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# *South West Perth Journey to Work Analysis*



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# 1. Introduction

As one of the fastest growing and diverse regions of Western Australia, the South West Metropolitan Region of Perth offers many exciting business development and lifestyle opportunities.

The South West Group of Local Authorities works to capitalise on these opportunities and to promote sustainable economic growth for the benefit of local communities.

Representing the Cities of Cockburn, Fremantle, Melville, Kwinana and Rockingham and the Town of East Fremantle, the South West Group takes an integrated approach to regional development designed to capitalise on our Region's unique social, commercial and environmental strengths.

The South West Group (SWG) has commissioned Hornibrook Consulting and Chris Loader and Associates to analyse Journey to Work (JTW) data from the 2006 and 2011 ABS Census to identify:

- Where journey to work share of sustainable transport modes (Public transport, walking and cycling) has increased in the Study Area between 2006 and 2011
- Potential explanations for improvements in Public Transport (PT) Mode Share in the Study Area
- The commuting flows to select workplace areas in the Study Area
- Whether there are any major commuting flows to these selected workplace areas that are not well supported by public transport.

## 1.1 Project scope

### 1.1.1 Study Area

This Study Area is defined as the area within the local government boundaries for the South West Group Member Councils, namely:

- City of Cockburn
- City of Fremantle
- City of Melville
- City of Rockingham
- Town of East Fremantle
- City of Kwinana

The Study area also includes the City of Canning, a non-South West Group member but adjoining LGA, as it is understood quite a few residents travel from Canning to work in employment centres within the South West Group of Councils.

### 1.1.2 In-Scope

- Changes in Sustainable Mode Share inside of the Study Area, including possible explanations as a result of Public Transport Service and Infrastructure Improvements or TravelSmart Programs within the Study Area

- Analysis of commuting flows to the following three workplace SA2 areas:
  - Kwinana Industrial Area (KIA) at Kwinana Beach in the City of Kwinana
  - Garden City Shopping Centre at Booragoon in the City of Melville
  - Australian Marine Complex (AMC) at Henderson in the City of Cockburn

### **1.1.3**      *Out-of-Scope*

- Gap Analysis of Public Transport Spatial and Temporal Coverage
- Gap Analysis of Walking and Cycling Infrastructure
- Changes in Mode Share outside of the Study Area, including possible explanations as a result of Public Transport Service and Infrastructure Improvement or TravelSmart Programs outside the Study Area
- JTW analysis at an SA1 level for Employment Destinations, as this data is not available from the ABS.

## 2. Understanding Journey to Work Data

The Australian Bureau of Statistics (ABS) conducts a Census of Population and Housing every five years. Census data provides a wealth of statistics about Australia's population. In particular the following Census questions are useful for transport planning purposes as they can be used to analyse Journey to Work Travel Behaviour:

- Where does the person usually live (Place of Usual Residence), as opposed to where they were on Census night (Place of Enumeration)? Note the latter is actually better for analysing Mode Shares. The former is more useful for analysing demand flows.
- For the main job held last week, what was the person's workplace address?
- How did the person get to work on Tuesday, 9 August 2011?

From this data we can identify the mode of transport used to travel to work, the Mode Share of various Transport Modes, changes in Mode Share between each Census, well as the Origin (usual place of residence address) and Destination (workplace address) for all trips to work. In other words Journey to Work data tells us where people live, where they work, and how they got to work on census day.

Most state governments also collect other sources of Origin Destination data through the Household Travel Survey or specific Origin-Destination Surveys. In the case of Transperth, their SmartRider smart card can also track origin and destinations at a stop level for trips by public transport. While the ABS Census is the most comprehensive data set in terms of sample size, it only collects data on work trips, not other trips purposes such as shopping or education. Likewise the Smartcard data only captures trips by public transport modes, not all modes and is unable to capture data on trip purpose. For this reason, when analysing Origin-Destination data, it is important to understand the limitations of each data set. For this study, only ABS Journey to Work data from the 2006 and 2011 Census will be referenced, with the exception of material taken from the Directions 2031 2012 Scorecard.

It is important to note the ABS released a new geographic classification for statistical outputs, the Australian Statistical Geography Standard (ASGS) for the 2011 Census, which replaces the former Australian Standard Geographical Classification (ASGC) used for the 2006 Census. Geographic classification systems are important because they provide a common framework which enables the publication of statistics that are spatially comparable and integrated. The ASGS is a hierarchically structured classification with a number of spatial units to satisfy different statistical purposes.

As a result of the above, there are some changes in digital boundaries between the 2006 and 2011 Census. For example the 2006 Census made origin data available at a Census Collect District (CCD) level, whereas the 2011 Census has made origin data available at a SA1 level. SA1 boundaries are generally much smaller than CCDs boundaries. As the boundary sizes are different between Census collection periods, it can be difficult to make like for like comparisons when calculating changes in Mode Share. Likewise in 2006 destination data was available at a Statistical Local Area (SLA) level (often covering an entire local government area) but for 2011 is available at a much smaller SA2 level.

The ASGS areas used for the 2011 Census are in the following hierarchy from most detailed level (smallest geospatial area) known as a Mesh Block to least detailed level (largest geospatial area):

- Mesh Block (MB) 30 to 60 dwellings;
- Statistical Area Level 1 (SA1) average population of 400 people;
- Statistical Area Level 2 (SA2) 3,000-25,000 people;

- Statistical Area Level 3 (SA3) 30,000-130,000 people;
- Statistical Area Level 4 (SA4) South West Region is a SA4;
- State/Territory (STE);
- Australia (AUS);

The only data available for individual Mesh Blocks for the 2011 Census is total population and total dwelling counts. Therefore the Journey to Work data is not available at this most detailed Mesh Block level. It is important to note that for JTW analysis the Destination data (workplace) is only available at an SA2 level, roughly aligned with recognisable suburb boundaries and Origin data (usual residence) is available at a smaller SA1 level.

The Statistical Area Level 1 (SA1) is the second smallest geographic area defined in the Australian Statistical Geography Standard (ASGS), the smallest being the Mesh Block (MB). The SA1 has been designed for use in the Census of Population and Housing as the smallest unit for the processing and release of Census data. For the 2011 Census, SA1s will also be the basis of output for most data; the exception being some Place of Work destination zones which as SA2s. For 2011, SA1s also serve as the basic building block in the ASGS and are used for the aggregation of statistics to larger Census geographic areas. An SA1 is represented by a unique seven digit code. For the 2011 Census, there are approximately 55,000 SA1s throughout Australia without gaps or overlaps. There are 4,094 SA1s in the Study Area.

The Statistical Area Level 2 (SA2) consists of one or more whole Statistical Areas Level 1 (SA1s). Wherever possible, SA2s are based on officially gazetted State suburbs and localities. In urban areas SA2s largely conform to whole suburbs and combinations of whole suburbs, while in rural areas they define the functional zone of a regional centre. SA2s cover, in aggregate, the whole of Australia without gaps or overlaps. There are 45 SA2s in the Study Area.

Please also note the following definitions of different transport modes:

- Public transport: Any journey involving any public transport mode (private transport might also have been involved – eg park n' ride or kiss n' ride).
- Cycling: A journey that involved cycling
- Walk only: A journey that only involved walking
- Active transport: A journey that only involved only walking and/or cycling.

While ABS Census data is readily available on Place of Enumeration, JTW data is based on Place of Usual Residence. Ideally Mode Shares should be measured using Place of Enumeration (where people actually were on census night).

It is also important to note the 2006 maps do not show the Mandurah rail line or the 2006 bus network. The Mandurah line was not operational until December 2007 and therefore has been omitted. Unfortunately Transperth do not make historical bus network GIS files publically available online.

It is also important to note that the 2011 maps actually depict the Transperth PT network as at November 2012. Again we were unable to source publically available GIS files for the date of the 2011 Census (9 August).

Please refer to Appendix A for some broader context of JTW analysis for Perth.



### 3. Journey to Work Analysis

The Western Australian Government releases an annual scorecard for Directions 2031 which includes public transport and Journey to Work data. Directions 2031 emphasises the need to “encourage alternatives to private car travel, particularly by improving the relationship between land use and public transport. Increased public transport use indicates that the strategy of encouraging a shift to more sustainable public transport modes is working”.

The image below shows the Activity Centres under Directions 2031 where Active Transport and Transit Oriented Development (TOD) principles are being encouraged to increase Sustainable Transport (Active and Public Transport) Mode Share:



Source: Directions 2031

The Table below shows Public Transport use (PT Mode Share) between 2001 and 2011 for Travelling Workers:

Local Government	2001	2006	2011	5 year Trend	10 Year Trend
Melville	3.10%	3.70%	6.08%	⬆️	⬆️
East Fremantle	2.40%	3.60%	2.94%	⬆️	⬆️
Fremantle	6.50%	8.90%	8.91%	⬆️	⬆️
Cockburn	1.50%	1.80%	2.94%	⬆️	⬆️
Kwinana	1.50%	1.20%	2.28%	⬆️	⬆️
Rockingham	2.50%	2.30%	3.69%	⬆️	⬆️

Source: 2001 and 2006 Figures taken from Directions 2031 2012 Scorecard and 2011 figures from the ABS

A possible reason for the decline in PT share decline for East Fremantle between 2006 and 2011 is primarily due to demographics associated with an aged population. The average age of residents has gone from 40 to 42, which is well above Perth's average of 36. This, combined with the decline in 15-49 year olds where people are more likely to be working full time, and increase on 50-64 year olds likely to be retired or working part time.

Please note in the above table, we have defined Travelling Workers, as Total workers less those who worked at home or did not go to work. We also defined Use of Public Transport, as being Total use of public transport including where public transport was used for only a part of a journey.

Passenger boardings and boardings per capita (all PT Modes) have trended up in recent years for the Perth Metropolitan and Peel regions, as per the table below:

Year	Total Boardings	Metropolitan Population	Passenger Boardings Per Capita Per Annum
2004	90,600,000	1,530,674	59.19
2005	94,900,000	1,558,827	60.88
2006	98,526,000	1,594,309	61.8
2007	100,926,000	1,637,553	61.63
2008	108,800,000	1,689,473	64.4
2009	128,784,000	1,745,300	73.79
2010	131,629,000	1,785,698	73.71
2011	135,975,000	1,832,255	74.21

Source: Directions 2031 Scorecard

The following maps were produced using data provided from the 2006 and 2011 ABS Census of Housing and Population.

- Public Transport mode share of journey to work (2006 and 2011) by home location (SA1)
- Walking mode share of journey to work (2006 and 2011) by home location (SA1)
- Cycling mode share of journey to work (2006 and 2011) by home location (SA1)
- Public Transport mode share of journey to work (2006 and 2011) by work location (SLA/SA2)
- Walking mode share of journey to work (2006 and 2011) by work location (SLA/SA2)
- Cycling mode share of journey to work (2006 and 2011) by work location (SLA/SA2)
- 2011 home locations of employees (SA1) for each SA2 (KIA, MCA and Booragoon)
- 2011 public transport mode shares of employees (SA2) for each SA2 (KIA, MCA and Booragoon)
- Employment density (2011)
- Employee numbers by PT Mode Share (2011)

The results of each GIS analysis are contained in the following sections.

### 3.1 Walking

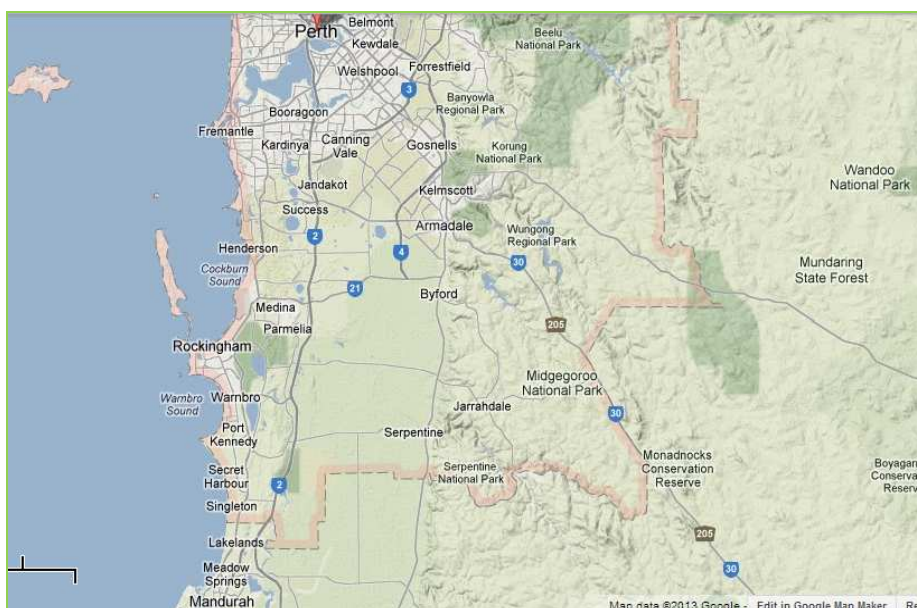
#### 3.1.1 Home Location

The [map online](#) shows Walking mode share by home location in 2006.

The only areas with good walking mode share (green and yellow) are in the coastal suburbs near Fremantle rail station.

It is understood the topography of Southern Perth is generally flatter along the coastline and along the Swan River, and this is where dedicated walking and cycling facilities are generally provided. For example there is a dedicated cycle and walking path along the Coast from North Fremantle to Munster.

The map below shows the terrain of the Study Area, which is generally flat in the populated areas to the west of the South Western Highway and conducive to active transport:



Source: Google Maps

The weather on 8 August, 2006 was as follows:

- Maximum temperature: 19.4 degrees
- Minimum Temperature 11.1 degrees
- Rainfall: 2.2mm to 9am

The slight rainfall in the am peak may have impacted on the propensity for residents to use active transport modes on Census day. It is possible Active Transport Mode Share is higher in Spring and Autumn (compared to census results), when the temperatures are not too hot, but there is less rainfall.

The [map online](#) shows Walking mode share by home location in 2011.

To simultaneously view changes in Mode Share between 2006 and 2011, animated gif files are available [online](#).

Walking should be improving within and around the activity centres identified under Directions 2031. The only activity centre that has had a noticeable change is Fremantle The weather on Census day (9 August 2011) in Perth Metro was as follows:

- Maximum temperature: 19
- Minimum temperature: 8.7
- Rainfall: 0.8mm

The above implies the weather conditions were generally conducive to walking and cycling on Census day.

### **3.1.2**      *Work Location*

The [map online](#) shows walking mode share by work location in 2006.

The [map online](#) shows walking mode share by work location in 2011.

To simultaneously view changes in Mode Share between 2006 and 2011, animated gif files are available [online](#).

It is difficult to determine changes in walking Mode Share due to the changed geographical boundaries between 2006 and 2011. It appears that 2006 is similar to a “blend” of the results from 2011 for each LGA.

## **3.2**      **Cycling**

### **3.2.1**      *Home Location*

The [map online](#) shows cycling mode share by home locations in 2006.

Like walking, residents living in the suburbs along the Fremantle coast showed good cycling mode share in 2006.

The [map online](#) shows cycling mode share by home location in 2011.

To simultaneously view Cycling Mode Share changes between 2006 and 2011 animated gif files are available [online](#).

Cycling is another activity that should be improving within and around activity centres. As with walking there was a slight improvement in Cycling Mode Share in Fremantle between 2006 and 2011. There also appears to be improved cycling Mode Share in some of the residential suburbs surrounding the new rail stations on the Mandurah Line, suggesting perhaps residents are choosing to cycle to the rail station and make use of the new bike

lockers, shelters and u-rail facilities at stations or the ability to take their bike on the train with them to work, in the off-peak.

### 3.2.2 *Work Location*

The [map online](#) shows cycling mode share by work location in 2006.

The [map online](#) shows cycling mode share by work location in 2011.

To simultaneously view Mode Share changes between 2006 and 2011 animated gif files are available [online](#).

There appears to be a slight improvement in Cycling Mode Share for workplaces located in Fremantle and Safety Bay/Shoalwater, although this could also be attributed to the changes in Census boundaries. It is noted that active transport facilities are quite good in these areas.

## 3.3 **Public Transport**

### 3.3.1 *Home Location*

The [map online](#) shows PT mode share by home location in 2006.

It is interesting to note that PT Mode Share is higher in residential areas closest to Perth CBD and gradually reduces the longer the distance from the CBD. This is a common trend in most Metropolitan cities as density and therefore demand is higher near the inner city, especially for travel to the CBD, therefore Transit Agencies can afford to supply more frequent services.

The [map online](#) shows PT mode share by home location in 2011.

To simultaneously view changes in Mode Share between 2006 and 2011, animated gif files are available [online](#).

*Directions 2031* promotes increased public transport use as part of a strategy to encourage a shift to more sustainable communities. There were significant increases in PT Mode Share in residential areas located either side of the Mandurah rail line, especially those areas located near rail stations. Reasons for this increase are examined further under Catalyst Projects (refer section 3.3.3).

### 3.3.2 *Work Location*

The [map online](#) shows PT Mode Share by work location in 2006.

It is no surprise to see PT Mode Share greater in the activity centres (Fremantle and Murdoch) located closer to Perth CBD as this is where the employment density and therefore level of PT service is higher.

The [map online](#) shows PT mode share by work location in 2011.

To simultaneously view Mode Share changes between 2006 and 2011 animated gif files are available [online](#).

As with home locations, there were significant changes to PT Mode Share in the work places located either side of the Mandurah rail station, especially those employment centres located near rail stations. Reasons for this increase are examined further under the next section Catalyst Projects.

### 3.3.3 *Catalyst Projects*

Public Transport Authority (PTA) Annual Reports were reviewed to identify Public Transport Service and Infrastructure Improvements that were operational in the Study Area between the 2006 and 2011 Census (8 August 2006 and 9 August 2011). While a number of TravelSmart travel behaviour change programs were also introduced over the same period, we were unable to ascertain detailed information.

The collation of network improvements excluded system-wide initiatives such as new fare machines at stations, improved passenger information at stops and stations, real time passenger information, safety initiatives, way-finding signage programs, upgrade of fleet, stops and stations to meet Disability Discrimination Act (DDA) compliance and the introduction of transit and customer service officers across the network.

Please also note, only Catalysts projects within the Study Area were identified, not improvements in the entire Transperth Service Area. Therefore while employees that travel from outside the Study Area to work within the Study Area may benefit from PT Service and Infrastructure Improvements outside the Study Area, these were not considered in the analysis

All of these catalyst projects are summarised below by financial year.

