

5. Engineering

5.1 Introduction

This chapter provides an overview of the development of the concept design for the CoastConnect — Caloundra to Maroochydore corridor. The concept design process included identification of potential corridor alignments, identification of bus priority measures and selection of preferred bus stop and bus station locations and treatments.

The study corridor, within which alignments were investigated, was identified during the pre-feasibility phase. This process was completed before the concept design and impact management plan (CDIMP) phase commenced.

A key requirement of the project development process was the consideration of the following:

- developing a priority public transport corridor that promotes and encourages people to use public transport to get to their destination
- providing a high-quality public transport link between Caloundra and Maroochydore that improves the reliability and speed of public transport along the corridor
- creating a landmark public transport priority corridor that is visibly distinctive and positively contributes to building the image and economy of the Sunshine Coast
- integrating high-quality station and stop environments with activity centres and the surrounding environment, and contributes to providing quick and efficient sustainable movement networks.

This concept design focuses on developing a design that:

- provides an efficient, reliable form of public transport
- provides safe, easy-to-use cycle lanes
- identifies local issues to ensure they are able to be managed appropriately
- can be delivered in stages so that:
 - the government can cost-effectively deliver the highest priority sections first
 - the project can be delivered in sections as demand grows
 - the impacts of the project's construction on the local community and road users can be reduced
 - the project can be timed to complement other planned transport and infrastructure projects
- provides an allowance in the corridor width for future alternative public transport modes.

5.2 Methodology

5.2.1 Concept design

Bus priority measures, stops and station designs have been developed for the concept design to a level appropriate for corridor preservation and preliminary impact assessment. The following concept design drawings were developed for the corridor:

- layout plans showing layout on aerial photo background with Digital Cadastral Database (DCDB) property boundaries
- typical cross-sections (including future proofing)
- bus stations and major stop layout plans.

The concept design drawings are contained within Volume 3 of 3: Drawings.

The concept design is based on low-level, digitised aerial survey. The survey information was captured on 28 September 2007 and 16 December 2007, and processed on 17 January 2008 by Schlenker Mapping. The survey is accurate to ± 40 mm in the x and y axes and ± 50 mm in the z axis. The survey uses MGA94 Zone 56 horizontal datum and Australian Height Datum (AHD) derived vertical datum.

The proposed quality bus corridor between Caloundra and Maroochydore has been divided into seven sections for design. These are illustrated in Figure 5-1 and described below:

- Section 1 – Caloundra to Buccleugh Street
- Section 2 – Buccleugh Street to Nicklin Way at Currimundi
- Section 3 – Nicklin Way at Buderim Street to Mooloolah River
- Section 4 – Lake Kawana Boulevard and Kawana Way to Main Drive
- Section 5 – Brisbane Road to Mooloolaba Esplanade (now a Council lead project)
- Section 6 – Mooloolaba Esplanade to Aerodrome Road
- Section 7 – Aerodrome Road and Horton Parade to Church Street.



Figure 5-1: Concept design alignment in sections

5.2.2 Design criteria

Design criteria for the CoastConnect — Caloundra to Maroochydore project were developed during the project initiation phase and have been reviewed by the Department of Transport and Main Roads (DTMR), and the former Caloundra City and Maroochy Shire councils. The following section summarises the critical design requirements.

Design horizons

The design years for various aspects of the design are shown in Table 5-1.

Table 5-1: Design year

Aspect	Design year ¹
Pavement design (flexible)	20
Traffic lanes	20
Motorway interchanges	20–30 ²
Intersections	10
Inaccessible drainage structures	100
Bridge structures	100
Bus interchange service life	25 ²

Notes:

1 Years after opening to traffic

2 Design years will depend on staging opportunities. All project sections were planned to be completed by 2016 for design purposes.

Design standard for replacement of existing elements

As part of the design, existing elements will be replaced to a similar standard to that which currently exists on site, including where significant land requirements would result if current guidelines were to be applied. Current design guideline minimums will only be applied where an upgrade is needed to ensure safety, capacity or other requirements.

For example if an existing footpath does not match the minimum 5.5-metre width for an arterial road specified in the *Road planning and design manual* then the design will allow for a footpath width similar to the existing one (i.e. 3.5–5.0 metres).

For DTMR-controlled roads, every endeavour will be made to achieve the desirable minimums in the *Road planning and design manual*. However, where there would be excessive cost or property requirements, alternatives will be reviewed and submitted for approval on a case-by-case basis during future design phases.

The project objectives are to improve quality and reduce travel times for buses on the corridor. At present, there is no intention to upgrade other existing infrastructure in the corridor to meet current minimum guidelines.

Geometric road design

Design standards

The following order of precedence applies to reference standards for DTMR-controlled roads:

- DTMR standards, including Road planning and design manual and Road drainage design manual
- Austroads publications
- TransLink Public transport infrastructure manual
- DTMR Busway planning and design manual
- Australian Standards and Australian Standard Handbooks
- local authority standards.

The following order of precedence applies to reference standards for council-controlled roads:

- local authority standards
- DTMR standards, including Road planning and design manual and Road drainage design manual
- Austroads publications
- DTMR Public transport infrastructure manual
- DTMR Busway planning and design manual
- Australian Standards and Australian Standard Handbooks
- Queensland streets.

Bus lanes

Dedicated bus lanes shall be a minimum width of 3.5 metres where on-road cycle lanes are not required. This width includes any concrete channel that may exist.

Public transport infrastructure

Bus stops, stations and supporting public transport infrastructure shall be designed in accordance with the TransLink *Public transport infrastructure manual*.

Design checks will also be made against the TransLink *Technical notes — Bus rail interchange and supporting facilities*, where appropriate.

The principals of Crime Prevention through Environmental Design (CPTED) will be applied in the preparation of conceptual design.

Future public transport opportunities

The bus corridor for CoastConnect — Caloundra to Maroochydore has been designed such that light rail transit (LRT), bus rapid transit (BRT) or other modes can be provided in the future with a minimum of corridor widening and disruption to services.

Cycle infrastructure

The design philosophy and design standards are informed by the following strategies, plans and standards as they relate to cycling:

- SEQ Regional Plan (2009)
- Cycle South East (1999)
- Queensland Cycle Strategy (2003)
- Integrated Regional Cycleway Network Plan for SEQ (2003)
- Integrated Regional Transport Plan
- Maroochy Plan 2000 (provision of bikeways and bicycle facilities)
- Maroochy Shire Bikeways Plan Review (2003)
- Caloundra City Plan 2004
- Caloundra City Council — Development Design Planning Scheme Policy
- DTMR Road planning and design manual (2004)
- Caloundra City Council Bicycle and Pedestrian Strategy (2004)
- Sub-regional Integrated Transport Strategy for the Sunshine Coast (SunTran) (2007).

The design philosophy to be adopted is informed by these publications and documents, and is built on the following principles:

- **Good connectivity:** the CoastConnect - Caloundra to Maroochydhore corridor will serve as a principal route for cyclists; it is connected to local cycle routes and the coastal route to improve connectivity between activity nodes throughout the region. Dead-ends will be avoided and the route will connect to other principal cycle routes to improve regional connectivity. Signage and route marking will improve connectivity.
- **Ease of use:** Cycle facilities along the CoastConnect - Caloundra to Maroochydhore corridor will provide for two distinct groups of users of cycling facilities. The first group comprises experienced sports and commuting cyclists; it requires a facility that focuses on speed, known as a 'high-speed facility'. The second group comprises students, recreational cyclists and cautious cyclists; it requires a facility emphasising safety, known as a 'high-safety facility'.
- **Safety:** The design of the cycle facility will prioritise safety for users. Conflicts with vehicles and pedestrians will be minimised, especially for the high-speed facility. Safety issues that could constrain/restrict use along the corridor will be avoided.
- **Appropriate:** the facility type and design need to be appropriate to the context of the pedestrian and vehicular traffic and the land use environment.

5.3 Preliminary analysis

5.3.1 Existing transport corridor

This section provides a general description of the existing transport corridor in which the quality bus corridor is proposed in relation to:

- transport infrastructure
- existing road network
- existing major structures
- public utility plant.

5.3.2 Sections 1 and 2 — Caloundra to Currimundi

Public transport infrastructure

Caloundra is a major terminus of the existing Sun Bus network and is a key nodal hub for public transport at the southern end of the Sunshine Coast.

The bus terminus is co-located with the long-distance, tourist and interstate coach station. Very few people transfer from long-distance to urban bus services, here or elsewhere, and consequently there is no real value in the terminuses of these two quite different types of passenger transport service being co-located.

Currently, the Caloundra terminus is presented as the focal point of public transport in Caloundra, and because of the lack of route visibility in the rest of the township, patrons tend to think that they must access bus services at the terminus.

Existing road network

Alignment description

The 6.1 kilometres of road in Sections 1 and 2 serve a catchment. Its land uses range from a mixture of retail outlets and higher density residential at the Bulcock Street precinct, through to low-density residential precincts in the Moffat Beach, Dicky Beach and Battery Hill areas.

The terrain in the southern half of Section 1 is hilly, and with the large number of intersections, the bus service is often slow and uncompetitive with the private car. The route south of Buderim Street is essentially a sub-arterial with centre line marking only.

The southern portion of Section 2 is 10–12 metres wide, while the northern portion of Buderim Street is 16–22 metres wide. Unrestricted kerbside parking is permitted along the majority of this section, effectively reducing the traffic flow to a wide single lane during the day.

The northern portion of Buderim Street is a four-lane divided sub-arterial and provides unrestricted traffic flow between Coonowrin Street and Nicklin Way. Known traffic pinch points exist at Tooway Creek Bridge and the new development on the corner of Elizabeth Street and Beerburum Street at Dicky Beach.

Generally, bus services are able to keep to schedule along this section, although increasing congestion at the two nominated pinch points, and lengthening queues at the Buderim Street/Nicklin Way intersection, warrant attention. The existing posted speed for this section is typically 60 km/h.

Car parks

In Section 1, kerbside use is typically for private parking. With the high-density residential use at the southern end, kerbside space can be at a premium during the peak tourist season. Elsewhere, the demand for kerbside space is not as significant.

In Section 2, there are no kerbside parking restrictions with the exception of loading zones and bus stops. Despite this, the low-density developments and adequate off-street parking provisions along the route generally result in intermittent vehicle parking at specific sites. For the most part, however, the kerbside lane is generally free of parking.

Bus stops

Locations for existing bus stops in Sections 1 and 2 are detailed in Table 5-2.

Table 5-2: Approximate locations of existing bus stops — Sections 1 and 2

Approximate northbound chainage (m)		Approximate southbound chainage (m)	
95	2,640	195	2,700
950	3,500	950	3,300
1,240	4,650	1,240	4,650
1,900	5,120	1,900	5,120
2,130		2,130	

Roundabouts and signals

Table 5-3 lists the location of the roundabouts and traffic signals for Sections 1 and 2.

These intersections have the potential to affect service reliability in peak times when intermittent traffic queuing affects run times. Depending on the extent of these impacts, specific priority treatments may be required.

Table 5-3: Roundabouts and traffic signals — Sections 1 and 2

Roundabouts	Traffic signals
Lower Gay Terrace/Moreton Parade	Roderick Street/Bucleugh Street
Moreton Parade/Burgess Street	Currimundi Primary School Crossing (Buderim Street)
Edmund Street/King Street	Buderim Street/Nicklin Way
Edmund Street/William Street	
Buderim Street/Coonowrin Street	

With the exception of school start and finish times, the roundabout at the intersection of Coonowrin Street, Buderim Street and Cooroy Street does not materially alter the service reliability of buses along this section. The school crossing signals are a necessity for safety reasons and should therefore remain. At the northern end, the traffic queuing at the signalised intersection of Nicklin Way and Buderim Street presents opportunities for bus priority to make bus travel competitive with the car.

Traffic congestion

The combination of high-density unit development, extensive kerbside parking and the hilly terrain at the southern end of Section 1 limits the operating speed of bus services. In times of peak tourist activity, queuing traffic is a constant challenge for bus drivers seeking to adhere to schedules.

Once buses reach Edmund Street, flow rates and operating speeds improve until the service reaches the speed bump at Rinaldi Street. From this point to the traffic lights at Buccleugh Street, the level of traffic congestion varies throughout the day and according to the season. At peak season times, traffic queuing in both Rinaldi and Roderick streets reduces the service speed and reliability of the services.

In Section 2 traffic congestion is generally low. However with the passage of time, those sites most susceptible to congestion and queuing are likely to be:

- the southbound approach to the Roderick/Buccleugh Street intersection
- the northbound approach to the Tooway Creek crossing
- the north and south flow through the developing Elizabeth Street/Beerburum Street residential/commercial precinct
- the intersection of Cooroy Street and Beerburum Street, for both northbound and southbound bus travel
- the intersection of Buderim Street and Nicklin Way for northbound bus travel. It is noted above that this intersection currently sees traffic queuing at peak periods.

Annual average daily traffic (AADT) traffic volumes for an average weekday, based on the 2006 base VISUM Model for Section 1 and 2, are:

- | | |
|---|--------------|
| ▪ Bulcock Street (Knox Avenue to King Street) | 5,500 AADT |
| ▪ Edmund Street (King Street to Buccleugh Street) | 2,700 AADT |
| ▪ Elizabeth Street (Roderick Street to Cooroy Street) | 14,600 AADT |
| ▪ Buderim Street (Beerburum Street to Nicklin Way) | 11,300 AADT. |

Existing provision for cyclists and pedestrians

There is provision for cyclists for the majority of Sections 1 and 2. Generally footpaths are provided on both sides of the road; however there are instances where footpaths are provided only on one side of the road. There are no cyclist/pedestrian facilities along Cooroy Street.

Existing major structures

The only existing major structure in Sections 1 and 2 is a timber bridge over Tooway Creek on Elizabeth Street at Dicky Beach. Planning is under way, by the Sunshine Coast Regional Council, for this bridge to be replaced; replacement is due to be completed in the 2010–11 financial year.

Utilities

The proposed alignment does not affect any public utility plant in this section; a possible exception is the upgrade/widening work at the intersection of Nicklin Way and Buderim Street to facilitate bus priority measures. Localised service relocations may be required to accommodate new bus shelters.

5.3.3 Section 3 — Nicklin Way

Public transport infrastructure

Currimundi Marketplace

Currimundi Marketplace is located on Nicklin Way at the intersection with Bellara Drive. It includes a supermarket and a number of specialty and fast food shops, and is a major generator of local car trips. This shopping precinct has the potential to become an important node in the southern part of the CoastConnect — Caloundra to Maroochydore corridor. At this point, services from southern Nicklin Way and the eastern beaches converge to head north along the Nicklin Way.

