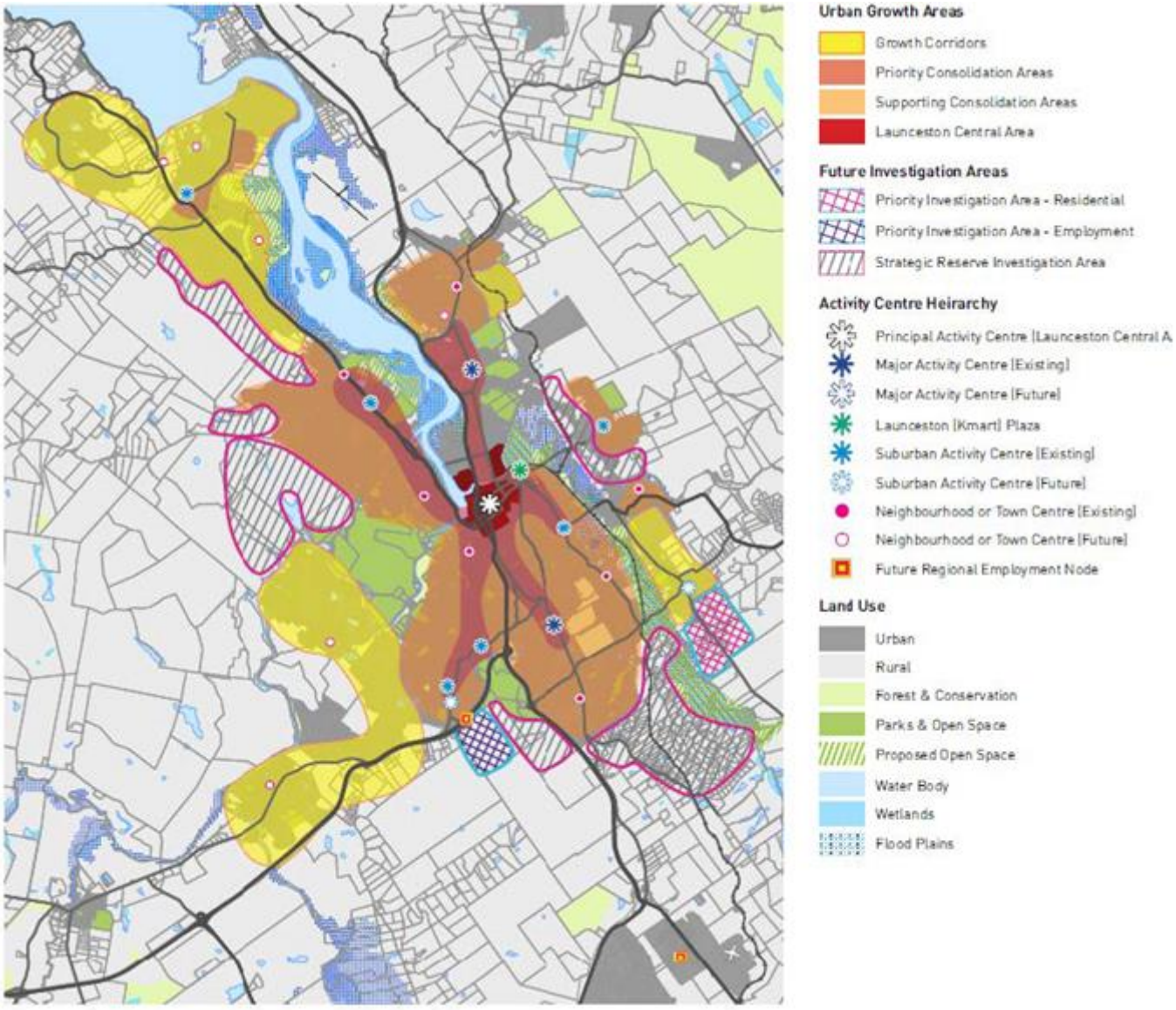


Figure 4 Northern Tasmania Regional Land Use Strategy Regional Framework Plan [4]

1.2 Transport vision

In March 2019, the Tasmanian Government committed to the implementation of the *Launceston and Tamar Valley Traffic Vision*. This vision included a suite of projects to address congestion and improve safety and travel time reliability on the Launceston and Tamar Valley road network.

A key commitment of this vision was to commence the planning, design, and costing of a new kanamaluka / River Tamar crossing between the East Tamar Highway and the West Tamar Highway north of Cormiston Road. This commitment sought to investigate potential travel time reliability improvements and peak traffic efficiencies on the West Tamar Highway, through reducing the need for travel through Launceston CBD.

[4] Northern Tasmania Regional Land Use Strategy, Tasmanian Government, 2018

To realise this vision, the Tasmanian Government committed to develop a case for co-investment from the Australian Government for a second kanamaluka / River Tamar crossing.[5] This has led to the development of this Business Case.

1.3 Project area

Figure 5 illustrates the Project study area, which encompasses the Launceston CBD as well as areas surrounding West Tamar Highway and East Tamar Highway near Launceston, including the suburbs of Legana, Riverside, Invermay, and Mowbray.

The West Tamar Highway and East Tamar Highway run parallel along either side of kanamaluka / River Tamar, culminating nearby the CBD. The West Tamar Highway enables an important connection between the Launceston CBD with the northern suburbs of Riverside through to Beaconsfield and beyond on the western side. Similarly, the East Tamar Highway is part of the National Land Transport Network, and connects the Launceston CBD to suburbs on the eastern side, such as Newnham and George Town.

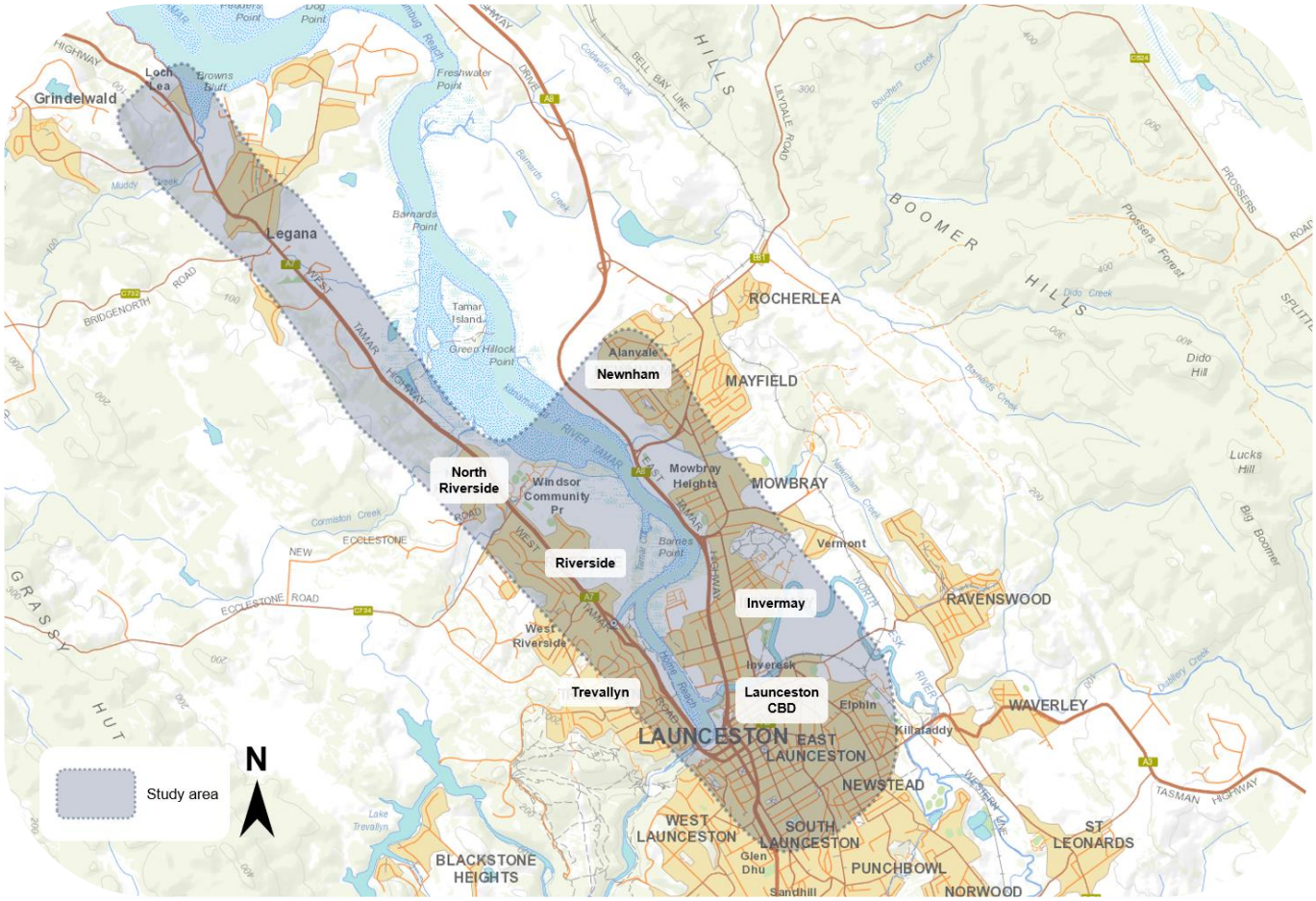


Figure 5 Project study area

[5] Securing Tasmania's future with a New Tamar River Bridge, Tasmanian Liberals, 2021: https://tas.liberal.org.au/securing-tasmanias-future-new-tamar-river-bridge

Figure 6 illustrates the West Tamar Highway and East Tamar Highway. This figure also highlights the existing crossings within the study area, over the North Esk River and South Esk River near the CBD.

King's Bridge and West Tamar Bridge are road bridges that cross the South Esk River, providing a connection between the northwest suburbs to the CBD. Lower Charles Street Bridge, Tamar Street Bridge and Hoblers Bridge cross the North Esk River, connecting the northeast suburbs to the CBD. In addition, the Inveresk Pedestrian Bridge provides an active transport connection for people walking to the CBD across the North Esk River.

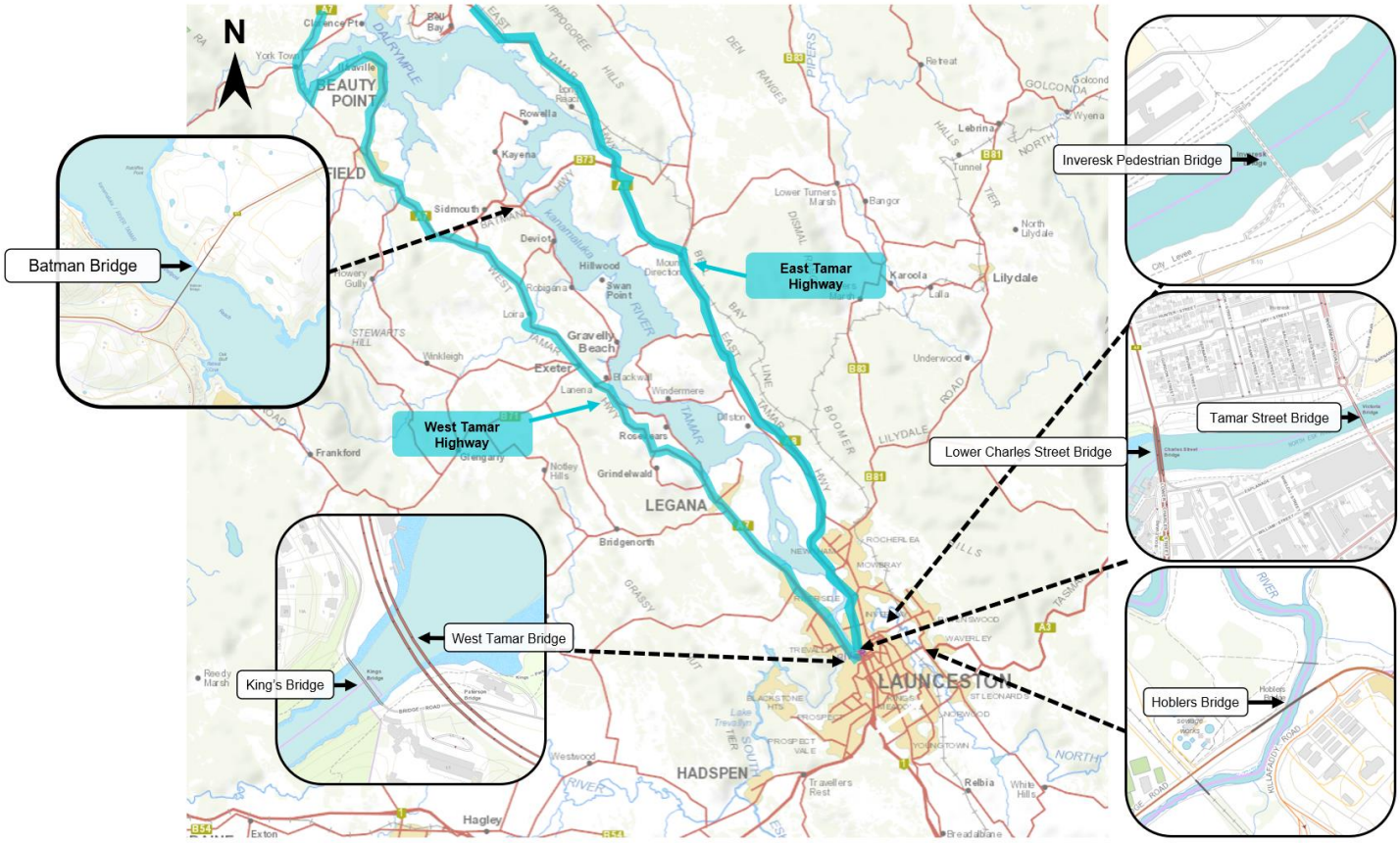


Figure 6 West Tamar Highway, East Tamar Highway, and existing bridges[6]

Several issues have been identified with the active mode facilities on these bridges, including:

- Existing footpaths along both sides of King's Bridge are narrow and constrained by fencing and other road infrastructure.
- There is a severance in the bicycle network with shared paths available on either side of the river and no formal connection between.
- Refuge islands within the Project area are typically smaller than the minimum recommended by Austroads.
- Poor sight distance at the crossing locations at either end of King's Bridge.[7]
- Batman Bridge has no formal active transport provisions.

[6] Base map obtained from LIST Maps (https://maps.thelist.tas.gov.au/listmap/app/list/map)

[7] Bridge Road Area Pedestrian and Bike Facilities Assessment, GHD on behalf of City of Launceston, 2016

1.3.1 Planning and land use context

The Project area encompasses complex topography and mixed land use. The valley floor is a wide flood plain with river meanders, wetlands and islands. Both sides have suburban development above the lower-lying grounds. The flood-prone land is used for farming or recreation, while higher up the hill there is considerable residential development as well as local shops, schools and other facilities typical of residential areas. In the older, more central areas there is a mix of light industry and residential development. Figure 7 illustrates the existing land use and topographical overlay of the project area.

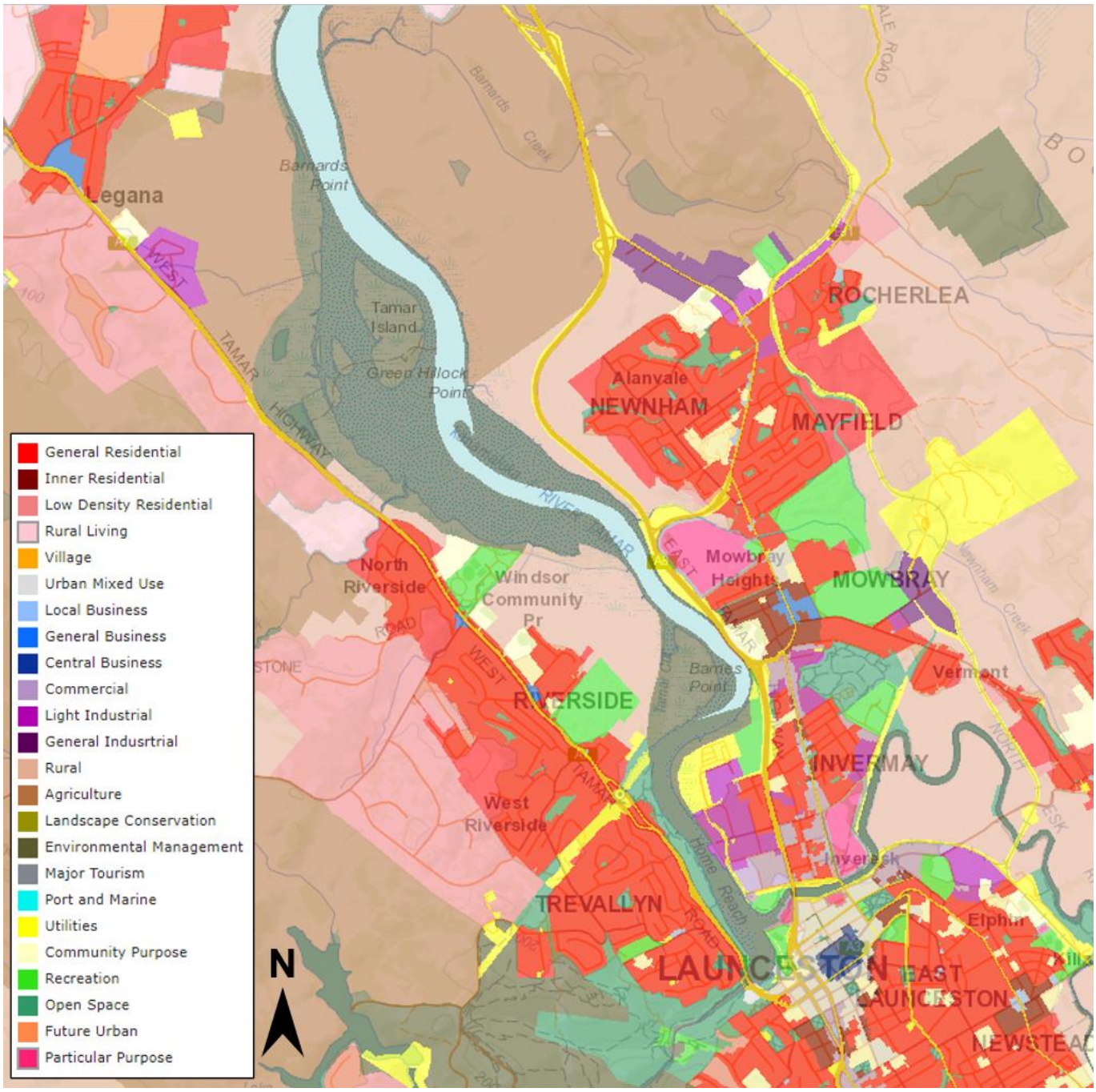


Figure 7 Existing use and development (topographic and zone overlay) of the project area

1.3.2 Existing environmental constraints

The kanamaluka / River Tamar is part of the Tamar Conservation Area and houses Threatened Native Vegetation Communities, so all options would need careful consideration of the natural values of the waterway. Additionally, the Tamar Conservation Area does not have a Reserve Management Plan and there is unknown risk associated with the assessment process for approvals in this area (that is, additional investigation and consultation with relevant stakeholders is needed as the project progresses to better understand the approvals process).

1.3.3 Existing social infrastructure

Figure 8 illustrates the existing social infrastructure within the project area. The project area contains key social and cultural infrastructure including schools, medical centres, churches, the Mowbray and Invermay campuses of UTAS, the Windsor Park Community Precinct and the Riverside Golf Club.

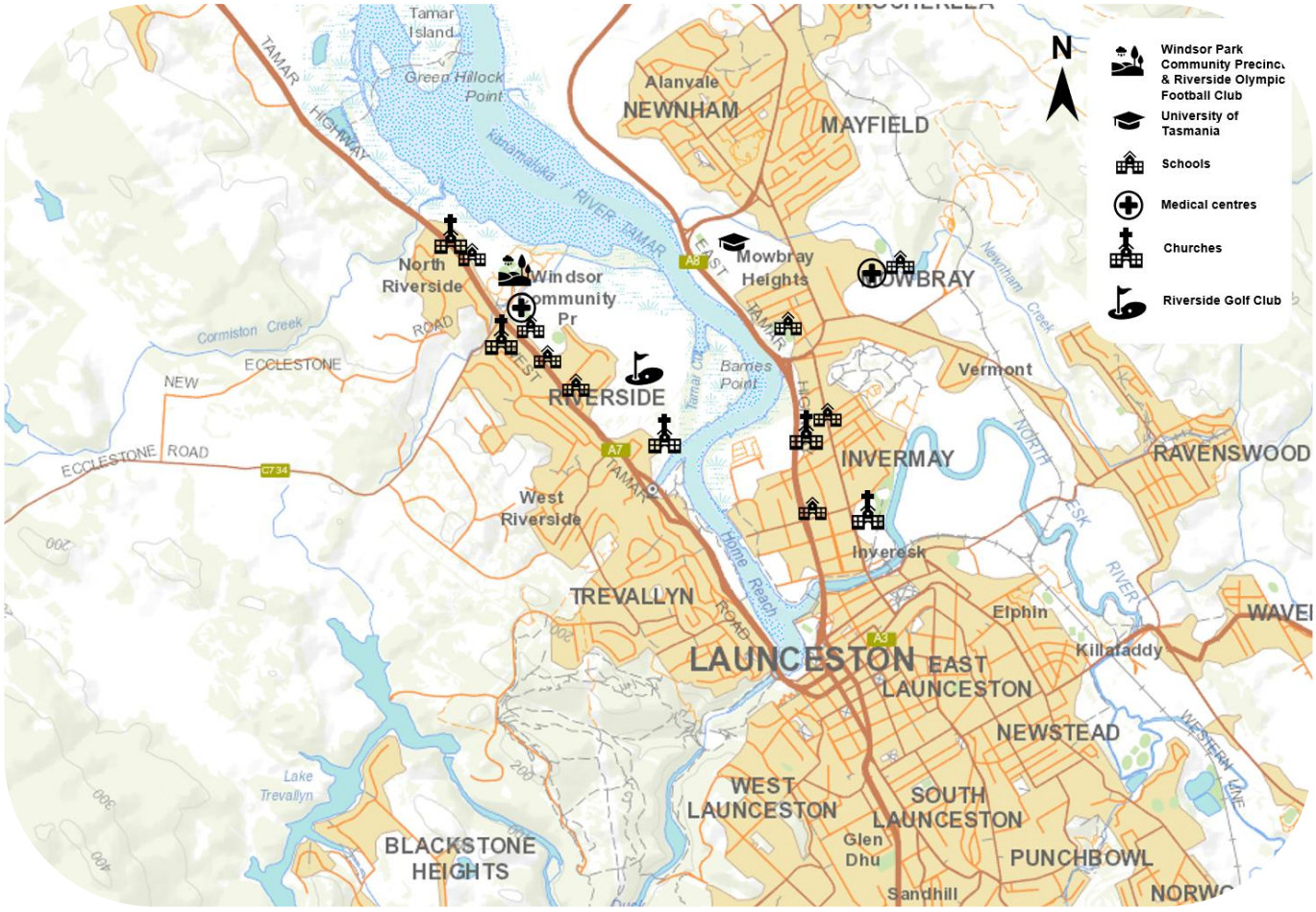


Figure 8 Social infrastructure within the project area

1.4 Alignment to strategy

Figure 9 outlines the key relevant strategic documents that have helped to inform the development of the Project.

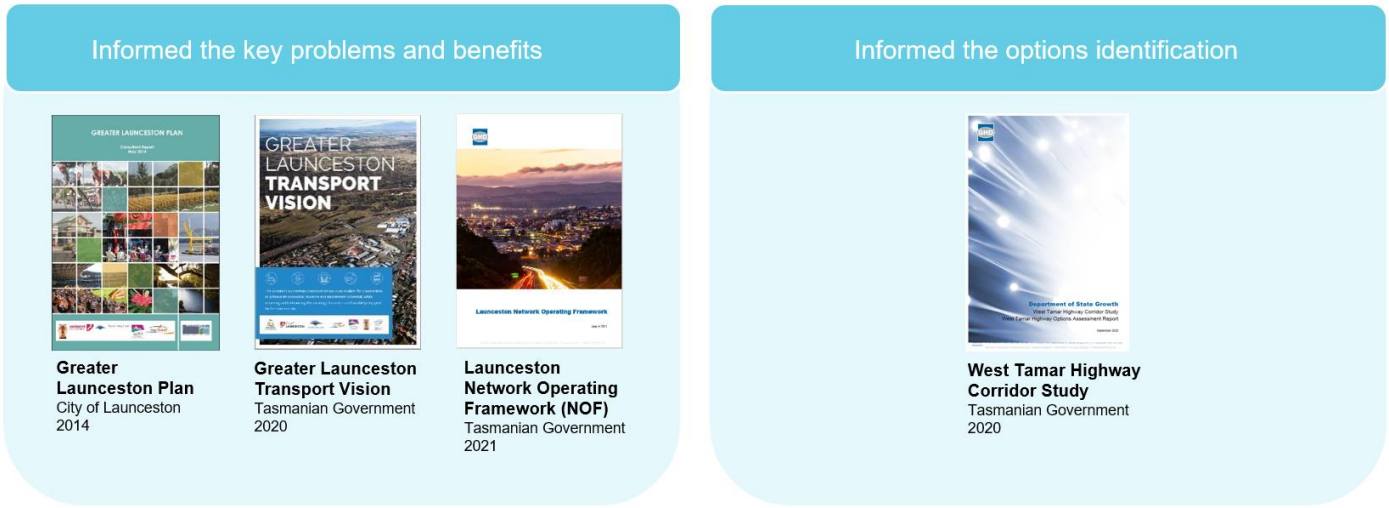


Figure 9 Relevant strategic publications

Figure 10 outlines the key related projects that have been considered due to their impacts in the Project area, including projects currently underway.

