



Priority Cycle Route Improvement Plans

Case studies

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Contents

Case study 1: The importance of saddle surveys in early concept planning	2
What is a saddle survey?	2
How do you go about it?	2
Phase 1: Before undertaking saddle survey or walk through	2
Phase 2: On day of saddle survey	3
Phase 3: Post saddle survey, documentation and evaluation	3
Application of a saddle survey	3
Background	3
In action	4
Lessons learned	5
Identifying priority movements	5
Having fresh eyes on the issues	7
Application of saddle surveys elsewhere	7
Evidence of operational safety concerns	7
Summary	7
Case study 2: PCRIP pilot projects – setting route objectives	9
Abstract	9
Understanding current use	9
In action	9
Cairns Regional Council – Mann Street Cycle Connection	10
Sunshine Coast Council – Maroochydore Cycleway	11
Moreton Bay Regional Council – Bribie Island Cycleway	12
Successful outcomes	13
Case study 3: Cycle route inspections – capturing outputs	15
Abstract	15
In action	16
SCC – Maroochydore Cycleway	16
MBRC – Bribie Island Cycleway	17
Summary	18
Lessons and transferability	19
Case study 4: Road diet at a high-speed roundabout	21
Abstract	21
Background	21
In action	21
Success	22
Lessons and transferability	22
Case study 5: Before and after study of a major intersection	25
Abstract	25
Background	25
In action	26
Process	27
Effective use of consultation	27
Effective use of modelling	27

Lessons and transferability	27
Case study 6: Improving intersections on a priority cycle route	30
Abstract	30
Route objectives	30
Background	30
In action	31
Concept design outcomes	34
Lessons and transferability	35
Case study 7: Using consultation effectively at early concept stage	37
Abstract	37
Background	37
In action	38
Stage one consultation	38
Stage two consultation	38
Results	40
Stage one consultation	40
Stage two consultation	40
Lessons and transferability	41
Attachment A: On-line community survey conducted on SCC Facebook page targeting the SCC community	42
Case study 8: Basis of design – how to conduct a workshop	48
Abstract	48
Basis of design approach on the Bruce Highway Cycleway Planning project – Townsville	48
Review background information	48
Identify stakeholders for workshop	49
Preparing for the workshop	49
Delivering the basis of design workshop	50
Outcomes of the basis of design workshop	50
Documenting the basis of design	50
Lessons and transferability	51
Attachment A – Key opportunities and constraints	52
Attachment B – Project success criteria	53
Case study 9: Bruce Highway Bikeway Bridge, Mackay – options analysis	55
Abstract	55
Background	55
The problem	55
Methodology overview	56
The results	56
Key learnings and recommendations	60

Case study 1

Case study 1: The importance of saddle surveys in early concept planning

What is a saddle survey?

A saddle survey involves riding a bike along the existing or proposed route. The purpose is to identify features, issues and opportunities along the route from the perspective of the user. It can also be used to audit existing infrastructure and to confirm suitable treatments prior to design.

How do you go about it?

The Priority Cycle Route Improvement Plan (PCRIP) guidelines identify metrics for documenting an existing route environment. A 'saddle survey' by bicycle (or walk through) can be an effective way of rapidly gathering information. There are three phases to a saddle survey: before, during and after, as outlined below.

Phase 1: Before undertaking saddle survey or walk through

Criteria	Considerations
Identify Participants	Participants on the survey could include: <ul style="list-style-type: none"> state and local government staff consultants/contractors/designers user groups (e.g. Bicycle User Group (BUG) representatives, walking groups) experienced and novice riders representing a range of bike riding abilities.
Timing	When choosing a time for a saddle survey, consider: <ul style="list-style-type: none"> high volumes of pedestrians, bicycles and vehicles can make it difficult to take photos or document issues some issues only occur at peak hours, such as queuing through intersections some issues only occur at night (e.g. headlight glare, lack of lighting, other Crime Prevention Through Environmental Design (CPTED) issues).
Survey study area	Confirm route for the saddle survey: <ul style="list-style-type: none"> consider dividing the route into different links of similar characteristics such as: traffic flow, speed, type and width of facility and barriers consider intersections separate to mid-block elements of a route identify at this point key constraints to observe on the survey day desktop review information (e.g. crash statistics, road hierarchy, land use planning, heritage, other operations such as public transport infrastructure and service).
Information to be collected	Some categories to consider are: <ul style="list-style-type: none"> path alignment and cross sections (e.g. visibility, sight distance, design speed, edges) intersections (e.g. locations, warning, control, layout) signs and lighting traffic signals (e.g. operation, push buttons, sensor loops) potential obstructions (e.g. fences and guard rails, bollards, chicanes) pavements (e.g. defects, skid resistance, potential ponding locations) other items (e.g. landscaping, headlight glare, conflict points between path users).
Data collection methods	Methods for collecting data include: <ul style="list-style-type: none"> annotating a map photographs video survey (e.g. GoPro) GPS logger (e.g. Strava) to capture elevation/gradient or travel time/delay discussion points/specific locations to record data on the route.
Preparation	Proper preparation is key: <ul style="list-style-type: none"> ensure appropriate Workplace Health and Safety procedures have been completed ensure bicycles are fit for purpose, and rider/s have appropriate equipment (e.g. helmet, lights).

Phase 2: On day of saddle survey

- Pre-ride safety check** Prior to commencing the saddle survey, ensure all participants:
- arrive early so that it can start on time
 - are aware of the route to be audited and are provided with a map/orientation
 - are aware of set points for stopping and discussing issues
 - have appropriate equipment for data collection and safe means to store equipment
 - check bicycle (brakes, chain, tyres, pedals, reflectors and bell) and PPE as required (including appropriate weather protection)
 - sign the Safe Work Method Statement (SWMS)
 - are aware of Queensland Road Rules for bike riding.

- | | |
|--------------------------------|---|
| Photos and data capture | Participants to capture agreed data by methods noted above: <ul style="list-style-type: none">• where safe to do so capture photographs of user behaviour• document road environment, bike riding facilities (type)• document type of bike riders and pedestrians using the route• capture photos of issues/areas needing treatment, which can be used for evidence as part of future monitoring and evaluation. |
|--------------------------------|---|

Phase 3: Post saddle survey, documentation and evaluation

- Collation and presentation**
- collate data captured from all participants
 - capture observations from the saddle survey in an easy to understand format
 - participate in discussion to capture individual observations and experiences of the route (acknowledging each participant's level of confidence and bike riding capability)
 - present results in a tabular or visual presentation for a PCRIP
 - identify key issues with reference to Austroads guiding principles and criteria for bicycle planning
 - identify where observations relate to data collected from desktop reviews (e.g. crash statistics, road hierarchy, land use planning, heritage, other operations such as public transport infrastructure and services)
 - it would be useful to include client/designer at a completion meeting to discuss outcomes and potential recommendations for route option treatments (opportunities), documenting these alongside the issues
 - see Case Study 3 Priority cycle route inspections: capturing outputs for example.

Application of a saddle survey

Background

Sunshine Coast Council (SCC) engaged a consultant to develop a PCRIP for on-road cycle facilities between Alexandra Headland and Maroochydore.

The route contains different on-road and off-road environments. A saddle survey was undertaken to ground-truth the existing route and potential route treatment options.

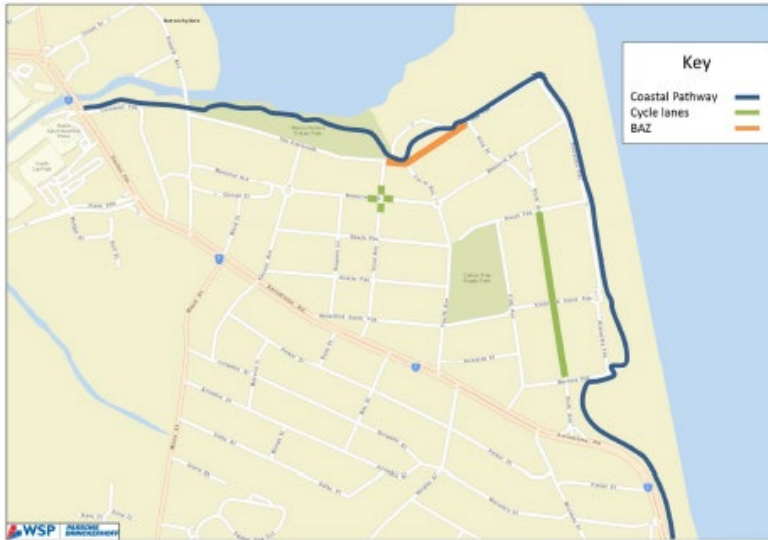


Figure 1 Existing cycle facilities in the study area, from Maroochydore, via Cotton Tree to Alexandra Headlands
 (Source SCC Maroochydore Cycleway Priority Cycle Route Improvement Plan, 2015)

In action

The saddle survey and walk-through of the proposed route was undertaken in May 2015.

Before the survey, the route was split into 9 links of roads with similar characteristics (labelled L1.0 to L9.0).

Photos were taken of each link to record the typical environment. Additional photos were taken to record issues or opportunities. Observations made during the saddle survey were categorised as follows:

- road environment
- bike riding facilities
- issues
- opportunities.

Data was manually captured on site and subsequently tabulated and presented in the PCRIP (see Figure 3). Additional information from other sources, such as traffic volumes and public transport data were subsequently presented with survey findings.

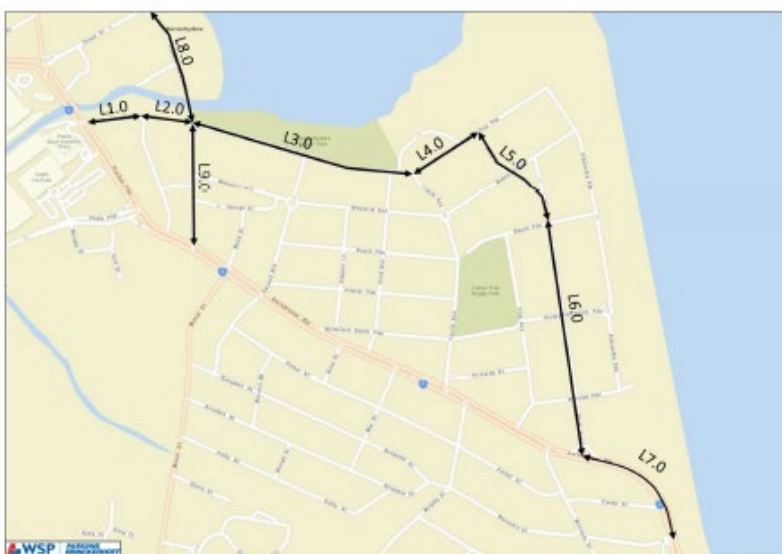


Figure 2 Proposed route for the saddle survey, divided into specific segments for assessment
 (Source SCC Maroochydore Cycleway Priority Cycle Route Improvement Plan, 2015)




Link ID	Link definition	Road environment	Cycling facilities	Photo	Issues	Opportunities
L1.0	Commeal Parade (defined by about 140 m east of the intersection at Horton Parade/Commeal Parade)	AADT: no information Posted 50 km/h. 2 lane, 2- way, undivided road	Parallel shared use Coastal Pathway between Commeal Parade and Commeal Creek.		Adjacent pathway may have high pedestrian use during afternoons, holidays and weekends. Narrow road prevents provision of cycle lanes	Road is primarily used to access parking. It is not a 'through' road so reduced speed will have minimal delay.
L2.0	100 m section between Commeal Parade and the intersection at First Avenue/ The Esplanade /Duporth Avenue)	The west section (50 m) is a circulation road within a carpark. The eastern section is a 5 m wide shared path.	Parallel shared use Coastal Pathway between Commeal Parade and Commeal Creek.		Adjacent pathway may have high pedestrian use during afternoons, holidays and weekends. Circulation within car park is marked as one-way. This means westbound cyclists can't use ramps between pathway and car park. Geometry of pathway effectively narrows usable path and creates pinch point that increases potential conflicts between pedestrians and cyclists. Transition between pathway and on-road at intersection is too narrow and difficult to use without conflicting with pedestrians.	Transition between on-road and off-road at west of the link provide opportunity for cyclists to enter/exit the pathway from the car park circulation road. Landscaping can be changed to reduce constriction at pinch point.
L3.0	The Esplanade (between Duporth Avenue and Fourth Avenue)	AADT: 3,330 vpd (in 2011) Posted 50 km/h 2 lane, 2- way, undivided road On- road parallel parking provided on both sides of the road 600 bus route	Shared use Coastal Pathway parallel to The Esplanade which follows the river edge.		Kerbside parallel parking, high cross corridor pedestrian activity due to park and pathway to the north, and businesses on other side. Shared path has high pedestrian and recreational use, particularly on the weekends Width of roadway is insufficient for bike lanes next to parked cars. Drainage grate at entrance to parking can be a risk to cyclists due to alignment of grate.	Westbound approach to Duporth Avenue/ First Avenue intersection is wide enough for cycle lane. Could be extended by removing two parking bays.

Figure 3 Route environment link review, outcomes from Saddle Survey
(Source SCC Maroochydore Cycleway Priority Cycle Route Improvement Plan, 2015)

Lessons learned

The saddle survey identified issues that were not identified in other background investigations.

Identifying priority movements

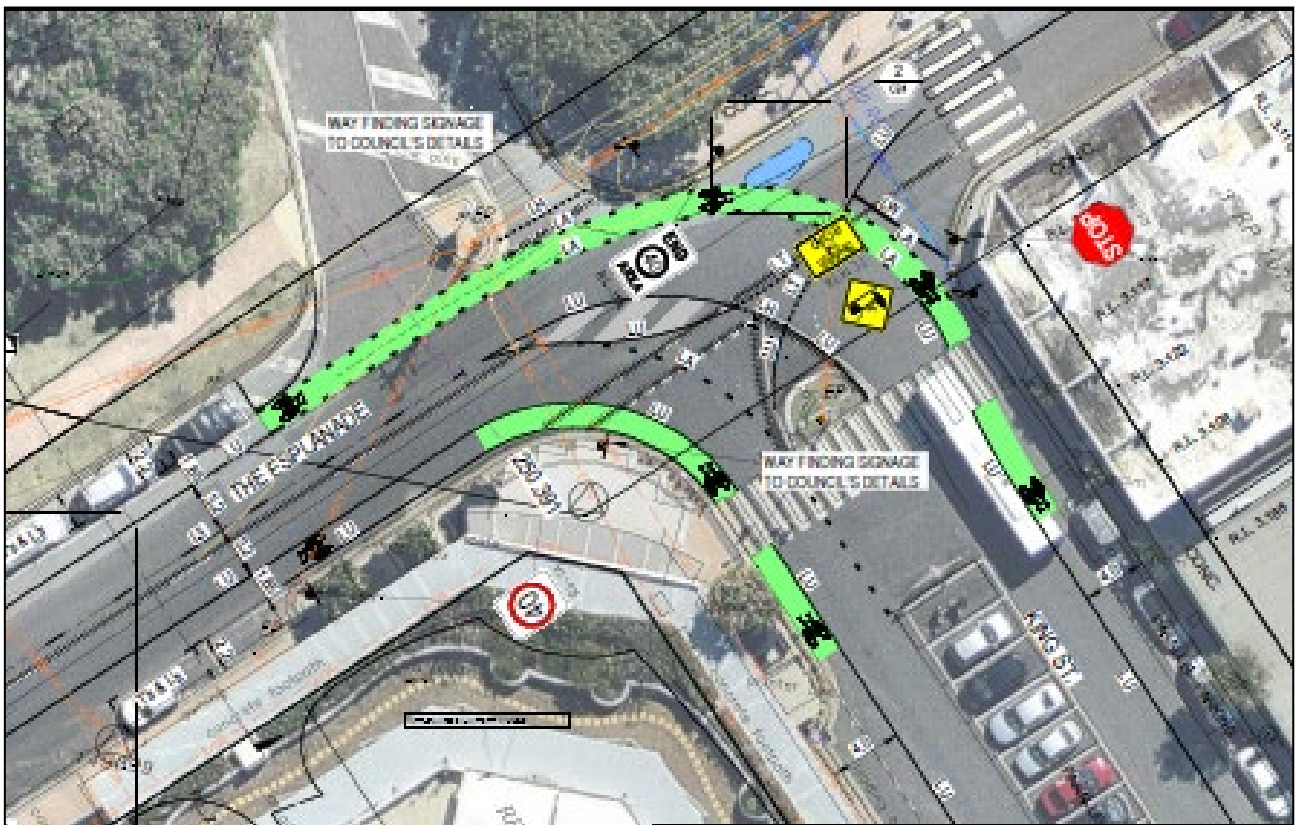
Poor legibility of the priority movement at King Street/Cotton Tree Parade intersection was noted as a potential hazard for bike riders (see photograph 1). This issue was not identified in the desktop analysis or user data but was experienced first-hand by auditors during the inspection.

