4.1.2 South East Queensland Infrastructure Plan and Program

The South East Queensland Infrastructure Plan and Program 2008-2031 (SEQIPP) outlines the infrastructure programme to support the SEQ Regional Plan.

Key public transport components of the program include:

- improving access between Caloundra and Maroochydore and emerging centres (such as Caloundra South), including improved public transport
- increasing the capacity of the North Coast Rail line and upgrading connections between the rail line and coastal activity centres
- preserving transport corridors to cater for future growth.

Notable public transport projects include the Caloundra–Maroochydore CoastConnect quality public transport corridor (due for implementation 2014 to 2020) and the CAMCOS Beerwah to Maroochydore rail line (due for implementation 2020 onwards).

4.1.3 Sunshine Coast Council

In 2011, the Sunshine Coast Council (SCC) adopted the Sunshine Coast Sustainable Transport Strategy (2011–2031) which outlines a vision for transport:

"In 2031, the Sunshine Coast is recognised as Australia's most sustainable region, which fosters the protection and enhancement of our natural environment, meets the social, health and learning needs of the community and facilitates prosperity for our economy and local businesses. Our community is supported by a sustainable, highly efficient, integrated and safe transport system. This innovative transport system is embraced by the community and has changed travel patterns to reduce car dependency and enhance quality of life and contribute to the sustainability of the region."

The five goals of the strategy are:

- a shift to pubic and active transport modes is achieved
- transport planning is collaborative, cost-effective, timely and progressive
- a conserving, clean and green transport system
- transport and land use integration serves the local and regional economy and promotes self-containment
- a safe travel environment is delivered.

The strategy provides for a hierarchy of public transport link types. For the Caloundra South area, the strategy identifies Dedicated Public Transport link corresponding with the CAMCOS line, a Public Transport Priority link between Maroochydore and Caloundra South (corresponding with an extended CoastConnect), a Public Transport Advantage corridor between Caloundra and Caloundra South and a Public Transport Other corridor between Caloundra South and Kawana and Maroochydore (corresponding with the Kawana Arterial alignment).

There are a range of policies that emphasise the importance of appropriate adjacent land use, frequency and reliability of services, coverage and real-time information. The strategy

is supportive of hourly to half hourly public transport connections between the Sunshine Coast and Brisbane.

4.1.4 TransLink plan and policy

The TransLink Transit Authority is responsible for coordinating public transport services within its designated service area. It is expected that this service area will expand to take in Caloundra South once urban development takes place (see Figure 4-1).

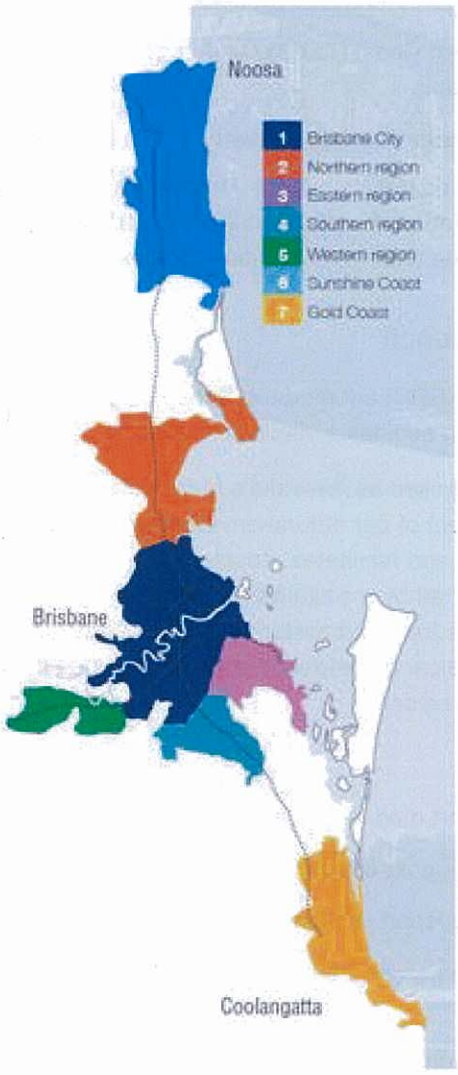


Figure 4-1: TransLink SEQ service area

In addition to standardised fares and timetables, TransLink has established standardised service levels and types for public transport. These standards, together with proposals for system improvements, are reported in the TransLink Network Plan (2007 release). TransLink has since realised the TransLink Network Plan 2010 which sets out the strategic direction and development of public transport services and infrastructure in SEQ. It outlines the infrastructure improvements to be carried out in the 2010/2011 financial year.

Service types

TransLink have established four broad categories of public transport services for the future, these are:

- High Frequency Priority (HFP): fast, frequent, reliable and direct services running along major corridors and connecting activity centres and residential communities. The HFP network will operate services at a frequency of 15 minutes of better, between the hours of 6:00 am – 9:00 pm, seven days a week. Commuters will not need a timetable on these services.
- Local services: primarily provided on local bus routes to help ensure most people across SEQ have access to public transport. Many local services will connect to the HFP network.
- Peak only services: to provide additional capacity for high demand in peak periods, may also offer limited stop or express services for part of the journey.
- Inter-regional links: provide for long distance travel, linking Brisbane with the Gold Coast, sunshine Coast and Rosewood/Ipswich.

The 2007 network plan identified TransLink's minimum service coverage requirements, with key features being:

- more than 90% of residents in urban areas have access to:
  - public transport within 400 m or a train station within 800 m on a weekday or Saturday
  - public transport within 800 m on a weeknight or a Sunday/public holiday.

4.2 Role of public transport on the Sunshine Coast

Buses and trains typically play different roles in a public transport system. Traditionally, rail in Queensland has been viewed as being for longer distance peak hour commuting. However, it does perform a range of services from inter-urban to local commuting. In some other cities (including Melbourne and Sydney) rail plays a much stronger local travel role.

By comparison, buses are usually viewed as providing connections to places not served by rail and supporting shorter trips. However major bus priority facilities, such as Brisbane's South East Busway, challenge these perceptions as Busway and Bus Rapid Transit (BRT) facilities provide greater speed and associated service frequency delivery.

In addition, with recent commitments to Light Rail Transit (LRT) on the Gold Coast, it is expected that Queensland (and Australia) will begin to see the opportunities which LRT can provide for both integrating land use development and providing excellent high quality transit services.

The various roles the modes perform currently and are likely to perform in the future within the Sunshine Coast are discussed below. This information helps to inform the most appropriate strategy for Caloundra South, which is discussed in the next section.

4.2.1 Rail on the Sunshine Coast

Rail on the CAMCOS corridor (Beerwah–Maroochydore) is incorporated as a key corridor in the Connecting SEQ 2031. Previously announced as 2016 to Caloundra but now more likely programmed for 2020+.

Key roles that a rail service would provide on the Sunshine Coast would include:

- commuters to Brisbane (express type services as per the Connecting SEQ 2031)
- day visitors to Brisbane and from Brisbane
- trips to major Sunshine Coast destinations (urban services as per Connecting SEQ 2031).

Inter-urban and commuter travellers are complementary — both require longer trains with fewer stops. For local users frequent, shorter trains stopping more often are appropriate.

CAMCOS — Beerwah to Maroochydore

Under the current CAMCOS envisioned rail route to Maroochydore, there is no reason why a good high frequency rail system cannot support both types of service. For example, a 30 minute 'express' service from Maroochydore to Brisbane stopping at major stations overlaid with a 15 minute local service from Caloundra South to Maroochydore stopping at all stations. If appropriate, different types of trains could be run (e.g. 6-car intercity trains to Brisbane and 3-car suburban trains within the coast).

In very busy cities lines can become overcrowded if too many different services are run. This is very unlikely to be an issue within the Sunshine Coast.

Under a full CAMCOS provision to Maroochydore, to support multiple services it may be desirable to provide 'turnback' facilities at Caloundra South (i.e. third track/platform) to allow for terminating services from Maroochydore. Details of service types and provision will be for discussion with TMR and TransLink.

However an alternative strategy for CAMCOS should also be explored both for servicing the Sunshine Coast and for Caloundra South. This is outlined further below but essentially suggests a first stage of CAMCOS from Beerwah to Caloundra South.

4.2.2 Buses on the Sunshine Coast

The primary purposes that bus services currently provide on the Sunshine Coast are:

- linking neighbourhoods to town centre, district services (schools, TAFE)
- feeder services to railway stations (especially for longer distance trips)
- linking to regional centres, especially Caloundra
- serving trips to work (especially for Caloundra South).

Bus services are most likely to be used when they are time competitive with the car. Typically this requires car traffic to be operating with some congestion while buses are given priority. In addition, frequency of operation is very important: typically four services per hour (15 minute headway) is the minimum needed to change travel behaviour. Service reliability and travel time reliability are also important and can be assisted with the provision of bus priority.

Lack of permanency (particularly when compared with rail) is a problem with buses, as people are reluctant to make major commitments to a bus service which may disappear at any time. Good infrastructure can overcome this but full busway solutions are expensive.

A hybrid solution, a 'Quality Bus Corridor' uses mostly a combination of regular roads for bus services with dedicated lanes, priority at intersections and dedicated stations. The CoastConnect project is just such a 'Quality Bus Corridor' with higher frequency services planned along the existing Sunshine Coast corridor (Caloundra to Maroochydore) supported by excellent quality stops and interchanges.

The currently planned CoastConnect corridor is shown in Figure 4-2.