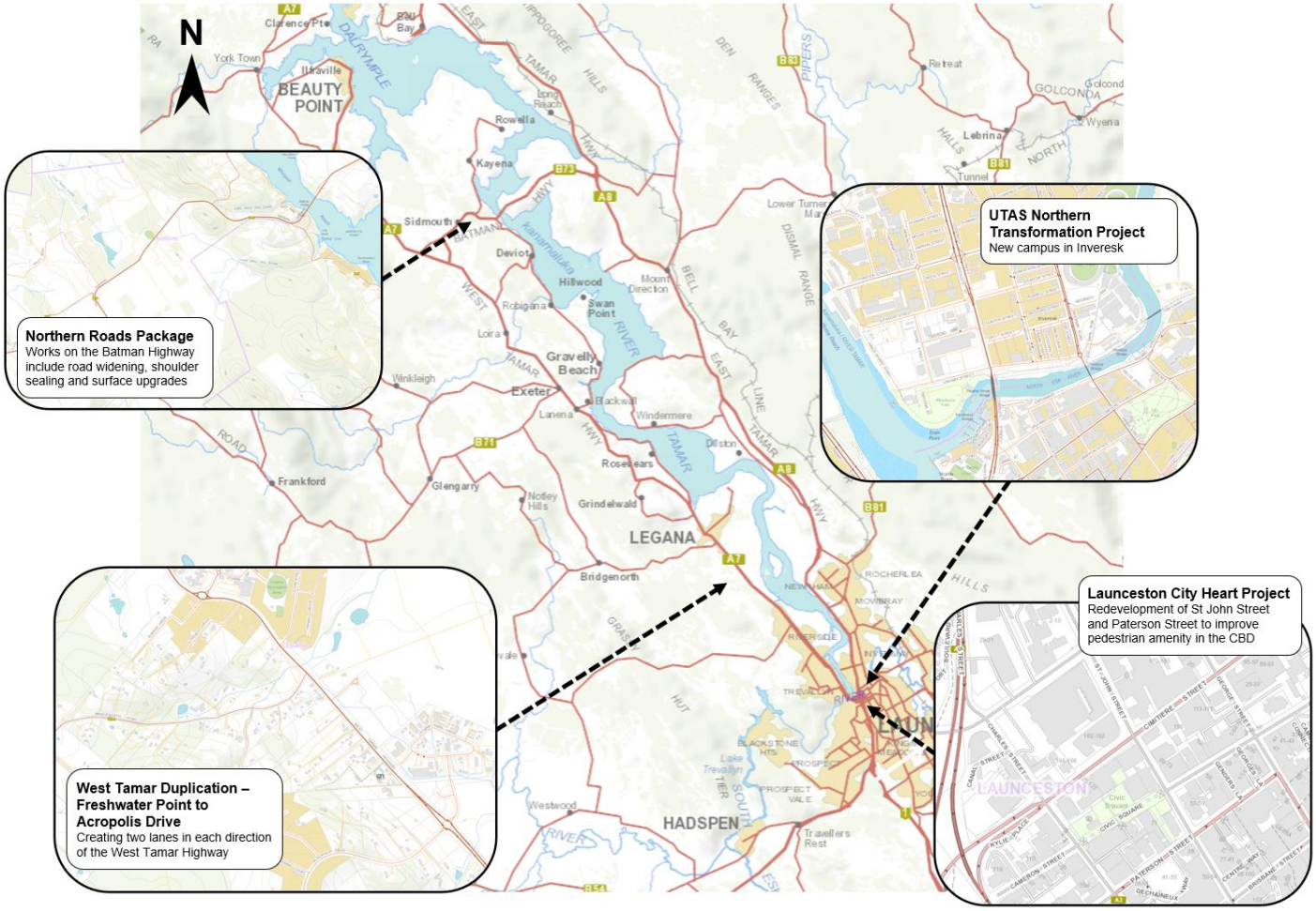


Figure 10 Current related projects in the project area

1.5 Key stakeholders

Table 7 outlines stakeholders from a range of organisations that have an interest in the Project.

While these stakeholders have not been specifically consulted as part of the Project, most of these stakeholders provided earlier input to the *West Tamar Highway Corridor Study*, helping to identify key challenges and opportunities to improve transport outcomes for the community.

The previous consultation outcomes have informed the Project, particularly the strategic case for investment and the investment logic map. It is recognised that further stakeholder engagement and community consultation will be needed should the Project proceed.

Table 7 Key stakeholders

Key stakeholders	Interest	Involvement
City of Launceston	The City of Launceston is responsible for leading and representing the Launceston community. The City of Launceston has a vision of '*inspired people, working together to create the best outcomes for our community*'.	Involved in the Investment Logic Mapping workshop.
West Tamar Council	West Tamar Council is responsible for leading and managing the West Tamar Local Government Area. The Council's vision is *'to create an inclusive community where people want to live, work and invest.'*	
Royal Automobile Club of Tasmania	A motoring club in Tasmania, representing the interests of Tasmanian motorists.	
Bicycle Network Tasmania	A member-based health promotion charity, with the vision of encouraging more Tasmanians to ride bicycles more often.	
Tamar Bicycle User Group	An incorporated not-for-profit organisation working towards building a strong bicycle riding community, while increasing bicycle awareness and safety in and around the Tamar Valley region.	No direct involvement to date, engagement to be undertaken in future phases.
Tamar Islands Wetlands Centre	Tamar Islands Wetlands Centre are responsible for managing the Tamar Islands Wetlands, located in the Tamar Conservation Area north of Riverside	
Department of Natural Resources and Environment Tasmania	The Department of Natural Resources and Environment Tasmania is responsible for the sustainable management of the State's natural and cultural heritage and the integrity of the racing industry for the benefit of the Tasmanian community.	

2 Investment logic mapping

Investment logic mapping is a tool used to enable a clear understanding of the primary problems that the Project needs to address, and the benefits sought from investment. This is achieved through defining the problems and benefit statements, and identifying a potential range of responses that could be pursued.

An investment logic mapping workshop was facilitated in 2019, originally as part of the *West Tamar Highway Corridor Study* and included representatives from:

- Department of State Growth
- City of Launceston
- West Tamar Council
- Royal Automobile Club of Tasmania
- Bicycle Network Tasmania.

Following this workshop, the problem, benefit, and response statements were identified for the study area and agreed with key stakeholders.

For the purposes of the Project, the investment logic map has since been refined to better reflect the Project context. Figure 11 illustrates the updated problem and benefit statements adopted for the Project. Further consultation on the investment logic map with key stakeholders is required following the completion of this business case, should the Project proceed.

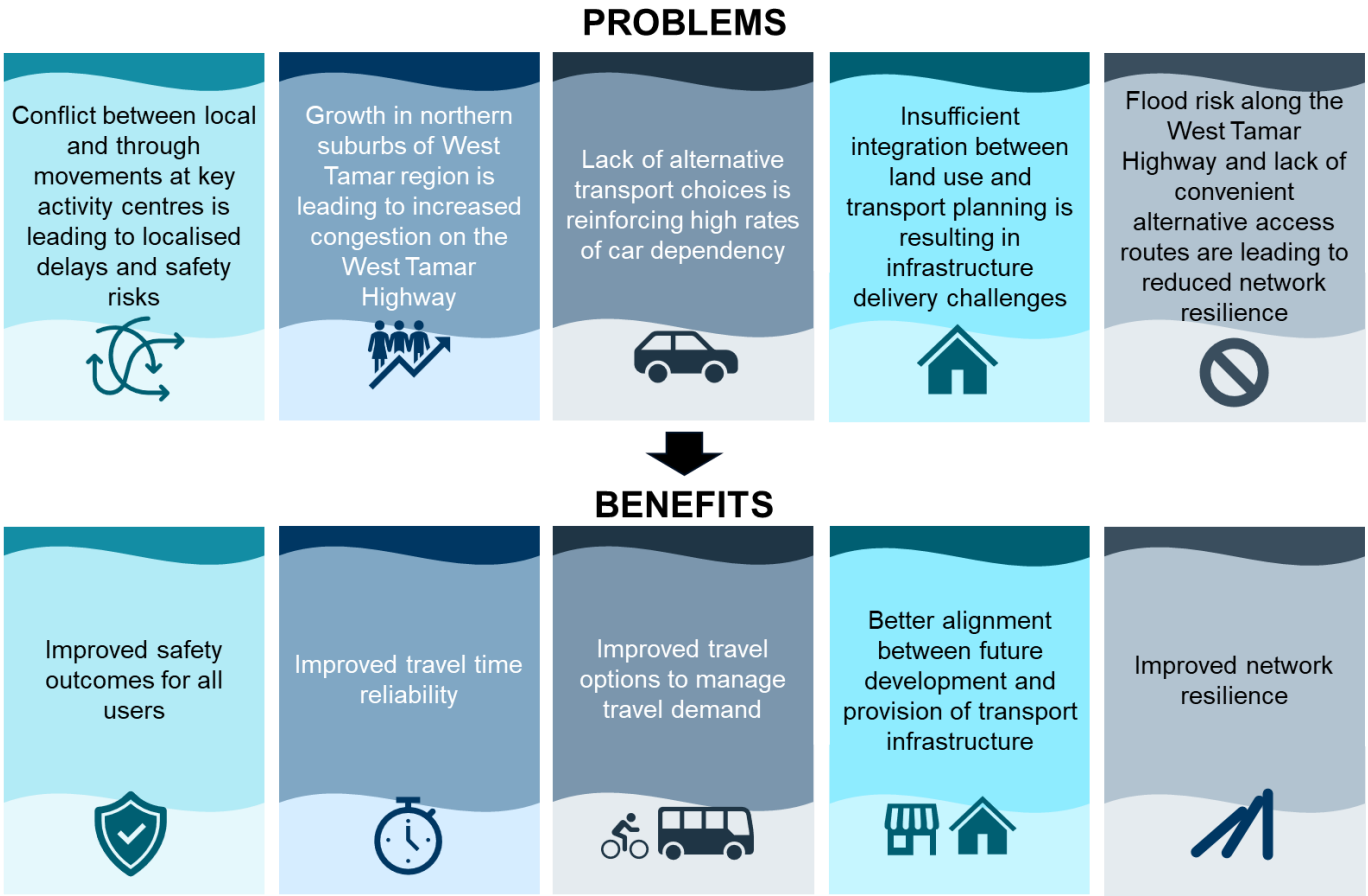


Figure 11 Problem and benefit statements

3 Key problems

This section outlines the evidence and scale of the key problems identified in the investment logic map. The causation evidence describes the contributing factors to the identified issues, and the effect evidence describes the impacts of these contributing factors.

Figure 12 outliners the problem statements as identified in the investment logic mapping process.

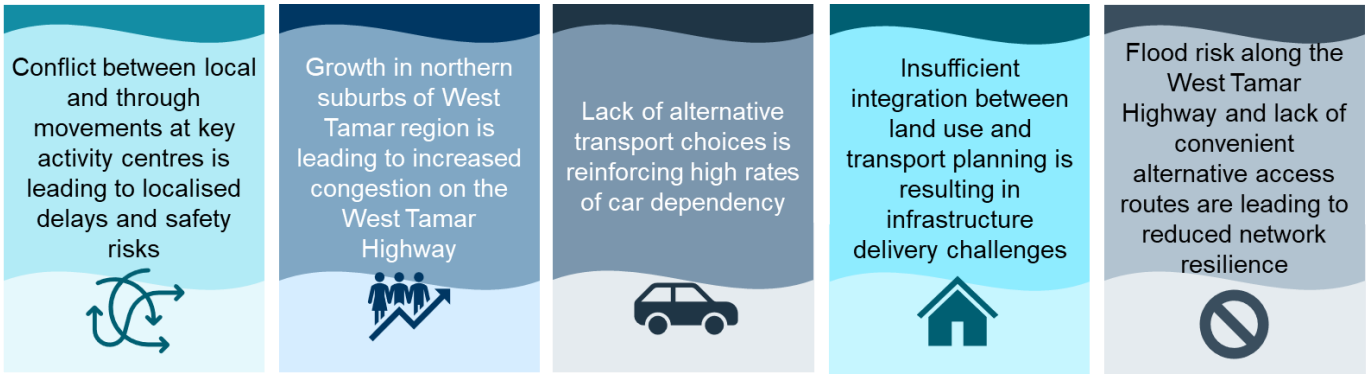
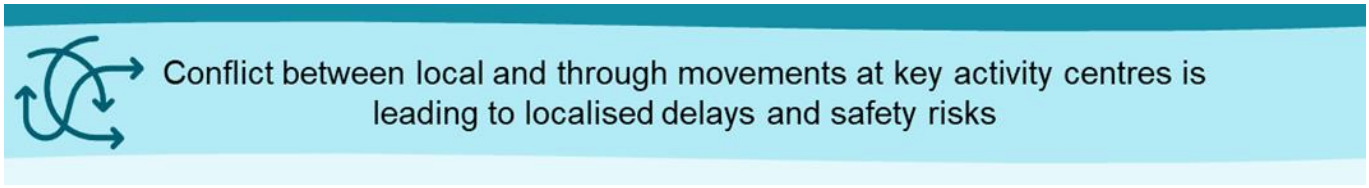


Figure 12 Problem statements

3.1 Problem statement one



3.1.1 Causation evidence

3.1.1.1 Conflict between local and through movements at key activity centres

Launceston CBD is a high amenity area, with key retail, hospitality and employment destinations. The CBD is located between the West Tamar Highway and the East Tamar Highway, and as a result, facilitates most movements for people traveling between the two highways.

Figure 13 illustrates the traffic destinations from different origins throughout the Project area during the morning peak period.[8] This shows that during the morning peak period, while 54% of trips originating outside of Launceston CBD finish in the CBD, a significant proportion (46%) pass through the CBD to reach other destinations. This demonstrates the differing movements, including local and through movements in Launceston and the significant proportions of traffic travelling through the CBD.

Almost 20% of morning peak period movements originating in the north-western sections of the West Tamar Highway have a destination on the eastern side of the Tamar Valley, indicating potential demand to cross the kanamaluka / River Tamar. Furthermore, 26% of trips originating in the north-eastern and eastern sections of Launceston finish in the north-western and western side of Launceston. It is

[8] Traffic analysis from *Tamar River Crossing Strategic Case* based on Austraffic 2019 data

assumed that these movements are primarily being supported by the existing river crossings of the North Esk and South Esk Rivers.

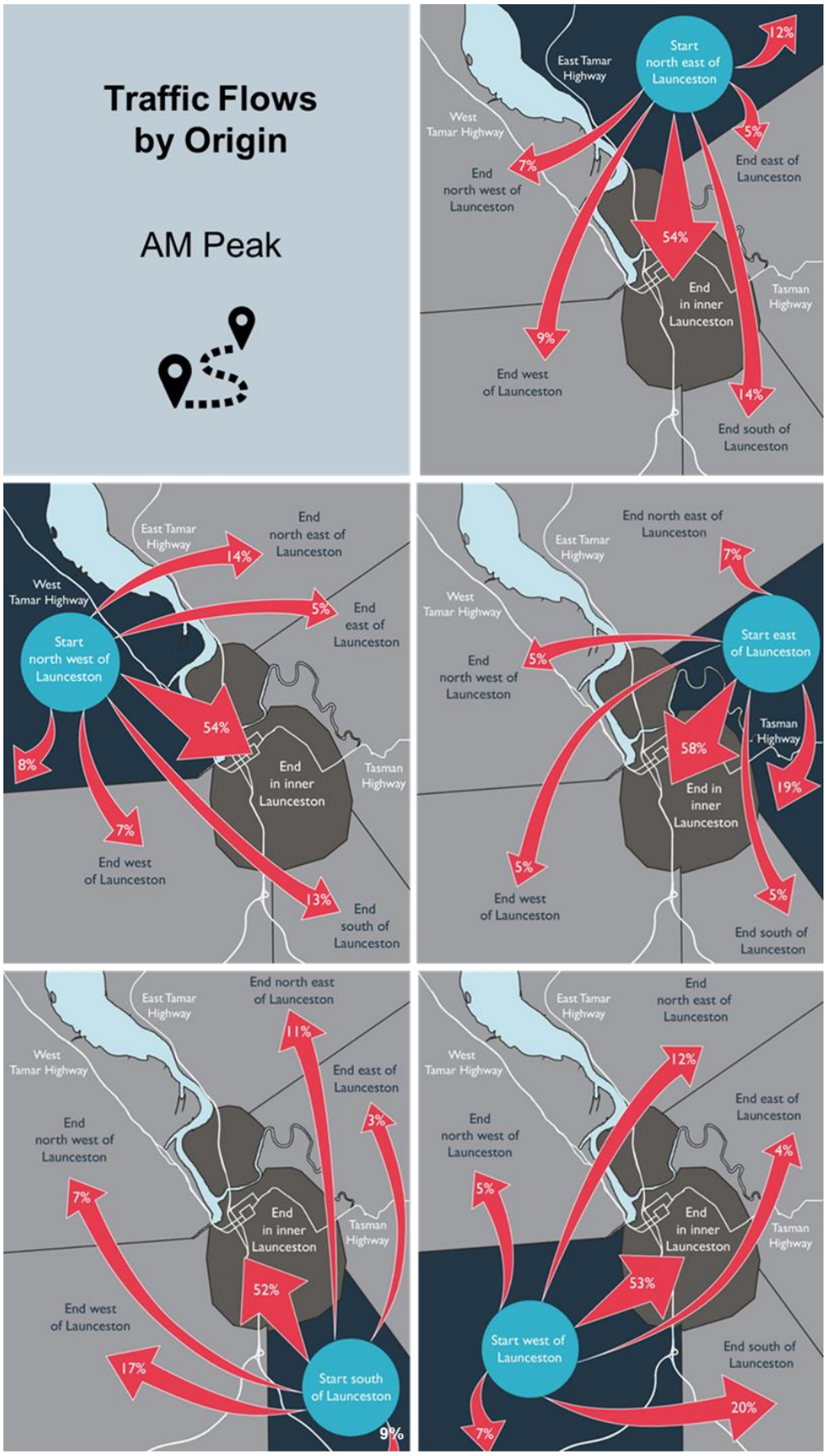


Figure 13 Traffic flow destinations by origin during morning peak period

3.1.2 Effect evidence

3.1.2.1 Localised delays

Based on travel time surveys conducted in the morning peak period (Wednesday, 3 July 2019), southbound travel times on the West Tamar Highway (from McEwans Road to Margaret Street) increase by approximately 50% (from a nominal 13 minutes to 19 minutes at approximately 8:10 am, before returning to below 15 minutes by approximately 8:45 am). There is no pronounced short-term peak on northbound travel times.

Based on travel time surveys conducted in the afternoon peak period (Wednesday, 3 July 2019), travel times in both directions along the corridor vary between a nominal 13 minutes and 15 minutes, potentially indicating a vulnerability in the network to incidents or increases in traffic volumes. The multiple short-term peaks identified are likely due to the offset between school peak (between 3 pm and 4 pm) and commuter peak (after 5 pm).[9]

3.1.2.2 Safety risks

In the five-year period between 01 August 2016 and 31 July 2021, a total of 1033 crashes were recorded on the West Tamar Highway and East Tamar Highway, resulting in 33 fatal and serious injury crashes.

Figure 14 shows the annual crashes that occurred within the Project area between August 2016 and July 2021.

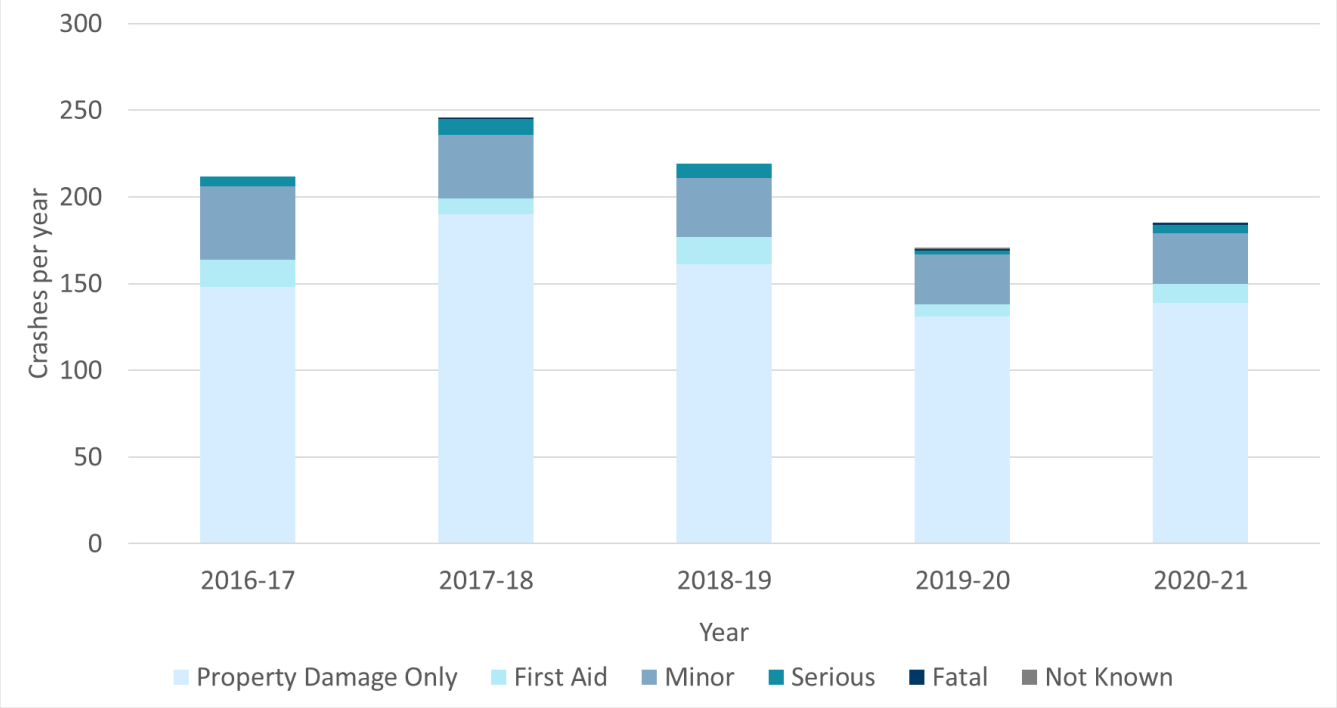


Figure 14 Project area crashes between August 2016 to July 2021 (inclusive)[10]

Approximately 60% to 70% of these crashes occurred in Launceston CBD, with the remaining 30% to 40% of crashes occurring on the West Tamar Highway and East Tamar Highway. It should be noted that the decreased number of crashes in 2020 could have been due to COVID-19 restrictions being

[9] West Tamar Highway Corridor Study, West Tamar Highway Strategic Review, Department of State Growth, March 2020

[10] Department of State Growth (2016 - 2021). 2016 and 2021 crashes have been annualized based on eight months and four months of data, respectively.

implemented at the time. Crash data shows that 21% (222 crashes) of the total crashes over the period were as a result of rear end crashes from vehicles in the same lane.

Figure 15 illustrates the crash history heatmap in the Project area. This shows that most crashes occur within the Launceston CBD. In addition, multiple crash incidents have also occurred in Riverside and north Riverside on the West Tamar Highway, and Mowbray and Invermay on the East Tamar Highway.

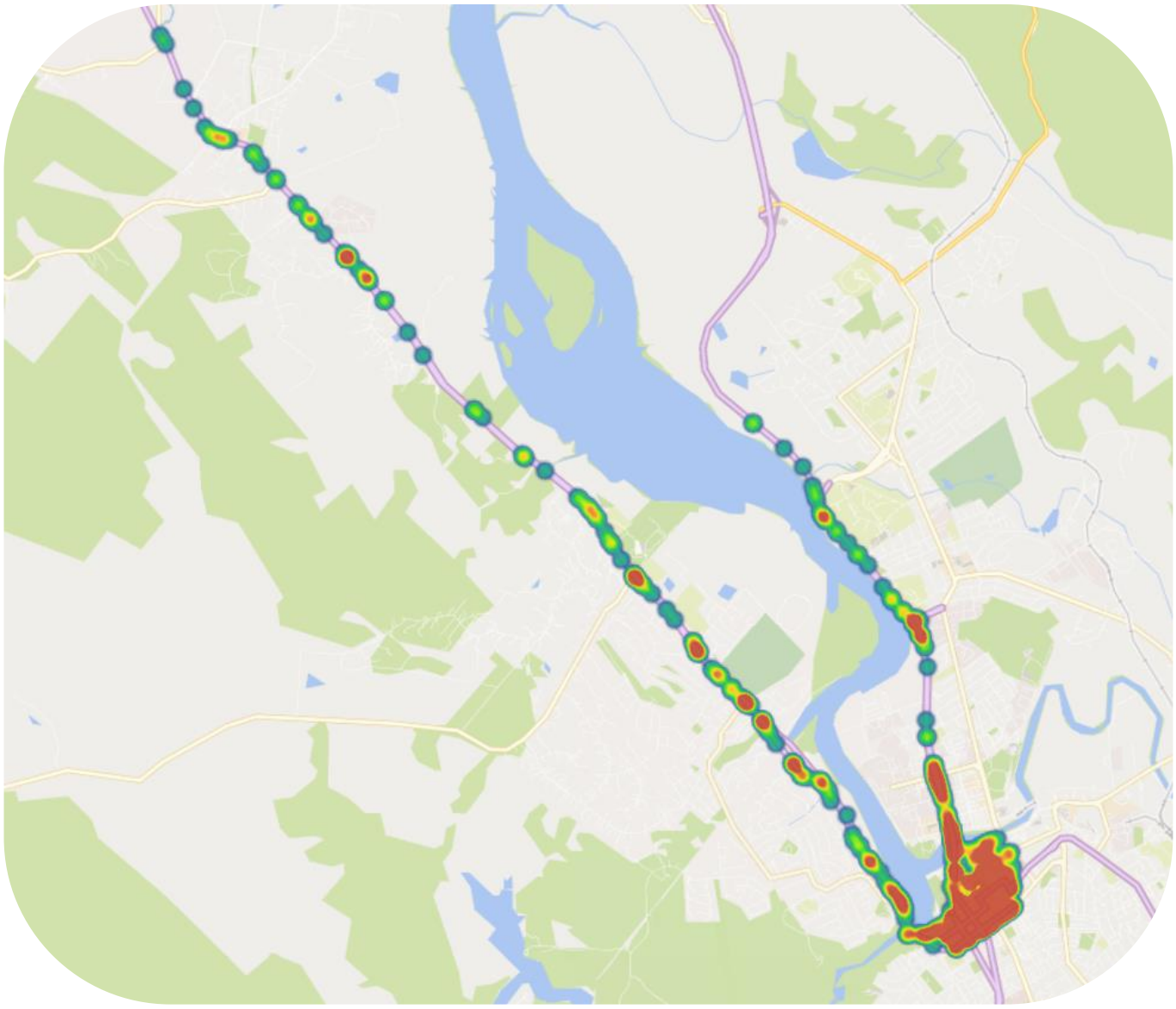


Figure 15 Project area crashes heat map between 2016 to 2021 (inclusive)[11]

Adding to the safety risks in the Project area are multiple uncontrolled property accesses along West Tamar Highway, as a result of residential areas situated alongside the West Tamar Highway with direct property access points. This was identified through a Road Safety Audit undertaken in December 2019.

[11] Department of State Growth, 2016 - 2021

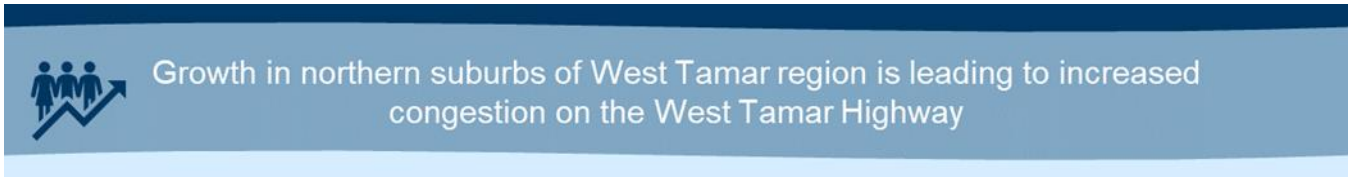
3.1.3 Summary

Most trips in Launceston travel to or through the Launceston CBD. This includes through movements (people traveling through Launceston to access another suburb for example), people accessing key destinations such as schools, and freight movements.

This conflict between vehicle movements traveling to and those passing through Launceston creates:

- Localised delays, through increased travel times during peak hours.
- Safety risk, shown by 1033 recorded crashes in the Project area, including 33 fatal and serious injury crashes that occurred in the five year period 2016 to 2021.

3.2 Problem statement two



3.2.1 Causation evidence

3.2.1.1 Growth in northern suburbs of the West Tamar region

Launceston is growing steadily, with high levels of both residential and commercial development occurring in the northern suburbs. This growth is driven in part by the *Tasmanian Government's Population Growth Strategy*, which aims to achieve a population target of 650,000 Tasmanians by 2050 to drive economic growth, create jobs and improve the standard of living for all Tasmanians.[12]

The West Tamar local government area (north-west of Launceston City) is projected to grow in population by 13% over the next 20 years, to approximately 29,000 in 2042.[13]

Figure 16 illustrates the *Greater Launceston Plan's* Regional Framework Plan, which outlines that approximately half of the housing requirements for the Greater Launceston area and over 75% of greenfield developments are planned to be met in the following three growth corridors.