As a result, the concept design sought to address legibility and priority for all users through this section of the cycleway (see photograph 2 overleaf).

Having the consultant take part in the saddle survey allowed them to bring 'fresh eyes' to identify opportunities which may not have been apparent to regular users of the route.



Photograph 1: King Street –The Esplanade/Cotton Tree Parade – unclear user priority, Maroochydore
 (Source: Imagery ©2016 Google, Map data ©2016 Google)



Photograph 2 King Street – The Esplanade/Cotton Tree Parade – proposed treatment, Maroochydore
 (Source: SCC Maroochydore Cycleway, Detail Plan, 2016)

Having fresh eyes on the issues

The benefit of a set of ‘fresh eyes’ in a saddle survey can identify opportunities which may otherwise be missed.

The saddle survey of the Maroochydore Cycleway route identified a better way to treat an existing desire line with a raised crossing on the western side of the T-intersection. The auditors had no previous familiarity with riding this priority route, and hence provided a new perspective which was able to be workshopped with the council to inform early concept design.

Application of saddle surveys elsewhere

Evidence of operational safety concerns

A saddle survey of a challenging cycle route in South Brisbane identified intersections as critical safety barriers for all users including pedestrians. The survey revealed that bike riders were significantly constrained by intersection phasing and inadequate storage.

Issues of this nature are often only understood when riding or walking.

Summary

A saddle survey is an effective tool to increase understanding of the route environment before selecting route treatment options. Performing a saddle survey, or at least a walk-through of the route, offers the opportunity to capture information which may not be present from other sources. It also provides an opportunity to collect photos of the environment which can be used to demonstrate the route’s issues and opportunities to stakeholders during consultation.

Saddle surveys can be undertaken at multiple stages of the PCRIP process to assist in confirming concept designs and the selection of treatment solutions.

PCRIP phase: groundwork

PCRIP themes: route environment review, issues and opportunities

References: PCRIP guidelines, groundwork phase



Photograph 3: Saddle survey, South Brisbane
(Source: Arup, 2016)

Case study 2

Case study 2: PCRIP pilot projects – setting route objectives

Abstract

Three local governments in Queensland undertook Priority Cycle Route Improvement Plan (PCRIP) Pilot Projects in partnership with the Department of Transport and Main Roads (TMR). The local governments produced concept designs to improve conditions for users along priority routes.

Each pilot project established route objectives. The objectives consider the needs of users, providing consistent standard of treatment, and cost effective and timely treatment options for the route environment. This enabled the projects to tailor treatment solutions to user needs such that the overall design benefitted current and potential users.

Understanding current use

Understanding the characteristics of existing bike riders and the purpose of their journeys is a critical first step in developing a PCRIP.

PCRIP projects should also consider the needs of users who may not currently be riding due to issues with safety or poor connectivity.

To develop and refine the route objectives for a priority cycle route, consider:

- **User needs:** Is there a bike user type and resultant trip purpose that the treatment options should target?
- **Continuity:** Which elements require continuity along the whole route to provide a consistent standard of facility that meets the needs of target users?
- **Affordability:** What cost effective solutions can be incorporated effectively and quickly to improve the user experience?

What are the characteristics of the existing users?

What is their trip purpose?

What infrastructure are riders currently using?

What are the barriers to attracting new riders?

PCRIP section 2.3

In action

The pilot projects were in areas characterised by different demographics, land use patterns, and bike user types. The route objectives, and early concept designs reflect the unique conditions of each site and are summarised below.

Cairns Regional Council – Mann Street Cycle Connection

Current/desired users

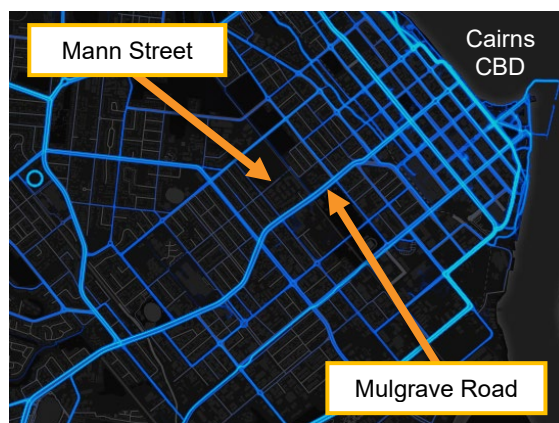
- Only confident bike riders were using Mulgrave Road from Westcourt to the CBD. This section is a highly trafficked, 4 to 6 lane median-divided road.
- Traffic speed, 9 sets of traffic signals, on-road cycle lanes and risk of being 'doored' by parked vehicles deter cautious or new bike riders from riding.
- Study area is within 3km of the Cairns Central Business District (CBD).
- 6.7% of residents in Westcourt ride a bike to work and 55% travel by car (as driver) (Source ABS).
- Majority of Westcourt population in 20-35yo age band (approx. 20%) followed by parents and home makers (35-49yo, 18.8%).
- Study area adjacent to Mann Street includes high-density residential, shopping centre, Cazaly's AFL Sporting Complex, Cairns District Junior Rugby League Grounds and Parramatta State School.
- CairnsPlan 2016 identifies Mann Street as a future neighbourhood road.

Route objectives

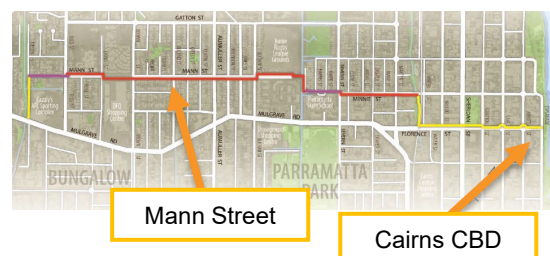
- Provision of a safer, more appealing and convenient cycle route that provides for less confident bike riders and existing riders.
- Priority for bike riders at intersections with quiet, low traffic volume streets, reducing travel times and stress levels for bike riders.
- Facilitate improved bike riding connectivity for residential, community and educational land uses.

Proposal

- Provision of a new facility along Mann Street in Westcourt and Minnie Street.
- Priority for bike riders at intersections along Mann Street (to reduce travel time) while minimising impact on the overall transport network.
- Three-metre-wide cycle path, separate from roadway in most places, connecting from/to schools, sporting facilities and attractors.
- Reduced traffic speed and Bicycle Awareness Zone where a separate path not able to be provided.
- The proposal offers less confident/cautious bike riders a safer alternative to Mulgrave Road.
- It has the potential to attract riders from Mulgrave Road, and provide a spine for a wider network of feeder routes into Cairns CBD.
- Case study 6 outlines priority intersection treatment proposals for the route.



Strava HeatMap showing high proportion of use along Mulgrave Road compared to Mann Street prior to project



Mann Street Cycleway route, CRC



Mann Street Cycleway route, CRC

Sunshine Coast Council – Maroochydore Cycleway

Current/desired users

- The priority cycle route between Alexandra Headland and Maroochydore City Centre is a key corridor for commuter, recreational and sport bike riding.
- The coastal path has the highest usage. Its users are characterised as cautious or novice bike riders or children that typically prefer separation from traffic.
- The coastal path is used for recreation by pedestrians, runners, dog-walkers and children playing. Activity increases during weekends and holidays.
- The direct route via Aerodrome Road and Horton Parade is hazardous for bike riders due to its narrow width and high traffic and heavy vehicle volumes.
- Riders on the Esplanade were mostly male and appeared to be commuter, sports and utility bike riders. Very few commuter riders were on-road.
- The coastal path is constrained in many sections. Conflicts with pedestrians result in delays to bike riders.
- The future target audience for this project is the commuter bike rider, sports bike rider and utility bike rider who want to feel safer when on road.
- The study area includes high-density residential and tourist accommodation, sport/recreation and community facilities, a local centre zone, and is close to the region’s Principal Activity Centre.

Route objectives

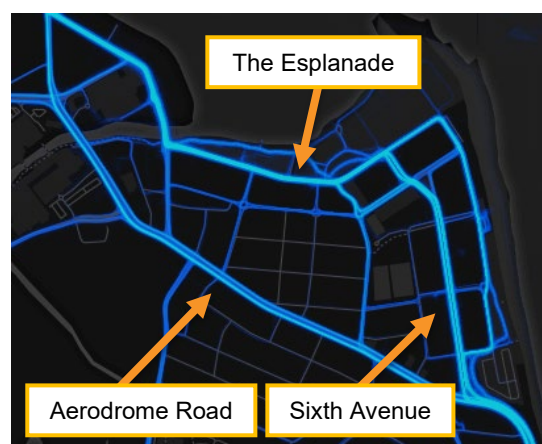
- Provide a safe, continuous on-road alternative to the coastal pathway, to encourage new commuters and more confident riders, and to improve access between Aerodrome Road, Cotton Tree and northern Maroochy CBD.
- Provision of a facility that is attractive to riders who are comfortable on-road and to free up capacity on the off-road coastal pathway.
- Make the route safer and more attractive for experienced bike riders.

Proposal

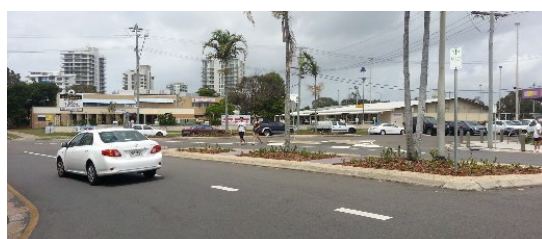
- Consideration of hook-turn intersection treatment and cycle lane facilities at, and prior to, Aerodrome Road/Sixth Avenue.
- Continuation of on-road cycle facilities along Sixth Ave through to King Street, with improved legibility and priority at Memorial Avenue and Cotton Tree Parade-The Esplanade. Improved continuity across First Avenue towards Cornmeal Parade.
- Reduce the traffic speed environment by introducing raised crossings along The Esplanade.



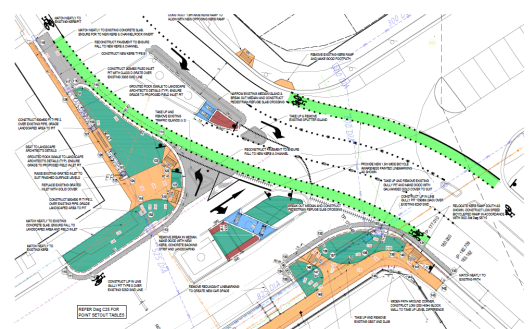
Existing cycle facilities in study area



Strava HeatMap showing high proportion of use along the coastal pathway, Sixth Avenue and Aerodrome Road prior to project



King Street: lack of cycle facilities and poor legibility between Cotton Tree



Improved on-road cycle provision and legibility from Sixth Avenue through King Street to The Esplanade.

Moreton Bay Regional Council – Bribie Island Cycleway

Current/desired users

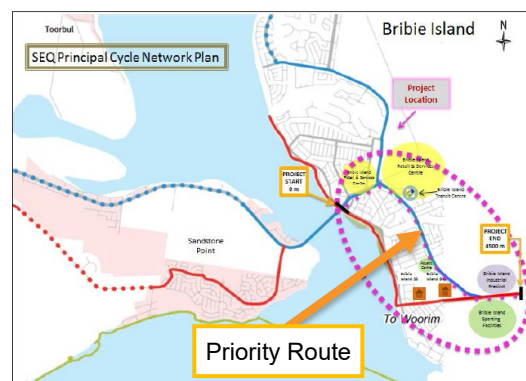
- The Bribie Island Cycleway extends from Bribie Island Bridge to its eastern beach. It follows the island's main corridor along Benabrow Avenue and Goodwin Drive, and connects to shopping, business, and industrial precincts.
- Bribie Island has a median age of 57 years. Children under 14 years make up 12%, and people over 65 make up over 35%.
- User types include a mix of elderly, young families, visitors and tourists, holiday makers (seasonal) and recreational bike riders. Observations on site confirm a high proportion of pedestrians assisted by mobility aids.
- Providing for access to services along the corridor – particularly for the elderly and people with disability – is a focus for upgrades.
- Current facilities are inadequate for walkers and bike riders. Poor connectivity, lack of legibility, and barriers for crossing the corridor for all users. Lack of safe alternatives for bike riders due to flow and speed of vehicles, particularly at intersections.
- The target audience also includes commuter/sports and utility riders, who may already be riding a bike on-road, or may wish to do so, but may be deterred due to safety at intersections.

Route objectives

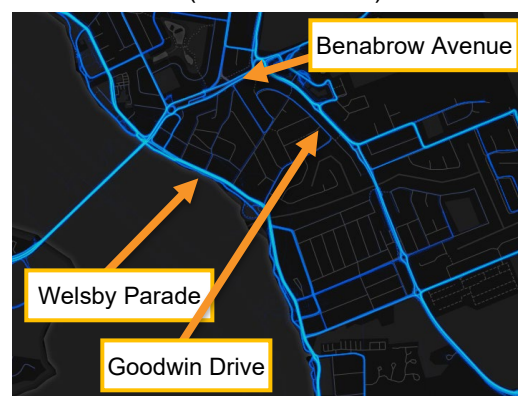
- Improve accessibility to Bribie Island town-centre for users of all mobility and confidence levels, by providing high quality and equally accessible off-road pathway connections.
- Increase the safety for all non-vehicle based trips by providing more defined priority and safer storage areas at intersections and conflict points.
- Where affordable, remove barriers to efficient and time competitive bike riding movements by reducing indirectness in the pathway network, and interruptions caused by crossings.
- Ensure cycling and other active transport infrastructure is explicitly designed for the range of movement devices accessing it, from bike riders to walkers and scooter users.
- Ensure that wayfinding signage is tailored for the range of user types and their respective destinations, and other signage provides adequate warning and clarity to support safe movement for both familiar and unfamiliar users.
- Provide explicit space for on-road bike riders along the length of the corridor, including treatment at intersections that improves safety, and further legitimises the use of roads by non-motorised travellers.
- Avoid reducing car parking where demand is high.

Proposal

- Consideration of a road-diet and on-road cycle facilities at the Goodwin Drive/Benabrow Avenue roundabout.
- Improved on-road cycle lanes.
- Enhanced crossing opportunity on Goodwin Drive with new zebra crossing.
- Improved off-road shared path with raised priority crossings at side roads/intersections, and kerb build outs to reduce turn-out vehicular speed.



Project study area in relation to the Principal Cycle Network Plan
(Source: MBRC)



Strava HeatMap showing current proportion of bike riders along Goodwin Drive, Benabrow Avenue, and along Welsby Parade



Benabrow Avenue—improved on-road bicycle lanes (Source: Google Maps Streetview)

Successful outcomes

Establishing route objectives for individual projects is an effective way of developing concept designs that meet the needs of target users in specific environments and assessing whether designs have met user needs. The following table summarises how this was achieved in each pilot project.

