

# Scarborough Beach Road Population & Land Use Study

**Department of Planning  
July 2010**

## Version Control

### Disclaimer

Syme Marmion & Co reports and advice are either of a general nature, or for specific circumstances. Syme Marmion & Co is not liable for any loss or damage incurred by any person relying on such reports or advice, except where they are created by Syme Marmion & Co expressly for that person.

Nothing in these terms shall be taken as excluding, limiting or modifying any term, condition or warranty implied by any applicable act of parliament that cannot be so affected. To the extent that such a term, condition or warranty is implied, the liability of Syme Marmion & Co for breach of that term, condition or warranty is, where permitted, limited at the option of Syme Marmion & Co, to:

- the supplying of the relevant goods or services again; or
- the payment of the cost of having the relevant goods or services supplied again.

### Document History and Status

Issue Status	Issued To	Qty	Date	Reviewed	Approved
1	DOP	Electronic	14/10/ 2009	GB	JS
2	DOP	Electronic	17/12/09	GB	JS
3	DOP	Electronic	18/01/2010	GB	JS
4	DOP	Electronic	22/02/2010	GB	JS
Final	DOP	Electronic	01/07/2010	GB	JS

**File Name:** 091217-P0905 – SBR Population & Land Use Study Final  
**Author:** GB  
**Client:** Department of Planning  
**Name of Document:** Scarborough Beach Road Population and Land Use Study  
**Document Version:** Report  
**Project Number:** P0905

## Executive Summary

Scarborough Beach Road is a 10km long district distributor A class road connecting the inner city area with the coastal region at Scarborough. It passes through a range of urban localities and incorporates residential, commercial and industrial land use areas. The corridor currently performs a number of functions within the context of the metropolitan area, being both a transport link for the north western suburbs and a major destination in its own right. Development along the corridor has occurred in piecemeal fashion over time and now suffers from poor co ordination between land use and transport requirements. The aim of this report is to investigate the existing demographic and land use characteristics of the corridor, and how these are likely to change in the period to 2031. It also looks at how the spatial framework outlined in Directions 2031 will affect the corridor and suggests region boundaries associated with identified activity centres.

### Existing Demographic Characteristics

The population of the corridor as at the 2006 census was 24,462, 1.7% of the metropolitan area total. The demographic characteristics were considered in the light of differences between Stirling and Vincent LGA sections of the corridor. The Vincent LGA section has a higher proportion of family households with young children, higher levels of household income, and generally supports groups who are buying or own detached properties. The Stirling section has a high proportion of single person households who are less wealthy, live in rental accommodation that is more likely to be of high and medium density, and who have higher levels of mobility. Both regions have similar proportions of middle aged people but the Stirling section has a lower proportion of young children and higher proportions of elderly people. The demographic makeup of the Stirling section is most likely influenced by the medium/high density dwelling types prevalent in the Scarborough area, which houses a considerable proportion of the population for this section of the corridor. There is also some evidence that section of Vincent LGA within the Scarborough Beach Road corridor has different characteristics to the remainder of the LGA and probably represents the most affluent and family oriented part of this LGA.

### Resident Employment Profile and Employment Self Sufficiency/Self Containment

Residents of the Scarborough Beach Road Corridor are more likely than Perth metro residents generally to be in managerial and professional occupations and less likely to be in trades and labouring occupations. The main industries of employment for residents are healthcare (12% of resident workforce), professional services (10.5%), retail trade (10%), construction and education (both 9%). Employment self sufficiency for the corridor is estimated to be 216%, indicating that there is substantial amount of employment activity in the region. While it is not possible to calculate an employment self containment ratio for this region, the equivalent figure for the relevant LGAs are 27% for Stirling and 14% for Vincent. It is also noted that Stirling LGA is the location of employment for approximately 17,000 people who live in the North West corridor. As the Scarborough Beach Road corridor accounts for approximately 1/3 of employment activity in Stirling, it would be reasonable to assume that the corridor is a major catchment for regional employment.

### Commercial and Industrial Activity

As at 2007, the Scarborough Beach Road corridor had approximately 351,000m<sup>2</sup> of commercial floor space and 1.15 million m<sup>2</sup> of industrial floor space which was 3% and 11% of the total respective metropolitan area totals. The split of commercial floor space between Stirling and Vincent is 81% to 19%, while all industrial activity is located in Stirling. In terms of employment, 7,145 are involved in commercial activity while 18,206 work in industrial areas. The major commercial activities in the corridor in terms of floor space are shop retail (22%), office/business (15%), and residential/tourism (14%) while the major industrial activities are storage/distribution (29%) and office/business (19%). The issue of industrial activity is important when considering the future profile of the corridor in terms of land use. Industrial activity is wholly accounted for by the Osborne Park industrial area. This area plays a significant role in the provision of industrial land across the metropolitan area. Potential development plans for Scarborough Beach Road that impact on the Osborne Park would therefore need to be considered carefully to allow for possible knock on effects across the entire metro area. The other land use of particular note for this area is "other retail" purposes. This land use is generally defined as activities that cannot be accommodated in a shopping centre by virtue of their scale or special nature of the goods sold, a prime example of which is car sales. The corridor currently accounts for approximately 9% of the total other retail floor space in the metropolitan area. However, in some instances it is envisioned that this land use may not be consistent with the characteristics of an activity corridor and that provision may need to be made to reduce the amount of floor space dedicated to this type of retail activity in key locations in the corridor where more intensive pedestrian level activity is planned.