Stockland Park

Stockland Park is one of the Sunshine Coast's largest sporting facilities, catering for many sports. The main venue has 45 hectares of playing fields and incorporates Lake Kawana, which is used for rowing, kayaking and canoeing. It also attracts major events on the Sunshine Coast. There is a proposal for a future sports stadium and TAFE on the site.

Kawana Shoppingworld

Kawana Shoppingworld is a key patronage generator on the southern Sunshine Coast. Strategically placed on the spine of the CoastConnect — Caloundra to Maroochydore corridor, it must continue to be served effectively and efficiently by the bus network.

The Kawana Shoppingworld bus facility presently experiences a number of operational shortcomings.

First, DTMR has advised that the facility is at capacity, and this is confirmed by site observations. As the number of bus movements through this shopping centre increases it is clear that the number of bus stops must be increased. This is particularly the case if more routes are to terminate at this location.

Second, and perhaps most important, the bus facility is located on the northern side of the shopping centre and accessed by a diversion off Nicklin Way via Point Cartwright Drive.

Due to the lack of bus priority measures along this access route, many buses passing through Kawana Shoppingworld spend over 10 minutes negotiating this deviation. This impacts negatively on the attitude of through passengers, contributing substantially to their desire not to travel by public transport.

It is understood that Kawana Shoppingworld has proposals for major redevelopment. While ease of access from Nicklin Way is regarded as high priority for improving services along the corridor, a substantial relocation of this bus facility may, if timing is appropriate, be incorporated into the centre's redevelopment.

It will be critical that any new station be well connected and well integrated with the shopping centre for the safety and convenience of patrons.

Existing road network

Alignment description

The 8-kilometre length of Section 3 from Buderim Street in the south to Mooloolah River in the north serves the coastal residential villages of Currimundi, Wurtulla, Bokarina, Warana and Minyama. This is a 30-metre-wide divided arterial. The existing posted speed for this section is 70 km/h.

Commercial (retail and homemaker warehouse) centres are spaced along the Nicklin Way as follows:

- Currimundi Marketplace — Bellara Drive
- Wurtulla Shopping Village — Piringa Street
- Bokarina Shopping Village — Thunderbird Street
- Kawana Shopping Centre — Meridian Street
- Minyama Retail — Kensington Drive.

The education precinct at Bokarina contains Kawana Waters State College and is a major destination for the many school bus services that service the broader coastal strip.

There are retirement villages adjacent to the Nicklin Way at Warana and Wurtulla, with another retirement village planned at Kawana Waters. It is considered important to maintain existing bus stops in these locations to help cater for those residents who may not be able to drive.

The existing roadway has four general traffic lanes from Buderim Street in the south to Kawana Island Boulevard in the north. Additional lanes are added at Kawana Island Boulevard to form a six-lane corridor to the Mooloolah River crossing where the road returns to a four-lane cross-section.

Car parks

Section 3 contains a significant amount of on-street car parking — currently, 1,170 car parks — and parking was one of the top issues raised by the community during consultation in September and October 2008. Local businesses stressed how important on-street parking is to them and their customers. For details relating to existing parking refer to Chapter 8 — Parking.

Bus stops

Locations for existing bus stops in Section 3 are detailed in Table 5-4. The existing stops are not recessed, but most are sited within the wide shoulders of the current carriageway.

Table 5-4: Approximate locations of existing bus stops — Section 3

Approximate northbound chainage (m)				Approximate southbound chainage (m)			
6,280	10,090	12,300	14,500	6,280	9,550	12,600	14,500
8,050	11,050	13,000	14,700	7,150	10,200	13,400	
8,550	11,300	13,750		7,980	11,450	14,050	
9,550	11,800	14,050		8,700	12,000	14,250	

Roundabouts and signals

There are no roundabouts in Section 3. The section has 15 signalised intersections along Nicklin Way. Northbound traffic accommodates four unsignalised side street entries, while for southbound traffic there are nine unsignalised side street intersections with Nicklin Way; the majority of the unsignalised intersections on Nicklin Way are ‘left in, left out’ from the side street. The unsignalised intersections only exist where the intersecting road forms a ‘T’ intersection with Nicklin Way. All ‘crossroad’ intersections along Nicklin Way are signalised.

The impact of this number of signalised intersections along Nicklin Way can be substantial. Traffic queuing at intersections during peak times is exacerbated by lack of integration between different intersections, so delays can be considerable. Congestion is most evident in northern Nicklin Way between Main Drive and Mooloolah River in both the AM and PM peaks and between Gannawarra Street and Buderim Street in the PM peak period.

In addition to stopping for passenger pick-up and set-down, bus services can be interrupted by the traffic delays at intersections. This then further reduces the capacity of the bus service to compete with the private car.

Traffic volume

Annual average daily traffic (AADT) volumes for an average weekday, based on the 2006 base VISUM strategic model for Section 3, are:

▪ Nicklin Way (Buderim Street to Gannawarra Street)	34,200 AADT
▪ Nicklin Way (Currimundi Creek to Lake Kawana Boulevard)	37,800 AADT
▪ Nicklin Way (Lake Kawana Boulevard to Point Cartwright Drive)	36,400 AADT
▪ Nicklin Way (Point Cartwright Drive to Mooloolah River)	51,500 AADT

Existing provision for cyclists and pedestrians

Currently on most of Nicklin Way there are generous road shoulders of approx 3 metres. This allows cycle traffic to travel with generous clearance from general traffic. Cyclists face potential conflict from cars parked parallel within the shoulder. This conflict occurs when car doors are opened without looking.

Cyclists and pedestrians also potentially conflict with cars leaving and entering the on-street parking and private/commercial accesses. There is no provision for cyclists on-road along northern Nicklin Way where shoulder width is limited due to additional roadway lanes. Pedestrian footpaths provided along Nicklin Way however many are quite narrow.

Existing major structures

Major bridge structures currently exist at:

- Currimundi Creek (Nicklin Way)
- Tokara Canal (Nicklin Way).

Currimundi Creek Bridge is located at chainage 6,500 metres and is approximately 95 metres long. The bridge is two-way, two-lane and contains a raised median. There is provision for pedestrians and cyclists on both sides of the bridge, separated from traffic by concrete barrier.

Tokara Canal Bridge is located at chainage 7,650 metres and is approximately 50 metres long. There are two separate bridges. Both bridges have provision for pedestrians and cyclists on the outside edges, separated from traffic by a concrete barrier.

Utilities

A summary of the existing public utility plant that is located within Section 3 is described below.

Sunshine Coast Water

Two water mains run parallel to Nicklin Way, including over Currimundi Creek Bridge and Tokara Canal Bridge. One water main runs down the western side of Nicklin Way and ranges in size from 250 millimetres to 525 millimetres, while the other water main runs down the eastern side of Nicklin Way and ranges in size from 100 millimetres to 250 millimetres. Water mains cross the road at various locations.

At various locations along Nicklin Way sewers cross the road; they vary in size from 100 millimetres to 675 millimetres. Sewer lines also run parallel to Nicklin Way ranging in size from 150 millimetres to 675 millimetres.

A substantial amount of local catchment stormwater drains are also located along Nicklin Way. Road drainage consists of kerb and channel flowing to gully pits, and pipes that then convey stormwater to local waterways.

Telecommunications

Various optic fibre cables run parallel to Nicklin Way. Cables also cross Nicklin Way near Lutana Street. The majority of the telecommunications services are underground and lie within the existing road footpaths.

Energex

For the majority of Section 3, overhead power and streetlights run parallel to Nicklin Way in the road footpath. The Energex infrastructure includes power poles and transformers.

5.3.4 Section 4 — Kawana Town Centre

Public transport infrastructure

The emerging Kawana Town Centre is currently serviced by two bus routes: the 601 and the 607. The 601 bus route follows Lake Kawana Boulevard, Kawana Way, Capital Place, Innovation Parkway, Metier Linkway and Kawana Way to Kawana Island Boulevard. The 607 bus route follows Lake Kawana Boulevard and Kawana Way to the Sunshine Motorway.

The ultimate layout of the CoastConnect — Caloundra to Maroochydore corridor will be affected by the following infrastructure projects and agreements:

- proposed Sunshine Coast University Hospital
- Caloundra – Mooloolaba Road (MMTC)
- CAMCOS railway
- proposed Kawana Town Centre development and surrounding residential land use
- Kawana Transport Infrastructure Agreement.

Existing road network

Alignment description

Kawana Town Centre is located west of Nicklin Way at Bokarina. Lake Kawana Boulevard is intended to play an increasingly important role in providing access to the extensive urban expansion planned for the Birtinya area.

The 5.5 kilometres of Section 4 will service the emerging Kawana Town Centre; it will provide a future bus link with the CAMCOS rail service at Birtinya and the proposed Sunshine Coast University hospital.

The existing road between the Decks on Lake Kawana Boulevard and Central Boulevard on Kawana Way is a temporary narrow formation. This section of roadway will be upgraded as part of the future Kawana Town Centre development.

The bus corridor is planned to follow a section of road that currently doesn't exist from Central Boulevard on Lake Kawana Boulevard to the west to join Kawana Way through the proposed Sunshine Coast Regional Hospital.

An additional section of the corridor also follows a future road that will be used to access the proposed CAMCOS train station at Kawana Town Centre.

The existing posted speed for this section is typically 60 km/h.

Car parks

Car parking currently exists along Lake Kawana Boulevard to the east of Lake Kawana, and along Main Drive from Metier Linkway to Nicklin Way. There are currently 215 on-street parallel car parks in Section 4.

Roundabouts and signals

There are three roundabouts and three signalised intersections in Section 4. Table 5-5 lists the location of the roundabouts and traffic signals for Section 4.

Table 5-5: Roundabouts and traffic signals — Section 4

Roundabouts	Traffic signals
Lake Kawana Boulevard and The Decks	Nicklin Way and Lake Kawana Boulevard
Soon to be open at Lake Kawana Boulevard and Kawana Way	Kawana Way and Capital Place
Kawana Way and Metier Linkway	Nicklin Way and Main Drive
Metier Linkway and Main Drive	

Traffic volume

Annual average daily traffic (AADT) volumes for an average weekday, based on the 2006 base VISUM Model for Section 4, are:

- Lake Kawana Boulevard (Nicklin Way to Kawana Way) 1,600 AADT
- Kawana Way (Lake Kawana Boulevard to Metier Linkway) 1,400 AADT
- Innovation Parkway (Capital Place to Metier Linkway) 600 AADT
- Main Drive (Kawana Way to Nicklin Way) 2,100 AADT.

Existing provision for cyclists and pedestrians

There is no provision for cyclists along sections of Lake Kawana Boulevard or Kawana Way. There is a very narrow road shoulder along this corridor. The narrow shoulder is used as a cycle lane and discontinuous off-road footpath. From Nicklin Way to The Decks, there is a wide shoulder that is shared between cyclists and parallel car parking. West of Lake Kawana Bridge, narrow shoulders are a pinch point for cyclists. Along Main Drive there is a bicycle awareness zone, but this shared parking and bike lane is too narrow to be used safely by cyclists when vehicles are parked. Footpaths are provided along both sides of most of the roads within the town centre and along the southern side of Main Drive. There is also a continuous path around Lake Kawana.

Existing major structures

- the two bridge structures in Section 4 are both over Lake Kawana on Lake Kawana Boulevard; the one to the east is currently in service, while the one to the west is not yet operational
- the eastern bridge is located at approximate chainage 600 metres and is approximately 120 metres long. The bridge is a two-way bridge with a footpath on the northern side
- the western bridge is located at approximate chainage 1,200 metres and is approximately 70 metres long. The bridge is a two-way bridge with a footpath on the northern side.

Utilities

The public utility plant that is located within Section 4 is described below.

Sunshine Coast Water

A 250-millimetre water main runs parallel to Lake Kawana Boulevard from Nicklin Way to The Decks, and a 150-millimetre water main crosses it to the east of the roundabout. Various water mains run parallel along Kawana Way from south of Capital Place to and along Metier Linkway and Main Drive to Nicklin Way. Various water mains cross Kawana Way, Metier Linkway and Main Drive; these water mains vary in size from 100–300-millimetre diameter.

A 150-millimetre sewer crosses Lake Kawana Boulevard at the eastern end. A 610-millimetre rising sewer main crosses the current (interim) alignment where Lake Kawana Boulevard becomes Kawana Way. This rising main will pass under the new bridge in the ultimate alignment.

Various sewer rising mains and gravity outfalls (from the sewage treatment plant) run parallel to and cross the alignments of Kawana Way, Metier Linkway and Main Drive. These range in size from 150 millimetres to 750 millimetres.

Road drainage consists of kerb and channel flowing to gully pits, and pipes that then convey stormwater to local waterways and the lake system.

Telecommunications

Various optic fibre cables run parallel to and across the alignment in Section 4. The telecommunication infrastructure in this section is predominantly underground.

Energex

Generally, Section 4 has underground power; it also has a significant number of street lights. A high-voltage overhead line runs parallel with Kawana Way on its western side.

5.3.5 Section 5 — Mooloolaba

To ensure that local values and visions are achieved in this section, the Sunshine Coast Regional Council is leading the planning and delivery of any improvements. Council's Mooloolaba Integrated Land Use and Transport Assessment Study is the current policy position for this section.

5.3.6 Section 6 — Alexandra Parade

Public transport infrastructure

There is no existing major public transport infrastructure in Section 6.

Existing road network

Alignment description

This section is approximately 3 kilometres in length and includes the northern end of Mooloolaba Esplanade and Alexandra Parade up to Parker Street, Maroochydore. For the bulk of the year, this section is relatively free-flowing. Peak tourist times see increased congestion levels as through traffic is affected by the extensive kerbside parking along the entire section, used to access the beach.

The rise up over Alexandra Headland and through the Buderim Road intersection is mostly a delay-free run. In heavy peak times and during the peak of the holiday season, traffic queues at this intersection. This road cross-section is typically a 22-metre-wide carriageway.

Travelling further north over the headland and down to the Alexandra Headland beach area, the alignment is a single-lane carriageway in each direction, as through-traffic passes the parked cars on both sides of Alexandra Parade between Bukatilla Street and Pacific Terrace.

The alignment past the Alex Surf Club is congested at peak tourist times because traffic queues at each of the three sets of signals in this section. From Alex Surf Club to the end of the section, the alignment is relatively congestion free with a four lane cross-section.

The existing posted speed for this section is 60 km/h; however, the speed environment is observed to be higher than this from Pacific Terrace to the north due to the straight alignment and wide road formation.

Car parks

This section attracts substantial kerbside car parking along the majority of the route during peak season times. For the bulk of the alignment between Mooloolaba and Bukatilla Street, the kerbside parking has little impact on the operation of buses through the section.

There are currently 285 on-street car parks in Section 6.