	Cairns Regional Council	Sunshine Coast Council	Moreton Bay Regional Council
Identified desired future users	<p>All ages and ability</p> <p>Less confident bike riders who would not currently use Mulgrave Road</p> <p>Confident bike riders currently using Mulgrave Road but who would prefer a safer facility with a comparative travel time</p>	<p>Primarily commuter, sports and utility bike riders</p> <p>Bike riders who are able to ride on path or on-road but want to feel safer when on-road</p> <p>Secondary beneficiaries – novice bike riders, pedestrians and children who will experience less conflict along the shared path</p>	<p>Primary off-road users</p> <ul style="list-style-type: none"> • utility, travelling moderate-fast for less than 5km • Primary on-road users • Utility and sport riders, travelling both fast and slow speeds with various levels of confidence and skills, coming from on or off the island <p>Secondary users –</p> <ul style="list-style-type: none"> • Mobility impaired (mobility scooters) and other recreational users • Pedestrians accessing the main centre • Recreational riders and tourists (primarily off-road)
Did the proposal address user needs?	<p>Early concept planning identified a wide shared path separated from general traffic flow, facilitating commuter, utility, recreational and educational trips by cautious or novice bike riders</p> <p>Priority crossing treatments at intersections along the route ensured there was the comparative travel time with Mulgrave Road to encourage existing riders to shift to Mann Street</p>	<p>The introduction of on-road lanes, a lower speed environment, and intersection treatments makes the route more attractive to experienced riders, but also enables the not-so confident bike riders to move from the shared pathway to the road.</p> <p>This has reduced pressure on the shared coastal path</p>	<p>The continuous on-road cycle facilities provide a more coherent and direct network for recreational users, as well as improving user safety at roundabout/s and past on-street parking along Benabrow Avenue</p> <p>The wide shared path along the southern side of Benabrow Avenue addresses broader mobility needs. It will improve shading, visibility and priority at intersections and access to community services, retail, businesses and attractions</p>

PCRIP phase: groundwork

PCRIP themes: route objectives, user characteristics, concept design

References: sections 2 to 3

Case study 3

Case study 3: Cycle route inspections – capturing outputs

Abstract

The preparation of a Priority Cycle Route Improvement Plan (PCRIP) requires a review of the current route environment. This will consider existing facilities and infrastructure, such as paths, signs, intersections, traffic volumes, road environment and conflict points.

This review feeds into the opportunities and issues analysis. It is also used to reconfirm route objectives before option development (see Figure 1).

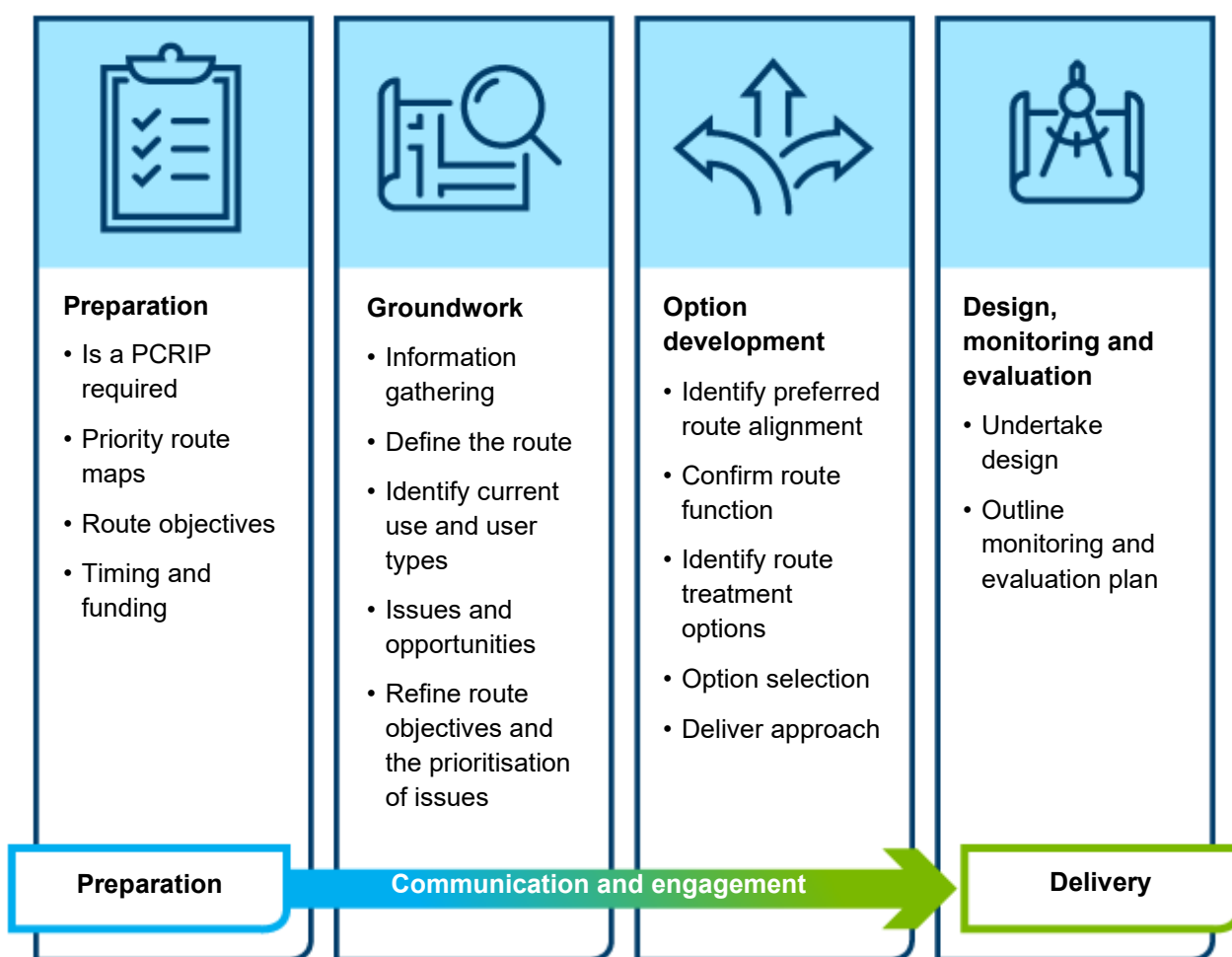


Figure 1 Phases of the PCRIP methodology

Approach taken

When piloting the PCRIP guidelines, Sunshine Coast Council (SCC) and Moreton Bay Regional Council (MBRC) took different approaches during groundwork to document the cycle route environment. SCC engaged a consultant and tabulated their results. MBRC used mapped based methods. In both cases, the councils' methodologies were effective in capturing and displaying the issues to be addressed during option development. The major differences in these approaches is summarised in the table below.

Sunshine Coast Council	Moreton Bay Regional Council
<ul style="list-style-type: none"> Engaged an external consultant Collected data through a saddle survey and walk-through Presented issues and opportunities primarily in tabular form Summed up issues visually along the study route. 	<ul style="list-style-type: none"> Undertook the process internally Collected data through a walk-through (multiple) Presented issues and opportunities on a map Captured visually the 'intent' of the study to aid subsequent stages and engagement with internal departments.

In action

SCC – Maroochydore Cycleway

In the SCC PCRIIP the consultants attempted to present the route environment review data visually in a map. They found the format was too cluttered such that key points and issues were not obvious to aid subsequent design/option development.

The priority cycle route was separated into 9 links, characterised by similar features and elements. The tabular format enabled them to give full details of the road environment, bike riding facilities, issues, opportunities and photos relevant to each link (see Figure 2 for example documentation). The table was accompanied by a summary map showing issues and opportunities along the route and key priorities.



Link ID	Link definition	Road environment	Cycling facilities	Photo	Issues	Opportunities
L4.0	Cotton Tree Parade (between Fourth Avenue and King Street)	AADT: 2,250 vpd (in 2011) Posted 50 km/h 2 lane, 2- way, undivided road On- road parking provided on both sides of the road 600 bus route	Bicycle Awareness Zone (BAZ) in both directions, there is also the shared use Coastal Pathway parallel to The Esplanade.		Poor design of shared path connection with road adjacent to the intersection with Fourth Avenue encourages unsafe crossing. High risk area for eastbound cyclists with vehicles accessing the angled parking at the north of the carriageway. Significant undefined (no line marking) space behind parking and at Fourth St intersection increase traffic speeds and risk for cyclists and pedestrians. Intersection at King Street/Cotton Tree Parade does not adequately define primary movement and bus route. This reduces efficiency and safety of intersection. Drainage grate behind angled parking can be a risk to cyclists due to alignment of grate.	Wide carriageway provides the opportunity to include on- road cycle lanes.
L5.0	King Street (between Cotton Tree Parade and Beach Parade)	AADT: 1,380 vpd (in 2011) Posted 50 km/h 2 lane, 2- way road On- road parking provided in the central median (between Cotton Tree Parade and Memorial Avenue) as well as kerbside parallel parking 600 bus route	None		High activity retail centre between Cotton Tree Parade and Memorial Avenue with parking in the central median and kerbside parallel parking provided. Increases risk to cyclists and pedestrians from cars. Narrow lane widths do not allow for bicycle lanes. Significant undefined (no line marking) space and slip lanes through Memorial Avenue intersection increase traffic speeds and risk for cyclists and pedestrians. Wide zebra crossing increases risk to pedestrians.	Sufficient width through Memorial Avenue intersection to provide cycle lanes.

Figure 4 Route environment review output for Links L4 and L5
 (Source: Maroochydore Cycleway, Priority Cycle Route Improvement Plan)

MBRC – Bribie Island Cycleway

MBRC developed its PCRIP using internal staff and resources. The staff performed a walk-through of the route to identify issues and opportunities that were then presented on mapping (e.g. aerial photography). This approach was effective for identifying constraints areas along the route. It also facilitated the identification of preliminary treatment options.

As the option development phase progressed, the method of illustrating route options remained in a mapped form. This provided enough documentation to support coordination with other departments. For example, the maps were used to identify where proposed works overlapped with future programs for rehabilitation and reseal. All parties involved in works along the corridor were easily able to understand the feasibility of the route treatments, prioritisation of treatments, other works on the corridor, and funding sources (see Figure 3).

'...capturing it [the route] visually helped explain what we wanted to achieve.'
 Source: MBRC

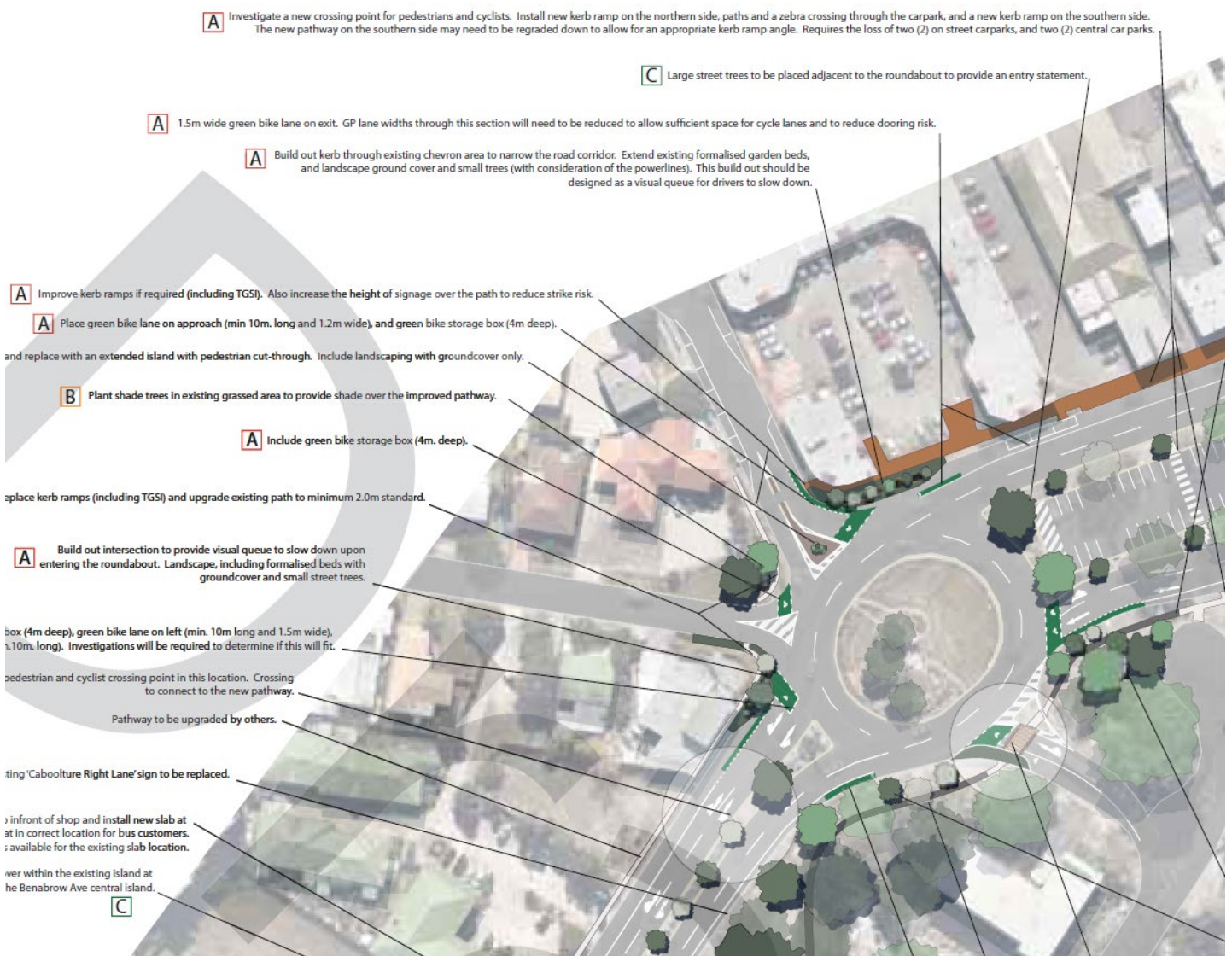


Figure 5 Visual concept design for Bribie Island cycleway study including prioritised treatment solutions
 (Source: Moreton Bay Regional Council, 2016)

Summary

The local government authorities (LGAs) were able to effectively evaluate the route environment and present this in a method easily understood by stakeholders and designers. The LGAs identified advantages and disadvantages to their approaches, as shown below:

Sunshine Coast Council		
Action	Advantages	Disadvantages
Engaging an external consultant	<ul style="list-style-type: none"> • Consultant assessed the route objectively, without a bias towards known issues or barriers • Did not require council resources. 	<ul style="list-style-type: none"> • Consultant may have less detailed understanding of route, end users and local issues compared to council staff • Can be more costly.
Performing a walk-through and saddle survey	<ul style="list-style-type: none"> • Identify issues not immediately apparent from desktop analysis or consultation • Able to experience level of comfort and perceived safety from a bike rider's perspective • Able to identify opportunities that could be addressed for walkers in same corridor. 	<ul style="list-style-type: none"> • Can be time consuming and costly • May be limited to one day, or time of the week which may not be representative.
Presenting issues and opportunities in tabular form	<ul style="list-style-type: none"> • Allows more complex information to be included • Allowed individual assessment of each link against route objective/s • Can be accompanied by a map to identify spatial issues. 	<ul style="list-style-type: none"> • Unable to see spatial relationships between links, issues or opportunities. • May be difficult for designers to identify spatial issues with route treatments • Not as effective for consultation purposes and demonstrating improvements along the route.
Moreton Bay Regional Council		
Action	Advantages	Disadvantages
Using internal staff and resources	<ul style="list-style-type: none"> • Council staff may have prior awareness of the route's issues and opportunities before starting, increasing efficiency of documenting the route environment • Can be less costly. 	<ul style="list-style-type: none"> • Council may be biased towards issues which are well publicised or where complaints have been received (objectivity).
Performing a walk-through	<ul style="list-style-type: none"> • Identify issues that not immediately apparent from desktop analysis or consultation • Readily accessible for all council staff and understand on site the feasibility of opportunities. 	<ul style="list-style-type: none"> • Can be time consuming and costly • Not able to fully experience the route from bike rider's perspective – may fail to identify some issues.
Presenting issues and opportunities on a visual map	<ul style="list-style-type: none"> • Easy to spatially co-ordinate with other information, such as rehabilitation works • Easier for designers to identify issues and feasibility of design (i.e. insufficient road width, drainage, lack of crossings and street clutter) • Allows identification of issues which could be improved with the same treatment • Allows prioritisation of treatment options • Enabled council to visually demonstrate the level of improved amenity they hoped to achieve. 	<ul style="list-style-type: none"> • Difficult to show photos or different viewpoints of issues (to garner robust route treatment option identification and selection process) • Not all important information can be included, as the map may become overcrowded.