#### **2006/07**

- In December 2006, Transperth bus services in the Kwinana/Cockburn area were relocated from the temporary bus station facility at Gateway Shopping Centre to the new Cockburn Central bus/train interchange.
- The temporary facility at the shopping centre, which had operated since 1999, had provided a public transport hub allowing passengers using feeder services to access the main line service operating along the Kwinana Freeway to Perth.
- The new bus station, provided bus services to the area until the Cockburn Central station opened in December 2007, and a new feeder bus network commenced.

#### **2007/08**

- Operations on the new, 71.4km dual track Mandurah Rail Line commenced on 24 December 2007, with 7 new rail stations opening in the study area (Cockburn Central, Bull Creek, Murdoch, Warnbro, Rockingham, Wellard, Kwinana) and one just a few hundred metres outside of the study area to the north (Canning Bridge). This was supported by an extensive feeder bus network, with all southern corridor bus services re-orientated to link the new bus/train interchanges with surrounding suburbs and key facilities.
- 5,408 park n ride bays were provided across the new stations on the Mandurah Line.
- The revised bus network consisted of 62 new services, including some into previously unserved communities in the southern corridor. In addition, increased frequency was provided along key corridors and a new connection was established between Canning Bridge Station and the Curtin University precinct.

## 2008/09

- The timetables for the Mandurah and Fremantle lines were amended on 28 June 2009 to accommodate new rolling stock (three x 3-car sets). We are uncertain if the new rolling stock were used to replace older rolling stock, or if they were used to provide additional capacity (more services and/or rolling stock with larger passenger carrying capacity)
- Park n ride bays on the Mandurah line increased by a further 225, to 5,633 bays. In contrast the Armadale Line had 2,346 bays and Fremantle Line had 545 bays.

## 2009/10

- Canning Highway bus service upgrade project consisted of route 105 peak service to provide additional capacity along Canning Highway between Applecross and the Causeway; Route 111 to provide additional peak and peak shoulder trips between Fremantle Station and Esplanade Busport via Kwinana Freeway; additional Saturday services on Route 106 on Canning Highway.
- Introduction of a trial bus service between Rockingham Station and Rockingham City Shopping Centre to better cater for the needs of seniors living in the Hefron Street area.

## 2010/11

- Two new routes to serve Harrisdale and Piara Waters including a link between Armadale and Murdoch stations.
- Conducted a trial service between Armadale and Cockburn Central rail stations for six months. The service was subsequently withdrawn due to lack of patronage.

## 2011/12

The following improvements were made in the 2011/12 financial year, however it is not certain if these were implemented prior to the Census on 9 August 2011, so caution should be used when implying a link between these service improvements and any improvements in PT Mode Share:

- Extension of existing routes to Aubin Grove
- Introduction of the new Mandurah Shuttle service
- Improvements to services to Cannington, Canning Vale, Bull Creek, Willetton
- New route in Baldivis North

### 3.3.4 *Link between Changes in PT Mode Share and Catalyst Projects*

It can be difficult to directly attribute positive changes in PT Mode Share to a single initiative, as often a combination of internal and external factors influence a person's decision to change their travel behaviour. For example, employment status, occupation, the cost of petrol, car parking and transit fares, parking supply at workplaces, transit service frequency, service span and spatial coverage all impact on a person's decision to use PT.

However it is difficult to ignore the significant changes in PT Mode share in the corridor surrounding the Mandurah Line. This project, commissioned in 2007, would appear to have significantly influenced travel behaviour, especially in the activity centres surrounding the new stations such as Murdoch, Cockburn Central and Kwinana.

This is also validated by Transperth patronage data which indicates the Mandurah Railway reached 2,007,021 boardings in May 2013 which is an average of 64,742 boardings per day, well above the forecast patronage.

The areas near the stations, but not immediately adjacent to stations, also generally have improved PT Mode Shares, no doubt as a result of improved feeder bus services that were introduced when the Mandurah line opened.

It is interesting to observe that Transperth choose to restructure bus routes to feed to the new bus station at Cockburn Central Rail station 12 months prior to rail services commencing. Presumably this was to allow passengers to transfer onto high frequency trunk bus routes travelling on the Kwinana Freeway, which would be replaced by rail services 12 months later. Such a strategy was presumably designed to get passengers used to the concept of transferring prior to the rail line commencing operations.

Like the South East Busway in Brisbane which now carries 70 million passengers a year, when governments chose to build rapid transit corridors in existing road corridors there appears to be higher PT Mode Share increases, compared to rapid transit corridors built in entirely new corridors. Perhaps this is due to the highly visual presence of the PT infrastructure in the corridor. That is motorists stuck in traffic on the Pacific Motorway (Brisbane) or the Kwinana Freeway (Perth) clearly see free flowing rapid transit vehicles in the adjacent corridor, prompting choice travellers to trial another mode. Providing these trials provide a positive customer experience, such as faster or more reliable travel times, more often than not the customer is retained, leading to long term Mode Share changes.

In the case of the Mandurah line, it replaced the Kwinana Freeway Busway which has about 14,000 boardings per day with a journey time of approximately 68 minutes. The rail line is almost 23 minutes faster compared to the former busway and carries almost four times as many passengers. In this comparison, the Kwinana Freeway busway had been implemented at a significantly lower incremental (i.e adding bus lanes to an existing freeway/road) cost than the railway, but given the limitations of the mode and carriageway, could not deliver the same capacity and travel time savings needed to support future corridor growth.

No doubt the existence of the busway in this corridor paved the way for the success of the Mandurah line, by entrenching good PT travel behaviour before the commissioning of the rail line.

It is interesting to note there were not any significant improvements to the Armadale and Thornlie Lines between 2006 and 2011, yet PT mode share in the residential areas to the west of the inner portion of the Armadale line (between Thornlie and Welshpool stations) have improved. This might be the case as the Mandurah line provides faster travel times, better feeder bus routes and greater park n ride capacity, as per the table below:

Line	Distance	Peak Travel time (mins)	Average Speed	Stations	Average stop spacing (km)	Park n rides
Mandurah	71.4	45	95.2	11	6.49	5,633
Armadale	30.1	36	51.1	20	1.51	2,346

Source: Transperth



In other words, despite residents in this area having previously had access to rail services on the Armadale and Thornlie Lines, they have only chosen to use public transport since the Mandurah line opened, as it provides a more attractive travel option.

It is also interesting to note that Transperth conducted a trial cross-town bus service between Armadale and Cockburn Central rail stations for six months in 2009/10, but the service was subsequently withdrawn due to a lack of patronage. While we are not certain as to Transperth's rationale for the trial Armadale bus service, it is possible this feeder bus service was introduced after the Mandurah line opened to ease pressure on the Cockburn Central park n ride by encouraging rail passengers to access Cockburn Central by bus, rather than car.

The distance by road between these two stations is 21 kms and the residential catchment area between the two stations is sparsely populated, except around the rail stations.

It is hard to imagine too many residents choosing to cease using the park n ride at Cockburn Central and instead catch a feeder bus route to either Armadale or Cockburn Central. It is little wonder the trial didn't work.

It is understood the new Aubin Rail Station and 2,000 bay park n ride has been brought forward as a 2013 WA Government election commitment to ease overcrowding of the Cockburn Central rail station and 800 bay park n ride. We believe this is likely to be a more successful initiative to alleviate overcrowding at the Cockburn Central park n ride, compared to the failed trial cross-town bus service.

In contrast the new feeder bus routes between Armadale and Murdoch rail stations did result in improved Mode Share in Harrisdale and Piara Waters presumably because these areas previously had no PT coverage and are roughly located half way between the two lines.

There were also slight increases in PT Mode Share either side of the Canning Highway, which is possibly a result of increased peak hour bus services on routes 105 and 111. Alternatively these residents were choosing to use the new Canning Bridge Station on the Mandurah line.

Other PT improvements in the Study Area were targeted at university students, senior citizens or on weekends and therefore are less likely to be attributed to changes in JTW PT Mode Share.

## 4. Employment Centres

### 4.1 Employment Density

The [map online](#) shows employment density (employees/hectare) in 2011 in the Study Area.

The dark shaded areas represent the most densely populated employment centres in the Study Area of:

- Canning Vale Commercial
- O'Connor
- Bibra Industrial

The employment centres by SA2 with the most number of employees, as opposed to employment density, include:

- Canning Vale Commercial - 13,791
- Fremantle - 14,767
- Rockingham - 10,491
- Bibra Industrial - 6,774
- KIA - 6,557
- Melville - 5,470
- Booragoon - 5,148
- Henderson - 4,175

There is a relationship between employment density and public transport level of service as density represents level of potential activity. Many Transit Agencies set planning guidelines that link density (employment and residential) to a minimum or desired level of service. In the case of Transperth and PTA, after a comprehensive search of their websites, it appears such guidelines do not exist.

This Study also analysed travel behaviour of employees working at three specific employment centres in the Study Area, namely:

- Kwinana Industrial Area (KIA), Kwinana Industrial (SA2 code: 507031173)
- Garden City Shopping Centre, Booragoon (SA2 code: 507041178)
- Australian Marine Complex (AMC), Henderson (SA2 code: 507011155)

It is relevant to note that the SA2 areas profiled in this report contain multiple Places of Work (POW) other than the major places of work targeted in this study. An estimate of employees in the areas outside the main employment centre is provided in the table below, noting that these estimates are preliminary and not verified through direct contact with the employer companies/organisations.

SA2 AREA	POW Description
Kwinana Industrial Area (KIA), Kwinana Industrial (SA2 code: 507031173)  <i>Total Employees - 6,557</i>	<ul style="list-style-type: none"><li>• Mostly KIA, although includes a light industrial area east of Rockingham Road bounded by Lee Road and Lionel St (approx. 300 to 400 employees)</li></ul>

SA2 AREA & TOTAL EMPLOYEES	POW Description
Garden City Shopping Centre, Booragoon (SA2 code: 507041178)  <i>Total Employees - 5,148</i>	<ul style="list-style-type: none"> <li>• Canning Highway Applecross - small business, cafe, some commercial (approx. 100 employees)</li> <li>• Riseley St, Ardross - small businesses, cafe, restaurants, commercial (approx. 100 employees)</li> <li>• Booragoon precinct - City of Melville (approx. 400 employees), Alcoa (200 employees) and Department of Environment and Regulation (approx. 200 employees)</li> <li>• Light industrial along Norma Road/Leach Highway (approx. 150 employees)</li> </ul>
Australian Marine Complex (AMC), Henderson (SA2 code: 507011155)  <i>Total Employees - 4,175</i>	<ul style="list-style-type: none"> <li>• AMC Jackovic Centre (approx. 150 to 200 employees)</li> <li>• Challenger TAFE (approx. 50 employees, 400 students)</li> </ul>

The table below shows the Transperth bus routes servicing each of the three employment centres in 2012, as well as PT Mode Share, number of Employees and Employment Density in 2011:

Employment Centre	LGA	Transperth Bus Routes	Employment Density	Employees	PT JTW Mode Share
Kwinana Industrial Area (KIA)	City of Kwinana	825, 920	392 employees/km <sup>2</sup>	6,557	2%
Australian Marine Complex (AMC), Henderson	City of Cockburn	522, 825	477 employees/km <sup>2</sup>	4,175	2%
Garden City Booragoon Shopping Centre, Booragoon	City of Melville	140, 150, 160, 205, 500, 501, 510, 881, 940	758 employees/km <sup>2</sup>	5,148	8%

Source: ABS Census of Population and Housing and Transperth

It is relevant to note that while route 920 operates in the vicinity of AMC along Rockingham Rd, it does not actually have any bus stops along Rockingham Rd between Dalison Ave and Russel Rd. For this reason, we do not suggest that route 920 realistically services AMC, as the walk from the nearest existing 920 bus stop to the core of AMC is 2.5km.

None of the above employment centres are directly serviced by rail. That is they are not located within an 800m (10 minute) walkable catchment of a rail station. Therefore if employees wish to use rail to travel to work they must be prepared to walk a significant distance or use feeder bus routes in combination with rail.

In contrast the average employment density for Perth CBD is 11,063 employees/km<sup>2</sup> and the Greater Perth area had a 12.3% PT JTW Mode Share, an increase of 2.1%. Therefore the three nominated employment centres are below the Perth average for public transport mode share and employment density.

Booragoon has a higher employment density and is much better serviced by PT compared to the other two employment centres. However unlike KIA and Henderson, Booragoon is a mixed used centre featuring commercial, retail and office facilities attracting both workers and shoppers. Conversely KIA and Henderson are solely industrial employment centres. It is for this reason that service levels are better to Booragoon and perhaps why PT Mode Share is also higher.

In Australia and New Zealand, industrial employment centres generally have poor PT Mode Share as Transit Agencies are traditionally adverse to servicing industrial areas for the following reasons:

- Industrial estates generally provide plenty of free on-site parking for staff as they are located in areas where property values are generally lower. This approach provides little disincentive for employees to drive to work.
- Some industrial estates require employees to start work earlier than the PT network traditionally commences. Alternatively some industrial areas employ shift workers on a 24/7 rotation, resulting in some workers finishing after PT network traditionally ceases operation.
- Many workers need their vehicle for work, due to their trade.
- The estates tend to be quite low density in terms of jobs per hectare, yielding low PT potential at the best of times.
- Many industrial estates are built within massive cul-de-sacs with no through connective through road network, making them inefficient to serve with a standard bus. We understand this is particularly the case in the KIA.
- There is generally little off-peak demand for public transport in industrial estates, making it difficult to offer a viable all-day service, unless other trip generators are located along the route.

That is not to suggest that PT Mode Share cannot be improved for Industrial Areas under the right circumstances. Section 6, profiles some industrial employment centre case studies in Australia where various initiatives have been introduced to induce PT demand.

In the case of Henderson, it is understood free staff parking is now in short supply, and therefore there is an opportunity to improve PT Mode Share to this destination. However, KIA currently has an abundance of free parking supply, and it will always remain a challenge to increase PT Mode Share under these conditions.

The following section provides a more detailed profile of each employment centre and analyses the origins (home locations) of employees working at each of these three employment centres to identify:

- Travel Demand between certain origins and the employment centre
- Spatial coverage gaps in the existing PT Network where high demand origins are not serviced

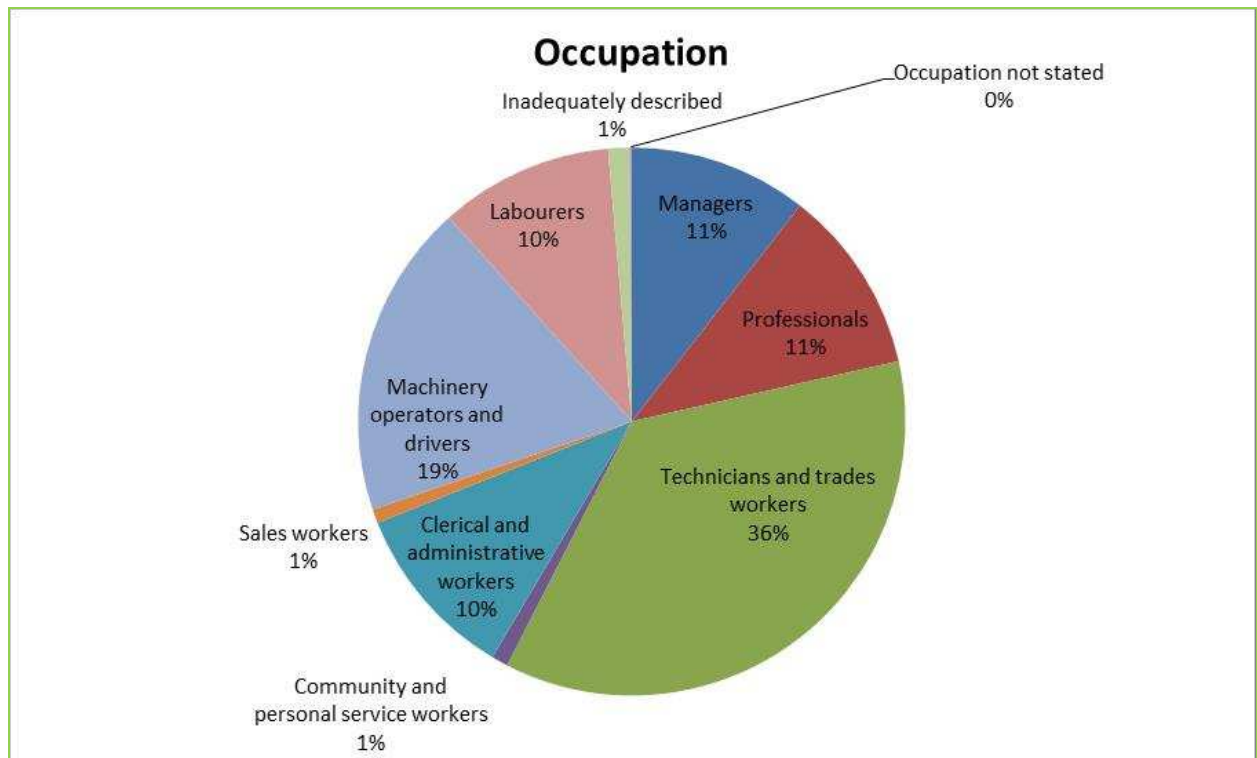
This information will then inform the South West Group where they should advocate for PT coverage to be improved to better service employment centres.

## 4.2 Booragoon

### 4.2.1 *Employment Centre Profile*

LGA	City of Melville
Employees	5,148
Male:Female	38%:62%
Area (km2)	6.78
Density (employees/km2)	758
Lane Use Zoning	Mixed Use: Retail, Commercial, Civic; Residential
Car parks staff	Not Available
Car parks visitors	Not Available
Total car parks	4,247
Transit services	9 bus routes
Transit stops	Booragoon bus station (14 bays) and 94 bus stops
Businesses	237
Weekly Income < \$1000	64%
Distance from Perth CBD	11 km
Established	1972
PT Mode Share	8%
Internal employment centres	Garden City Shopping Centre; Melville City Council; Garden City Medical Centre, Applecross SHS
Operating Hours	Mon-Weds: 9:00am - 5:30pm; Thurs: 9:00am - 9:00pm; Fri: 9:00am - 5:30pm; Sat: 9:00am - 5:00pm; Sun: 11:00am - 5:00pm

The pie chart below shows the distribution of employees by occupation:



Source: ABS Census of Population and Housing

This employment centre has a very different profile to KIA and AMC. A majority of employees are females working in retail, which is no surprise given the presence of a large shopping centre in the SA2.