- **Riverside – Legana corridor, West Tamar Council:** Area extending north from Riverside to include the Legana district, and the adjoining Grindelwald and Rosevears areas.
- **St Leonards – Waverley corridor, City of Launceston:** Area extending south-east along the northern edge of the North Esk river valley, including the planned residential areas of Waverley, and extends south to include St Leonards and future potential growth areas.
- **South-West corridor, Meander Valley Council:** Area extending north and west from Prospect Vale to include the localities of Blackstone Heights and Travellers Rest, and the planned community of Hadspen.

[12] Department of State Growth Tasmania's population growth strategy, https://www.stategrowth.tas.gov.au/policies_and_strategies/populationstrategy#:~:text=The%20Tasmanian%20Government%20has%20set,of%20living%20for%20all%20Tasmanians

[13] 2023 Draft medium series population projections for Tasmania – Department of Treasury and Finance

According to the *Legana Town Centre Structure Plan*, the population in the Legana district is expected to increase from 27,000 people in 2011 to approximately 33,000 people by 2026, exceeding 35,000 people by 2036 (an increase of 30% on the 2011 population).[14]

Additionally, the plan details opportunities for development of shopping areas in Legana Town Centre, including a future Urban District Centre, a new or enlarged supermarket and a discount department store, indicating ongoing growth is likely to occur in the northern suburbs of the West Tamar region.

[14] West Tamar Council (2014)

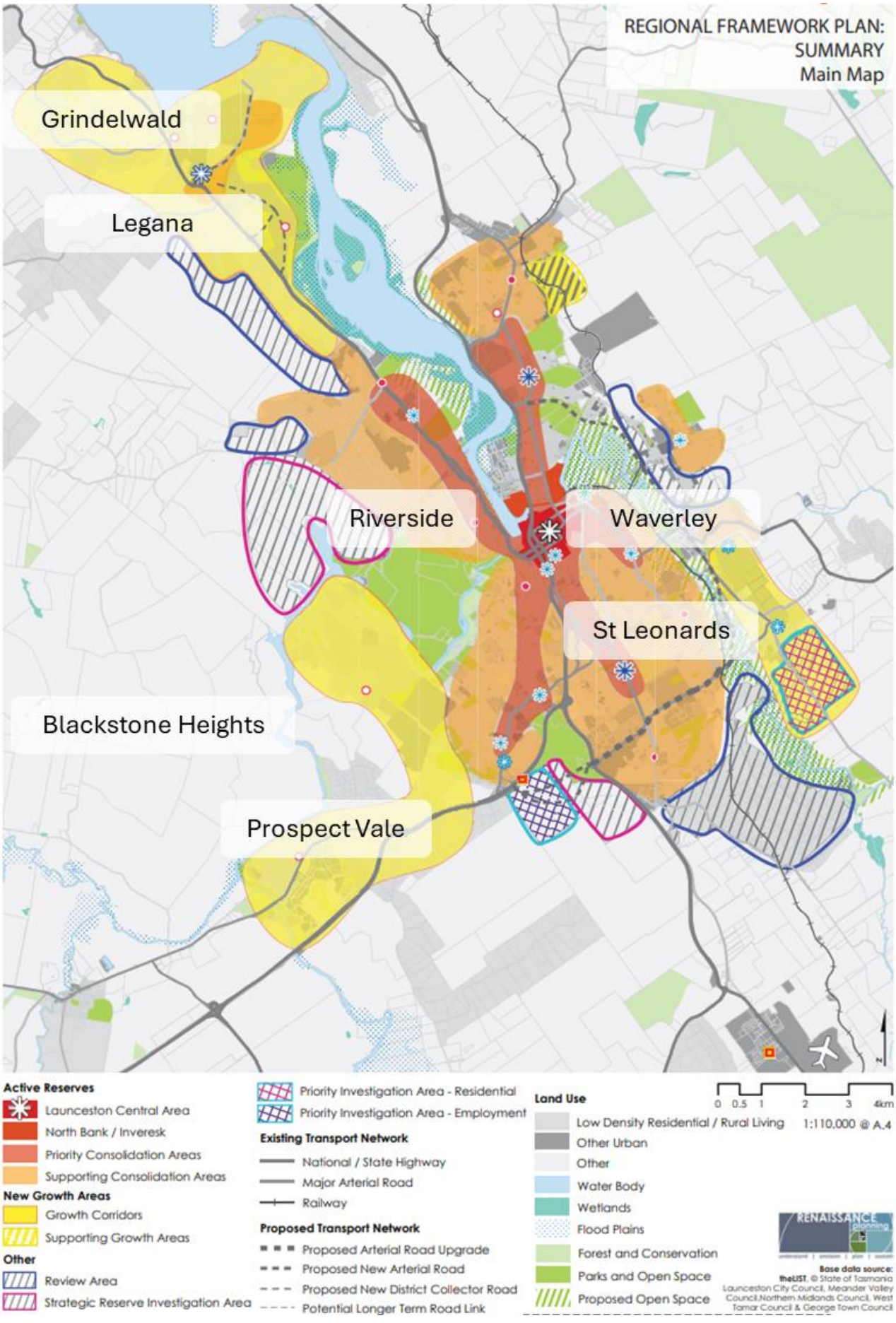


Figure 16 Regional Framework Plan[15]

3.2.2 Effect evidence

3.2.2.1 Increased congestion on the West Tamar Highway

Traffic volumes on the West Tamar Highway have been increasing steadily over the last 20 years (1999 to 2019), with the following approximate increases over the period:

- 35% towards the southern end near Launceston (1.8% growth on average per annum)
- 50% through Riverside (2.4% growth on average per annum)
- 75% near Legana (3.8% growth on average per annum)[16]

This indicates the highest levels of traffic growth have been near the northern suburbs of Legana and Riverside. Figure 17 illustrates these traffic counts by location along the West Tamar Highway.

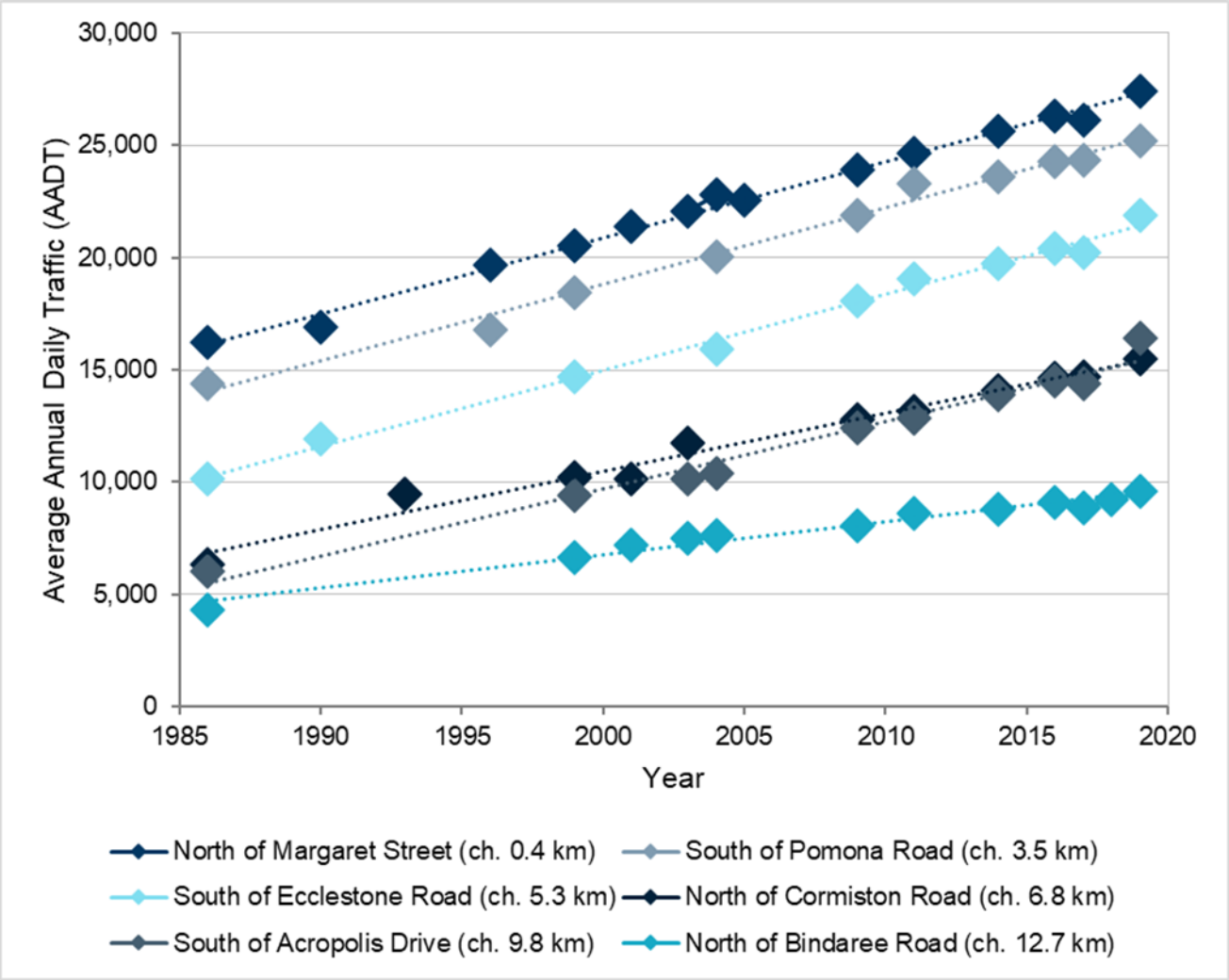


Figure 17 West Tamar Highway historic traffic growth trends[17]

[16] Retrieved from *Tamar River Crossing Strategic Case*, based on interpolated historic traffic data (1986-2019) received from Department of State Growth

[17] Ibid

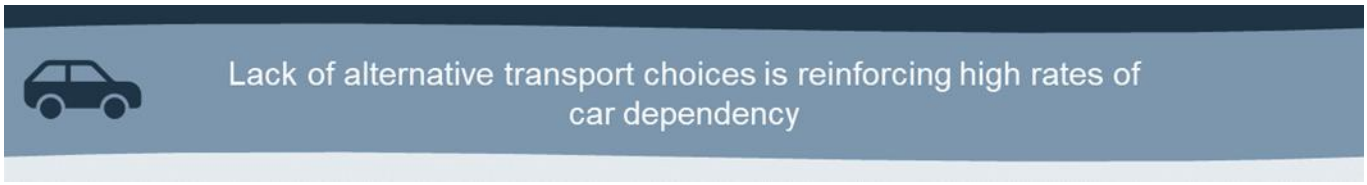
This shows that the highest volumes occur north of Margaret Street (near Launceston CBD), with an average annual daily traffic (AADT) of 27,392.[18] If current trends continue, traffic volumes on the corridor near Launceston could be expected to reach almost 35,000 vehicles per day by 2040, with peak volumes in the range of 3400 to 3500 vehicles per hour.

Travel demand in Launceston increases during peak periods. The morning peak hour (8 am to 9 am) experiences the highest hourly volumes of traffic, with up to approximately 2800 vehicles both ways on the West Tamar Highway. The afternoon peak is longer but experiences less hourly volumes of traffic, spanning the end of school and the traditional workday (3 pm to 6 pm). Over the afternoon peak period, the highest hourly volumes of traffic are experienced between 4 pm and 5 pm, with up to approximately 2400 vehicles both ways on the West Tamar Highway. This shows the potential for congestion to occur on the West Tamar Highway due to an increase in travel demand over these peak travel times.

3.2.3 Summary

The *Greater Launceston Plan* indicates ongoing future residential and commercial development in the northern suburbs of Greater Launceston, particularly near the suburb of Legana. Traffic volumes from passenger vehicles have been increasing steadily over the last 20 years on the West Tamar Highway, reducing available road capacity during peak hours. Limited connections into the Launceston CBD may exacerbate the effects of this expected future congestion.

3.3 Problem statement three



3.3.1 Causation evidence

3.3.1.1 Lack of alternative transport choices

Launceston has a short average commuting distance in comparison to other Australian cities, with an average commuting distance of approximately nine kilometres. In comparison, Hobart has an average commuting distance of almost 12 kilometres and Sydney of 15 kilometres.[19]

Approximately 10% of the Greater Launceston population lives within a 30-minute walk of the CBD, and around 25% of the population live within a 30-minute bicycle ride of the CBD.[20] This short commuting distance highlights the potential for high levels of walking, bicycle riding and public transport to access destinations, subject to the provision of appropriate infrastructure to support active transport.

[18] Data source: Department of State Growth. Retrieved from West Tamar Strategic Review, GHD on behalf of Department of State Growth, 2021

[19] Census, 2016

[20] Launceston Network Operating Framework, GHD on behalf of Department of State Growth, October 2020

3.3.1.2 Public transport

Bus services along the West Tamar Highway primarily service the residential area adjacent to the West Tamar Highway, with a three buses servicing the Legana area further north along the West Tamar Highway (as at 2024). There are several buses that service the East Tamar Highway area.

Primary routes were identified in the public transport network, representing routes carrying high frequency bus services. These bus services generally connect residential areas to the CBD or schools. The following primary routes were identified in the public transport network due to these routes being well serviced by buses (serviced roughly every 15 minutes during peak hour on weekdays, and half hourly off-peak) to and within the CBD from the north and south:

- Invermay Road, William Street and St John Street (connecting to the CBD) from the north.
- Charles Street, Wellington Street and Howick Street (connecting to the CBD) from the south.

The following two routes are performing as secondary public transport routes (routes that connect residential catchments, recreational facilities and other key nodes). These routes currently provide public transport access to the CBD from the east and west. These, however, are recognised as potential future primary routes:

- West Tamar Highway, including Brisbane Street and York Street (connecting to the CBD) from the west.
- Elphin Road (connecting to the CBD) from the east.

The following secondary public transport routes were also identified since they complement the primary routes by providing local access and connectivity:

- Henry Street, Boland St, Innes Street and Cimitiere Street (connecting to the CBD) from Ravenswood.
- Westbury Road (connecting to Wellington Street Primary route) from Prospect.[21]

Timetables for Manions' Coaches and Metro Tasmania near the West Tamar Highway and East Tamar Highway were reviewed based on the frequency of bus services.

Bus services along the Launceston to Mowbray corridor were the most frequent with scheduled services every 10 minutes (Turn Up and Go services) during weekdays between 7 am and 7 pm. Along the West Tamar Highway between Brisbane Street and Legana, there were predominantly two to three scheduled services per hour during off peak times (on weekdays, between 6 am and 8 pm), and six to nine scheduled services during the peak hour. During weekends, scheduled bus services along West Tamar Highway showed one to two bus services per hour. There were no bus services after 7:42 pm on Monday through to Saturday, and after 5:42 pm on Sundays. These bus routes are shown in Figure 18.

[21] Launceston Network Operating Framework, GHD on behalf of Department of State Growth, October 2020

Figure 18 Launceston urban bus network[22]

[22] Launceston urban network effective 15 January 2023, Metro Tasmania, Sourced January 2024 from: https://www.metrotas.com.au/wp-content/uploads/2023/01/22729_DSG_network_map_launceston_A3.pdf

This shows that bus services are relatively frequent during weekdays, particularly during peak periods. However, there are no bus services available in the evenings and overnight, limiting people's ability to travel by public transport. This may create a dependence on private vehicle or rideshare services.

3.3.1.3 Bicycle riding

Launceston's bicycle network consists of predominantly on-road routes, principally designed for commuter bicycle riding. There are several off-road cycle trails or shared cycle paths to the east and north-east of Launceston, however, the bicycle riding facilities that exist through the CBD are on-road and not physically separated from traffic. Currently, there are no dedicated cycle lanes along the West Tamar Highway north of Riverside. Overall, the current bicycle riding network is disconnected and inconsistent, making it less likely to attract recreational or less confident riders.

An upgraded cycle network is planned alongside the proposed development of Legana throughout the area. The *Legana Town Centre Structure Plan* states that '*safe and amenable'* bicycle riding linkages should be provided between the 'Town Centre' (Launceston CBD) and the wider network.[23]

A strategic objective identified in the *Launceston NOF* is to provide continuous journeys that safely connect communities for people on bikes to encourage bicycle riding as an everyday mode of transport. The network should enable people to travel by bicycle for work, education, social and recreational purposes.

Figure 19 illustrates the difference between the planned aspirational bicycle routes (red) and the implemented bicycle riding infrastructure within Launceston area (green). The gaps highlight where there is an opportunity to improve connectivity across the network. This shows that there is existing bicycle infrastructure along either side and around kanamaluka / River Tamar. However, there are limited connected routes through the CBD.

[23] West Tamar Highway Corridor Study, West Tamar Highway Strategic Review, Department of State Growth, March 2020

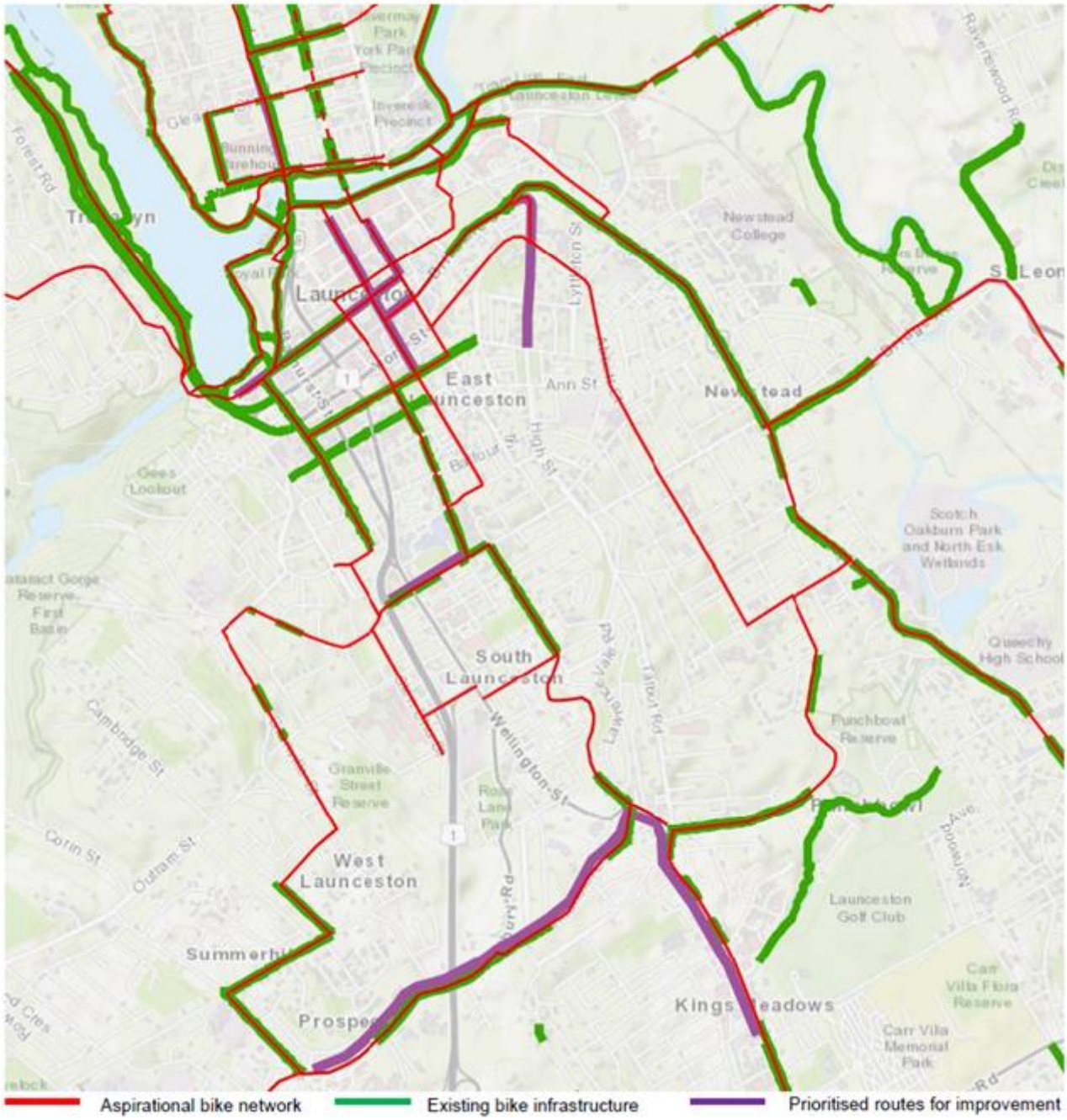


Figure 19 Aspirational bicycle riding network compared to existing infrastructure[24]

The following road sections have the highest bicycle riding performance gap and high network significance (purple):

- Brisbane Street (St John Street to George Street).
- George Street (William Street to Paterson Street).
- Goderich Street (Gleadow Street to Lower Charles Street).
- High Street (Elphin Road to Arthur Street).
- Hobart Road (Wellington Street to Opossum Road).

[24] Launceston Network Operations Plan, GHD, 2021

- Howick Street (Charles Street to Wellington Street).
- Paterson St (Bridge Road to George Street).
- St John Street (Esplanade Street to Elizabeth Street).
- Westbury Road (Wellington Street to Stanley Street).[25]

3.3.1.4 Walking

There is a desire from stakeholders to provide safe walking connections to encourage uptake of this transport mode. This includes connections to key land use areas and high amenity nodes such as hospitals, schools, the CBD and bus stops. The following are key issues with the current walking network, identified in the *Launceston NOF*:

- Disconnected residential areas, riverfront, schools, UTAS Inveresk Campus, recreation areas and commercial centres.
- Need for greater provision of shared off-road facilities.
- The couplet as an east-west accessibility restriction.[26]

There are limited dedicated crossing opportunities on the West Tamar Highway between Launceston and Pomona Road, in Riverside. However, there are five signalised crossings near Riverside (between Pomona Road and Cormiston Road) along with a pedestrian underpass.

Between North Riverside and Legana, there are three mid-block refuge islands.[27] Sealed footpaths between North Riverside and Legana are limited and discontinuous, typically provided immediately adjacent to attractions and areas that exhibit higher activity, but without connectivity to the wider network.

Between Invermay and North Newnham along the East Tamar Highway, there are ten signalised crossings (Lindsay Street, Gleadow Street and Forster Street), and two pedestrian overpasses between Mowbray and Newnham which do not have wheelchair ramps.

Figure 20 (following page) illustrates the primary ‘desire line’ routes identified for people walking (both current and future), which are connections between key locations. The following are the primary desire lines identified in Launceston:

- Within the CBD.
- Between the CBD and Launceston General Hospital.
- Between the Cataract Gorge and the CBD (off-road walkway).
- Between the riverfront and the CBD.
- Connections to central public transport stops.
- Connections to the UTAS campus.

The secondary pedestrian desire lines link into primary routes and connect to schools and residential areas on the outskirts of the CBD.

[25] Launceston Network Operations Plan, GHD, 2021

[26] Launceston Network Operating Framework, GHD, October 2020

[27] As at 2023

This shows a primary desire line down the West Tamar Highway and into the CBD, and primary desire lines around UTAS Invermay campus. Secondary desire lines are shown along the East Tamar Highway.

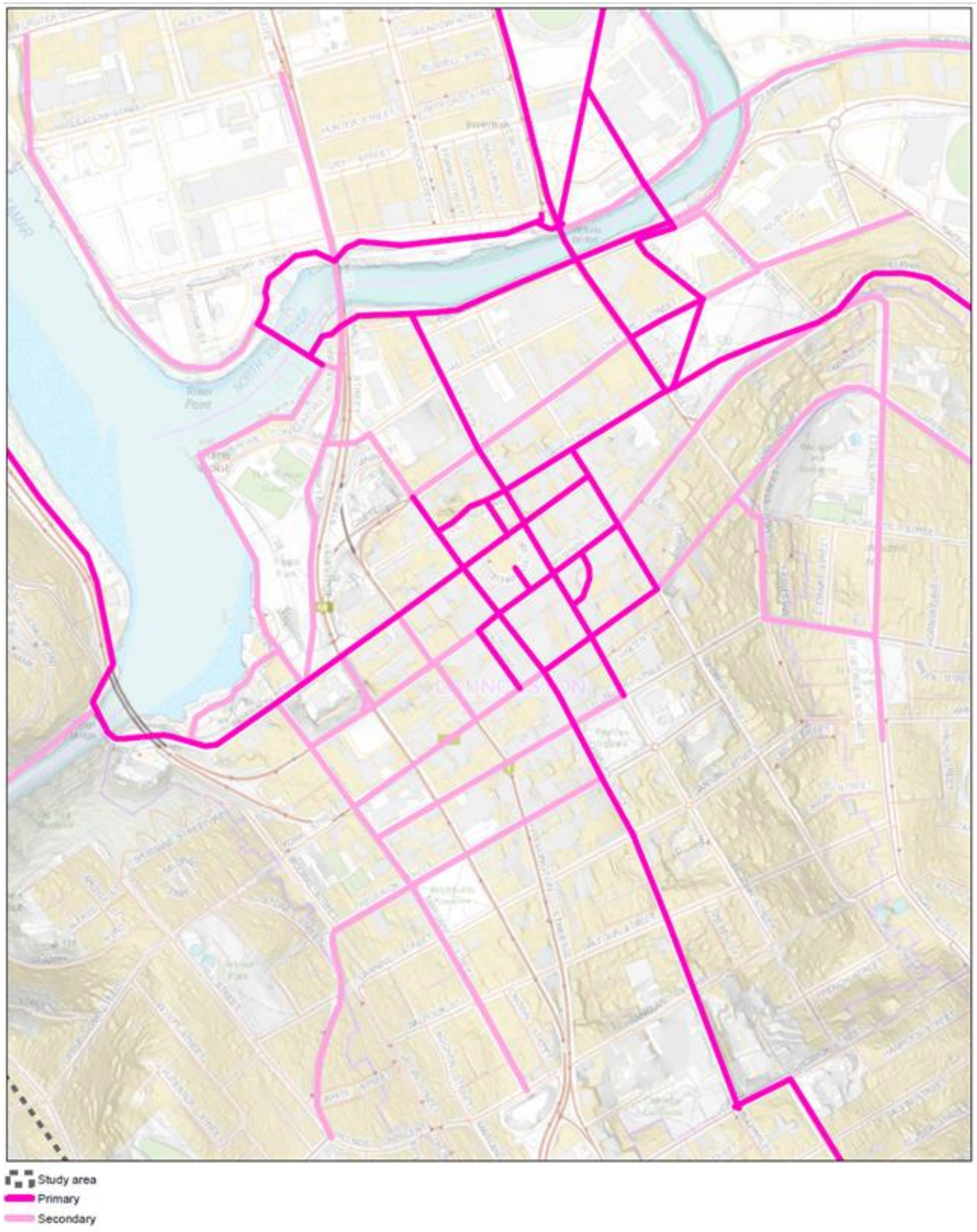


Figure 20 Primary and secondary pedestrian desire lines in Launceston CBD [28]

[28] Launceston Network Operations Framework, GHD on behalf of Department of State Growth, October 2020

3.3.2 Effect evidence

3.3.2.1 High rates of car dependency are being reinforced

Despite the short average commuting distances, there is a high dependency on private vehicles in Launceston (SA3) with 90% of people traveling to work by car (percentage includes both as a driver and as a passenger). This is compared to 67% in Hobart - Inner. Additionally, Launceston has a relatively low proportion of people that use public transport (1.8%), in comparison to Hobart - Inner (6%).