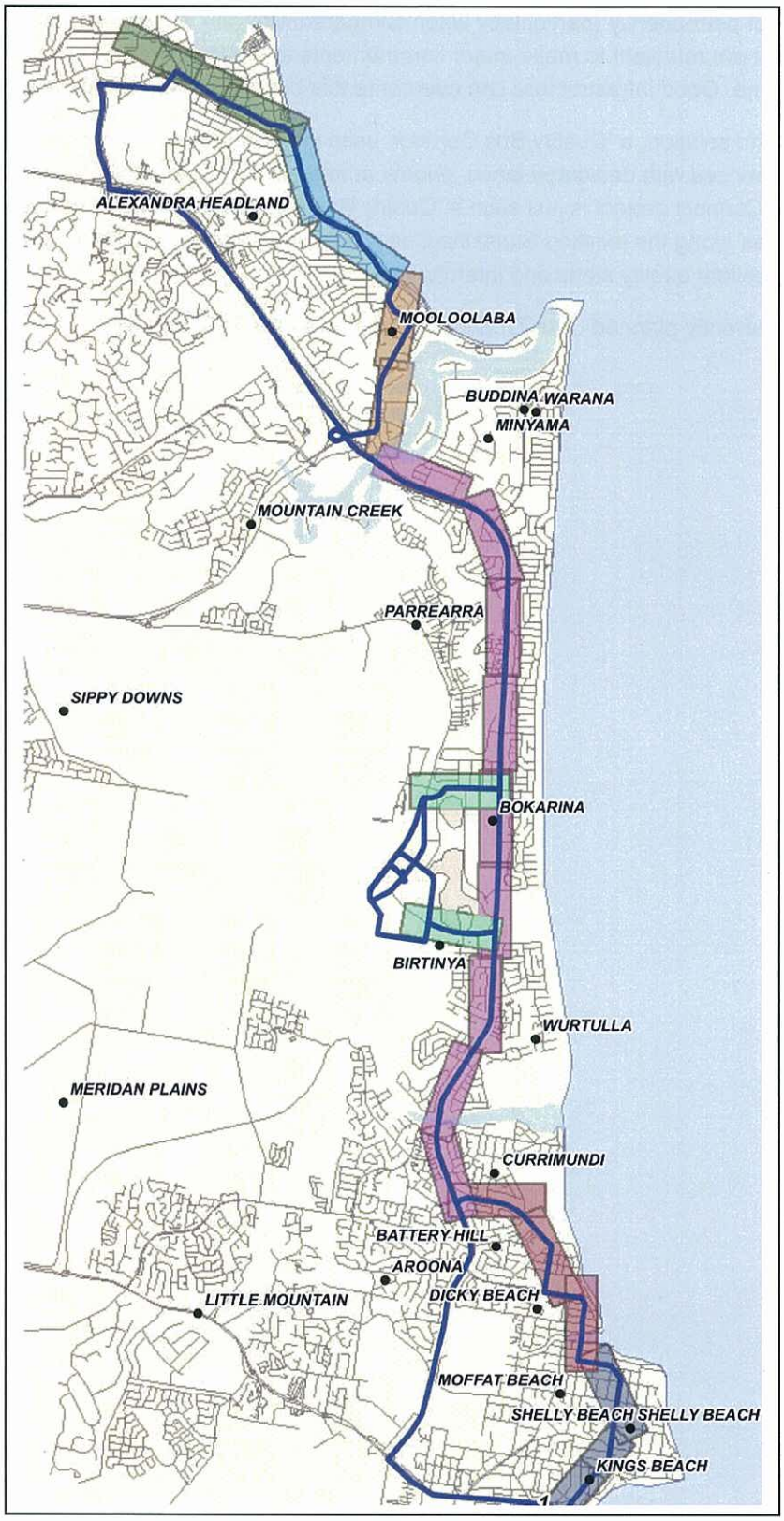


Figure 4-2: Planned CoastConnect corridor

4.2.3 Light Rail opportunities

LRT has been proposed from time to time on the Sunshine Coast. At this point it is unlikely that this will come into fruition in the short term as the current development patterns for the coast are less than ideal. However opportunities do exist with major development planning underway and significant growth forecast for light rail to deserve some exploration in the medium term. In addition with the delivery of the Gold Coast Rapid Transit project, it is expected that greater knowledge learning and interest in LRT will increase in SEQ, including for the Sunshine Coast. In the longer (15 to 30-year) timeframe, it is possible that an LRT system may become viable. The planning for CoastConnect has included future proofing for LRT and the Nicklin Way has been identified as the most suitable corridor.

4.3 Proposed strategic direction

4.3.1 Identified public transport travel demands

Based on Caloundra South's location in the southern Sunshine Coast and the predicted regional development patterns, PB has identified a range of destinations for which there is likely to be a demand for public transport.

Trips likely to show the highest public transport demand include those where:

- significant demand is available at origin and destination
- trips take up to around 20 minutes to or from Caloundra South
- traffic speeds are low and/or congestion is high so that public transport can be time competitive with the private car
- longer trips to Brisbane (particularly for the work commute).

Major destinations meeting these conditions include:

- Principal Activity Centre at Maroochydore
- University of the Sunshine Coast and science and technology precinct at Sippy Downs
- regional hospital and employment centre at Kawana Waters
- centres at Caloundra and Beerwah
- residential communities in the southern Sunshine Coast (from Kawana Island through to Pelican Waters) for travel to Caloundra South
- Brisbane CBD or major centres of employment along train/bus lines.

As identified, there is also likely to be some demand for travel to and from the Brisbane CBD, Brisbane northern suburbs and Pine Rivers/Caboolture (for trips from Caloundra South to these locations, as well as business and commuter trips from these locations to major destinations within Caloundra South). These trips are illustrated in Figure 4-3.

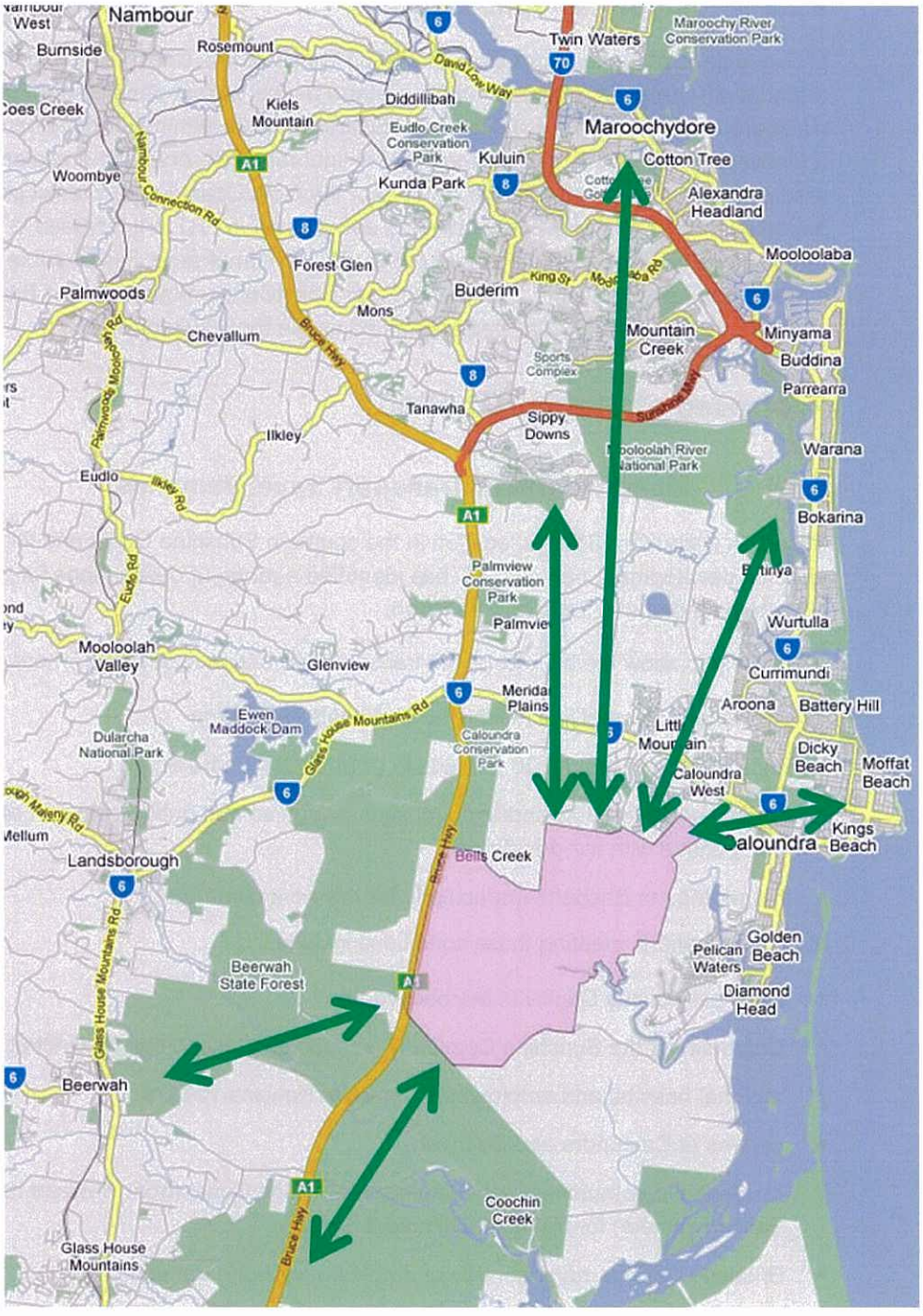


Figure 4-3: Identified major public transport demands

Some estimates of the times these typical trips are likely to take from Caloundra South are provided in Table 4-1. This gives guidance on which routes are likely to be time competitive with the car for both bus and train (and thus can be expected to require higher quality of services). The table below assumes the full provision of the MMTC including the Kawana Arterial and CAMCOS for estimating travel times.

Table 4-1: Indicative peak period travel times (in minutes) from Caloundra South Town Centre (with CAMCOS and Kawana Arterial to Maroochydore)

Destination	Car	Rail	Bus
Brisbane Airport	85	95	
Brisbane CBD	90	100	
Inner Nth (Bowen Hills)	85	80	
Strathpine	70	70*	
Narangba	55	60*	
Caboolture	40	40	
Beerwah	25	15	20 - 30
Kawana TC	11	10	35
Maroochydore	25	20	50 - 65
Caloundra, including beaches	10	n/a	15 - 20
Sippy Downs	20	n/a	30

4.3.2 Public transport strategy for Caloundra South

In order to meet the identified demands for public transport and to encourage a shift from private car to public transport, a three-pronged approach to public transport has been recommended for Caloundra South.

This comprises:

- rail connection
- quality bus corridor and bus priority
- local bus services.

Note that these broadly match the Connecting SEQ 2031 public transport strategies for rail (express, urban and suburban) and for bus provision.

Rail connection

Caloundra South is located on the proposed Beerwah–Maroochydore railway line (CAMCOS). A station is proposed for the town centre, as shown in Figure 4-4.

This line is expected to provide the following primary public transport role:

- provide access to the Sunshine Coast Principal Activity Centre at Maroochydore
- provide access to the Major Activity Centres of Kawana Waters and Beerwah
- provide access to Caboolture and Brisbane.

To a lesser degree, the rail service will:

- provide access to Caloundra South town centre and southern business precincts for residents of locations such as Kawana Island, Creekside and Aroona
- provide access to the Caloundra South town centre and southern business precinct for residents of northern Brisbane
- support business trips from Brisbane and Maroochydore CBD's to Caloundra South.

The indicative walk up catchment (800m) for the town centre rail station is shown in Figure 4-4.

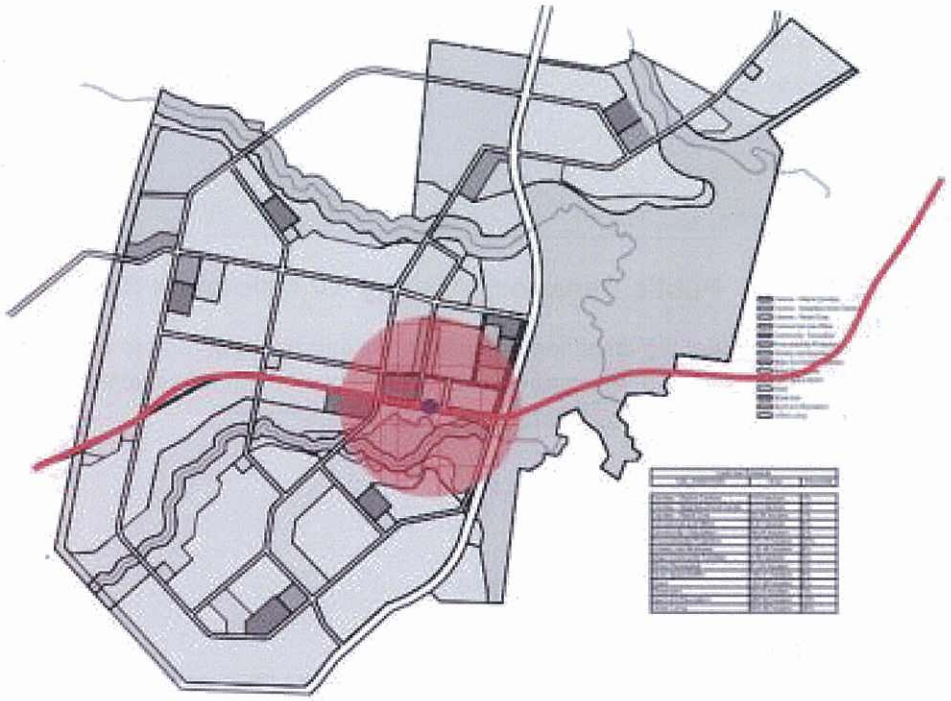


Figure 4-4: Indicative rail station catchment

CAMCOS – A staged strategy (Stage 1, Beerwah to Caloundra South)

Instead of a full provision of CAMCOS from Beerwah to Maroochydore, a staged strategy should be explored which connects rail from Beerwah to Caloundra South Town Centre as a Stage 1 of CAMCOS. This would provide the following benefits to the Coast:

- earlier investment in rail to the Coast as expected investment would be much lower than a full provision to Maroochydore. [Note the year 2020 is clearly indicative, but suggests that the initial cost of a stage 1 CAMCOS would be more achievable than a full delivery of CAMCOS to Maroochydore (with current timing expected 2030 and beyond)]
- excellent express service provision for those going to Brisbane from the Sunshine Coast both from the new town centre and from provision of adequate park 'n ride (ideally located at an adjacent station not directly in the town centre)
- transit connectivity with high frequency and high priority bus services (e.g. extension of the currently planned CoastConnect services or exploration of a higher order BRT service (see below)

- excellent integration of rail transit into Caloundra South in the foreseeable future (e.g. 2020) rather than a provisional but uncommitted investment in CAMCOS currently slated for beyond 2030, which would eventuate in either a 'stale' and preserved corridor through much of the Sunshine Coast and Caloundra South for the next 20 to 30 years.