The [map online](#) shows the home locations of employees working at Booragoon in 2011, expressed as employees/hectare.

Most of the employees working at Booragoon live close by in the City of Melville. Very few employees live south of the City of Cockburn. There is a high density pocket of employees living in the surrounding areas of Booragoon, Mt Pleasant, Brentwood, Winthrop and Bateman which is currently well serviced by local bus routes.

#### 4.2.2 Coverage Gap Analysis

The following areas appear to have some employee density without a direct service to Booragoon:

- Canning Vale
- Leeming
- Yangebup
- South Lake
- Coogee

Section 5 outlines some possible service improvements to better fill this coverage gap

The [map online](#) shows PT Mode Share to Booragoon by origin (home) in 2011

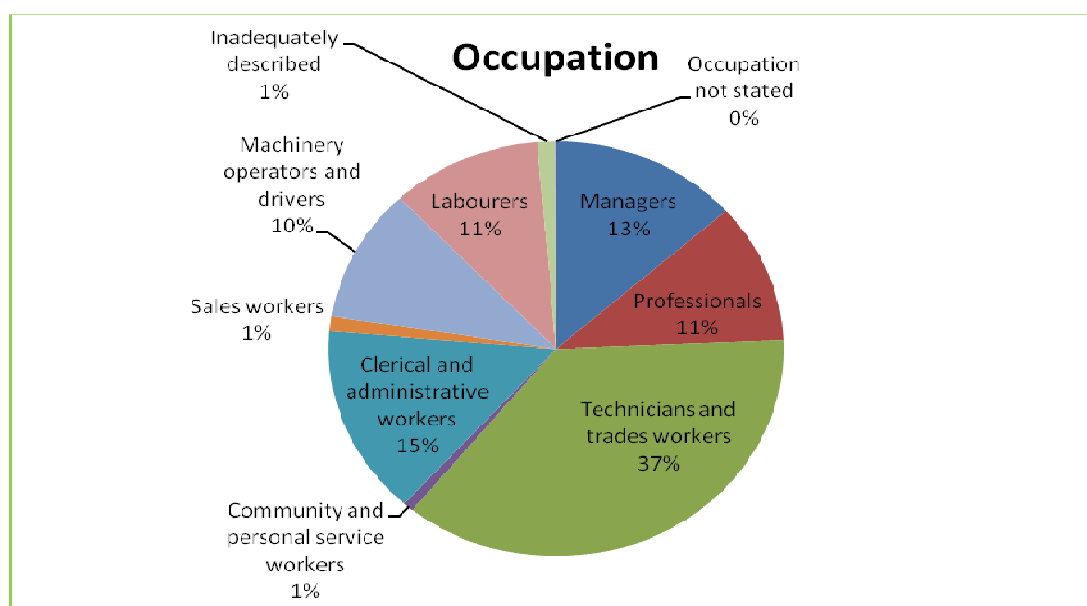
Public Transport Mode Share to Booragoon from Winthrop (route 940) is 9% and 8% from Bateman (Route 510). PT Mode Share is lower in Booragoon itself at 3%, suggesting while there may well be good self-containment, employees are probably choosing to walk or cycle to work for these shorter trips, rather than catching PT. We have not been asked at this stage to produce Active Transport Mode Share Maps for Booragoon to confirm this theory.

### 4.3 Australian Marine Complex (AMC), Henderson

#### 4.3.1 Employment Centre Profile

LGA	City of Cockburn
Employees	4,175
Male:Female	84%;16%
Area (km2)	8.73
Density (employees/km2)	477
Lane Use Zoning	Industrial
Car parks staff	Not Available
Car parks visitors	Not Available
Total car parks	Not Available
Transit services	2
Transit stops	18 bus stops
Businesses	150
Weekly income < \$1,000	25%
Distance from Perth CBD	23
Internal Employment Centres	Australian Marine Complex (AMC)
Established	2003
PT Mode Share	2%
Operating Hours	Not Available

The pie chart below shows the distribution of employees by occupation:



Source: ABS Census of Population and Housing

As with KIA, the majority of employees are male blue collar workers and reasonably affluent compared to Booragoon, with one in four being paid less than \$1,000/week.

Most employees travel to the Australian Marine Complex (AMC) at Henderson by car. The consequence of high vehicle use is that there is significant traffic congestion during the am and pm peak periods, extensive on street parking and footpath parking which impedes pedestrian movements. A further consequence is the movement of high wide loads as the on street parking significantly reduces clearances. Cars are also parked around corners reducing visibility and turning circles for heavy vehicles. Problems areas within the AMC site include Welding Pass, Quill Way and Nautical Drive, as per the images below:



Source: South West Group (Nautical Drive)



Source: South West Group (Quill Way)

Transperth provided boarding and alighting data from NetBI for routes 522 and 920 for the only paired stops (10666 and 10676) on Cockburn Rd that service AMC. For an average



weekday in October 2012, there were almost 18 passenger movements at these stops. Assuming passengers catch the bus to and from work, this represents only 9 passengers a day using these stops, or one passenger movement (boarding or alighting) for every four passing services, as per the following:

Stop	522		825		Total
	Boarding	Alighting	Boarding	Alighting	Passenger Movements
10666: Cockburn Rd Before Quill Way	0.45	0.05	4.32	5.09	9.91
10676: Cockburn Rd After Quill Way	0.00	0.36	3.86	3.73	7.95
<b>Total Weekday Daily Average</b>	<b>0.45</b>	<b>0.41</b>	<b>8.18</b>	<b>8.82</b>	<b>17.86</b>
<b>Total Weekday Services</b>	<b>15</b>		<b>63</b>		<b>78</b>
<b>Movements/Service</b>	<b>0.06</b>		<b>0.27</b>		<b>0.23</b>

Source: Transperth NetBI

The [map online](#) shows the home locations of employees working at Henderson in 2011.

#### 4.3.2 Coverage Gap Analysis

Henderson has a similar employment density profile to KIA, in that a group of employees live in the suburbs surrounding Kwinana City Centre, Baldivis, and Rockingham Council to the west of the Mandurah Line. However only residents in Rockingham and Kwinana City Centre get a direct service on routes 825 and 920.

However unlike KIA there is reasonable employee density in the City of Cockburn Council, especially along route 522 (Rockingham/Cockburn Roads) servicing Success, Yangebup, Beeliar, Coogee and Spearwood.

The following areas appear to have some employee density without a direct service to AMC:

- Shoalwater
- Safety Bay
- Waikiki Coo loongup
- Warnbro
- Port Kennedy
- Baldivis
- Secret Harbour

Section 5 outlines some possible service improvements to better fill this coverage gap. In many cases improvements proposed for KIA employees will also benefit employees working in AMC.

The [map online](#) at shows PT Mode Share to AMC by origin (home) in 2011.

Ironically the most densely populated areas serviced by route 522, have very poor PT Mode Share. Perhaps this is because this route only services one set of bus stops along Cockburn Rd on the very northern fringe of the AMC site and does not provide good coverage of the entire AMC. The very few employees using this service no doubt work in the northern precinct, as the walk to any of the other three precincts within the site is excessive.

Conversely residential areas with above average PT Mode Share, such as Fremantle, Rockingham, Calista and Parmelia-Orelia all provide a direct service to the AMC site with much better coverage.

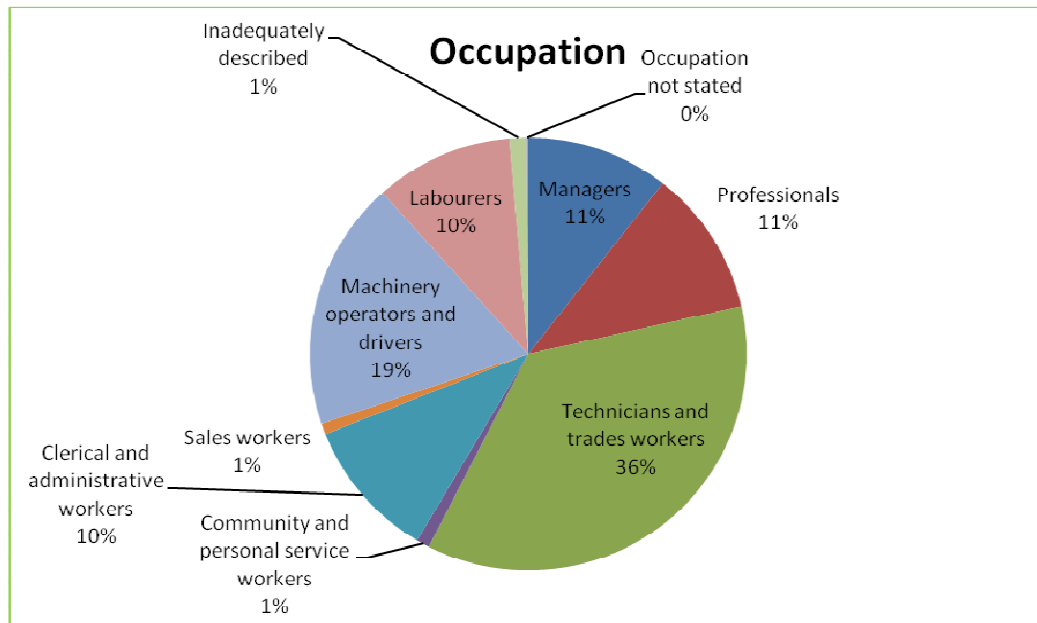
There is abnormally high PT Mode Share in Murdoch-Kardinya, Applecross-Ardross and Como given a direct PT service is not provided. Perhaps these employees are choosing to park n ride or kiss n ride informally near a bus stop that does provide direct access to KIA?

#### 4.4 Kwinana Industrial Area (KIA)

##### 4.4.1 Employment Centre Profile

LGA	City of Kwinana
Employees	6,557
Male:Female	86%:14%
Area (km2)	16.71
Density (employees/km2)	392
Lane Use Zoning	Heavy Industrial
Car parks staff	Not Available
Car parks visitors	Not Available
Total car parks	Not Available
Transit services	1
Transit stops	26 stops
Businesses	40
Weekly Income < \$1000	17%
Distance from Perth CBD	33
Internal Employment Centres	Kwinana Industries Council
Established	1952
PT Mode Share	2%
Operating Hours	24 hours a day.

The pie chart below shows the distribution of employees by occupation:



Source: ABS Census of Population and Housing

A majority of employees are male blue collar workers, as one might expect in an industrial area. Only 17% of employees earn less than \$1,000/week

The [map online](#) shows the home locations of employees working at KIA in 2011, shaded as employees/hectare to depict the density of each origin.

Most employees come from the City of Kwinana or City of Rockingham in the south. Employee numbers are not very concentrated in the northern Council areas of Fremantle, East Fremantle, Cockburn and Melville. Given these low densities, it would be difficult to justify a new direct bus service from East Fremantle and Melville and it is understandable why car is the dominant Mode from these areas. It does however suggest a strategically placed park n ride in the north along route 825 and/or 920 could service the low density northern catchments not directly serviced by routes 825 and 920.

Many employees come from the suburbs surrounding the Kwinana City Centre (Medina, Calista and Parmelia-Orelia) that have access to bus route 920. The suburb of Rockingham has reasonable employee numbers and is also serviced by routes 825 and 920.

#### 4.4.2 *Coverage Gap Analysis*

The following areas appear to have some employee density without a direct service to KIA:

- Other than the suburb of Rockingham, the remainder of Rockingham Council (Waikiki, Coo loongup, Warnbro, Port Kennedy and Secret Harbour) is not serviced by a direct bus route to AMC. Employees living in this area would need to transfer between local routes 562/558/559/561/557 at Rockingham Rail station onto routes 825 or 920 to travel to work by bus.
- There is also a small and isolated pocket of employees living in Baldivis not serviced by a direct bus route to AMC. Employees living in this area would need to transfer between local route 568 and 825/920 at Rockingham Rail station to travel to work by bus or local route 564 at Warnbro rail station, catch the Mandurah line one station to Rockingham Station and then transfer again onto routes 825/920, requiring two transfers.
- There are also reasonable numbers of employees living in Shoalwater Bay. At present they could catch local routes 551/552/553 to Rockingham Station and transfer onto routes 825 and 920 to travel by bus to AMC.

The above areas therefore have poor PT Mode Share as passengers are required to transfer at least once, sometimes twice.

Section 5 outlines some possible service improvements to better fill this coverage gap

The [map online](#) shows PT Mode Share to KIA by origin (home) in 2011.

As would be expected for a low density industrial employment centre, overall PT Mode Share to KIA is low at 2%. There is surprising high PT Mode Share from Winthrop (17% or 24), Bateman (16% or 19) and South Perth (13% or 30), even though a direct bus service does not exist to KIA. However while the PT Mode Share percentages are higher than the Perth average, the actual numbers of employees are low at 73 collectively. Perhaps these employees are choosing to park n ride or kiss n ride informally near a bus stop that does provide direct access to KIA?

## 5. Preliminary Assessment of Coverage Improvement Options

The following section outlines some potential low cost solutions to improve coverage to the three employment centres from the highest demand origins in the Study Area. Following the client's feedback, we will then choose one employment centre requiring the greatest attention and produce a more detailed solution including route maps, indicative timetable (frequency and service span), forecast demand and gross cost. CHANGE ORDER

### 5.1 Booragoon

- There are 148 employees living in Leeming currently without a direct service to Booragoon. At present they can get to Booragoon by a transfer between routes 515 and 510 at Murdoch Station and 11% of them would appear to be doing this now which indicates this area has some propensity for transit. Combining short routes 510 and 515 into a single route would provide some cost effective solutions to provide a direct service between Leeming and Booragoon. However rail connections should be maintained at Murdoch for passengers travelling to the CBD or other destinations on the Mandurah Line. Holding the bus at Murdoch for rail transfers could add a minor delay to through passengers travelling between Leeming and Booragoon, but is less convenient than having to physically transfer. At present route 510 is more frequent and has a longer service span than route 515, so there would be a cost associated with matching this level of service in Leeming. Alternatively only select services might be through-routed to Leeming to keep the costs of combing these routes to a minimum.
- There is reasonable demand between Coogee and Booragoon, also without a direct service. Potentially route 881 could be reviewed to service Coogee instead of Spearwood (where demand is lower to Booragoon) to fill this coverage gap. However this recommendation is based solely on demand between Coogee/Spearwood and Booragoon and does not consider demand between these origins and other destinations along the route or the broader network with transfers. That is more passengers may potentially be disadvantaged from this change than the numbers who would benefit. More detailed origin-destination analysis would be required to inform decision making. It is also important to note this analysis is based on employee density, not total demand.
- Route 522 currently services Coogee but terminates in Coleville Crescent near the Cockburn City Council Chambers. This route could be extended to Booragoon but a more cost effective option would be to extend route 881 to Coogee via Troode St instead of terminating at Santich Park. Alternatively route 881 could be pulled off Marvell Ave and straighten to operate on Rockingham Rd, potentially servicing both the Spearwood and Coogee communities on either side of Rockingham Rd, providing there is reasonable pedestrian connectivity and CPTED (Crime Prevention Through Environmental Design) measures in place, such as lighting and CCTV, through Mervyn Bond Park/Dwayne Favazzo Playground for Coogee residents. There appears to be a 400m pedestrian connection through this park linking Blato Place in Coogee to the bus stops at Stargate Shopping Centre via Gerovich Way.

### 5.2 Henderson

- Investigations into possible transport hubs and/or designated car parking area options are being investigated by industry and other organisations with a view of finding solutions to the congestion and safety issues related to parking within the AMC precinct. As such this report will not investigate transport hubs and park n ride options.

- Divert route 522 via Sparks Rd and Quill Way to better penetrate the core of AMC. There is no catchment to the north of Cockburn Rd and no stops on Cockburn Rd between Sparks Rd and Quill Way so there is little point having an essentially local route, which is allowed to be slightly more circuitous compared to a trunk route, operate directly along Cockburn Rd if there is no catchment. AMC could be approached to cover the small cost of a 1.2km diversion on a trial basis.
- Provide timed connections between route 522 and outbound Mandurah line services in the am peak direction (and the reverse in the pm peak) at Cockburn Central station to enable employees living north of Cockburn Central station to access rail and feeder bus services to AMC. This route would also benefit from having additional peak services to coincide with work start and finish times at AMC.
- Divert route 920 via Cockburn Rd/Quill Way/Cockburn Rd/Russell Rd instead of Rockingham Rd to provide better coverage within the AMC site. While route 920 is a direct trunk route with a focus on faster travel times, there is limited catchment on the eastern side of Rockingham Rd, no catchment on the western side due to the Beeliar Regional Park and no bus stops between Dalison Ave and Russel Rd, so in the interests of maximising patronage, it is questionable as to why route 920 currently follows this alignment. The diversion to service the core of AMC would add an extra 1km to the route which could potentially be funded by AMC. Under this proposal route 920 would service the western part of the AMC site via Quill Way and route 825 would service the western part via Sparks Rd to maximise coverage. As a desk top exercise we are also uncertain how suited Quill Way is for buses and an on-site inspection would be required. A more detailed analysis of passenger movements at the three impacted Rockingham Rd bus stops between Russell Rd and Hope Valley Rd would be required as currently no other routes operate in this section of Rockingham Rd.
- Extend route 825 or 920 south to Port Kennedy or Secret Harbour via Reed St as there are 2,267 employees in this catchment area that currently must transfer. Timed connections at Rockingham Station should be maintained for residents wishing to travel north towards Perth CBD. Using the existing resources on route 559 would reduce the cost of the route extension south. As both routes 825 and 920 have good frequencies and service spans, it is questionable as to whether Reed St requires this level of services. Perhaps only select services are through-routed to the south in the pre-am and pre-pm peak to reflect the start and finish times of these employees.

### **5.3 Kwinana**

All improvements to routes 920 and 825 above proposed for AMC will also benefit employees of KIA.