Lessons and transferability

Two local governments undertaking the PCRIP pilot projects chose different methodologies to document and understand the route environment. Both methods effectively presented information leading to analysis of the issues and the design of treatments. When using the PCRIP guidelines, it is important that the methodology chosen:

- Presents all relevant information along the route
- Allows clear comprehension of the issues and opportunities for all involved in the planning and future option development phase
- Can be interpreted by designers and third parties
- Assists with identifying priority issues for treatment
- Can be presented in a way that enables coordination with other works or funding sources.

PCRIP phase: groundwork

PCRIP themes: current route environment; current use, issues and opportunities

References: PCRIP guideline, information gathering, issues and opportunities, Appendix A sample PCRIP form

Case study 4

Case study 4: Road diet at a high-speed roundabout

Abstract

Moreton Bay Regional Council (MBRC) trialled a road diet treatment at the Benabrow Avenue roundabout, Bribie Island. The successful pilot demonstrated how trialling, monitoring and evaluating innovative treatments can produce a good outcome for bike riders without compromising the wider road network.

Background

MBRC aimed to develop the Bribie Island Cycleway as a priority route for bike riders by implementing short term treatments which offer high value for money. The objectives for this route were:

- Improve accessibility to Bribie Island town-centre for users of all mobility and confidence levels by providing high quality and equally accessible off-road pathway connections.
- Increase safety for all non-vehicle-based trips by defining priority and providing safer storage areas at intersections and conflict points.
- Where affordable, remove barriers to efficient and timely bike riding movements by reducing indirectness in the pathway network and interruptions caused by crossings.
- Ensure that active transport infrastructure is explicitly designed for the types of users it services, including bike riders, walkers and scooter users.
- Provide explicit space for on-road bike riders throughout the corridor and include treatments at intersections that improve safety and legitimise the use of roads by non-motorised travellers.
- Support safety and efficiency-orientated infrastructure with amenity and streetscaping improvements where affordable and commensurate with the goals for the corridor.

The existing 2-lane roundabout at the eastern end of Benabrow Avenue intersects with Sunderland Drive and Goodwin Drive is shown in Figure 1. MBRC identified the safety challenges at this roundabout as:

- carries a large volume of traffic
- speed limit of vehicles entering the roundabout is 60km/h
- no current provisions for bike riders
- lack of legibility of the route for bike riders navigating the roundabout to key destinations.

Considering innovative or non-standard treatments can lead to a good outcome while maintaining safety.

In action

MBRC identified and analysed a suite of options to improve the safety and usability of the Benabrow Avenue roundabout for bike riders. The preferred option was a road diet treatment which removed one of the circulating lanes within the roundabout. This was supported by the introduction of bicycle storage boxes at the give way lines as shown in Figure 1¹. The benefits of this approach are:

- reduced speed of vehicles using the roundabout
- bike riders are more visible at the entry to the roundabout
- increased visibility of bike riders circulating the roundabout.

¹ Regarding the use of bicycle storage boxes, please refer to Austroads guidance for the most up-to-date design guidance.

- priority and clearer definition of correct lane positioning for bike riders at the roundabout.



Figure 6 Benabrow Avenue roundabout today [left] and with road diet option design [right]
 (Source: Moreton Bay Regional Council, ©Nearmap)

As a road diet treatment had not been used by MBRC before it was initially installed as a trial. A monitoring and evaluation program was established to test whether the treatment was achieving the objectives – in particular to assess the vehicle speed reduction at the intersection and behaviour of motorists and bike riders.

During the early consultation process concerns were raised by MBRC’s Network Planning department regarding the reduction in roundabout capacity associated with removing a circulating lane. They were concerned it would lead to a decreased level of service throughout the wider network. The interests of the 2 groups within MBRC were:

Council’s Bribie Island Cycleway project team interests	Council’s Network Planning interests
Providing a safe on-road facility for bike riders along the priority cycle route.	Maintaining an acceptable level of service at the roundabout so there is no adverse influence on the wider road network.

Success

MBRC undertook traffic modelling to assess how the design would impact the surrounding road network until 2031. Results showed that the level of service of the modified roundabout would still be acceptable in the long-term future.

The Department of Transport and Main Roads further challenged MBRC to consider a scheme that would benefit bike riders beyond the roundabout to the Bribie Island Bridge.

The trial road diet on the Benabrow Avenue roundabout was monitored and found to be successful in achieving the route objectives of increasing safety and connectivity. Feedback from the local community suggests the roundabout feels safer and is less confusing to use.

Lessons and transferability

The successful implementation of a road diet in MBRC’s Bribie Island Cycleway demonstrated that:

- It is beneficial to consider a broad range of treatment options

- Considering innovative or non-standard treatments can lead to a good outcome
- It is important to negotiate with other internal departments to have early 'buy-in' and ensure other network functions are not compromised
- Implementing and monitoring a trial treatment ensures the treatment meets the route objectives and provides lessons learned for other opportunities.

PCRIP phase: option development

PCRIP themes: roundabout treatments, option selection, trial treatments

Case study 5

Case study 5: Before and after study of a major intersection

Abstract

The Maroochydore Cycleway Priority Cycle Route Improvement Plan (PCRIP) identified a need for better facilities at the intersection of Aerodrome Road and Sixth Avenue to improve priority for bike riders and address safety issues relating to road geometry and car parking.

The PCRIP guidelines option selection process helps practitioners consider multiple issues, including safety, visibility, environmental/location constraints, adjacent land uses, and property needs. This case study outlines how the Sunshine Coast Council (SCC) applied the process to identify treatments on a complex intersection.

Background

Bike riders travelling west on Aerodrome Road are required to make a right turn across 2 lanes of traffic to access cycle lanes on Sixth Avenue. During the evaluation of the current network, SCC identified several opportunities at this intersection that could improve bike rider and pedestrian safety (Figure 1). Primarily, there was no provision for riders travelling westbound on Aerodrome Road to turn right into Sixth Avenue. Data showed that bikes avoid riding on-road along Aerodrome Road.

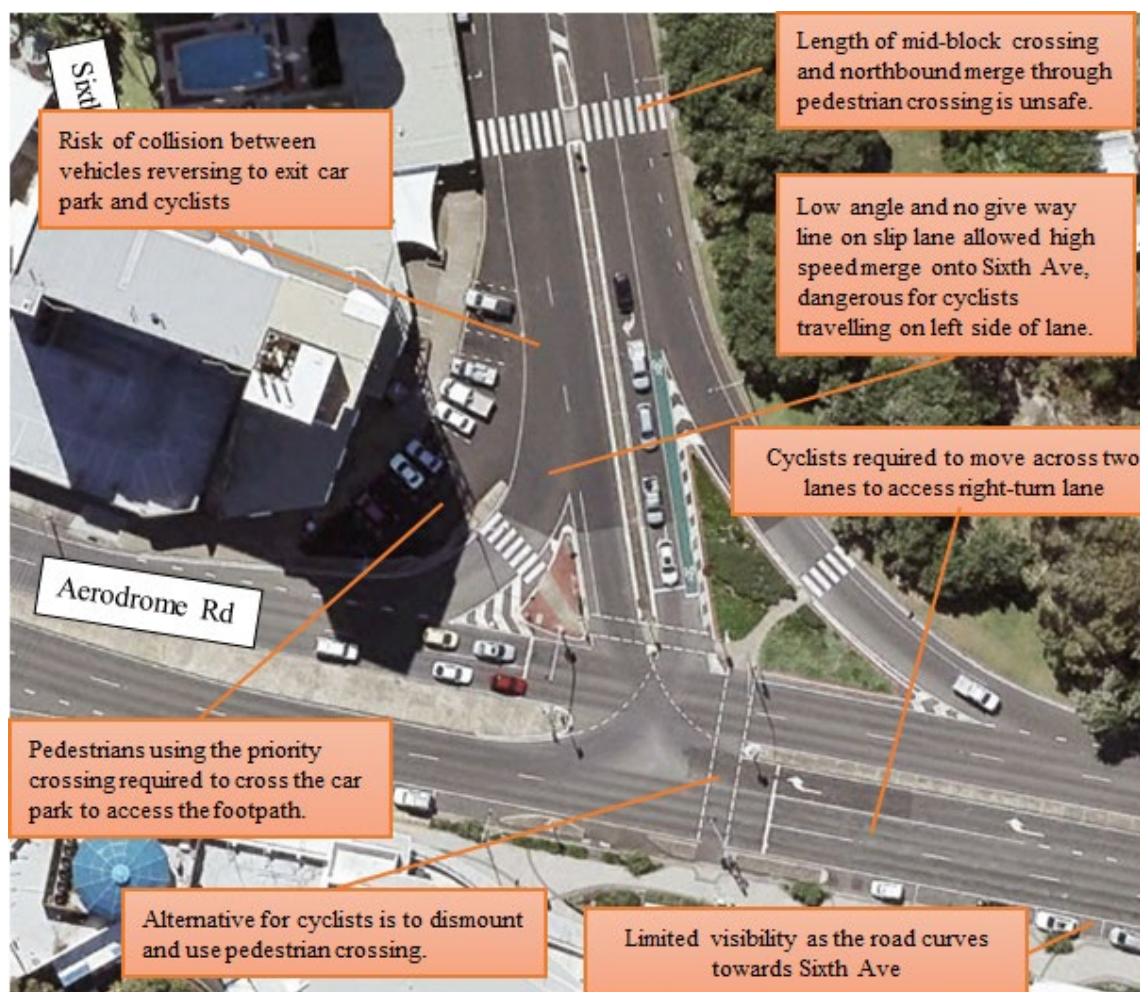


Figure 7 Safety concerns at Aerodrome Road and Sixth Avenue intersection
(Source: Sunshine Coast Council, 2015)

Priority route objectives were to:

- Provide a safe, continuous on-road alternative to the coastal pathway to encourage new commuters and more confident riders and to improve access between Aerodrome Road, Cotton Tree and northern Maroochy CBD.
- Provide a facility that is attractive to riders who are comfortable on-road and to free up capacity on the off-road coastal pathway.
- Make the route safer, and more attractive for experienced bike riders.

In action

Figures 2 and 3 present the Aerodrome Road/Sixth Avenue intersection concept design proposals with respect to:

- car parking
- lane reduction on Sixth Avenue
- hook turn storage at signals on Aerodrome Road.

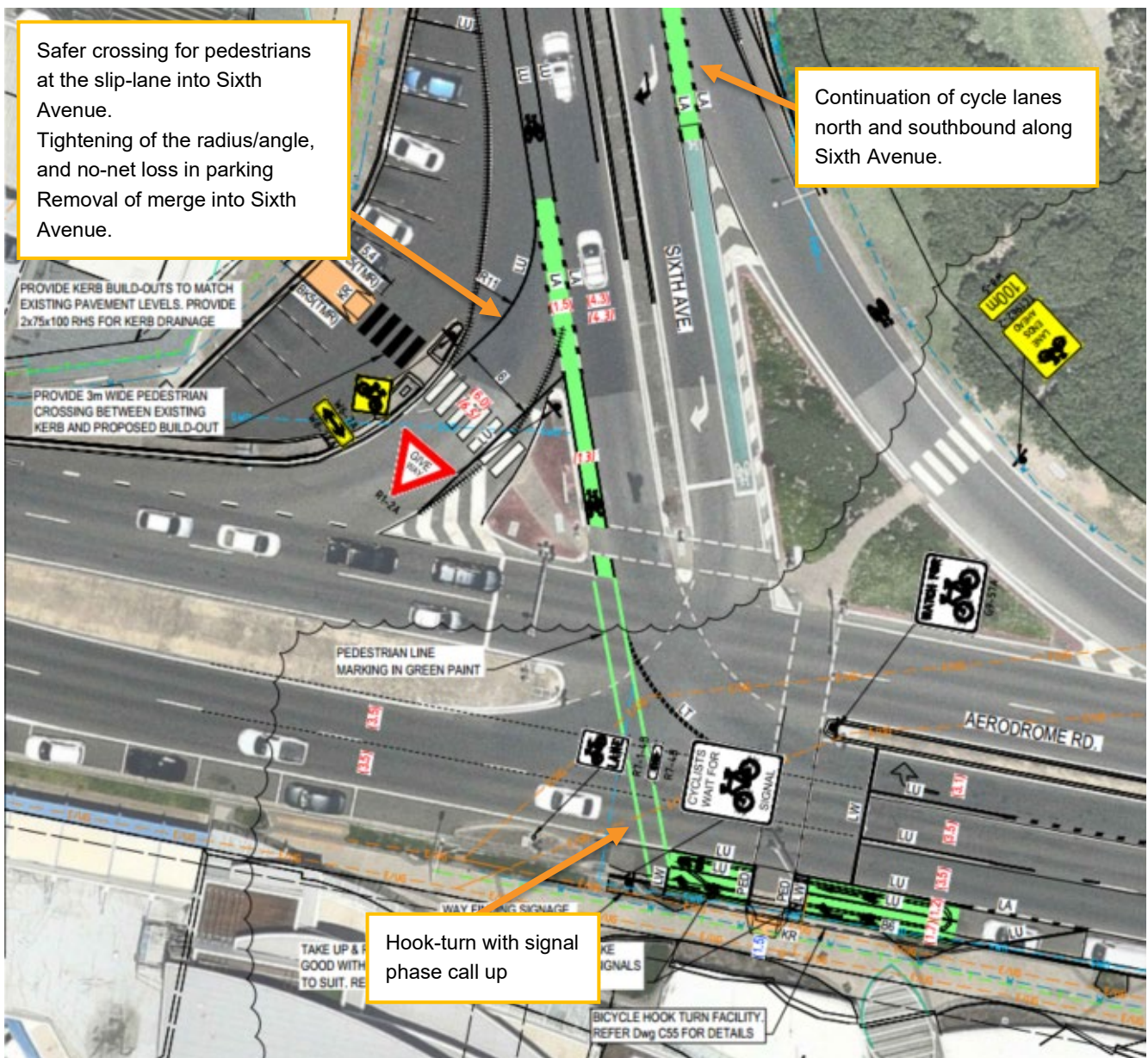


Figure 8 Aerodrome Road/Sixth Avenue intersection concept design proposal
(Source: Sunshine Coast Council, 2018)

Process

Effective use of consultation

SCC undertook targeted consultation and a parking utilisation survey as part of the early concept planning for the study. Findings indicated removal of parking was a key issue for local businesses. As a result, SCC's early concept planning sought to minimise the loss of parking, whilst addressing design improvements required to improve safety and functionality for all users of the route.

Effective use of modelling

A performance assessment was undertaken of the Aerodrome Road/Sixth Avenue intersection. The assessment incorporated a bicycle hook turn phase to enable bike riders to clear the intersection unopposed by vehicles. It demonstrated the intersection would operate well within capacity with the introduction of the hook-turn, providing confidence for consideration of this option.

Lessons and transferability

The project addressed most, but not all key objectives at this location. The right turn movement and improved bicycle lanes at Sixth Avenue were included. However, concerns about parking remained a key issue and parking was not removed at the approach to the right turn bay as originally proposed.

The installation of the hook turn storage box and alteration of the intersection phasing remains outstanding. A learning from the project has been the need to allow sufficient lead time for alterations to TMR signalised intersections.

The project outcomes reflect a compromise, whilst still addressing the most significant issues for riders at this intersection (see Figure 4).

This case study outlines how SCC considered 3 components of feasibility in finalising the design:

- **Technical:** how the option addressed the route objectives – in particular, safety and continuity of the on-road facility, as well as making it more attractive for experienced riders.
- **Support:** how the option is likely to be supported by stakeholders and the public – this was captured through extensive targeted consultation and backed up by survey evidence, which influenced the choice of preferred options that affected parking provision.
- **Cost:** how the option delivers value for money – several safety issues at the intersection addressed by a small number of treatments.

