

INFRASTRUCTURE SERVICES COMMITTEE 15 NOVEMBER 2017	1
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CITY LOOP BUS SERVICE

Bruce Gardiner | 1/3/21-20 | #5574895

RECOMMENDATION:

It is recommended that Council:

- 1. Does not proceed with the City Loop Bus at this point in time due to the potential low patronage and high operating cost.**
- 2. Continues to discuss public transport for Cairns with the State Government and work collaboratively with TransLink to investigate ways to make improvements to the existing bus services and consider ways to encourage transport mode share towards public transport.**
- 3. Continues with the broader discussion paper and investigation on Future Sustainable Public Transport for the Cairns region. This may include revisiting a City Loop Bus in the medium term.**

EXECUTIVE SUMMARY:

Council requested a report on the practicalities and costs associated with the implementation of a City Loop Bus service at the April 2017 Ordinary meeting. Consulting firm ARUP were subsequently engaged to investigate and prepare a discussion paper for consideration by Council. ARUP presented their draft findings at a workshop with Council in August 2017.

This report to Council provides a summary of the findings in the ARUP discussion paper and recommends that Council not pursue the option of a City Loop Bus at this point in time for a range of reasons including the potential low patronage and high operating cost versus the possible benefits gained.

It should be noted that Council has implemented, or is implementing a range of initiatives to reduce the need for a City Loop service and make the CBD more 'walkable' including:

- Improved availability of carparks
- Upgrades of Shields, Lake and proposed Florence Streets
- Adoption of a Tropical Urbanism policy that encourages large awnings
- Funding in this year's budget for a wayfinding signage strategy
- Progressive footpath upgrades
- Improved ease of crossing at signalised intersections with the countdown timers
- The upgrade of street lighting.

BACKGROUND:

At the April Ordinary Council requested a report on the practicalities and costs associated with the implementation of a City Loop Bus service. Council subsequently engaged ARUP to investigate and prepare a discussion paper for consideration by Council.

The purpose of a loop bus service provided to ARUP included the following:

- Facilitate short trips around the CBD
- Encourage tourist trips between destinations around the CBD
- Help to alleviate traffic congestion along critical streets
- Reduce the demand for parking within the CBD area.

The discussion paper explored the function a City loop service would play and the potential operational requirements of introducing such a service. The options developed in the discussion paper are based on a desk top review of existing data and documents, discussions with the CRC transport team, and benchmarking of other bus loop services.

Documents reviewed included the following:

- Cairns Transit Network (CTN) Concept Design Report, DTMR (2010)
- Shuttle Bus Park and Ride Facilities for Cairns Discussion Paper, Planz (2010)
- Car Parking Assessment, Findings and Solutions for Discussion, Cardno (2015)
- Initial draft of Public Transport discussion paper, Arup (2017).

Cities where loop buses operate currently that were benchmarked were Ballarat, Perth, Townsville, Auckland and Christchurch in New Zealand, Stratford and Hertfordshire in the UK.

The critical issues for the success or otherwise of a loop bus service identified by Arup included:

- The potential numbers of passengers
- Motivators for use of the service
- Service area options
- Financial costs and contractual agreements
- Impact on existing transport services
- Coordination with regulated parking in the CBD.

COMMENT:*Learnings from Benchmarking*

ARUP summarised the lessons learned from benchmarking loop services in other locations as follows:

- Simple routes are more effective
- Service can be connected to car parks to potentially reduce vehicle circulation but this is only feasible if kerbside parking is scarcely available or charged at a high premium

- The operation of loop services can conflict with existing public transport services
- The introduction of loop service can be seen to conflict with measures to encourage active transport as they often operate over distances that can easily be undertaken by walking or cycling
- Frequency and hours of operation are critical attributes
- Where loops are used, they should ideally be two-way.

Potential Patrons

In terms of the potential patronage of a loop service, ARUP identified the following based on 2016 and 2011 ABS data:

- The population in the CBD/North Cairns area is 11,439 with 3,689 working in the CBD
- Approximately 17,400 people from across the Cairns region are employed in the CBD/North Cairns
- On average there are about 27,000 visitors a day to the CBD.
- Only 4.1% of people in the Cairns region travel to work using public transport (bus/taxi) The majority of people use personal transport (48.2%), or walk/cycle to work (18.4%).

While it is difficult to know the number of patrons who might use a loop bus service, the report provided some estimates based on assumptions on the percentage of workers or tourists that might. These estimates range from essentially 0 through to 1097.

Loop Bus Options

ARUP developed 4 potential loop bus routes (attachment 1) that were reviewed for potential patronage and operational costs. The options are summarised in the following table. The first 3 options were point to point services between new park and ride locations along Spence Street and Lake Street for different lengths. Option 3 was the longest service running from Cannon Park to the Airport. The 4th option was more of a traditional loop route servicing the CBD only.

Table 1 - Possible City Loop Bus routes investigated

Option 1	Option 2	Option 3	Option 4
Point to point service between new park and ride locations at Draper Street (adjacent to Council Offices) and Charles Street site (opposite the Cock and Bull Pub) via Spence Street, and Lake Street – 6.5km	As per route 1 but extended to serve new park and ride site at Lilly Street instead of Charles Street location – 8.8km	As per route 1a but with extension to a new park and ride site at Cannon Park in the south via Spence Street and little Spence Street which requires a new road link across the river and Cairns Airport to the north via Lake Street and Airport Avenue – 20.2km	Loop service via new park and ride site at Charles Street, Esplanade, Abbot Street, Shields Street, Esplanade, Spence Street, Lake Street, Hartley Street, Sheridan Street, McLeod Street, Aplin Street, Grafton Street and Charles Street park and ride – 5.9km

Estimated Costs

Given the walkability of the CBD and the generally quick drive time in a private vehicle along the routes, in order for any of the options to be successful, the frequency of bus service (headway time) would need to be quite short. Provision of a frequent bus services would require a number of buses to operate at any one time - at least in peak times. Hence the number of buses required to operate ranges from 3 with 15 minute headway, and up to 25 for 5 minute headway for Option 3.