Conversely a Stage 2 CAMCOS could then be designed and delivered following the earlier investment and delivery of Stage 1 to Caloundra (in addition Stage 2 could explore alternate use of the corridor).

This strategy is depicted in Figure 4-5.

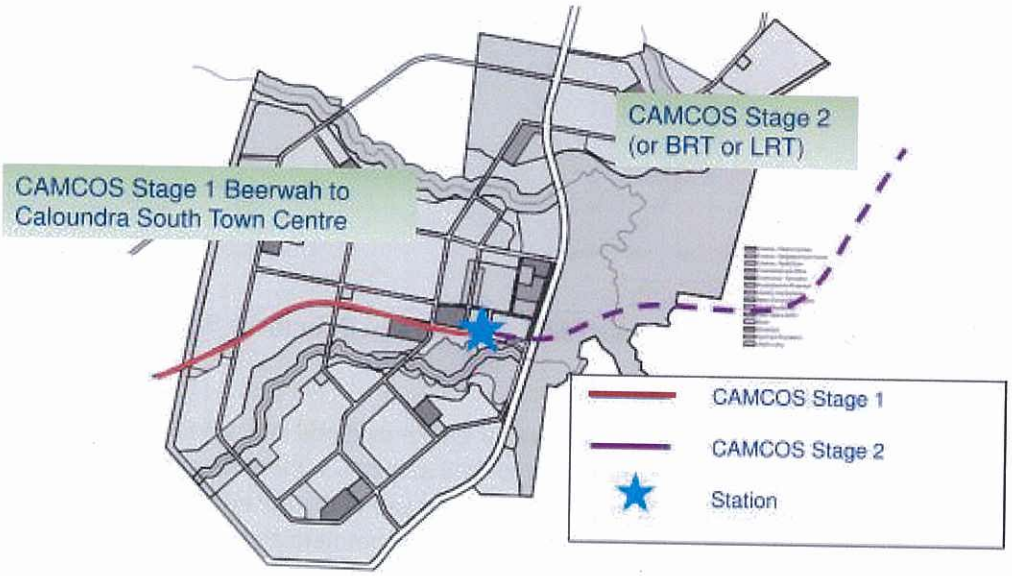


Figure 4-5: Proposed CAMCOS staging

Bus Rapid Transit — Beerwah to Caloundra South (to Kawana/Maroochydore)

The provision of a BRT (not necessarily busway) should be explored to provide a service from Caloundra South to both Beerwah (and the rail station for transfer to further destinations within Brisbane) and Kawana and Maroochydore in the north. It is envisioned this BRT would utilise the Kawana Arterial road alignment as per Figure 4-6.

With the eventual delivery of CAMCOS (possibly as stage 1 and stage 2 as identified elsewhere) it is envisioned the BRT would be phased out or provide more of a local Sunshine Coast priority express service. It is also prudent to note that provision of a BRT in a separate corridor to the CAMCOS alignment is advantageous to building and keeping transit patrons over time.

It would provide the following benefits:

- easy and less expensive (early) provision of high quality transit to Caloundra South (and the Coast) as well as connecting to Beerwah and rail line
- a separate on road service that will minimise disruptions to the existing BRT while constructing the future rail (it has proven extremely difficult to construct new rail in existing transit corridors with generally significant disruption to the existing users and network).

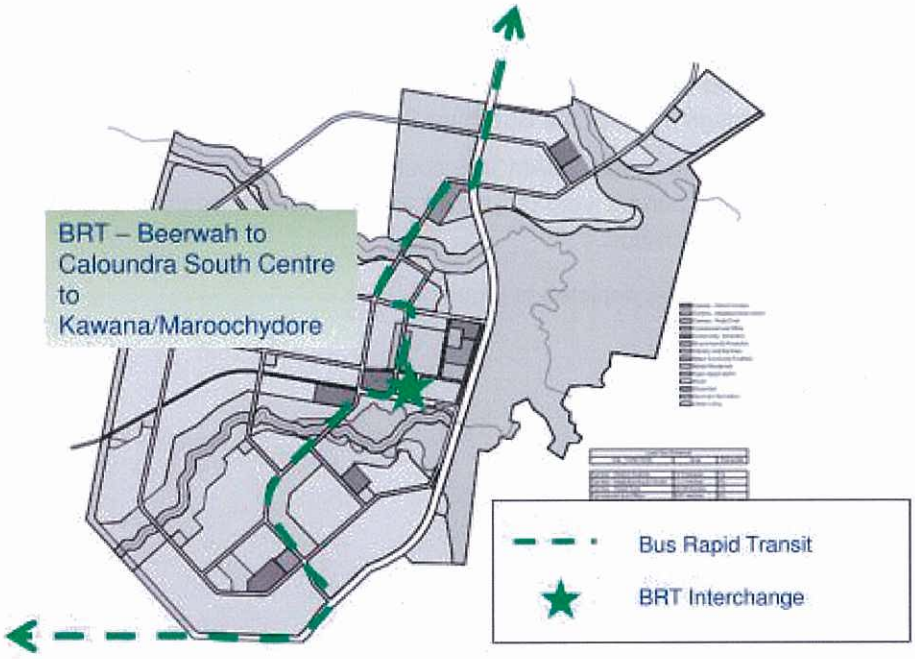


Figure 4-6: Proposed BRT (Beerwah to Caloundra South to Kawana/Maroochydore)

Dedicated bus corridor

While rail services will provide for longer distance inter and intra-regional trips, there remains a very important role for bus services in the Caloundra South development. Bus services will provide access to major areas of the rail network (including the Sippy Downs/University of the Sunshine Coast commercial, technical and educational centre), provide access to the major retail centres in Caloundra South from neighbouring communities (including Palmview and the Caloundra beaches areas) and provide access to all the major commercial, retail and community facilities within Caloundra South for all residents outside convenient walking distance.

To assist in the provision of high quality bus transport, Stockland has identified the concept of a dedicated bus corridor through the Caloundra South development, which will provide a spine of high-quality public transport linking the major centres and communities that make up Caloundra South.

It is anticipated that this dedicated corridor would allow for buses running on dedicated lanes along the major sub-arterial road network, with signal priority for buses at intersections and purpose built stations. On other key road corridors priority measures will be provided at intersections.

The proposed dedicated bus corridor is shown in Figure 4-7. It includes a connection into the Town Centre, to allow for interchange with the CAMCOS rail station and closer interaction with the centre.

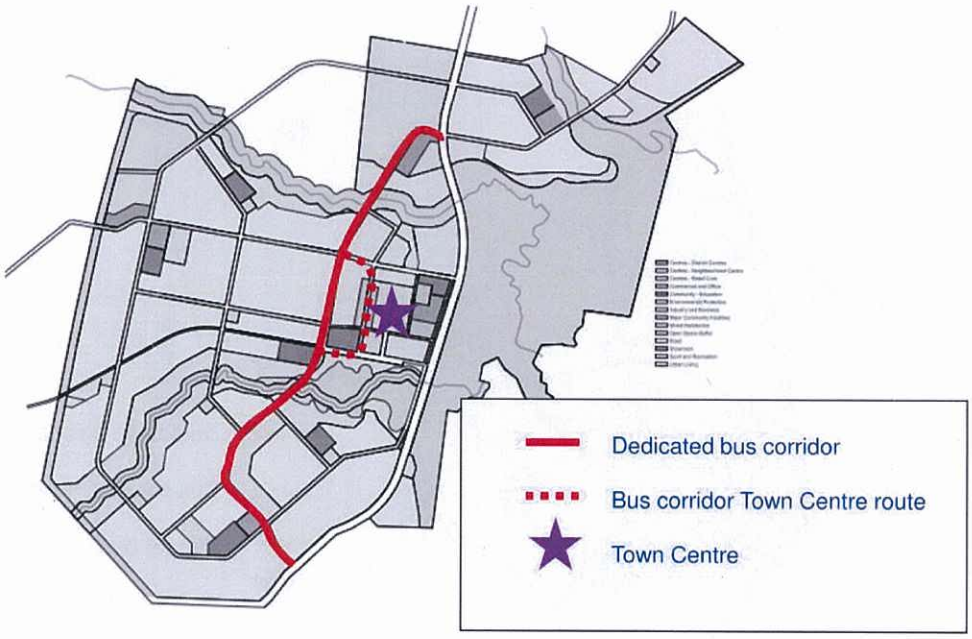


Figure 4-7: Proposed dedicated bus corridor

Kerbside running bus lanes are preferred as they align with the proposed CoastConnect Quality Bus Corridor design. Kerbside running has the advantage of requiring a narrower overall corridor width (when compared to median running) and possibly slightly less complex intersections, but the disadvantage of a wider road for pedestrians (three lanes to cross at a time).

Feeder bus corridors

To support the use of the dedicated bus corridor, the sub-arterial and lower order road network of Caloundra South will be utilised to feed bus services into the priority corridor. This will allow for extensive coverage of the Caloundra Downs site by bus services, as shown in Figure 4-8.

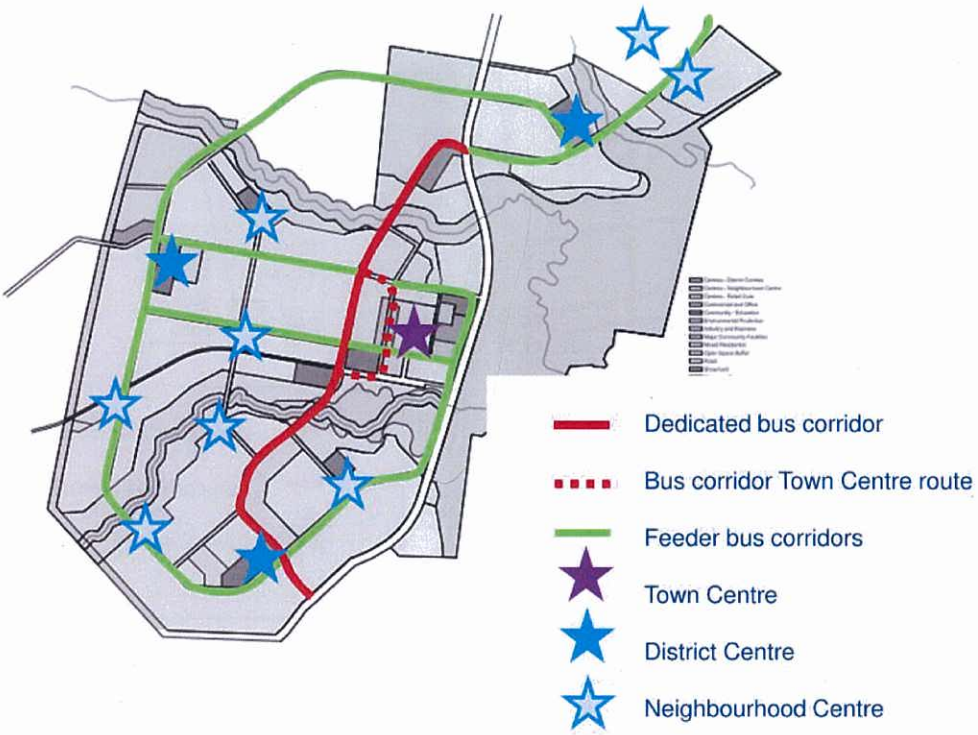


Figure 4-8: Proposed feeder bus corridors

The combination of the dedicated corridor and the feeder corridors means that over 90% of all residential areas are within 400 m of a basic bus service during the day. This meets the TransLink basic standard for service provision. The indicative catchment is shown in Figure 4-9.