## 6. Case Studies

The intention originally was to undertake four case studies to profile instances where bus routes were introduced to service industrial precincts in Yatala (Gold Coast), Gladstone, Murarrie (Brisbane) and Artarmon (Sydney). These case studies were chosen as they were intended to showcase:

- A variety of alternative funding models from external sources such as Council parking revenue, employers, developer contributions, Council Transport levies, advertising, sponsorship, Council environmental levies or on a purely commercial basis by a private bus operator.
- Provided a feeder bus function linking to a rail station, bus station and/or park n ride

Each case study summarises, subject to the availability of information of often commercial-in-confidence information, the following attributes:

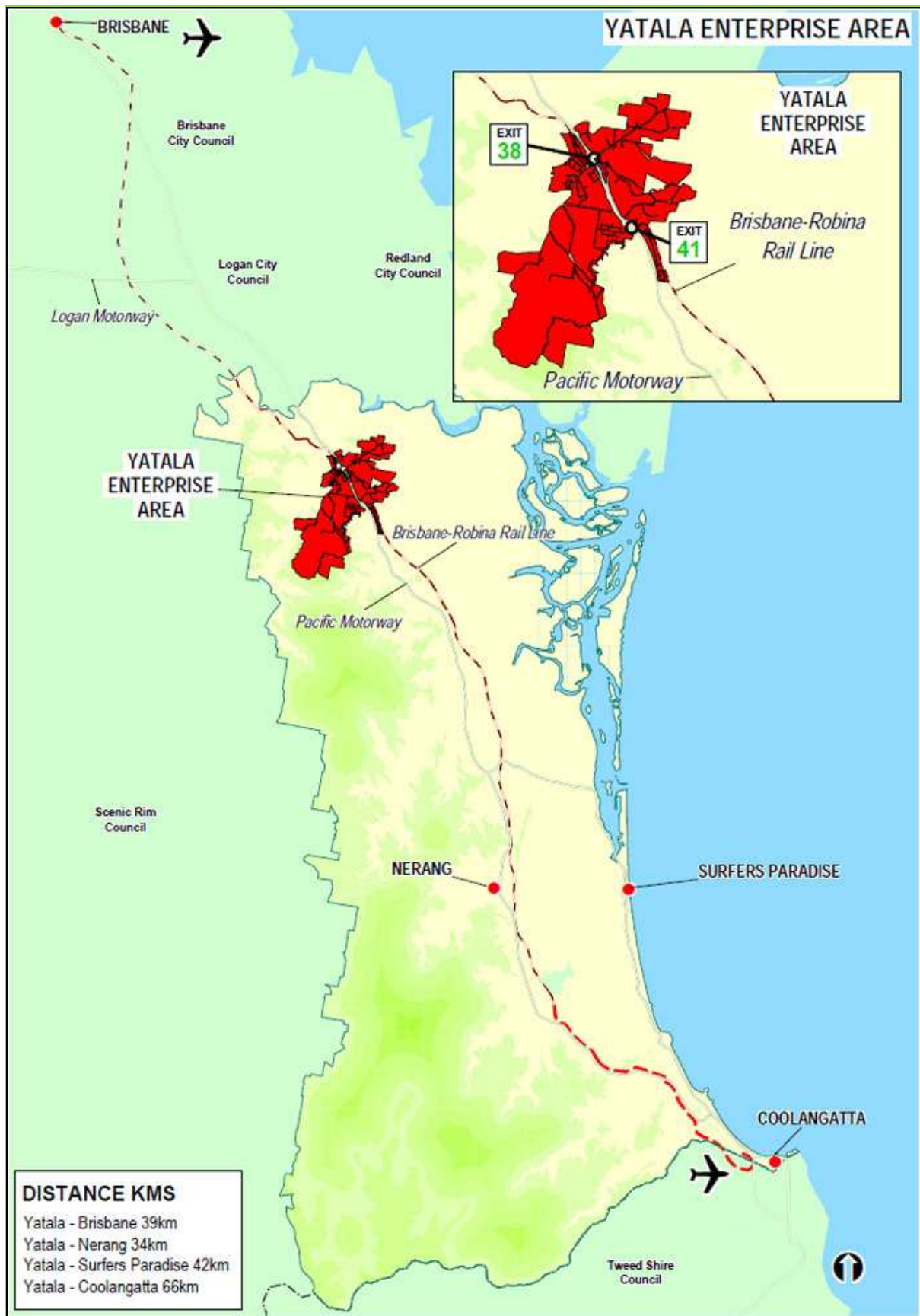
- Description of the employment centre in terms of geographical size, number of staff or business and employment density (jobs/hectare), as well as type of businesses operating in the precinct.
- Description of the bus service in terms of origin, destination, route alignment, stopping pattern, service span and frequency and dedicated connections
- Fares and ticketing policy
- Performance of each service in terms of patronage
- PT Mode Share of the employment area based on JTW data
- Funding Sources
- Evolution of each service ie transitioning from third party to transit agency funding after a trial period, if applicable
- Lessons learnt

In the case of Gladstone and Murarrie, limited information was available and employers and bus operators choose not to respond to requests for information.

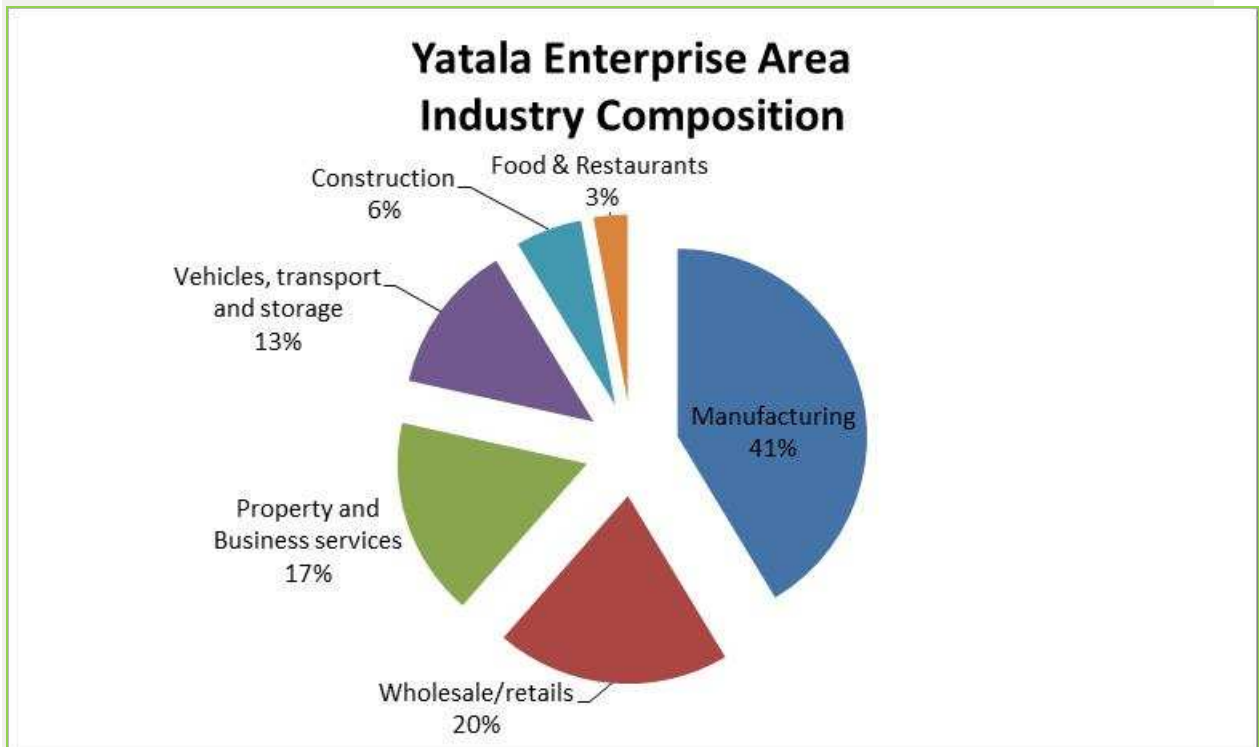
### 6.1 Gold Coast Yatala Industrial Estate

Gold Coast City Council funded new route 567 between Ormeau and Beenleigh through their Rate Payer Funded Transport Levy, to service the Yatala industrial area. It provides feeder bus connections at two rail stations at Ormeau and Beenleigh.

6.1.1 Employment Centre Profile

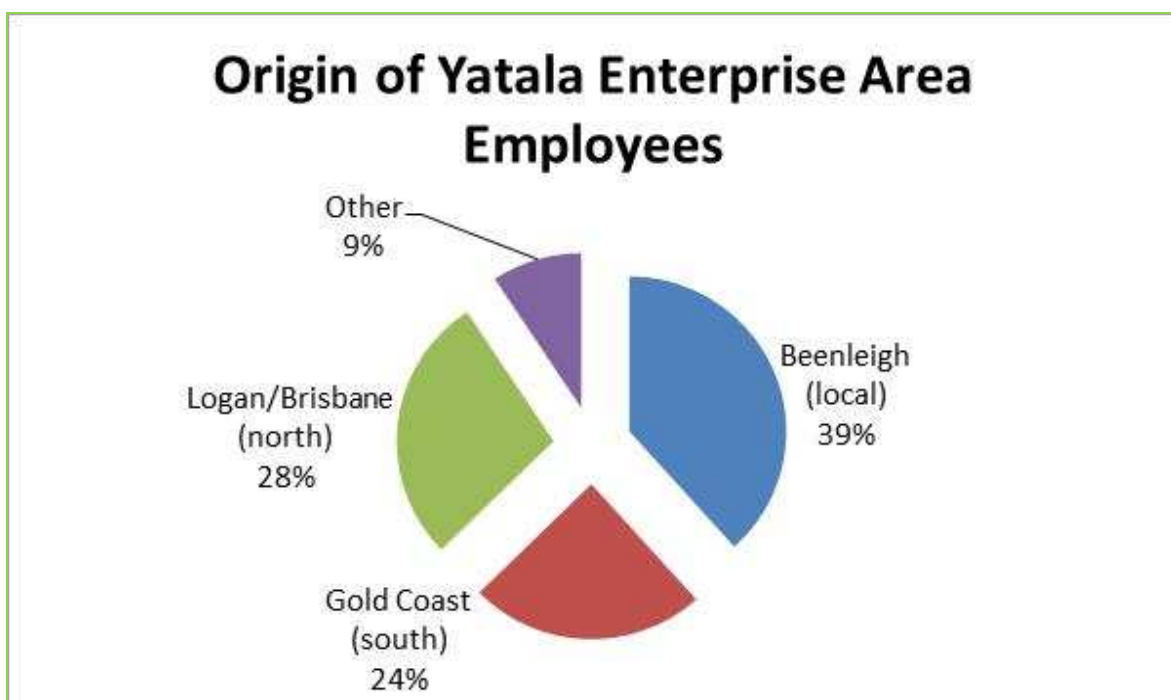


Over 550 businesses are located in the Yatala Enterprise Area (YEA) employing approximately 10,000 workers in the following sectors:



The projected labour force for the YEA is between 14,000 to 16,000 people within the next five years

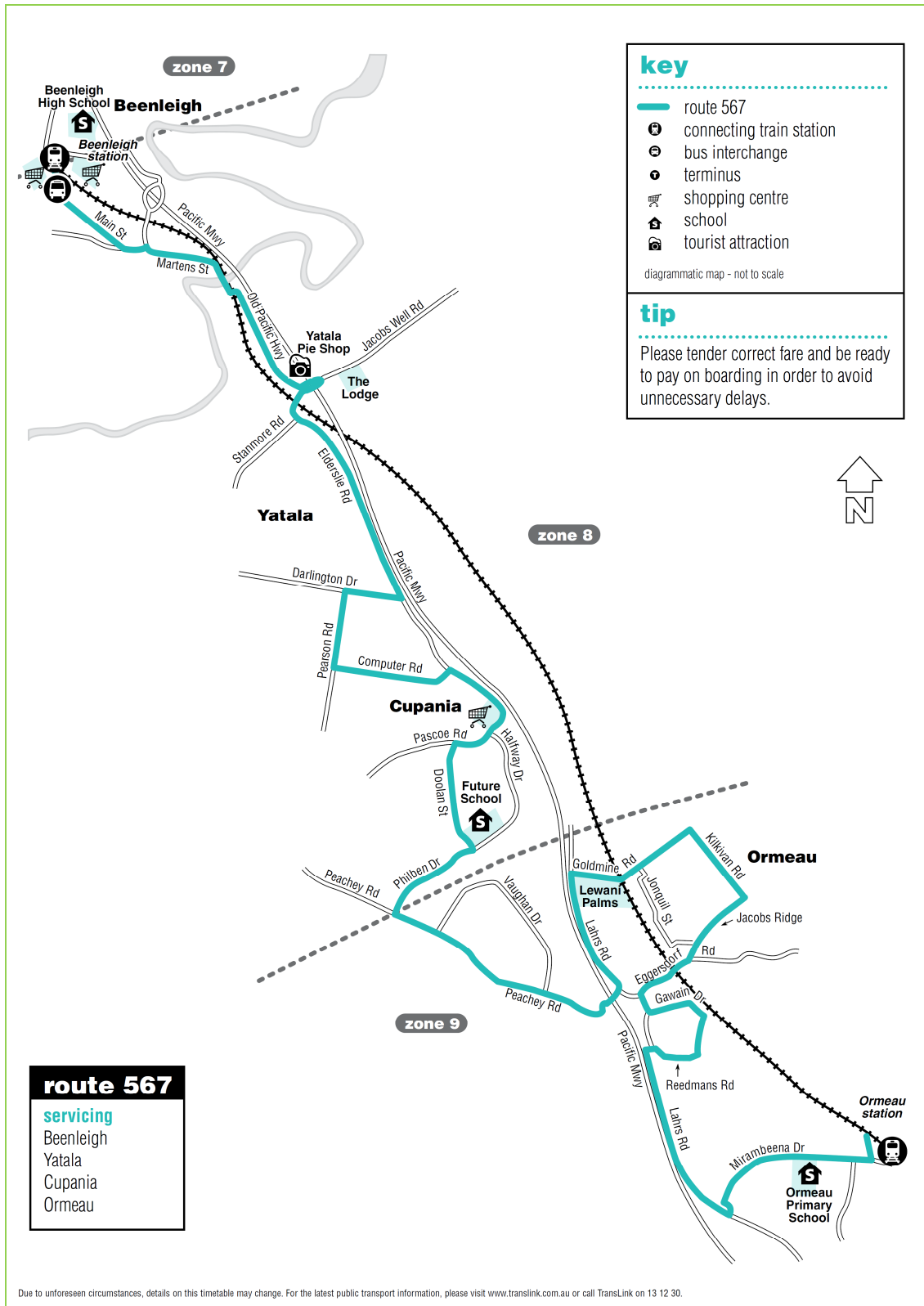
The origin of the existing labour force is as follows:





## 6.1.2 Spatial Coverage

The route alignment and spatial coverage of route 567 is outlined below:



### 6.1.3 Temporal Coverage

There are 15 services a weekday to Ormeau and 14 operating in the opposite direction to Beenleigh. The service does not appear to be structured to support employment travel with limited morning peak services and regular hourly off peak services. The route operates 7 days a week between 5.11am to 8pm. The full timetable can be viewed [online](#).

### 6.1.4 Funding Sources

Route 567 was introduced as a TransLink service in 2005/06, but initially funded by Gold Coast City Council for a three year period through the City Transport Improvement Charge. Under this arrangement, Council paid TransLink for the gross cost of the service, TransLink paid the bus operator the gross cost of operating the service on behalf of Council and TransLink kept the fare revenue.

The City Transport Improvement Charge assists Council to fund improvements to local roads and to partner with public and private organisations to improve state roads and provide expanded bus services, Council cabs, ferry services, bicycle, pedestrian and rapid transport.

The levy was introduced in 2004/05 at \$15 per household and has gradually increased over the years. In 2011 Council voted to increase the Transport levy for Ratepayers to \$111/annum, an increase of \$17.50. The tax will generate \$37 million for the council to be used expand transport services in remote areas, expand community transport, trial a ferry service and contribute to the cost of the Gold Coast Light Rail project construction.

The route 567 is now fully funded by TransLink.

### 6.1.5 Fares

Standard TransLink Fares apply for zones 8 and 9 (1 and 2 zone fare):

Zones travelled	Adult			Concession		
	go card	go card off-peak	Single paper ticket	go card	go card off-peak	Single paper ticket
1	\$3.28	\$2.63	\$4.80	\$1.64	\$1.32	\$2.40
2	\$3.85	\$3.08	\$5.60	\$1.93	\$1.54	\$2.80

### 6.1.6 *PT Mode Share*

Ormeau – Yatala has a low population density of only 234.6 persons per square kilometre and a total population of 16,911 (ABS 2012) which adds to the difficulty in having viable public transport. Nearby Beenleigh is also a reasonably sized centre with a population of 40,383. The 2011 Census shows 129 of the 7,810 employed population of Ormeau-Yatala used a bus to travel to work.

Ormeau-Yatala, which is a larger area than the YEA site, had a JTW PT Mode Share of 1.13% as an employment destination (place of work), compared to a Gold Coast average of 5%.

### 6.1.7 *Route Performance*

The SEQ Bus Network Review conducted by TransLink in March 2013 concluded the route 567 had low value for money and low average patronage.

The route averages 10 boardings per service on weekdays and between 5 and 6 boardings on weekends. The government subsidy per boarding is \$14.43 giving it very low cost recovery of 8%.

The route has limited competition with 93% unique stops. 63% of passengers transfer suggesting they live outside of the area, whereas 37% are residents using the route to travel locally only.

A detailed Route Profile is contained in Appendix B.

### 6.1.8 *Lessons Learnt*

#### 6.1.8.1 *Positives*

- The service also travels through residential catchment areas enabling locals to transfer at two train stations for onward travel or to travel directly to work at YEA. There are other attractors en-route, such as Ormeau State School, the famous Yatala Pie Shop (tourist attraction) and the local shopping centre. This boosts overall patronage on the route, making it more productive than if it was a stand-alone shuttle servicing a single employment centre.
- There are numerous local Beenleigh bus services that hub into Beenleigh Bus/Rail Interchange that enable passengers to access the 567 bus route by feeder bus.

#### 6.1.8.2 *Negatives*

- The route does not provide bus/rail connections for employees travelling to and from the Gold Coast (south), which represent 24% of the YEA workforce. It would be better for the route to connect with Gold Coast trains at Ormeau and Brisbane trains at Beenleigh.
- As a major employment centre along the route, it is surprising that it is not listed as a Timing Point on the timetable or route map. It is not immediately obvious the route services this YEA.
- The YEA is cut off by the Pacific Motorway. Route 567 only services the section of the YEA to the west of the motorway. To service the entire estate with one route will make the route quite indirect for non-YEA passengers trying to get to the train station.