Figure 21 illustrates the method of travel to work in Launceston (via one method only).

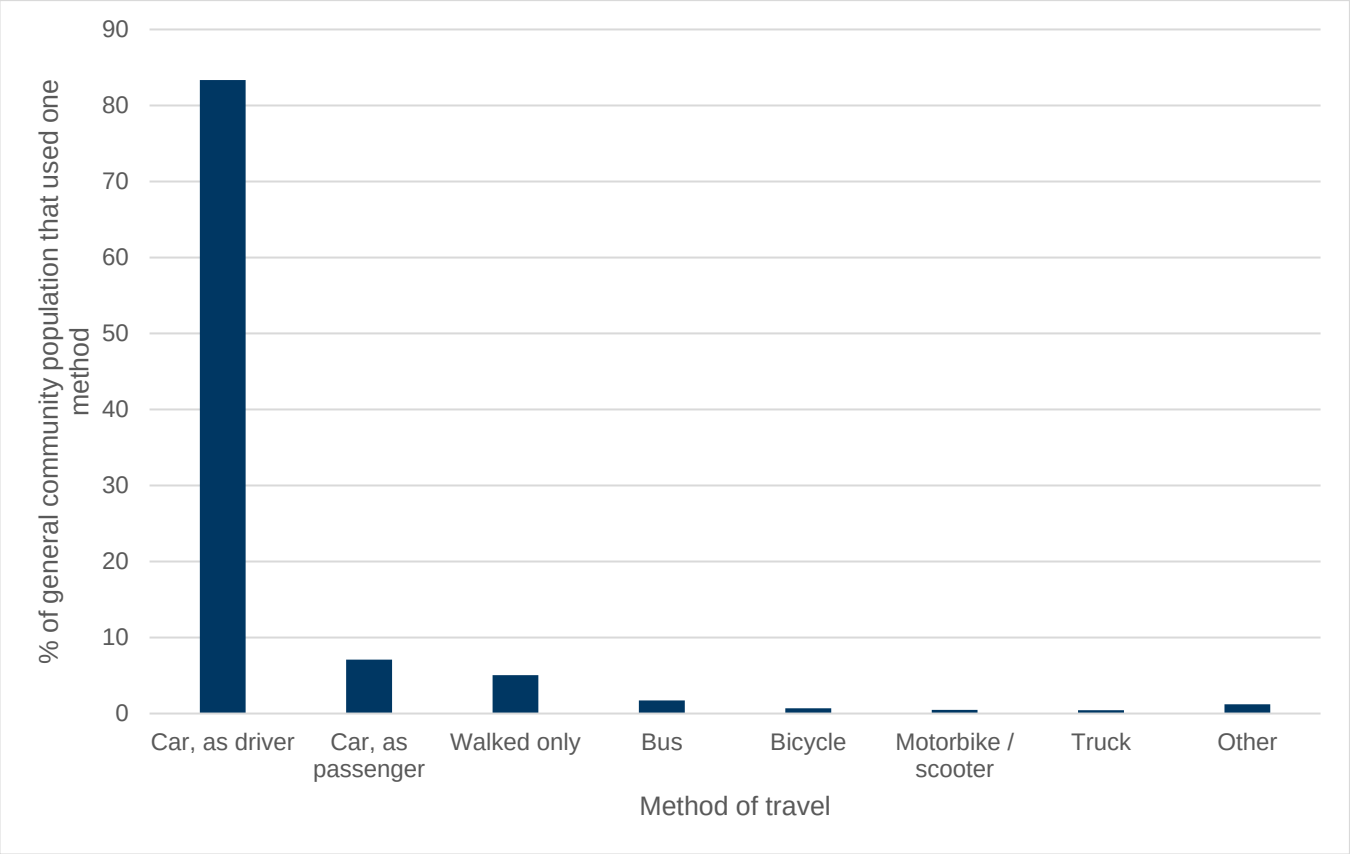


Figure 21 Launceston (SA3) method of travel to work for employed persons aged 15 and over 2021 [29] [30]

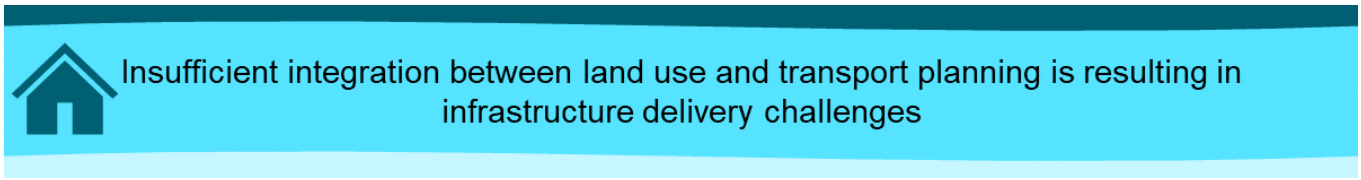
3.3.3 Summary

A lack of attractive alternative travel choices for people in Launceston is demonstrated by limited bus services, particularly in the evenings, a disconnected cycle network and limited formal crossing facilities for people walking. This has led to Launceston having one of the highest dependencies on cars for travel to work compared to other Australian cities. Launceston residents have a short average distance to commute to work, so there is potential to improve this mode share and reduce the dependency on cars by improving the levels of service for alternative travel modes.

[29] 2021 Census, Australian Bureau of Statistics

[30] 'Other' contains proportions of people that did not go to work or worked from home

3.4 Problem statement four



3.4.1 Causation evidence

3.4.1.1 Insufficient integration between land use and transport planning

Land use and transport planning is an important aspect of development. The function and road category need to be integrated with the surrounding land use zoning, such that the road reflects the environment in which it is operating. The zoning in Launceston from the *Tasmanian Planning Scheme* indicates the following:

- Land surrounding the West Tamar Highway is primarily general residential.
- Launceston CBD is primarily urban mixed use and central business.
- Land surrounding the East Tamar Highway includes a mix of general residential, inner residential, light industrial, utilities, commercial and recreation.[31]

These adjacent land uses, including the residential zones along the West Tamar Highway and limited commercial areas, indicate the transport task, with many people likely commuting to Launceston CBD along the West Tamar Highway to places of employment.

Movement and place functions

Roads serve two primary roles, to facilitate the movement of people and goods and to act as places for people. West Tamar Highway has both high movement and place functions, with the corridor serving multiple purposes. As a result, there is a need to carefully consider and allocate road space in an equitable manner that considers all users and desired functions of the corridor.

Currently the West Tamar Highway serves as the only corridor providing access between the Launceston CBD and the West Tamar region immediately north of Launceston CBD. It therefore serves a significant through and to / from movement function, particularly during peak periods when it caters to commuter traffic.

The southern section of the corridor between Launceston CBD and Legana also has a high place function, defined by the numerous attractions along its length. Its surrounding land use combination of residential, recreation, community purpose, open space, business, rural and light industrial makes it a diverse area of potentially high intensity human activity.

Topography

Additional to the land use zones, the topography of the city and its natural features, including kanamaluka / River Tamar, is a key constraint to Launceston's transport network. This is due to a lack of alternate routes as the transport network is constrained by the river, which forms a natural severance between east and west, with limited options for travel. As a result, people traveling between West Tamar

[31] Land Information System Tasmania, Tasmanian Government, Tasmania Planning Scheme – Zones, January 2024: https://maps.thelist.tas.gov.au/listmap/app/list/map

Highway and East Tamar Highway travel around kanamaluka / River Tamar through Launceston CBD, increasing pressure on the network.

3.4.2 Effect evidence

3.4.2.1 Infrastructure delivery challenges

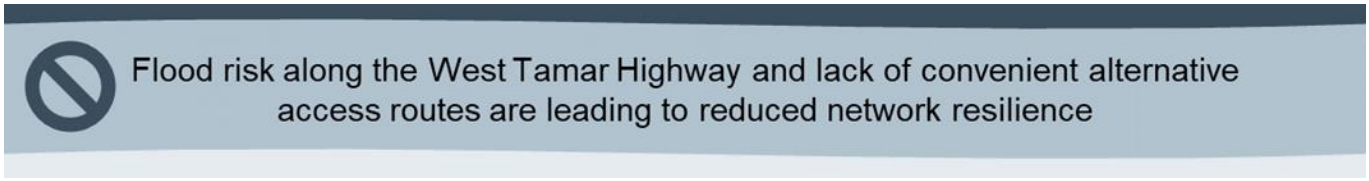
With growing residential areas in northern suburbs and limited commercial areas nearby West Tamar Highway, there is likely to be increasing volumes of people starting or ending their trips in these northern suburbs. This brings about the need for consideration of how the wider network will continue to function effectively as the transport task along this corridor continues to increase.

Currently, there is a lack of a wider network master plan and infrastructure planning to guide the delivery of public transport and active travel improvements. With multiple smaller subdivisions within the project area, delivering a connected, integrated transport network becomes challenging without an accompanying plan and results in network gaps, inefficiencies and a lack of connectivity into Launceston CBD and other key destinations for newer subdivisions. With limited attractive alternative travel modes available, this reinforces the dependency on private vehicles and results in reduced travel time reliability outcomes.

3.4.3 Summary

As a result of the challenges from insufficient integration between land use and transport, there is an opportunity for additional investment in public transport, active travel and amenity to better support population growth in new subdivisions and residential developments. Currently, the lack of attractive alternatives to travel by private vehicle, particularly in the newer subdivisions is reinforcing car dependency. This is demonstrated through a lack of available transport infrastructure to enable access between Launceston CBD and new developments such as Legana through public transport and active travel modes.

3.5 Problem statement five



3.5.1 Causation evidence

3.5.1.1 Flood risk along the West Tamar Highway

To understand the flood risk for the Project area a high-level desktop assessment using publicly available flood mapping data was conducted. This showed that in the event of a flood in Launceston, it is likely that access to Launceston CBD will be limited, restricting access or creating a need for large detours to travel between West Tamar Highway and East Tamar Highway.

Currently, access to Launceston CBD from West Tamar is via West Tamar Highway, crossing West Tamar Bridge or King's Bridge. In a one in 50 year (1:50) flood event, it is likely that this access would be impacted, due to the 1:50 flood extents impacting the southern sections of West Tamar Highway and both West Tamar Bridge and King's Bridge. Similarly, from the eastern suburbs, access to Launceston

CBD is via East Tamar Highway and across Tamar Street Bridge and Lower Charles Street Bridge. In a 1:50 flood event, it is likely that both of these bridges crossing the North Esk River will be impacted.

In a one in 100 year (1:100) flood event, impacts to access are similar, with East Tamar Highway near Mowbray Link also likely to be impacted.

The 1:50 and 1:100 flood maps are shown in Figure 22 and Figure 23, respectively.

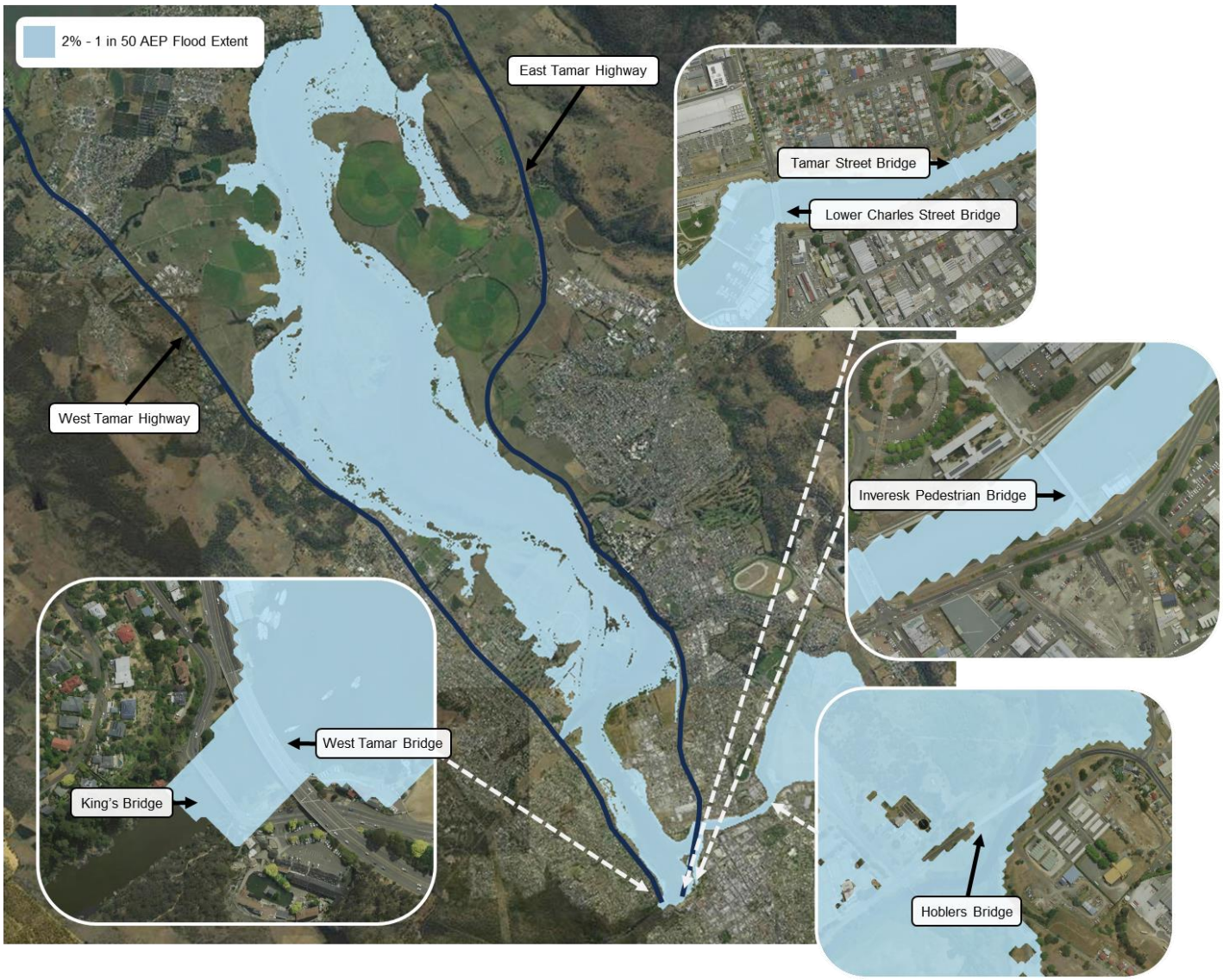


Figure 22 1:50 AEP flood map [32]

[32] Launceston Flood Maps, 2% - 1 in 50 AEP Flood Extent, accessed January 2024: https://launceston.maps.arcgis.com/apps/webappviewer/index.html?id=19c346f2067b4b6c884631b6d8dd5075

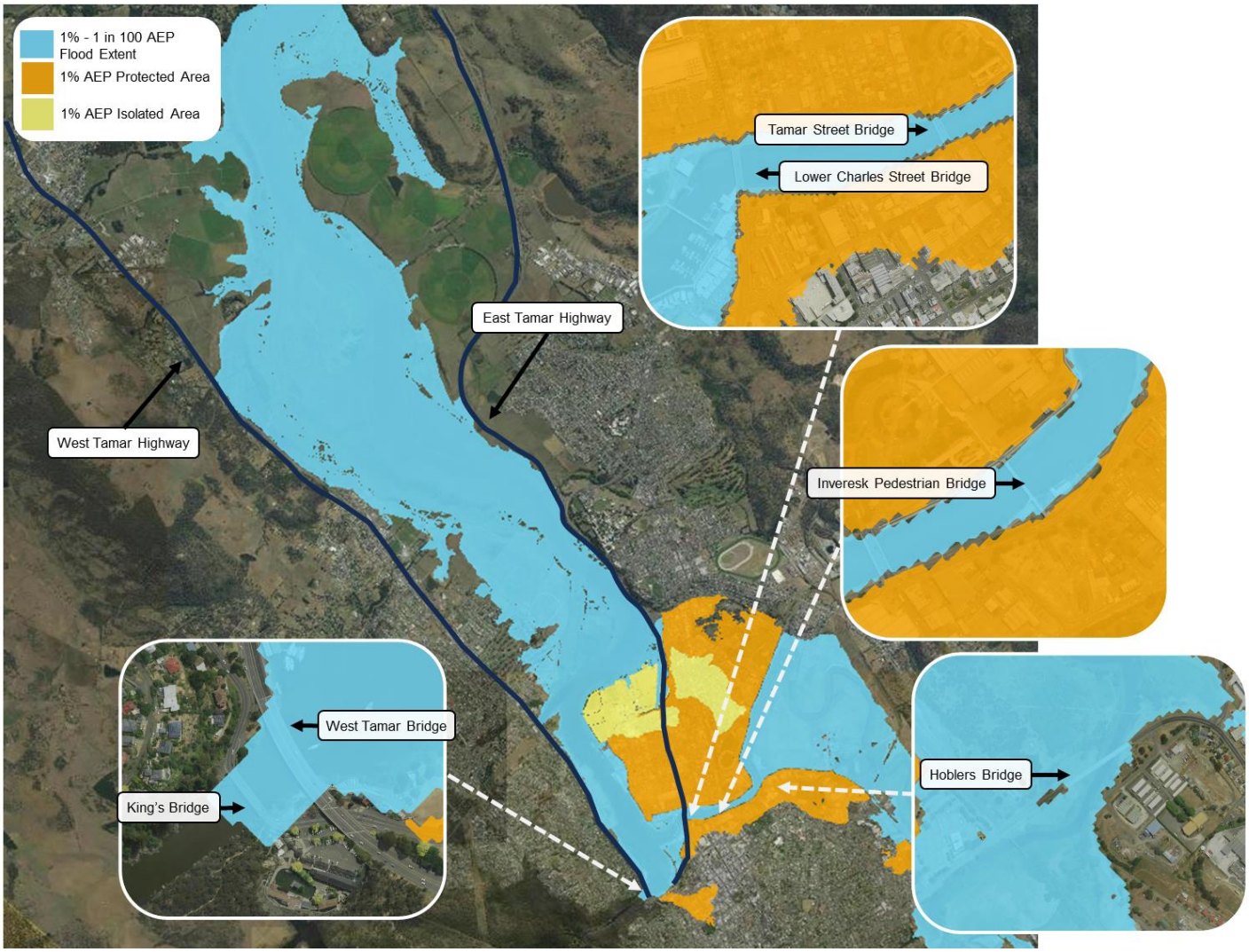


Figure 23 1:100 AEP flood map [33]

3.5.1.2 Lack of convenient alternative access routes

In the event of a 1:50 or 1:100 flood, to access Launceston CBD from West Tamar Highway would likely require a detour of approximately 43 kilometres along Ecclestone Road, through Westwood and Meander Valley Road. However, this detour may not be suitable for heavy vehicles.

Batman Bridge provides an alternative route between western and eastern sides of kanamaluka / River Tamar, should access through the Launceston CBD be impacted. Batman Bridge is situated north of the study area, approximately 38 kilometres from West Tamar Bridge and King's Bridge and is the only crossing of the kanamaluka / River Tamar north of the CBD. For western suburbs such as Riverside that would typically use King's Bridge or West Tamar Bridge to access the eastern suburbs such as Newnham, this would be a detour of approximately 65 kilometres, resulting in negative impacts to travel time reliability and freight efficiency.

Additionally, there is a lack of redundancy for people that need to use Batman Bridge. In the event that Batman Bridge incurred any form of disruption resulting in bridge closure (such as a major incident or the need for major maintenance works), all traffic that currently traverses the bridge would be required to divert through Launceston, adding approximately 70 kilometres to the journey (assuming drivers would

[33] Launceston Flood Maps, 1% - 1 in 1000 AEP Flood Extent & Protected Areas, accessed January 2024: https://launceston.maps.arcgis.com/apps/webappviewer/index.html?id=19c346f2067b4b6c884631b6d8dd5075

reroute from the junction of Deviot Road and Batman Highway in the west, through to Launceston CBD, and to the junction of Batman Highway and East Tamar Highway in the east). The lack of redundancy in terms of crossings of the kanamaluka / River Tamar therefore poses a key risk to east-west movements of people and freight.

3.5.2 Effect evidence

3.5.2.1 Reduced network resilience.

Detour options as a result of closure of Batman Bridge, or West Tamar Bridge and King's Bridge would create increases to travel time for both light and heavy vehicle users and have impacts on productivity, both for the local and wider economy. Freight vehicles unable to use alternative routes could face extensive delays until the disruption cleared, and the increased journey time could impact productivity, affecting their ability to make scheduled deliveries within agreed times and during permitted safe shift lengths.

Additionally, a lack of redundancy could have negative impacts to the local community and for light vehicle users accessing key amenities. There are many schools and tertiary institutions in east Launceston and west Launceston, including the Tas TAFE Launceston Drysdale Campus, Launceston College, and Launceston Church Grammar School. Students needing access to these schools and tertiary institutions may therefore be impacted if traveling from the opposite side of the kanamaluka / River Tamar. There could also be impacts on access to shops and places of employment, which could have a negative impact on productivity and the local economy.

The lack of redundancy for crossings over the kanamaluka / River Tamar poses a key risk to east-west movements of people and freight.

3.5.3 Summary

There is an opportunity for greater resilience against unplanned disruption to the network, including flood events, traffic incidents, or other incidents that could otherwise disrupt the local network. Due to a lack of redundancy in the network, particularly between areas to the east and west of kanamaluka / River Tamar, such disruptions have the potential to create inefficiencies for freight and impact access to local communities and businesses. As such, there is an opportunity to enable better network resilience and provide more redundancy for freight vehicles to enable a more resilient local economy.

3.6 Summary of problems

Figure 24 illustrates a summary of the key problems experienced within the project area and available evidence.

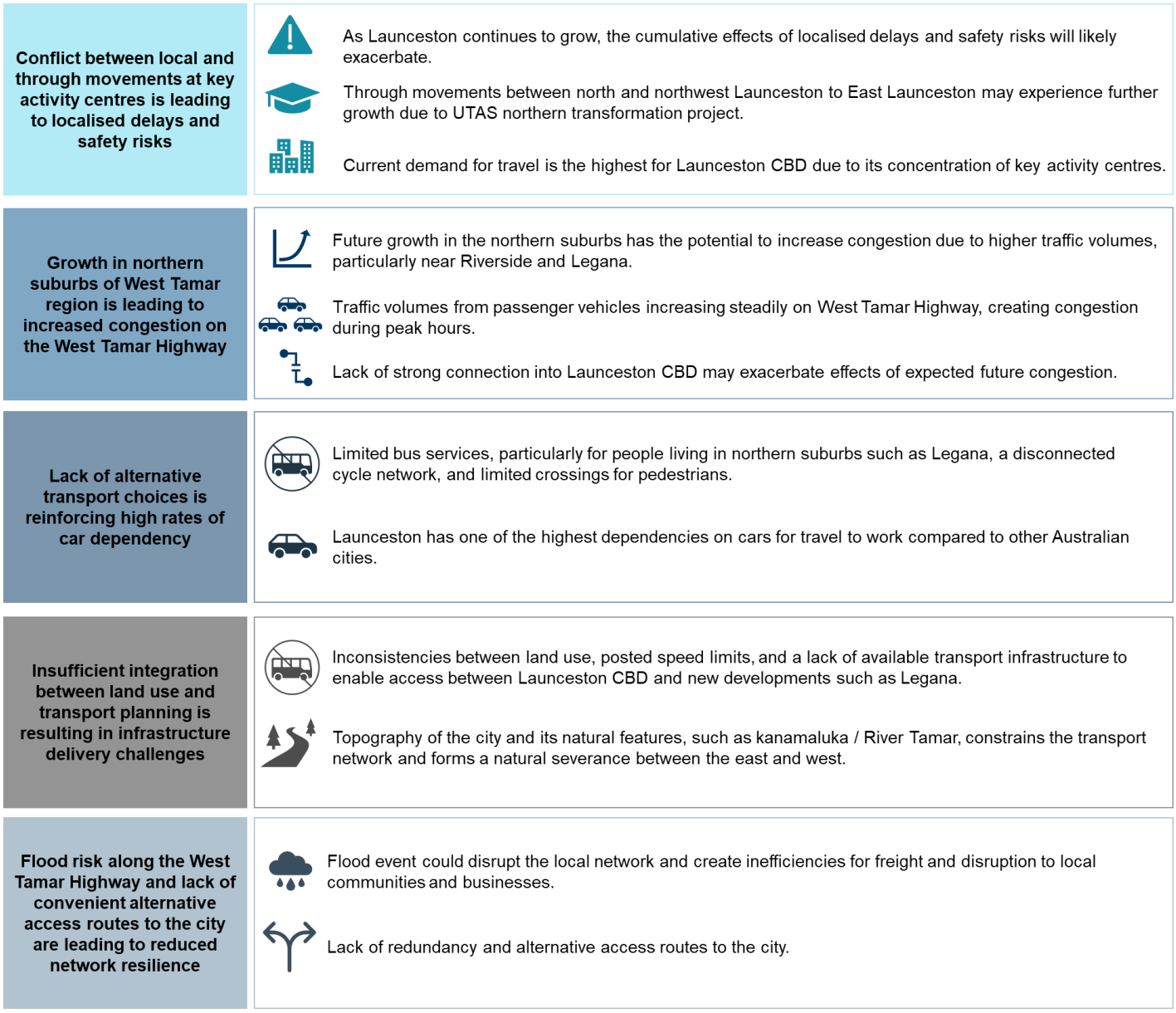


Figure 24 Problems summary

4 Key benefits

Through the investment logic mapping process, five benefits statements were defined, as outlined in Figure 25. Key performance indicators (KPIs) were also developed for each identified benefit to enable progress towards achieving the benefits to be measured.