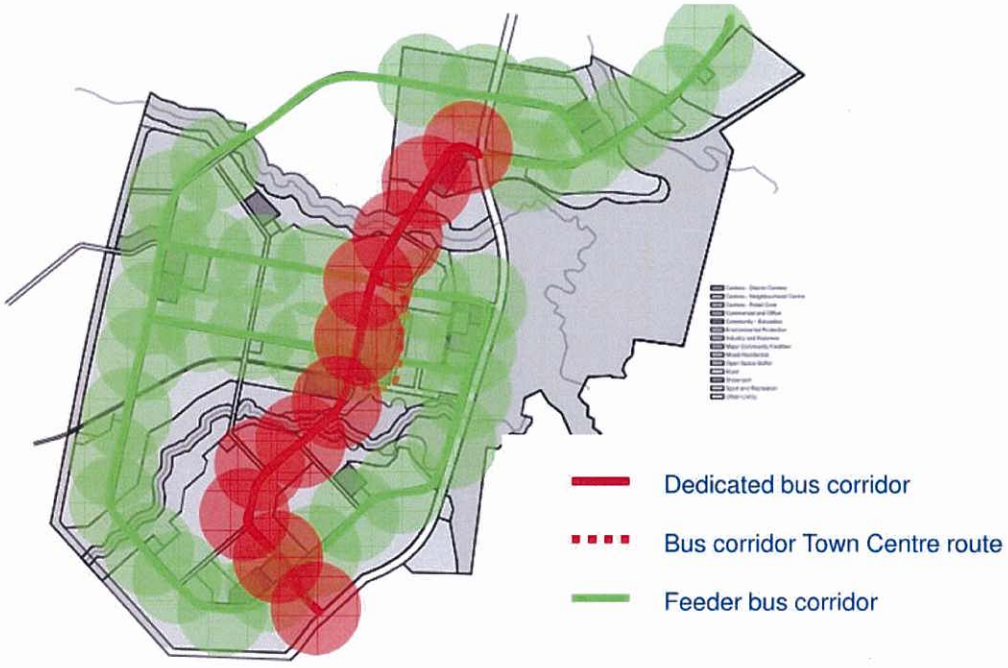


Figure 4-9: Indicative bus catchment to meet TransLink service standards

Service strategy

The Caloundra Downs site will be serviced by a combination of high frequency services and local services. The high frequency services would operate typically every 5 to 10 minutes during peak hours and every 15 minutes at other times (similar to the Brisbane 'BUZ' services). The target population for Caloundra South includes a younger 'creative' demographic. To cater for this demographic, a quality service including 24/7 operation should be considered.

It is also envisioned this service would be well connected to or form part of the extension of the CoastConnect Quality Bus Corridor described above. Local services would operate less frequently, possibly every half hour during the day and hourly on weekends during the day.

4.3.3 Staging and implementation

To achieve a sustainable transport 'culture' it is essential that public transport be available to Caloundra South residents and workers from when they move into the area. However, provision of public transport requires a financial outlay. Therefore, it is essential that the development of Caloundra South is staged in such a manner that public transport can be progressively delivered in an as efficient manner possible, corresponding with the desire to promote the use of public transport.

PB recommends that the following steps be undertaken:

- establish an agreement with TransLink in relation to the provision of public transport services
- implement high frequency services (along the dedicated corridor and supporting feeder corridors) at early stages of development, and progressively expand routes and services as development is rolled out
- develop neighbourhood and precinct design standards so that appropriate street connectivity is provided to enable provision of direct public transport services.

Innovative solutions for financing of public transport services should also be considered, such as developer contributions, householder levies or joint ventures.

5. Road network strategy

5.1 Network requirements and characteristics

Two self-containment or job internalisation scenarios were used to develop likely external trip generation of the Caloundra South site in the morning peak period. The job internalisation scenarios are:

- 30% scenario: 4,835 trips outbound, 4558 trips inbound
- 40% scenario: 4,441 trips outbound, 3,863 trips inbound.

These numbers would typically be reversed in the afternoon peak period.

Roadway capacity is influenced by a number of factors, including lane width, clearances to median/verge obstructions, proportion of heavy vehicles in the traffic stream, terrain characteristics and design speed. It is also influenced by the flow characteristics (i.e. uninterrupted free flow vs. interrupted flow). Aside from the Kawana Arterial (which will have a higher speed environment and will have more free flow conditions), the connecting roads are likely to be classified as an 'Urban Arterial with Interrupted Flow' (as per the Austroads Guide to Traffic Engineering Practice – Roadway Capacity). The mid-block lane capacity for such a road is generally given as up to 1,000 vehicles per lane. The lane capacity of the Kawana Arterial is likely to be up to 1,600 vehicles per lane (as it is a higher speed arterial link). However, this road link will also cater for through vehicle trips not bound for Caloundra South.

Therefore, to cater for the estimated peak period traffic volumes, there is a need for up to five outbound and four inbound lanes, assuming an even distribution of the traffic volumes among each of the access points. However the real road network loading is likely to be different, reflecting the distribution of trip origin and destinations shown in Figure 2-5. The majority of external trips generated by Caloundra South are likely to originate or be bound for Caloundra, Kawana and Maroochydore (approximately 55%).

Based on the assumed trip distribution, the likely routes that these trips will use have been identified:

- trips to Brisbane/Caboolture will use the Kawana Arterial to access the southern Bruce Highway interchange
- trips to Beerwah will use the east-west sub-arterial connection to access the northern Bruce Highway interchange
- trips to Palmview, Sippy Downs and Nambour will use the east-west sub-arterial connection to access the northern Bruce Highway interchange as well as the western north-south connector road (connects to Caloundra Road)
- trips to Kawana and Maroochydore will use the Kawana Arterial
- trips to Caloundra will use the eastern north-south connector road (connects to Caloundra Road via Bellvista).

The resultant traffic volumes for the peak direction of travel have been calculated for each scenario and are shown in Figure 5-1 and Figure 5-2.

As the eastern connection to Caloundra Road via Bellvista Boulevard is likely to only have additional capacity of up to 1,000 vehicles (equivalent to one traffic lane), an additional connection will be required to meet the anticipated Caloundra South peak period demand. The indicative location of this link is shown in the figures. Should this link not be provided then that traffic volume will need to be distributed between Bellvista Boulevard, the Kawana Arterial and the western sub-arterial connector.

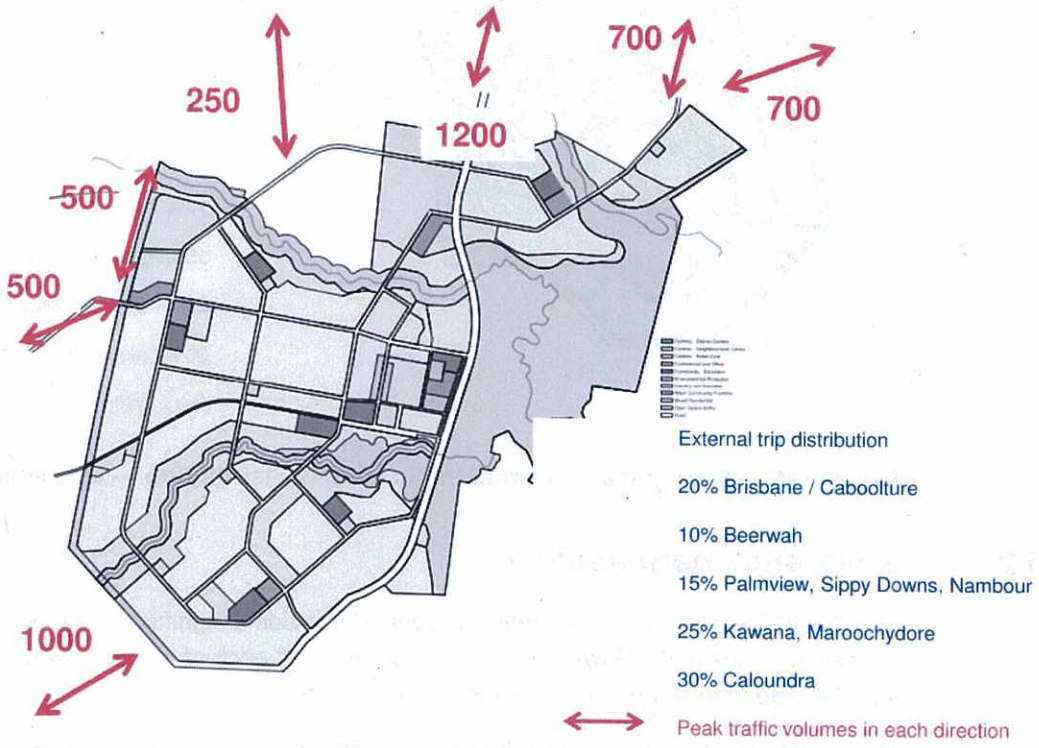


Figure 5-1: Approximate external traffic volume distribution — 30% scenario

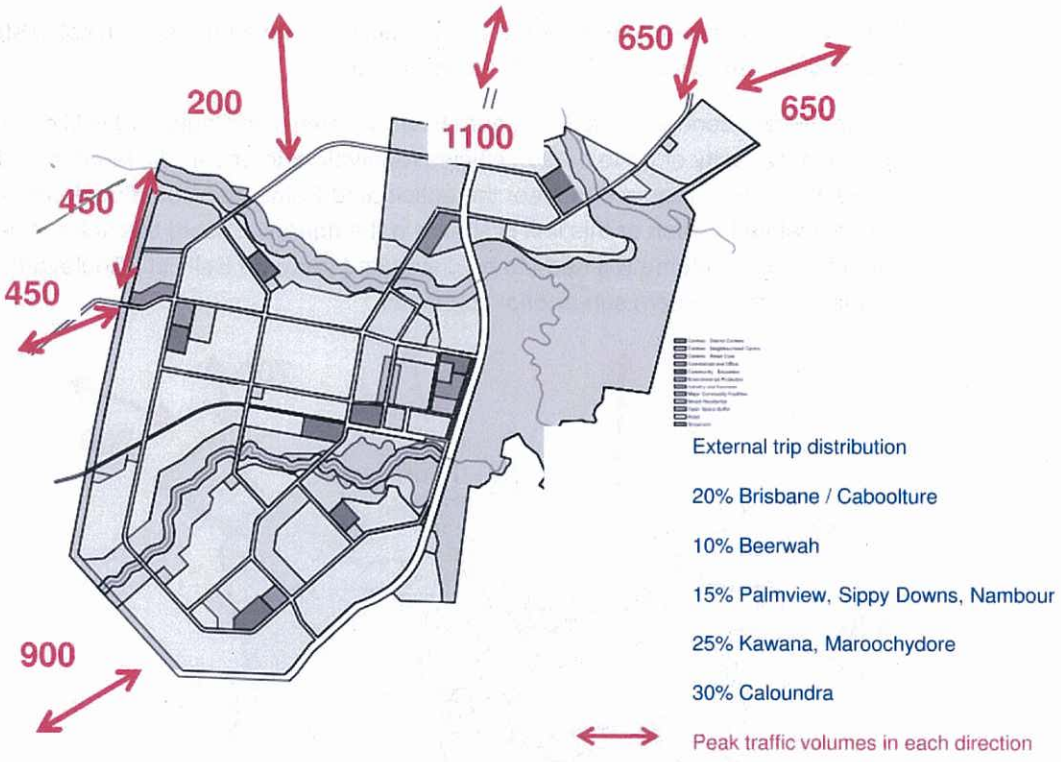


Figure 5-2: Approximate external traffic volume distribution — 40% scenario

5.2 Severance/permeability

The CAMCOS and Kawana Arterial corridors will provide a significant east-west barrier for pedestrian movements. Provision needs to be made at each of the motorway interchanges for adequate pedestrian and cycle access across the corridor(s).

The Masterplan does not identify the road network down to the local network level. It is recommended that where possible, the local street system is set out in a grid like pattern, similar to that shown for the town centre. The use of cul-de-sacs for local roads should be discouraged however where the site layout precludes other options, allowance should be made for a pedestrian/cyclist thoroughfare to allow for permeability of the site (provided this can be done with CPTED principles in mind).