Bus stops

Locations for existing bus stops in Section 6 are detailed in Table 5-6.

Table 5-6: Approximate locations of existing bus stops — Section 6

Approximate northbound chainage (m)		Approximate southbound chainage (m)	
18,600	19,800	18,550	20,450
19,000	20,450	20,000	

Roundabouts and signals

This section contains no roundabouts but has five sets of traffic signals. Three of these signal sets are grouped near the Alex Surf Club. The intersection at Buderim Road often sees traffic queuing, and thus should be considered for a priority treatment.

The existing signalised intersections are located at:

- Alexandra Parade and Buderim Road
- pedestrian crossing adjacent to the intersection of Alexandra Parade and Mary Street
- Alexandra Parade and Pacific Terrace
- pedestrian crossing adjacent to Alex Surf Club
- Alexandra Parade and Okinja Road.

Traffic volume

Annual average daily traffic (AADT) volumes for an average weekday, based on the 2006 base VISUM model for Section 6 are:

- Alexandra Parade (Venning Street to Pacific Terrace) 17,400 AADT
- Alexandra Parade (Pacific Terrace to Parker Street) 23,600 AADT.

Existing major structures

The only structure in this section is a rock retaining wall on the western side of the road corridor between Buderim Road and Mandin Street (chainage 18,850 to chainage 18,930).

Utilities

The public utility plant located in Section 6 is described below.

Sunshine Coast Water

Water mains ranging in size from 100–150 millimetres run along and across the parts of Section 6 from Mandin Street to Mayfield road and Pacific Terrace to Katoa Street; sewer mains ranging in size from 150–450 millimetres run along and cross the proposed alignment of Section 6.

Road drainage consists of kerb and channel directing flow to gully pits, and pipes that then convey stormwater to the ocean.

Telecommunications

Various optic fibre cables run parallel to and across the alignment of Section 6. The telecommunications in this section are generally underground and located in the roadway footpaths.

Energex

Underground power and streetlights run parallel to Alexandra Parade for the majority of Section 6.

5.3.7 Section 7 — Maroochydore

Public transport infrastructure

Sunshine Plaza at Maroochydore is the major terminus for public transport services on the Sunshine Coast, and the pre-eminent network node in the study area.

This bus facility must serve two key but distinct purposes. First, as Sunshine Plaza is a major potential patronage generator for bus services in the study area, the bus terminus must effectively meet the needs of the customers of this major shopping centre.

Second, as the hub of public transport on the Sunshine Coast, this facility must satisfy all the basic requirements of a bus terminus, not only in terms of bus operations but also in customer facilities.

The present Sunshine Plaza bus facility fails to adequately meet either requirement, being located in a position that is not visually prominent and with a neighbouring land use occupied by a motor vehicle workshop. The present bus facility is also located separately from the main entrance to the shopping centre.

During several site inspections, it was noted that the majority of passengers are obliged to walk the length of the multi-deck car park in order to reach the bus terminus from the plaza. Nothing appears to have been done to make the walk easier for passengers pushing shopping trolleys or carrying parcels.

In the operational context, the bus facility is poorly located and lacks essential design parameters to meet current requirements, much less future demands, in that:

- the parking bays are of sawtooth, nose-to-the-kerb design, requiring buses to reverse from their parking bay into the path of other buses
- there are insufficient bus parking bays to meet future operational requirements
- while there is an existing bus-only right turn lane out of the centre to Aerodrome Road, it is frequently used by general traffic. Consequently, there are no effective bus priority measures into and out of the plaza, so buses are subject to the vagaries of normal traffic flow
- there is traffic conflict between buses manoeuvring and private vehicle movements.

From a user perspective, the present facility lacks:

- adequate shade
- adequate protection from the elements
- adequate passenger information
- good connectivity between passenger facilities and the general environs.

Maroochydore Centre Position Paper

Sunshine Coast Regional Council has prepared a position paper outlining the future development of the Maroochydore centre. The most significant change would be the development of a compact transit-oriented development on the Horton Park Golf Club land. This area will also accommodate a future CAMCOS rail station.

Existing road network

Alignment description

This section is approximately 2.1 kilometres in length and contains the key arterial for the Maroochydore CBD precinct. The section runs from Parker Street to the signals at Third Avenue, Maroochydore, and is relatively congestion-free. From Third Avenue to Maroochydore Road, Aerodrome Road and Horton Parade, arterials are heavily congested for most of the day.

During peak tourist seasons, the increase in traffic causes a significant deterioration in the level of service.

The existing posted speed for this section is 60 km/h.

Car parks

The Aerodrome Road frontage contains numerous businesses that have off-street parking adjacent to their premises. In addition, there are 210 existing on-street car parks along both sides of the road.

Bus stops

Locations of existing bus stops in Section 7 are detailed in Table 5-7.

Table 5-7: Approximate locations of existing bus stops — Section 7

Approximate northbound chainage (m)		Approximate southbound chainage (m)	
21,500	Sunshine Plaza Station	21,500	Sunshine Plaza Station

Roundabouts and signals

This section contains no roundabouts but has seven signalised intersections; the signalised intersections are located at:

- Aerodrome Road and Sixth Avenue
- Aerodrome Road and Maud Street
- Aerodrome Road and First Avenue
- Horton Parade and Plaza Parade
- Horton Parade and Sunshine Plaza
- Horton Parade and Cornmeal Parade
- Horton Parade/Beach Road and Maroochydore Road/Ocean Street.

Traffic volume

Annual average daily traffic (AADT) volumes for an average weekday, based on the 2006 base VISUM model for Section 7 are given below:

- Aerodrome Road (Parker Street to Wrigley Street) 20,200 AADT
- Aerodrome Road (Wrigley Street to Maud Street) 21,900 AADT
- Horton Parade (Maud Street to Church Street) 20,100 AADT.

Existing provision for cyclists and pedestrians

The existing road has no formal cycle provision. Narrow road lanes and parallel parking make cycling along this portion of the corridor unattractive. The footpaths in the area also accommodate a high volume of pedestrian and recreational traffic due to the numerous shops fronting the corridor. Although there is no provision for cyclists through this section, there are cycle corridors in the adjacent section: along the beachfront near Cotton Tree, up alongside Cornmeal Creek to the Maroochydore CBD, and around the south-eastern boundary of the Horton Park Golf Course from Maude Street to Plaza Parade.

Existing major structures

A bridge on Horton Parade crosses Cornmeal Creek; it is five lanes wide, with provision for pedestrians and cyclists on both sides. The pathway on the northern side of the bridge is a separate structure.

Utilities

The public utility plant within Section 7 is described below.

Sunshine Coast Water

Water mains ranging in size from 100–1200 millimetres and sewer mains ranging in size from 150–225 millimetres run in the road footpaths along and across the proposed alignment of Section 6.

Road drainage consists of kerb and channel flowing to gully pits, and pipes that then convey stormwater to local waterways.

Telecommunications

Various optic fibre cables run parallel to and across the alignment of Section 7. The telecommunication infrastructure is underground and mostly in the southern road footpath.

Energex

Overhead power and streetlights run parallel to Aerodrome Road for the majority of Section 6. Most of the major services are located in the southern road footpath.

5.4 Option selection

5.4.1 Selection of preferred option

The corridor of the CoastConnect — Caloundra to Maroochydore project was determined during the pre-feasibility study completed in February 2007, before the concept design and impact management plan (CDIMP) was commenced.

The pre-feasibility study split the 23-kilometre study area into 10 sections. Each section was defined by its relatively homogenous land use and operating environment. This sectioning of the study area has carried through to the CDIMP phase.

Section 8 is currently being planned for as a part of the Multi Modal Transport Corridor (MMTC) project. Sections 9 and 10 will be conducted in future studies, once more is known about the future Caloundra Transit Oriented Community (CALTOC) and the Caloundra South development.

At the commencement of the CDIMP process, possible bus priority treatment options were developed within the project corridor. These options were evaluated to select an initial concept design which was released to the public for comment in September 2008. Revised concept designs were prepared in response to public submissions and a further round of consultation concluded in August 2009. Brief details of design amendments are summarised in later sections of this chapter.

The pre-feasibility study also confirmed that a kerbside location for any bus priority treatment was preferred. The CoastConnect — Caloundra to Maroochydore corridor has numerous services entering and exiting throughout its length and a kerbside solution is the most efficient layout for catering to these types of services.

The preferred bus priority treatments have been selected on a value basis. The selection process has also benefited from input from various stakeholders such as Sunshine Coast Regional Council and the Department of Transport and Main Roads (DTMR), which has helped refine the options into an initial concept design for a preferred option.

The bus priority measures have been considered for both proactive and reactive conditions and opportunities. That is, bus priority is not only considered where there is a current demonstrated demand, but is also considered where patronage growth potential exists.

5.4.2 Option development

Through consultation with DTMR, Sunshine Coast Regional Council and Sunbus, possible bus priority measures were developed within the project corridor as the basis for more detailed assessment. The options were based on the learnings from the pre-feasibility study and were considered to cover all practical and reasonable alternatives in the project corridor. Performance testing carried out in the VISUM strategic and VISSIM microsimulation models were a key input into the selection of a preferred option.

Key consideration in the concept design process included:

- minimising property and construction impacts on community assets, such as parks and private property
- minimising traffic impacts during construction and during the staged implementation of the project
- maximising prioritisation of buses along the corridor compared to private car travel, particularly in the peak periods
- maximising efficiency in terms of travel time, operation and construction
- locating the bus stops and stations where they were most accessible to people and activity centres
- meeting relevant design guidelines
- identifying opportunities to integrate with other infrastructure and transport projects.

5.4.3 Option evaluation process

A project team workshop was held on 13 August 2009 to select the preferred option for two sections of the corridor: Mari Street signals and Okinja Road realignment. The Brisbane Road cycle options have been provided to the Sunshine Coast Regional Council for their review.

Option evaluation criteria were developed from the project objectives to allow comparison between the options. The criteria were agreed between DTMR and Sunshine Coast Regional Council.

A summary of the option evaluation criteria is provided in Table 5-8.

Table 5-8: Option evaluation criteria

	Broad assessment criteria	Assessment criteria
A	Public transport intersections, mid-block and interchange performance and design	<ul style="list-style-type: none"> ▪ capacity ▪ reliability ▪ local accessibility ▪ operational functionality ▪ user functionality ▪ design.
B	Other corridor user design and performance	<ul style="list-style-type: none"> ▪ general traffic ▪ driver legibility ▪ cyclists ▪ pedestrians.
C	Flexibility in design/planning (future proofing) Sustainability Beyond 2026 (future proofing)	<ul style="list-style-type: none"> ▪ future upgrades ▪ compatibility with possible future modes.
D	Land use integration	<ul style="list-style-type: none"> ▪ strategic planning ▪ urban design.
E	Community and stakeholder impacts	<ul style="list-style-type: none"> ▪ visual amenity and urban design impact ▪ minimise impacts in relation to noise and air quality.
F	Property impacts (private/freehold)	<ul style="list-style-type: none"> ▪ minimise property acquisition and displacement impacts.
G	Environmental impacts	<ul style="list-style-type: none"> ▪ maintain biological diversity and ecological integrity ▪ reduce environmental footprint ▪ minimise impact on areas of cultural or archaeological significance.
H	Constructability/staging	<ul style="list-style-type: none"> ▪ constructability ▪ staging ▪ minimise disruption to traffic during construction ▪ utilities ▪ deliverability.
I	Safety	<ul style="list-style-type: none"> ▪ safety for the user ▪ safety of infrastructure provided.
J	Construction cost	<ul style="list-style-type: none"> ▪ capital cost of construction (including temporary works for construction/constructability).

The weightings for the criteria had been determined by an earlier project team using a pair-wise assessment. Upon review, the workshop group collectively agreed on slightly amended ratings reflecting the importance of public transport operation when compared with property impacts; and the importance of property impacts over design flexibility.

The adopted pair-wise scoring matrix is shown in Table 5-9:

Table 5-9: Final pair-wise scoring matrix

A	B	C	D	E	F	G	H	I	J
A	2A	1A	1A	A/E	2A	1A	1A	A/I	1A
	B	B/C	B/D	B/E	1B	1B	1B	B/I	B/J
		C	1D	1E	1F	1C	C/H	1I	1C
			D	1D	1D	1D	D/H	D/I	1D
				E	1E	E/G	1E	E/I	1E
					F	F/G	2H	1I	F/J
						G	H/G	G/I	1G
							H	1I	H/J
								I	1I

This led to the agreed weightings shown in Table 5-10:

Table 5-10: Agreed weightings

Criteria	Raw score	Weight	Agreed weight
A	10	21	20
B	5.5	11	10
C	3	6	5
D	6.5	14	15
E	6	13	10
F	2	4	5
G	3	6	5
H	4	8	10
I	6.5	14	15
J	1.5	3	5
Total	48	100	100

The group reviewed each option of each scenario in turn, and applied a rating of 1 to 5 for each of the criteria; 1 was poor and 5 was excellent.

5.4.4 Mari Street signals

For Alexandra Parade, the option to install traffic signals at Mari Street emerged as the preferred option, with a ranking of 345. The option rankings are shown in Tables 5-11 and 5-12 below.

This treatment would provide superior accessibility to the recreational space on the eastern side of the corridor and the additional crossing facility means that the bus stops can be evenly spaced to service the local area. Safety of the intersection would also be improved for traffic accessing Mari Street due to the presence of the traffic signals.

Table 5-11: Mari Street option ranking — no signals

Assigned weight		20	10	5	15	10	5	5	10	15	5	Option ranking
Assessment criteria		A	B	C	D	E	F	G	H	I	J	
No signals	Criteria ranking											
	5 E											
	4 VG	4							4			
	3 G		3		3	3	3	3		3	3	
	2 F			2								
	1 P											
	Subtotal		80	30	10	45	30	15	15	40	45	15

Table 5-12: Mari Street option ranking — signals

Assigned weight		20	10	5	15	10	5	5	10	15	5	Option ranking
Assessment criteria		A	B	C	D	E	F	G	H	I	J	
Signals	Criteria ranking											
	5 E					5						
	4 VG		4		4					4		
	3 G	3						3	3			
	2 F			2			2					2
	1 P											
	Subtotal		60	40	10	60	50	10	15	30	60	10

5.4.5 Okinja Road realignment

For the potential realignment at Okinja Road, the ‘do-nothing’ option emerged as the preferred option, with a ranking of 323 (see Tables 5-13 and 5-14).

The realignment option would provide no additional benefit to public transport accessibility or priority over the do nothing option. The construction of the realignment option would be at significant additional cost and disruption to the local community.