PCRIP phase: option development

PCRIP themes: route treatment options, option selection, communication and engagement

References: option development, communication and engagement

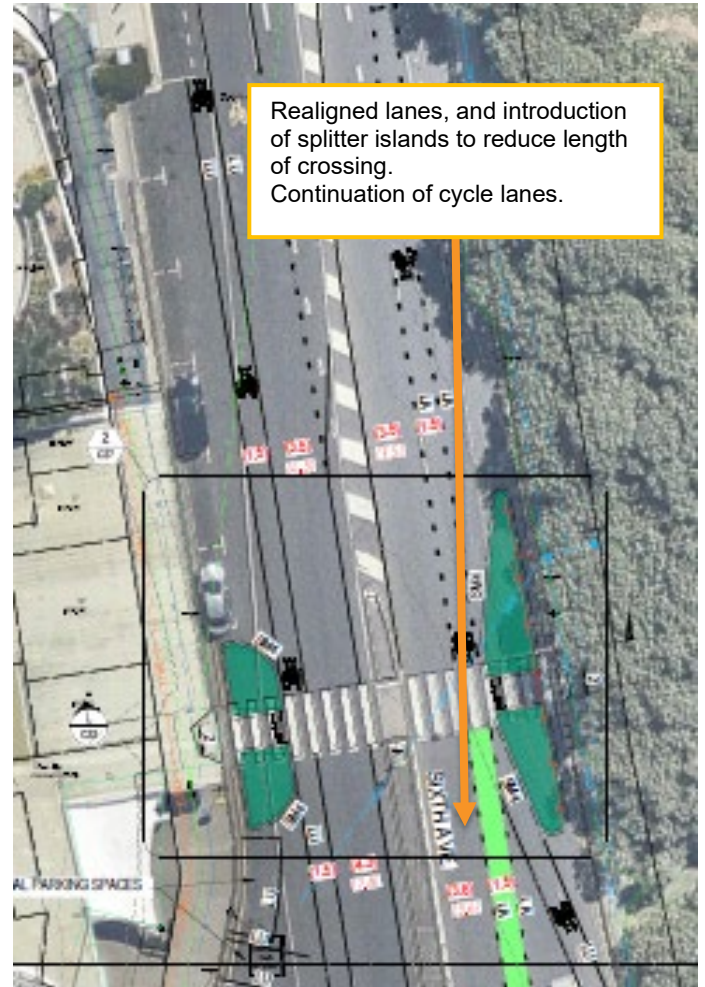


Figure 9 Sixth Avenue improved pedestrian mid-block crossing

(Source: Sunshine Coast Council, 2016)



Figure 4 Sixth Avenue improved pedestrian crossing, bike lanes and protected right turn for bike riders
(Source: Nearmap 2020)

Case study 6

Case study 6: Improving intersections on a priority cycle route

Abstract

Cairns Regional Council's (CRC) Mann Street Cycle Connection applied different intersection treatments to provide bike riders with safe and efficient access across lower and higher order roads.

Route objectives

The Mann Street Cycle Connection primary route objectives were to:

- Provide a safer, more appealing and convenient bike riding route suitable for less confident bike riders as well as existing riders using the busy Mulgrave Road.
- Provide priority for bike riders at intersections across low traffic volume streets to reduce travel times and stress levels for bike riders.
- Facilitate improved bike riding connectivity for residential, community and educational land uses.

'Minor intersections require clear sight lines; clearly delineated and non-hazardous travel paths and unambiguous indication of priority.'

Source: Bicycle Network 2016

Background

Cairns Regional Council (CRC) sought to create a 3.8km high-quality separated cycleway between Cairns' western suburbs and the CBD. The aim was to attract a wide range of bike riders by providing a safer, high quality alternative route to the 4-6 lane Bruce Highway – Mulgrave Road corridor.

While most of the route is on low traffic streets, the main challenge was the high number of crossings of higher order and lower order roads (refer to Figures 1 to 4 below). These intersections presented bike riders and pedestrians with several issues:

- lack of safe crossing
- lack of priority along the priority route
- delay in crossing each intersection and route (compared with navigating the signalised crossings on the Bruce Highway-Mulgrave Road route)
- lack of visibility to other users
- speed of traffic making crossing unsafe or stressful.



Figure 1 Minnie Street/ Severin Street, 2015—no priority for bike riders (Source: TMR 2015)



Figure 2 Mann Street at Hector Close—priority exists for bike riders (Source: TMR 2015)



Figure 4 Mann Street, Creedy Street, 2016—priority exists for bike riders (Source: Arup 2016)



Figure 3 Mann Street, Boland Street, 2016—priority exists for bike riders (Source: Arup 2016)

In action

The option development phase aimed to adopt a consistent priority treatment and design intent for the route. This required consideration of the context of each intersection in terms of movement patterns for other users, adjacent land uses, and environmental/physical constraints. The table below summarises the intersection configurations, crossing treatments and safety improvements proposed.

Intersections	Before project	After project
Priority to cycle crossing	8 intersections	10 intersections
No priority to cycle crossing	6 intersections	4 intersections
No crossing treatment	All intersections	<ul style="list-style-type: none"> Only 1 untreated intersection remaining (i.e. unable to install new concrete islands and/or line marking within the median due to severe space constraints)
Improved crossing safety	n/a	<ul style="list-style-type: none"> 8 existing priority intersections treated to improve safety 2 new priority intersections installed 3 existing non-priority intersections treated with new concrete islands and/or line marking within the median.

Along the priority route, bike riders already had priority at 8 streets and these were easily treated with priority crossings. Figures 5 and 6 illustrate a typical treatment for the existing priority (non-signalised) intersections.

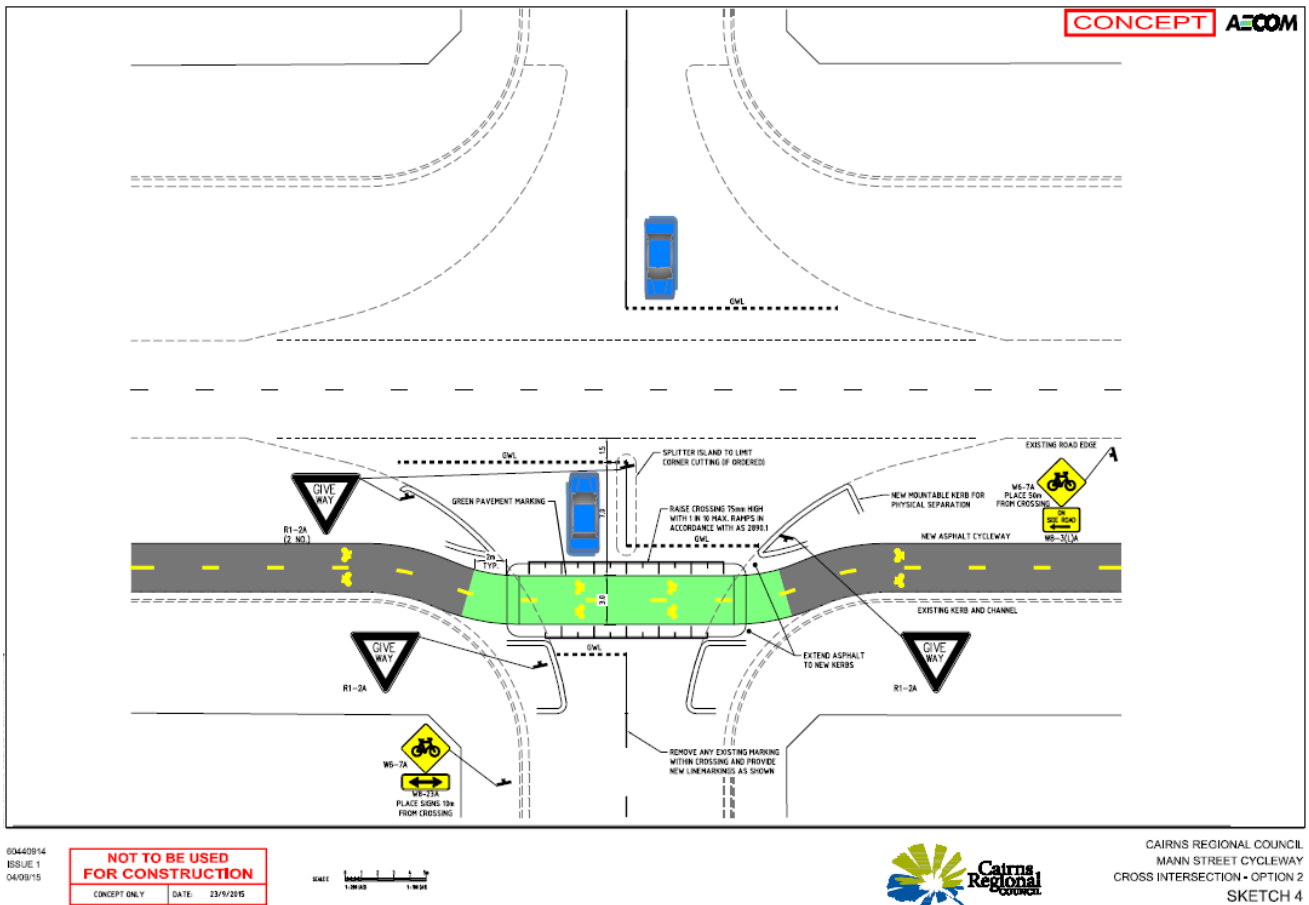


Figure 5 Priority intersection treatment option solution for Mann Street’s intersections treatments (Source: Cairns Regional Council, 2015)

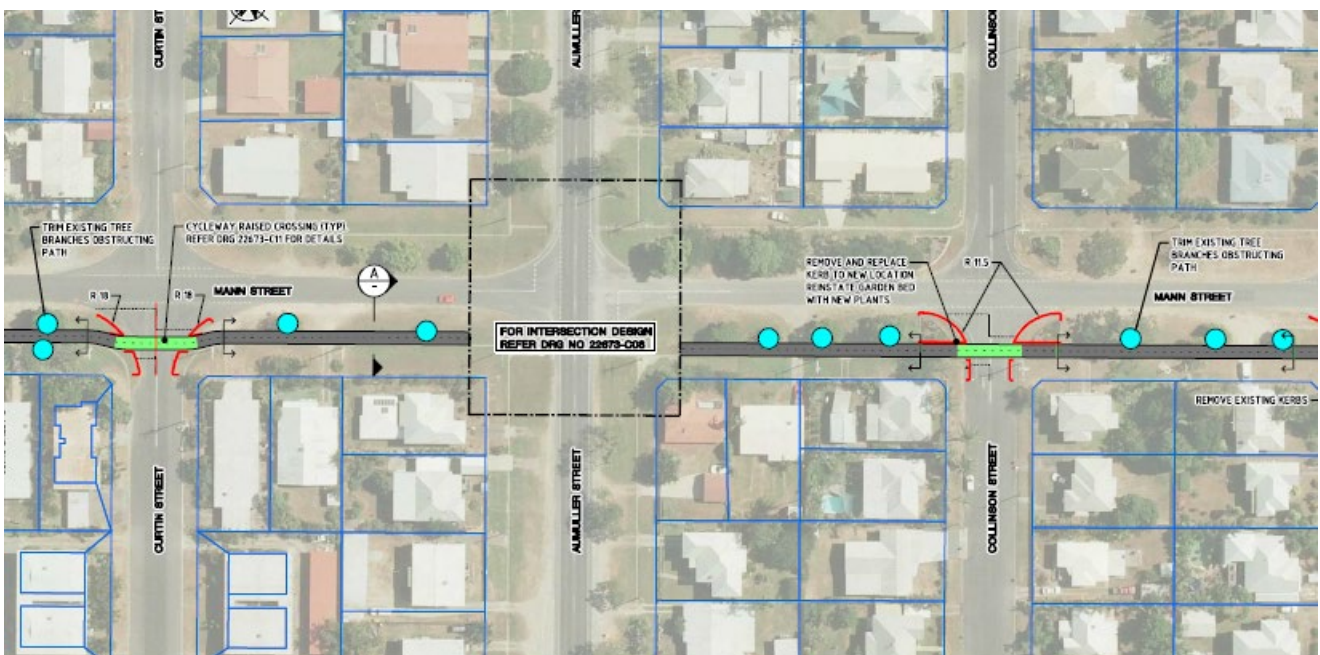


Figure 6 Mann Street Cycleway, Concept Design–Priority intersection treatments (Source: Cairns Regional Council, 2016)

The remaining 6 intersections along the route did not have priority for bike riders. It was particularly important to treat these intersections to achieve the route objectives to improve safety, reduce travel times and enhance route continuity, journey experience and attractiveness.

Treatments at these intersections included:

- Buchan Street – changed traffic conditions to give priority to Mann Street over Buchan Street
- Tills Street and Martyn Street – concrete island refuges installed to improve safety
- Severin Street – introduced a pedestrian crossing with existing line marked car parking bays moved closer to the roadway and re-line marked to provide a continuous path
- Brown Street – required specific consideration to address drain crossing (refer to Figure 7). Design review recommended a priority treatment and drain crossing to meet route objectives
- Aumuller Street – a concurrent project was underway to upgrade the road to 4 lanes. Design review recommended a crossing treatment. Treatments included a cut-through refuge and green treatments for existing bicycle lanes on Aumuller Street (refer to Figure 8 and 9).



Figure 7 Brown Street/Mann Street intersection, Cairns (Source: Arup, 2016)



Figure 8 Aumuller/Mann Street intersection, Cairns [Left]—shows completed cycle refuge crossing. [Right] – shows on-road facilities looking south (Source: Arup 2016)



Figure 9 Before and After: Aumuller/Mann Street intersection, Cairns
(Source [left]: ©Google, Source [right]: Arup, 2016)

Concept design outcomes

Figure 10 presents a summary plan of the proposed route and intersection design outcomes.

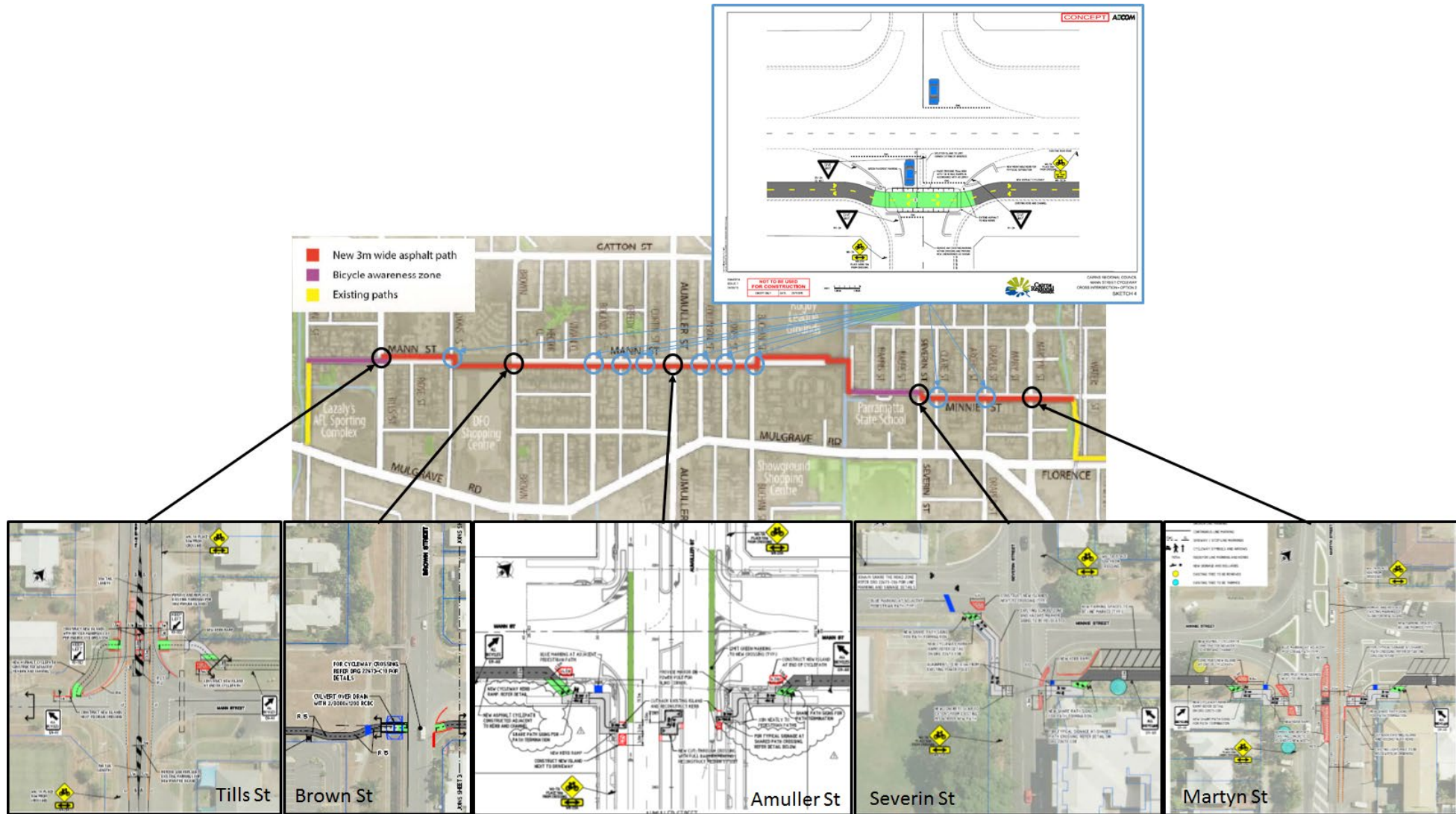


Figure 10 Summary plan of the proposed route and intersection design outcomes (Source: Cairns Regional Council, 2016)

Lessons and transferability

Early project concept designs at the non-signalised intersections failed to achieve key route objectives. By introducing specific intersection treatments to improve priority for bike riders, the project was able to achieve improved safety, reduced travel times, enhanced route continuity, improved journey experience and greater attractiveness to new bike riders.