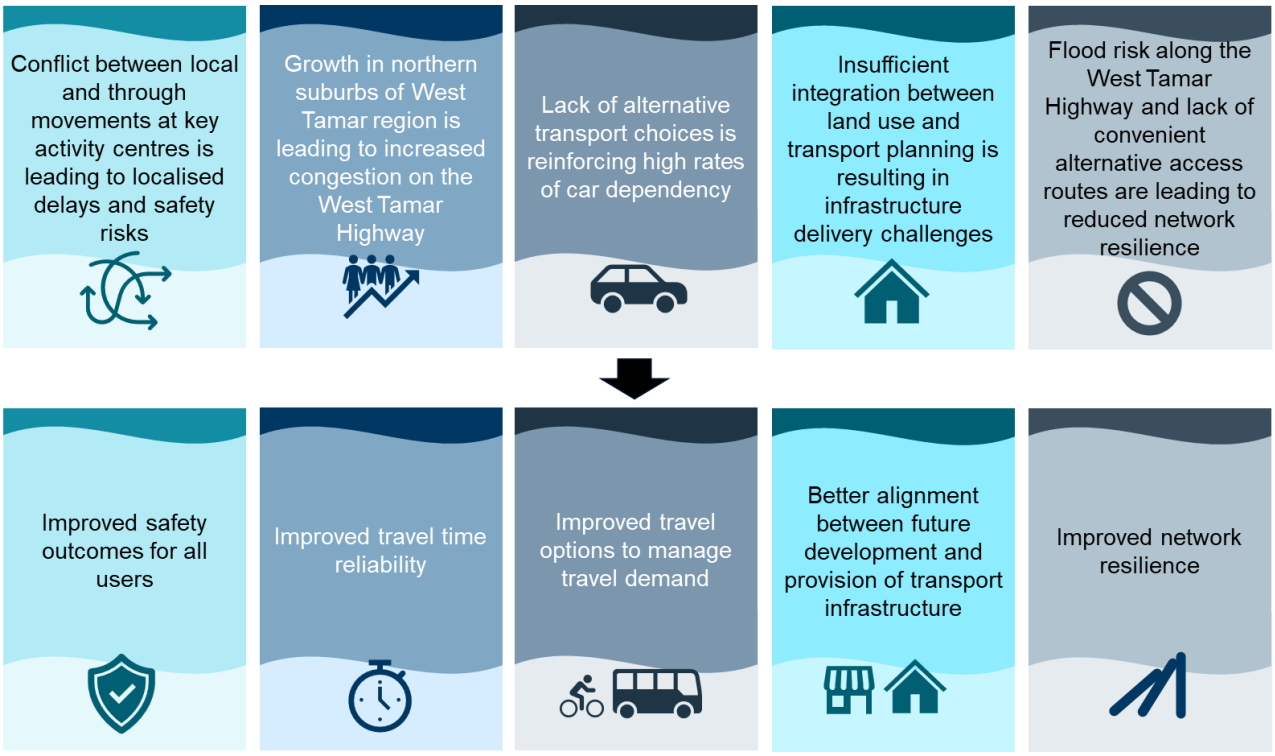


Figure 25 Benefit statements

4.1 Improved safety outcomes for all users

Reducing the number of fatalities and serious injuries on the road network is a priority for all levels of government. There are several strategic catalysts driving this prioritisation of road safety. One of the biggest influences is the *Towards Zero – Tasmania Road Safety Strategy 2017 – 2026*, which is the long-term vision of a Tasmania where no one is seriously injured or killed from a road accident.

The strategy is based on adopting a Safe System approach, which acknowledges that the road system must be designed to protect people when human error inevitably occurs. Safe road user behaviour, safe roads and roadsides, safe speeds, and safe vehicles all play a significant role when improving road safety.

Providing safe, convenient, and accessible transport for residents, businesses and visitors to Launceston not only reduces fatalities and serious injuries, but also contributes to the quality of life, liveability and economic prosperity of the city and surrounding region. Improving the actual and perceived safety of the road network, including for people walking and riding, provides greater choice and reduces stress for those traveling.

The following KPI has been identified to best measure progress of this benefit:

- Reduce the frequency of fatal and serious injuries.

4.2 Improved travel time reliability

East Tamar Highway (part of the National Land Transport Network) and West Tamar Highway are key routes in Launceston that support the local economy. These highways not only provide important freight connections, but also enable the growing population to have access to employment and education opportunities, and health, retail, leisure and other services.

Increased congestion and the cumulative effect of localised delays are contributing to reducing travel time reliability, particularly on the West Tamar Highway and through Launceston CBD. Improving connectivity could potentially reduce travel time variability between the East Tamar Highway and West Tamar Highway, together with providing improved levels of access to employment, services and facilities.

The following KPI has been identified to best measure progress of this benefit:

- Reduce the peak period travel time variability for motorists through the CBD, on the West Tamar Highway and on the East Tamar Highway.

4.3 Improved travel options to manage travel demand

'Improved travel options' is an objective from the 2020 *Greater Launceston Transport Vision*, with a particular emphasis on increasing opportunities and facilities for active transport such as walking and bicycle riding.

Improving travel options creates the opportunity to reduce the reliance on private vehicles, meaning less congestion and a reduction in emissions. This provides greater opportunities and benefits for people, reducing social inequalities and increasing access to jobs, services and education. This can be achieved through the following:

- Reducing the barriers to the uptake of active transport modes.
- Improving the relative attractiveness of non-single occupancy car travel.

The following KPI has been identified to best measure progress of this benefit:

- Increase proportion of users traveling by active modes and public transport for journey to work trips.

4.4 Better alignment between future development and provision of transport infrastructure

Improved integration between land use planning and transport infrastructure has an important role to play in facilitating improved liveability and delivering improved social and environmental outcomes. Enabling better connections for emerging growth areas such as Legana and Riverside, will help improve accessibility to key amenities and improve liveability for residents of subdivisions adjacent to the West Tamar Highway. In particular, reducing the length of routes that people need to travel to access key destinations, such as workplaces and places of education, is an important factor in improving achieving these outcomes.

It is acknowledged that while outside of the scope for the Project, government policy and other city-wide interventions are likely to be most effective in enabling improvement in alignment between transport and development going forward. However, the relevant KPI for the Project has been framed based on what

can be influenced within the scope of the Project, whilst still contributing to this benefit. The KPI for measuring this benefit is:

- Improved levels of access to key destinations through reduced trip length.

4.5 Improved network resilience

Improving network resilience creates the opportunity to mitigate network disruption caused by unplanned closures from floods, traffic incidents or other events. This is an important factor in retaining access to key destinations for users of the transport network and improving economic outcomes.

The KPI for measuring this benefit is:

- Reduced network disruption due to unplanned closures from flood or other events.

5 Responses

Based on the benefits identified in the investment logic map, strategic responses were identified. These responses highlight the opportunities of addressing the problems through a range of different potential investments, to achieve the benefits sought.

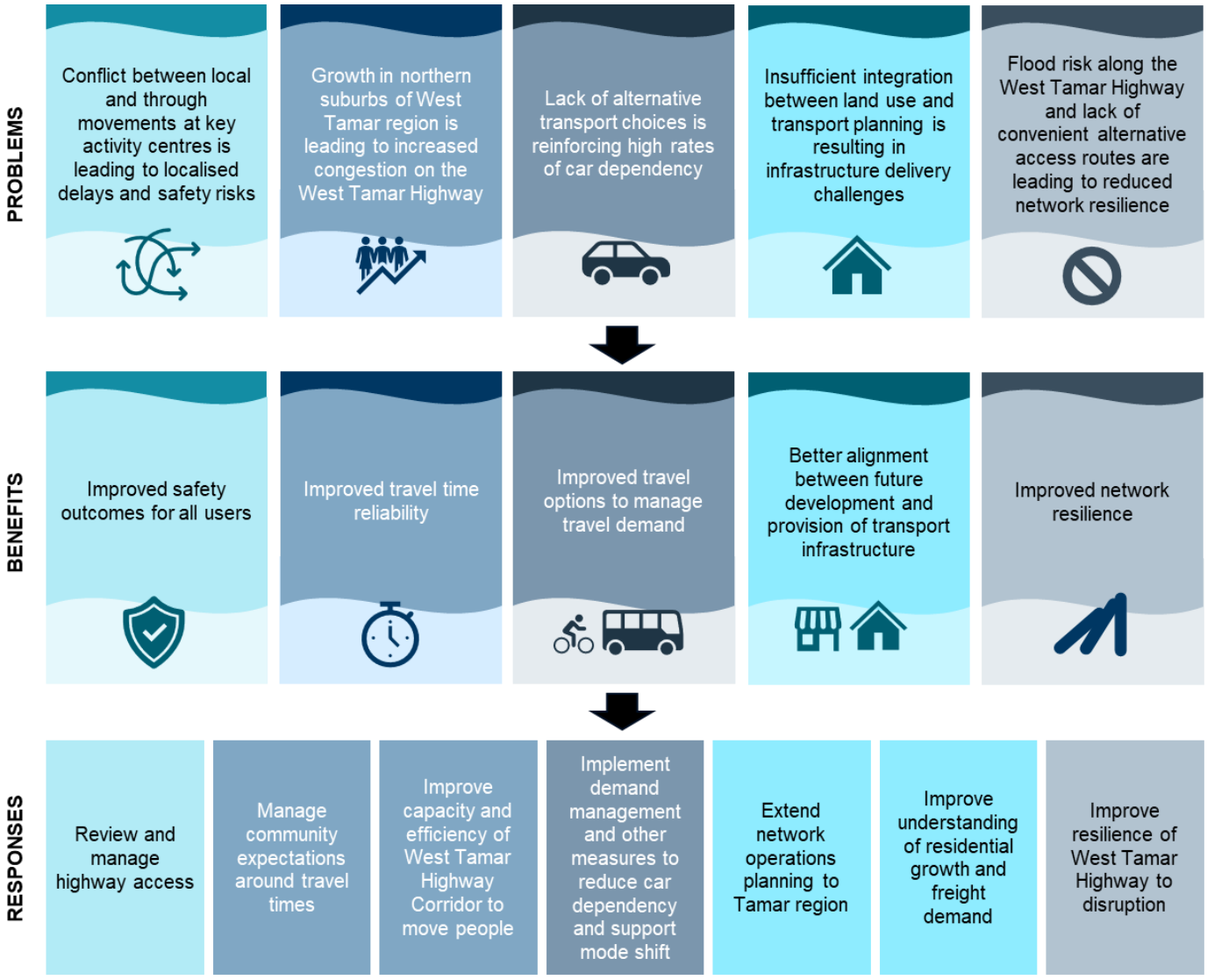


Figure 26 Identified responses

6 Options development

Building on the responses, this section describes the process applied to develop these responses into response options for consideration and assessment, followed by the identification of project options.

6.1 Methodology

Figure 27 shows the process used for option development and assessment throughout the Project. This shows that building on the problem statements, benefit statements and potential responses outlined in the preceding sections, responses were expanded upon to form response options. These response options were then assessed and packaged, before further assessment, resulting in the identification of project options for further assessment.

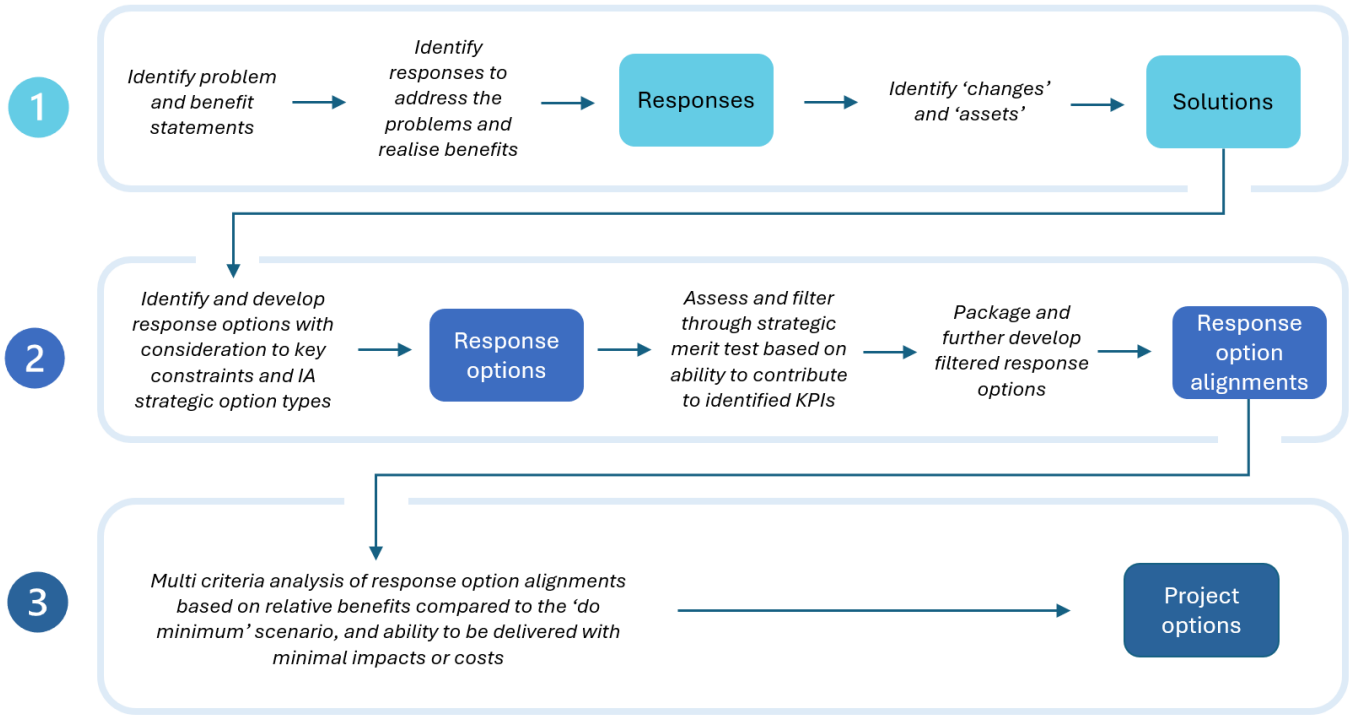


Figure 27 Options development methodology

Section 7 outlines stage 2 of the diagram above. Stage 3 is then outlined in Section 8.

7 Response options

Response options were developed with consideration given to a range of response option types. Table 8 details the types of response options to be considered, outlined by Infrastructure Australia. This shows that options should represent a range of reasonable alternatives, with capital investment being one of those options. Both capital and non-capital response options should be considered, along with both demand-side and supply-side response options.

Table 8 Infrastructure Australia types of response options to be considered[34]

Regulatory Reform	'Better Use' Reform	Governance Reform
– Regulatory or access regimes – Market structures and frameworks – Safety – Environment – Standards – Licensing	– Active management systems – Intelligent transport systems – Smart metering – Pricing and demand management	– Administrative and institutional frameworks – Project appraisal and selection processes – Public service delivery – Approval processes – Contractual provisions – Funding agreements
Capital Investment	**Service Reform**	**Land Use Reform**
– Expansion of existing infrastructure – New infrastructure – Programs of projects from across a network	– Service delivery / quality reform – Asset and modal integration – Comfort and amenity programs – Information and open data	– Planning or land use controls – Strategic regional planning – Integrated decision-making

7.1 Key constraints

Development of the response options required consideration of the key constraints and considerations in the Project area, including those outlined in Figure 28.

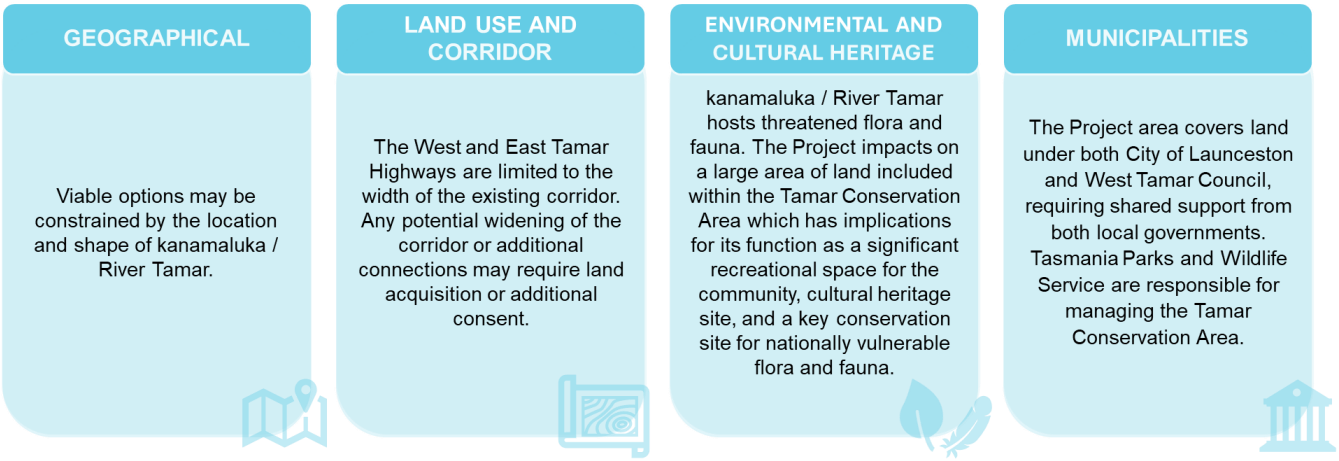


Figure 28 Key constraints and considerations

[34] Identifying and analysing options, Infrastructure Australia, 2021

7.2 Base case (‘do minimum’)

The base case of this project refers to the 'do minimum' scenario, in which only required maintenance, and committed and funded expenditure projects are undertaken to maintain the status quo.

The committed and funded expenditure projects are limited to what was included in the development of the Launceston Hybrid Traffic Model (originally built in 2017), which are the following:

- Mowbray Link / East Tamar Highway interchange upgrade.
- Forster Street upgrades, intersection upgrades and extra lane.
- Goderich Street / Gleadow Street signalisation.
- Lindsay Street / Goderich Street right turn ban.
- Montague Street / Gleadow Street connection.

7.3 Response options

Response options were developed based on the responses outlined in Section 5, with consideration given to different response option types (including both infrastructure and non-infrastructure based options) and the key constraints.

Table 9 outlines the resulting response options, along with the corresponding Infrastructure Australia response option type. These response options were then used as the basis for assessment and further development, as outlined in the following sections.

Table 9 Response options

	Response option	Infrastructure Australia strategic option type
1	Identify and mitigate / remove roadside hazards	Capital Investment
2	Implement variable speed limits	‘Better Use’ Reform
3	Review existing speed limits	Regulatory Reform
4	Introduce parking management schemes	‘Better Use’ Reform
5	Restrict on-street parking	‘Better Use’ Reform
6	Build a park 'n' ride facility	Capital Investment
7	Reduce bus prices	‘Better Use’ Reform
8	Provide express bus services	‘Better Use’ Reform
9	Improve bus frequencies	‘Better Use’ Reform
10	Undertake integrated land use and active transport catchment planning for activity centres	Regulatory Reform
11	Investigate freight movements and develop freight strategy for Launceston	Regulatory Reform
12	Traffic management plans in the event of unplanned closure	Regulatory Reform
13	Improve traffic signal timing and coordination	‘Better Use’ Reform
14	Signalise key intersections	Capital Investment
15	Increase corridor capacity	Capital Investment
16	Build new vehicle connection between West Tamar Highway and East Tamar Highway	Capital Investment

	Response option	Infrastructure Australia strategic option type
17	Build new public transport connection between West Tamar Highway and East Tamar Highway	Capital Investment
18	Build new active transport connection between West Tamar Highway and East Tamar Highway	Capital Investment
19	Improve bus priority	'Better Use' Reform
20	Improve bus stop infrastructure	Capital Investment
21	Implement multiple occupancy vehicle lanes	'Better Use' Reform
22	Improve connections to off-corridor active transport facilities	Capital Investment
23	Introduce on-road cycle facilities	Capital Investment
24	Signalise pedestrian crossings	Capital Investment
25	Relocate freight hubs	Capital Investment
26	Build a Launceston bypass road	Capital Investment

7.4 Strategic merit test

A Strategic Merit Test (SMT) was undertaken to filter the response options, based on performance against the identified benefits and KPIs for the Project. The intent of the filtering process was to identify a list of options that have the potential to contribute to all identified benefits. This approach focusses on the desired end state, considering a long-term timeframe. However, it does not prohibit the consideration and implementation of a staged approach that may include complementary options to further enhance project outcomes.

As a first step to this process, response options already being progressed as part of other packages (parallel options) were filtered out, to avoid duplication. While not included in the base case, it is expected that response options being progressed as part of the *West Tamar Highway Corridor Improvement Plan* will provide additional benefits to safety, traffic flow and catering for growth along the corridor. Therefore, these expected benefits will need to be quantified for inclusion in future stages of the Project. The response options identified as already being progressed through other related projects and packages include:

- Implement variable speed limits (through the *West Tamar Highway Corridor Improvement Plan*).
- Review existing speed limits (through the *West Tamar Highway Corridor Improvement Plan*).
- Provide express bus services ('undertake route review for Legana' through the *West Tamar Highway Corridor Improvement Plan*).
- Improve traffic signal timing and coordination (through the *West Tamar Highway Corridor Improvement Plan*).
- Signalise key intersections (through the *West Tamar Highway Corridor Improvement Plan*).
- Increase corridor capacity (through the *West Tamar Highway Corridor Improvement Plan*).
- Improve bus stop infrastructure (through the *West Tamar Highway Corridor Improvement Plan*).
- Improve connections to off-corridor active transport facilities (through the *West Tamar Trails Strategy* and *West Tamar Highway Corridor Improvement Plan*).

- Introduce on-road cycle facilities (through the *West Tamar Trails Strategy* and *West Tamar Highway Corridor Improvement Plan*).
- Signalise pedestrian crossings (through the *West Tamar Highway Corridor Improvement Plan*).
- Build a Launceston bypass road (through the *Eastern Bypass Feasibility Study*).

The parallel response options listed above are expected to complement the Project, helping to address the identified problems and enhance the proposed benefits. The parallel response options are not included in the base case ('do minimum') for the Project and, as such, have not been assessed through this business case. The parallel response options and the implications for the Project will be considered as the Project progresses to further enable a robust investment decision.

After the parallel response options were filtered out, the remaining response options were assessed against the KPIs relevant to each identified benefit, as outlined in the investment logic map. The intent of this qualitative assessment was to identify response options that directly contribute to one or more of the identified benefits (package response options), and those that indirectly contribute to the benefits (complementary response options).

Following the initial assessment it was found that no single response option directly contributed to all of the KPIs. The next stage was to package options that directly contribute to the related problem causes, to identify potential combinations of response options that directly contribute to all identified benefits and KPIs for the Project.

Other response options that indirectly contribute to KPIs through alleviating the related problem effects were categorised as complementary response options. These complementary response options were identified for potential inclusion in packages to enhance Project outcomes. Based on the SMT, the following response options were identified as being suitable for packaging, as they directly contribute to one or more KPIs:

- Build a park 'n' ride facility.
- Reduce bus prices.
- Build new vehicle connection between West Tamar Highway and East Tamar Highway.
- Build new public transport connection between West Tamar Highway and East Tamar Highway.
- Build new active transport connection between West Tamar Highway and East Tamar Highway.
- Improve bus priority.
- Implement multiple occupancy vehicle lanes.

Based on the SMT, a package of response options was developed to directly contribute to each of the KPIs. As such, a 'multi-modal river crossing' was identified, by packaging together the three response options of:

- Build new vehicle connection between West Tamar Highway and East Tamar Highway.
- Build new public transport connection between West Tamar Highway and East Tamar Highway.
- Build new active transport connection between West Tamar Highway and East Tamar Highway.

Following the packaging assessment, a multi-modal river crossing was progressed for further investigation. This included the development and assessment of a range of locations for a new multi-modal river crossing as summarised in Section 8 of this report.

The following response options were identified as being complementary (or suitable for packaging but not packaged) to a new multi-modal river crossing (potential enhancements for consideration later in the project, subject to further investigation):

- Build a park 'n' ride facility.
- Reduce bus prices.
- Improve bus priority.
- Implement multiple occupancy vehicle lanes.
- Identify and mitigate / remove roadside hazards.
- Introduce parking management schemes.
- Restrict on-street parking.
- Undertake integrated land use and active transport catchment planning for activity centres.
- Investigate freight movements and develop freight strategy for Launceston.
- Traffic management plans in the event of unplanned closure.
- Relocate freight hubs.
- Based on the SMT, several combinations of the options identified for packaging could be packaged together to collectively contribute to all KPIs.

8 Project options

8.1 Response option alignments

8.1.1 Identification

State Growth identified the response option of a multi-modal river crossing for further investigation. Based on this, three response option alignments were identified and developed. These response options alignments vary based on the location of the proposed multi-modal river crossing, ranging from nearby the CBD, to further north nearby the suburb of North Riverside.

Figure 29 illustrates the indicative locations of the response option alignments.

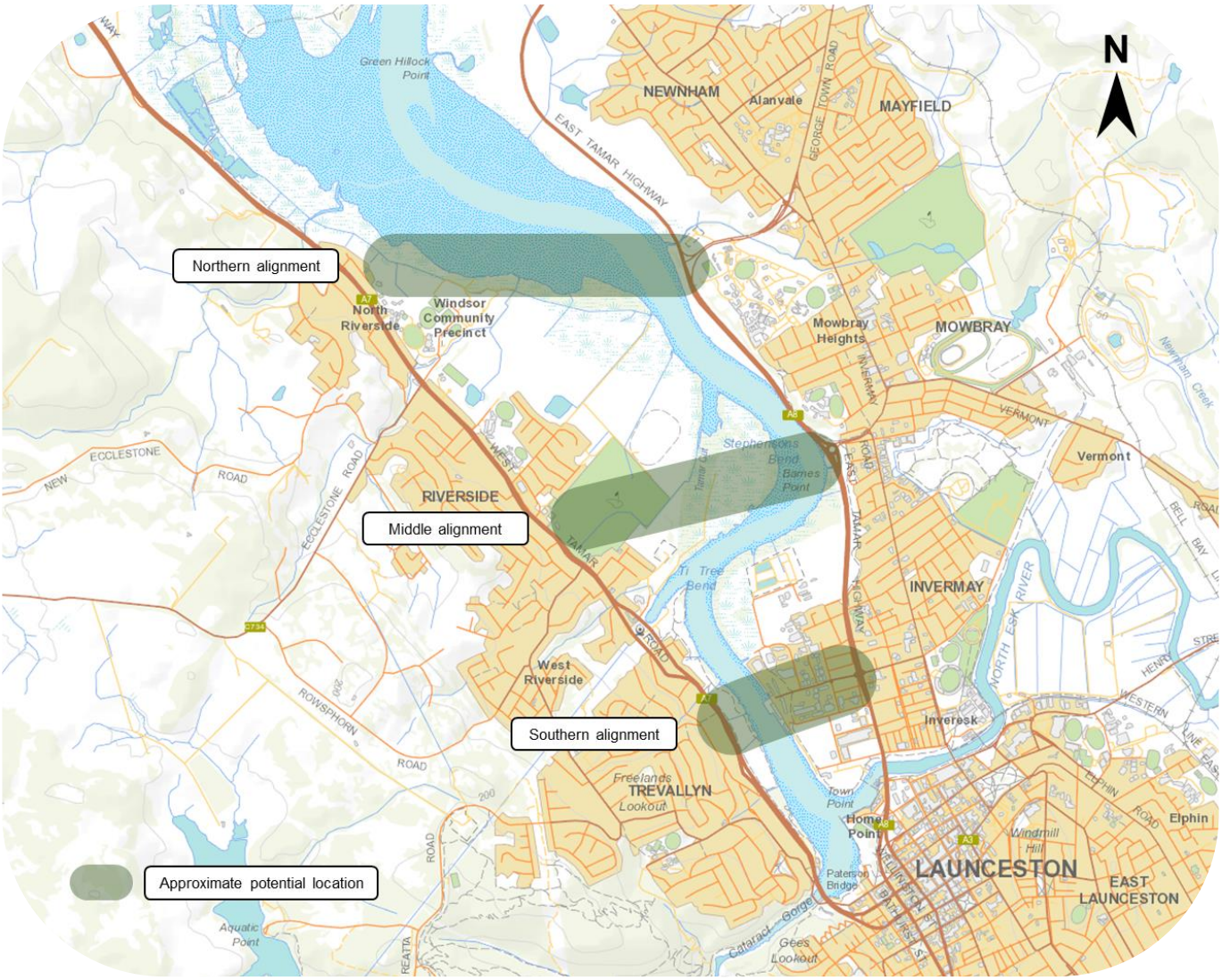


Figure 29 Response option alignments

8.1.2 Multi-criteria analysis

The response option alignments were assessed using multi-criteria analysis (MCA), based on the relative benefits of each alignment compared to the do minimum, and their ability to be delivered with minimal impacts and costs. The MCA framework for assessment was developed using the benefits identified in the investment logic map, to provide a clear line of sight between the assessment of alignments and the benefits sought, along with deliverability considerations.