The green corridors indicated on the plan should cater for pedestrian and where suitable cycle movements.

5.3 Road hierarchy

An effective road hierarchy optimises access, amenity, connectivity and safety for all road users. It incorporates public transport, pedestrian and cycle networks into the road network system. The suitable distribution of the traffic throughout the development site allows longer distance through traffic to be separated from the local areas and other sensitive areas, preserves those areas where less traffic is desired, and keeps land uses consistent with the traffic flows.

The road hierarchy classifies the roads by their size, function and capacity. Typically, they are broken down into four classes: arterial road, sub-arterial road, collector and local streets. Each serves a specific purpose, these being:

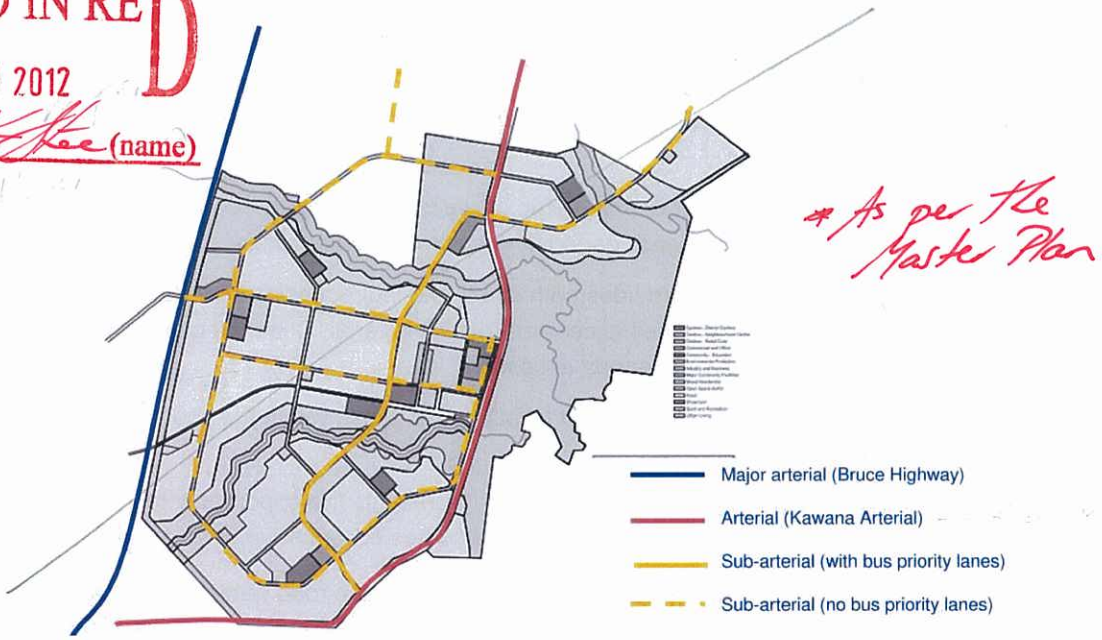
- **Arterial road:** carries through traffic external to the site/development area. Restricted or limited access.
- **Sub-arterial road**: carries traffic between the arterial road network and multiple specific areas. Property access generally restricted or rationalised.
- **Collector street**: provides both direct and indirect access for land uses within the specific area, provides access off the sub-arterial. Does not carry external traffic, provides for some property access.
- **Local street**: provides for all local/internal areas within the specific site, provides access to properties.

As Caloundra South is a Greenfield site, it presents the opportunity to optimise the road network hierarchy to best achieve the outcomes described in Section 1.2.

The inclusion of the dedicated bus corridor within the road network presents an additional challenge, in that this proposed bus route (refer to Section 4 for details of the recommended route) travels along some sections of the road network where the highest traffic volumes would be expected (as they provide the most direct access between the key site elements). There is a need to provide for secondary, alternate routes to this primary route, for general traffic to travel along to ease congestion on the dedicated corridor, allowing priority and reduced travel times for this service.

The proposed road network hierarchy for the Caloundra South Masterplan is shown in Figure 5-3. No collector streets or access street have been indicated on the plan, these will be determined through more detailed planning. Although there is a great network of sub-arterial roads, there will be variance in the cross-section throughout the site, as described below.

AMENDED IN RED
13 JUN 2012
By: (name)
of the ULDA



* As per the Master Plan

Figure 5-3: Caloundra South road hierarchy

To support this road hierarchy, a series of recommended design standards have been developed for roads and streets within Caloundra South. These are based on contemporary best practice for sustainable urban design. Refer to Table 5-1.

5.4 External road network connectivity

The Caloundra South site will have direct access to both the Bruce Highway and the Kawana Arterial. The proposed location of these connections is shown in Figure 5-4 below. (interim and ultimate)

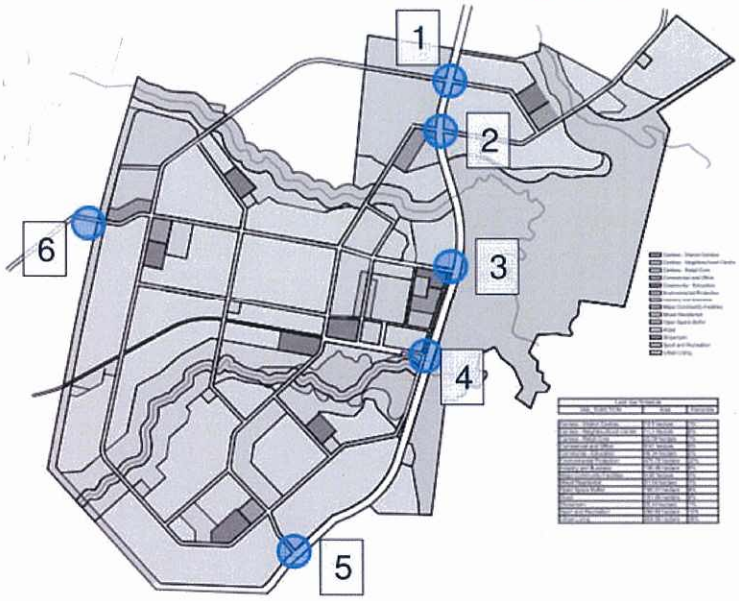


Figure 5-4: Caloundra South direct external road network connections
Indicative

5.4.1 Staging of external network connections

The nominated key connection points to the external network allow for some flexibility in the potential staging of the access to/from Caloundra South.

All intersections (aside from number 6, the connection to the Bruce Highway), should initially be at-grade intersections. As development progresses and traffic volume demands increase, intersection number 1 may be removed, with grade separated access being provided across Kawana Arterial at this location. Intersection number 2 would then be the primary northern access point to Caloundra South (remaining at grade).

With regard to the town centre access (intersection number 3 and 4), as traffic volume and demand increases these may be converted to split interchanges (with north/south facing ramps). This will promote distributed access to the town centre.

5.5 Intersection treatments

Intersection design is an important factor in ensuring the road network is available to all classes of user.

Generally speaking the preferred intersection design for higher order roads (arterial and sub-arterial) is signalised intersection including pedestrian cycles on all legs. Unsignalised (give way) intersections may be appropriate providing appropriate pedestrian facilities (such as median refuges are provided).

Multi-lane roundabouts and complex intersection design (such as flyovers and unsignalised slip lanes) should be avoided, as they provide an environment that is hostile to pedestrians and cyclists.

For lower order (collector and access streets) T-intersections should be signed with give way signs and cross-roads may be provided with roundabouts.

Table 5-1: Recommended road and street design standards for Caloundra South

Classification	Design speed	preferred solution	Intersection	Property access	Parking	Pedestrian	Cycle	Public Transport
Freeway (Bruce Highway)	100 - 110	Fully segregated	Fully grade separated	None	None	Not preferred	Off-road cycle path	not preferred (separate facility required)
Arterial	70	(preferred) 4 to 6 lane limited access road (with central median) (alternative) 4 to 6 lane arterial boulevard treatment (with service lanes)	Signalled intersections (limited number)	(preferred) Limited to multiple unit sites (no individual driveways) (alternative) Via service lanes	(preferred) via side street/back lane (alternative) dedicated parking lane	Footpath one side only	Off-road cycle path, can be shared facility with pedestrains	General traffic or dedicated lanes as required by expected service levels and delays
Sub-arterial	60	2 or 4 lane with central median	Signalled intersections	limited to multiple unit sites	dedicated parking lane	Footpaths both sides	Cycle lanes on carriageway	General traffic or dedicated lanes
Collector	50	2 lanes	Signalised T-intersections or roundabout	Generally appropriate	On street encouraged	Footpaths both sides	Shared parking/bicycle lanes or dedicated on road cycle facility	General traffic lane if required (generally not preferred)
Access street	40	single carriageway	give-way intersections or roundabout	Encouraged	On street encouraged	Footpaths one side only	General traffic lane	Not suitable
Access place	25	single carriageway – low speed	give-way intersections	Encouraged	On street if required or in bays	pedestrian space allocated	General 'traffic' lane	Not suitable

* As per Part 2 of The Caloundra South Master Plan

5.6 Cross-section

(As per Part 2 of the Master Plan)

The recommended cross-sections for each of the identified road types shown in Figure 5-3 are described in the following section.

The cross-section requirements for verges, lanes, bike lanes, footpaths and medians have been specified in accordance with *Road Planning and Design Manual* and *Busway Planning Design Manual* as well as the Austroads guides.

There may be a need to provide a wider road cross-section where collector roads pass through the industrial areas, which will allow for the larger size vehicles (parking, manoeuvring etc.).

5.6.1 Major arterial (Bruce Highway)

As per TMR standards, the section of the Bruce Highway in proximity to Caloundra South comprises four general traffic lanes, central median, shoulders and verge. No typical cross-section is provided as no changes are necessary as part of the Masterplan.

5.6.2 Kawana Arterial

To support best practice in sustainable design, the extension of the Kawana Arterial should be designed as an urban arterial, in accordance with Table 5-1.

In line with the design specifications of the MMTC - Creekside Boulevard to Main Drive, the cross-section will comprise the following:

- four general traffic lanes
- centre median (allowing future provision of additional two lanes, if required),
- on-road bi-directional bike way (one side only).

Ultimate cross-section requirements will depend on the terrain, drainage requirements and the nearby CAMCOS rail corridor.

The general configuration of the Kawana Arterial cross-section is shown in Figure 5-5:

Kawana Arterial 4/6 lanes

* As per requirements of DTMR

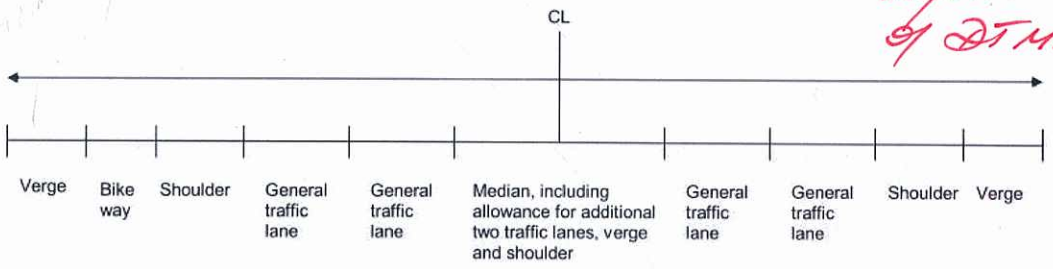


Figure 5-5: Cross-section — Kawana Arterial

This represents a high speed arterial option for the Kawana Arterial, which will encourage a high level of through trips between the Bruce Highway and Kawana/Maroochydore. As this

section passes directly through the Caloundra South site where development is located both sides of the corridor, there is the opportunity for better integration of the road corridor with the site. Introducing closer spaced signalised intersection to replace the interchanges, as well as the inclusion of service roads/lanes to serve local development that could front the corridor, will encourage use of this road for more local trips, allowing better access between the key areas of Caloundra South, resulting in less pressure on the sub-arterial road network (in particular the dedicated bus corridor).