The option development design review process enabled Council, its consultants and key stakeholders to ensure the chosen design treatments were consistent with the route objectives.

This project underlines the importance of reconfirming route objectives in the groundwork phase of the PCRIP guidelines. This ensures issues and opportunities are identified early in the project and additional data can be sourced if required to confirm the proposal achieves objectives.



Figure 11 Mann Street and Lyon Street intersection, Cairns (Source: Arup, May 2016)

PCRIP phase: option development

PCRIP themes: intersection treatments, treatment selection, priority at intersections

References: PCRIP guideline, typical route treatment options, Appendix C treatment option tables

Case study 7

Case study 7: Using consultation effectively at early concept stage

Abstract

Consultation is often undertaken later in project lifecycles after options have been developed. This case study demonstrates how one council undertook targeted consultation with the community as part of early concept planning. As a result, the council developed cycle infrastructure solutions that improved outcomes for other users and were well received by the community.

Background

Prior to this project by Sunshine Coast Council (SCC) there were 2 main cycle routes from the Maroochydore CBD to Alexandra Headland (see Figure 1):

- The most direct route via Aerodrome Road and Horton Parade has high traffic volumes, on street parking and no designated space for people riding bikes.
- The existing coastal route contains a mix of bike riding provisions including a shared pathway along the coast and bicycle awareness zones (BAZ) along some of the parallel road route.

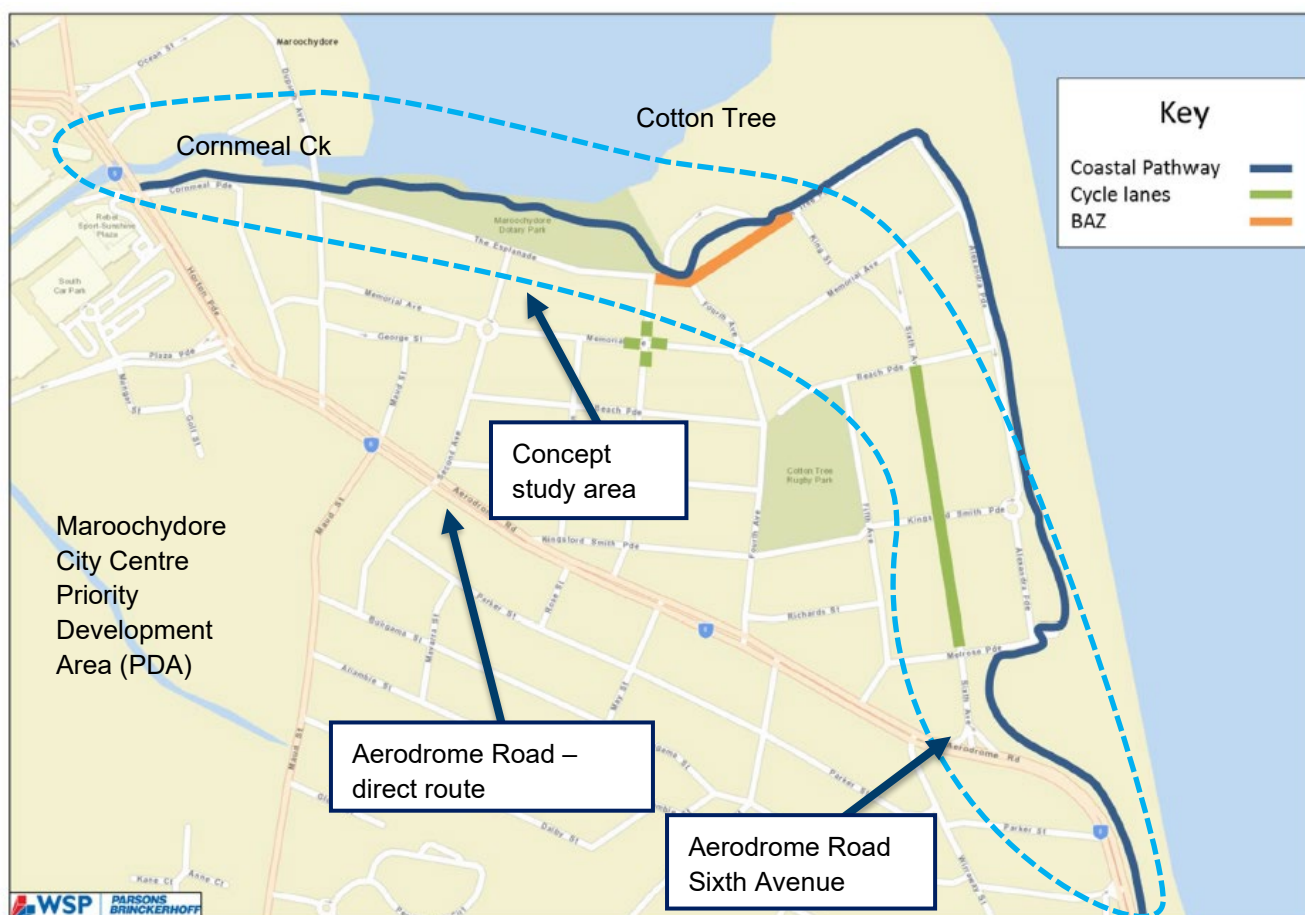


Figure 10 Existing cycle routes and facilities in study area
(Source: SCC, Maroochydore Priority Cycle Route Improvement Plan, 2015)

The project aims were to:

- provide a safer alternative to the current route along Aerodrome Road for commuters and experienced bike riders
- take the pressure off the busy coastal pathway by providing an alternative facility.

As part of early concept planning, Council's consultant developed a 2-stage consultation program.

In action

Stage one consultation

The first stage of was developed to:

- inform the documentation of the current route environment
- identify treatment options
- refine route objective with the desired users in mind.

The following stakeholders were engaged:

- local councillors
- local community
- internal stakeholders within SCC
- Cycling Reference Group (CRG). This includes representatives from other government agencies, local businesses and bicycle user groups.

The local Sunshine Coast community was engaged via an online survey on Council's Facebook page (see Attachment A). The survey was also distributed via the CRG to engage with existing users. Council provided a prize incentive for survey participants.

The online survey (see Attachment A and B) asked the community to respond to:

- rank route issues into 'major', 'minor' and 'not an issue'
- list their 3 most important issues on the route
- identify how often and the purpose of their trips on the cycle route
- information about the respondent (gender, age, capability, resident and so on).

Stage two consultation

The second stage helped refine option development and feasibility of route treatments in the vicinity of Aerodrome Road and Sixth Avenue (see Figure 1). Consultation addressed:

- kerbside parking changes along Aerodrome Road and the northwest corner of Sixth Avenue
- unsafe manoeuvres caused by current parking arrangements
- impacts on safety for drivers, pedestrians and bike riders.

Stakeholders were engaged via 'face to face' meetings and through direct written consultation with all businesses and property owners (e.g. flyers, letters). The focus was the effect of parking changes in the Aerodrome Road – Sixth Avenue section of study area.

Meetings were conducted with some stakeholders whilst others provided written or verbal responses to proposals. Council officers also undertook a door knock of commercial properties along Aerodrome Road.

A series of parking occupation/utilisation surveys were to identify the potential impact of parking changes (See Figure 4). This was useful to inform discussions with business owners.

Utilising Council's Facebook page enabled the survey to be accessed by a broad cross section of interested users of Maroochydore's walk and cycle network. This helped Council identify the need (essential or desired) and priority of addressing the issues in line with the objectives for the route.



Figure 3 Existing car parking provision off Sixth Avenue Aerodrome Road, Maroochydore, 2015



Figure 4 Location of Parking bays surveyed in the vicinity of Aerodrome Road and Sixth Avenue Intersection
(Source: SCC Maroochydore Cycleway Priority Cycle Route Improvement Plan, 2015)

Results

Stage one consultation

The social media survey captured a broad range of views from the local community. The most important issues on the route were identified as:

- current shared path can sometimes become too crowded for bike riders to use
- parked cars opening doors or pulling out of bays create hazards for bike riders
- lack of separation between traffic and bike riders
- lack of continuity and bike riding provisions on some routes.

From this information, Council and its consultant were able to identify opportunities and treatment options/solutions to address these issues.

Stage two consultation

Council received a wide range of responses from this stage of engagement:

- bike riding commuters were in support of a safer bike riding experience along Aerodrome Road
- commercial business operators voiced concerns over a reduction in parking and impact to operations
- broader concerns over the availability of spaces because parking time limits did not encourage high turnover
- opportunities to provide indented parking provision through the loss of landscaping.

The parking survey provided evidence in support of a reduction in parking. It demonstrated occupancy of 75% on a Saturday and 70% on weekday for the spaces at the north-west corner of Sixth Avenue, and 56% for Saturday and 59% for a weekday for the Aerodrome Road parking zones.

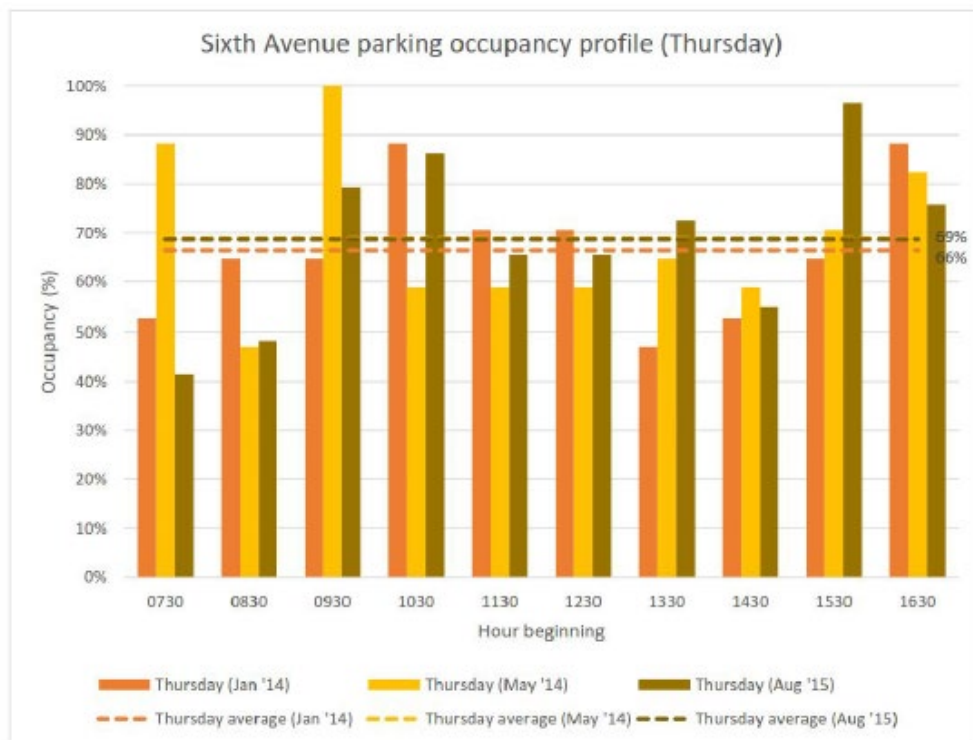


Figure 5 Sixth Avenue parking survey results–weekday
(Source: SCC Maroochydore Cycleway Priority Cycle Route Improvement Plan, 2015)

The evidence of existing parking behaviour did not convince business operators that the removal of some parking would not be significantly detrimental to business viability. This concern resulted in a compromise where the majority of on-street parking was retained in the final configuration.

Lessons and transferability

- targeted consultation can be useful in gaining information from a particular group of people/stakeholders at multiple stages of a project. Careful planning is required to identify stakeholders and capture feedback
- connecting with the wider community is important and can be achieved with a well-publicised online survey with an incentive. Prizes can present good value for money in encouraging survey uptake
- early engagement can identify opportunities that could otherwise be overlooked
- workshops and public displays can supplement online processes
- engaging with businesses can identify issues and opportunities for consideration
- collecting data to provide evidence in support of proposed parking changes is valuable
- timing of engagement should consider other studies with similar issues being addressed with the community. Coordination of such activities might facilitate early political support and help create a sense of ownership of the issues.

PCRIP phase: communication and engagement

PCRIP themes: external consultation, engagement methods

Attachment A: On-line community survey conducted on SCC Facebook page targeting the SCC community

Maroochydore Cycle Route Improvement survey

The Sunshine Coast Council is currently in the process of planning and designing cycle network improvements through Maroochydore. Council is investigating cycle route for improvements for a route that would likely use the following roads: Sixth Avenue, The Esplanade, Cornmeal Parade and First Avenue (see image below).

In answering the survey questions please limit your responses to the general corridor identified. Should you have other comments or concerns in regards cycle infrastructure elsewhere on the Sunshine Coast please contact Council offices on mail@sunshinecoast.qld.gov.au



1. Have you cycled along any sections of the cycle route through Maroochydore?
 - A. Yes
 - B. No
2. On average, how frequently do you cycle along the route?
 - A. Daily
 - B. At least once a week
 - C. At least once a month
 - D. At least once a year
 - E. Rarely or never

Figure 6 Maroochydore cycle route improvement survey questionnaire (continued over page)
(Source: SCC Maroochydore Cycleway Priority Cycle Route Improvement Plan, 2015)

Figure 6 Maroochydore cycle route improvement survey questionnaire (continued)

3. On average, what is (or would be) the main reason that you cycle along the route?
 - A. Commute to work
 - B. Recreational cycling
 - C. Training or group rides
 - D. Cycling to school

Accessing shops, restaurants, the market, the beach, etc.

4. Rank the following elements according to whether they are issues along the route (Ranking: major, minor, not an issue)
 - (i) Lack of continuity of bicycle lanes/paths
 - (ii) Traffic volumes and speeds
 - (iii) Conflicts with parked cars
 - (iv) No separation from traffic
 - (v) Unsafe intersections
 - (vi) Lack of signage of cycle route
 - (vii) Aggressive driver behaviour
 - (viii) Personal safety or security concerns
 - (ix) No bicycle parking
 - (x) Conflicts with pedestrians
 - (xi) Other issue (please identify below)
5. Please provide details of any other issue identified.
6. Please identify the three most important issues (and location if appropriate) that need to be addressed to improve cycling along the route.
 - (i) Open response field (limit to 140 characters)
 - (ii) Open response field (limit to 140 characters)
 - (iii) Open response field (limit to 140 characters)
7. What is your gender?
 - A. Male
 - B. Female
8. What is your age?
 - A. < 12
 - B. 12 - 18
 - C. 30 - 39
 - D. 40 - 49
 - E. 50 - 59
 - F. 60 - 69
 - G. > 70

Figure 6 Maroochydore cycle route improvement survey questionnaire (continued)

9. How would you rate your cycling ability?

- A. Novice
- B. Cautious
- C. Confident

10. Are you a Sunshine Coast resident?

- A. Yes
- B. No.