Deliverability criteria enabled assessment of the response option alignments based on indicative cost and construction impacts. The top performing response option alignments based on the MCA assessment were the Northern Alignment and Middle Alignment options. Both options scored similarly, with the Northern Alignment scoring slightly higher for 'Improved travel options to manage travel demand'.

The Southern Alignment was identified as having prohibitive impacts under the deliverability category, due to not achieving the clearance requirements for the navigation span. If it was lengthened to meet the design requirements, this would affect more roads and properties, resulting in land impacts deemed to be prohibitive. As a result, this response option alignment was not carried forward for further assessment.

As a result of this assessment, the Northern Alignment and Middle Alignment options were carried forward for further investigation and assessment. Project options were then identified based on the Northern and Middle alignment options, considering high-level combinations of the alignments and varying signal and ramp connections. These resulting project options are outlined in the following section.

8.2 Project option identification

The following five project options were identified for further investigation. The resulting project options for further assessment are as follows.

- **Orange option:** Crossing between North Riverside and Newnham. This option is connected to East Tamar Highway between University Way and George Town Road, and West Tamar Highway between Cormiston Road / Walcorm Court and Danbury Drive (south) via grade separated trumpet interchanges.
- **Purple option:** Crossing between North Riverside and Newnham. This option is connected to East Tamar Highway between University Way and George Town Road via a grade separated interchange, and to the West Tamar Highway at Windsor Drive via a signalised intersection.
- **Pink option:** Crossing between Riverside and Invermay. This option is connected to East Tamar Highway between Forster Street and Mowbray Link, and West Tamar Highway between Pomona Road and Eden Street via grade separated trumpet interchanges.
- **Blue option:** Crossing between Riverside and Invermay. This option is connected to East Tamar Highway between Forster Street and Mowbray Link, and West Tamar Highway at Pomona Road via signalised intersections.
- **Yellow option:** Crossing between Riverside and Invermay. This option is connected to East Tamar Highway between Forster Street and Mowbray Link via a grade separated interchange, and to the West Tamar Highway at Pomona Road via a signalised intersection.

Table 10 summarises the project options.

Table 10 Project options summary

Option	Alignment	West Tamar Highway connection	East Tamar Highway connection
ORANGE OPTION	North Riverside to Newnham	 Grade separated interchange, between Cormiston Road / Walcorm Court and Danbury Drive (south)	 Grade separated interchange, between University Way and George Town Road
PURPLE OPTION	North Riverside to Newnham	 Signalised intersection, at Windsor Drive	 Grade separated interchange, between University Way and George Town Road
PINK OPTION	Riverside to Invermay	 Grade separated interchange, between Pomona Road and Eden Street	 Grade separated interchange, between Forster Street and Mowbray Link
BLUE OPTION	Riverside to Invermay	 Signalised intersection, at Pomona Road	 Signalised intersection, between Forster Street and Mowbray Link
YELLOW OPTION	Riverside to Invermay	 Signalised intersection, at Pomona Road	 Grade separated interchange, between Forster Street and Mowbray Link

Figure 30 shows the indicative locations and configurations of the five project options.

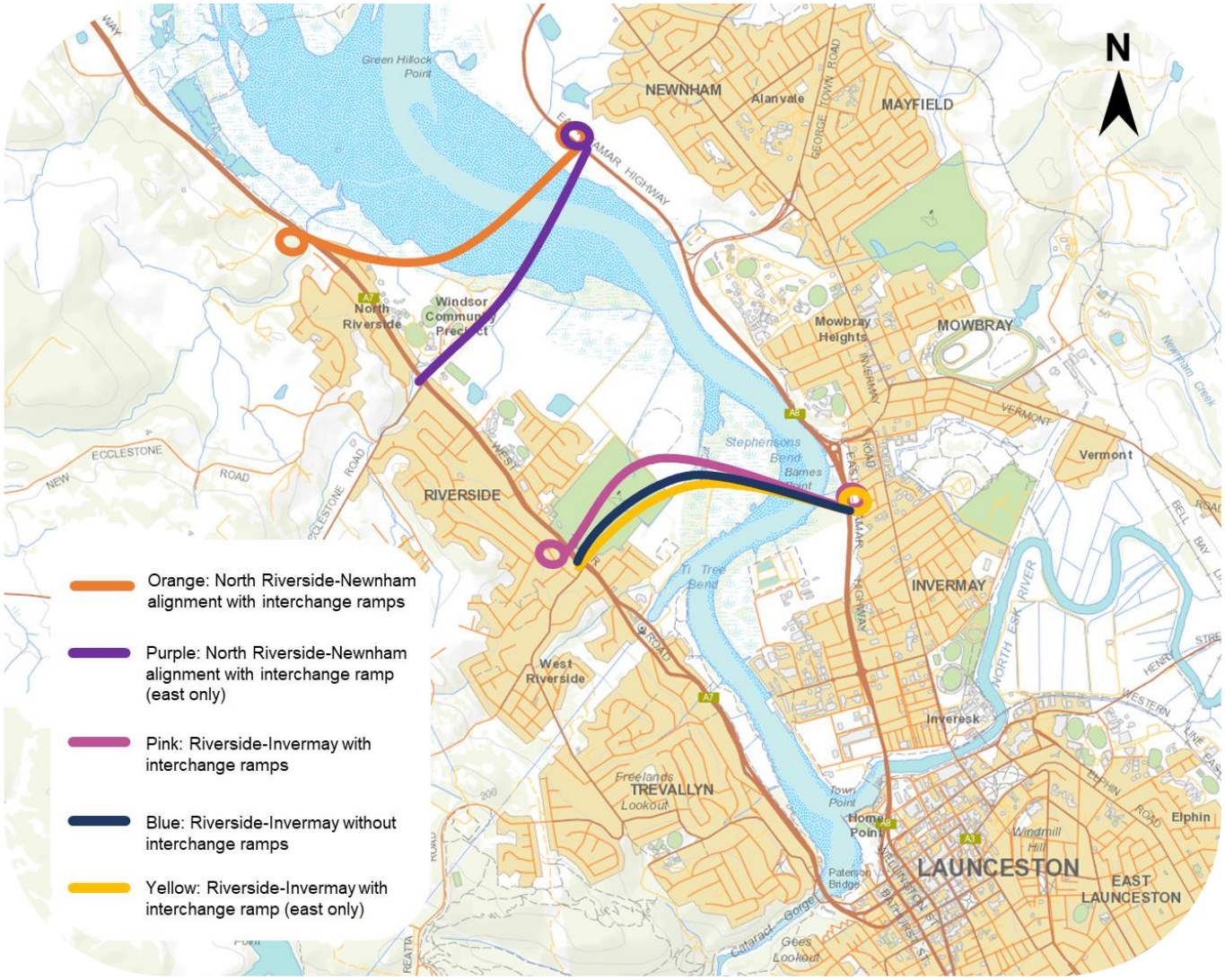


Figure 30 Option alignments

9 Design development

Initial concepts for the project options were developed to facilitate a better understanding of design specifications, planning, environmental and social constraints, and impacts to properties. Based on this, the indicative typical cross sections of the project options are shown in Figure 31 and Figure 32. These cross sections show two traffic lanes in each direction, along with a 3.5m shared path on southern side of bridge

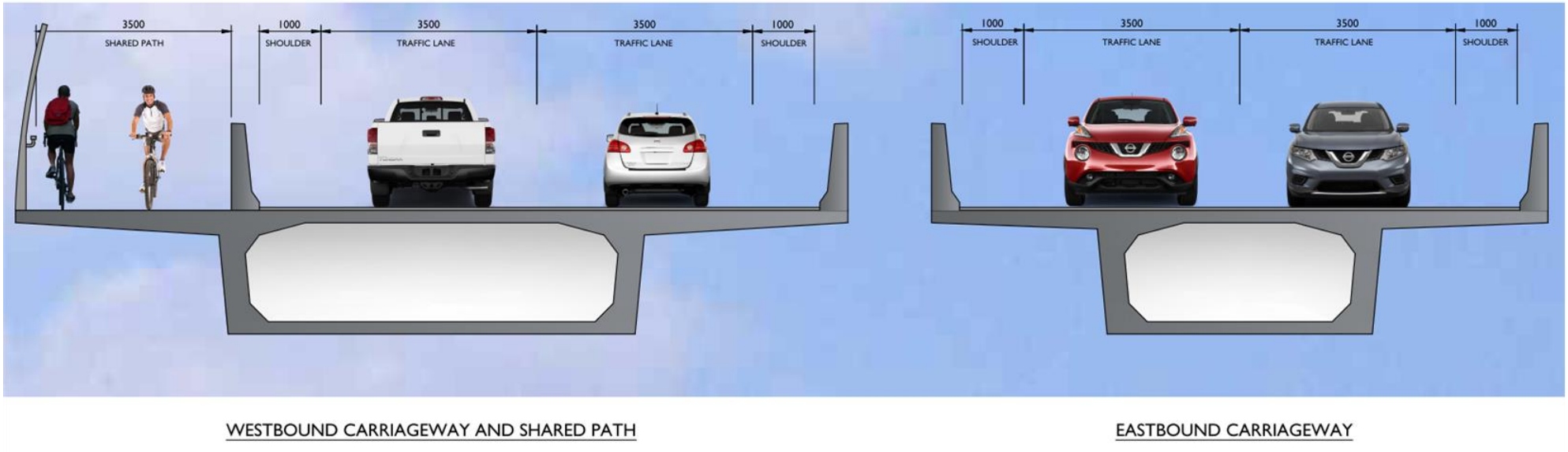


Figure 31 Typical cross section through main span

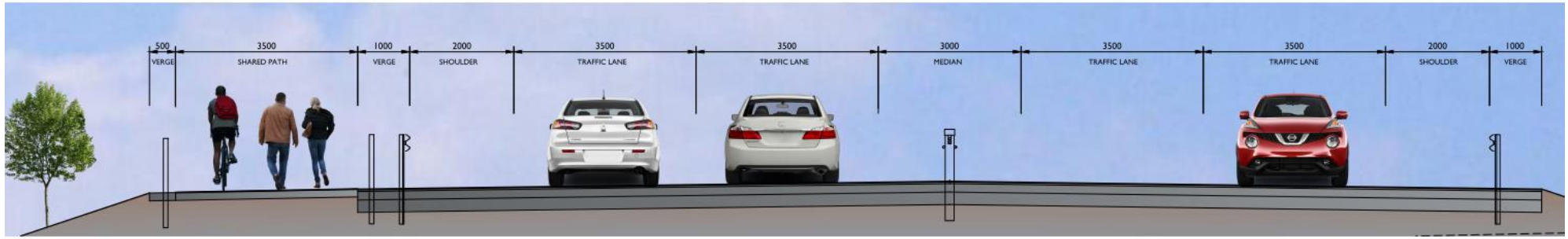


Figure 32 Typical cross section - link road (embankment)

Figure 33 shows the indicative bridge profile, including the elevation. As outlined, the bridge height is 22 metres to enable vessels that currently use kanamaluka / River Tamar to maintain a safe passage under the bridge.

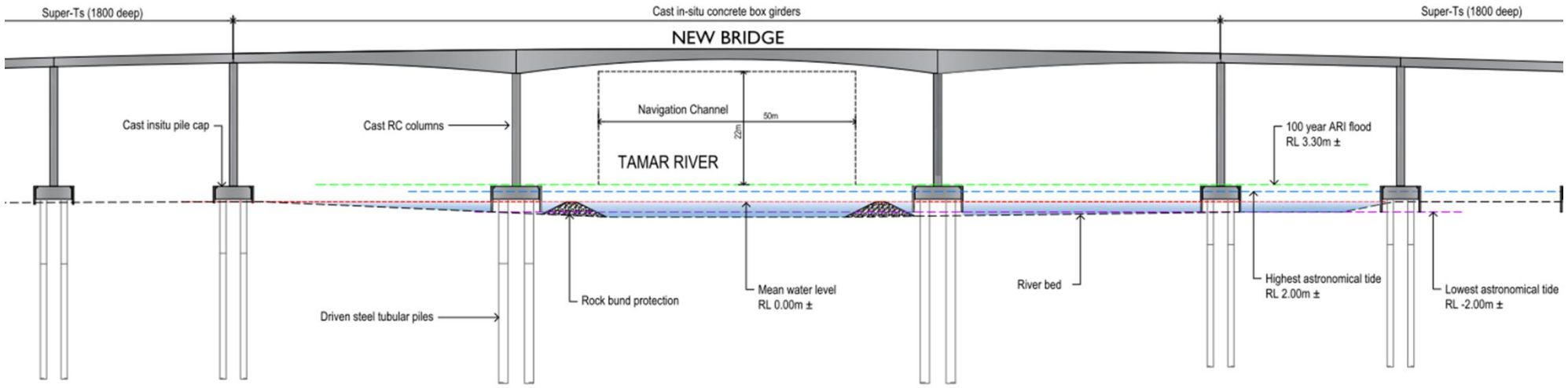


Figure 33 Bridge elevation

A summary of the design development considerations specific to each project option are outlined in Table 11.

Table 11 Project option design development considerations

Project option	Total length (including bridge and embankments)	Bridge length	Connection to West Tamar Highway	Connection to East Tamar Highway	Property acquisition costs and social impact	Other considerations
Orange option	2990 m	1550 m	Interchange ramps	Interchange ramps	Minimal	Road embankment extends through the flood plain on the western side of the river to minimise property impacts.
Purple option	2080 m	1040 m	Signalised intersection	Interchange ramps	Minimal	Additional intersection required for access into the Windsor Community Precinct.
Pink option	2360 m	1140 m	Interchange ramps	Interchange ramps	Significant, largely associated with West Tamar Highway grade separated interchange.	
Blue option	2140 m	1000 m	Signalised intersection	Signalised intersection	High, largely associated with West Tamar Highway intersection.	If this option proceeds, there may be an opportunity in the detailed design stage to upgrade the intersections to allow for more efficiency.
Yellow option	2140 m	1040 m	Signalised intersection	Interchange ramps	High, largely associated with West Tamar Highway intersection.	

10 Traffic modelling

Traffic modelling was undertaken to evaluate the performance of the base case and five project options. This section documents the methodology and model used, and summarises the network statistics, traffic redistribution impacts, and corridor travel times under each project option.

10.1 Methodology

The Launceston Hybrid Traffic Model (the model) was used in Aimsun Version 8.2.1 to assess the comparative performance of the transport network with the project options, in comparison with the network without a new crossing (base case). The models were reviewed under the two-hour peak periods in the morning (7:30 am to 9:30 am) and afternoon (4:00 pm to 6:00 pm), under 2019 and 2033 demand conditions.

The base case of the model used includes currency updates from the calibrated model including 2033 signal updates to reflect likely required operational changes and the following committed and funded projects.

- Mowbray Link / East Tamar Highway interchange upgrade.
- Forster Street upgrades, intersection upgrades and extra lane.
- Goderich Street / Gleadow Street signalisation.
- Lindsay Street / Goderich Street right turn ban.
- Montague Street / Gleadow Street connection.

These updates were common to all models used for the comparative assessment of the base and project options.

10.2 Results

Network statistics, including Vehicle Kilometres Travelled (VKT) and Vehicle Hours Travelled (VHT) were reviewed for each of the project options. Figure 34 and Figure 35 show the results of the modelling, which suggest that in general VKT and VHT are reduced due to a new crossing, indicating shorter routes with travel time improvements could occur due to the project options.

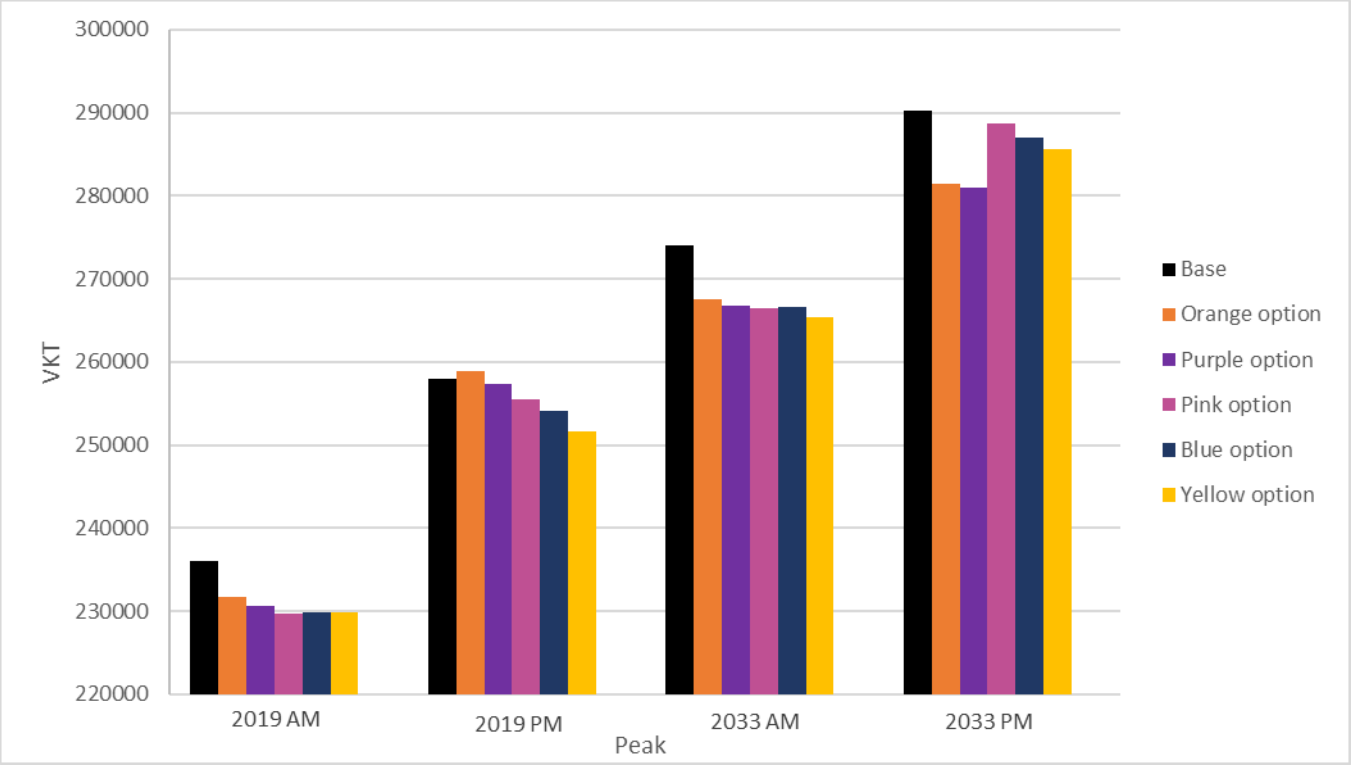


Figure 34 Peak 2019 and 2033 VKT for each project option

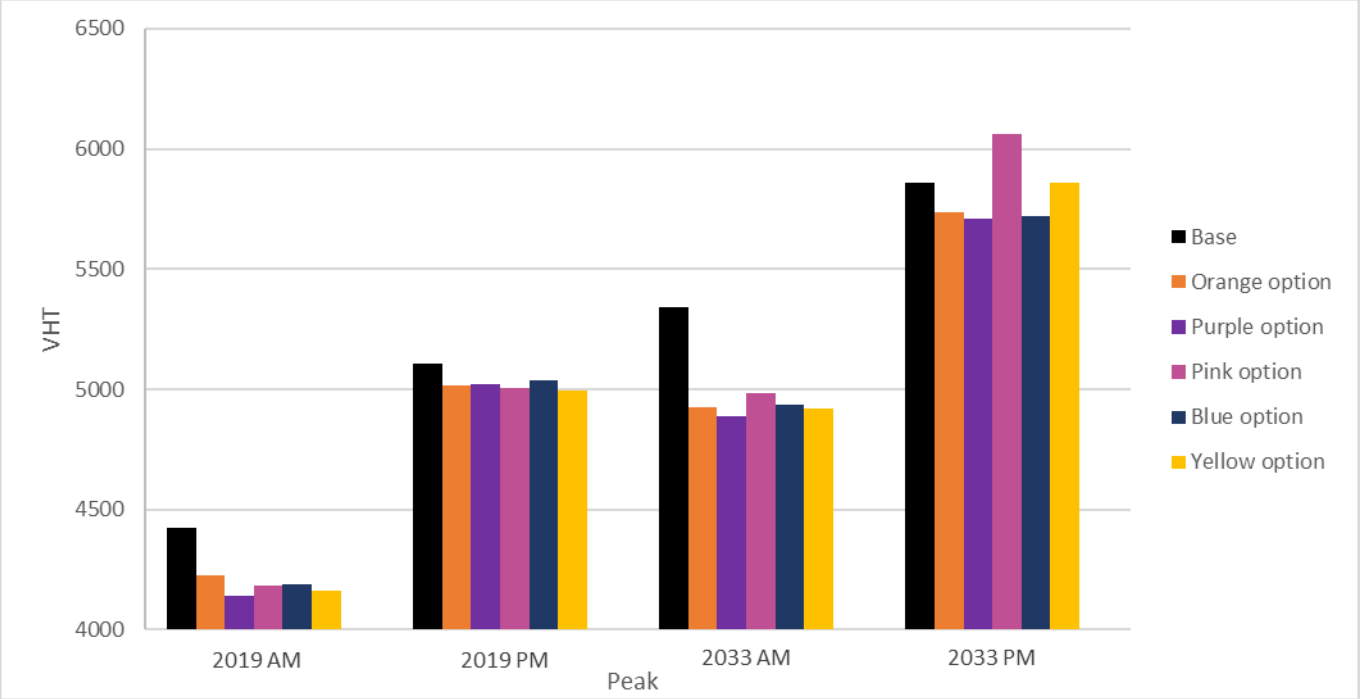


Figure 35 Peak 2019 and 2033 VHT for each option

The network speeds determined from the VKT and VHT were slightly higher for all five project options than the base in the 2019 and 2033 am, indicating a reduction in network delay with the introduction of the crossing.

The location of the project options and design of the interchanges influence route choice. The modelled project options shift demand from existing routes onto the crossing, as outlined in Table 12.

Table 12 Summary of peak period volumes on the crossing

Project option	2019				2033			
	Eastbound		Westbound		Eastbound		Westbound	
	AM	PM	AM	PM	AM	PM	AM	PM
Orange option	945	474	762	1,552	1,101	643	869	1,420
Purple option	873	480	824	1,511	973	647	920	1,486
Pink option	1,339	913	1,034	1,793	1,418	1,002	1,074	1,912
Blue option	1,324	967	1,078	2,053	1,414	1,155	1,126	2,141
Yellow option	1,314	942	1,087	1,862	1,499	969	1,182	1,924

The Austroads Guide to Temporary Traffic Management suggests that the operational capacity of a single traffic lane is ~1800 passenger cars per hour, however this is affected by factors including pavement width, restricted lateral clearances, grades and the presence of heavy vehicles. In practice this generally means the operational capacity is less than 1800 vehicles per hour due to heavy vehicles in the traffic stream and further reductions due to the other factors listed.

With reference to the observed usage of the crossing in the model, the highest demand was attracted in the westbound direction in the PM peak which likely exceeds operational capacity of a single lane. Dependent on the factors and detailed design conditions the eastbound direction may also require two lanes to be within operational capacity. The current design allows for two lanes in each direction.

Based on the peak period modelling results, projected AADT may be obtained by applying a peak period factor of 2.5, as shown in Table 13. This suggests that the Riverside-Invermay alignment project options (Pink, Blue and Yellow) result in higher crossing volumes than the North Riverside-Newnham alignment project options (Orange and Purple), with the Blue option expected to result in the highest crossing volumes overall.

Table 13 Summary of projected AADT on the crossing

Project option	2019	2033
Orange option	9,333	10,083
Purple option	9,220	10,065
Pink option	12,698	13,515
Blue option	13,555	14,590
Yellow option	13,013	13,935

Results of the modelling suggest that the project options generally reduce trips on the West Tamar Highway and on the Bathurst Street / Wellington Street couplet, with some increased travel demand on the East Tamar Highway expected as a result, causing minimal changes in average speed across the network.

To accommodate the additional traffic, the section of the East Tamar Highway on approach to and south of Mowbray Link may need to be upgraded or the configuration reviewed to accommodate increased demand. This could be further investigated in subsequent project phases, to maximise network efficiency and align with broader strategic network changes.

Reduced traffic on the West Tamar Highway and Bathurst / Wellington couplet could create opportunities for the reallocation of road space or placemaking.

Generally, travel times were observed to be relatively consistent across the options reviewed. The project options generally resulted in slightly higher travel times on the East Tamar Highway, with the exception of the Pink option to a large extent and the Yellow option to a smaller extent.

The project options with free flow connections generally resulted in lower travel times on the West Tamar Highway compared with the base. For the project options with signalised connections, travel times on the West Tamar Highway were primarily lower than the base in the am peak, with the exception of the Purple option under 2019 demand, and higher in the pm peak.

A summary of the general directional volume trends in the peak hours review of the project options compared with the base is provided in Table 14. It is noted that as these are general trends only and display the maximum change that was observed in the reviewed sections, they may not be applicable to all time periods, locations and demand conditions assessed. In particular, changes in volumes on the East Tamar Highway were observed to vary significantly along the corridor, and this summary provides detail of changes at specific locations only.

Table 14 Summary of directional trip number trends in project options compared with the base

Project option	Peak hour	East Tamar Highway trips	West Tamar Highway trips	Bathurst Street / Wellington Street couplet trips
Orange option	2019 AM	Increase (up to ~15% directly north of Mowbray Link)	Decrease (up to ~45% south of the crossing)	Decrease (up to ~15%)
	2019 PM	Increase (up to ~55% directly north of Mowbray Link)	Decrease (up to ~35% south of the crossing)	Similar (less than ±3%)
	2033 AM	Increase (up to ~5% directly north of Mowbray Link)	Decrease (up to ~45% south of the crossing)	Decrease (up to ~5%)
	2033 PM	Increase (up to ~10% directly north of Mowbray Link)	Decrease (up to ~35% south of the crossing)	Decrease (up to ~10%)
Purple option	2019 AM	Increase (up to ~15% directly north of Mowbray Link)	Decrease (up to ~45% south of the crossing)	Decrease (up to ~15%)
	2019 PM	Increase (up to ~45% directly north of Mowbray Link)	Decrease (up to ~40% south of the crossing)	Decrease (up to ~5%)
	2033 AM	Increase (up to ~10% directly north of Mowbray Link)	Decrease (up to ~45% south of the crossing)	Decrease (up to ~10%)
	2033 PM	Increase (up to ~30% directly north of Mowbray Link)	Decrease (up to ~30% south of the crossing)	Decrease (up to ~10%)
Pink option	2019 AM	Decrease (up to ~15% directly south of Lindsay Street)	Decrease (up to ~50% south of the crossing)	Decrease (up to ~20%)
	2019 PM	Increase (up to ~30% directly south of Lindsay Street)	Decrease (up to ~40% south of the crossing)	Decrease (up to ~15%)
	2033 AM	Decrease (up to ~25% directly south of Lindsay Street)	Decrease (up to ~55% south of the crossing)	Decrease (up to ~20%)
	2033 PM	Decrease (up to ~20% directly south of Lindsay Street)	Decrease (up to ~35% south of the crossing)	Decrease (up to ~15%)
Blue option	2019 AM	Decrease (up to ~20% directly south of Lindsay Street)	Decrease (up to ~50% south of the crossing)	Decrease (up to 20%)

Project option	Peak hour	East Tamar Highway trips	West Tamar Highway trips	Bathurst Street / Wellington Street couplet trips
	2019 PM	Decrease (up to ~30% directly south of Lindsay Street)	Decrease (up to ~50% south of the crossing)	Decrease (up to 25%)
	2033 AM	Decrease (up to ~30% directly south of Lindsay Street)	Decrease (up to ~55% south of the crossing)	Decrease (up to 20%)
	2033 PM	Decrease (up to ~20% directly south of Lindsay Street)	Decrease (up to ~50% south of the crossing)	Decrease (up to 20%)
Yellow option	2019 AM	Decrease (up to ~15% directly south of Lindsay Street)	Decrease (up to ~55% south of the crossing)	Decrease (up to ~20%)
	2019 PM	Increase (up to ~25% directly south of Lindsay Street)	Decrease (up to ~50% south of the crossing)	Decrease (up to ~20%)
	2033 AM	Decrease (up to ~15% directly south of Lindsay Street)	Decrease (up to ~45% south of the crossing)	Decrease (up to ~10%)
	2033 PM	Decrease (up to ~10% directly south of Lindsay Street)	Decrease (up to ~50% south of the crossing)	Decrease (up to ~15%)

A summary of the general overall network speed and travel time trends of the project options compared with the base is provided in Table 15. It is noted that as these are general trends only, they may not be applicable to all time periods and demand conditions assessed.