## Overall Population Growth

As the WA Tomorrow and associated Australian Bureau of Statistics population projections are only disaggregated to LGA level, it is not possible to give a direct evaluation of population growth in the corridor. Indirect projections have been investigated based on the corridor population as a proportion of the metropolitan area and also corridor population growth between census periods. These methods indicate a population of between 26,000 and 52,000 by 2031, with a most likely range between 35 and 50,000. These projections have been supplemented with consideration of the development projects planned for the corridor and the population likely to result from these developments. These population projections give a range from 37,000 to 70,000. Given the amount of development planned for the Scarborough Beach Rd corridor and the advanced nature of some of these plans, it is likely that population projections based on natural growth in relation to the metropolitan area total population will underestimate the magnitude of population growth in the region. However, assuming that all development will occur within the time frame of this project and that the associated increase in the number of residents would follow is likely to lead to a substantial over estimation of population. A number of metropolitan LGAs have ambitious development plans in response to the expected growth in the overall population but this growth, although substantial, is unlikely to allow every development to proceed to completion. It is therefore considered that the most likely population projection for the corridor for 2031 will be approximately 50,000.

## Activity Centre Hierarchy

The publication of Directions 2031 and the draft Activity Centres policy has set a hierarchy of centres in the Scarborough Beach Road corridor. In particular, Stirling has been identified as a strategic city centre, Osborne Park as a regional industrial centre and Scarborough, Glendalough and Mt Hawthorn as district town centres. Using these centres as a base, the following areas have been identified to disaggregate activity along the corridor

1. Scarborough/SEAS – Incorporating the area between the coast (including the defined SEAS project area) and Deanmore Rd (*District Town Centre*);
2. Stirling Residential – Deanmore Rd to Odin Rd;
3. Stirling Central – Odin Rd to King Edward Rd/Selby St North, as outlined by the Stirling City Centre plan and centred on development around Stirling railway station to TOD principles ( *Note – part of this area lies to the north of the Mitchell Fwy and is therefore outside the bounds initially set for the study but it is considered more important to consider this development as a whole*) (*Strategic City Centre*) ;
4. Osborne Park – King Edward Rd/Selby St North to Gould St, enclosed to the north by the Mitchell Freeway (*Regional Industrial Centre*);
5. Glendalough – Gould St to approximately Brady St, also including the area north of Scarborough Beach Rd enclosed by Main St, Roberts St and the Freeway, this area is centred on the Glendalough railway Station as the basis for a TOD development (*District Town Centre*);
6. Mt Hawthorn – Approximately the area bounded by Egina St, Oxford St, Edinboro St and Woodstock St (*District Town Centre*) ;
7. Remainder Stirling/Vincent – The remaining area not covered by the regions defined above.

The existing characteristics of these centres are as shown in the following table

Parameter	Scarborough / SEAS	Stirling Residential	Stirling Central	Osborne Park	Glendalough	Mt Hawthorn	Remainder
Activity Centre Hierarchy	District Centre	None Given	Strategic City Centre	Regional Industrial Centre	District Centre	District Centre	None Given
Total Area (Ha)	200	313	324	232	191	60	243
Area exc Roads/Reserves	110	219	210	192	146	42	170
Current Population	4163	8288	2570	66	3390	1557	6750
Population/Ha	37.8	37.8	12.2	0.3	23.2	37.1	39.7
% Separate Houses	16%	57%	52%	18%	16%	90%	77%
% Semi Detached	45%	36%	19%	82%	34%	6%	13%
% Apartments	39%	7%	29%	0%	50%	4%	10%
Total Current Dwellings	1896	3593	1169	38	1610	563	2732
Dwellings/Ha	17	16	6	0	11	13	16
Shop/Retail (m <sup>2</sup> )	11,300	5,400	57,100	70,000		10,900	4,400
Office Business (m <sup>2</sup> )	2,750	1,700	42,800	200,000		9,400	3,400
Ent/Rec/Culture (m <sup>2</sup> )	9,650	440	11,200	14,500		2,200	2,100
Other Retail (m <sup>2</sup> )	700	730	45,900	100,000		1,600	2,200
Other Categories (m <sup>2</sup> )	53,700	1,400	111,500	760,000		10,100	6,700
Total Commercial / Industrial (m <sup>2</sup> )	78,100	9,700	268,500	1,115,000		34,200	18,800
Major Transport Infrastructure			Stirling Railway Station		Glendalough Railway Station		

Source – ABS (2006) – Census of Population and Housing, DPI (2007) – Industrial/Commercial Land Use Survey

Note – Floor space figures for Osborne Park and Glendalough are a mixture of commercial and industrial zoned areas, other areas are solely commercial

The projected characteristics of these areas as at 2031 is shown in the following table

Parameter	Scarborough / SEAS	Stirling Residential	Stirling Central	Osborne Park	Glendalough	Mt Hawthorn	Remainder	Total
Population	8,300	9,000	14-18,000	0	6,300-8,000	2,000	7,000	46-52,000
Shop Retail Floor Space (m <sup>2</sup> )	15-20,000	5-6,000	120-160,000	70,000		10-15,000	3-4,000	220-270,000
Office Business Floor Space (m <sup>2</sup> )	2-3,000	Minimal	200-300,000	250-300,000		Minimal	Minimal	450-600,000
Other Retail Floor Space (m <sup>2</sup> )	Minimal	Minimal	Minimal	120-140,000	Minimal	Minimal	Minimal	120-140,000
Tourist Accommodation (m <sup>2</sup> )	100-150,000	0	0	0	0	0	0	100-150,000
Other Industrial categories (m <sup>2</sup> )	0	0	0	900,000	0	0	0	900,000