5.6.3 Dedicated bus corridor (sub-arterial)

As detailed in Section 4, the dedicated bus corridor is to comprise a bus priority facility, with kerbside bus lanes provided. A description of the cross section function is provided below:

Dedicated bus corridor, kerbside running:

- two bus lane/transit lanes
- four general traffic lanes
- on-road cycle lane both sides
- pedestrian footpath each side. At the bus stop locations there needs to be clearance around/between all obstructions to comply with disability standards
- median (for drainage and road design requirements. The medians may also be required to contain surface water treatment facilities (bioretention)
- parking lane may be added, however this may be combined with the reduction in the number of general traffic lanes if the corridor is constrained.

A benefit of kerbside running is the reduced total cross-section requirement however there are urban design and pedestrian disadvantages. At this stage, kerbside running is proposed as it matches the proposed CoastConnect corridor. The general configuration of the kerbside running dedicated bus corridor is shown in Figure 5-6.

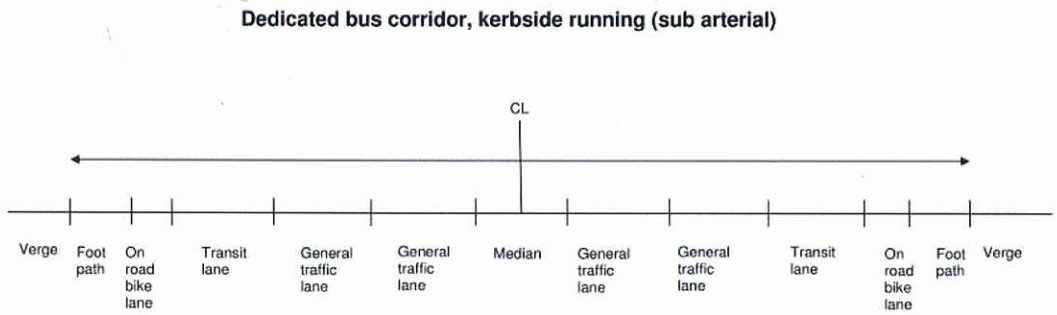


Figure 5-6: Cross-section — Dedicated bus corridor, kerbside running

5.6.4 Sub-arterial — no bus priority

This is a general purpose urban road designed to perform multiple functions including efficient carrying of traffic, facilitating pedestrian and public transport use and providing development frontage of adjoining properties. They are particularly suitable for retail streets where passing traffic (foot and vehicle) supports retail businesses.

Depending on traffic demand, either two or four lane roads may be appropriate. For planning purposes, PB recommends designing for four lane roads — if traffic modelling shows that two lane roads can provide an acceptable level of service, then two lanes should be provided.

Typical design features include:

- four general traffic lanes
- on-road cycle lane both sides
- pedestrian footpath each side. At the bus stop locations there needs to be clearance around/between all obstructions to comply with disability standards
- parking lane both sides, where bus stops are located parking will be removed, allowing a kerbside stop
- median (for road design and drainage requirements). The medians may also be required to contain surface water treatment facilities (bioretention). Where possible, the bioretention systems should be incorporated into the verge rather than the median to reduce the pedestrian crossing distance.

The general configuration of the sub-arterial (no bus priority) is shown in Figure 5-7.

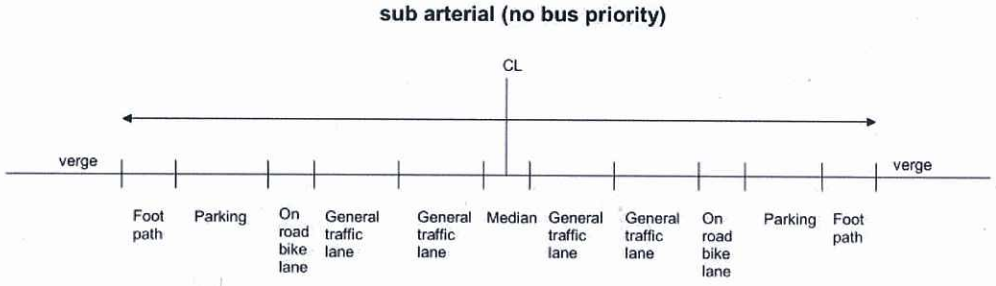


Figure 5-7: Cross-section — Sub-arterial (no bus priority)

5.6.5 Collector roads

The purpose of the 'collector' road is to provide an interface between busier arterial/sub-arterial roads and quiet residential streets. It should still provide for active frontages and a mixture of uses (including low-scale retail, commercial and residential) with direct property access is appropriate. Collector roads should feature frequent local access street connections.

Standard design features would include:

- two general traffic lanes
- on-road cycle lane both sides
- pedestrian footpath each side. At the bus stop locations there needs to be clearance around/between all obstructions to comply with disability standards
- parking lane both sides, where bus stops are located parking will be removed, allowing a kerbside stop

- verge (for drainage design requirements). The verges may need to contain surface water treatment facilities (bioretention). Where required, these systems could be incorporated into one side of the road, allowing parking on the other (as shown below).

The general configuration of the collector road is shown in Figure 5-8.

Collector road

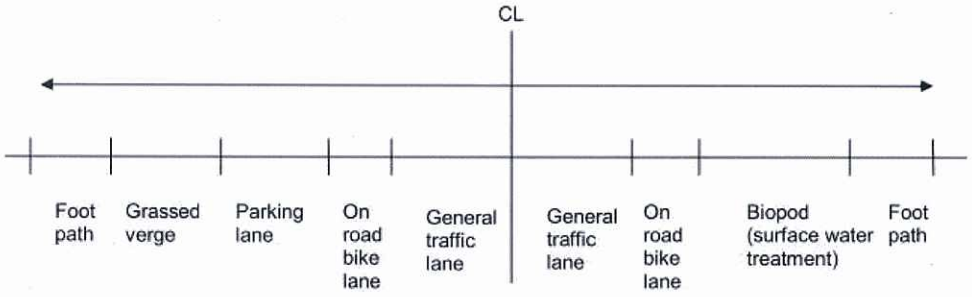


Figure 5-8: Cross-section — Collector road

5.6.6 Access streets

Local access streets will provide a high level of local amenity. Typical design will incorporate a single (two-way) central carriageway with verges, each incorporating a footpath. Additional verge space may be required for water treatment (bioretention systems) and these can be provided as required. Other factors, such as topography or adjacent land uses may lead to different design solutions. However, care should be taken in design features to ensure a slow-speed environment is encouraged without the need for traffic control devices such as speed humps.

Direct driveway access is provided and ideally access streets should be relatively short and provide access at both ends to enable a permeable street network.

Typical design features include:

- one central, two-way carriageway
- verges each side, incorporating footpaths and appropriate street plantings
- additional setback as may be required for utilities or water treatment facilities.

5.6.7 Access place

Modelled after the Dutch 'Woonerf', this is a short, very low speed (20 km/h), very low traffic (<150 vehicles per day) environment, where priority is given to pedestrians. It features a single bidirectional traffic lane with parking bays and passing bays at regular intervals. In certain circumstances, dedicated pedestrian facilities can be omitted, provided careful attention is paid to design detail. Typical feature would include paved or cobblestone streets to ensure slow speed of traffic.

5.7 Network impacts

There are a number of impacts likely to affect the regional road transport network as a result from the development of Caloundra South. These are discussed from a high level perspective below.

5.7.1 External road network implications

- Bruce Highway (interchange requirements) — the location and configuration for the interchange will need to be negotiated with TMR, and will need to accommodate any allowance for future planning (corridor improvements, additional road links/connections).
- Caloundra Road (particularly the Bellvista Boulevard intersection) — the current connection of Bellvista Boulevard to Caloundra Road is in the form of a roundabout with three legs/approaches (dual lane on Caloundra Road, single lane on Bellvista Boulevard). There will be a need to promote the use of other road links in and out of Caloundra South as an alternative to Bellvista Boulevard, such as the Kawana Arterial, or the potential east-west connector to Pelican Waters. If there are no direct links to the east from Caloundra South, a further assessment of Caloundra Road will be required to ensure that it operates satisfactorily.
- Kawana Arterial (interchange requirements) — it is proposed that there be five connection points of the Kawana Arterial with Caloundra South. As there is no modelling or forecast data yet available for the section of the Kawana Arterial running through Caloundra South, it is not known what proportion of the traffic volumes will be associated with through traffic trips.

5.7.2 Staging requirements (impact on mode share and traffic distribution)

The staging of the road network implementation will need to give consideration to the type, size and location of the land use and the ability to create a connected, functional interim transport network. In particular, connectivity for buses will be required to ensure good public transport uptake from commencement.

Initially, mode share for public transport is likely to be lower than the targets due to the viability of providing a full public transport service with limited coverage and catchment.

5.7.3 Size of internal intersections

No detailed assessment has yet been undertaken regarding the traffic volume distribution within Caloundra South accounting for both the external and internal generated trips. Detailed analysis will be required to assess the intersection size, layout, capacity and operation, giving consideration to public transport priority and pedestrian/cyclist movements.

The operation of the intersections located along the dedicated bus corridor (in particular those connecting with the other sub-arterial roads) will be influenced by the traffic volume distribution.

6. Travel demand management strategy

6.1 Introduction

Travel Demand Management (TDM) is generally defined as a series of strategies that aim to improve transportation system efficiency. These strategies seek to emphasise the movement of people and goods, not the motor vehicle, and prioritise the use and accessibility of more efficient or alternative travel modes (cycle, walk, public transport). They can be in the form of improved transport options, financial incentives, parking and land use management, planning policy or education programs.

This section identifies possible TDM strategies that could be implemented to better manage the use of the transport system within Caloundra South and improve its overall efficiency. These incentives are primarily focused on changing people's private vehicle travel behaviour, ultimately reducing the number of vehicle trips.

The following includes an overview of various programs and incentives that can be applied as part of the TDM strategy.

6.2 'TravelSmart' program

Individual marketing programmes, of which 'TravelSmart' is the best known, seek to change individuals' travel choices by providing them with information that is directly relevant to their needs. These include information on walking and cycling paths as well as public transport timetable and fares information. These programmes could be funded by state or local government.

The greatest benefits from these programmes have been found where quality transport alternatives are available, and perform best in inner city areas with plentiful public transport and commute distances short enough to support cycling.

6.3 Workplace travel plans

Workplace travel plans are employer-based packages that promote sustainable travel options to their staff. Workplace travel plans can encourage alternatives to the private car such as walking, cycling, public transport and car sharing. As an example, in Wellington, New Zealand the council has developed and implemented a travel plan program to encourage the uptake of business, school, community and individual travel plans, and associated travel behaviour change initiatives such as ridesharing, telecommuting, flexible work hours, walking school buses, etc.

6.4 School travel plans and walking school bus initiatives

School related travel is a key contributor to travel demand. A significant portion of vehicular trips are likely to relate to the drop-off and pick-up of school children. School travel plans promote healthy and sustainable methods of travelling to school, such walking and cycling and less use of the private car. In addition, school choice and siting policies should be reviewed and modified to reduce dependence on cars and transit in order to promote walking and biking for school children.

6.5 Ride sharing

Ride sharing programs to identify potential travel partners are useful for private car users where passenger transport services are currently not available or provide limit services. The services may become even more important as fuel costs rise over time in real costs. Rewards for users could include priority parking spaces at places of work and at satellite park 'n ride facilities along with subsidised transit tickets.

6.6 Spread peak demand

The greatest demands on the transport network occur in the morning peak, where work and school peaks coincide in a relatively narrow band. Peak-spreading attempts to tackle this problem by encouraging trips at slightly different times. In particular, employers are encouraged to introduce policies that allow employees to commence work earlier or later and travel before and after the peak.

One management technique to achieve this is to 'time release' parking in the morning. Under this approach, parking operators are required to limit the availability of a portion of parking lots until certain designated times. This would create a behaviour whereby a certain portion of drivers would defer driving until later in or after the peak period.