Table 5-13: Ranking — no realignment at Okinja Road

Assigned weight		20	10	5	15	10	5	5	10	15	5	Option ranking
Assessment criteria		A	B	C	D	E	F	G	H	I	J	
No realignment	Criteria ranking											
	5 E								5			
	4 VG										4.5	
	3 G	3	3		3	3	3	3		3		
	2 F			2								
	1 P											
	Subtotal		60	30	10	45	30	15	15	50	45	23

Table 5-14: Ranking — realignment at Okinja Road

Assigned weight		20	10	5	15	10	5	5	10	15	5	Option ranking
Assessment criteria		A	B	C	D	E	F	G	H	I	J	
Realignment	Criteria ranking											
	5 E											
	4 VG	3.5			4	4				3.5		
	3 G		3.5					3				
	2 F			2			2		2			
	1 P											1
	Subtotal		70	35	10	60	40	10	15	20	53	5

5.4.6 Selection of preferred bus stop locations and layouts

Siting and spacing criteria¹

Stop spacing on bus routes is typically between 0.4 kilometres and 0.8 kilometres for local services, and 0.8 kilometres and 2 kilometres for express services. In consultation with relevant stakeholders, proposed locations for CoastConnect bus stops have been identified, taking into account known future public transport needs.

¹ Based on TransLink (2007) Public transport infrastructure manual

In general, bus stops should be located in areas:

- with high visibility and lighting (or access to power for future lighting)
- close to major attractions (e.g. shopping centres or community centres), which minimises walking distances and assists with passenger safety
- where there is sufficient pavement area for buses to stop outside the main traffic stream, allowing unhindered traffic movement away from tight bends, hill crests or gullies, as these can create blind spots for vehicles
- that allow bus drivers to see traffic approaching from the rear and that maintain clear sightlines between the bus driver and the bus stop and passengers
- these desirable principles have been targeted in the planning of the bus stop locations however the constraints of individual sites have been taken into account on a case-by-case basis.

Recessed bus stops

The need for, and benefit associated with, recessed bus bays at stops depends on a number of factors including:

- bus volumes
- traffic volumes
- applicable bus stopping patterns
- passenger numbers
- bus stop dwell times
- presence or otherwise of a dedicated through bus lane.

Indented bus bays are more necessary in locations where bus volumes are high, and/or traffic volumes are high, and/or bus stopping patterns are mixed, and/or passenger numbers/dwell times are high.

Planning to protect for future recessed bus bays has typically been preferred in the CoastConnect corridor, except in specific instances where local conditions indicate that these may not be necessary or may not be reasonably achievable.

Stop hierarchy

Potential passenger facilities that may be provided at bus stops include:

- information signs and displays
- network information
- bus stop furniture (shelter, seating, refuse bins)
- concrete footpath
- concrete hardstand area (including tactile ground surface indicators)
- lighting.

The level of passenger facility provision at each stop depends on where the stop is located in the overall stop/station hierarchy. Higher order stops or stations may include additional optional facilities such as:

- CCTV/security cameras
- emergency phone
- public phone
- bicycle rack/storage
- shopping trolley bays
- drinking fountains
- commercial vending machines.

The proposed CoastConnect — Caloundra to Maroochydore bus stop hierarchy has been determined with reference to the standard TransLink stop hierarchy, which includes the following categories:

- regular stop
- intermediate stop
- premium stop
- signature stop.

DDA compliance

In order to meet desirable design principles, including those of *Disability Discrimination Act 1992* (Cwth) (DDA) compliance, bus stops are typically designed:

- with at least 1.2 m (preferably 1.5 m) clear access, around and between all infrastructure and obstructions, to comply with disability standards. This includes access to both approach and departure sides of bus stop posts so passengers can view timetables
- with bus stop boarding points that are flat and stable (maximum gradient of 1:40)
- with walkways with a maximum gradient of 1:20, and ramps with a maximum gradient of 1:14, to comply with disability standards.

These specifications have been met wherever possible; however, it is recognised that some areas may have site constraints that prevent this.

Passenger waiting environment

To ensure an acceptable passenger waiting environment, stops have been designed to ensure that they are:

- free from stormwater drains or pits, to prevent buses from splashing pooled water when approaching and departing
- located to minimise exposure to direct sunlight for waiting passengers.

The principles of Crime Prevention through Environmental Design (CPTED) have been applied in bus stop planning and design; these include:

- maximising the use of transparent materials within public transport infrastructure (i.e. toughened glass)
- maximising the use of easily maintained (anti-graffiti) materials for infrastructure and providing strict maintenance schedules
- locating public transport facilities in clearly visible locations (e.g. under street lights or away from foliage and other objects that can be used as hiding places)
- locating independent bus stops near existing activity centres (i.e. service stations or shops), where casual public surveillance can occur.

In some instances, it was appropriate to include elements such as landscaping, public art, and specific architectural and streetscaping features in the stop and station design to enhance the passenger waiting environment.

Provision for advertising

Advertising space forms part of CoastConnect's future policy direction for stop infrastructure. Accordingly, provision for future advertising should be provided. Advertising displays will be wall-mounted and backlit, under mar-resistant transparent material and in locations with maximum visibility to passengers; they will provide space for standard 1,200 mm x 1,800 mm posters.

Where advertising displays are to be encased, electrical provisions shall be provided in the shelter design. Consideration should be given in the design of display cases to ensure that the material used will withstand wear and that it can be easily kept clean. It is understood that a space of 1,500 mm x 2,000 mm x 50 mm is adequate for the standard wall-mounted poster modules described above; however, planners/designers should verify specific requirements with the relevant advertising company should an advertising contract applying to CoastConnect stop infrastructure exist.

5.5 Option description

5.5.1 Sections 1 and 2 (Caloundra to Currimundi) — Bus station

Caloundra station

The upgrade to Caloundra Transit Centre will improve bus efficiency by creating a bus station on both sides of Cooma Terrace and improve passenger safety through the use of CPTED principles.

Previous options considered and discarded

Two options were previously presented for this station. The first provided for all buses to service an on-road station on Cooma Terrace immediately adjacent to the existing bus interchange. The other option provided for improvements to, and a reconfiguration of, the existing bus interchange.

The preferred option is the on-road solution. The interchange itself will continue to provide a location for operational bus activities such as layovers, but its importance will diminish in the longer term when a new CAMCOS bus–rail interchange is developed in the Caloundra Town Centre (nominally 2019).

Station location

The existing Cooma Terrace interchange suffers from its distance from the activity centre of Bulcock Street, remaining somewhat anonymous in the local area.

Moving the passenger waiting areas onto Cooma Street will allow increased passive surveillance of the station, particularly when the existing vacant allotments on Cooma Terrace are developed into multistorey residential buildings (it is understood that such planning is currently under way).

Improved signage and walking paths between the high-activity areas along Bulcock Street will enhance connectivity with the station. Each platform at Caloundra station will be a linear, in-line platform suitable for accommodating two buses simultaneously.

In the short term, layover activities will continue to occur in the Cooma Street interchange. This facility, while generally unappealing for passengers, will remain capable of meeting operational needs for the next decade. In the longer term, layover facilities will be provided at the proposed Caloundra CAMCOS station, and it is anticipated that services that currently terminate at Cooma Terrace will be extended to the new rail station.

Operational performance

Future planning for the local bus network suggests that up to 11 buses per hour will pass through the Caloundra station in each direction by 2031. This level of demand will be comfortably accommodated by the proposed two-bus platform.

Safety

While Cooma Terrace is somewhat set back from the busier area of Bulcock Street, the increasing development along the street will ensure that the station receives adequate passive surveillance.

Local traffic interaction

Cooma Terrace is a local street and not subject to high traffic volumes. Interaction of buses with other road users is unlikely to be problematic.

Pedestrian access, including DDA compliance

The station will be designed to meet all applicable *Disability Discrimination Act 1992* (Cwlth) (DDA) requirements.

Footpaths along Cooma Terrace, Knox Avenue and Minchinton Street will need to be assessed for adequacy for the high volumes of pedestrian traffic that the station will generate.

Pedestrian waiting environment

As with all CoastConnect stations, a high-quality pedestrian waiting environment will be created through the installation of new stop and shelter infrastructure.

Kiss-and-ride facilities

The relatively quiet street environment of Cooma Terrace will allow casual passenger drop-off to occur adjacent to the station location. Set-down bays will be provided near the station to allow this.

Integration with surrounding land use

The immediate precinct surrounding the Cooma Terrace station location consists predominantly of residential, commercial and retail land uses. This area is expected to undergo significant redevelopment in coming years that will increase the density of land use and add to the transport demand.

The residential catchment within 800 metres of the station is predominantly medium- to high-density housing. The 2006 residential population within this catchment was approximately 2,800; this does not include non-permanent residents.

5.5.2 Sections 1 and 2 (Caloundra to Currimundi) — Bus stops

Previous options considered and discarded

Bus stops locations have been amended throughout the concept design process to reflect community feedback where possible.

Preferred options

Proposed bus stop locations are detailed in Table 5-15 and shown on the drawings in Volume 3. These bus stops are proposed to be in line with the parking on the sides of the carriageways. Additional recessing is not considered necessary due to the low traffic volumes in these sections.

Table 5-15: Approximate locations of proposed bus stops — Sections 1 and 2

Approximate northbound chainage (m)		Approximate southbound chainage (m)	
100	2,600	200	2,700
450	3,100	460	3,100
950	3,300	950	3,500
1,380	4,250	1,450	4,250
1,880	4,400	1,900	4,490
2,100	5,150	2,100	5,150

5.5.3 Sections 1 and 2 (Caloundra to Currimundi) — Corridor improvements

Priority measures

No bus priority measures are recommended through the majority of Sections 1 and 2. The exception is the intersection of Buderim Street and Nicklin Way, where proposed bus lanes will begin. Priority measures are not considered necessary in this section due to low traffic volumes and low congestion.

Future planning for a major residential development at Caloundra South will change the alignment of trunk bus services in this area. In the future, southern Nicklin Way will become an important link in the overall public transport corridor as patronage from the Caloundra South area grows. Over time, it is expected that this section of road will take over as the main spine of the network.

Cross-section

There will be no change to the existing cross-section within the majority of Sections 1 and 2. The exception is the Buderim Street and Nicklin Way intersection approach, where bus lanes will be provided for buses turning right into Nicklin Way.

Pedestrians and cyclists

No change is proposed other than the localised improvements that will be required to assist access to the relocated or proposed bus stops. Small retaining walls and ramps may be required to ensure compliance with disabled access codes.

Intersection treatments

Intersections in Sections 1 and 2 will remain as is, with the exception of the priority measures proposed for the Buderim Street/Nicklin Way intersection.

Pavement

No improvement will be made to pavement in Sections 1 and 2.

Major structures

As detailed in Section 5.3.2, the only bridge in Sections 1 and 2 is Tooway Creek Bridge. Sunshine Coast Regional Council is currently planning to replace this bridge. No changes to this structure will be required as part of the CoastConnect — Caloundra to Maroochydore project.

Public utility plant

Public utilities in this section will not be affected by the proposed design, with the exception of minor changes that maybe required as part of bus stop relocation and/or additions.

5.5.4 Section 3 (Nicklin Way) — Bus stations

Currimundi station

Previous options considered and discarded

The design for the Currimundi station is basically unchanged from the previous concept design of October 2008. Planning for this station now accommodates an elevated pedestrian overpass, which may be constructed in the future.

Station location — visibility from high-activity areas

This station's location, at the intersection of Nicklin Way and Buderim Street, achieves very high visibility at this busy location. This is the location where many CoastConnect services will first join Nicklin Way, and the presence of the station at this nexus will be highly noticeable within the urban landscape. Importantly, the station is immediately adjacent to the Currimundi Marketplace, which will remain the primary local shopping precinct between the Kawana Town Centre and Caloundra.

Station layout

Currimundi station will be a signature stop, single bus stop configuration.

Operational performance

Future planning for the local bus network suggests that up to 15 buses per hour will pass through the Currimundi station in each direction by 2031. As a key location in the network, it is anticipated that Currimundi station will be an active stop on express routes that will be implemented between Caloundra and Maroochydore in the longer term.

Safety

Currimundi station is in a highly visible location and will offer excellent passive surveillance. Pedestrian safety should be well catered for in the short term due to the adjacent signalised intersection. In the longer term, an elevated pedestrian overpass will improve access as bus and passenger volumes grow. Additional pedestrian access points may be desirable and should be investigated through the detailed planning and design process.

Local traffic interaction

In the southbound direction, the bus stop location is well segregated from other traffic movements, as left-turning traffic will have already entered the left-turn lane 150 metres to the north. Buses will have their own dedicated left-turn slip lane.

Northbound, the stop will be located immediately before the left-turn entry into Currimundi Marketplace, and the interaction of turning traffic with buses exiting the stop will need to be carefully assessed at detailed design stage to identify and address potential safety issues.

The possible addition of the elevated pedestrian overpass would mean pedestrian crossing phases would not add additional delay to the cycle time of the Nicklin Way/ Buderim Street intersection.

Pedestrian access, including DDA compliance

The grade of Nicklin Way at this location creates some complexity for the southbound stop, which can be addressed through appropriate detailed design of the shelter area and paths leading to it. The proposed elevated pedestrian overpass will incorporate lifts to enable mobility-impaired users to cross Nicklin Way safely.

Pedestrian waiting environment

As with all CoastConnect stations, a high-quality pedestrian waiting environment will be created through the installation of new stop and shelter infrastructure.

Kiss-and-ride facilities

The road environment immediately adjacent to this station does not allow for the provision of formal kiss-and-ride facilities. It is anticipated that kiss-and-ride pickups and setdowns could occur informally around the Currimundi Marketplace and in Bellara Street.

Integration with surrounding land use

Currimundi Marketplace and the strip shopping environment along Nicklin Way provide both retail and employment opportunities within the immediate vicinity of the station. The residential catchment within 800 metres of the station is predominantly low- to medium-density housing, with a 2006 residential population of approximately 4,600.

Kawana Shoppingworld station

Previous options considered and discarded

Two options were previously presented for this station: one that provided for all buses to service stops on Nicklin Way, and another that provided for an island style major bus interchange within the existing car park for the shopping centre. Planning and investigation into the most appropriate form of station for this location determined that the on-road option would provide significantly better operational performance, as buses would not need to divert off Nicklin Way. The island style interchange option is best suited where interchanging between bus services occurs. This function is now proposed at Kawana Town Centre, thereby negating the need for an interchange solution at Kawana Shoppingworld. The on road option also reduced the area of the car park that would need to be acquired in order to construct the station, allowing greater development potential for the centre.

Station location — visibility from high-activity areas

The station will benefit from the high visibility offered by its location on Nicklin Way. The busy Kawana Shoppingworld will create activity throughout the day and early evenings. Existing residential frontage along Nicklin Way may be suitable for redevelopment to create increased density in the local area.