ARUP used three different methods to estimate the operating costs of the different options. The range of annual operating costs for the different options for running a City Loop Bus service are from \$0.4 million up to \$6.5 million for the longest route Option 3 as shown in the following table.

Table 2 - Operating cost estimates

Option	\$100,000 per bus per annum (Planz 2010)	105 cents per km (ATAPG)	\$6.11 per km (BITRE)
1	\$800,000	\$357,739	\$2,081,701
2	\$1,100,000	\$484,324	\$2,818,303
3	\$2,500,000	\$1,111,743	\$6,469,288
4	\$1,600,000	\$649,434	\$3,779,089

*ATAPG is Australian Transport Assessment and Planning Guidelines
BITRE is Bureau of Infrastructure Transport and Regional Economics*

Free or Paid Service

An option for recovering at least some of the operating costs of running a City Loop Bus would be to charge fares for the service. The benchmarking demonstrated that the most successful loop bus services operate free of charge. Patrons either did not take up the service or reduced use of the service once a fare was brought in. In order to encourage use, it would be recommended that the service be offered free of charge should it proceed.

Legal and Contractual Arrangements

The Transport Operations (Passenger Transport) Act 1994 (TOPTA) introduced the system of service contracts under which operators in restricted markets like Cairns, are held accountable for providing minimum levels of service. Cairns is a prescribed area under the TOPTA and forms a regional bus service that is currently contracted to Transit Australia Group (TAG), Sunbus. Any additional bus service would require offer and negotiation with TAG/Sunbus.

It is likely that a City Loop Bus, particularly if operated free of charge to passengers, would attract some patrons from existing paid services. This matter would need further investigation should the City Loop Bus proceed.

OPTIONS:

The recommended option is for Council to not proceed with the City Loop Bus at this point in time due to the potential low patronage and high operating cost. Further consideration should be given to the option in the medium term or as other impacting factors change.

Council does have the option of proceeding with a City Loop Bus. However, there are a number of unqualified risks to the success of the service at this point in time. These would need to be further explored to gain more certainty of the potential costs of running the service.

CONSIDERATIONS:

Risk Management:

The key risks in moving forward with a City Loop Bus at this point in time are that the number of patrons that would use the service is most likely to be low and the operating costs are high. A service would also be competing with private use vehicles with low cost parking in the CBD and the walkable nature of the CBD due to the small footprint.

There are a number of hotels and small operators who run shuttle type services in the CBD currently. Council may be criticised for taking patrons from these services if a loop bus was introduced.

Council Finance and the Local Economy:

There are currently no funds set aside in the Council budget or 10-year financial plan for the operation of a City Loop Bus. There may be opportunities for external funding for such a service in the future.

Community and Cultural Heritage:

The introduction of a City Loop Bus would improve public transport options for commuters in the catchment zone and tourists. There would also be a number of jobs created from the operation of a City loop service.

Natural Environment:

There would be environmental benefits from reduced private car use if a City Loop Bus service was introduced.

Corporate and Operational Plans:

Consideration of this proposal supports Corporate Goal 3 Liveability - A safe and secure city that is easy to live in and connected to the world.

Statutory:

Council would need to adhere to any requirements of the Transport Operations (Passenger Transport) Act 1994 (TOPTA) relating to the prescribed area under this Act.

CONSULTATION:

Limited external consultation has occurred on this proposal at this point in time. A workshop was held with the Council in August 2017. There has been media interest in the topic on several occasions the most recent being an article in the Cairns Post on August 3 stating that Council was not intending to proceed with the City Loop Bus.

ATTACHMENTS:

City Loop Bus Options Map (ARUP 2017)
Potential Loop Bus Service for Cairns CBD #5529041



Bruce Gardiner
General Manager Infrastructure Services

City Loop Bus Options Map (ARUP 2017)



Potential Loop Bus Service for Cairns CBD

Cairns Regional Council
**Potential Loop Bus Service for
Cairns CBD**
Discussion Paper

Revision B | 16 August 2017

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 255370-00

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Document Verification

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			Prepared by	Checked by	Approved by
		Name	Emma Forde	Brian Smith	Nathan Lee Long
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| Revision B | 16 August 2017 | Arup

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1 Introduction

Cairns Regional Council (CRC) have a vision for developing an improved and sustainable public transport network and are currently investigating the potential options that will create an integrated transport system that will:

- promote tourism;
- increase public transport, walking and cycling use;
- provide safe, efficient and effective movement of goods and people
- respond to community concerns about CBD parking
- facilitate access to places and services.

A discussion paper is being prepared to identify the opportunities for future sustainable public transport for the Cairns region. The future sustainable public transport discussion paper will build on extensive work already completed by the Department of Transport and Main Roads (DTMR) in relation to the future Cairns Transit Network (CTN) and the CRC in relation to the proposed parking strategy for the Cairns City.

To supplement this discussion on a future sustainable public transport network the opportunity to provide a loop bus service operating within the Cairns Central Business District (CBD) was identified by the CRC. This discussion paper explores what function such a service would play and the potential operational requirements of introducing such a service.