Table 15 Summary of general overall network speed and travel time trends in project options compared with the base

Project option	East Tamar Highway trips	West Tamar Highway trips	Bathurst / Wellington couplet	Average speed	East Tamar Highway travel times	West Tamar Highway travel times
Orange option	Increase	Decrease	Decrease	Similar	Increase	Decrease
Purple option	Increase	Decrease	Decrease	Similar	Increase	Increase
Pink option	Varies	Decrease	Decrease	Similar	Decrease	Decrease
Blue option	Varies	Decrease	Decrease	Similar	Increase	Varies
Yellow option	Increase	Decrease	Decrease	Similar	Varies	Varies

11 Transport planning considerations

A desktop qualitative analysis of the impacts of each project option on different modes of travel (private transport, public transport, and active transport) was undertaken. This section summarises the impact of each project option to users of different transport modes, based on factors such as bridge length, travel time reliability, and proximity to the Launceston CBD and other key amenities.

For each mode, the relative performance for each project option is summarised in comparison to the base case, as shown in Table 16.

Table 16 Option comparison key

Shading	Description
	Generally provides an overall improvement compared to the base case
	Generally provides similar impacts compared to the base case
	Generally provides negative impacts compared to the base case

11.1 Private transport and freight

Table 17 summarises the impacts of each project option to users of private transport and freight. Traffic and safety impacts are covered in Section 10 and Section 12.

Table 17 Impacts to users of private transport and freight

Project option	Access to amenity	Resilience
Orange option	Improves connectivity between areas to the east and west of kanamaluka / River Tamar. This includes between Windsor Park Community Precinct, Riverside High School and North Riverside residential areas in the west, UTAS Newnham Campus, and residential areas in the east. Reduces traffic through Launceston CBD.	Provides redundancy for east-west movements across kanamaluka / River Tamar, particularly in the event of a closure of the bridges traversing the South Esk River and North Esk River, or Batman Bridge. Reduces the distance of travel required in the event of a closure of the Batman Bridge, the re-routing distance being reduced by approximately 10 kilometres compared to re-routing through the CBD.
Purple option		As per Orange option. Reduces the distance of travel required in the event of a closure of the Batman Bridge, the re-routing distance being reduced by approximately 9 kilometres compared to re-routing through the CBD.

Project option	Access to amenity	Resilience
Pink option	Improves connectivity between Riverside residential areas in the west, and the residential and commercial areas in the east, such as the UTAS Inveresk Campus and UTAS Stadium. Reduces traffic through Launceston CBD.	As per Orange option. Reduces the distance of travel required in the event of a closure of the Batman Bridge, the re-routing distance being reduced by approximately 4 kilometres compared to re-routing through the CBD.
Blue option		As per Orange option. Reduces the distance of travel required in the event of a closure of the Batman Bridge, the re-routing distance being reduced by approximately 4 kilometres compared to re-routing through the CBD.
Yellow option		As per Orange option. Reduces the distance of travel required in the event of a closure of the Batman Bridge, the re-routing distance being reduced by approximately 4 kilometres compared to re-routing through the CBD.

11.2 Public transport

Table 18 summarises the impacts of each project option on public transport outcomes.

Table 18 Public transport outcomes by project option

Project option	Dispersed residential growth	Improved services
Orange option	The bridge alignment being further north may encourage more dispersed residential growth away from the CBD and other activity centres. This would likely make it more difficult for public transport to service the area.	Provides an opportunity for more efficient bus routes for people travelling to UTAS from the western suburbs. Increased capacity south of the bridge on West Tamar Highway could provide a future opportunity to reallocate road space to public transport to improve travel choices.
Purple option		
Pink option	The bridge alignment location may encourage more dispersed residential growth away from the CBD and other activity centres. This may make it more difficult for public transport to service the area.	Provides an opportunity for more efficient bus routes for people travelling to Mowbray Racecourse from the western suburbs. Increased capacity south of the bridge on West Tamar Highway could provide a future
Blue option		

Project option	Dispersed residential growth	Improved services
Yellow option		opportunity to reallocate road space to public transport to improve travel choices.

11.3 Active transport

Table 19 compares the design outcomes for users of active modes (walking and bicycle riding), by project option.

Table 19 Active transport design outcomes by project option

Project option	Active mode connections	Alignment to desire lines	Useability
Orange option	Improves between Windsor Park Community Precinct, Riverside High School and North Riverside residential areas in the west, UTAS Newnham Campus, and residential areas in the east.	Follows potential desire lines as identified in the *Launceston Network Operating Framework.*	Location may limit useability for people walking as it is far from key amenities in Launceston CBD.
Purple option			
Pink option	Improves active mode connections between Riverside residential areas in the west, and the residential and commercial areas in the east, such as the UTAS Inveresk campus and UTAS Stadium.	Follows potential desire lines as identified in the *Launceston Network Operating Framework.*	Location may lead to higher useability for people walking and riding due to its shorter distance from key amenities in Launceston CBD.
Blue option			
Yellow option			

12 Safety analysis

12.1 Crash analysis

Figure 36 illustrates the crash history heat map in the Project area of crashes over the five-year period between 2016 to 2021. This shows that most crashes occurred within the Launceston CBD, although there are locations with multiple crash incidents nearby Riverside and north Riverside on the West Tamar Highway, and Mowbray and Invermay on the East Tamar Highway.

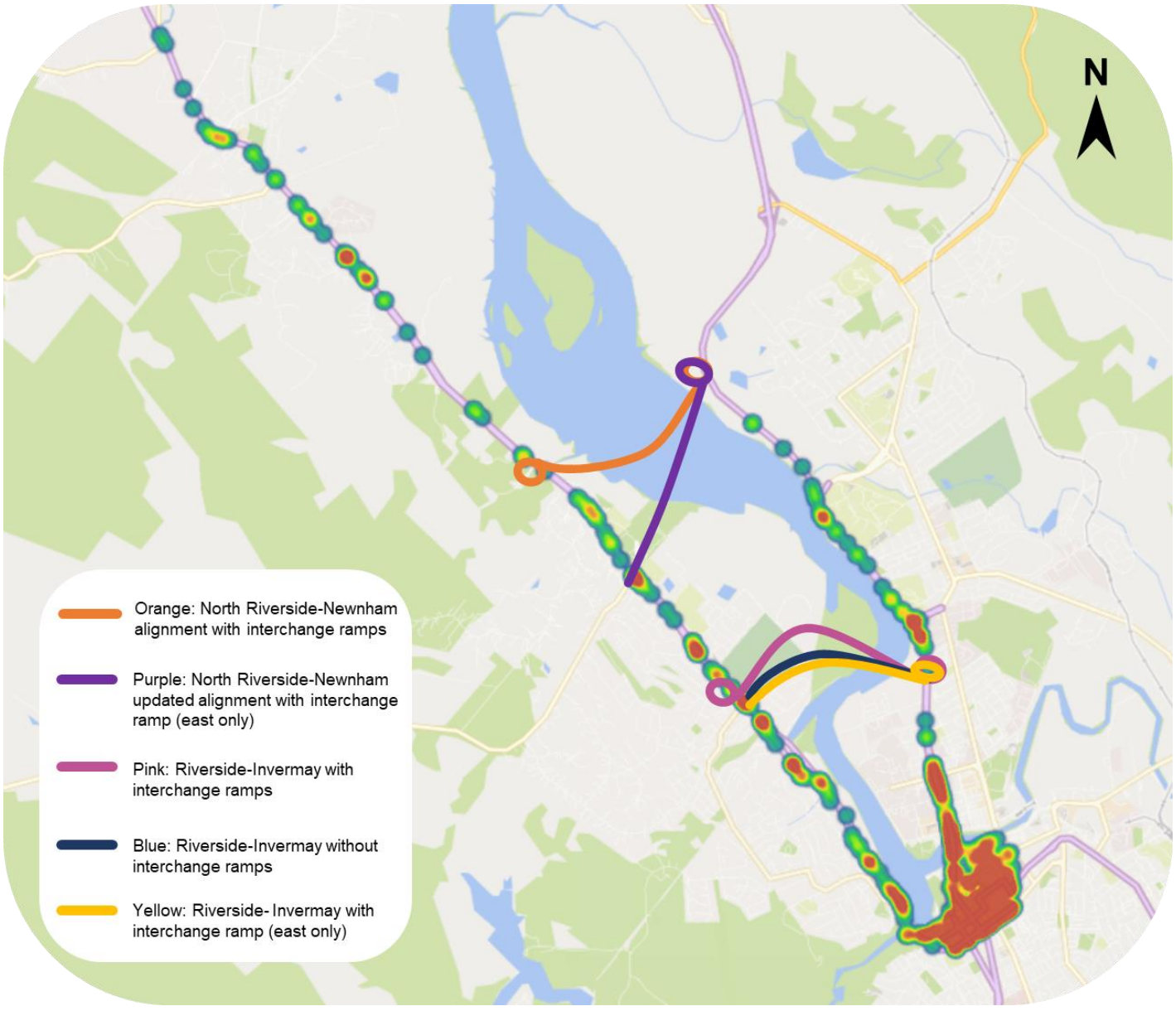


Figure 36 Project options alignment with heat map of crashes along the West Tamar Highway, 2016 to 2021[35]

Generally, the project options decrease trips on southern sections of the West Tamar Highway and through key sections of the Launceston CBD, with a corresponding increase in trips on southern sections of the East Tamar Highway as outlined in Section 10. This has the potential to reduce crash exposure

[35] Department of State Growth, 2016 - 2021

risk on the southern sections of West Tamar Highway and in areas of the Launceston CBD, however, this would need to be considered on balance with a potential increase on the southern sections of East Tamar Highway.

It would also need to be considered on balance with impacts from changes in risk at the locations where each project option connects to West Tamar Highway and East Tamar Highway, as outlined in the following section.

12.2 Safe System Assessment

An assessment of the project options and base case was conducted using the Safe System approach, which seeks to reduce road users subjected to kinetic energy exchange in a crash that will result in death or serious injury.

The base case and project options have been assessed using Safe System Assessment (SSA) principles and scoring matrices. This assessment has been undertaken based on locations and configurations of the crossing tie-ins to West Tamar Highway and East Tamar Highway only. The purpose of the SSA matrix is to assess the different major crash types against three crash risk components as follows:

- **Road user exposure:** this refers to which road users, in what numbers and for how long are using the road and are thus exposed to a potential crash. The measures of exposure include: AADT, side-road traffic volumes, number of motorcycles, people riding and people crossing or walking along the road, length of the road, area and length of time.
- **Crash likelihood:** groups of factors affecting the probability of a crash occurring. They can be elements which moderate opportunity for conflict (e.g. number of conflict points, offset to roadside hazards, separation between opposing traffic). They can also include elements of road user behaviour and / or road environment. Typically, these are the elements which moderate road-user error rates. This includes issues such as level of intersection control (e.g. priority / signals / movement ban), speed, sight distance, geometric alignment, driver guidance and warning, and maintenance (change in practice; implications of timing).
- **Crash severity:** groups of factors affecting the probability of severe injury outcomes should a crash occur. Typically, these factors are associated with the amount of kinetic energy and its transfer in the crash (e.g. impact speeds and angles, severity of roadside hazards).

Seven different major crash types were considered; run-off-road, head-on, intersection, pedestrian (people walking), cyclist (people riding), motorcyclist and other. These crash types represent the main crash and road user types that contribute to fatal and serious injury.

Achieving a low score is the desired outcome of a design. This means that there is lower risk of a fatal or serious injury crashes occurring, and that the design has alignment with Safe System objectives. The maximum possible score to achieve is 448 out of 448 for a single treatment. A score of 448 means that there is very high likelihood and consequence of a fatal or serious crash occurring and has extremely poor alignment to Safe System objectives. There is no industry standard of what an ideal score is to achieve, as each project assessed is unique and subjective.

For each of the project options considered, both the East Tamar Highway and West Tamar Highway treatments were assessed and their scores combined, resulting in a maximum possible score of 896 for a single option.

Scores for the East Tamar Highway and West Tamar Highway were combined for each option, under existing and project conditions. For each project option:

- Existing score is the combined East Tamar Highway and West Tamar Highway scores for the existing conditions at the locations where the option would join them.
- Option score is the combined East Tamar Highway and West Tamar Highway scores for the proposed interchanges / intersections.

Table 20 provides a summary of the scoring by project option, based on both existing and option conditions.

Table 20 Summary of SSA matrix scores

Project Case	Score
Orange existing	290/896
Orange option	335/896
Purple existing	326/896
Purple option	351/896
Pink existing	280/896
Pink option	390/896
Blue existing	322/896
Blue option	338/896
Yellow existing	322/896
Yellow option	352/896

Figure 37 provides a graphical summary of each option by crash type.

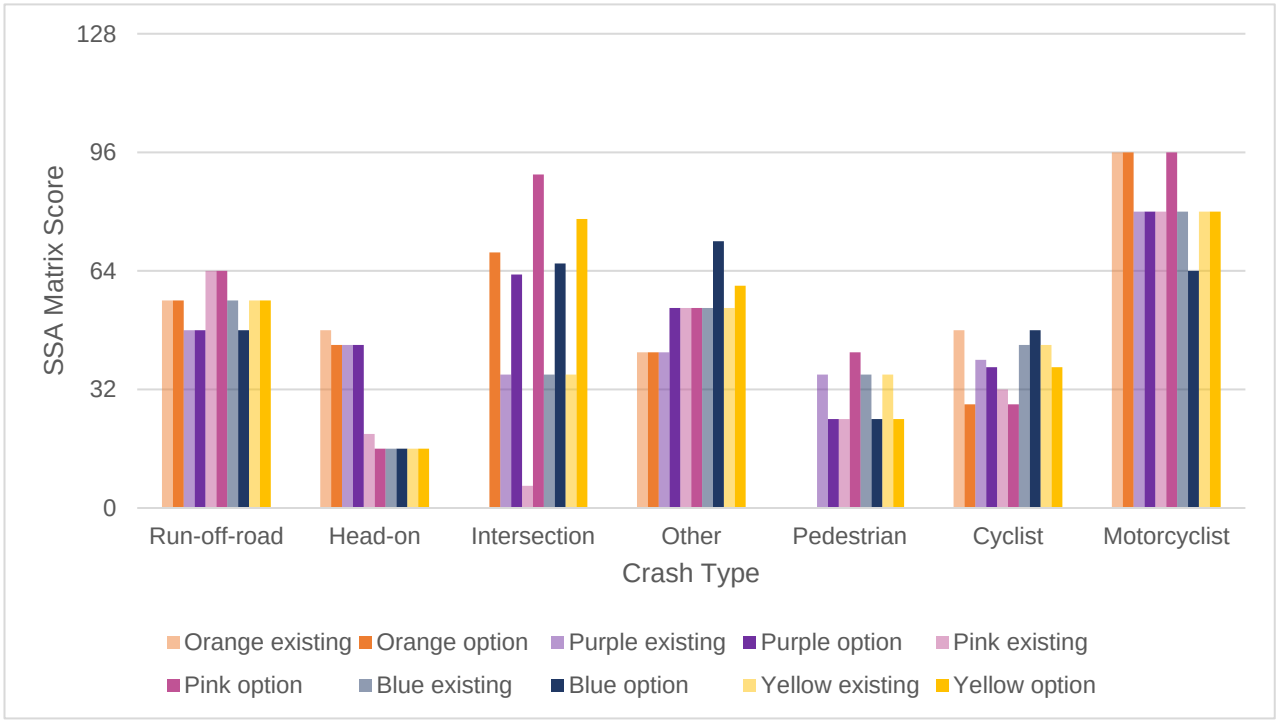


Figure 37 Safe System Assessment matrix score by crash type

12.2.1 Summary

A comparative assessment of existing conditions and project options has been conducted in accordance with Safe System Assessment (SSA) principles. A summary of the scores is shown in Table 21.

Table 21 Summary of SSA matrix scores

Project Case	Score
Orange existing	290/896
Orange option	335/896
Purple existing	326/896
Purple option	351/896
Pink existing	280/896
Pink option	390/896
Blue existing	322/896
Blue option	338/896
Yellow existing	322/896
Yellow option	352/896

Based on the evaluation, all existing conditions demonstrate better alignment with Safe System principles than the project options. The principal factors influencing lower scores are the absence or simplicity of intersections in the existing conditions. Among the proposed options, the Orange Option has the lowest score, primarily due to its minimal exposure of pedestrians. Conversely, the Pink Option records the highest score, indicating the lowest alignment with Safe System principles. The primary contributing factor to this outcome is the heightened complexity introduced to intersection arrangements.

As part of subsequent project stages, additional components that comprise the Safe System (i.e. road users, vehicles and post-crash care) will be considered.

13 Planning, environmental and social assessments

High-level desktop land use, environmental and social assessments were undertaken for the five project options. The project options were assessed based on the two general alignment locations: North Riverside-Newnham (generally aligns with the Orange and Purple options) and Riverside-Invermay (generally aligns with the Pink, Blue and Yellow options). The assessments included identification of potential issues, and a review of relevant data.

13.1 Planning assessment

Planning in the project area is largely governed by two planning authorities (Launceston and West Tamar), with the exception of an area in the river that is not within the authority of either local government. Both municipalities have adopted the Tasmanian Planning Scheme. This is made up of the State Planning Provisions, a standard set of zones and code rules which applies (or will apply) to every planning authority in the State, along with a specific Local Provisions Schedule which sets out where the zones and codes are applied in each Council area.

The *Northern Tasmanian Regional Land Use Strategy* (NTRLUS) (June 2018) is the statutory plan that applies to the region. This was updated to include the findings of the Greater Launceston Plan and encompasses the strategic direction for the two municipalities, (City of Launceston and the West Tamar Council) and their respective planning schemes.

Table 22 provides a summary of the key planning and land use considerations relevant to each option in relation to existing planning controls, process and land tenure. Further work should include a review of strategic documentation and public consultation, including consideration of impacts to Aboriginal Heritage. Additionally, infrastructure that will need to be considered in design includes trails, roads, water, sewer, stormwater, power lines, communications and kanamaluka / River Tamar flood levy walls.

Table 22 Key planning and land use considerations

Project option	Description
Orange option	– This option requires the largest land conversion, although virtually no demolition would be required. It is relatively close to the sensitive Tamar Wetlands Centre and may cover some land identified as part of this area. – To reduce the impact in the Environmental Management Zone it may be required to bring the alignment southwest into the Community Purpose Zone and Recreation Zone, which may be more difficult to justify. – The alignment would pass through land within a Local Heritage Place, however it is not anticipated that the proposal would substantially affect the heritage significance. – The option would interact with the beginning (or end) of scenic roads on both sides of the waterway, however this is unlikely to require significant documentation to support. – Based on the NTRLUS, this option could provide improved activity between Growth Corridors to the west and Supporting Consolidation Areas to the east.
Purple option	– This option provides the most direct line from an existing junction across the waterway to a new interchange. Part of the Recreation Zone has an additional overlay prohibiting Utilities use, but the alignment is likely to be well clear. Development for that use may nonetheless struggle to demonstrate consistency with the Zone Purpose. – The alignment would pass through land within a Local Heritage Place, however it is not anticipated that the proposal would substantially affect the heritage significance.

Project option	Description
	– The option would interact with the beginning (or end) of scenic roads on the eastern side of the waterway, however this is unlikely to require significant documentation to support. – Based on the NTRLUS, this option could provide improved activity between Growth Corridors to the west and Supporting Consolidation Areas to the east.
Pink option	– This option requires the largest land conversion of the Riverside-Invermay alignment options and may require relocation of the golf course and demolition of several houses on both sides of the waterway. – Development in the Recreation Zone, Community Purpose Zone and Open Space Zone may struggle to demonstrate consistency with the Zone Purposes. – Relocation of St Finn Barr school's car parking may be difficult. – The eastern side would interact with significant transmission wires (underground). – The option is situated slightly inside an Airport Obstacle Limitation area, however it is unlikely to be of a height that would present a concern. – Based on the NTRLUS, this option could provide an improved connection between the existing Suburban Activity Centre on the western side, and the existing Major Activity Centre on the eastern side of the river. These options are located within Priority Consolidation Areas.
Blue option	– This option requires a smaller land conversion that would require relatively few demolitions. There would be less development in the Recreation Zone and none in the Community Purpose or Open Space Zones. – The eastern side would interact with significant transmission wires (underground). The new intersection would be located where the existing corridor crosses the highway. – The option is situated slightly inside an Airport Obstacle Limitation area, however it is unlikely to be of a height that would present a concern. – Based on the NTRLUS, this option could provide an improved connection between the existing Suburban Activity Centre on the western side, and the existing Major Activity Centre on the eastern side of the river. These options are located within Priority Consolidation Areas.
Yellow option	– This option requires slightly greater land conversion than Riverside – Invermay alignment without interchange ramps, but less than Riverside – Invermay alignment with interchange ramps, and would involve development in the Recreation Zone, Community Purpose Zone and potentially Open Space Zones. – The eastern side would interact with significant transmission wires (underground). – The option is situated slightly inside an Airport Obstacle Limitation area, however it is unlikely to be of a height that would present a concern. – Based on the NTRLUS, this option could provide an improved connection between the existing Suburban Activity Centre on the western side, and the existing Major Activity Centre on the eastern side of the river. These options are located within Priority Consolidation Areas.

13.2 Environmental

Table 23 outlines the results of the environmental assessment based on the general alignment locations of North Riverside-Newnham (Orange and Purple Options) and Riverside-Invermay (Pink, Blue and Yellow options).

Table 23 Environmental assessment

Assessment area	North Riverside-Newnham	Riverside-Invermay
Vegetation communities	– Proposed alignment predominately intersects Agricultural land. – Node on the West Tamar features Urban areas, while the East Tamar node features extra-urban miscellaneous. – Bridge traverses through a portion of freshwater aquatic sedgeland and rushland on both the western shore and eastern shore of kanamaluka / River Tamar, which is listed as a threatened community (wetland) under Tasmania's Nature Conservation Act 2002. – Western end of the node also extends into proximity of Eucalyptus viminalis grassy forest and woodland.	– Proposed alignment primarily traverses through extra urban miscellaneous on the western extent of the crossing (the Riverside Golf Course) and fresh water aquatic sedgeland and rushland on the eastern half. – Patches of agricultural land. – Fresh water aquatic sedgeland and rushland is listed as threatened as a wetland under Schedule 3A of the Nature Conservation Act 2002. – Salinity in this community can range from fresh to brackish, with the diversity and floristic composition of species heavily dependent on the frequency of inundation and soil characteristics of the site. – The community is dominated by sedges and rushes from the genera Juncus (rush), Baumea (twigsedge), Carex (sedge), Cyperus (flatsedge), Eleocharis (spikesedge), Gahnia (sawsedge / cutting grass), Lepidosperma (swordsedge/rapiersedge), Phragmites (reed), Schoenus (bogsedge) and Typha (cumbungi). – Stratum are generally taller than 50 cm, although they can vary from a few centimetres to over three metres in height. – A variety of smaller sedges and herbs commonly form a dense to sparse layer between and below the dominant sward. This vegetation type is listed as a threatened community under Tasmania's Nature Conservation Act 2002. – Small patches of Melaleuca ericifolio swamp forest on the West Tamar side of this option, also listed under Schedule 3A of the Nature Conservation Act 2002.

Assessment area	North Riverside-Newnham	Riverside-Invermay
Threatened flora	– Six threatened flora species that have been recorded within 500 metres.	– Three threatened flora species have been recorded within 500 m of study area.
Threatened fauna	– Five threatened fauna species have been recorded[36].	– Four threatened fauna species have been recorded in the Project area.
Fauna habitat	– There is a known raptor nest within 1 km of the Project area that is recorded against the White-bellied sea-eagle (Haliaeetus leucogaster) dated 2014. – Hollow bearing trees that may provide potential habitat for threatened fauna may be present in the native vegetation patches featuring eucalypts. Fauna species include the masked owl (Tyto novaehollandiae subsp. castanops). – Agricultural land, pasture, wetland and eucalyptus forest (Eucalyptus viminalis grassy forest and woodland) are within proximity to the western node of alignment that could be potential nesting, denning and foraging habitat for threatened species. – Additionally, wetlands present as freshwater aquatic sedgeland and rushland, which is likely to provide habitat for the green and gold frog (Litoria raniformis).	– There is a known raptor nest within 1 km of the Project area that is recorded against the White-bellied sea-eagle (Haliaeetus leucogaster) dated 2014. – Hollow bearing trees that may provide potential habitat for threatened fauna may be present in the native vegetation patches featuring eucalypts. Fauna species include the masked owl (Tyto novaehollandiae subsp. castanops). – Agricultural land, pasture, wetland and eucalyptus forest (Eucalyptus viminalis grassy forest and woodland) are within proximity to the western node of alignment that could be potential nesting, denning and foraging habitat for threatened species. – Additionally, wetlands present as freshwater aquatic sedgeland and rushland, which is likely to provide habitat for the green and gold frog (Litoria raniformis).
Introduced species	– Four priority weeds have been recorded within 500 metres, which have a risk of spreading into and out of the Project area.	– Four priority weeds have been recorded within 500 metres that have a risk of spreading into and out of the Project area.
Geo-conservation sites	– There are no geo-conservation sites occurring within 1000 metres.	– There are no geo-conservation sites occurring within 1000 metres.