Photo 5-1 shows the location of the proposed bus station at Kawana Shoppingworld.



Photo 5-1: General location of proposed bus station

Alternative locations

The preferred concept location for Kawana Shoppingworld station is subject to possible future redevelopment of Kawana Shoppingworld. The ultimate location of the bus station may need to be revised to integrate with any proposed redevelopment.

Station layout

Each platform at Kawana Shoppingworld station will be a linear, in-line platform arrangement of 55 metres length, suitable for accommodating three buses simultaneously. Layover facilities will be provided in alternative locations nearby, but not immediately adjacent to the station. The future network has been planned to minimise the number of services that terminate at this station, to avoid the need for a large bus interchange. Layover options under investigation include to the rear of the centre near Bermagui Crescent, at the northern end of Point Cartwright Drive, and at Longwood Street to the north.

Operational performance

Future planning for the local bus network suggests that up to 27 buses per hour will pass through the Kawana Shoppingworld station in each direction by 2031. As a key location in the network, it is anticipated that Kawana Shoppingworld station will be an active stop on express routes that will be implemented between Caloundra and Maroochydore in the longer term.

Safety

Kawana Shoppingworld station is in a highly visible location and will offer excellent passive surveillance. An elevated pedestrian overpass is proposed, to improve access as bus and passenger volumes grow.

Local traffic interaction

Current planning is under way to ensure that the interactions of buses leaving the station and vehicles turning left into the shopping centre are accommodated appropriately. Northbound, the stop will be located immediately before the left-turn entry into Marawa Drive, and the interaction of turning traffic with buses exiting the stop will need to be carefully assessed to determine potential safety issues. The left-turn demand into Marawa Drive is relatively low because of the small residential area that this side street leads to.

Pedestrian access, including DDA compliance

The station will be designed to meet all applicable DDA requirements. The proposed elevated pedestrian overpass will incorporate lifts to enable mobility-impaired users to cross Nicklin Way safely. All weather access from the bus station into Kawana Shoppingworld is being planned in partnership with relevant stakeholders.

Pedestrian waiting environment

As with all CoastConnect stations, a high-quality pedestrian waiting environment will be created through the installation of new stop and shelter infrastructure.

Kiss-and-ride facilities

The road environment immediately adjacent to this station does not easily allow for the provision of formal kiss-and-ride facilities. It is anticipated that kiss-and-ride activity could occur informally around the Kawana Shoppingworld or in Marawa Drive, both of which provide a relatively calm environment for passenger drop-off and collection.

Integration with surrounding land use

Kawana Shoppingworld and the strip commercial environment along Nicklin Way provide both retail and employment opportunity within the immediate vicinity of the station. The residential catchment within 800 metres of the station is predominantly low- to medium-density housing, with a 2006 residential population of approximately 3,000.

The development of the station will increase pedestrian activity on Nicklin Way, which could act as a catalyst for future development of the Kawana Shoppingworld’s building footprint to extend towards the station location. This would provide better integration between the station and the centre.

5.5.5 Section 3 (Nicklin Way) — Bus stops

Previous options considered and discarded

During the concept design process some changes to bus stop locations were made. This reflected community feedback and technical studies.

Preferred options

The locations of proposed bus stops are detailed in Table 5-16 and shown on the drawings in Volume 3. The stops along Nicklin Way are all proposed to be a recessed design. This enables unrestricted passage for express or semi-express services in the corridor. These stops are a combination of new or relocated locations in order to provide the most accessible location in terms of proximity and where a safe crossing point exists on the corridor.

Table 5-16: Approximate locations of proposed bus stops — Section 3

Approximate northbound chainage (m)		Approximate southbound chainage (m)	
5,650	10,500	5,650	10,450
6,180	11,200	6,180	11,100
6,600	11,800	6,600	11,670
7,300	12,300	7,200	12,300
8,100	13,000	7,950	12,900
8,700	14,250	8,700	14,150
9,400	14,700	9,270	14,480
9,850		9,850	

5.5.6 Section 3 (Nicklin Way) — Corridor improvements

Priority measures

Previous options considered and discarded

During the earlier concept design phase the option of a shared bus and cycle lane was assessed. The cycling community raised concerns with the safety of this form of treatment given the speed along Nicklin Way. The option was rejected and separate cycle lanes have now been incorporated.

Residents and business owners expressed concern with the proposed loss of on street parking. There was strong support to retain parking on the Nicklin Way. In response to these concerns the design was amended to narrow the existing road median and carriageway lanes which made space for some parking to be added back into the corridor.

Preferred Options

The bus priority measures proposed for Nicklin Way is continuous kerbside bus lanes on each side of the road from Buderim Street to Mooloolah River. The continuous bus lanes will give priority to buses, saving travel time and improving reliability and efficiency when Nicklin Way is congested. This should encourage public transport patronage. The bus lane will also be able to be used by both taxis and emergency vehicles. A separate bicycle lane has been provided.

At those traffic signal locations where a left-turn slip lane is not provided, general traffic will be able to use the bus lane to turn left at the side roads. For the most part, the extra lanes along Nicklin Way will be new lanes along the existing road shoulders.

However, it will be necessary to convert existing general traffic lanes to bus lanes in the 3-kilometre section between Kawana Island Boulevard and the Mooloolah River at the northern end of Nicklin Way. This work will be dependent on additional capacity across the Mooloolah River being provided by the MMTC.

Cross-section

The proposed typical cross-sections for Nicklin Way are shown in Figures 5-2 and 5-3.

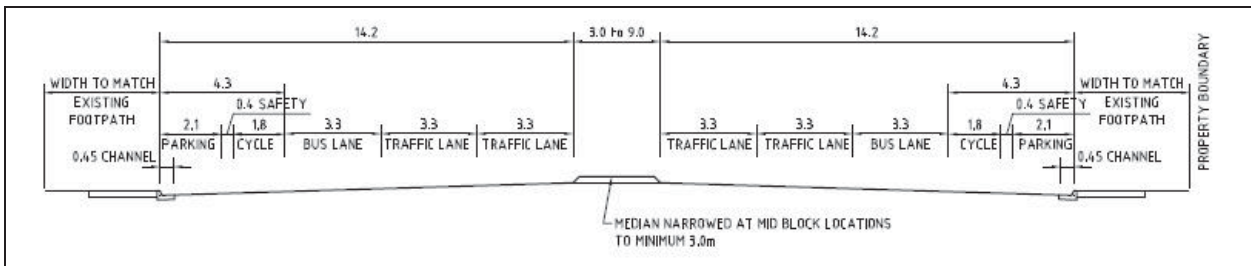


Figure 5-2: Nicklin Way typical cross-section with on-road parking

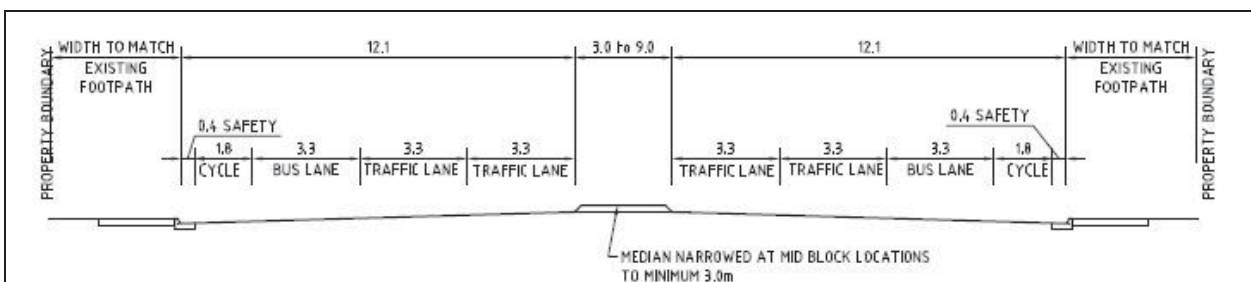


Figure 5-3: Nicklin Way typical cross-section without on-road parking

The proposed cross-sections provide 2 x 3.3 metre traffic lanes, 1 x 3.3 metre bus lane, 1 x 1.8 metre cycle lane and 1 x 2.1 metre parking lane (where possible) in each direction, separated by a minimum 3.0 metre raised median. Both the median and the existing traffic lanes have been narrowed to reduce the overall corridor width and minimise possible property impacts.

The desirable minimum width of the median is 4.0 metres, and the absolute minimum width is 3.0 metres. Where the median is 3.0 metres it is proposed it be hard-paved due to reduce the area for maintenance. In some cases, median streetlight poles are also sited on the median, further reducing the width available for mowing should they be sown with grass.

The existing traffic lanes have been narrowed from 3.5 metres to 3.3 metres. The proposed width for the bus lane is also 3.3 metres.

Outside the bus lane there is a 1.8-metre cycle lane and a 2.5-metre lane for on-street parking (where possible), for each direction of travel. Semi-trailer loading bays are provided at chainage 6,080 metres and 6,400 metres southbound and chainage 6,400 metres northbound. The width provided for these loading bays is 2.95 metres. These loading bays are primarily provided for the numerous car sales yards in the Currimundi section.

The proposed width of the footpath is designed to match the existing footpaths. This is consistent with the project design criteria.

Pedestrians and cyclists

A future possible pedestrian overpass is proposed for Nicklin Way at Currimundi Marketplace (chainage 5,650 metres). This will create a safe crossing of Nicklin Way for the major bus stops on Nicklin Way at Buderim Street and safe access to the Currimundi Marketplace shops. In the interim, the addition of an at-grade pedestrian crossing on the northern side of the Buderim Street/Nicklin Way signalised intersection has been recommended. A possible future pedestrian overpass is proposed for Kawana Shoppingworld (chainage 13,450 metres). An all-weather access into the shopping centre from the bus stop is also recommended.

Provision for cyclists is made in Section 3 by inclusion of a 1.8-metre-wide cycle lane, which runs from Buderim Street to Mooloolah River in both directions. Stakeholders, including local cycle groups, have had input to refine the design of these dedicated cycle lanes. The existing cycle connection across the Mooloolah River will be maintained. Footpaths will be reinstated to their existing width to meet the needs of pedestrians. Previous designs included a shared bus-cycle lane; however, feedback received during consultation indicated that this was not a preferred form of treatment in a high-volume high-speed location such as Nicklin Way. The proposed bus stops for this section are generally located adjacent to signalised intersections. This facilitates a safer environment for pedestrians crossing the road corridor.

Bus stops are proposed adjacent to the intersections of Nicklin Way and Thunderbird Drive, and Nicklin Way and Jinang Street. Possible future traffic signals at these intersections will help to facilitate a safer environment for pedestrians crossing at these locations. The possible future traffic signals at Thunderbird Drive also provide safety improvements for school students accessing Kawana Waters State College. Bus stops have been added near the intersection of the Nicklin Way and Meridan Way/Beach Road to provide an alternative loading and unloading point for the school students.

Intersection treatments

In general, intersections along Section 3 need to be widened on the outside edges to provide for bus and cycle lanes. To allow for the intersection widening, traffic signal hardware, traffic islands, signs, services etc. related to the affected intersection will need to be relocated.

Possible future traffic signals are proposed at the intersections of Nicklin Way and Thunderbird Drive, and Nicklin Way and Jinang Street, to facilitate safe pedestrian crossing of the road corridor. These improvements would only be carried out in partnership with Sunshine Coast Regional Council.

As the design of intersections is 'like-for-like', existing left-turn slip lanes will be reinstated. However, where low-angle entry lanes exist, they will be replaced with 70° entry slip lanes. A number of the proposed left-turn islands are less than the desirable minimum area of 25 m².

An option for further consideration in future design phases is the possible removal of the left-turn slip lanes at the following locations:

- Erang Street – Nicklin Way western approach
- Nicklin Way – Paringa Street southern approach
- Nicklin Way – Palkana Drive northern approach.

Provision of left turns at these locations via the traffic signals will further reduce the amount of land that would need to be resumed from commercial sites. A result of the MMTTC from Caloundra to Mooloolaba will be an interchange at Creekside Boulevard and provision for a future park-and-ride CAMCOS train station adjacent to the interchange.

This interchange and station will cause a significant increase in the amount of turning traffic into and out of the intersection of Nicklin Way and Erang Street. To deal with the increased traffic, dual right-turn lanes are proposed both into and out of Erang Street.

Traffic modelling has shown that two-stage pedestrian crossings may be required at the following intersections on Nicklin Way:

- Erang Street
- Lake Kawana Boulevard
- Main Drive
- Sunbird/Koorin Drive
- Lutana Street
- Point Cartwright Drive
- Kensington Drive/Jessica Boulevard.

The existing median islands vary in width from 1.5–4.3 metres at these intersections, with most being less than 2.5 metres wide. Further analysis will be required to determine the minimum width that is appropriate at each location to provide refuge for future pedestrian volumes crossing the corridor.

In some cases the median islands need extending further into the intersection, or pedestrian crosswalk lines need shifting back so that pedestrians are directed onto the median islands.

The provision of two-stage pedestrian crossings at intersections along Nicklin Way will be assessed in future design phases when additional traffic and pedestrian analysis will be available.

Road pavement

Pavement investigations revealed variations between the pavement in the carriageways and the shoulders. The existing road shoulders will need to be excavated and new pavement constructed for the proposed bus and bike lanes for the length of the section where only four traffic lanes currently exist. Where the existing formation is a six-lane carriageway, allowance has been made to replace the road pavement to ensure the 25-year pavement design life is achieved.

Mechanistic pavement design has been conducted for this section using CIRCLY software. The required full-depth asphalt pavement structure for the traffic loadings is summarised in Table 5-17.

The proposed full-depth asphalt pavement materials and parameters recommended are:

- dense-graded asphalt (DG14, A5S)
- seal (14 millimetre S2S)
- dense-graded asphalt (DG20 C600)
- working platform:
 - type 2.1 (E = 800 MPa)
 - type 2.3 (E = 450 MPa)
 - type 2.4 (E = 350 MPa).

Table 5-17: Section 3 — Summary of recommended full-depth pavement designs

Road locations	Actual % of CVs	Design traffic (ESAs)	Depth of asphalt surfacing	Depth of asphalt base layer	Depth of working platform Type 2.1	Subgrade material design CBR %
Nicklin Way: Buderim Street to Gannawarra Street	4	8.90E+06	45/45 mm	195 mm	150 mm	5
Nicklin Way: Gannawarra Street to Lake Kawana Boulevard	5	1.18E+07	45/45 mm	210 mm	150 mm	5
Nicklin Way: Lake Kawana Boulevard to Point Cartwright Drive	6	1.40E+07	45/45 mm	215 mm	150 mm	5
Nicklin Way: Point Cartwright Drive to Mooloolah River	5	1.55E+07	45/45 mm	150 mm	150 mm	45

Public utility plant

There are numerous services in Sections 3 that will be affected by the proposed alignment. A preliminary assessment shows that these services include:

- Sunshine Coast Water infrastructure
 - 160 metres of 100-millimetre water main
 - 140 metres of 250-millimetre water main
 - 320 metres of 375-millimetre water main
 - 60 metres of 525-millimetre water main
 - removal of two sewer manholes
 - installation of four sewer manholes
 - 45 metres of sewer reticulation main
 - 140-metre sewer rising main.
- Energex infrastructure
- Telecommunication infrastructure.