The legal framework within which a loop bus service would operate is not explored within this discussion paper but it is understood that under the Transport Operations (Passenger Transport) Act 1994 this type of service would be considered a public passenger service and as such would be delivered by the current bus operator under the TransLink scheme.

The options developed within this discussion paper are based on a desk top review of existing data and documents, discussions with the CRC transport team and benchmarking of other bus loop services.

2 Context

To understand the potential to introduce a bus loop service in Cairns a high level review was completed of the following CRC documents to identify the issues and opportunities for such a service:

- Cairns Transit Network (CTN) Concept Design Report, DTMR (2010)
- Shuttle Bus Park and Ride Facilities for Cairns Discussion Paper, Planz (2010)
- Car Parking Assessment, Findings and Solutions for Discussion, Cardno (2015)
- Initial draft of Public Transport discussion paper, Arup (2017)

A more extensive review of these documents is provided within the wider discussion paper on Future Sustainable Public Transport Options. Table 1 below summarises the main issues and opportunities that relate to the development of a loop bus service.

Document Reviewed	Issue	Opportunity
CTN Concept Design Report	Identifies the preferred route for the future CTN in the CBD which is designed to make trips by public transport faster more frequent and improve reliability.	Identification of Lake Street as a core public transport corridor which should be promoted
Car Parking Assessment (2015)	Identified actions to alleviate car parking constraints within the northern Cairns CBD particularly around the recently redeveloped hospital.	Consider how the route of a loop bus service could help to redirect existing parking demand away from the immediate environs within the northern Cairns CBD to area and provide a fast and frequent public transport link to this area.
Shuttle Bus discussion paper	Following on from the 2009 parking strategy for Cairns this study examined potential options for providing additional park and ride / shuttle bus facilities around Cairns.	Consider the use of suggested park and ride locations on land adjacent to the CRC Administration building, the Cock and Bull Pub and on the north east corner of Lake Street and Lilly Street to act as the starting point for potential loop services
Public Transport Discussion paper	Cairns city centre is the main bus hub. No bus routes go through the city centre from south to north or vice versa - bus customers need to change buses in the city centre bus station to travel through the city. Printed schedules allow for about a 5-minute transfer time but late running (for which there is some evidence in recent studies) may make through trips difficult to make by bus.	A dedicated Cairns CBD bus loop service on a high frequency could improve transfer opportunities in the short term whilst longer term network planning is considered to transition from bus routes to the future CTN.

Table 1 Document Review Summary

Discussions with the CRC have also indicated that the function of a loop bus service would primarily be to:



- Facilitate short trips around the CBD;
- Encourage tourist trips between destinations around the city centre;
- Alleviate traffic congestion along critical streets within the CBD; and
- Reduce the demand for parking within the city area particularly around major trip attractors such as the hospital in Cairns North.

3 Benchmarking

A bench marking exercise was complete of bus loop services to help identify suitable characteristics for the introduction of such a service in Cairns. These focused on services that were known to the study team and had similar objectives to those of CRC in relation to introducing such a service. Table 2 provides details of the benchmarking exercise.

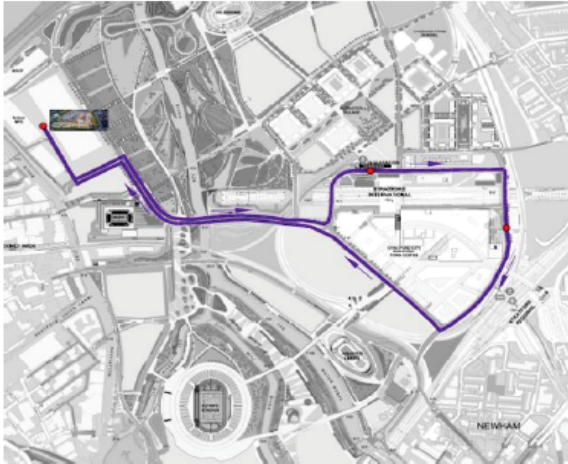
In summary lessons learned from loop services in other locations include:

- Simple routes are more effective;
- Service can be connected to car parks to potentially reduce vehicle circulation but this is only feasible if kerbside parking is scarcely available or charged at a high premium;
- The operation of loop services can conflict with existing public transport services;
- The introduction of loop service can be seen to conflict with measures to encourage active transport as they often operate over distances that can easily be undertaken by walking or cycling;
- Frequency and hours of operation are critical attributes; and
- Where loops are used, they should ideally be two-way.