11. If you want to participate in the lucky draw for a bicycle (open to Sunshine Coast residents), please provide contact details.

Name:

Suburb:

Postal code:

Email address:

Phone number:

Figure 7: Project website seeking input (Source: SCC Maroochydore Cycleway Priority Cycle Route Improvement Plan, 2015)

The screenshot displays the Sunshine Coast Council website interface. At the top, there is a navigation bar with 'Sites', 'Contact Council', social media icons, and 'MyCouncil Login'. Below this is a main menu with icons for 'Experience Sunshine Coast', 'Living and Community', 'Environment', 'Business', 'Development', 'Council', and 'Pay and Apply'. A red maintenance banner states: 'Council's corporate website will be unavailable on Monday 30 May between 12 and 12.30 pm for maintenance. For more information visit council's Sites Status page.' Below the banner, a weather widget shows '19°' and a search bar. The breadcrumb trail reads: 'Home > Council > News Centre > Have your say on Maroochydore cycle routes'. The main content area features a sidebar titled 'In this section' with links for 'Headlines', 'News', 'Council TV', 'Councillor News', 'Search News Centre', and 'Newsletters'. The main article is titled 'Have your say on Maroochydore cycle routes' and is dated 'Thursday 07 May 2015'. The article text reads: 'Council is investigating how it can best improve the cycle network in Maroochydore, and is inviting residents to have their say via a short survey. The study focuses on a route along Sixth Ave, Cotton Tree Esplanade, Commeal Pde and First Ave. People are invited to provide input into the planning process to help identify issues and opportunities with this cycling corridor. This project will identify short-term improvements that can be implemented quickly to address current issues, and it will also help identify longer term improvements. Everyone who completes the survey will enter the draw for one of two adult bikes. Improving the cycle networks across the region helps take cars off the road and increase active transport, which contributes to Council's goal of becoming Australia's most sustainable region. The survey is available on Council's Facebook page or at <http://svy.mk/11LnOyC>, and closes on Sunday May 17.' Share and Print icons are visible in the top right of the article.

Figure 8: Project website (Source: SCC Maroochydore Cycleway Priority Cycle Route Improvement Plan, 2015)

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7th May 2015 1:20 PM

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YOUR SAY: Sunshine Coast Council is urging residents to have their say on how to best improve the cycle network in Maroochydore.

Scott Powlick

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SUNSHINE Coast Council is investigating how it can best improve the cycle network in Maroochydore, and is inviting residents to have their say via a short survey.

The study focuses on a route along Sixth Ave, Cotton Tree Esplanade, Cornmeal Pde and First Ave.

People are invited to provide input into the planning process to help identify issues and opportunities with the cycling corridor.

This project will identify short-term improvements that can be implemented quickly to address current issues, and it will also help identify longer term improvements.

Everyone who completes the survey will enter the draw for one of two adult bikes.

Improving the cycle networks across the region helps take cars off the road and increase active transport, which contributes to the council's goal of becoming Australia's most sustainable region.

The survey is available on the council's Facebook page or visit https://www.surveymonkey.com/r/Maroochydore_cycle_route_improvement- and closes on Sunday, May 17.

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Sunshine Coast Daily

Case study 8

Case study 8: Basis of design – how to conduct a workshop

Abstract

The Bruce Highway Cycleway Planning project identified a concept for a continuous and connected bike riding facility in Townsville, to get 'more people riding, more often'.

This case study outlines the approach taken to deliver the basis of design for the Bruce Highway Cycleway Planning project. A basis of design is a concise and specific description of the project objectives and considerations for achieve them.

Undertaking a workshop with key project stakeholders is an efficient and effective way of incorporating stakeholder input into the basis of design.

Basis of design approach on the Bruce Highway Cycleway Planning project – Townsville

The following approach was used to establish and document the basis of design on this project:

- (1) Review background information
- (2) Identify stakeholders for workshop
- (3) Workshop planning and preparation
- (4) Conduct the basis of design workshop
- (5) Workshop outcomes
- (6) Documenting and reporting the basis of design.

Review background information

Investigations were undertaken prior to planning the workshop to ensure:

- The project team was informed about site conditions and potential issues.
- Appropriate branches of TMR and Council were engaged to address issues in the project area.
- Relevant background information was provided for the workshop.

Prior to the workshop, the following background investigations were undertaken for the project:

- Review of existing and future cycle and pedestrian networks and usage.
- Project team site visit to understand the site conditions and constraints.
- Desktop investigations, including:
 - land use (property constraints and population demographics)
 - geometric considerations and constraints
 - identification of key attractors (origins and destinations)
 - hydraulic performance
 - environmental and cultural heritage considerations
 - crash statistics
 - existing bike riding level of service performance.

Identify stakeholders for workshop

The following stakeholders were invited to attend the project basis of design workshop:

- project consultant
- Project Steering Group: Department of Transport and Main Roads (TMR) – District and Cycling and Walking team
- key stakeholder: Townsville City Council (TCC)
 - network performance
 - engineering and civil infrastructure groups
 - public/active transport and traffic.

Key Council contacts were individually telephoned by a TMR consultation representative to discuss involvement requirements and the importance of their role and involvement requirements.

Being early in the planning development, TMR identified TCC only as an external stakeholder to be invited to the workshop. Initial collaboration with local government stakeholders is important to confirm common priorities in developing the active transport network. Input from other stakeholders, including schools, defence and retailers was to be sought later in the project planning process following options development. Wider consultation with stakeholders is planned so that all key stakeholders are engaged and invited to raise any additional unidentified issues and opportunities.

Preparing for the workshop

In preparation for the workshop, the following materials were prepared:

- workshop invitation email describing the project and the purpose of the workshop
- a Stakeholder Information Sheet
- an agenda circulated prior to the workshop that included:
 - allocated times for discussion items
 - activities to engage with and collect input from stakeholders
 - activities to prioritise the most important stakeholder issues
- large strip maps outlining site constraints, existing infrastructure, attractors and the Principal Cycle Network.
- a PowerPoint presentation.

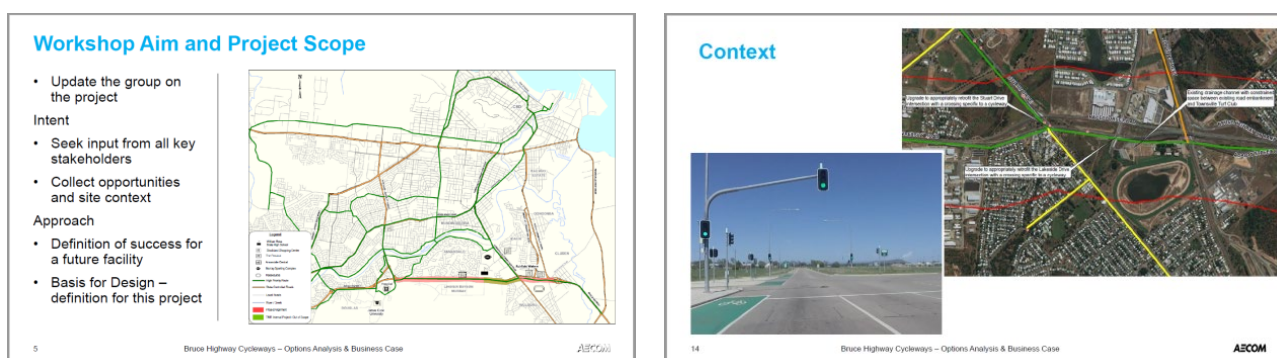


Figure 1 Example Basis of design workshop slides highlighting the approach to the workshop (slide 1) and project context (slide 2)

Delivering the basis of design workshop

The workshop was delivered as follows:

- outline of the key workshop aims, background, context and scope
- presentation of constraints (geometric, environmental, services), network performance, use, Principal Cycle Network, land use and potential growth
- inquiry questions to prompt collation of workshop participant local knowledge of the site, through marking up of locality strip maps
- a group exercise to identify participant 'top 5' indicators of project success
- determination of key opportunities and constraints for the project
- connecting project success factors and opportunities/constraints to inform basis of design summary.

Outcomes of the basis of design workshop

The workshop produced the following outcomes:

- a list of key opportunities and constraints for the project (refer Attachment A)
- annotated maps:
 - identifying existing issues in the area for pedestrians and bicycle riders
 - attractors and desire lines identified by workshop participants
 - participants' site knowledge
- identification of specific challenges for the site
- participants' written definitions of what project success looked like (5 for each participant)
- collated list demonstrating the project's key success criteria (refer Attachment B).

Documenting the basis of design

After defining project success indicators, participants were led through a discussion to clearly define a basis of design. Basis of design sets the key project objectives moving forward for planning and design (route and design treatment options identification and analysis).

Table 1 outlines the basis of design established in the workshop with applications and relevant references identified post workshop as part of Working Paper 1 – Background Investigations and basis of design report development. Working Paper 1 also summarised and documented the background investigations, workshop process and outcomes. It provides a reference document to inform route and design treatment options development and assessment.

Table 1 Basis of design

Project principal	Example applications	Relevant references
Personal safety	Smooth surface to provide predictable grip	Austrroads Guide to Road Design
	Visibility – past vegetation and planting, allowing line of sight	Crime Prevention Through Environmental Design (CPTED)
	Perception of safety and passive surveillance	CPTED
	Lighting to improve safety – day and night	Australian Standard (AS) 1158.3
	Closed circuit television (CCTV)	CPTED
Traffic safety	Protected intersections	Technical Note 128 Selection and Design of Cycle Tracks
	Simplified signalised crossings – not multi-phase	TMR Road Safety Policy
	Aim for priority crossings of un-signalised crossings	Technical Note 128 Selection and Design of Cycle Tracks
	Supports all ages and abilities	Technical Note 128 Selection and Design of Cycle Tracks
	Separation from higher speed motor vehicle traffic	TMR Road Safety Policy
Connection	Destinations include schools, university, hospital, workplaces, shops, mountain bike trails, sports venues	Principal Cycle Network Plan (PCNP)
	Catchments include residential subdivision, university, defence housing	Townsville City Plan
Comfort and Appeal	Attraction nodes at intersections – water, shade, seats	PCNP
	Effective drainage that minimises risk of damp or slime on travel surface	Technical Note 132 Maintenance minimisation guidelines for walking and bike riding facilities
	Inviting and innovative (new to Townsville) designs	Technical Note 128 Selection and Design of Cycle Tracks
Predictable	Smooth surface to allow efficient travel	Austrroads Guide to Road Design
	Effective drainage to provide a predictably dry facility	Technical Note 132 Maintenance minimisation guidelines for walking and bike riding facilities
	Design to minimise the need for maintenance intervention to provide a reliable surface	Technical Note 132 Maintenance minimisation guidelines for walking and bike riding facilities

Lessons and transferability

- Convening key stakeholders early in the project to identify what project success looks like and opportunities and constraints is crucial for establishing the basis of design.
- Providing a succinct summary of the project context, scope and intent is essential to setting the scene for the project.
- A well facilitated and interactive workshop can draw out important local knowledge.
- Getting the right people at the workshop is crucial to developing an informed basis of design. This can be achieved by targeting key Council personnel in decision making roles in network performance, engineering and civil infrastructure planning (including local public/active transport specialists).
- Focussing the workshop on engaging and collecting information is an effective way of ensuring the basis of design reflects the needs of the community. It also supports continued stakeholder investment in the ongoing project.
- Asking the same questions such as, 'what does success look like?' to different people captures the interests of a wider range of stakeholders.
- Seeking agreement from key parties on the basis of design improves certainty for defining route and design treatments, in future phases.

Attachment A – Key opportunities and constraints

Table A1 outlines the key opportunities and constraints agreed in the workshop for the project, developed from the group discussion and strip map detail.

Table A1 Key opportunities and constraints

Opportunity	Constraint
Recognise the existing demand for a crossing north-south to the university (Note that this is outside the scope of the project)	Corridor width in some segments of the project is narrow
The project is supported at state level and is funded by TMR	Future road corridor requirements (i.e. duplication of existing road network) may make the location more constrained
To enable isolated communities such as Wulguru and Cluden, to travel to key nodes (schools, defence, work, recreation, university, hospitals)	Access between the north and south sides of University Road
Provide connectivity to schools	Ease of construction (south side) and access to destination (north side)
Improve the existing underpass drainage issues (University Drive underpass, for example)	Potential defence vehicle priority over bicycles
Provide for service authority access	
Potential to minimise intersections to maintain a through speed for bicycle riders	

Key opportunities and constraints can be consolidated as:

- **Opportunity:** The overarching opportunity for the project is to provide connectivity to key attractors within the area and to get 'more people riding, more often'.
- **Constraints:** There are significant trade-offs depending on whether a northern or southern corridor route is selected, with segments of the project constrained by established development on both sides of the corridor.

Attachment B – Project success criteria

Table B1 outlines the initial basis of design, determined through participant discussion on the 'top 5' success criteria.

Table B1 Initial basis of design

Project principal	Example applications	Participant comments
Personal safety	Smooth surface to provide predictable grip	Safe for the community to use day and night (CCTV, lights, vegetation management, safe sight distances, smooth surfaces). Crossings are designed to be '10 year old suitable' crossings, through the implementation of protected intersections (time separated) and simplified crossings (not multi-phase). Create a perception of safety for the user.
	Visibility - past vegetation and planting, allowing line of sight	
	Perception of safety and passive surveillance	
	Lighting to improve safety - day and night.	
	CCTV	
Traffic safety	Protected intersections	Appropriate separation from the traffic to ensure that the route is suitable for 'all ages and abilities' and to establish a perception of safety to help entice new users.
	Simplified signalised crossings – not multi-phase	
	Aim for priority crossings of un-signalised crossings	
	Supports all ages and abilities	
	Separation from higher speed motor vehicle traffic	
Connection	Destinations include: schools, university, hospital, workplaces, shops, mountain bike trails, sports venues	Connecting the route to key nodes in the influence area (schools, university, hospital, work, recreation, shopping centres, etc.).
	Catchments include: residential subdivision, university, defence housing	
Comfort and appeal	Attraction nodes at intersections – water, shade, seats	To ensure the users want to bike ride on the path by providing attractors such as shade, a good riding surface and innovative (new to Townsville) designs.
	Effective drainage that minimises risk of damp or slime on travel surface	
	Inviting and innovative (new to Townsville) designs	
Predictable	Smooth surface to allow efficient travel	The route is dry and drains well to ensure that users know the network and path is predictable and operational after rain events – added benefit is that maintenance will be minimised (will avoid silt and slime build up). The layout and design of the route is self-explanatory to new users (requiring no new learning or training), especially at intersections by making it clear who has right of way.
	Effective drainage to provide a predictably dry facility	
	Design to minimise the need for maintenance intervention to provide a reliable surface	

Case study 9

Case study 9: Bruce Highway Bikeway Bridge, Mackay – options analysis

Abstract

The Department of Transport and Main Roads (TMR) undertook an Options Analysis (OA) on a high priority cycle route on the Bruce Highway spanning the Pioneer River in Mackay. The study objective was to identify options to provide a safe, direct and continuous facility for bike riders and pedestrians across the river. Key considerations included hydraulics, afflux, access and integration of the desired level of service with cost effective designs.

Background

The Ron Camm bridges in Mackay provide for vehicles on the Bruce Highway but there are no separated paths for bike riders or pedestrians. A new pedestrian and cycle bridge would provide a key connection between the existing Gooseponds and Bluewater trails and connect the large residential catchment in the north to the employment, retail, education and service hubs to the south (see Figure 1). In 2019, TMR undertook an OA to address this gap.

The problem

Without investment in an off-road bike and pedestrian crossing, access between the north and south sides of the city will continue to be restricted to riders confident enough to ride in high speed traffic, or to those willing to detour 3km to the Forgan Bridge.