The impact of the proposed design on the above infrastructure requires additional investigation during future design phases of the project to determine the scale of impacts. Consultation with Energex and Telstra during the option development process concluded that relocation prior to commencement of the road construction works is preferred. A cost estimate to relocate affected services was provided by Telstra and Energex to help inform this planning study.

Major structures

Currimundi Creek Bridge

The concept design requires widening of this structure on the outside (both sides) by approximately 4 metres.

The existing Currimundi Creek Bridge structure, shown in Photo 5-2, is a six-span structure supported on prestressed concrete (PSC) piles and reinforced concrete (RC) headstocks. A previous widening has been carried out on both sides, the original structure being PSC girders (Bulb T type) and the widened structure being PSC deck units with a composite deck slab.

It is envisaged that widening for the CoastConnect — Caloundra to Maroochydore alignment would involve driving new PSC piles and extending the headstocks, breaking back the existing edge and internal barriers and deck cantilever, placing new PSC deck units and extending the composite deck. The widening is considered to be of conventional form. It is proposed that any widening works or new structure would match the existing navigation clearance.



Photo 5-2: Currimundi Creek Bridge

Tokara Canal Bridge

The concept design requires widening of the existing structure on the outside by approximately 4 metres.

The existing Tokara Canal Bridge structure, shown in Photo 5-3, is a two-span structure supported on PSC piles and RC headstocks. The existing deck consists of transverse stressed PSC deck units. A 375-millimetre-diameter water main is supported on brackets on the outside of the structure (east side).

It is envisaged that widening for the CoastConnect — Caloundra to Maroochydore alignment would involve driving new PSC piles and extending the headstocks, breaking back the existing edge and internal barriers, removing the transverse stress anchor plates and removing the outside deck unit. It is recommended that the widening extension incorporate a composite deck rather than extending with transverse stressing; this is considered necessary for attachment of the higher containment barriers required under the provisions of the new AS 5100 bridge code. It is proposed that any widening works or new structure would match the existing navigation clearance.



Photo 5-3: Tokara Canal Bridge

5.5.7 Section 4 (Kawana Town Centre) — Bus station

Kawana Town Centre station

Previous options considered and discarded

The CoastConnect station at Kawana Town Centre will be part of an integrated bus–rail interchange when the CAMCOS rail corridor is developed. In the short –term, on-road bus stops will be provided on Kawana Way until the interchange is developed.

Station location — visibility from high-activity areas

Located on the western edge of the new Kawana Town Centre, the integrated bus–rail interchange will become an integral part of the town centre. Initial planning for the town centre layout includes a pedestrian spine leading to the station. Active shop frontages are planned along the street facing the interchange, encouraging the creation of an integrated land use zone with exposure to pedestrian traffic throughout business hours.

Station layout

The bus station component of the interchange will have the look and feel of other CoastConnect stations, though additional platform length will be provided as bus dwell times at a rail station can often be longer due to the larger number of passengers interchanging there.

However, to avoid using excessive space for a major bus interchange in a town centre location, the future bus network has been designed to minimise the number of buses that terminate at this station. Consequently, linear in-line platforms will be provided operating with standard head of bay pickup arrangements. Specific bays may need to be set aside for those routes that act as a distinct rail feeder service, but adequate bus platform length has been preserved to enable this.

As a major transport interchange, the interchange is likely to be visited by long-distance coach services. Facilities for drivers will be provided as part of the rail station building.

Operational performance

Future planning for the local bus network suggests that up to 27 buses per hour will pass through the Kawana Town Centre station in each direction by 2031. As a key location in the network, it is anticipated that Kawana Town Centre station will be an active stop on express routes that will be implemented between Caloundra and Maroochydore in the longer term.

Safety

Kawana Town Centre station is in a highly visible location and will offer excellent passive surveillance from the adjacent businesses that front the station. Pedestrian safety should be catered for by at-grade pedestrian crossings and wide pedestrian footpaths. An opportunity exists to extend the pedestrian overpass that will link the rail platforms across to the bus interchange, providing a safe and convenient pedestrian crossing environment.

Local traffic interaction

The bus platforms will be fully segregated from other traffic, ensuring minimal conflict between different road users. Road network planning of the town centre area is still in its preliminary stages, but the need to ensure bus priority over other road traffic will play an important part in this planning.

Pedestrian access, including DDA compliance

As a new station in a newly developed town centre, Kawana Town Centre station will benefit from full compliance with DDA standards.

Pedestrian waiting environment

Integrated with the future rail station, a high-quality pedestrian waiting environment will be provided.

Kiss-and-ride facilities

Kiss-and-ride facilities will be provided immediately adjacent to the bus station area, serving the needs of both bus and rail passengers.

Architecture and landscaping

The design of the integrated bus and rail station will integrate with the new town centre, using compatible architectural styles to create a seamless experience as people move through the town centre into the station.

Integration with surrounding land use

As part of a Greenfield development, the station will be a core component of the local area. Adjacent land uses will include dense mixed uses, including commercial, retail, entertainment, medical and residential. This rich mix of uses is expected to be supportive of public transport and will contribute to the effectiveness of services using the CoastConnect — Caloundra to Maroochydore corridor.

5.5.8 Section 4 (Kawana Town Centre) — Bus stops

Proposed bus stop locations are detailed in Table 5-18 below and shown on the drawings in Volume 3. The stops have been located to service the proposed retirement village and commercial developments near The Decks (chainage 300). The proposed Sunshine Coast University Hospital will have stops within its site.

Chainage 1,550 m provides interim stops to service the Kawana Town Centre precinct prior to the construction of an integrated bus and train station when the CAMCOS rail is constructed.

The stop at chainage 3,000 metre services the industrial zone surrounding Main Drive.

Table 5-18: Approximate locations of proposed bus stops — Section 4

Approximate northbound chainage (m)		Approximate southbound chainage (m)	
300	1,550 interim	300	1,400 interim
Hospital	3,100	Hospital	3,000

5.5.9 Section 4 (Kawana Town Centre) — Corridor improvements

Priority measures

Southern Nicklin Way to proposed regional hospital

Bus lanes are proposed for Lake Kawana Boulevard between Nicklin Way and Central Boulevard. The lanes will be in addition to the existing four general traffic lanes; however, significant road widening will be required to provide these lanes. Boundary setbacks have been provided in the development approvals for the adjacent sites to accommodate this widening.

At Central Boulevard, the bus services will leave Lake Kawana Boulevard and join the local road network to connect via the eastern access, through Birtinya island, to the proposed Sunshine Coast University Hospital. The priority measures along this link will generally be in the form of dedicated bus lanes. This needs to be agreed among relevant stakeholders.

The option of running services for the full length of Lake Kawana Boulevard to the hospital was considered, but the addition of priority measures at the intersection of Kawana Way and Lake Kawana Boulevard is complicated by the high volume of traffic predicted at this intersection. A further complication is the difficulty of accessing the hospital via this link and the need to provide priority for emergency services entering and exiting the hospital.

Proposed regional hospital to Northern Nicklin Way

Bus priority measures in this section are subject to further investigations with Queensland Health, the Sunshine Coast Regional Council and Stockland (as the developer of the proposed Kawana Town Centre). Options for further consideration for the middle portion of this section include:

- using the CAMCOS train station access road and Kawana Way until bus services experience high delays
- using the CAMCOS train station access road and the proposed CAMCOS rail line corridor (co-location of rail and bus services) up to Main Drive.

Options considered for bus priority for the northern part of this section were:

- Kawana Way or CAMCOS to Metier Linkway and along Main Drive
- Kawana Way to and along Kawana Island Boulevard.

The preferred option is the addition of bus lanes along Metier Linkway and Main Drive. This could be achieved within the existing road corridor in a 3-metre flush median. Otherwise, additional land would be required from the southern side of the corridor to provide a 4.6-metre-wide raised median.

Provision of bus priority lanes north of Main Drive along Kawana Way and Kawana Island Boulevard is not preferred for the following reasons:

- this route would not service the industrial zone adjacent to Main Drive or the portion of Section 3 corridor between Main Drive and Kawana Island Boulevard
- bridge duplication would be required on Kawana Island Boulevard over Parrearra Channel
- the intersection of Kawana Island Boulevard and Nicklin Way is predicted to be near capacity at 2016 and 2026, and would be difficult to upgrade
- significant land requirements would be necessary on the eastern side of Kawana Way on the approaches to the Kawana Island Boulevard intersection
- the intersection of Melody Court and Kawana Island Boulevard would need to be converted to a 'left in, left out' form of control
- reserve land would be required on the approaches to the Parrearra Channel Bridge
- the Main Drive corridor option has the added benefit of providing improved public transport infrastructure to the Stockland Park sports precinct.

Cross-section

Figure 5-4 below details the proposed cross-sections for Lake Kawana Boulevard from Nicklin Way to Central Boulevard.

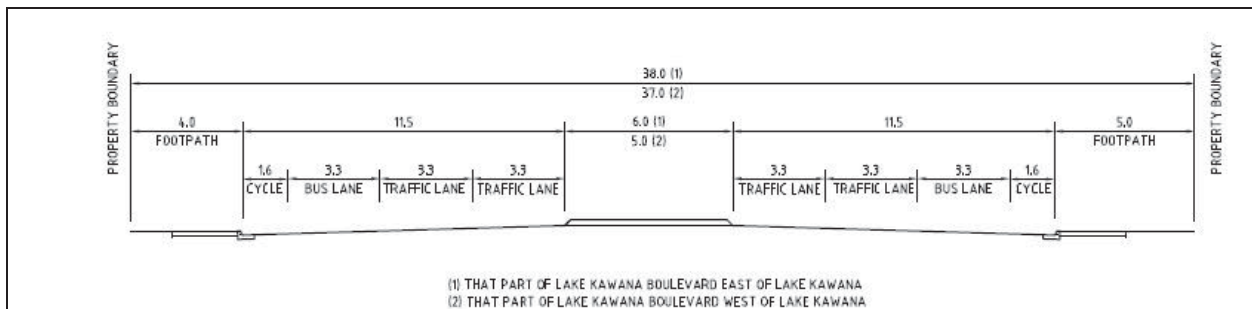


Figure 5-4: Lake Kawana Boulevard typical cross-section

There are different cross-sections proposed for Lake Kawana Boulevard. East of Lake Kawana the cross-section consists of:

- 6.0-metre median
- 2 x 3.3-metre traffic lanes (per direction)
- 3.3-metre bus lane (per direction)
- 1.6-metre cycle lane (per direction)
- 1 x 4.0-metre footpath (per side)
- 1 x 5.0-metre footpath (per side).

West of Lake Kawana the cross-section width is narrowed by 1.0 metre, as the median is reduced from 6.0 metres to 5.0 metres.

The preferred cross-section proposed for Main Drive is shown in Figure 5-5. The figure shows a cross-section option that includes:

- 4.6-metre median
- 3.2-metre traffic lane (per direction)
- 3.3-metre bus lane (per direction)
- 1.2-metre cycle lane (per direction)
- 4.5-metre footpaths.

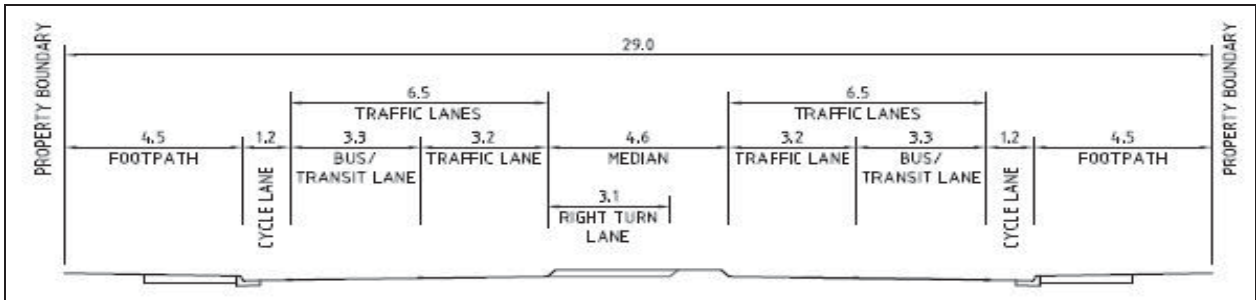


Figure 5-5: Main Drive typical cross-section

An alternative cross-section for Main Drive has been developed that provides wider carriageway lanes and narrower footpaths in each direction. This alternative achieves the minimum recommended width between kerbs of 8.4 metres, as per RPDM Chapter 7 Table B1 for multi-combination vehicle routes.

The alternative cross-section is shown in Figure 5-6 and provides:

- 4.6-metre median
- 3.4-metre traffic lane (per direction)
- 3.4-metre bus/transit lane (per direction)
- 1.6-metre cycle lane (per direction)
- 4.0-metre footpaths.

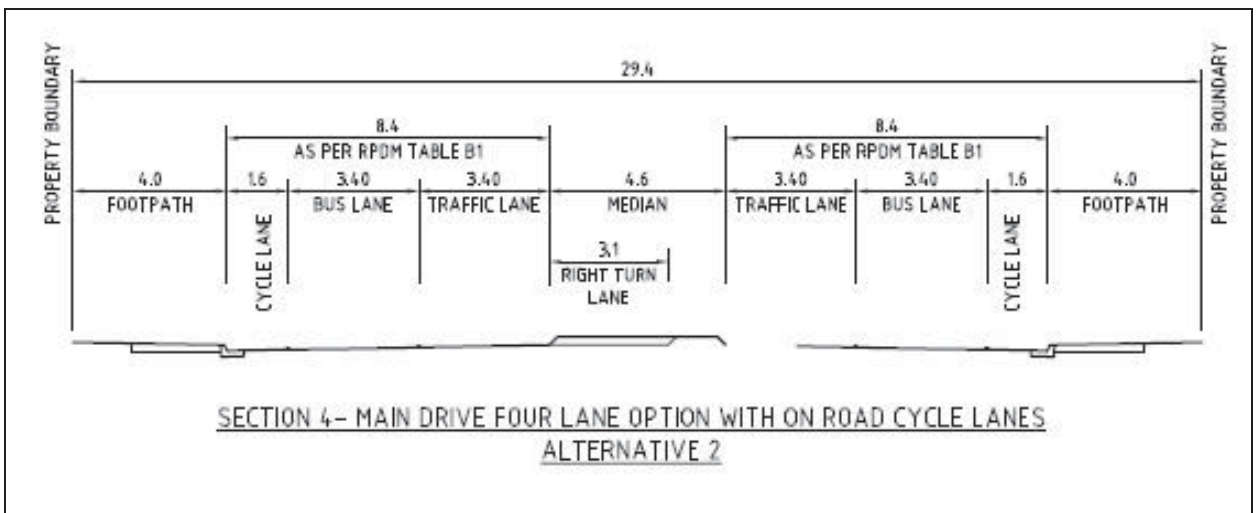


Figure 5-6: Main Drive alternative typical cross-section

Pedestrians and cyclists

The provision for cyclists includes a 1.6-metre cycle lane in both directions along Lake Kawana Boulevard and, depending on the cross-section adopted, either 1.2-metre or 1.5-metre cycle lanes in both directions along Main Drive. Further detailed studies for cycle provision in this portion of the corridor are ongoing as part of the planning for the MMTC and Kawana Town Centre projects.