Both car and public transport users can benefit from this approach, and there are potential savings on road and public transport capital expenditure that would otherwise be required to meet the peak demand. For public transport users, the improved flow of travel means the transit can operate more reliably. However, it is important that public transport services are of adequate quality either side of the peaks to encourage drivers to travel off-peak.

6.7 Bike hire schemes

Public bike hire schemes provide convenient rental bicycles intended for short (less than 5 km) urban trips. A typical public bike hire scheme will comprise of a fleet of bicycles, a network of automated stations where bikes are stored, and bike redistribution and maintenance programs. Bikes may be rented at one station and returned to another. Stations with automated self-serve docking systems are located at major destinations and transportation centers, spaced about 300 m apart. Use is free or inexpensive for short periods (typically first 30 minutes). This allows urban residents and visitors to bicycle without needing to purchase, store and maintain a bike. These schemes are most efficient when bikes are shared many users each day, with some systems average as many as twelve daily users per bike. Brisbane City Council has recently implemented the first stage of the City Cycle scheme, where ultimately there will be up to 2,000 bikes available for use at 150 parking stations.

6.8 Car parking management

Car users need somewhere to store their car at their destination. Car dependence in post war cities has led to a dependence on car parking, which, in turn has led to oversupply. To prevent this trend from occurring in Caloundra South, parking management strategies are integral to the reduction of the demand for parking, encouraging efficient use of parking facilities, improving quality of service and design as well as increasing the provision of viable alternatives including active and public transport.

7. Conclusions

The transport patterns and demands generated by the proposed Caloundra South community have been assessed and an Integrated Transport Strategy presented to support the development. Development of the strategy began with the identification of key outcomes to achieve the vision for Caloundra South. These outcomes are:

- develop a transport network that provides for future movement needs, facilitates sustainable forms of transport and supports connected communities
- provide an urban form, settlement patterns structure and demand management measures that increases mode share of sustainable forms of transport such as walking, cycling and public transport over private vehicle use
- increase access to, and awareness of, options for sustainable travel to reduce dependence on private car travel.

A travel needs assessment determined that the proposed community would generate a total of 14,801 residential peak hour trips of which 11,310 would be car based (where proximity to public transport services and good site design are conducive to mode shift). Of these trips, up to 4,835 will be external to the site. There will be a further 4,091 external peak hour trips generated by the proposed employment within the site.

In order to cater for these demands, a series of networks has been developed to cater for walking, cycling, public transport and private vehicle trips.

Section 3 shows how the site fits within the regional context and the opportunities for linking into the Principal Cycle Network Plan. This section describes the desired characteristics of facilities for pedestrians and cyclists. It also lists the different requirements that cyclists have over pedestrians.

Figure 3-2 shows the important walking catchments for pedestrians where it will be essential to provide high quality facilities. Figure 3-3 shows the off-road network which will cater for cautious and recreational cyclists, as well as the more experienced cyclists. This off-road network is to be supported by on-road cycle facilities. It is essential that the full requirements of cyclists are catered for and some detail is provided about the directional signage, and end-of-trip facilities that cyclists need. The achievement of high levels of walking and cycling will be essential to achieving a good non-car mode share and will be reliant on the design of the land uses creating a good environment for these modes.

Section 4 presents the Public Transport strategy and includes details of operational standards of service and the regional context and connections. The strategy shows the proposed dedicated bus corridor and its relationship to the proposed CAMCOS rail line as well as local buses to serve the community. It will be essential to ensure that the street and road network is developed in a staged manner that enables connected bus services to be provided from early on in the development.

The road network strategy assesses the required capacity and location of external roads to provide access to the site. In particular, it is anticipated that there will be demand towards Caloundra that would best be catered for by the provision of an additional road connection to the east of the site. If this link is not provided, then additional pressure will be placed on the other roads connecting Caloundra South to the surrounding region.

It is recommended that these trips towards Caloundra would best be catered for by the provision of direct links from the site.

The road hierarchy is presented down to the level of Sub-Arterial Road. Cross-sections which provide the required capacity are illustrated for all road types from Major Arterial down to Collector. These cross-sections may need to cater for the provision of landscaping and Water Sensitive Urban Design however there is also a need to take account of pedestrian crossing needs to ensure that major barriers are not created.

Section 6 discusses Travel Demand Management and how it might be applied within the site. These measures will be required to achieve the overall non-car mode share of approximately 24%. Ideally, through the comprehensive application of these measures along with good design, this share would be exceeded.

AMENDED IN RED
13 JUN 2012
By: _____ (name)
of the ULDA

Appendix A

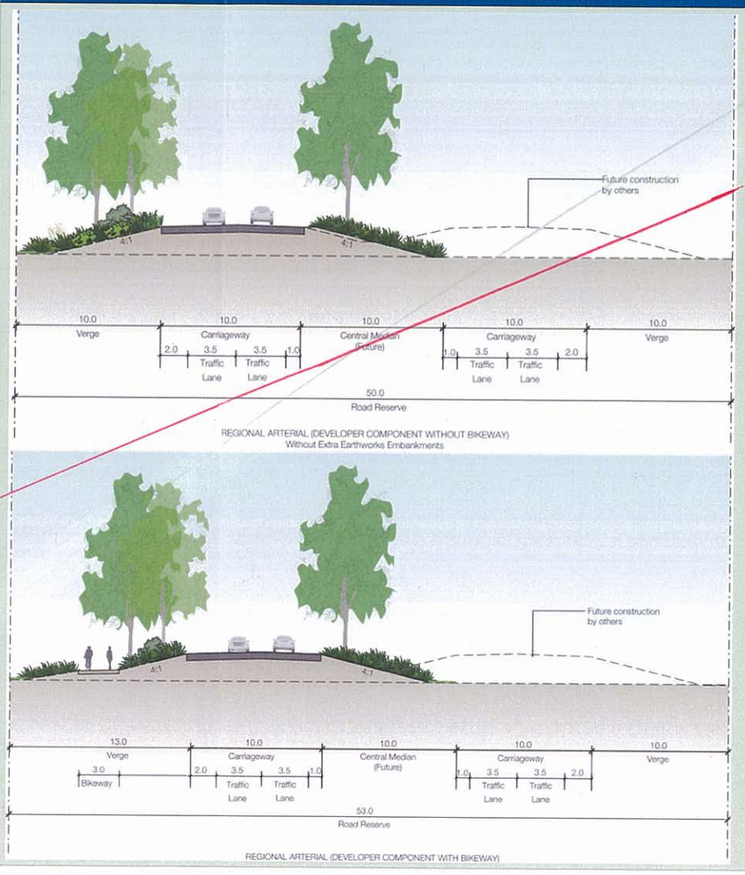
Cross sections

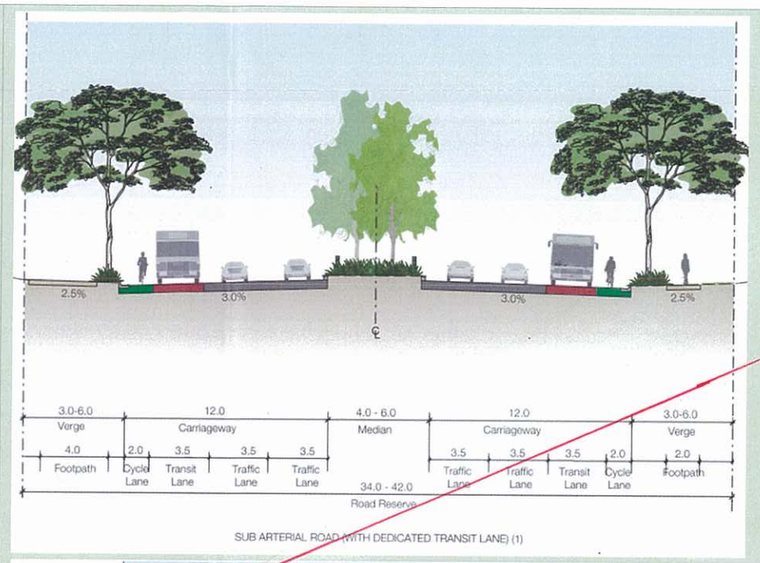
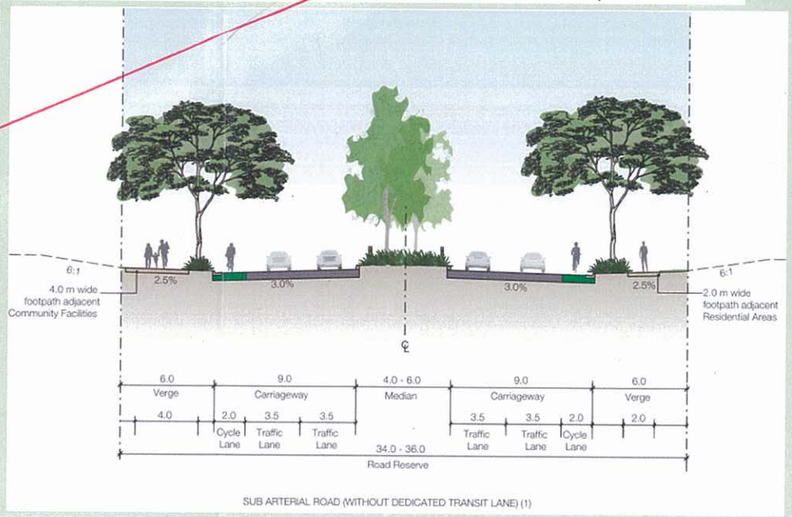
(as per Part 12 of The Master Plan)

Following on from the preparation of the Integrated Transport Strategy for Caloundra South, the Desired Standards of Service for road transport infrastructure has been developed. These standards have been developed through a thorough review of the Sunshine Coast Council guidelines, ULDA Street and Movement Network guidelines, Complete Streets, Austroads standards and guidelines, and international best practice based on PBs Practice Area Network.

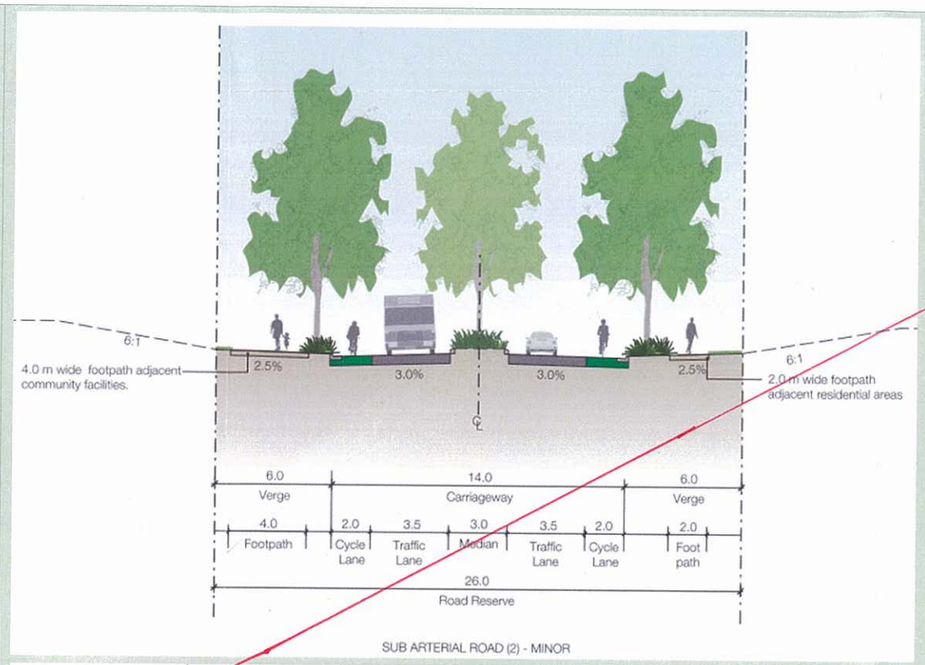
A summary of the desired standards for the road network is provided below in Table 1 and Table 2 with the indicative cross sections also shown.