The projected employment numbers in the corridor as at 2031 are shown in the following table

	Scarborough SEAS	Stirling Residential	Stirling Central	Osborne Park/Glendalough	Mt Hawthorn	Remainder	Total
Minimum	1,100	150	11,000	20,000	300	90	33,000
Mid Range	1,2-1,700	160-200	12-17,000	22-24,000	330-500	100-130	35-43,000
Maximum	1,800	220	18,500	26,300	550	150	47,000

## Public Transport

Based on assumptions of public transport usage across the entire metropolitan area and projections of population growth in the Scarborough Beach Road corridor, it is estimated the area could generate approximately 15,000 – 18,000 public transport trips per weekday by 2031. There is some evidence that public transport usage in the corridor is higher than across the metro area in general and so these figures may be a conservative estimate.

A number of studies have been carried out to estimate the number of trips required to make various transit systems viable. Thresholds developed by Sinclair, Knight & Mertz range from 1,000 passengers per hour for a rapid bus system to above 4,500 per hour for a heavy rail system. These estimates are derived from an analysis of Sydney conditions and may require additional moderation for Perth conditions. The figure of 15-18,000 public transport trips per week day along various sections of the Scarborough Beach Rd corridor by 2031 has been used to evaluate the type of transit system that would be viable in this area. Public transport usage across the day is not uniform, with 80% of boardings estimated to occur during the morning and evening peak period. Assuming that the two peak periods account for 6 hours in a day, this would suggest a load of 2-2,300 passengers per hour during the times of heaviest use. This level of patronage would appear to make a bus rapid transit system in this area viable.

It is noted that issues such as climate change and increased petrol prices/peak oil are likely to have a major effect on transport and may force changes over a short time scale. It is difficult to quantify the effect of these issues on a small spatial area; however there may be some validity in considering the potential outcomes in tandem with the question of economic viability.

# Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>3</b>
<b>1. INTRODUCTION .....</b>	<b>1</b>
1.1 Background to the Project .....	1
1.2 Purpose.....	1
<b>2. ACTIVITY CORRIDOR RATIONAL AND CHARACTERISTICS .....</b>	<b>2</b>
2.1 Planning Principles .....	2
2.2 Rational for Activity Corridors .....	2
2.3 Characteristics of an Activity Corridor.....	4
<b>3. POPULATION ORGANISATION UNITS .....</b>	<b>5</b>
<b>4. SCARBOROUGH BEACH ROAD POPULATION PROFILE .....</b>	<b>7</b>
4.1 Population Size and Age Profile .....	7
4.2 Household Composition and Income.....	8
4.3 Population Mobility.....	11
4.4 Residence Tenure.....	12
4.5 Dwelling Types.....	13
4.6 Demographic Summary .....	13
<b>5. RESIDENT EMPLOYMENT PROFILE.....</b>	<b>15</b>
5.1 Occupations and Industries of Employment .....	15
5.2 Employment Self Sufficiency and Self Containment .....	16
<b>6. COMMERCIAL AND INDUSTRIAL ACTIVITY .....</b>	<b>17</b>
6.1 Floor Space Usage and Employment in the Scarborough Beach Road Corridor .....	17
6.2 Comparison of Commercial Activities with Perth Metro Area and Other Activity Areas .....	17
6.3 Future Demand for Commercial Floor Space in the Metropolitan Area .....	19
6.4 Osborne Park Industrial Area .....	20
<b>7. POPULATION GROWTH IN THE SCARBOROUGH BEACH ROAD CORRIDOR.....</b>	<b>21</b>
7.1 The Effect of Population Growth on Development Strategies .....	21
7.2 Population Projection Data Sets .....	21
7.3 Limitations of Population Projections at Small Geographic Scales .....	21
7.4 Population Growth Based on Natural Growth.....	21
7.5 Potential Development Implications on Population Growth.....	23
7.5.1 Scarborough Environs Area Strategy .....	23
7.5.2 Stirling City Centre.....	24
7.5.3 Herdsman Business Park .....	24
7.5.4 Glendalough TOD .....	24
7.5.5 Scarborough Beach Rd/Oxford Street.....	24
7.6 Corridor Populations Resulting From Implementation of Proposed Developments .....	24
7.7 Summary of Population Growth.....	25
<b>8. ACTIVITY CENTRE HIERARCHY .....</b>	<b>26</b>
8.1 Introduction .....	26
8.2 Current State Planning Strategies .....	26
8.3 Proposed Differentiation of Centres and Associated Regions .....	27
8.4 Projected Centre Characteristics as at 2031 .....	30