Project	Site	Scope	Key Service Features	Outcome	Commentary
<p>Auckland City Centre Shuttles Auckland, NZ (Pop – 1,614 million, 2016)</p>	 <p>Every 7 to 8 Minutes Monday to Saturday – 6.25am to 11.25am</p> <p>Every 10 Minutes Sunday and Public Holidays – 7am to 11.20pm</p> <p>Connecting Wynyard Quarter, Queen St and Karangahape Rd</p> <p>Cash Fare: 50c (30c child) Free to HOP card users No concessions apply</p> <p><small>Actual bus frequency may vary & is to include local conditions & services. Unpublished circumstances. Please respect to change.</small></p>	<p>The initial City Circuit Free Bus (10 minute frequency, operating between 8am and 6pm) ran predominantly along the Queen Street tourist and shopping strip in the CBD. This changed in 2011 to the 'Citylink' service, part of a three link bus route network.</p> <p>The current form includes the 2014 change to serve the growing Wynyard Quarter Precinct.</p>	<p>Operates predominantly along the Queen Street shopping and tourist strip High frequency (every 7-8 minutes) Currently operates between the hours of 6.25am and 11.25pm</p> <p>Funded by Auckland Transport, part-funded by Heart of the City (a city centre business association) and Waterfront Auckland (an urban regeneration agency) when the service was free</p>	<p>Caters for 2.6 million boardings each year Suffers from major congestion and bunching issues</p>	<p>The service began as a free service for transit card users before switching to a small cash fare for a brief period. It is now run as a low-fare paid service (unless users are transferring from another PT service). When free travel was removed, patronage dropped 700,000 boardings per annum, highlighting the importance customers placed on free travel.</p>
<p>Christchurch Free CBD Shuttle Christchurch, NZ (Pop – 375,000, 2016)</p>		<p>The concept was a free shuttle bus operating in the heart of the Christchurch CBD, predominantly serving the main shopping strip in the city centre</p>	<p>Hybrid diesel-electric buses Buses operated at a frequency of 10 minutes The service was run by a contracted bus operator and paid for by the Christchurch City Council The cost grew from \$450,000 per year in 1999 to \$1.05 million by 2011</p>	<p>42% of passengers were shoppers 33% of passengers were tourists The service was operating at approximately 1 million passenger trips per year in 2009 prior to shutting down (in the first five weeks the buses served 80,000 passengers at 3,000 per day) Businesses in the city centre strongly supported the service</p>	<p>Service was removed after the major earthquake in 2011 due to the city being largely abandoned. There are now calls for the shuttle to be re-introduced</p>

Project	Site	Scope	Key Service Features	Outcome	Commentary
<p>Christchurch Orbiter Christchurch, NZ (Pop – 375,000, 2016)</p>		<p>An outer suburban link bus connecting suburban destinations such as shopping malls, hospitals, university and technical colleges Doesn't go to city centre (Note: the Orbiter route is shown in lime green on the map)</p>	<p>Normal fares are charged for the service Connects with radial bus routes to the CBD Operates as a two-way loop service every 10 minutes</p>	<p>Approximately 50,000 passengers per month in 2000 (2 million per annum) Within a year of implementation, this route handled 12% of all city bus trips with 40% new users Suffers from bunching issues. Limited priority</p>	<p>Within a year, the route became the busiest bus route in the city Small bus with bright green livery</p>
<p>Ballarat Free City Circle Bus Trial 2016 Ballarat, Australia (Pop – 102,230, 2016)</p>		<p>Objectives included capturing commuters, easing parking pressure, activating the CBD and improving customer movement in the CBD</p>	<p>Operated as a 6 month trial Buses operated on a 10 minute headway The Council funded 75% of the trial with the State Government covering the other 25%</p>	<p>Low use in commuter peak times The buses were most used through the middle of the day. The effect of this was that urban buses reported a 10% reduction in use of CBD stops Approximately 1,000 passengers per week (very low) The trial ended after 6 months with no plans to re-introduce the service</p>	<p>A potential reason for low patronage during the trial, suggested by stakeholders, was that the buses weren't low floor</p>

Project	Site	Scope	Key Service Features	Outcome	Commentary
Perth CAT Services review (Pop – 2,066 million, 2016)		Four CAT (Central Area Transit) services use small buses to provide free bus circulation of the city centre.	<p>Designed to complement the Transperth train and bus network</p> <p>10-15 minute frequency on most routes and operates daily from around 6am to 7pm (later on Friday and Saturday)</p> <p>Funded through the Perth Parking Managing Act – a car parking levy funds the services. In 2010 carried approximately 82,000 people</p>	Well-established service that has been expanded in the city and to other centres. The routes provide good coverage of the city and are used by commuters, shoppers and tourists	Challenge of monitoring demand identified as the service is free there is no ticketing information available.
Townsville, Sun Bus Red Bus Trial (Pop – 180,000, 2015)		To connect key destinations in the city precinct directly with the Magnetic Island Ferry service	<p>Designed to connect to parking nodes operated by the Council and alleviate some of the city parking and traffic issues and also provide locals and visitors alike with a frequent and easy to use city bus service.</p> <p>Operated by Sunbus with a \$60,000 contribution from the Council.</p> <p>30 minute frequency, daily from around 7am to 9pm with enhanced 10 minute frequencies at peak times.</p>	Redbus stopped operating in 2012 and connections were incorporated into the wider bus network. Route 200 and 201 - 10 minute services during weekdays to the Breakwater Ferry Terminal. 30 minute services on weeknights, weekends and public holidays	Identifies the need to consider how ongoing operational costs can represent value for money when not part of a wider network of services.

Project	Site	Scope	Key Service Features	Outcome	Commentary
<p>Here East Shuttle Bus Stratford, London, UK (Pop -17,768, 2011) (Stratford and New Town Ward)</p>		<p>Service connects Here East mixed use development and Stratford mainline and underground rail stations Designed to attract businesses to the development and part of the conditions of planning approval.</p>	<p>Peak hour trips when development fully occupied needed to accommodate just over 570 people Minibus operation, recommended every 5-7 minute frequency Route length: 4km loop</p>	<p>Service commenced operation last quarter of 2016 running every five minutes from 7am to 10:30pm Monday to Friday Tender won by private operator and costs covered by the development with some charges passed on to occupiers</p>	<p>Marketing and branding opportunities to raise the profile of Here East were explored Modern vehicle specifications and technology opportunities including the use of electric vehicles were highlighted in the study Service specification considerations, including 'cleaner' fuels, free WiFi, on-board information, priority seating, TV screens and seat monitors</p>