Table 1: Road Transport Infrastructure Network (General) – Design Characteristics

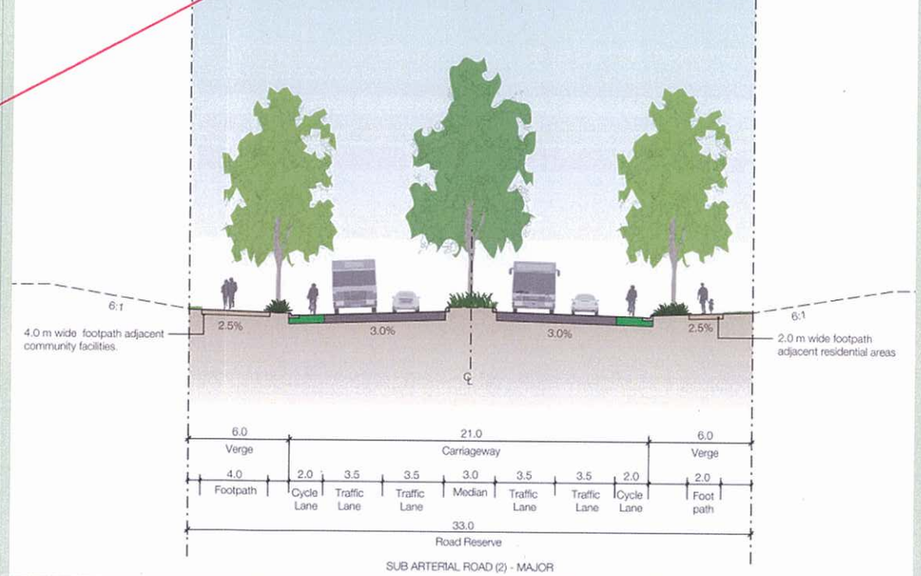
Road type and road reserve width	Typical features and treatments	Typical cross section
Regional Arterial 50 metres without bikeway 53 metres with bikeway	▪ Dual carriageway with landscaped median and verges; ▪ No direct property access; ▪ Four general movement lanes (two in each direction); ▪ Roundabouts as interim intersections (generally in accordance with Intersection Plan Numbers 1 – 5); ▪ Ultimately grade separated intersections/interchanges; ▪ No less than 800m between intersections ▪ 80kmh design speed and posting	

Sub-Arterial Road 34 metres – without dedicated transit lane 34 metres – with dedicated transit lane	▪ Dual carriageway with landscaped median and verges; ▪ No direct property access; ▪ On-road dedicated bicycle lanes both sides; ▪ On-road dedicated transit lanes; ▪ Four general movement lanes (two in each direction); ▪ Indented bus bays; ▪ Footpaths both sides: 4m wide footpath where adjacent to community facilities and town centres, 2m wide footpath where adjacent to residential areas; ▪ At grade intersections; ▪ No more than 800m between intersections in residential areas; ▪ 60kmh design speed and posting;	 SUB ARTERIAL ROAD (WITH DEDICATED TRANSIT LANE) (1)  SUB ARTERIAL ROAD (WITHOUT DEDICATED TRANSIT LANE) (1)

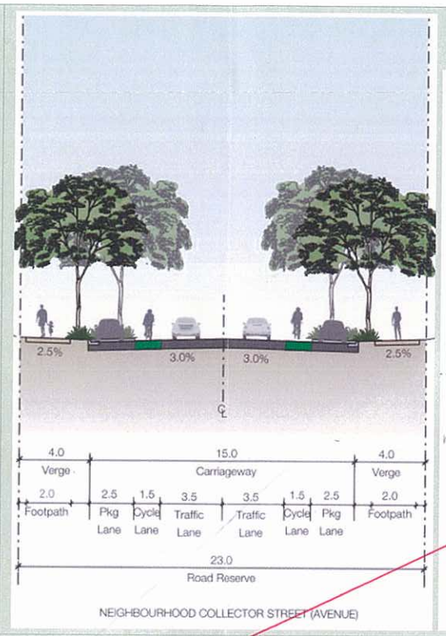
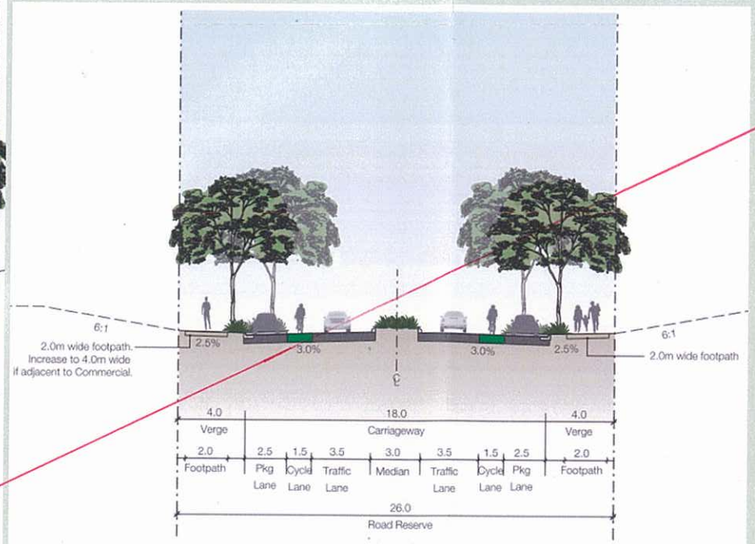
Sub-Arterial Road 26 metres (Minor) 33 metres (Major)	▪ Dual carriageway with landscaped verges; ▪ Four general movement lanes (two in each direction) for the major sub-arterial; ▪ Two general movement lanes (one in each direction) for the minor sub-arterial; ▪ No direct property access; ▪ On-road dedicated bicycle lanes both sides; ▪ Indented bus bays; ▪ Footpaths both sides: 4m wide footpath where adjacent to community facilities and town centres, 2m wide footpath where adjacent to residential areas; ▪ Where permitted, intersections are provided at a maximum spacing of 300 metres; overall, no more than 700m between intersections; ▪ In major and district activity centres, and major community facilities infrastructure, intersection spacing is to be provided at a maximum of 200-300m to encourage network permeability; ▪ 50 kmh design speed and posting;

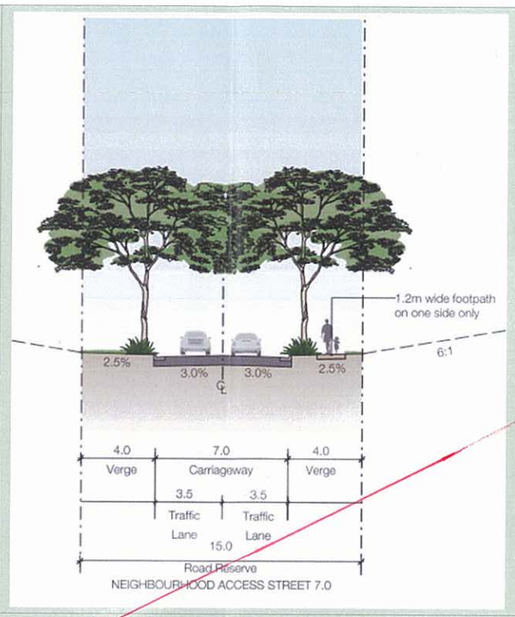
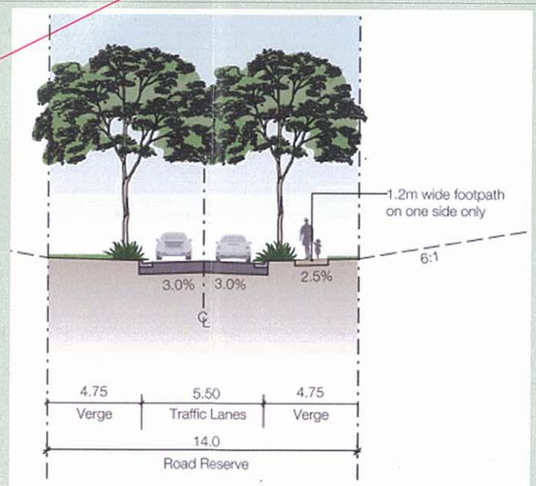


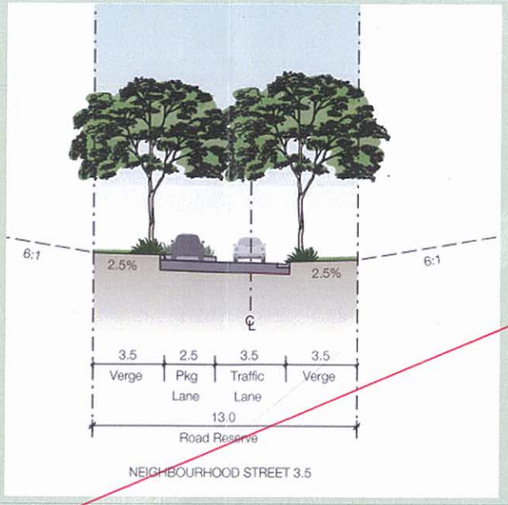
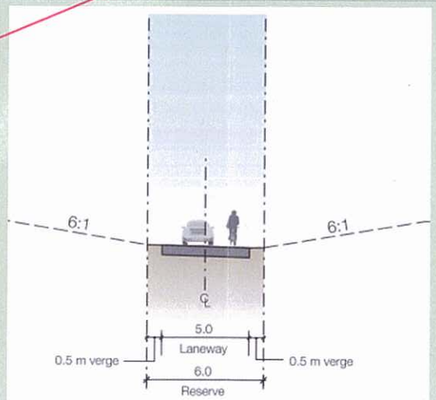
SUB ARTERIAL ROAD (2) - MINOR



SUB ARTERIAL ROAD (2) - MAJOR

Neighbourhood Collector Street 24m (Avenue) 27m (Boulevard)	▪ 6,000-10,000 vehicles per day; ▪ Minimum intersection spacing 60m; ▪ Parking lanes parallel both sides where required; ▪ Designed to accommodate bus routes; ▪ On-road dedicated bicycle lanes both sides; ▪ One general traffic lane in each direction; ▪ 2.0m footpaths both sides; ▪ 50 kmh design speed and posting;	 NEIGHBOURHOOD COLLECTOR STREET (AVENUE)  NEIGHBOURHOOD COLLECTOR STREET (BOULEVARD)
Neighbourhood Street 20 metres	▪ 3,000-6,000 vehicles per day; ▪ Parking lanes parallel both sides of street; ▪ Where permitted, intersections are provided at a maximum spacing of 100 metres (inclusive of median openings approved for development driveways); ▪ Designed to accommodate bus routes; ▪ One general traffic lane in each direction; ▪ Footpath on one side of the street only (minimum width 1.2m); ▪ 50 kmh design speed and posting;	 TYPE SECTION - NEIGHBOURHOOD STREET

Neighbourhood Access Street 7 15 metres (use if density of 20-30 dwellings per hectare; infrequent driveways; high connectivity)	▪ 3,000-6,000 vehicles per day; ▪ On street parking permitted (not marked); ▪ One general traffic lane in each direction; ▪ Footpath on one side of the street only (minimum width 1.2m); ▪ 4-way or 'T' intersections;	 NEIGHBOURHOOD ACCESS STREET 7.0	
Neighbourhood Access Street 5.5 14 metres (use if density less than 20 dwellings per hectare, frequent driveways; high connectivity)	▪ Less than 3,000 vehicles per day; ▪ On street parking permitted (not marked); ▪ One general traffic lane in each direction; ▪ Footpath on one side of the street only (minimum width 1.2m); ▪ 4-way or 'T' intersections;	 NEIGHBOURHOOD ACCESS STREET 5.5	

Neighbourhood Access Street 3.5 13 metres (use if density of 15-30 dwellings per hectare; infrequent driveways; low connectivity)	▪ Single general traffic lane (two way traffic flow permitted); ▪ Passing bays provided with interspersed indented parking bays; ▪ 4-way or 'T' intersections;	 NEIGHBOURHOOD STREET 3.5
Neighbourhood Rear Lane 6 metres	▪ To provide access to properties, refuse collection and servicing only ▪ No on-street parking (short term loading for refuse collection etc. excepted);	 NEIGHBOURHOOD REAR LANE