8.5	Employment .....	31
<b>9.</b>	<b>PUBLIC TRANSPORT .....</b>	<b>34</b>
9.1	Existing Public Transport Situation .....	34
9.2	Projected Public Transport Usage By Residents.....	34
9.3	Projected Public Transport Usage By Workforce .....	35
9.4	Transit System Viability.....	36
9.5	Additional Considerations .....	36
	<b>APPENDIX 1 – SCARBOROUGH BEACH ROAD COLLECTION DISTRICT SUMMARY.....</b>	<b>39</b>
	<b>APPENDIX 2 – SPATIAL DISTRIBUTION OF COLLECTION DISTRICTS .....</b>	<b>41</b>
	<b>APPENDIX 3 – POPULATION DISTRIBUTION BY COLLECTION DISTRICT AS AT 2006 CENSUS.....</b>	<b>42</b>
	<b>APPENDIX 4 – POPULATION DENSITY BY COLLECTION DISTRICT AS AT 2006 CENSUS.....</b>	<b>43</b>
	<b>APPENDIX 5 – AGE DISTRIBUTION AS AT 2006 CENSUS.....</b>	<b>44</b>
	<b>APPENDIX 6 – LONE HOUSEHOLDS DISTRIBUTION AS AT 2006 CENSUS .....</b>	<b>48</b>
	<b>APPENDIX 7 – INCOME DISTRIBUTION AS AT 2006 CENSUS .....</b>	<b>49</b>
	<b>APPENDIX 8 – LOCATION OF EXISTING COMMERCIAL AND INDUSTRIAL AREAS IN SBR CORRIDOR .....</b>	<b>55</b>
	<b>APPENDIX 9 – COMMERCIAL AND INDUSTRIAL ACTIVITY BY PLANNING LAND USE.....</b>	<b>56</b>

# 1. Introduction

## 1.1 Background to the Project

Scarborough Beach Road is a 10km long district distributor A class road connecting the inner city area with the coastal region at Scarborough. It passes through a range of urban localities and incorporates residential, commercial and industrial land use areas. The corridor currently performs a number of functions within the context of the metropolitan area, being both a transport link for the north western suburbs and a major destination in its own right. Development along the corridor has occurred in piecemeal fashion over time and now suffers from poor co ordination between land use and transport requirements

## 1.2 Purpose

The purpose of this report is to

- provide an initial analysis of existing population demographics along the SRB corridor
- examine the population growth projections available for the Perth Metropolitan region and appraise how this growth may impact on the population of the corridor, both in overall magnitude and distribution
- examine current commercial activity in the corridor and provide scenarios for commercial growth based on population growth
- Provide some commentary on the viability of a mass transport system (eg -light rail/dedicated bus system) based on the population projection estimates derived above.

## 2. Activity Corridor Rational and Charactersitics

### 2.1 Planning Principles

Activity corridors are an important component of the urban structure envisaged in Network City, which promoted a more logical, intimate and appropriate relationship between land uses and the movement networks that serve them. The 20<sup>th</sup> century approach to town-planning that underpins the urban structure of the Perth Metropolitan Region Scheme is based on an assumption of widespread car ownership and cheap running costs; evident in a dispersion of activity centres and employment areas based on the distance between them rather than the transport infrastructure, particularly transit infrastructure, that connects them. After all, in a car-based movement system, travel is equally easy in any direction whereas travel by public transport is constrained by the location and direction of the transit infrastructure. In essence, the aim of Network City was to better align the places of activity (the places that people need to travel to and from) with the public transit network that people can use to get to and from their daily activities.

Network City identified a range of places that activity takes place within the urban structure: Activity Centres, Activity Corridors, Specialised Centres, Industrial Centres and the Central Business District. According to Network City, Activity Corridors *“are connections between activity centres that provide excellent, high frequency public transport to support the land uses that will occur along the activity corridors and at the activity centres. Activity corridors are not designed to be high-speed through traffic routes.”* As a definition, it's a useful start, but requires further consideration of the rationale behind the concept before the ideal characteristics of an activity corridor can be fleshed out.

In June 2009, the WAPC released the Directions 2031 framework. This document outlines the high level strategic plan under which the future growth of Perth and Peel will be governed. Directions 2031 builds on the themes identified in Network City but modifies these themes to allows for contemporary changes in growth trends that have occurred since the release of Network City. In particular, Directions 2031 makes the following assumptions:

- A more compact city is desirable
- An appreciation of the existing metropolitan area configuration and an acceptance of the need to work with this configuration
- More efficient use of land and infrastructure is required
- Prioritisation of land that is already zoned

Directions 2031 also outlines a hierarchy of centres within the Metro area and aligns these centres with particular sets of characteristics. The plan therefore has a direct impact upon the Scarborough Beach Road corridor as several localities in the area are identified within the hierarchy of centres and this will have a determination on how these centre develop.

### 2.2 Rational for Activity Corridors

The first part of the activity corridor equation is an assumption that if the land uses in an activity corridor are to be supported by high-frequency public transport, then they need to generate sufficient patronage to justify the expenditure on the public transport provision. Patronage is very much related to the density and intensity of development. In simple terms; more floorspace and the more intensively it is used, the more people whether, resident or in the workforce and therefore the greater patronage of public transport.

The second part of the equation is the direction of movement. For public transport to be an attractive means of transport the desire line between different activities, including between where people live and where they do things, should be along the public transport route. In simple terms, the activity and thus the intensity of development that contains the activity, should be linear. Where hot spots of activity occur (activity centres) they too, should lie on, or close to, the activity corridor.

The more that an activity corridor contains the spectrum of land uses that make up the daily life of people, the more that the corridor funnels movement within itself, the more it can be said to be self-contained. Self-containment reduces the need to travel further afield within the urban environment, and as David Engwicht once

said, the hallmark of a more sustainable urban environment is one that “*maximises human exchange whilst minimising the travel necessary to do it*”<sup>1</sup>.

To maximise the degree of activity self-containment within an activity corridor, it is important to incorporate both destination and origin uses – the places that people travel to and the places they travel from. The principal origin use is residential; that is, where people live. Destination uses include employment, shopping, learning, recreation and entertainment.