Project	Site	Scope	Key Service Features	Outcome	Commentary
<p>Stevenage Greenbus Hertfordshire, UK (Pop – 1,166 million, 2015)</p>	 <p>STEVENAGE GREENBUS STUDY Proposed Bus Route</p> <p>ARUP</p>	<p>Intended to</p> <ul style="list-style-type: none"> • promote growth • raise the sustainable profile of the town • reduce congestion; • improve air quality <p>Low emission bus technologies were considered</p> <p>Viability assessment criteria included financial viability, green impact assessment, potential demand, additional enhancements and implementation considerations</p>	<p>Single, frequent, easy-to-access bus service linking key parts of urban Stevenage in Hertfordshire (UK) via a circular route</p> <p>Electric or gas fuel sources deemed more appropriate than hydrogen/ hybrid technologies due to a combination of cost, practicability and track record in the UK factors</p> <p>Preferred option involves 3 buses running at 15 minute frequency</p> <p>A stop servicing new residential catchments in the Symonds Green area provides new revenue streams.</p> <p>Route length: Option 1 - 7km loop Option 1b – 11km loop</p>	<p>Not currently in operation</p> <p>Proposed loop service would meet the agreed priorities for encouraging economic growth and raising the sustainable profile of the town. However, the service would not be able to commercially cover its costs, necessitating the need for public subsidy.</p> <p>Recommended that discussions should be progressed with an existing operator to consider the opportunity to introduce Option 1b as a commercial service which the council could provide support through S106 funding for capital works and branding of services (part of the planning approvals process in the UK)</p> <p>Whilst the green impact of low carbon vehicle technology was deemed as minimal for the route, the use of electric or gas-powered vehicles was recommended as it would raise the service's profile, help businesses meet sustainable objectives and save money on fuel (longer term) – with potential to seek additional funding</p>	<p>Strong emphasis on a technology assessment which fed into an overall Viability Assessment, comparing the Euro VI, gas and electric types against the study priorities.</p> <p>Additional enhancements noted include the idea of a live bus map application, extra stops, bus priority and the potential for marketing/ branding on buses</p> <p>The proposed route replicated part of an existing service, potentially compromising the existing route's viability</p>

Table 2 Benchmarking of Loop Services

Option	1	1a	1b	2
Route	Point to point service between new park and ride locations at Draper Street (adjacent to Council Offices) and Charles Street site (opposite the Cock and Bull Pub) via Spence Street, and Lake Street	As per route 1 but extended to serve new park and ride site at Lilly Street instead of Charles Street location	As per route 1a but with extension to a new park and ride site at Cannons Park in the south via Spence Street and little Spence Street which requires a new road link across the river and Cairns Airport to the north via Lake Street and Airport Avenue	Loop service via new park and ride site at Charles Street, Esplanade, Abbot Street, Shields Street, Esplanade, Spence Street, Lake Street, Hartley Street, Sheridan Street, McLeod Street, Aplin Street, Grafton Street and Charles Street park and ride
Trip attractors served	Council Chambers, Police Station, Cairns Central Station, Shopping Centres (Cairns Central, Orchid Plaza, City Place, Rustys Markets), Cairns Hospitals	As per route 1 and Cairns International Tennis Centre, North Cairns Reserve	As per route 1b and Barlow Park, Cairns Airport, industrial precinct along Spence Street and Cannons Park	All attractions along the Esplanade, all shopping centres and markets including The Pier and DFS Galleria, The convention centre, Police Station, library, Munro Martin Parklands, Cairns State High School, Central Queensland University
Likely passenger base	Council officers wishing to travel into the CBD, workers who choose to park and ride, hospital staff, visitors and patients	Council officers wishing to travel into the CBD, workers who choose to park and ride, hospital staff, visitors and patients	Council officers wishing to travel into the CBD, workers who choose to park and ride, hospital staff, visitors and patients, airport staff and passengers	Students and Tourists as well as residents and workers wishing to take short trips

Table 3 Summary of Route Options

4.2 Route Characteristics

Table 4 describes some of the operational features of the potential loop service. A review of loop services identifies that fundamental to the success of such connections is the ability to turn up and ride so frequencies must be high to maximise ridership. It is also important to note that the success of the service will depend on what journey times are achievable. Whilst as a comparative exercise a frequency of 4 buses per hour has been identified the bench marking indicates that to be successful a much higher frequency would be required. Discussions with the Council have also identified that a 5 minute headway is the preferred option which must be combined with a quick journey time.

Reference	Route type	Distance km *	Journey time (Hours: Mins)**		Peak vehicle requirements (low speed)	
			high speed	low speed	5 min headway	15 min headway
1***	Point to point service operating in	6.5	0:20	0:39	8	3
1a***	Point to point service	8.8	0:26	0:53	11	4
1b***	Point to point service	20.2	1:00	1:21	25	9
2	Loop service	5.9	0:18	0:35	16	6

* based on one round trip or one full loop, distance measured using google maps

**high speed of 20kph based on the research for the wider public transport study

Low speed of 10kph based on previous project experience for the operation of loop services in city centre locations.

***Routes 1, 1a and 1b do not operate as specific loop services but direct connections through the CBD linking two potential parking locations.

Table 4 Service Characteristics



Figure 1 Bus Route Options

4.3 Cost Considerations

High level indicative costs were developed using two different sources of information which varied significantly. Information from the benchmarking exercise also indicated that costs associated with introducing loop services were often high without being able to identify a clear revenue stream.

The Shuttle Bus Park and Ride Facility Discussion Paper identified an indicative operating cost for bus services at \$100,000 per bus per annum. In comparison the Australian Transport Assessment and Planning Guidelines (ATAPG) provided a series of vehicle operating costs per km statistics. Information on Urban Public Transport trends is also published by the Bureau of Infrastructure Transport and Regional Economics (BITRE). Based on the different approaches Table 5 provides a summary of the significant variation in operating cost estimates associated with running a loop bus service.