- The service span on this route does not reflect the earlier start and finish times for YEA employees. For example the first bus service departs Beenleigh Station at 6.05am. Conversely the service span in the evening appears overly generous, with the last bus arriving at Ormeau station at 8pm to meet a connecting train to Brisbane.
- It is questionable as to whether the early weekend services are warranted, especially the early trips.

#### **6.1.9**      *Future of the route*

To improve this route's performance, the following changes will be implemented by TransLink in 2014:

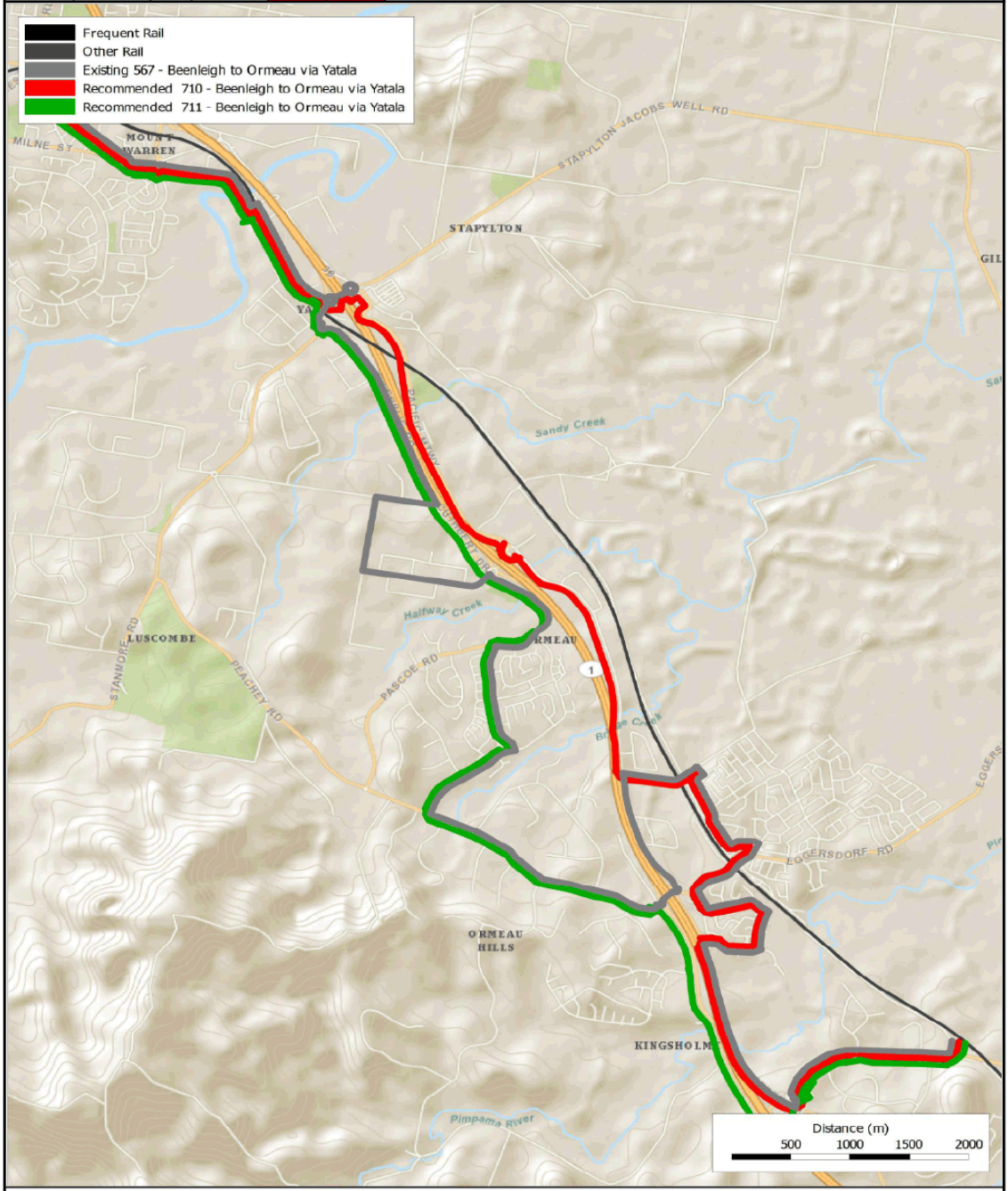
- Reductions to the hours of operation and frequency of this route to align service frequency with passenger demand.
- Changes to where this route travels in Ormeau and Yatala to make better use of resources. The existing route will be renumbered to route 710 and a new route 711 will service either side of the Pacific Motorway, improving service coverage as per the map below:

**SEQ Network Review  
Recommendations**

**567 - Beenleigh to Ormeau via Yatala  
Surfside Buslines**



Region	Operator	Route	Classification	Value for Money	Capacity Utilisation	Route recommendation
Gold Coast	Surfside Buslines	567	Coverage	Low	Low	Reductions to the hours of operation and frequency of this route are recommended to align service frequency with passenger demand. Changes to where this route travels in Ormeau and Yatala are recommended to make better use of resources. The existing route will be renumbered to route 710 and a new route 711 will service either side of the Pacific Motorway, improving service coverage.



Notes: This map is schematic only and has been produced to complement the text recommendation. There may be minor errors or omissions on this map. These maps detail the existing route alignment and also include those proposed services which will replace the existing route in the proposed network. The route alignments shown and stopping patterns will be subject to final negotiations with operators and stakeholders. The recommendation is based on the whole of network being implemented. The numbers for the proposed routes in the Brisbane Transport network are unique identifiers used for planning purposes only and may not be the final bus route number. In all other operator areas the numbers of the proposed routes will be the final bus route number.

## 6.2 MetroPlex on Gateway at Murarrie

### 6.2.1 Background

MetroPlex Gateway is currently one of the largest Business and Industrial Park in Brisbane, and is part of the broader Australian Trade Coast Precinct. As with AMC, the site exceeded on-site car parking capacity. After requests for TransLink to divert an existing route to service the site were rejected by TransLink, MetroPlex management commissioned Gateway Connections, a local private bus operator, to provide a shuttle bus between Murarrie Rail Station and MetroPlex Gateway for MetroPlex employees.

In 2011 TransLink introduced new route 590 to service MetroPlex Gateway, yet the privately operated shuttle bus continues to operate. It is assumed this arrangement remains commercially viable for Gateway Connections, despite government subsidised competition.

### 6.2.2 Employment Centre Profile

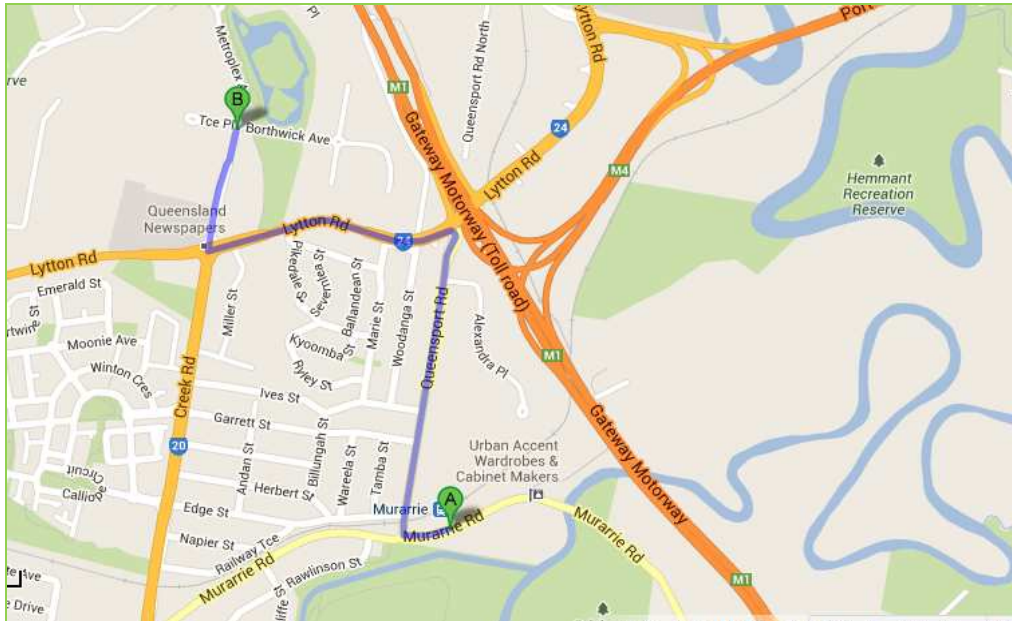
MetroPlex is located in the eastern suburb of Murarrie, a short distance from the Gateway Motorway, as per the map below:



There are 109 businesses operating out of MetroPlex in a mix of industries.

### 6.2.3 Spatial Coverage

The Map below shows the route between Murarrie Rail Station and MetroPlex:

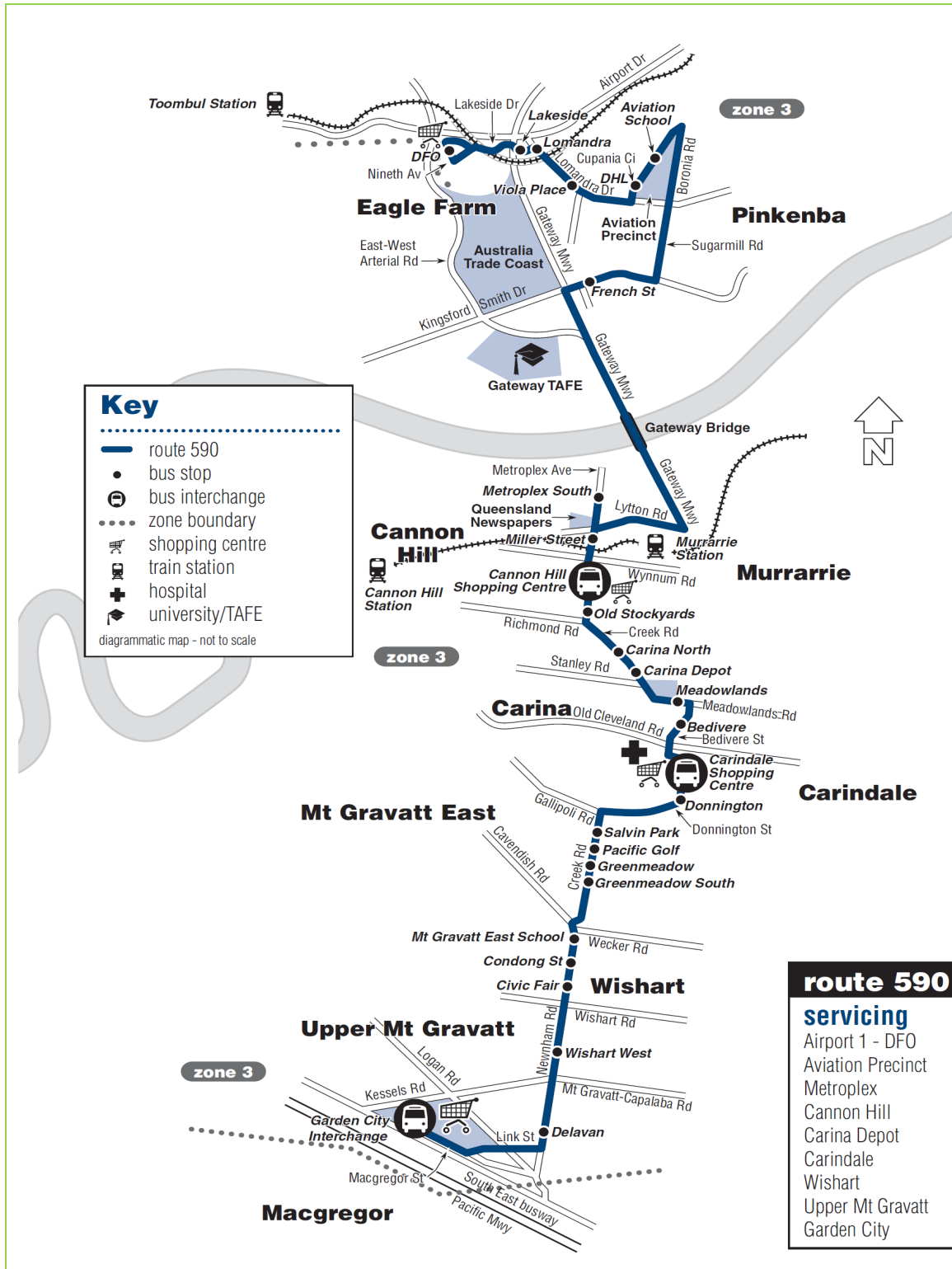


The map below shows the location of the eight bus stop within the MetroPlex site:



The important take out from this map is that for large industrial sites, it is not sufficient to simply drop passengers at the entrance of the estate, as the internal walk can be very long. The bus service often has to penetrate the core of the site to provide good coverage.

The 590 route operated by TransLink in contrast does not service the Murrarie Rail station nor does it penetrate the core the MetroPlex site, as per the route map below:





#### 6.2.4 Temporal Coverage

There are 7 loop services operating non-stop between Murarrie Rail Station and MetroPlex in the weekday morning and six in the weekday afternoon, as per the timetable below:

Murarrie Station	Stop 1	Stop 2	Stop 3	Stop 4	Stop 5	Stop 6	Stop 7	Stop 8	Murarrie Station
6.45	6.50	6.52	6.54	6.56	6.58	7.01	7.03	7.05	7.10
7.15	7.20	7.22	7.24	7.26	7.28	7.31	7.33	7.35	7.40
7.45	7.50	7.52	7.54	7.56	7.58	8.01	8.03	8.05	8.10
8.15	8.20	8.22	8.24	8.26	8.28	8.31	8.33	8.35	8.40
8.45	8.50	8.52	8.54	8.56	8.58	9.01	9.03	9.05	9.10
9.15	9.20	9.22	9.24	9.26	9.28	9.31	9.33	9.35	9.40
9.45	9.50	9.52	9.54	9.56	9.58	10.01	10.03	10.05	10.10

Murarrie Station	Stop 1	Stop 6	Stop 7	Stop 2	Stop 3	Stop 4	Stop 5	Stop 8	Murarrie Station
2.40		2.45	2.46	2.47	2.48	2.49	2.50	2.51	2.56
3.10		3.15	3.16	3.17	3.18	3.19	3.20	3.21	3.26
3.40		3.45	3.46	3.47	3.48	3.49	3.50	3.51	3.56
4.05		4.10	4.11	4.12	4.13	4.14	4.15	4.16	4.21
4.30		4.35	4.36	4.37	4.38	4.39	4.40	4.41	4.46
5.00		5.10	5.11	5.12	5.13	5.14	5.15	5.16	5.21

The 590 route operates every 20 minutes peak and 30 minutes off-peak which equates to 72 weekday services, and 48 services on Saturdays and Sundays.

#### 6.2.5 Fares

Employees of MetroPlex do not have to pay a fare, as the service is fully funded by MetroPlex.

In comparison the TransLink fares between Murarrie and MetroPlex are as follows:

Ticket type	Price
go card adult	\$3.28
	\$2.63 (off-peak)
go card concession	\$1.64
	\$1.32 (off-peak)
Single paper adult	\$4.80
Single paper concession	\$2.40

Given the fare differential, it is no surprise then to see very few employees using the TransLink service.

#### 6.2.6 *PT Mode Share*

Murarrie, which is a larger area than the MetroPlex site, had a JTW PT Mode Share of 3.39% as an employment destination (place of work), compared to a Brisbane average of 15.9%.

#### 6.2.7 *Performance*

Patronage data for the Gateway Connections service was not available.

The SEQ Bus Network Review conducted by TransLink in March 2013 concluded the route 590 had low value for money and low average patronage.

The 590 route averages 15 boardings per services on weekdays and between 13 and 16 on weekends.

The government subsidy of \$13.99 per boarding and has a poor cost recovery of 9%. 67% of passengers are transferring, which is no surprise given it was designed as a cross-town route. However the route only services bus interchanges at Garden City, Carindale and Cannon Hill – nowhere along the route does it provide convenient rail connections.

The route averages 44 alightings and 56 boardings a weekday at the stop in MetroPlex. A detailed route profile is contained in Appendix C.

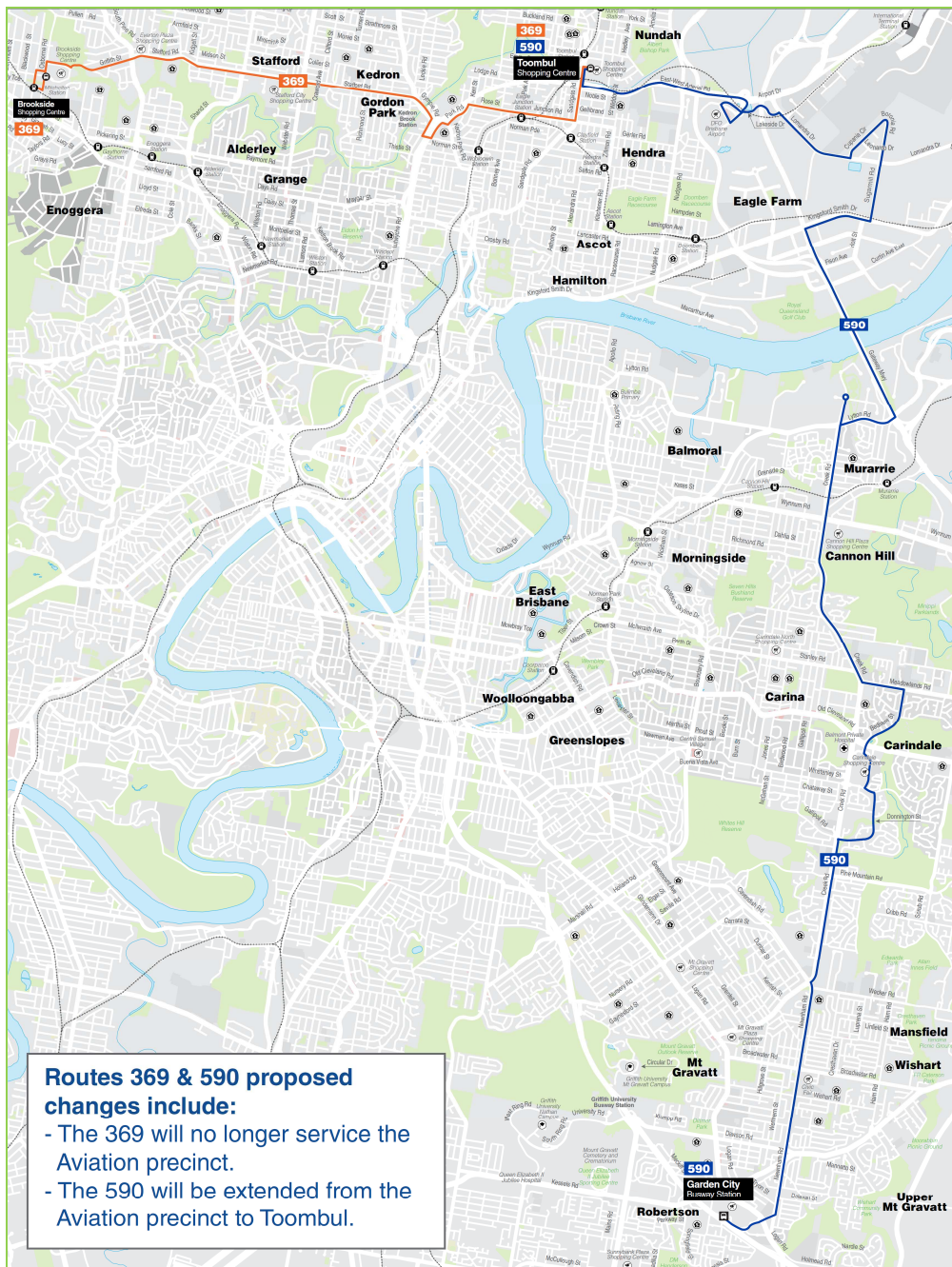
#### 6.2.8 *Lessons Learnt*

- The current northside route terminus has limited opportunities to enable transfers with other northside buses
- The route 590 competes with a free employers funded service
- The route 590 does not connect with the rail network
- The route 590 does not provide the same level coverage within the MetroPlex site compared to the Gateway Connections service. Employees have to walk some distance to reach their final work place.