To accommodate sufficient people living within reasonable walking distance of the public transport and other services along the corridor and to provide enough patronage to support those services the density of residential needs to be relatively high. These may be apartments, although significant density can be achieved with a more intense version of medium density accommodation such as terrace houses. Given that apartments don't need to be on the ground floor, they can be located above commercial land uses to make even more efficient use of the valuable land along the activity corridor.

The non-residential activities to which people travel should also be located along the corridor so that the residents within the corridor have the option to either walk or take convenient public transport from the place that they live to the places that they work, learn or play. One element of this is the strict economic concept of employment self containment which refers to the proportion of jobs in a location that are actually performed by workers who are resident in the location. The greater the level of employment self containment across a specific geographic region, the less overall travel demand. The important part of the rationale for the activity corridor is therefore to ensure the corridor is an attractive location for the variety of land uses that are contained within in it, hence maximising the mix of residents and employment opportunities.

For an activity corridor to be attractive to residents it must have, in addition to the provision of local services and public transport, a safe and attractive streetscape where walking is perceived as a comfortable and desirable choice, not an unavoidable challenge. To this end, the streetscape must provide shade and shelter; traffic behaviour must be tamed; and the pedestrian crossing regime must be enhanced to give pedestrians more than a fighting chance to cross the road. The taming of traffic behaviour and the provision of shade and shelter through street planting also has the added bonus of creating a more desirable streetscape for an outlook from a residential apartment.

For an activity corridor to be attractive to businesses and their customers, it needs to provide physical exposure and access. Given that the intent of an activity corridor is to funnel movement and activity together, exposure is an inherent by-product. Whilst access provision by public transport is improved by higher frequency services in an activity corridor, most businesses will still need to be accessed by customers or clients in car. No matter how good the provision of public transport is, or how expensive oil will become, the private car will still be an important means of travel within the urban environment in the future. Therefore, the activity corridor needs to work for cars too.

The fundamental difference between the urban arterials of the 20<sup>th</sup> century and the activity corridors of the 21<sup>st</sup> century is that the road is no longer seen as a traffic corridor whose sole purpose is to enable as many cars as possible to travel from one end to the other with minimal interruption. In an activity corridor, cars can still drive from one end to the other but not at the expense of other users of the street such as public transport, pedestrians and the businesses that may face the street. The corridor is a series of linked nodes rather than a continuous wall.

From the business perspective, it is not enough for passers-by to see the premises and then pass on by. Those passers-by need to be able to stop and become customers. Therefore, the provision of convenient/accessible parking is a necessity. On street parking is optimal from a business owner's point of view. This can allow some parking right outside the front door but without divorcing the business from the footpath and the pedestrian traffic by placing a barrage of parked cars in their way. Parking can also be provided between the footpath and set back business premises, but this divorces the activity from the footpath and can be unattractive. Another option is to provide it at the rear of the development via laneways, but patrons without local knowledge may not know it is there and careful design is required so that passing trade can read the street and parking arrangements easily. In other words, a lack of on-street parking reduces street oriented business activity and detracts from the ability of a location to act as an activity corridor.

<sup>1</sup> David Engwicht (1993) – *Reclaiming our Cities and Towns*, New Society Publishers

## 2.3 Characteristics of an Activity Corridor

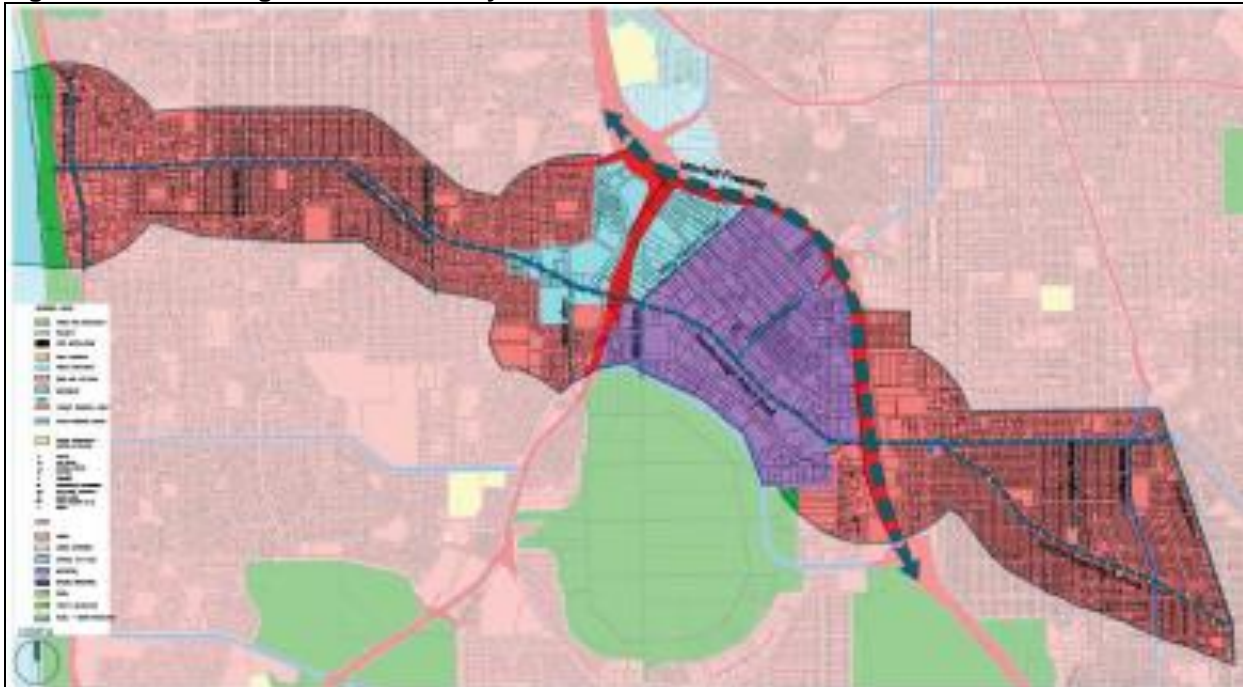
There are evidently many aspects characterising an ideal activity corridor. The following points are suggested as being important features for inclusion:

- High density apartment living sometimes as a component of mixed use development in nodes and centres
- A wide range of retail, office, food and beverage, fine-grained commercial services, health, short-stay accommodation and education uses
- A high intensity of development along the street that forms the spine of the activity corridor, with a reduction in intensity behind, subject to local conditions (land uses, street network, heritage and amenity issues)
- A 'pulsing' of activity depending on the intersection of other corridors and movement paths, and the location of existing centres
- A supplementary dedicated transit system if more than a few kilometres in length
- 'Urban' buildings that meet the footpath
- On-street car parking to provide access to businesses and add 'friction' to the traffic movement, at least in centres or hot spots
- High frequency bus or light rail transit with a minimum 10-minute, but preferably 5-minute, headway
- Queue jump facilities or other priority measures for public transit
- Street trees and canopies to provide shade and shelter
- Wide footpaths on both sides of the street
- Formalised pedestrian crossings with kerb nibs, median islands and signals as required
- Frequent use of traffic measures to create traffic platoons and allow pedestrian crossing and vehicle turning movements
- Ambient traffic speeds of less than 50mk/hr
- Elimination of acceleration and deceleration lanes, left-turn pockets and free left turns at signalised intersections (unless part of a bus priority measure), to reduce the 'bitumenscape', modify traffic behaviour and improve pedestrian amenity
- Parallel rear lanes on local streets (not continuous along the length of the corridor) that enable safe and efficient vehicle access and local circulation patterns to develop)
- A growth strategy that allows a critical mass of development to occur in 'hot-spots' in the short to medium term, and then allows the 'hot-spots' to grow and eventually merge.

### 3. Population Organisation Units

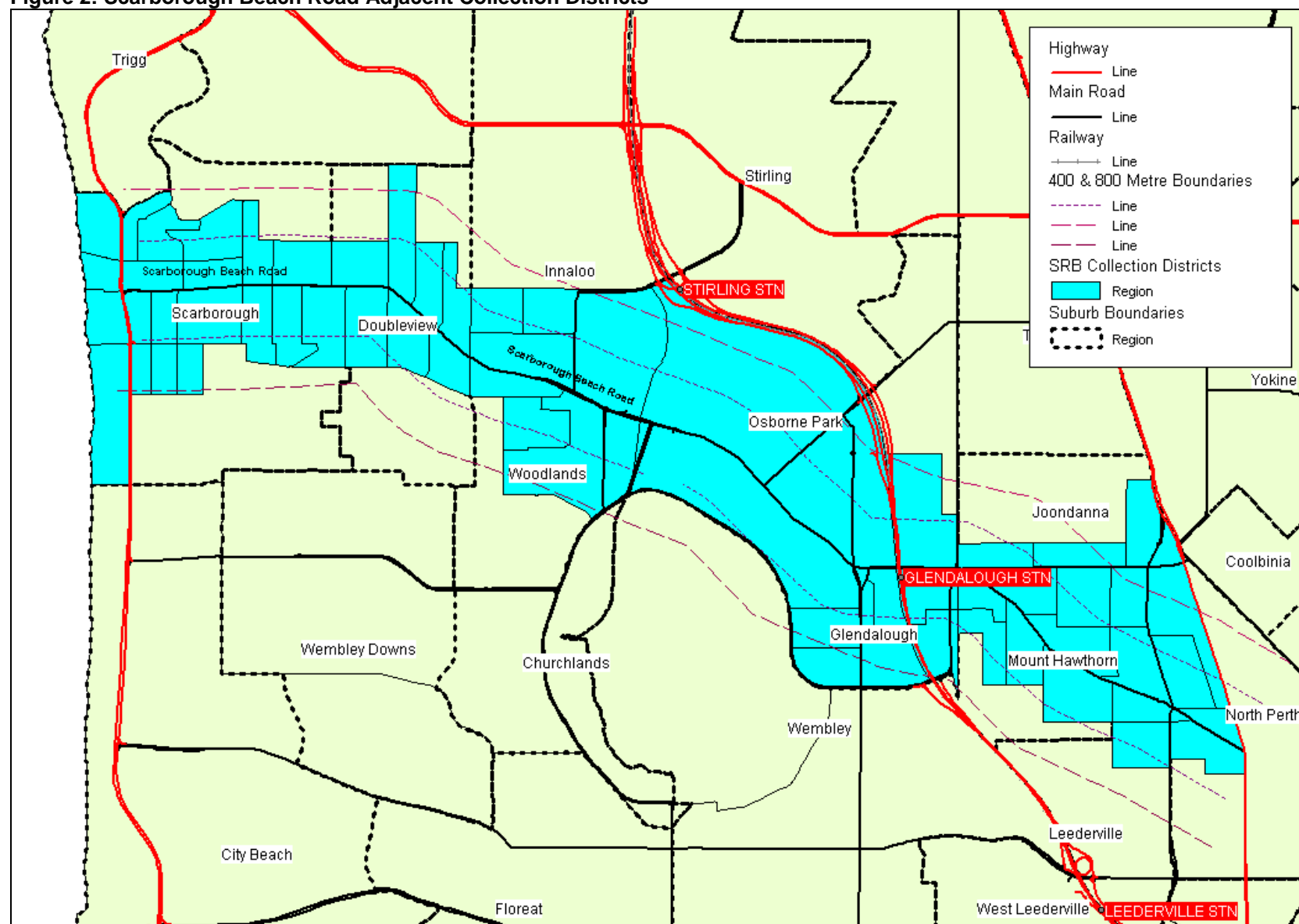
The Scarborough Beach Road study area as outlined in the project brief is shown in the following figure