Route Option	Comparative Operating Cost		
	<i>\$100,000 per bus per annum (previous study)</i>	<i>105 cents per km (ATAPG)</i>	<i>\$6.11 per km (BITRE)</i>
1	\$800,000	\$357,739	\$2,081,701
1a	\$1,100,000	\$484,324	\$2,818,303
1b	\$2,500,000	\$1,111,743	\$6,469,288
2	\$1,600,000	\$649,434	\$3,779,089

Table 5 Comparative Operating Cost Exercise

Whilst the actual costs calculated vary significantly the relative costs indicate that route option 1 is the cheapest as a result of providing the most direct connection through the CBD and thus minimising the operation kms.

The benchmarking exercise highlighted that differing approaches were taken to funding loop services with the most comprehensive of the network being in Perth where the Central Area Transit (CAT) bus services are funded through the Perth Parking Managing Act which allows for a car parking levy to fund the services.

The benchmarking also indicated that the more sustainable option for loop services is often to provide the connections via integrating them with the existing public transport and enhancing the service offering in terms of frequency and hours of operation.

4.4 Demand Considerations

The daytime population of Cairns is a mix of journey to work, residents and tourists/ visitors so the potential demand for the loop service is likely to come from a range of sources. Many of these sources already have a defined method of travel so caution must be taken not to overestimate likely new demand for the loop service.

4.4.1 Cairns CBD and Cairns North SLA Population Considerations

Australian Bureau of Statistics figures for the Cairns Regional Community Profiles and in particular for the Cairns City and Cairns North areas have been reviewed and are summarised below.

The Cairns City and Cairns North population is stated to be 11,439 (ABS 2016), of this population it is stated that 3,689 (ABS 2011) work within the Cairns CBD and Cairns North areas.

For the Cairns Region it is stated that 17,398 people are employed and work within the Cairns CBD and Cairns North areas in total.

Tourism Research Australia estimates on average 27,000 visitors are in the Cairns Region each night.

For the Cairns Region (ABS 2011), the following indicates the methods of travel to work:

- 4.1% public transport – bus (2.2%) / taxi (1.6%)
- 48.2% personal transport
- 18.4% walk/bicycle
- 29.3% don't travel for work

Source: <http://www.id.com.au>

Table 6 summarises the number of existing employees within the bus loop service catchment and information on their current mode of travel.

Location	Total Employees	Mode share	
		Car (vehicles)	Bus
Cairns City	12,863	6200	283
Cairns North	4,535	2186	99
Paramatta Park	2,501	1205	55

Manunda	2,081	1003	46
Totals	21,980	10,594	483

Source: <http://www.id.com.au>

Table 6 Mode Shares for Employees within the Cairns CBD area

4.4.2 Existing Services

Figure 2 identifies the existing daily total bus boardings for Cairns CBD which indicates there is a significant concentration of bus activity around Cairns City Bus station and Cairns Central. It is understood that there are currently a limited number of bus services that provide a north south connection through the CBD. A review of the proposals for the CTN indicates that a designated public transport corridor is proposed for Lake Street for which a loop bus service could act as the method by which to transition to the transit network. Alternatively the loop service could be developed along adjoining corridors whilst construction of any supporting infrastructure for the CTN was undertaken.



Figure 2 Existing Daily Bus Boardings in Cairns CBD

Existing bus services to and through the centre of Cairns are characterised as follows:

- Generally the frequency of individual bus routes is poor with no one service operating more frequently than twice per hour and many operate hourly, even in peak times on weekdays making services unattractive for passengers.
- Within the Cairns City centre, bus routes on a largely common corridor describe a U-shape through the heart of the city, with stops located near Cairns Central shopping centre, and in Lake Street, from which much of the city centre is within an easy walk. A higher frequency (up to every 10 minutes) is achieved in these common sections of routes.
- Cairns city centre acts as the main bus hub, servicing 16 out of 17 of the daytime routes. But no bus routes go through the city centre from south to north or vice versa. Work travel patterns (reviewed in the main discussion paper) suggest there is a demand for through travel (ie from the south of the city to the north and vice versa), but bus customers need to change buses in the city centre bus station to travel through the city.

It will be important to examine further how the introduction of an additional bus service could facilitate short to medium term changes to the routing and service patterns of existing routes to better serve existing and potential passengers.

4.4.3 CBD Parking and Bus Fare

One of the critical considerations for the additional bus service is the ability to support a mode shift from car based trips to public transport based trips. This is likely to be most effective if accompanied by initiative such as introducing car parking charges in specific areas within the CBD. Figure 3 summarises research on the potential demand elasticities associated with increasing the cost of parking. This would be particularly relevant within the northern Cairns CBD around the hospital where a high proportion of the parking supply is designated as 8 hour parking.

Best estimates of parking demand elasticities for CBD areas (derived from a number of Booz Allen studies and reviews, as well as consultations, and reported in *International Approaches to Tackling Transport Congestion*⁸²) were as follows:

0-2 hours: -0.1
2-4 hours: -0.3
4-7 hours: -0.5
7+ hours: -0.9

Thus, a 10% increase in parking charges would result in a 1% decrease in parking demand for people who park for up to 2 hours, a 3% reduction in demand for people who park 2-4 hours etc. This might imply that people respond more to the absolute cost of parking rather than the percentage increase. Alternatively it may be that most people only wish to park for a relatively short period, perhaps for shopping.