Figure 1 Existing and proposed bikeway network

Methodology overview

The project included three working papers (WP) summarised in a final OA report. Each WP coincided with stakeholder workshops and meetings. The process is shown in Figure 2.

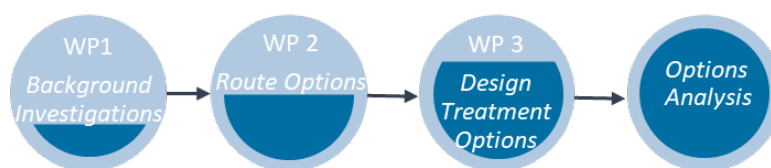


Figure 11 Overview of the work phases

The results

WP1 Background investigations

WP1 identified the need for the bike and pedestrian bridge and defined key users. Key users were cautious riders, potential riders and pedestrians. Suitable infrastructure was defined as off-road shared pedestrian and bike paths.

The key issues identified from this assessment included:

- riverine flooding, coastal surge and potential afflux issues
- flood immunity of the tie-ins at either end of the bridge.

Stakeholder engagement was undertaken with TMR and Mackay Regional Council (MRC). The process and outcomes are described in Table 1.

WP2 Route options

Based on WP1 and engagement with TMR Engineering and Technology (E&T) branch, minimum and desired design standards for the bridge were established to guide concept design. A summary of requirements is provided in Table 2.

WP2 Route options

Based on WP1 and engagement with TMR's E&T branch, minimum and desired design standards for the bridge were established to guide concept design. A summary of requirements is provided in Table 2.

Table 1: WP1 - Stakeholder engagement

Stakeholder Engagement	
Who?	How?
TMR project team MRC	Workshop
Purpose	
To identify and confirm the Basis of Design and target bike rider group.	
Outcome	
The definition of intended users was confirmed as "cautious riders".	
High-level options for the provision of a bike crossing were presented. Along with standards, the local environment and case studies of similar bridges were used to define the minimum bikeway width. This information, presented to stakeholders, was acceptable.	

Table 2: Bikeway and bridge requirements

Bikeway Requirements	Bridge Requirements
<ul style="list-style-type: none"> • Desired unobstructed path width of 5.0m • Absolute minimum unobstructed path width of 3.0m • Bridge to ground level tie-in ramps at each end of bridge • A new, standalone bridge is to adopt the desirable path width of 5.0m • Bridge modification options are to achieve no less than a 3.0 m path width and aim to achieve the desirable 5.0 m width (or between) as feasible. 	<ul style="list-style-type: none"> • Pier spans consistent with the existing Ron Camm bridges • Vertical clearance consistent with maritime and hydraulic requirements • Structural materials suitable for their application and marine conditions • Not adversely impact any existing structure's design life, nor impede TMR's ability to maintain the existing bridges • A new, standalone bridge must be constructed to a 100-year design life, 4 kPa design load and accommodate an M13.5 maintenance vehicle.

With consideration of the local context, path width, vertical tie-ins, flooding considerations and structural requirements, the route options phase identified four options as shown in Figure 3.

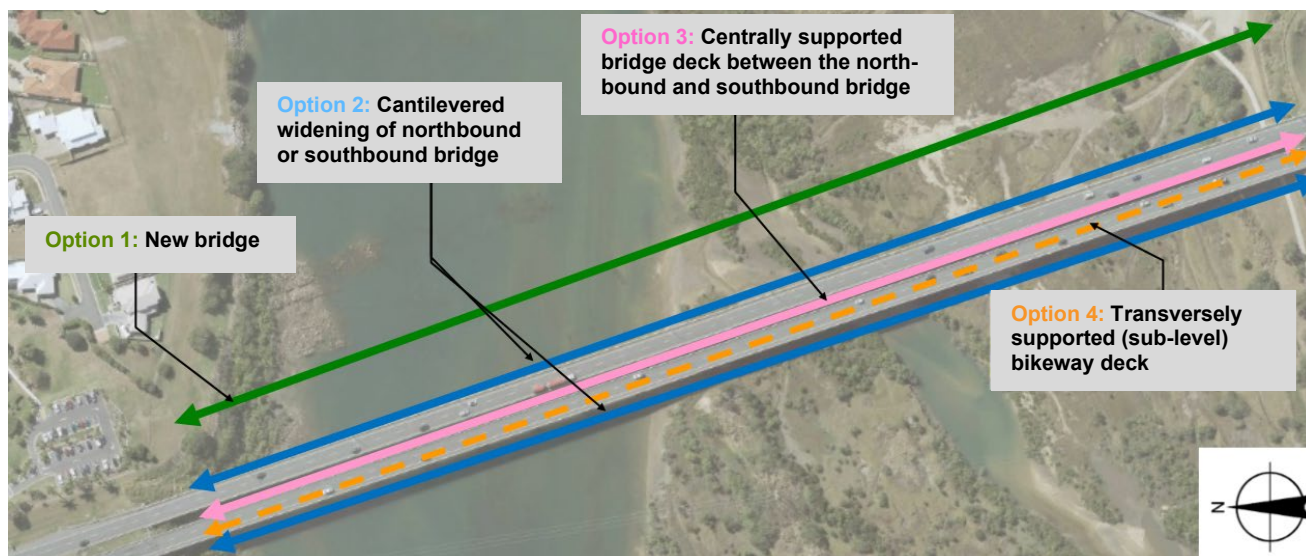


Figure 12 Bruce Highway Bikeway Bridge options

A high-level comparative assessment was undertaken for each of these options for different structural material types, durability, maintenance, constructability, maritime, flooding and cost factors to determine a recommended bridge option. As a major bridge, TMR would own and maintain the asset. Accordingly, TMR's E&T branch, a key stakeholder, was integral to identifying the preferred option. This process is summarised in Table 3.

Table 3: WP2 stakeholder engagement outcomes

Stakeholder engagement	Working Paper 2 outcome
Who?	WP2 assessed the four options using a high-level comparative assessment, focusing on structural engineering feasibility. Design requirements for the bridge and bikeway were identified to frame the assessment. Engagement with TMR's E&T branch was a key component of this working paper. Among the outcomes and technical considerations, a key outcome was the preference for a new separate structure with concrete as the preferred material and to maintain navigation clearances.
TMR project team	
TMR E&T	
Maritime Safety Queensland (MSQ)	
How?	Based on outcomes resulting from the meeting with E&T and assessment of structural material, structural loading, impact to existing bridges, and bikeway requirements, the preferred option (also of relatively high cost) was identified as Option 1 A standalone bridge downstream (east) of the existing Ron Camm Bridges.
Purpose	
To review the four route options and identify a preferred.	

WP3 Design treatment options

A short span alternative to Option 1 was developed to assess its merits with respect to flooding and hydraulics. Both options are shown below in Figure 4.

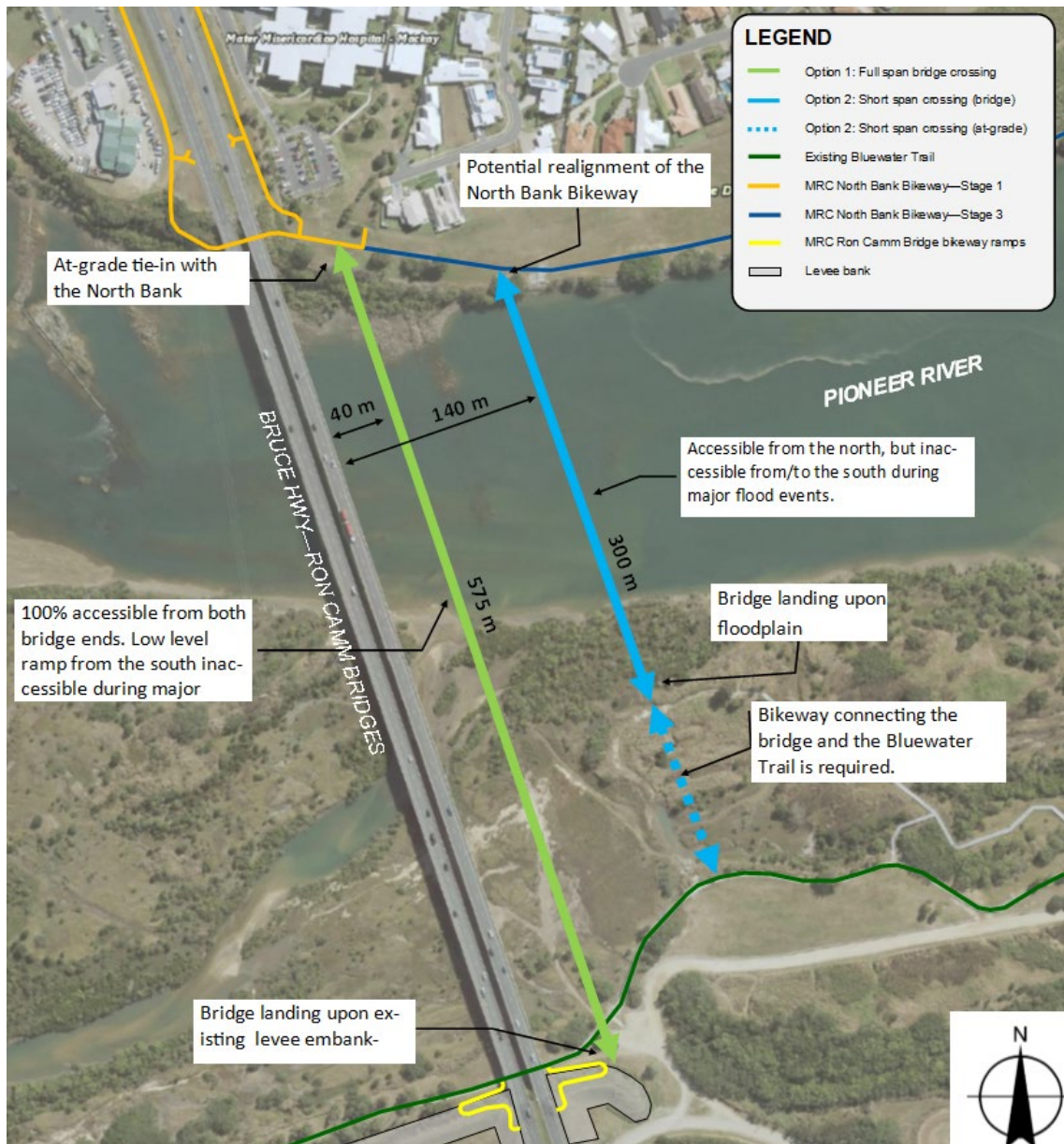


Figure 13 Option 1 and the alternative bikeway bridge option

Refer to Table 4 for a summary of the key outcomes of stakeholder engagement.

Table 4: WP3 - Stakeholder engagement outcomes

Stakeholder engagement	Working Paper 2 outcome
Who?	WP3 developed the preferred option. To test the preferred option from WP2, an alternative was developed that had a shorter bridge span with a bikeway connecting the bridge to the Bluewater Trail, south of the river. This would cost considerably less than Option 1.
TMR project team	
TMR E&T	
MSQ	
How?	However, while the main river span is flood immune, the southern approach would not be. This particular aspect was of primary concern; for a costly asset such as this, an overall satisfactory level of flood immunity for the approaches should be set (in AS 5100.1:2017, this is 1 in 10 years).
Email and phone correspondence.	
Purpose	Through correspondence with E&T, the preferred option was option one.
To seek feedback and approval of the bridge crossing options.	

An extract of the proposed concept design and cross section is shown below in Figure 5.

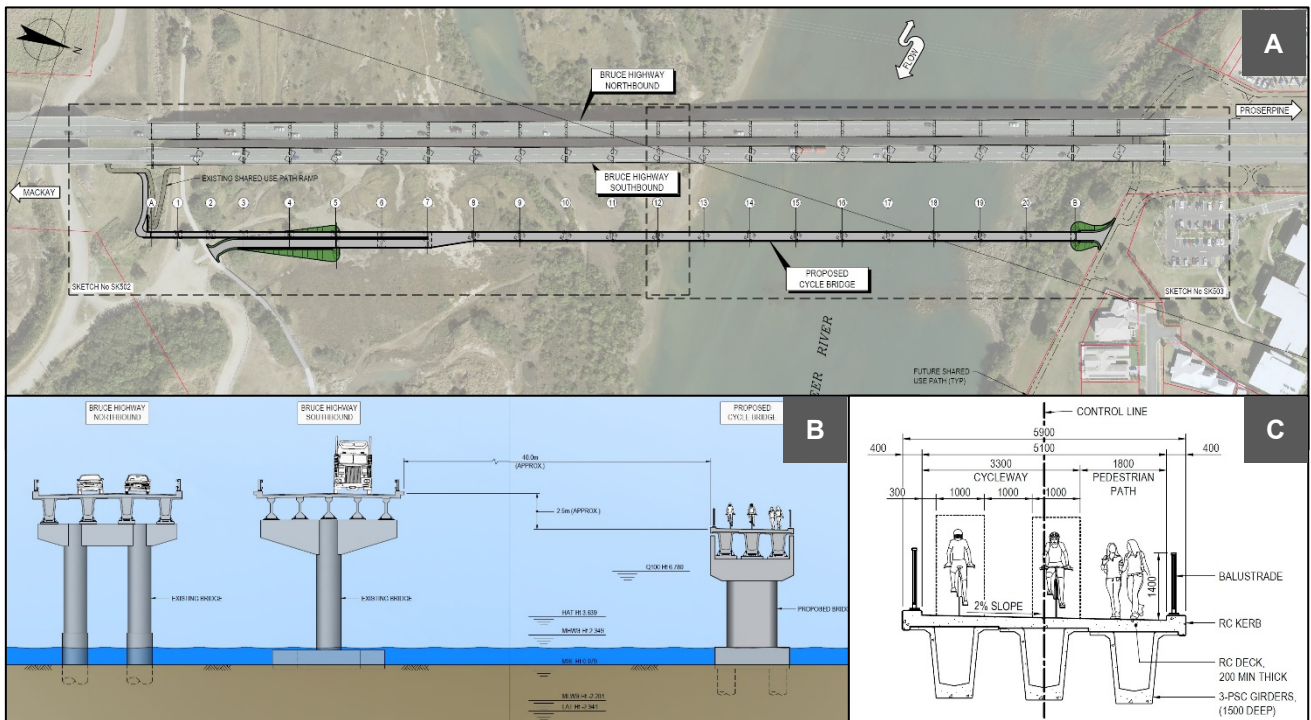


Figure 14 Bruce Highway Bikeway Bridge concept plan and cross-sections

The key design outcomes are listed below:

- The bridge design incorporates a full crossing of the Pioneer River and floodplain. The ramped connection to the Bluewater Trail has been designed as the primary route and maintains the same deck width as the main span to maintain separation of bike riders and pedestrians. The elevated connection to the Bruce Highway provides flood immune accessibility for the bridge, however this connection only provides functionality for riders travelling southbound on the highway.
- Toward the southern end of the bridge, the bridge deck separates to provide a ramped connection to the Bluewater Trail and elevated connection to the Bruce Highway southbound carriageway. Refer to Figure 5, image A.
- The bikeway bridge is proposed to sit at a height of 9.67m AHD, approximately 2.5m lower than the highway road decks. Refer to Figure 5, image B.
- Three Super T-girders provides for a 5.1m bridge deck, 3.0m bikeway and a 1.8m pedestrian path. Refer to Figure 5, image C.

Alternative designs that would potentially achieve significant cost savings were also identified and presented to stakeholders. This design would only require two rows of Super T-girders rather than the three proposed. The cross section would comprise a 4.5m wide deck, 3.0m bikeway, 0.3m clearance between the bikeway and railing and a 1.2m pedestrian path. Potential for savings and ongoing value-engineering that could be undertaken as part of future investigations was noted.

Key learnings and recommendations

The PCRIP guidelines supported the Bruce Highway Bikeway Bridge OA process in identifying target users and treatments. Because the Bruce Highway project had a heavy focus on bridge design options, the options analysis process was relatively straightforward with a heavy focus on design treatments that could meet the needs of target users – 'cautious riders' and pedestrians.