**Figure 1: Scarborough Beach Rd Study Area**



In order to provide a coherent picture of the regional demographics, the study area must be matched with available data sources. The smallest geographical unit used by the Australian Bureau of Statistics as part of the Population and Dwelling Census is the Collection District. In urban areas a CD has, on average, approximately 225 dwellings. Collection Districts can vary in boundary conditions from census to census, meaning that they cannot be compared over a time series. However, they can provide a detailed snapshot of a small spatial area at the time of the particular census they relate to and these snapshots can be aggregated to provide population details of an irregular area, such as the entire Scarborough Beach Road study area and any subsequently identified sub regions within the corridor. They can also be used as the basis for examining scenarios of population growth. A map of the 2006 census collection districts adjacent to Scarborough Beach Road can be seen in **Figure 2**. A full list of the collection districts used in this study is shown in Appendix 1 with relevant summary information.

**Figure 2: Scarborough Beach Road Adjacent Collection Districts**



## 4. Scarborough Beach Road Population Profile

### 4.1 Population Size and Age Profile

As noted in section 3, the data for the Scarborough Beach Road corridor has been aggregated by summing the census data for the relevant collection districts. As collection districts are sub-sets of local government areas, an additional level of analysis has been carried out to separate the CDs into either the Stirling or Vincent section of Scarborough Beach Rd. The total population figures for the study area, the relevant LGAs and the Perth Metro area are shown in the following table, along with the proportional representation of populations for these areas.

**Table 1: Population Sizes and Proportions**

Region	Population	Proportion of LGA
Stirling LGA	176,871	9.9%
Stirling Section of SRB	17,613	
Vincent LGA	26,880	25.5%
Vincent Section of SRB	6,849	
Perth Metro Area	1,445,078	1.7%
Total SRB Corridor	24,462	

Source – ABS (2006) Census of Population and Housing

It should be noted that the 2006 estimated resident population is somewhat higher for each region compared with the census,

- Perth Metro – 1,518,748
- Stirling LGA – 186,286
- Vincent LGA – 28,515

However, the equivalent ERP is not available at CD level and so the census data has been used to calculate the proportional representation. It is estimated that the Scarborough Beach Road corridor may have an actual population that is approximately 1,000 – 1,200 persons larger than the figure shown in **Table 1**. In terms of population densities, the majority of the corridor has between 20 and 30 people per hectare. The highest population densities are in the Hastings/Brighton/Stanley St area of Scarborough and the Pollard/Cayley St area of Glendalough.

The following table shows the total population and age profile of the collection districts outlined in **Figure 2** as at the 2006 census. The corridor has been disaggregated to show data specific to collection districts in Stirling and Vincent LGAs respectively.

**Table 2: Scarborough Beach Road Population and Age Profile**

Age Group	Stirling LGA Section		Vincent LGA Section		Total Corridor	
	Number	%	Number	%	Number	%
0-4	866	4.9%	561	8.2%	1427	5.8%
5-14	1,338	7.6%	815	11.9%	2153	8.8%
15-24	2,577	14.6%	754	11.0%	3331	13.6%
25-39	5,172	29.4%	1937	28.3%	7109	29.1%
40-54	3,341	19.0%	1535	22.4%	4876	19.9%
55-64	1,554	8.8%	483	7.1%	2037	8.3%
Over 64	2,765	15.7%	764	11.2%	3529	14.4%
<b>Total</b>	<b>17,613</b>	<b>100.0%</b>	<b>6849</b>	<b>100.0%</b>	<b>24,462</b>	<b>100.0%</b>

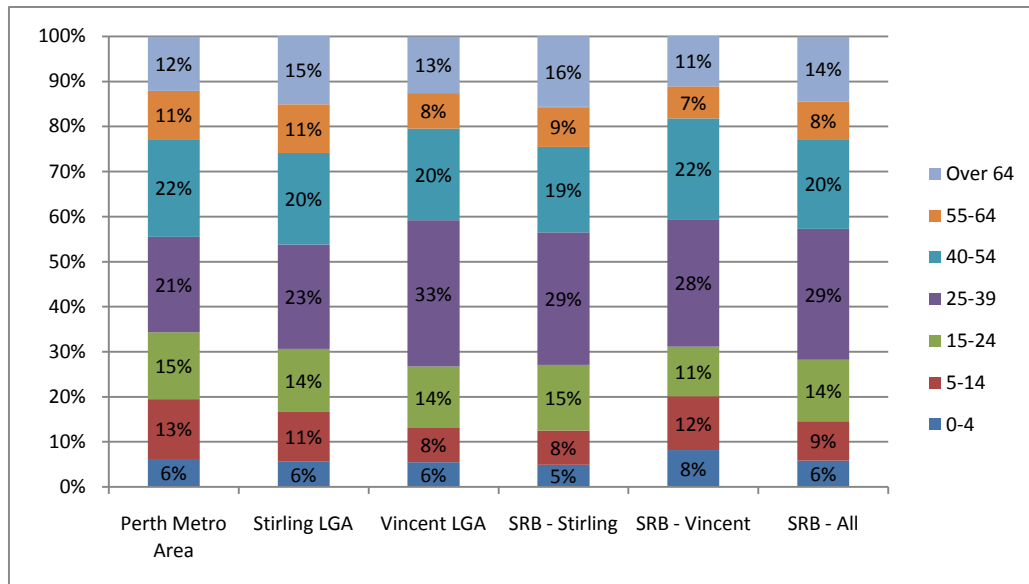
Source – ABS (2006) Census of Population and Housing

The 25-39 age bracket accounted for the largest proportion of people in both sections and overall, while the relatively high proportion of people in the +64 age group in comparison to the under 14 age groups underlines the general aging of the population.