### 6.2.8.1 Future of the Route

To improve the 590 route's performance, on 22 July 013 the route will be extended to Toombul, a district Activity Centre (shopping centre) with both a bus interchange and rail station. This will enable northside residents on opportunity to access this cross town route on both the rail and bus services at Toombul.

Competition will also be reduced by truncating route 369 at Toombul, as per the map below:



## 6.3 Willoughby City Council

Willoughby City Council funded a trial of a Shuttle Bus between St Leonards Rail Station and the Artarmon Industrial Precinct known as the 'Artarmon Loop'.

### 6.3.1 *Employment Centre Profile*

The southern part of Artarmon between the North Shore Railway and the Pacific Highway developed a strong industrial base from the 1880s, with the initial focus being on brick-making and by 1912 the brick industry was the main employer in Artarmon and the Gore Hill area. With the demise of the industry in the 1940s, the area was zoned as an industrial area under the Cumberland County. By 1951, 42 factories had been established in the area with 444 employees.

Initially the focus was on small firms engaged in light industrial activities, but over time there was a shift to high-tech industries, particularly those associated with film and television production and distribution. The advent of television from 1956 saw Artarmon become the base for the Australian film and television industry and this sector remains a major employer in the area. Light industrial activities continue to be dominated by automotive repair workshops, printing and publishing, and recycling services.

- Fox Sports has leased 60% of Building C, on the corner of the Pacific Highway and Broadcast Way and recently switched to broadcasting live from the Gore Hill studios in early 2013.
- An award-winning 11,750m<sup>2</sup> liquidity centre opened twelve months ago and has been leased to the Australian Stock Exchange (ASX) and several of Australia's top 100 listed companies.
- Woolworths has purchased a 1.25ha parcel of land to construct a Masters Hardware retail outlet.
- In 2013 construction is scheduled to commence on the next three commercial buildings which will incorporate a large retail plaza with food court.
- Gore Hill offers premium quality space in a business park campus environment, across five standalone buildings which feature large flexible floor plates with harbour and district views. A plaza-style retail precinct, indoor sports centre, gymnasium and swimming pool will provide a sought-after work environment in which to balance work and play.
- On completion, more than 4,000 people will work at Gore Hill.
- For more information visit [www.gorehill.com.au](http://www.gorehill.com.au)

### 6.3.2 *Service*

The Artarmon Loop is a free shuttle service travelling on a loop from St Leonards station through the Artarmon industrial area. The service aims to encourage the use of public transport and reduce car usage across the City of Willoughby while also enhancing the viability of the Artarmon business precinct.

The Willoughby City Council service commenced with two 43 seater buses on 27 April 2009. The installation of internal bike racks on board reduced seating capacity to 39 seats.

At a later time the fleet changed to 3 x 25 seater service.

In December 2012 the fleet was reduced to 2 x 25 seater buses as the route's major sponsor, Lindsay Bennelong developments (Gore Hill Technology Park), withdrew their financial support, to commence their own service using a single 45 seater bus operating over

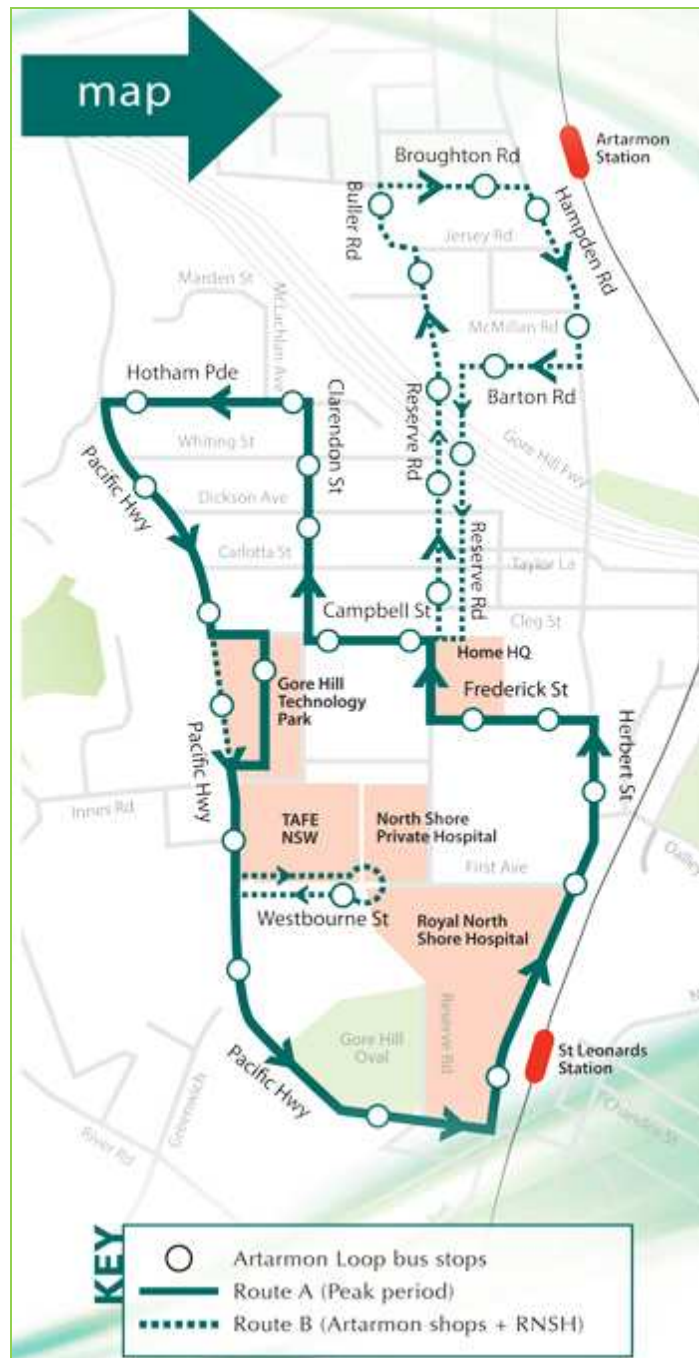
a more direct route between St Leonards Rail Station and Gore Hill Technology Park, as per the route below.



The Gore Hill service operate 60 trips per day, with one stop at St Leonards Station in Herbert Street, and two stops on Broadcast Way within Gore Hill Technology Business Park. The bus operates from Monday to Friday from 7.30am to 7.30pm. During peak travel periods of 7.30am to 10.00am; noon to 2.30pm; and 4.30pm to 7.30pm, the bus operates on a continuous loop every ten minutes.

More information about the Gore Hill loop can be found [online](#).

In response to the introduction of the Gore Hill Technology Park Shuttle Bus, the Willoughby City Council route has been adjusted so in the off-peak, when demand is lower and more recreational/discretionary in nature, the route is extended to Artarmon Shops and the residential area, as per the dotted line below:



This service has 17 stops along the route and services multiple attractors such as Artarmon shops, the Royal North Shore Hospital, TAFE NSW, Gore Hill Technology Park and Home HQ, not just a single industrial employment locality. This is its distinguishing feature compared to the other routes profiled in this case study.

The service also permits bikes to be carried on board, meaning passengers can ride for the last leg of their journey to reach their final destination.

The Artarmon Loop runs every 10 minutes during peak times (Route A) and every 30 minutes during off peak periods from 6am to 7pm, Monday to Friday. The service incorporates Artarmon Station, Artarmon shops and the Royal North Shore Hospital (Route B) between 10am and 2.30pm, stopping at these locations every 30 minutes.

AM - ROUTE A ONLY:							
			6.00	6.15	6.30	6.45	6.55
7.00	7.10	7.20	7.30	7.37	7.45	7.54	
8.02	8.11	8.19	8.28	8.36	8.45	8.53	
9.02	9.10	9.20	9.30	9.45			

INCORPORATES ARTARMON STATION AND SHOPS (ROUTE B):					
AM	10.00	10.30	11.00	11.30	
PM	12.30	1.00	1.30	2.00	2.30

PM - ROUTE A ONLY:						
3.00	3.18	3.36	3.54	4.15	4.30	
4.39	4.46	4.55	5.02	5.11	5.18	5.27
5.34	5.43	5.50	6.00	6.20	6.40	

\* The service does not run on public holidays.

More information about the Willoughby City Council route can be found at <http://www.willoughby.nsw.gov.au/community/Traffic---Transport/Artarmon-Loop/>

### 6.3.3 Funding Sources

Funding for the route has come from the following sources:

- Sustainability Levy
- Parking Revenue
- Developer Contributions
- Advertising/Sponsorship

#### 6.3.3.1 Sustainability Levy

The service is funded primarily by the E-Restore Levy, which is a program set up by Council to improve the environment, made possible by the introduction of an environment levy.

In 2000, Council adopted the Environmental Management Plan which identified that the local natural environment was degraded and required restoration and ongoing attention. Council's resources were insufficient to deliver an adequate response while still delivering the existing level of works and services to the community. To address this, an Environmental Levy was introduced in July 2000 to provide funding for action. Strong community support saw the program extended for a second term from 2003 until 2008.

From July 2008 a new Sustainability Levy replaced the Environmental Levy to fund the third round of the e.restore program. e.restore 3 continues the important local environmental

works that have been underway since 2000, while introducing a new focus on responding to climate change.

The third round projects will be focused on areas including:

- restoring our ecosystems
- climate change (mitigation and reduction)
- sustainable business and suburbs
- community engagement and action

e.restore is subject to rigorous auditing by the Department of Local Government and open reporting to ensure accountability to the community. e.restore funds can only be spent on sustainability

#### 6.3.3.2 *Council Parking*

Revenue from Council's car parking meters also funds a large component of the route's operating cost.

#### 6.3.3.3 *Developer Contributions*

Lindsay Bennelong developments were originally providing a sizeable amount of funding for the Council service, but have now ceased this arrangement in lieu of funding their own service.

#### 6.3.3.4 *Advertising and Sponsorship*

According to Council, very little revenue is generated from on-board advertising.

Council offer sponsorship and advertising opportunities associated with the Artarmon Loop. For example a 'Partner' is required to pay \$30 000 but in return:

The Artarmon Loop Partner presents the service in conjunction with Willoughby City Council and will receive:

- Advertising space on the back of one of the two busses which will run consistently from 6am to 6pm, weekdays.
- Two internal advertising spaces located inside each bus, four spots in total.
- Logo inclusion and partner recognition on each side of each bus.
- Logo inclusion and partner recognition on the Artarmon Loop timetable.
- Logo inclusion and partner recognition on the Artarmon Loop posters.
- Logo inclusion, partner recognition and web link on the Willoughby City Council website visited by more than 60 000 people each month.
- Logo inclusion and partner recognition on Artarmon Loop advertisements on Council electronic ad screens located at the Willoughby Leisure Centre, Council administration building and the Zenith Theatre.
- Partner recognition highlighted in a selection of Willoughby City Council's e.newsletters sent out during the duration of the sponsorship.
- Editorial support in all Artarmon Loop media material.
- Your business flyer distribution through internal bus holders.
- Opportunity to display flyers at Artarmon Loop displays at Council events including the Willoughby StreetFair.

Alternative a Sponsor can pay \$5 000 and receive:

- Logo inclusion in the Artarmon Loop timetable.
- Logo inclusion and web link on the Willoughby City Council website.



- Logo inclusion on Artarmon Loop advertisements on Council electronic ad screens located at the Willoughby Leisure Centre, Council administration building and Zenith Theatre.
- One internal advertising space located inside each bus, two spaces in total.

Or finally an Artarmon Loop Supporter can pay \$1,000 for one internal advertising space located inside each bus, two spaces in total.

### 6.3.3.5 State Government

The state government (Transport for NSW) does not currently contribute funding towards the service as it does not meet their guidelines. For example, most of the Industrial Area is within 1 km or either St Leonards or Artarmon Rail Stations or within 400m of bus services running along the Pacific Highway. As the precinct was already within a coverage area, the additional route was deemed as unwarranted.

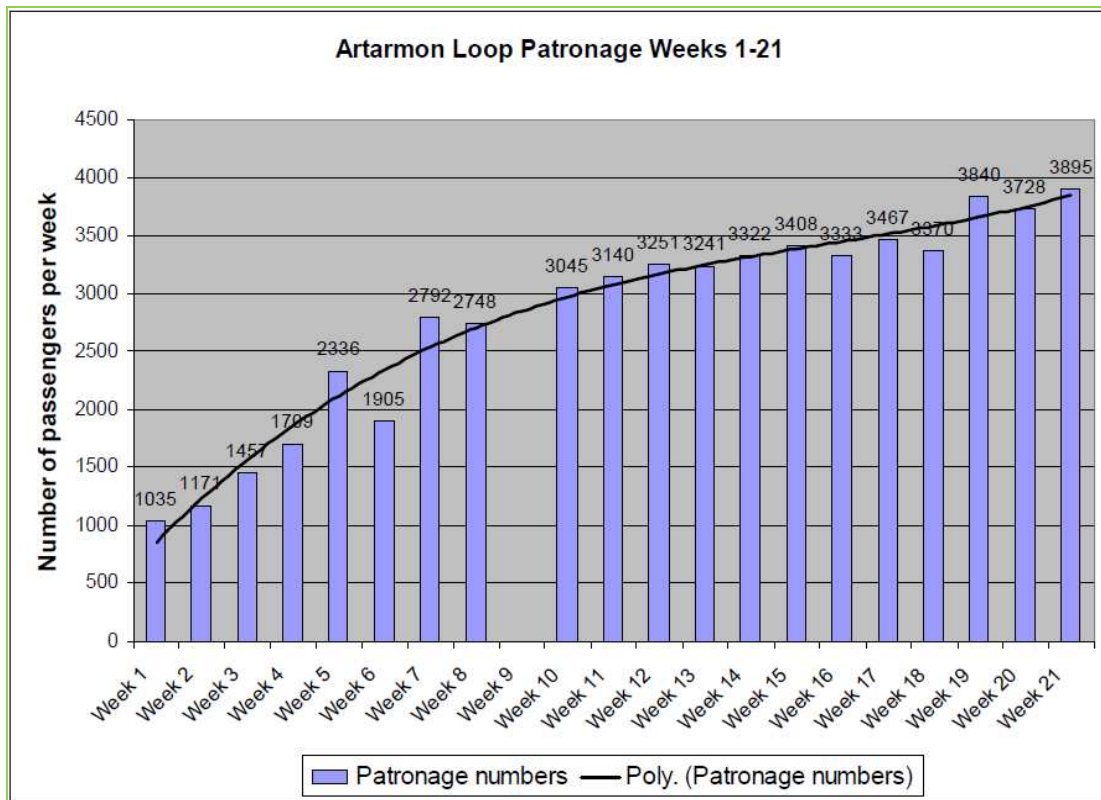
### 6.3.4 PT Mode Share

Chatswood East-Artarmon is a densely populated area with 5,159 persons per square kilometre and a total population of 26,215 (ABS 2012) which readily supports the use of public transport. The 2011 Census shows that 8,921 persons used public transport for their journey to work out of a workforce of 33,658

Artarmon and Chatswood East, which is a larger area than the Artarmon Industrial Area, had a JTW PT Mode Share of 34.64% as an employment destination (work place), compared to a Sydney average of 24%.

### 6.3.5 Performance

Patronage data was provided by Willoughby City Council for the first 21 weeks of operation, as per the graph below:



The Artarmon Loop has an average of nearly 1,000 boardings on 78 services a weekday. This is an average of 12 boardings per service or 2.4 boardings/km. Best Practise suggests that 2 pax/km is a good performing route.

#### **6.3.6**      *Fares*

Passengers are not charged a fare on either the Council or Gore Hill funded services. It is important to note that unlike some of the other services in Gladstone and Murarrie, this service is open to the public, not just employees of a single industrial employment locality.

#### **6.3.7**      *Competition*

Sydney's Metrobus network is comprised of 13 routes, providing high-frequency, high-capacity links between key employment and growth centres across Sydney.

The 'Metrobus 20' connects north and south via the city. This operates in 10-minute intervals during peak hours and 15-minute intervals in off peak periods. The bus stop is located directly outside Gore Hill on the Pacific Highway.

#### **6.3.8**      *Lessons Learnt*

The timetable and route map is not very legible. The various peak and off-peak variations, plus the duplication with the Gore Hill Shuttle could cause passenger confusion.

The Artarmon Loop has been successful in attracting patronage by offering a free high frequency bus service linking multiple densely populated mixed health, educational, commercial and residential land uses with a rail station.