Intersection treatments

The following intersection treatments, including changing intersections to 'left in, left out', are indicative only and are subject to additional modelling and analysis as a part of future phases.

As a result of the added bus and cycle lanes along Lake Kawana Boulevard, the existing roundabout at the intersection of Lake Kawana Boulevard and The Decks is proposed to be upgraded to traffic signals. Similarly, intersections along Main Drive will need to be signalised. It is proposed that the roundabout between Metier Linkway and Main Drive will be upgraded with signals. This could happen as a result of the construction of a future overpass over Kawana Way, built as part of the MMTC project, before the CoastConnect — Caloundra to Maroochydore project's implementation.

Sportsmans Parade is proposed to be realigned to form a crossroad with Tandem Avenue; this future intersection would also be signalised. Bus stops will be located adjacent to this signalised intersection to provide safe pedestrian crossing of Main Drive.

The intersections of Main Drive and Textile Avenue, and Bearing Avenue and Commerce Avenue are recommended to become 'left in, left out' control. There is insufficient space to signalise and provide all-movement intersections at these locations.

Pavement

Mechanistic pavement design has been conducted for this section using CIRCLY software; the recommended full-depth asphalt pavement structure for the traffic loadings is summarised in Table 5-19.

The proposed full-depth asphalt pavement materials and parameters recommended are:

- dense-graded asphalt (DG14, A5S)
- seal (14 millimetre S2S)
- dense-graded asphalt (DG20 C600)
- working platform:
 - type 2.1 (E = 800 MPa)
 - type 2.3 (E = 450MPa)
 - type 2.4 (E = 350MPa).

Table 5-19: Section 4 — Summary of recommended full-depth pavement designs

Road locations	Actual % of CVs	Design traffic (ESAs)	Depth of asphalt surfacing	Depth of asphalt base layer	Depth of working platform Type 2.1	Subgrade material design CBR %
Lake Kawana Boulevard	4	1.36E+06	45/45 mm	140 mm	150 mm	5
Kawana Way	5	3.36E+06	45/45 mm	160 mm	150 mm	5

Public utility plant

There are numerous services in Section 4, including those that will be affected by the proposed alignment. A preliminary assessment shows that these services include:

- Energex infrastructure
- telecommunication infrastructure
 - installation of four medium Telstra pits
 - installation of six minor Telstra pits
- Sunshine Coast Water infrastructure
 - 450 metres of 250-millimetre-diameter water main.

The impact of the proposed design on the above infrastructure requires additional investigation during future design phases of the project to determine the scale of impacts. Consultation with Energex and Telstra during the option development process concluded that relocation prior to commencement of the road construction works is preferred. A cost estimate to relocate affected services was provided by Telstra and Energex to help inform this planning study

Major structures

Lake Kawana Bridge (East)

The concept design requires widening of the Lake Kawana Boulevard Bridge (East) on both sides by approximately 5 metres. Alternatively, the bridge could be widened on the northern side only. The widening option adopted will be confirmed in future design phases.

The existing Lake Kawana Boulevard Bridge (East) structure, shown in Photo 5-4, is a five-span structure supported on PSC piles, RC columns and RC headstocks. The existing deck consists of PSC deck units.

It is envisaged that widening for the CoastConnect – Caloundra to Maroochydore alignment would involve driving new PSC piles and extending the headstocks, breaking back the existing edge and internal barriers, and removing the outside deck unit. It is proposed that any widening works or new structure would match the existing navigation clearance.



Photo 5-4: Lake Kawana Bridge (East)

Lake Kawana Bridge (West)

Lake Kawana Bridge (West) does not form part of the preferred option for the ultimate alignment of the CoastConnect — Caloundra to Maroochydore corridor. Planning for the duplication of this bridge is being conducted by DTMR.

The existing Lake Kawana Bridge (West) structure, shown in Photo 5-5, is a three-span structure supported on PSC piles, RC columns and RC headstocks. The existing deck consists of PSC deck units.



Photo 5-5: Lake Kawana Bridge (West)

5.5.10 Section 5 (Brisbane Road to Mooloolaba Esp.) — Bus station

To ensure local values and visions are achieved along Brisbane Road/Walan Street, the Sunshine Coast Regional Council is leading the design and delivery of this section. Council’s Mooloolaba Integrated Land Use and Transport Assessment Study is the current policy position for this section.

Section 6 (Alexandra Parade) — Bus station

There is no bus station proposed for Section 6.

5.5.11 Section 6 (Alexandra Parade) — Bus stops

Proposed bus stop locations are detailed in Table 5-20 and shown on the drawings in Volume 3. Many of the stops proposed in this section are in-line to reduce the impact on adjacent developments. It is not considered this will adversely affect service reliability as there are few stops and traffic congestion is generally low.

Table 5-20: Approximate locations of proposed bus stops — Section 6

Approximate northbound chainage (m)		Approximate southbound chainage (m)	
18,450	19,900	18,460	19,900
19,000	20,350	19,000	20,450

5.5.12 Section 6 (Alexandra Parade) — Corridor improvements

Previous options considered and discarded

During the draft concept design phase the option to provide six lanes for the full length of Alexandra Parade from Pacific Terrace north was assessed. This would provide continuous bus lanes and guarantee bus priority even during peak holiday periods.

Residents and business owners generally did not support widening of Alexandra Parade and suggested reducing traffic through this area. Concerns raised related to loss of open space and the provision of pedestrian crossing facilities to provide access to the beach and recreation space on the eastern side of the corridor.

The option was rejected in response to community feedback to create a balanced outcome. The preferred concept proposes bus lanes only at signalised intersections to allow buses to bypass intersection congestion.

Priority measures

The bus priority measures proposed for this section include bus queue bypass lanes at intersections. Bus queue bypass lanes will promote buses to the front of the traffic queuing at traffic signals and give them the green light at the same time as other vehicles at the intersection. There will be a short merge lane for buses on the departure side of the intersection to allow them to re-enter the traffic stream. While this solution does not provide the same level of benefit as dedicated bus lanes, preliminary traffic studies show that this low-impact solution provides a balanced outcome that will provide sufficient improvements for local and tourist bus trips and will complement local amenity.

Bus queue bypasses are proposed for the following intersections:

- Venning Street and Mooloolaba Esplanade
- Buderim Avenue and Alexandra Parade/Mooloolaba Esplanade
- Pacific Terrace and Alexandra Parade
- Okinja Road and Alexandra Parade.

The bus queue bypass lanes will be marked as bus lanes that buses and taxis are permitted to use. It is considered that this solution strikes the right balance between minimising local impacts and providing the benefits of improved public transport priority. Photo 5-6 shows the general location of bus queue bypasses on Alexandra Parade.



Photo 5-6: General location of proposed bus queue bypasses on Alexandra Parade

Cross-section

The proposed cross-section for Alexandra Parade (where bus queue bypasses are provided) is shown in Figure 5-7; the cross-section provides:

- 3.6-metre (at priority control) or 4.5-metre (at signals) median
- 2 x 3.2-metre traffic lanes (each way)
- 3.3-metre bus lanes (each way)
- 1.5-metre cycle lanes (each way)
- footpath to match existing width.

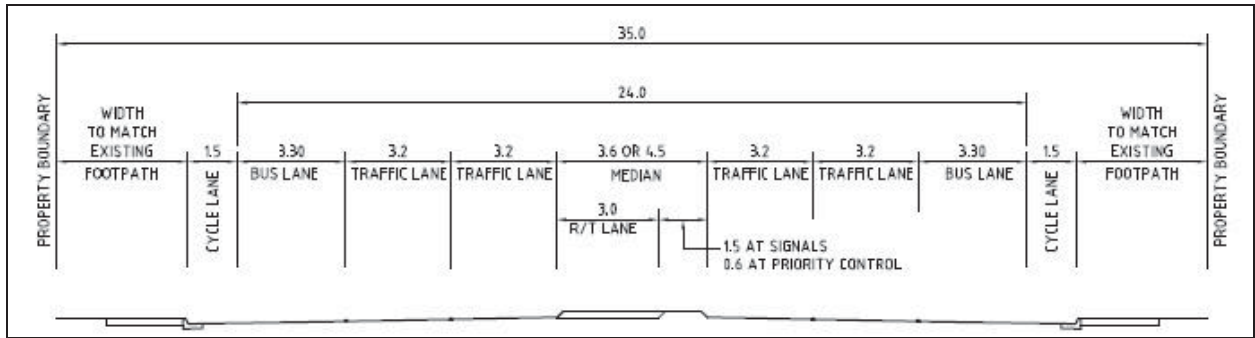


Figure 5-7: Alexandra Parade typical cross-section at bus queue bypasses

Where bus queue bypasses are not proposed, the cross-section for Alexandra Parade will remain as it is. Where widening is required, generally at the intersections, the widening will be to the east, reducing the impact to local residents and businesses.

The widening to the east will require conversion of space that is currently used for recreational purposes. Typically, this space is a grass buffer between the existing road and the cycle paths and foreshore area.

De-maining

During consultation in September and October 2008, some community members asked that Alexandra Parade be ‘de-mained’ — that is, turned into a slow-speed environment and managed by the Sunshine Coast Regional Council. This would have implications for the greater transport network and the ownership and management of the road. The council has been advised of, and is considering, this feedback.

Pedestrians and cyclists

Dedicated on-road cycle lanes are proposed along Alexandra Parade. These will be provided at every location where road widening is proposed. Full-length cycle lanes have been shown in the concept design, and it is proposed that these will be provided in conjunction with council. Off-road cycle facilities will remain.

Pedestrian facilities through this area will generally remain as is with possible small changes including:

- relocation of pedestrian crossings closer to Mayfield Street to be closer to the pedestrian desire line for people who want to cross Alexandra Parade after walking from Mayfield Street
- increased space for pedestrian pathways opposite Boolarong Crescent provided by realignment of the road away from the coastline
- relocation of the pedestrian crossing in front of Alex Surf Club to the south
- provision of pedestrian phases as part of the proposed traffic signals at Mari Street.

The proposed bus stops for this section will generally be located adjacent to signalised intersections. This will create a safer environment for pedestrians crossing the corridor.

Intersection treatments

It is proposed that the intersection of Alexandra Parade and Bukatilla Street become a ‘left in, left out’ intersection through the inclusion of a traffic island to restrict right turns. This change is in response to community concerns about the ‘hooning’ that has been observed at this location.

Traffic signals are proposed for the intersection of Mari Street and Alexandra Parade. The signals will help vehicles wanting to enter Alexandra Parade from Mari Street.

The signalised pedestrian crossing in front of Alex Surf Club would be shifted south if the Mari Street signals are constructed.

It is proposed that Alexandra Parade be realigned through the section of Boolarong Crescent. This realignment would provide additional width for pedestrians and cyclists on the eastern side of the corridor. The existing memorial tree at this location will not be affected by this realignment.

Pavement

Mechanistic pavement design has been conducted for this section using CIRCLY software; the required full-depth asphalt pavement structure for the traffic loadings is summarised in Table 6-21.

Allowance has been made to replace the road pavement to ensure the proposed bus queue bypass lanes achieve the 25-year pavement design life.

The proposed full-depth asphalt pavement materials and parameters recommended are:

- dense-graded asphalt (DG14, A5S)
- seal (14 millimetre S2S)
- dense-graded asphalt (DG20 C600)working platform:
 - type 2.1 (E = 800 MPa)
 - type 2.3 (E = 450 MPa)
 - type 2.4 (E = 350 MPa).

Table 5-21: Section 6 — Summary of recommended full-depth pavement designs

Road locations	Actual % of CVs	Design traffic (ESAs)	Depth of asphalt surfacing	Depth of asphalt base layer	Depth of working platform Type 2.1	Subgrade material design CBR %
Mooloolaba Esplanade/Alexandra Parade: Venning Street to Pacific Terrace	5	5.45E+06	45 mm	180 mm	150 mm	10
Alexandra Parade: Pacific Terrace to Parker Street	3	4.38E+06	45 mm	190 mm	150 mm	8

Public utility plant

Section 6 contains numerous services, some of which will be affected by the proposed alignment. A preliminary assessment shows that these services include:

- Sunshine Coast Water
 - sewer manholes
 - sewer reticulation mains
- Energex
- telecommunications.

The scale of the impact of the proposed design on the above infrastructure needs to be investigated and determined during future design phases of the project. Consultation with Energex and Telstra during the option development process concluded that relocation prior to commencement of the road construction works is preferred. A cost estimate to relocate affected services was provided by Telstra and Energex to help inform this planning study.

5.5.13 Section 7 (Maroochydore) — Bus stations

Maroochydore station

Previous options considered and discarded

Two options were previously presented for this station. The first provided for all buses to service an on-road station on Horton Parade; the other provided for a major bus interchange within the existing car park of the Sunshine Plaza Shopping Centre (replacing the existing interchange).

Planning and investigation into the most appropriate form of station for this location determined that the on-road option would provide better operational performance, as buses would not need to divert off Horton Parade. It would also provide superior accessibility to the Big Top shopping centre and the Cotton Tree recreational areas via the pedestrian/cycle spine along Cornmeal Creek. .

Station location — visibility from high-activity areas

Horton Parade effectively runs through the heart of Maroochydore. The proposed station location is immediately adjacent to Sunshine Plaza, and close to the Big Top Shopping Centre. This is a highly active area at all hours of the day.

Photo 5-7 shows the proposed location of the Sunshine Plaza bus station.



Photo 5-7: General location of proposed Sunshine Plaza bus station

Station layout

Each platform at Maroochydore station will be indented. The proposed platform arrangement of 55-metres length is suitable for accommodating three buses simultaneously. Options exist to extend the platforms to accommodate a fourth bus in the future, if required.