Source: *International Approaches to Tackling Transport Congestion*, Booz Allen Hamilton, 2006

Figure 3 Parking Demand Elasticities

Based on the information in the car parking assessment report for the northern Cairns CBD 64% of car parking supply was free and subject to an 8 hour time limit. If consideration was given to implementing charges for such parking there is the potential to see up to a 9% shift in demand away from car.

The fare set for individual bus journeys tends to have the largest impact on demand. It is crucial that the fare level is set at the right one to attract passengers and more importantly to retain them. Also the fare structure should be simple and easy to understand with some consideration given to how passengers will pay their fare (cash, smartcard, contactless, etc.). Further consideration on current parking supply and parking charges would be recommended prior to implementing the preferred new route to maximise the attractiveness of the service to current car drivers and passengers.

4.4.4 Cairns CBD Walkability

Walkability of the Cairns CBD is an objective of the Cairns City Master Plan. The master plan outlines the following.

Creating a more walkable City Centre is fundamental to the master plan. Specific initiatives include:

- Creating more shade in all City Centre streets to reduce ambient temperatures
- Creating more sheltered awnings along all City streets
- Improving footpaths
- Improving signage
- Creating a co-ordinated suite of street furniture and urban elements to provide resting places
- Improving under-awning lighting to enhance night-time safety
- Creating more places and spaces for seating

The above initiatives are being implemented around the CBD. A large extent of the proposed loop service area has many of these initiatives in place providing a city centre that is considered walkable. The distance of most attractors in the CBD are within a suitable walking distance.

The walkability of the CBD should be maintained and promotes reasons for a spine type service (park and ride) and against a loop type service.

4.4.5 Transport Operations (Passenger Transport) Act 1994

The Transport Operations (Passenger Transport) Act 1994 (TOPTA) introduced the system of service contracts under which operators in restricted markets like Cairns, are held accountable for providing minimum levels of service. Cairns is prescribed area under the TOPTA and forms a regional bus service that is currently contracted to Transit Australia Group (TAG), Sunbus.

Any additional bus service would require offer and negotiation with TAG, Sunbus.

4.4.6 Estimation of Potential CBD Worker Patronage

An estimate of potential worker passengers has been calculated based on low, medium and high usage scenarios based on the considerations above and the following assumptions:

- Low Usage – assumed current conditions are maintained, i.e. nothing done to motivate passengers.
- Medium Usage – assumed the service is provided with motivators incorporated to boost patronage, i.e. advertising, parking regulations. Considered likely.
- High Usage – assumed the service is provided with motivators incorporated with a high take up of service usage.

Table 7 summarises an estimation of potential worker passengers for a proposed CBD bus service. We have assumed a park and ride service would be adopted.

PT Use/Mode Share	Origin	Estimated Current PT Passengers (Based on 2% Mode Share)	Potential New Passengers On Spine Service
2% of Employed (LOW)	CBD/Nth CNS	74	0
2% of Employed (LOW)	Outside CBD	274	0
10% of Employed (MEDIUM)	CBD/Nth CNS	74	295
5% of Employed (MEDIUM)	Outside CBD	274	411
20% of Employed (HIGH)	CBD/Nth CNS	74	664
10% of Employed (HIGH)	Outside CBD	274	1097

Table 7 Estimate of Potential CBD Worker Passengers.

4.5 Technology Considerations

The use of technology in relation to the type of vehicle used or the format in which information is disseminated to passengers can facilitate the introduction of a loop service which encourages people to shift from driving to public transport. Table 8 below describes some of the potential ways in which technology is currently being used to enhance the service offering provided by buses to encourage greater patronage.



Autonomous Bus trials in Perth

The State Government are supporting RAC to conduct a trial of a driverless shuttle in South Perth.

Curtin University is also trialling a commercial driverless bus which will contribute to the wider field of research into automated driving technology.



Cambridge (UK) Autonomous Bus Feasibility

Engineering feasibility studies have been undertaken for an autonomous high-speed bus system which could provide an affordable high frequency, short duration point-to-point transport system. The system being developed aims to be sufficiently attractive to persuade people not to use their private cars within urban environments. Investigations include the development of a concept vehicle design and feasibility assessments for segregated at-grade, viaduct and tunnel roadways. The system envisages a 120mph, 40 passenger capacity vehicle. Peak system capacity is aimed at a minimum of 2,000 passengers per hour.



Trackless, driverless train-bus hybrid

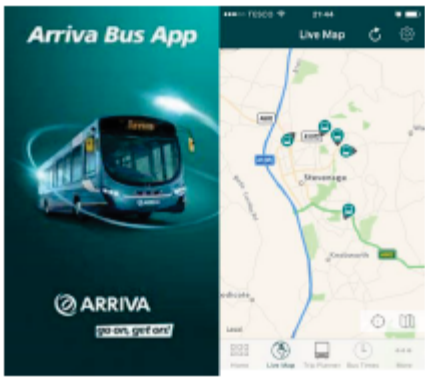
Developed by a Chinese train company the vehicle is a train-bus hybrid that uses sensors on the vehicle to detect guidelines painted on the road so doesn't need a driver or tracks.





Electric Bus – inductive charging

The Milton Keynes trial is considered to be the world’s most demanding electric bus route, operating for 17 hours a day, 7 days a week in a ‘real-life’ commercial setting. The electric buses run every 15 mins from 6:00 to 23:00 (17 hours a day), up to 7 days a week. The route is 15 miles (24km) each way on busy urban roads. The buses used are single deck, 9.5m long and have a total capacity of 46 passengers. The buses use IPT technology to wirelessly recharge their batteries. This means they do not have to solely rely on plugs and cables to get their power.