[36] NVA 2020

13.3 Social

Table 24 shows the results of the social assessment of the two general alignment locations of North Riverside-Newnham (Orange and Purple Options) and Riverside-Invermay (Pink, Blue and Yellow options)

Table 24 Social assessment

North Riverside-Newnham	Riverside-Invermay
– Impacts Legana on the western side of kanamaluka / River Tamar, and Newnham and Mayfield on the eastern side. There are several schools in the vicinity, which ordinarily would be contributors to peak hour traffic volumes. UTAS is the closest educational institution on the eastern side of kanamaluka / River Tamar and could be impacted. – There are a variety of community facilities and services, churches, schools, and sporting facilities on the western side of kanamaluka / River Tamar. The Windsor Park Community Precinct which includes the Tamar Function Centre, Windsor Park parkrun facility and a community garden, as well as the Riverside Olympic Football Club (adjacent to the Windsor Park Community Precinct) could be impacted. – The Tamar Conservation Area functions as a significant recreational space for the community, cultural heritage site, and a key conservation site for nationally vulnerable flora and fauna. There is a risk of this area being impacted. – The project options that use this alignment (Orange and Purple options) could provide improved connectivity between destinations such as North Riverside to the UTAS Newnham campus, and between Newnham and Windsor Community Precinct.	– There are several schools in the vicinity, which ordinarily would be contributors to peak hour traffic volumes. There are a variety of recreational and sporting facilities, including some that are part of the Launceston Church Grammar School that could be impacted by the project options on this alignment. – The Tamar Conservation Area functions as a significant recreational space for the community, cultural heritage site, and a key conservation site for nationally vulnerable flora and fauna. There is a risk of this area being impacted. – The project options that use this alignment (Pink, Blue and Yellow options) could provide improved connectivity between destinations such as Riverside to Mowbray Racecourse, Heritage Forest, UTAS Inveresk Campus and Invermay Activity Centres, and to riding trails such as Riverside Foreshore Trail.

14 Risk analysis and cost estimation

This section summarises and documents the key monetary and non-monetary risks identified for each of the project options and outlines the preliminary cost estimates.

14.1 Risk analysis

14.1.1 Contingency risk

Risk assessments were undertaken to assess project-specific risks. Table 25 outlines the key risks identified, which were assessed based on likelihood and potential cost impact prior to modelling.

Table 25 Key risks

Theme	Description
Geotechnical	Late or insufficient geotechnical investigation data; site geotechnical features not compatible with design
Construction	Low quality material generated from cut; insufficient allowance for unsuitable material removal and disposal.
Environmental Planning Assessments	Water management requirements in catchment area greater than envisaged; protection of kanamaluka / River Tamar will be paramount.
Construction	Flood events and natural disaster impacting delivery and safety, including delay due to landslide.
Design-roadworks	Change of alignment, type of bridge or other major redesign – potentially due to project requirements shift.
Construction	Contamination of existing material.
Construction	Wet weather delays.

A P50 and P90 risk assessment was undertaken considering inherent risks in the estimate, as well as contingent risk applied using a risk analyser tool. Table 26 outlines the applicable risk allocations.

Table 26 Probabilistic contingency

Probability	Orange option	Purple option	Pink option	Blue option	Yellow option
P50	20.7%	29.2%	23.4%	25.7%	25.2%
P90	25.9%	35.2%	28.3%	31.0%	30.4%

14.1.2 Non-monetary risks

Additionally, the following non-monetary project risks have been identified for the project:

- Changes in political commitments.
- No specific stakeholder consultation has been undertaken for this report.
- There is the potential that a more suitable response option was not progressed for further investigation.
- Infrastructure Australia (IA) may identify additional matters for assessment and consideration to align with IA criteria.
- Risk that less active transport users (people walking and riding) than anticipated utilise the multi-modal crossing.
- Travel patterns of inter-peak period and off-peak period are not like the peak periods.

- Scope creep to include upgrade of the West Tamar Highway and East Tamar Highway adjacent to interchanges.
- Project attractiveness and cost-benefit balance as viewed from stakeholders and the community.
- Changes in land use / population growth patterns.

14.2 Capital cost estimation

This section outlines the indicative capital cost estimates for the Project, including the methodology used.

14.2.1 Methodology

The following were utilised to prepare the capital cost estimates for the project options:

- Benchmarking.
- Measurements.
- Construction methodology.
- Construction program and duration.

The cost plan was benchmarked against a regional cost database (current civil and building projects in Tasmania and the Australian mainland) and cross-referenced to the industry average of similar projects.

The estimate considered the proposed bridge construction methodology, the assumed geotechnical conditions and the designed road alignment for the connections with the East Tamar Highway and West Tamar Highway.

The following key assumptions were made in estimating the cost of the works.

- Escalation cost assumes construction start in 2025/26 financial year (FY).
- There has been limited design work on the alignments for the 5 options that have required a range of assumptions and allowances to be made to inform this initial cost estimate. The projects estimates should be reviewed during any potential future stages of the project as the detailed design progresses.
- Geotechnical data in the area is very limited and ground conditions are inferred to be poor to very poor.
- 80% of the material will be disposed off-site, with the required fill material to be imported.
- Construction scope will be carried out under a single construct-only style contract.
- Use of a mobile crane lifting the girder onto the preceding span from the access jetty for girder installation.

The construction works encompass a new bridge across the river, new civil infrastructure and connecting roads at the interchanges, as well as additional utility works, structural signs, and land acquisition.

The indicative development program is in the order of three years, noting that the sequencing of the works, consideration of interfaces and commissioning considerations will determine the specific project calendars.

14.2.2 Summary

The key cost driver of these indicative estimates is the bridge structure; specifically, the piling, the temporary bridge required for construction, and the concrete substructure. However, there is an opportunity to achieve cost savings in capital requirements through value engineering and clarity on the geotechnical conditions. There is however a risk that geotechnical conditions may be worse than assumed and foundation costs may increase.

The bridge was priced based on a first-principles approach, with each element being quantified based on the received design, and construction methodology assessed. Due to its complex nature, a reasonably conservative approach was adopted with regards to the sequencing, productivity, and temporary works requirements.

Client costs were assessed for each stage of delivery based on delivery costs and expected duration. The proportional allowances were derived from other benchmarked projects and assumes that the client will be responsible for all design costs up until delivery. These costs include but are not limited to:

- Design costs (all stages).
- Community engagement.
- Project management over the Project lifecycle.
- Other specialist external consultants.
- Geotechnical assessment.
- Legal fees.

A P50 and P90 risk assessment on the capital cost estimate considered inherent risks in the estimate as well as contingent risk applied from the risk analyser.

Table 27 provides a summary of the P90 capital cost estimates for the project options.

Table 27 P90 capital cost estimates ($ million, rounded to the nearest million) (exc. GST)

Item	Orange option		Purple option		Pink option		Blue option		Yellow option	
CAPEX (incl. prelims and margins	$736		$417		$534		$449		$469	
Client costs	$106		$60		$77		$65		$68	
Property acquisition	$14		$14		$121		$89		$89	
Project base costs	**$856**		**$492**		**$732**		**$603**		**$626**	
Risk and contingency	$222	25.9%	$173	35.2%	$207	28.3%	$187	31.0%	$190	25.2%
Total risk adjusted costs	**$1,078**		**$665**		**$939**		**$790**		**$816**	
Escalation	$77		$47		$67		$56		$58	
Total outturn costs	**$1,154**		**$712**		**$1,006**		**$846**		**$875**	

Table 28 provides a summary of the capital cost estimates.

Table 28 P50 capital cost estimates ($ million, rounded to the nearest million) (exc. GST)

Item	Orange option		Purple option		Pink option		Blue option		Yellow option	
CAPEX (incl. prelims and margins	$736		$417		$534		$449		$469	
Client costs	$106		$60		$77		$65		$68	
Property acquisition	$14		$14		$121		$89		$89	
Project base costs	**$856**		**$492**		**$732**		**$603**		**$626**	
Risk and contingency	$177	20.7%	$143	29.2%	$171	23.4%	$155	25.7%	$158	30.4%
Total risk adjusted costs	**$1,033**		**$635**		**$903**		**$758**		**$783**	
Escalation	$73		$45		$64		$54		$56	
Total outturn costs	**$1,107**		**$680**		**$968**		**$812**		**$840**	

14.3 Operating cost estimation

Operating cost was calculated from project-specific costs, based on the resources required, and benchmarked against similar civil and bridge projects Australia-wide. The operating cost accounts for:

- inspections
- traffic control
- general maintenance
- major repairs
- resurfacing of the asphalt.

All bridge related maintenance has made allowance for a barge to carry-out works from the river side, instead of a maintenance gantry.

The operating costs have been estimated over a 30-year period considering their frequency and year of expense incursion. Additionally, contractor overheads and a margin of 5% has been applied. Table 29 outlines a summary of the P50 and P90 risk adjusted operating cost estimates.

Table 29 P50 and P90 operating cost 30 year undiscounted values ($ million, rounded to the nearest million)

Item	Orange option	Purple option	Pink option	Blue option	Yellow option
Total operating cost	$49	$35	$43	$40	$38
P50 contingency	$10	$10	$10	$10	$10
P50 risk-adjusted total	$59	$46	$54	$51	$47
P90 contingency	$13	$13	$12	$13	$12
P90 risk-adjusted total	$62	$48	$56	$53	$49

14.4 Value management

There are a number of potential opportunities for staging and value management for the project options that will be investigated as part of any further development of the Project.

The key cost driver for the capital cost estimate is the long bridge structure, specifically the piling, temporary bridge required for construction and concrete substructure. Cost savings could be achieved through refined and optimal designs of these structures. Value management scenarios for consideration as the Project progresses include:

- Consideration of the width of the active transport provisions along the bridges.
- A bridge with a total of two lanes, instead of four lanes.
- A bridge with three lanes (including tidal flow options for the peaks), instead of four lanes.
- Staging options, with a bridge with two lanes in the short term, with the opportunity to construct an additional two-lane bridge in the longer term, when the demand warrants four lanes.
- Staging options to construct the whole bridge sub-structure for a four-lane bridge, and only two lanes of the bridge superstructure now, with the remaining bridge superstructure to be completed in the future.
- Different bridge forms such as longer span structures to reduce the number of piers and piles required or long span steel cable-stay or suspension bridges.

15 Financial analysis

The financial analysis captures whole-of-life costs, including the initial capital costs, and ongoing maintenance and operational costs over the evaluation period. This is key in informing the financial viability and affordability of the options, funding framework, and impacts on State Growth budgets over the lifecycle of the Project.

The following were calculated as part of the financial analysis for the Project:

- The net financial impact of the options on all levels of government, during construction and over the lifecycle in both outturn and Net Present Cost (NPC) terms. This is an important consideration in terms of the Government capital as an investor in the Project, as it allows comparison with other projects where construction periods may differ.
- Sensitivity of net financial impacts to changes in material factors or assumptions, impacting estimates of financial costs and benefits.

15.1.1 Assumptions

Table 30 outlines the key assumptions made in the financial analysis.

Table 30 Key financial modelling assumptions

Description	Assumption	Source
Long-term average inflation rate for escalation of operational expenditure	3.5% compounding annual growth rate (CAGR)	-
Model base year	2023/24 financial year (FY)	Current financial year
Price year	September 2023	Current price year
Construction period	3 years during 2025/26 FY to 2028/29 FY	Assumed construction date
Evaluation period	36 years	September 2023 to June 2059, including construction (30 years of operation)
Debt / equity funding	Nil	-
Residual value	Nil	-
Taxation (incorporation of GST)	Nil	-
Revenues	Nil	-
Discount rate	4.138% CAGR (nominal rate) based on the average of Australia 10-year bonds	Public rates – Australian Government as at 25 August 2023

15.1.2 Summary

Table 31 outlines the key outcomes of the financial analysis.

Table 31 Financial analysis – key findings ($ million, rounded to nearest million)

Cost item	Outturn Dollar: P90 whole-of-life costs	NPC: P90 whole-of-life costs
Orange option	$1,372	$1,106
Purple option	$867	$691
Pink option	$1,200	$965
Blue option	$1,022	$818
Yellow option	$1,043	$840

16 Economic analysis

Economic analysis was undertaken on each of the project options per guidelines set out by ATAP, Infrastructure Australia, Austroads, and United Kingdom's Department of Transport. As part of this analysis, Cost Benefit Analysis (CBA) was undertaken to provide a basis for comparison between the project options. This section documents the methodology, assumptions, and inputs used to undertake the economic analysis.

16.1 Assumptions

Table 32 outlines the key assumptions applied to inform the CBA, in accordance with ATAP's *T2 Cost Benefit Analysis.*

Table 32 Key assumptions

Parameter	Assumption	Source / rationale
Evaluation start	2026/2027 financial year (FY)	As per construction start timeframe
Construction period	3 years during 2025/26 FY to 2028/29 FY	-
Operating period	30 years from 2029/30 FY	As per CBA guidelines
Evaluation period	33 years, with capped growth	Evaluation start year through to the end of the operating period
Price year	September 2023	As per most recent CPI data
Reliability Ratio	0.4	As per TAG A1.3
Discount rate	7% (4% and 10% sensitivity analysis scenarios)	As per CBA guidelines
Capital costs	P50 total risk-adjusted cost estimates	As per CBA guidelines
Operating costs	Risk-adjusted cost estimates	-
Peak period factor	2.5	As per traffic data
Annualisation factor	300	As per traffic data

Traffic volumes were linearly interpolated between the 2019/20 FY and 2032/33 FY and capped at 2032/33 FY levels. The benefits were assessed over a 30-year period, and a residual value was included to capture the estimated value of the bridge after 30 years. This residual value was calculated using straight line depreciation over the 120-year life.

16.2 Methodology and approach

Economic analysis was undertaken for the options based on a CBA framework. The CBA considers benefits accruing against the costs associated with each option, and calculates a benefit-cost ratio (BCR) to assist in assessing the economic viability of the options.

Figure 38 illustrates the CBA methodology, comparing the project options to the base case.

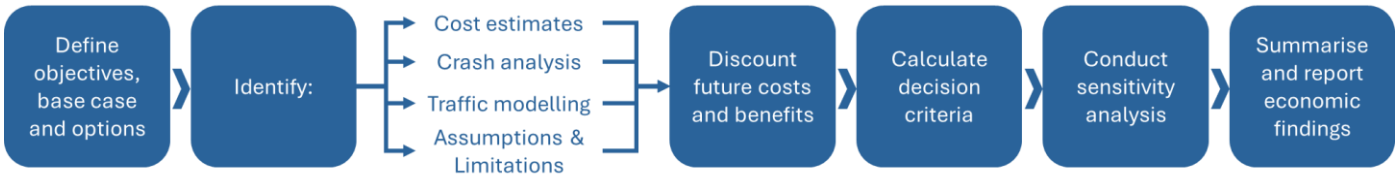


Figure 38 Cost-benefit analysis methodology

The CBA was undertaken to calculate the following results:

- Net present value (NPV) – the present value of net future cash flows can be used to indicate improvement in economic efficiency in comparison to the base case.
- Benefit-cost ratio – the present value of benefits divided by the present value of costs (including operating costs). This can be used as a decision tool and to rank initiatives. A BCR greater than one suggests that the present value of the monetised benefits outweighs the present value of costs.

At this stage, only readily monetisable benefits were used to undertake the CBA.

16.3 Inputs

16.3.1 Monetised costs

16.3.1.1 Capital costs

The capital costs were estimated for the project options as per the Cost Estimates (September 2023). Refer to section 14.2 of this report.

Table 33 outlines the key capital inputs to inform the CBA.

Table 33 Key capital cost inputs ($ million, rounded to the nearest million)

Item	Orange option	Purple option	Pink option	Blue option	Yellow option
P90 capital cost – Total risk adjusted costs	$1,078	$665	$939	$790	$816
P50 capital cost – Total risk adjusted costs	$1,033	$635	$903	$758	$783

16.3.1.2 Ongoing operational costs

Operating cost profiles were developed to estimate the expected ongoing routine and programmed maintenance costs for the project options beyond that of the base case. These operating costs are outlined in Section 14.3 of this report.

Table 34 outlines the key operating cost inputs to inform the CBA.

Table 34 Key inputs ($ million, rounded to the nearest million)

Item	Orange option	Purple option	Pink option	Blue option	Yellow option
P90 operating cost – risk-adjusted total 30 year undiscounted	$62	$48	$56	$53	$49
P50 operating cost– risk-adjusted total 30 year undiscounted	$59	$46	$54	$51	$47

16.3.2 Monetised benefits

The monetised benefits applied to the project options stem from an incremental change in VHT, VKT, vehicle operating speed, and crashes compared to the base case. Figure 39 shows the benefits (or dis-benefits) that were able to be monetised for the Project.

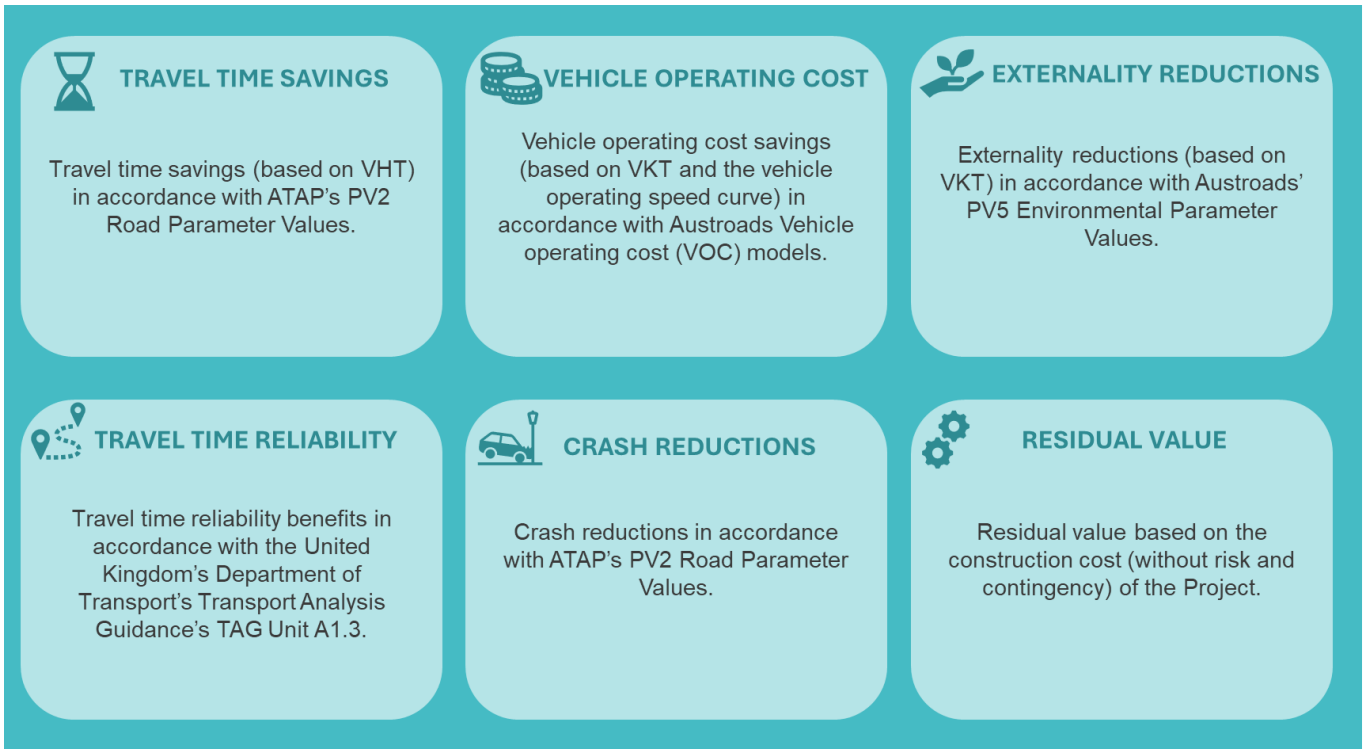


Figure 39 Monetised benefits and disbenefits

16.4 Results

The CBA calculates total and present values of net costs and benefits of the project options relative to the base case. The total value is the sum of all undiscounted cash flows, whereas present value is the sum of all discounted cash flows (Sep-23$). Table 35 outlines the present value of the net costs and benefits for each project option, based on the P50 and P90 capital cost estimates and using a 7% discount rate.

Table 35 Net costs and benefits of project options relative to the base case ($ million)

Cost / benefit / result ($ M)	Orange option		Purple option		Pink option		Blue option		Yellow option	
	P50	P90	P50	P90	P50	P90	P50	P90	P50	P90
Costs										
Capital cost	$967	$1,008	$594	$622	$845	$879	$709	$739	$733	$764
Operating costs	$19	$19	$15	$16	$17	$18	$16	$17	$16	$16
Total costs	$985	$1,028	$610	$639	$862	$897	$726	$757	$749	$780
Benefits										
Travel time savings value	$194	$194	$147	$147	$203	$203	$22	$22	$190	$190
Vehicle operating costs reduction	$65	$65	$75	$75	$60	$60	$21	$21	$63	$63
Externalities value reduction	$4	$4	$8	$8	$5	$5	$4	$4	$7	$7
Crash reductions value	$7	$7	$12	$12	$8	$8	$6	$6	$11	$11
Residual value	$65	$67	$38	$38	$56	$56	$46	$46	$48	$48
Total benefits	$336	$336	$279	$279	$332	$332	$100	$100	$318	$318
Travel time reliability	$1	$1	$0	$0	$3	$3	$-6	$-6	$0	$0
Total benefits (below the line)	$337	$337	$280	$280	$335	$335	$94	$94	$318	$318

16.4.1 Summary

Table 36 summarises the key data from the key tables from the results section in Table 33 and Table 35 above. This allows for an overall comparison between option results.

Table 36 Summary of results – P50 (7% discount rate) (Sep-23$)

Result	P50 Cost	P50 benefits	NPV (7% discount rate)	BCR (7% discount rate)
Orange option	$1,033 million	$336 million	-$650 million	0.3
Purple option	$635 million	$279 million	-$330 million	0.5
Pink option	$903 million	$332 million	-$530 million	0.4
Blue option	$758 million	$100 million	-$625 million	0.1
Yellow option	$783 million	$318 million	-$430 million	0.4

16.4.2 Sensitivity analysis

In accordance with ATAP's T2 Cost Benefit Analysis, sensitivity analysis on key inputs was undertaken. This sensitivity test is developed to examine areas of uncertainty within the report and analysis, and to gauge the impact these uncertainties may have on the BCR of the project.

Table 37 outlines the key results from the sensitivity analysis. As can be seen the BCR values display moderative sensitivity to parameter changes.

Table 37 Summary of sensitivity results (7% discount rate)

Parameter	Orange option	Purple option	Pink option	Blue option	Yellow option
Central scenario	0.3	0.5	0.4	0.1	0.4
Vehicle growth extrapolation					
Yes, extrapolated growth (30-years)	0.4	0.5	0.5	0.1	0.5
Yes, extrapolated growth (50-years)	0.5	0.5	0.5	0.1	0.6
No, capped growth (50 years)	0.3	0.5	0.4	0.1	0.4
Capital costs					
Low-range	0.4	0.6	0.5	0.2	0.5
High-range	0.3	0.4	0.4	0.1	0.4
Peak period factor					
1.0	0.2	0.2	0.2	0.1	0.2
3.0	0.4	0.5	0.5	0.2	0.5
Annualisations					
260	0.3	0.4	0.3	0.1	0.4
365	0.4	0.5	0.5	0.2	0.5

16.5 Qualitative considerations

The project options have been assessed in the preceding sections on their ability to contribute to the identified benefits, while minimising impacts and costs. Qualitative benefits and impacts should be considered along with the quantified costs and benefits to enable robust decision-making. Figure 40 outlines the potential benefits (or dis-benefits) that were not monetised or quantified for the purposes of this analysis.

Figure 40 Qualitative considerations

17 Comparison

Table 39 gives a high-level comparative summary between the project options, based evidence outlined in the preceding sections. This comparison has been categorised based on contribution to the desired benefits (as identified within the investment logic map), along with qualitative considerations, impacts, risk, cost, financials and economics.

Options are compared based on their comparative performance to the base case, as shown in Table 38.

Table 38 Option comparison key

Shading	Description
	Generally results in improved performance compared to the base case
	Generally results in similar performance compared to the base case
	Generally results in reduced performance compared to the base case

Table 39 Option performance summary

Criteria	Basis of assessment	Orange	Purple	Pink	Blue	Yellow
Improves safety outcomes for all users	Safe system assessment, noting additional analysis required to consider area-wide impacts.					
Improves travel time reliability	Travel time impacts.					
Improves travel options to manage travel demand – public transport	Opportunities for bus services and allocation of road space.					
Improves travel options to manage travel demand – active transport	Usability for people walking and riding.					
Enables better alignment between future development and provision of transport infrastructure	Impacts to connectivity and residential growth.					
Improves network resilience	Provision of redundancy to flood events and for Batman Bridge					
Urban amenity	Visual and aesthetic qualities, noise and traffic impacts.					
Property acquisition impacts	Impacts to residential and commercial properties.					
Social impacts	Impacts to community facilities and access to key destinations.					
Environmental impacts	Land, flora and fauna impacts.					
P90 Probabilistic Contingency Risk	The Purple option has the highest P90 probabilistic contingency risk, while the Orange option has the lowest.					
P90 Total outturn capital cost	The Orange option has the highest total outturn capital cost, while the Purple option has the lowest.					
P90 Net present cost – whole of life costs	The Orange option has the highest whole of life net present cost, while the Purple option has the lowest.					
Value management/ Stageability	Potential value management opportunities for further investigation.					
Economic analysis	The Purple option has the highest BCR, while the Blue option has the lowest.					

18 Conclusions

18.1 Summary

This Business Case has begun investigating the case for change to improve congestion, safety, and travel time reliability along West Tamar Highway, as part of the Launceston and Tamar Valley Traffic Vision.

A range of options have been considered to address the problems and their associated benefits, costs, and risks have been assessed. Through qualitative assessment, a new kanamaluka / River Tamar multi-modal crossing was identified for further investigation, as it aligned with the identified project benefits and key performance indicators.

Further investigations considered different crossing locations and configurations, with transport assessments undertaken considering impacts related to travel time reliability, network resilience, safety, and accessibility. Additionally, a high-level assessment of the likely environmental and social effects has been completed, along with financial and economic analysis.

While there are benefits of a new kanamaluka / River Tamar crossing, the economic analysis shows that at this stage the costs outweigh the readily available monetised benefits. However, it is recognised that the envisioned benefits extend beyond the monetised benefits and beyond transport improvements.

The qualitative evaluations underscore the transformative potential of a new kanamaluka / River Tamar crossing, presenting opportunities for regional economic growth. A multi-modal crossing could serve as a catalyst for development, foster connectivity between essential hubs such as shopping centres and educational institutions, provide improved network resilience, and optimise logistics for goods and services. A strategic rerouting of traffic and freight could reshape the urban landscape, offering prospects for placemaking in the CBD and potential value uplift benefits.

As such, any future stages of the Project will need to further assess whether the qualitative benefits associated with the Project, in addition to the monetised benefits, provide sufficient justification for investment. The broader implications for accommodating growth, facilitating development, and contributing to the regional and national economy requires a holistic assessment. While the initial analysis suggests that transport-related costs may outweigh the expected transport benefits, the likely broader socio-economic advantages highlight the need to further evaluate these wider factors in potential future assessments. If in these assessments it is found that the overall benefits do not justify the costs at this time, the Project could be considered a longer-term, potential future investment for Launceston as the city grows over time.

18.2 Next steps

The following additional activities will be considered to further investigate the development of a second kanamaluka / River Tamar crossing:

- Perform additional technical investigations, including:
    - Additional design development and associated technical investigations.
    - Additional traffic modelling.
    - Detailed safety analysis.
    - Additional planning, environmental and social investigations.
    - Additional economic analysis.
- Further investigation into complementary placemaking opportunities in the CBD.
- Undertake consultation with key stakeholders and the community on the project options.
- Engage with Infrastructure Australia to discuss potential funding scenarios and requirements for Australian Government funding support.
- Identify options for further investigation.