Layover facilities are to be provided at two locations nearby. For services travelling from the south, a layover facility is being considered at Church Street. For services travelling from the north, options for providing layover facilities in or near Cornmeal Parade are being investigated. In the longer term, layover facilities could possibly also be provided at the proposed Maroochydore CAMCOS station.

Operational performance

Future planning for the local bus network suggests that up to 48 buses per hour will pass through the Maroochydore station in each direction by 2031. This level of demand will be comfortably accommodated by the proposed three-bus platform.

Safety

Maroochydore station is in a highly active and visible location, and will offer excellent passive surveillance. An elevated pedestrian overpass is proposed to improve pedestrian access across Horton Parade. Additionally, signalised intersections to the north and south of the station will provide safe crossing opportunities.

Local traffic interaction

Horton Parade is, and will continue to be, a highly trafficked road. The proposed station layout provides for two through-traffic lanes plus a bus lane in each direction. Immediately north of the station, buses will enter mixed traffic as they continue their journeys, either in live running or in dead running to a layover or turnaround location.

Pedestrian access, including DDA compliance

The station will be designed to meet all applicable DDA requirements. The proposed elevated pedestrian overpass will incorporate lifts to enable mobility-impaired users to cross Horton Parade safely.

Pedestrian waiting environment

As with all CoastConnect stations, a high-quality pedestrian waiting environment will be created through the installation of new stop and shelter infrastructure.

Kiss-and-ride facilities

The road environment immediately adjacent to this station does not easily allow for the provision of formal kiss-and-ride facilities. It is anticipated that kiss-and-ride setdowns could occur informally around the Sunshine Plaza or in Cornmeal Parade, both of which provide a relatively calm environment for passengers being dropped off and collected.

Integration with surrounding land use

The immediate precinct surrounding the Horton Parade station location consists predominantly of commercial, retail and entertainment land uses. This area is expected to undergo significant redevelopment in coming years that will increase the density of land use. The residential catchment within 800 metres of the station is predominantly medium- to high-density housing, though there is limited residential development in this area. The 2006 residential population within this catchment, excluding non-permanent residents, was approximately 1,600. The expected significant increases in local development will create significant additional demand for transport to this local area, ensuring that the CoastConnect station forms a valued and vital component of the Maroochydore CBD.

5.5.14 Section 7 (Maroochydore) — Bus stops

Proposed bus stop locations are detailed in Table 5-22 and shown on the drawings in Volume 3.

Table 5-22: Approximate locations of proposed bus stops — Section 7

Approximate northbound chainage (m)		Approximate southbound chainage (m)	
21,150	21,800	21,100	21,700
21,480	22,350	21,500	22,350

5.5.15 Section 7 (Maroochydore) — Corridor improvements

Previous options considered and discarded

During the draft concept design phase the option of providing six lanes for the full length of Aerodrome Road and Horton Parade was assessed. This would provide continuous bus lanes with a guarantee of bus priority even during peak holiday periods.

Residents and business owners generally did not support widening and suggested reducing traffic through this area. Concerns mostly related to the loss of on street parking.

The option was rejected in response to community feedback to create a balanced outcome. Bus lanes are now only proposed at signalised intersections south of Third Avenue, with bus lanes proposed between Third Avenue and Cornmeal Parade where congestion is expected to be a greater issue.

Priority measures

In this section, bus queue bypass lanes are proposed for either side of Sixth Avenue. They will promote buses towards the front of the traffic queue.

Bus lanes are also proposed from Third Avenue to beyond Cornmeal Parade. This is a highly congested section of the Sunshine Coast’s road network, and needs a bus priority solution before the traffic congestion worsens significantly and buses are unable to reliably access the Maroochydore CBD.

The bus queue bypass solution does not provide the same level of benefits as full-length dedicated bus lanes. It is a low-impact solution considered to provide a balanced outcome to allow sufficient improvements for local and tourist bus trips that will work with the local amenity.

Cross-section

The proposed cross-section for Section 7 (where bus queue bypasses and bus lanes are provided) is shown in Figure 5-8; the cross-section provides:

- 3.6-metre (at priority control) or 4.5-metre (at signals) median
- 2 x 3.2-metre traffic lanes (each way)
- 3.3-metre bus lanes (each way)
- footpath to match existing width.

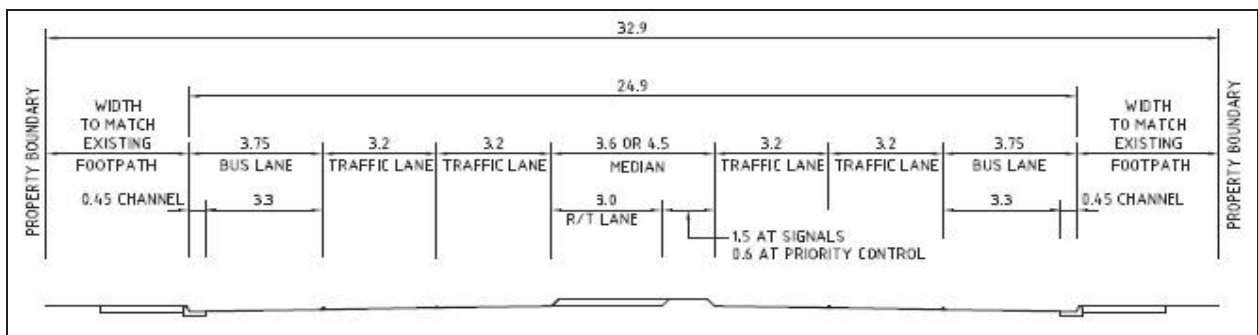


Figure 5-8: Aerodrome Road/Horton Parade typical cross-section at bus queue bypasses and six-lane sections

Where bus lanes are not provided, the cross-section for the remainder of Alexandra Parade will remain as it is. Proposed corridor and carriageway widening alternates between the north and south sides of the road. The side chosen has been based on minimising impact on adjacent sites, as well as other constraints such as the significant trees located near 127–137 Aerodrome Road, and the locations of infrastructure services.

Pedestrians and cyclists

Pedestrian and cyclist facilities will generally remain the same as at present. In the future there is a possibility for placing pedestrian signals adjacent to the bus stops proposed near the intersection of Wrigley Street and Aerodrome Road (chainage 21,100 metre). Future traffic signals are proposed for the intersection of Aerodrome Road and Rose Street (chainage 21,450 metre) to provide a safe pedestrian crossing of both Rose Street and Aerodrome Road.

As a part of the relocation and upgrade of the Sunshine Plaza Shopping Centre bus station, a future pedestrian overpass is proposed. This will provide bus passengers with all-weather access to Sunshine Plaza Shopping Centre. The proposed bus stops for this section are generally located adjacent to signalised intersections. This creates a safer environment for pedestrians crossing the six-lane corridor.

Intersection treatments

The intersection of Sixth Avenue and Aerodrome Road will remain generally in its current layout, except for the removal of parallel car parking to make way for the bus lanes. However, some localised widening will be needed through this intersection.

The following intersections with Aerodrome Road and Horton Parade require widening to provide the width required for the proposed cross-section:

- Rose Street
- Second Avenue
- Maud Street
- First Avenue
- Plaza Parade
- Plaza Entry
- Cornmeal Parade.

Pavement

Mechanistic pavement design has been conducted for this section using CIRCLY software; the required full-depth asphalt pavement structure for the traffic loadings is summarised in Table 5-23.

Allowance has been made to replace the road pavement to ensure the 25-year pavement design life is achieved for the proposed bus queue bypass and bus lanes.

The proposed full-depth asphalt pavement materials and parameters recommended are:

- Dense-graded asphalt (DG14, A5S)
- seal (14 millimetre S2S)
- dense-graded asphalt (DG20 C600)
- working platform:
 - type 2.1 (E = 800 MPa)
 - type 2.3 (E = 450MPa)
 - type 2.4 (E = 350MPa).

Table 5-23: Section 7 — Summary of recommended full-depth pavement designs

Road locations	Actual % of CVs	Design traffic (ESAs)	Depth of asphalt surfacing	Depth of asphalt base layer	Depth of working platform Type 2.1	Subgrade material design CBR %
Aerodrome Road/Horton Parade: Parker Street to Cornmeal Parade	3	4.38E+06	45 mm	190 mm	150 mm	8

Public utility plant

Sunshine Coast Water

In Section 7, public utility plant that will be affected by works associated with bus priority initiatives includes:

- Sunshine Coast Water
 - 660 metres of 225-millimetre water main
 - sewer manholes
- Energex
- telecommunications.

Consultation with Energex and Telstra during the option development process concluded that relocation prior to commencement of the road construction works is preferred. A cost estimate to relocate affected services was provided by Telstra and Energex to help inform this planning study.

Major structures

Cornmeal Creek Bridge

The concept design requires widening of the Cornmeal Creek Bridge on both sides by approximately 2.5 metres. There are two existing structures at this location. The main structure is supported on PSC piles and RC headstocks; the existing deck consists of PSC deck units. The main structure is used for the traffic lanes and the western footpath. The minor structure is supported on PSC piles and RC headstocks; the deck consists of PSC girders. This structure is used for the eastern footpath.

It is envisaged that widening for the CoastConnect — Caloundra to Maroochydore project's alignment would involve demolishing the eastern footpath structure and constructing a new structure with adequate width in its place.

The existing Cornmeal Creek Bridge is shown in Photo 5-8.



Photo 5-8: Cornmeal Creek Bridge

5.6 Future-proofing corridor width

Corridor widths required as future proofing for alternative public transport modes are shown in Volume 3 on drawings RC0006, RC0007 and RC0008. The corridor widths range from 40.7 metres in a 70 km/h zone at intersections to 23.3 metres in a 60 km/h zone at a mid-block location.

The following assumptions have been made in analysing future requirements:

- the CoastConnect — Caloundra to Maroochydore project's bus lanes will not be required once the alternative mode is installed. Remaining buses will share the general traffic lanes with no priority
- the alternative mode is based on median-running dual tracks/lanes. Although widths in the order of 7.5 metres have been used for recent LRT/BRT projects, a width of 8.0 metres has been adopted at this stage due to the high level of uncertainty with this assessment
- road configurations will remain unchanged from those proposed in the CoastConnect — Caloundra to Maroochydore project (i.e. cycle lanes and parking will need to be maintained where they are provided by the project; no additional cycling facilities or parking is to be added). The exception is Nicklin Way, where no parking has been allowed for in the future-proofing corridor widths
- right-turning vehicles can use the alternative mode formation to make turns
- traffic lanes will not be reduced in width to accommodate future proofing
- footpaths for 60 km/h zones are 4.0 metres wide
- footpaths for 70+ km/h zones are 4.5 metres wide.

On the basis of the above assumptions, the majority of the corridor is sufficiently wide to cater for a future median-based public transport initiative. Table 5-24 details the existing corridor width, the proposed corridor width in the CoastConnect — Caloundra to Maroochydore project, and the additional width required for future public transport initiatives.

Table 5-24: Future proofing corridor width requirements

Road name	Road section	Cross-section applied*	Existing corridor width	Proposed CoastConnect corridor width	Minimum width required for future public transport initiative
Nicklin Way	Caloundra Road to Beerburum Street	CS1	58.6 – 89.2 m	No change	40.7 m at intersections
		CS2			33.8 m mid-block
Nicklin Way	Beerburum Street to Buderim Street	CS1	40.4 – 42.2 m	No change	40.7 m at intersections
		CS2			33.8 m mid-block
Nicklin Way	Buderim Street to Main Drive	CS1	39.7 – 40.2 m	No change	40.7 m at intersections
		CS2			33.8 m mid-block
Nicklin Way	Main Drive to Kawana Shoppingworld	CS1	38.9 – 44.5 m	No change	40.7 m at intersections
		CS2			33.8 m mid block
Nicklin Way	Kawana Shoppingworld to Mooloolah River	CS1	41.3 m	No change	40.7 m at intersections
		CS2			33.8 m mid-block
Brisbane Road	Mooloolah River to Tucker Creek	CS3, CS4	40.1	n/a	38.3 m with cycle and parking
					38.7 m with cycle and left-turn lanes
Brisbane Road	Tuckers Creek to Walan Street	CS5	20.1	n/a	37.4 m with cycle and parking
Walan Street	Walan Street to Venning Street	CS6, CS7	20.1	n/a	29.3 m at intersections
		CS6, CS7			23.3 m mid-block
Venning Street	Walan Street to Mooloolaba Esplanade	CS6, CS7	22.5	n/a	29.3 m at intersections
		CS6, CS7			23.3 m mid-block
Mooloolaba Esplanade	Venning Street to Buderim Drive	CS6, CS8	Infinite**	No change	35.7 m at intersections
		CS6, CS8			29.3 m mid-block
Alexandra Parade	Buderim Drive to Pacific Terrace	CS6, CS8	Infinite**, 43.4 m at Alex Surf Club	No change	35.7 m at intersections
		CS6, CS8			29.3 m mid-block
Alexandra Parade	Pacific Terrace to Aerodrome Road	CS6, CS8	Infinite**, 43.4 m at Alex Surf Club	No change	35.7 m at intersections
		CS6, CS8			29.3 m mid-block
Aerodrome Road	Aerodrome Road to Plaza Parade	CS6, CS8	30.2 m	32.9 m	35.7 m at intersections
		CS6, CS8			29.3 m mid-block
Horton Parade	Plaza Parade to Cornmeal Creek	CS6, CS8	30.15 m	32.9 m	35.7 m at intersections
		CS6, CS8			29.3 m mid-block

* Cross-sections are shown in drawings RC0006, RC0007 and RC0008 in Volume 3

** Infinite is in locations adjacent to the ocean.

5.7 Land requirements

The concept design potentially directly impacts approximately 113 properties along the corridor of the CoastConnect including a mix of residential, commercial and state government owned properties. DTMR has been in contact with property owners who are potentially directly affected, and will continue to engage with property owners throughout the consultation phase.

5.8 Future investigations

The following tasks are to be undertaken during further (detailed) design phases for the CoastConnect — Caloundra to Maroochydore project:

- detailed ground topographical survey of the project site, including public utility plant
- detailed design of the preferred alignment, incorporating the inputs from the detailed technical investigations and the refinements required following the consultation process.

5.9 References

McCormick Rankin Pty Ltd 1998, *Busway planning and design manual*, revision 1, Queensland Transport, Brisbane.

PB and McCormick Rankin Cagney 2007, *Pre-feasibility study: Caloundra to Maroochydore Connect study*, Parsons Brinckerhoff, Brisbane.

TransLink 2007, *Public transport infrastructure manual*, Queensland Government, Brisbane.