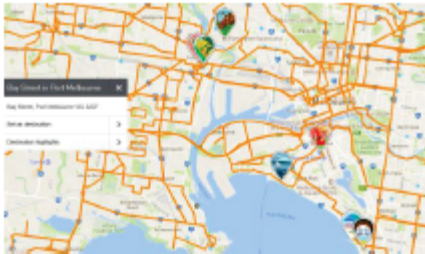
Bus Apps – real time vehicle tracking

Timetable information and up to date service information is seen as an essential part of a bus system and many passengers now expect high quality information available in many formats as standard. The presence of a Real Time vehicle Tracking system in particular is welcomed by passengers. Therefore information provision should be considered as a key component of the potential new bus route. Many bus companies now have Apps that can be downloaded to provide real time information on individual bus locations such as the one shown here for Arriva in the UK.



Bus Apps – City Mapper Smart bus London

Citymapper launched an experimental free pop up circular bus route with a view to transforming how bus services cater for changing passenger demands. It builds on experience in creating City based journey planner applications that integrate transport modes to develop an understanding of how bus services can respond to the real time challenges of congestions and delays within City environments.



Bus Apps - PTV’s new Bus Route Viewer

Public Transport Victoria have launched an interactive map so passengers can view which bus routes travel along specific roads across Melbourne and identify points of interest that can be visited by bus.



Quality Factors

High specification vehicles, high quality waiting facilities and good driver quality can enhance a passenger's travel experience and encourage them to use the bus again, thus increasing patronage. Features such as free wi-fi connections and interactive bus shelters can encourage greater use of bus services

Table 8 Technology Options

City centre shuttles and loop services often use innovative liveries, vehicles or technologies, for example Christchurch's yellow electric shuttle, Darling Harbour's tram-bus, Sydney's monorail and other electric bus shuttles to differentiate them from 'normal' services. This can be an important feature, but increases risk in relation to costs and operational flexibility.

Distinctive liveries and vehicles (including emerging technologies) can help to raise the profile of the service, demonstrate innovation and attract users who may not be enticed to use conventional buses for instance. However, use of non-standard vehicles and emerging technologies can increase costs, provide challenges for integration with existing networks and fleet acquisition, and complicate maintenance and servicing. Should the trial fail, the risk of a stranded asset is increased.

Some special technologies, such as bus guidance, need to be considered in terms of the problems they are designed to solve. Introduction of optical guidance or other hi-tech elements do not necessarily confer a general benefit, but can help to provide a solution to a design or technical challenge that constrains use of conventional vehicles. If those design or technical challenges aren't in evidence (ie if the special technology isn't really needed), then it can just increase the complexity of the service and the risk of service interruption. In the case of optical guidance for instance, most systems that have been tested have been deactivated for various reasons – not functioning at high enough speeds, optical tracking not dealing with extremes in weather conditions, wearing on marking and increased maintenance costs. There is a risk that failure of a hi-tech component reflects poorly on the whole service.

4.6 Other Considerations

Previous experience of loop bus services that operate within small catchment is that they act as a good marketing initiatives as they act as mobile advertising. This is of particular importance for a city like Cairns where there is a significant level of tourism activity.

The implications of introducing a loop bus service would also need to be considered in relation to the wide range of existing alternative options for tourists, residents and workers to travel around Cairns. This includes:

- The existing bus network;

- limousine / taxi / rideshare;
- car rental; and
- hotel shuttle services.

Introducing a loop bus service may result in an abstraction of passenger demand and consequently revenue for such services.

Consideration also needs to be given to the risk that the introduction of a loop bus service will reduce the number of people attracted to walk and cycle within the Cairns CBD.

Potential collaboration with TransLink and Bus Service Operator around the enhancement of existing services and promotion of the services currently operating.

5 Recommendations and Next Steps

There are two distinctive options of an additional bus service to the Cairns CBD that would be more attractive to different user groups. These options are a loop service and a spine type service.

The loop service would be more appealing to the tourism market and only service a small population of park and ride type passengers. The walkability of the CBD would be a detractor from the service as most attractions are within a 5-10 walking distance. An expanded loop service that included city fringe attractions like the Botanical Gardens and additional shopping areas would be more appealing to tourists. However this would make trip times far too long for use as a park and ride facility.

The spine type service would be most attractive to the CBD workers as a park and ride service. The service would likely be used by the tourism market depending on its length. A link to the Cairns Airport may be appealing to the tourism market. The CBD's walkability is maintained and promoted through the placement of passengers centrally in the CBD along a spine route where the majority of attractions can be reached within a 5 minute walk.

In either option of an additional bus service to the Cairns CBD, consideration of the following should take precedence:

- Each of the investigated options comes with a high operational cost without consideration of any infrastructure capital costs;
- A complex contractual arrangement between TransLink, Council and the bus operator would be required;
- The existing bus services provide a high frequency of services for a large portion of the CBD spine in addition to a walkable CBD footprint;
- Lessons from the loop service trial in Townsville indicated that it is difficult to encourage people out of cars;
- There is only a limited issue with parking availability within the CBD in one particular area around the Cairns Hospital; and
- A significant change in transport mode share towards public transport is required to support an additional bus service.

The following next steps are recommended:

- Council not pursue a City Bus Loop Service for the considerations noted above and review the situation in the future;
- Council continue to discuss public transport for Cairns with the State Government and work collaboratively with TransLink to investigate ways to make improvements to the existing bus services and consider ways to encourage transport mode share towards public transport; and
- Continue with the broader discussion paper and investigation on Future Sustainable Public Transport for the Cairns region.