### **6.4**      **Gladstone**

Three LNG operators (APLNG, QCLNG and Santos Gladstone Liquefied Natural Gas (GLNG)) currently jointly fund 50 buses provided by Stonestreet Coaches for their employees. Bus services operate from park n ride sites as far away as the southern Rockhampton suburb of Gracemere (1 hour+ travel time) to Gladstone Harbour to meet connecting ferry services between Gladstone Harbour and Curtis Island for their employees.

At present the employees are constructing LNG processing facilities at Curtis Island, but ultimately the workforce will increase significantly once these plants become operational.

Part of this arrangement includes the \$21m capital purchase of high speed vessels to operate in Gladstone Harbour by Transit Systems. Normally under a charter arrangement, the employer doesn't usually fund capital purchases such as fleet, so this is a unique situation. It would also appear that non-employees such as tourists can use the ferry service, which can help to subsidise the cost of operating the service.

Limited information was available for this case study, as neither the bus operator nor the employer/LNG developers responded to phone calls and emails.

## 7. Conclusion

The table below provides a comparative summary analysis of the four areas:

Metric	Yatala	Murarrie 590	Murarrie Gateway	Gladstone	Artarmon
<b>Access Mode</b>	Rail; Bus	Bus	Rail	Park n ride; ferry	Rail; Cycle
<b>Fares</b>	Transit Agency	Transit Agency	Free	Free	Free
<b>Funding Source</b>	LGA/ Transit Agency	Transit Agency	Employer	Employer	LGA (parking; environmental levy; develop contributions; sponsorship and advertising)
<b>Weekday Boardings/service</b>	10	15	NA	NA	12
<b>Cost Recovery</b>	8%	9%	NA	NA	NA
<b>Government Subsidy/boarding</b>	\$14.43	\$13.99	NA	NA	NA
<b>Transfers</b>	65%	67%	100%	NA	NA
<b>No of stops</b>	36	24	2	2	17
<b>Average Stop spacing</b>	700m	1.3km	4km	NA	300m
<b>PT Mode Share by Place of Work</b>	1.13%	3.39%	3.39%	1.71%	34.64%
<b>Stopping Pattern</b>	All stops	Limited stops	Non-stop	Non-stop	All stops
<b>Competition</b>	No	Yes	Yes	No	Yes
<b>Ultimate Employees</b>	14,000-16,000	NA	NA	NA	4,000
<b>Businesses</b>	550	109	109	3	NA
<b>On-site Car Parking</b>	Unknown	Full	Full	Not available	Not available
<b>Route length</b>	25.29km	27.26km	4km	NA	5km
<b>Fleet (seats)</b>	Standard ridged (45)	Standard ridged (45)	NA	NA	(25)
<b>Boardings/km</b>	.39	.55	NA	NA	2.4
<b>Peak headway</b>	60-90	20	30	NA	10
<b>Off-peak headway</b>	60	30	NA	NA	30

The servicing of industrial estates is traditionally a challenge for any transit agency as:

- Industrial estates generally provide plenty of free on-site parking for staff as they are located in areas where property values are generally lower. This approach provides little disincentive for employees to drive to work.
- Some industrial estates require employees to start work earlier than the PT network traditionally commences. Alternatively some industrial areas employ shift workers on

a 24/7 rotation, resulting in some workers finishing after PT network traditionally ceases operation.

- Many workers need their vehicle for work, due to their trade.
- The estates tend to be quite low density in terms of jobs per hectare, yielding low PT potential at the best of times.
- Many industrial estates are built within massive cul-de-sacs with no through connective through road network, making them inefficient to serve with a standard bus. We understand this is particularly the case in the KIA.
- There is generally little off-peak demand for public transport in industrial estates, making it difficult to offer a viable all-day service, unless other trip generators are located along the route.

Stand-alone bus services to industrial estates, that are not part of a broader PT network, servicing multiple destinations, have a better chance of success under the following circumstances:

- Car parking supply is in short supply, such as in Gladstone, Murarrie and AMC
- No fares are charged for employees to use the service such as in Willoughby, Gladstone and Murarrie
- No competition exists such as in Yatala and Gladstone. In Willoughby and Murarrie, the free employee shuttles compete with government funded services that provide better coverage (service many more destinations).
- Industrial estates have good representation of white collar workers, such as in Willoughby and Murarrie, who generally have a greater propensity to use PT.
- Estates have mixed used developments and are not solely heavy industrial. It should be noted in the case of Murarrie and Willoughby, these centres have transformed from heavy industrial to light industrial and commercial, with a mix of retail.
- They only operate in the worker peak. Off-peak services to industrial areas usually fail to attract patronage.
- If the route is to operate off-peak it needs to service multiple attractors en-route, not just the employment centre.
- The service span needs to reflect the operating hours of the employment centre.
- The route is anchored to one or more PT interchanges (rail, bus or park n ride) to enable passengers to transfer and ultimately service a large coverage area

When routes servicing industrial areas are integrated into the broader PT network, subsidised by government and passengers must pay a standard fare, stand-alone routes that only service an industrial area do not tend to perform well as there is insufficient demand to warrant servicing a single trip generator. This applies to all bus routes and is the basis of best practise route planning, as bus routes are most productive when there is high passenger turnover. The only exception being express bus services to CBDs, where there is generally sufficient concentrated demand to only service a single attractor along the route.

Government subsidised services therefore need to have multiple trip generators/attractors en-route to be viable. Good performance on the rest of the route then cross-subsidises the relatively low yield from the industrial estates. Therefore options to divert/re-align existing Transperth services should be explored if the South West Group has any chance of getting government to ultimately subsidise services to the KIA and AMC industrial estates.

The problem with trialling a free employer funded shuttle bus first to prove to a transit agency, such as Transperth, that demand does exist for bus services to industrial estates and that they should take over funding of the service, is that passengers will then be required to pay for a service that was previously free. A [potential risk is that disgruntled

employees blame their employer for 'pulling the funding pin' and they revert back to their previous behaviour of driving to work.

## **7.1 Recommendations**

Unfortunately there were limited examples in Australia to enable a comprehensive case study to be developed profiling an industrial area operating a shuttle bus service from a park n ride site. One could argue Gladstone was a captive market, as the park n ride provided the only option for employees to access a remote work site on Curtis Island. That is employees cannot make their own travel arrangements to and from work.

### **7.1.1 *Trial hybrid arrangement for AMC site***

As such the trial of a hybrid arrangement for the AMC site, where bus services and parking are linked with a free internal shuttle bus should still be considered. When promoting the trial, it should be made clear that:

- a) The service is being provided on a "use it or lose it" basis and must meet agreed performance measures within the trial period. It is recommended the SWG adopt Transperth performance measures as the basis for advocating the service should be eventually funded by Transperth
- b) The intention is for the shuttle service to transition to a Transperth service charging standard Transperth fares

### **7.1.2 *Transition service to be incorporated into broader Transperth network***

Ultimately the goal should be to have the service incorporated into the broader Transperth network to maximise the catchment area and access to the service. Under this arrangement, AMC may continue to contribute funding to the cost of the service, in addition to government subsidies and fare revenue contributions.

### **7.1.3 *Negotiate with Transperth changes to route to maximise patronage***

However the SWG should be prepared to consider changes to the service offering if they legitimately want Transperth to subsidise the route. For example, to make the route viable from Transperth's point of view, the route's catchment may need to be extended to service other transport hubs and attractors.

Cost effective options to consider how existing Transperth services may be modified in the future are outlined in Chapter 5.

While Transperth may argue that such modifications (extensions/route realignments) will make the route longer for some passengers not travelling to AMC, best practice planning suggests that the patronage generated by the deviation should be a greater percentage of the overall ridership than the additional running time needed to serve the deviation is of the total running time. For example, if a route which has a running time of 60 minutes includes a deviation which takes 6 minutes of that time, then the total ridership generated by the deviation should be greater than 10% of the total. So if the route is expected to carry 40 passengers, the deviation should expect to service 4 or more passengers to justify the deviation.

### **7.1.4 *Encourage bus stops being located in the core of the industrial area***

The other key learning is that it is not sufficient to drop employees at the entrance to a large industrial estate, as route 522 currently does at AMC, as the walk to the workplace can still be significant. We know from boarding and alighting data for the AMC stop on Cockburn Rd

that this approach does not work. Large sites like KIA and AMC need the route to stop within the industrial site at numerous locations to provide good coverage, as demonstrated by the Gateway Connections service in Murarrie, compared to the TransLink 590 service. Therefore we strongly recommend, given the size of the AMC site, that different bus services operate on both Quill Way (route 522, 920) and Sparks Rd (route 522) to maximise coverage with the site.

## 8. References

- City of Rockingham Walking and Cycling Map
- Perth/Fremantle Walking and Cycling Map
- 2006 ABS Census of Housing and Population
- 2011 ABS Census of Housing and Population
- PTA Annual Report 2006/07
- PTA Annual Report 2007/08
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- Travelsmart website (<http://www.transport.wa.gov.au/activetransport/24605.asp>)
- Transperth website ([www.transperth.wa.gov.au](http://www.transperth.wa.gov.au))
- PTA website (<http://www.pta.wa.gov.au/>)
- Bureau of Meteorology website (<http://www.bom.gov.au/>)
- Charting Transport website ([www.chartingtransport.com](http://www.chartingtransport.com))
- KIA website (<http://www.kic.org.au/kia.asp>)
- AMC website (<http://www.australianmarinecomplex.com.au/>)
- Garden City Shopping Centre website (<http://www.gardencity.com.au/>)
- Activity Centres Policy State Planning Policy 4.2
- Directions 2031 2012 Scorecard
- Willoughby City Council
- TransLink Division, Queensland Department of Transport and Main Roads
- MetroPlex website
- Stonestreet Coaches website
- LNG website
- Gateway Connections website
- Gore Hill website
- Yatala Enterprise Area website
- Transit Systems website

## Appendix A

### SOUTH WEST METROPOLITAN REGION

#### JOURNEY TO WORK STUDY CONTEXT

##### Perth Metropolitan Area

The Journey to Work data collected from the 2011 Census provides detailed information and useful spatial data which needs to be analysed in context. Information on Metropolitan Perth is provided here to enable a basis for assessing the performance of the South Metropolitan Region (see Table 1).

In August 2011 there were 926,100 employed persons in the Perth Metropolitan Area (ABS) but not all of these were surveyed or chose to respond to the 2011 Census so the employed total in Table 1 is only 811,001. The percentages for each mode of travel to work are therefore more significant. The State of Australian Cities Report 2012 identifies that 2.6% of persons walked to work and 1.1% travelled to work by bicycle. Perth has the lowest walk to work rate of any capital city.

**Table 1: Method of travel to work**

Perth Statistical Division	2011			2006		Change	
	Number	%	City of Perth	Number	%	City of Perth	2006 to 2011
Train	54,877	6.8	5.2	29,690	4.3	3.3	+25,187
Bus	30,999	3.8	14.6	29,010	4.2	10.7	+1,989
Tram or Ferry	111	0.0	0.1	244	0.0	0.1	-133
Taxi	1,577	0.2	2.0	1,304	0.2	2.1	+273
Car - as driver	503,840	62.1	31.1	436,603	63.0	33.4	+67,237
Car - as passenger	42,572	5.2	4.2	39,983	5.8	5.3	+2,590
Truck	6,532	0.8	0.1	7,245	1.0	0.3	-713
Motorbike	4,761	0.6	0.6	3,832	0.6	0.6	+929
Bicycle	9,498	1.2	1.3	6,736	1.0	1.2	+2,762
Walked only	16,835	2.1	22.8	14,224	2.1	20.9	+2,612
Other	13,101	1.6	4.3	7,773	1.1	3.7	+5,328
Worked at home	28,321	3.5	2.6	24,865	3.6	4.1	+3,456
Did not go to work	87,493	10.8	10.2	79,699	11.5	13.4	+7,794
Not stated	10,482	1.3	0.8	11,875	1.7	1.0	-1,393
<b>Total employed persons aged 15+</b>	<b>811,001</b>	<b>100.0</b>	<b>100.0</b>	<b>693,083</b>	<b>100.0</b>	<b>100.0</b>	<b>+117,918</b>

Source: Enumerated Data tabulated by ID for City of Perth

It is also useful to compare Metropolitan Perth with other capital cities and to look at trends over time. Figure 2 shows that Perth is only now returning to the public transport mode share that existed in 1976. Figure 3 shows the dramatic expansion of the use of the motor vehicle after World War II.



Figure 1: Non- motorised travel to work

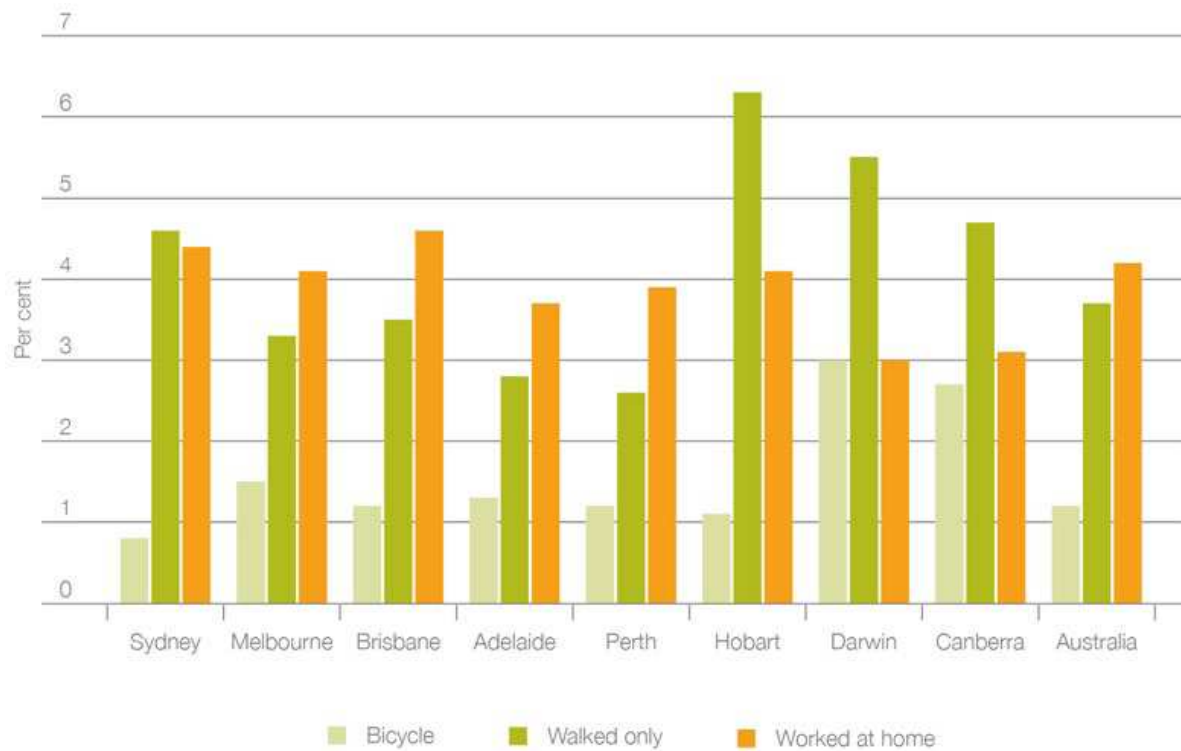
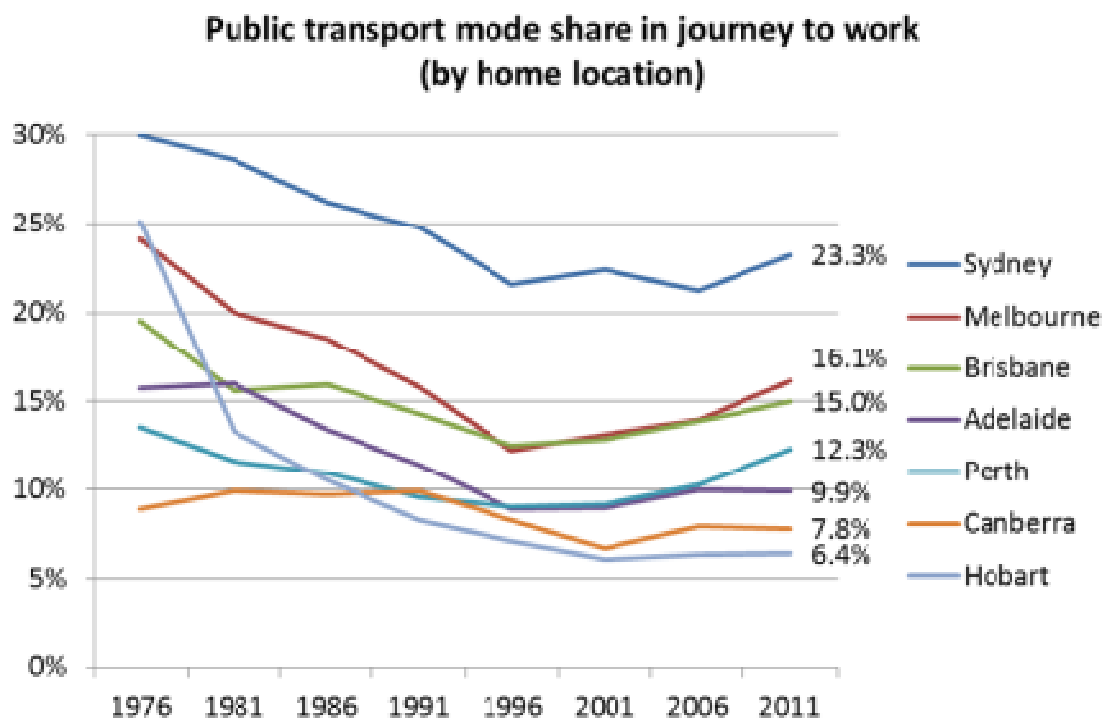
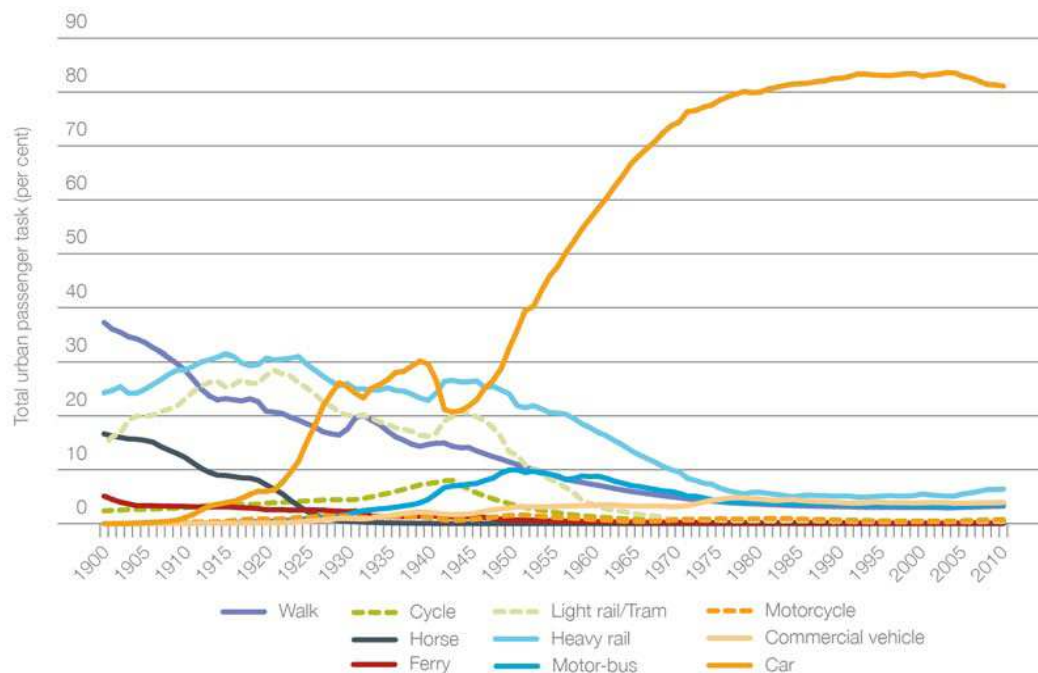


Figure 2: Transport Mode Share



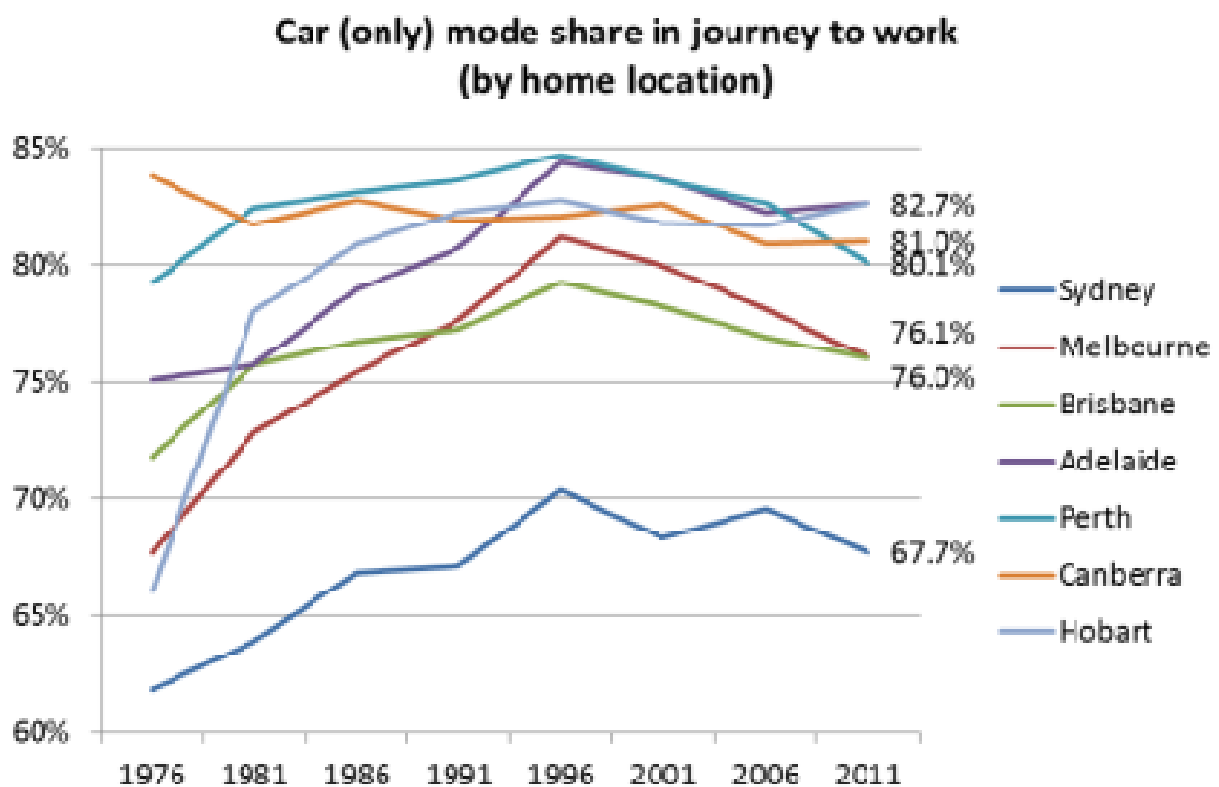
Source: Charting Transport

**Figure 3: Mode Shares 1900 to 2011**



Source: State of Australian Cities Report 2012

**Figure 4: Car Mode Share**



Source Charting Transport

Figure 4 shows the dominance of the car for journey to work with Perth at 80.1%. Even though this figure is declining it is disappointing that car occupancy for journeys to work is now at 1.084 showing that proportionally more car passengers than car drivers are choosing to use public transport.

The State of Australian Cities Report 2012 states that only 41% of Perth residents were satisfied with the quality of the public transport system indicating that more improvement is necessary to drive significantly increased patronage.

Improving public transport has become a significant issue as congestion on Perth roads increases. The strong economic growth and population growth boosted by migration are both increasing vehicle kilometres travelled on Perth's roads.

Table 2 shows the strong growth in light commercial vehicle traffic and truck movements. Perth vehicle kilometres travelled are predicted by BITRE to reach 20 billion by 2019 from the current 16.77 billion.

**Table 2: Annual Vehicle Kilometres travelled in Metropolitan Perth 2002 to 2012**

Mode	Annual VKT in Metropolitan Perth in billions of kilometres											
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	% Change 2002 to 2012
Car	10.28	10.57	10.78	10.96	11.11	11.33	11.34	11.89	11.77	11.94	12.10	17.70%
Motor Cycle	0.09	0.09	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.18	0.19	111.11%
Light Commercial Vehicles	2.48	2.56	2.67	2.70	2.78	2.90	2.95	3.04	3.00	3.09	3.13	26.21%
Rigid Truck	0.56	0.57	0.59	0.61	0.64	0.66	0.66	0.66	0.65	0.67	0.67	19.64%
Articulated Truck	0.37	0.38	0.40	0.41	0.42	0.44	0.45	0.46	0.46	0.48	0.48	29.73%
Bus	0.18	0.19	0.19	0.20	0.20	0.20	0.21	0.21	0.21	0.20	0.20	11.11%
All	13.97	14.37	14.73	14.99	15.27	15.68	15.75	16.44	16.26	16.57	16.77	20.04%

Source: Bureau of Infrastructure Transport and Regional Economics Information Sheet 44 dated November 2012

### Local Employment

A strategy to reduce congestion is to promote local jobs (self-sufficiency) for local people (self-containment). The Urban Development Institute of Australia has undertaken an assessment of employment patterns using the 2011 Census Data. The figures in Table 3 again need to be used carefully as ABS identify a resident workforce of 204,500 in August 2011 for the South West Metropolitan Region compared with the UDIA figures of 172,369 resident workers.

**Table 3: Local Employment in the South West Metropolitan Region**

LGA	Resident Workers	Jobs	Employment Self Sufficiency	Employment Self Containment	Public Transport	Car	Walk/Bicycle
Cockburn	46,287	29,748	64.3%	24.3%	3.2%	91.6%	2.3%
East Fremantle	3,564	2,022	56.7%	13.9%	3.5%	87.1%	7.0%
Fremantle	13,316	24,700	185.5%	31.1%	9.0%	82.7%	5.6%
Kwinana	12,731	11,528	90.6%	18.5%	2.4%	93.8%	1.4%
Melville	48,375	31,686	65.5%	24.8%	6.2%	88.3%	3.5%
Rockingham	48,096	24,429	50.4%	37.0%	3.8%	88.5%	4.1%
<b>Total</b>	<b>172,369</b>	<b>124,113</b>	<b>72.0%</b>				

Source: UDIA

Employment self-containment increases as the area being analysed increases. UDIA report that employment self-containment for Cockburn, Kwinana and Rockingham stands at 40.3%, reflecting the high numbers of Rockingham residents that work in Kwinana.

Public transport and active transport are typically higher in areas of greater density and this is reflected in the higher figures for Fremantle and East Fremantle.

### Motor Vehicle Registrations

Concern has been expressed about the significant increase in car registrations. The ABS undertake an annual motor vehicle census and the January 2012 results are summarised in Table 4.

Using the 2011 region population of 373,359 and 850 vehicles per 1,000 population, it is estimated that there are 317,355 vehicles in the South West Metropolitan Region increasing at 950 vehicles a month.

High vehicle registrations do not necessarily translate to an equivalent increase in vehicle kilometres travelled. Motor cycle registrations increased by 57.57% between 2007 and 2012 but vehicle kilometres travelled only increased by 35.71%.

**Table 4: Registered Motor Vehicles 2007-2012**

Type	Registered 2007	Registered 2011	Registered 2012	Increase 2007-2012
Passenger	1,254,426	1,394,241	1,432,969	14.23%
Campervans	7,370	7,941	8,127	10.27%
Light Commercial	268,330	318,147	332,417	23.88%
Light Rigid Trucks	10,136	13,160	14,258	40.66%
Heavy Rigid Trucks	42,538	49,089	50,483	18.68%
Articulated Trucks	9,985	12,590	13,217	32.37%
Non Freight Trucks	4,006	4,582	4,719	17.80%
Buses	11,673	13,597	14,371	23.11%
Motor Cycles	68,031	99,392	107,195	57.57%
Total Motor Vehicles	1,676,495	1,912,739	1,977,756	17.97%



## Route Summary - 2011/12

# Route 567

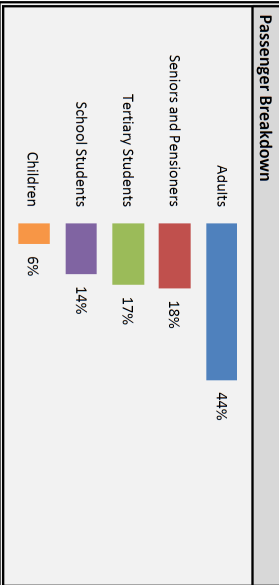
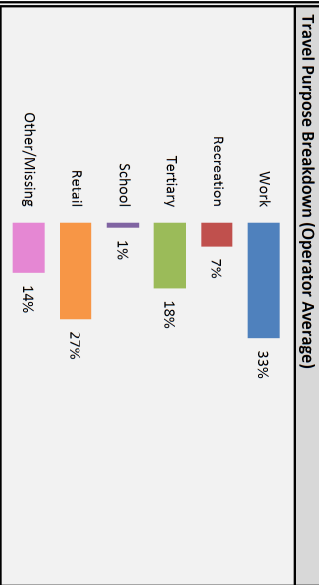
Beenleigh to Ormeau via Yatala  
 Service type: Coverage  
 Typical vehicle type: Long  
 Region: Gold Coast  
 Last service change: Pre 10/11 Financial Year  
 Route length: 25.29 km  
 85th Percentile Load: 9.8  
 Surfside Buses  
 Unique stops: 93%

Route Performance	Absolute Value		Rank (Coverage Routes)		Rank (All Routes)	
	10/11	11/12	10/11	11/12	10/11	11/12

Boardings per service	9	9	160 of 222	177 of 283	273 of 337	333 of 441
Average load	3	3	174 of 222	204 of 283	287 of 337	355 of 441
Boardings per in-service kilometre	0.3	0.3	198 of 222	238 of 283	311 of 337	395 of 441
Boardings per in-service hour	13.8	13.7	176 of 222	200 of 283	287 of 337	353 of 441
Cost per boarding	\$14.55	\$14.43	23 of 222	50 of 283	313 of 337	391 of 441
Cost per passenger kilometre	\$1.66	\$1.65	55 of 222	77 of 283	280 of 337	362 of 441
Estimated cost recovery	8%	8%	205 of 222	254 of 283	317 of 337	410 of 441
Value for money	0.62	0.69	186 of 222	222 of 283	298 of 337	377 of 441

Route Statistics						
Estimated annual boardings	88,000	87,300	111 of 222	121 of 283	189 of 337	218 of 441
Annual in-service kms	268,000	263,000	43 of 222	53 of 283	76 of 337	94 of 441
Annual in-service hours	6,370	6,370	94 of 222	100 of 283	135 of 337	151 of 441
Estimated average passenger kms	8.8	8.8	46 of 222	59 of 283	107 of 337	131 of 441
Estimated annual passenger kms	771,000	765,000	96 of 222	106 of 283	171 of 337	194 of 441
Estimated gross annual cost	\$1,280,000	\$1,260,000	47 of 222	46 of 283	84 of 337	92 of 441
Estimated annual fare revenue	\$105,000	\$105,000	123 of 222	136 of 283	223 of 337	257 of 441
Estimated net annual cost (subsidy)	\$1,175,000	\$1,155,000	27 of 222	23 of 283	283 of 337	392 of 441

Patronage drivers	
Households	4,100
Population	12,000
Jobs	4,000
Primary and Secondary Enrolments	6,200
Tertiary Enrolments	9,100
Captive Passengers	Unknown
Transfer Passengers	65%



Service details	High-Demand Operation						Low-Demand Operation					
	Daily Services	Daily In-Service Hours	Average Boardings per Service	Start of first service	Start of last service	Typical frequency	Daily Services	Daily In-Service Hours	Average Boardings per Service	Start of first service	Start of last service	Typical frequency
Weekday	29	17	10	5:11 AM	6:30 PM	Peak 80 Off-Peak 65	29	17	10	5:11 AM	6:30 PM	Peak 80 Off-Peak 65
Saturday	29	18	6	5:11 AM	6:30 PM	80	29	17	7	5:11 AM	6:30 PM	80
Sunday/Public Holiday	29	18	5	5:11 AM	6:30 PM	80	29	17	8	5:11 AM	6:30 PM	80

## Appendix B 567 Route Profile

## Route Summary - 2011/12



# Route 567

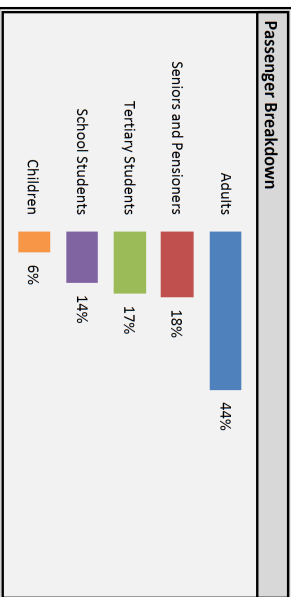
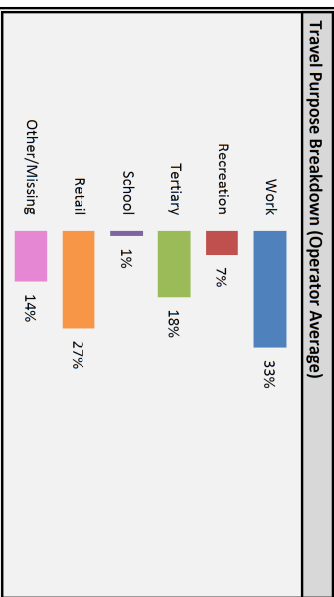
Service type: Coverage  
 Typical vehicle type: Long  
 Region: Gold Coast  
 Last service change: Pre 10/11 Financial Year  
 Route length: 25.29 km  
 85th Percentile Load: 9.8  
 Unique stops: 93%

Beenleigh to Ormeau via Yatala  
 Surfside Buses

Route Performance	Absolute Value		Rank (Coverage Routes)		Rank (All Routes)	
	10/11	11/12	10/11	11/12	10/11	11/12
Boardings per service	9	9	160 of 222	177 of 283	273 of 337	333 of 441
Average load	3	3	174 of 222	204 of 283	287 of 337	355 of 441
Boardings per in-service kilometre	0.3	0.3	198 of 222	238 of 283	311 of 337	395 of 441
Boardings per in-service hour	13.8	13.7	176 of 222	200 of 283	287 of 337	353 of 441
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Value for money	0.62	0.69	186 of 222	272 of 283	298 of 337	377 of 441

Route Statistics	Estimated annual boardings	Annual in-service kms	Annual in-service hours	Estimated average passenger kms	Estimated annual passenger kms	Estimated gross annual cost	Estimated annual fare revenue	Estimated net annual cost (subsidy)
	88,000	268,000	6,370	8.8	771,000	\$1,280,000	\$105,000	\$1,175,000
	87,300	263,000	6,370	8.8	765,000	\$1,260,000	\$105,000	\$1,155,000
	111 of 222	43 of 222	94 of 222	46 of 222	96 of 222	47 of 222	123 of 222	27 of 222
	121 of 283	53 of 283	100 of 283	59 of 283	106 of 283	46 of 283	136 of 283	23 of 283
	189 of 337	76 of 337	135 of 337	107 of 337	171 of 337	84 of 337	223 of 337	283 of 337
	218 of 441	94 of 441	151 of 441	131 of 441	194 of 441	92 of 441	257 of 441	392 of 441

Patronage drivers	Households	Population	Jobs	Primary and Secondary Enrolments	Tertiary Enrolments	Captive Passengers	Transfer Passengers
	4,100	12,000	4,000	6,200	9,100	Unknown	65%



Service details	High-Demand Operation						Low-Demand Operation							
	Daily Services	Daily In-Service Hours	Average Boardings per Service	Start of first service	Start of last service	Typical frequency	Daily Services	Daily In-Service Hours	Average Boardings per Service	Start of first service	Start of last service	Typical frequency		
					Peak	Off-Peak					Peak	Off-Peak		
Weekday	29	17	10	5:11 AM	6:30 PM	80	65	29	17	10	5:11 AM	6:30 PM	80	65
Saturday	29	18	6	5:11 AM	6:30 PM	80	65	29	17	7	5:11 AM	6:30 PM	80	65
Sunday/Public Holiday	29	18	5	5:11 AM	6:30 PM	80	65	29	17	8	5:11 AM	6:30 PM	80	65

## Appendix C 590 Route Profile