This data provides some indication that the collection districts adjacent to Scarborough Beach Road within Vincent LGA have a younger age profile than the Stirling section. A possible cause of this difference is an influx of reasonably wealthy younger professional families to inner city areas such as Mount Hawthorn.

The following chart compares the age profile of the sections of the Scarborough Beach Road corridor outlined in **Table 2** with the Perth Metro Area as a whole, Stirling LGA and Vincent LGA.

**Figure 3: Comparison of Age Profile**



Source – ABS (2006) Census of Population and Housing

The main point of interest in **Figure 3** is difference in the proportional representation of the 25-39 age group between the Scarborough Beach Road corridor and the metro area as a whole. For both sections of the Scarborough Beach this age group accounts for approximately 1/3 of the cohort while the figure for the Perth Metro area is approximately 20%.

Full thematic mapping of population and age distribution at collection district level, along with residents per hectare densities are shown in **Appendix 3, 4 & 5**.

#### 4.2 Household Composition and Income

The following table provides a breakdown of household types, using the same groupings as the age and population size table to disaggregate the data

**Table 3: Scarborough Beach Road Household Types**

Household Composition	Stirling LGA Section		Vincent LGA Section		Total Corridor	
	Number of Households	%	Number of Households	%	Number of Households	%
Lone Person	3,154	40.1%	737	28.3%	3,891	37.2%
Family	4,059	51.6%	1,708	65.7%	5,767	55.1%
Non Family Group	651	8.3%	155	6.0%	806	7.7%
<b>Total</b>	<b>7,864</b>	<b>100.0%</b>	<b>2,600</b>	<b>100.0%</b>	<b>10,464</b>	<b>100.0%</b>

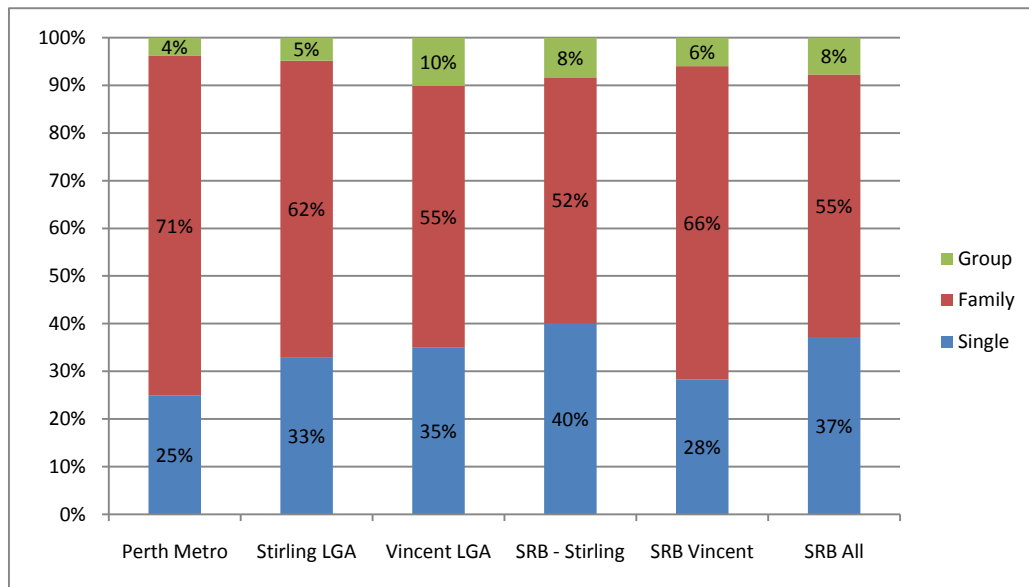
Source – ABS (2006) Census of Population and Housing

These data indicate that a substantial proportion of households in the Stirling LGA section of the corridor are lone person households. It is interesting to observe that the proportion of 25-39 years olds are quite similar between the Stirling and Vincent sections of the corridor and yet the proportion of lone person households are quite different between these two areas. It would generally be assumed, given current social trends, that this age group would be the most likely to be living in a lone person household and that the age/household pattern shown for the Stirling section of the corridor would be a more likely combination. The Stirling section includes Scarborough, which has a high proportion of lone person households in apartments. This not only may partly

explain the difference between the Vincent and Stirling sections of the Road, but also illustrates the role of housing type in influencing household mix.

The following table provides a comparison of household types across the Metro Area, LGAs and sections of the Scarborough Beach Rd corridor

**Figure 4: Comparison of Household Types**



Source – ABS (2006) Census of Population and Housing

This chart shows that the Stirling LGA section in particular and the entire corridor in general has a different household makeup compared to the metro area, with the prevalence of lone person households evident.

Weekly household income by household type is shown in the table below

**Table 4: Gross Household Weekly Income**

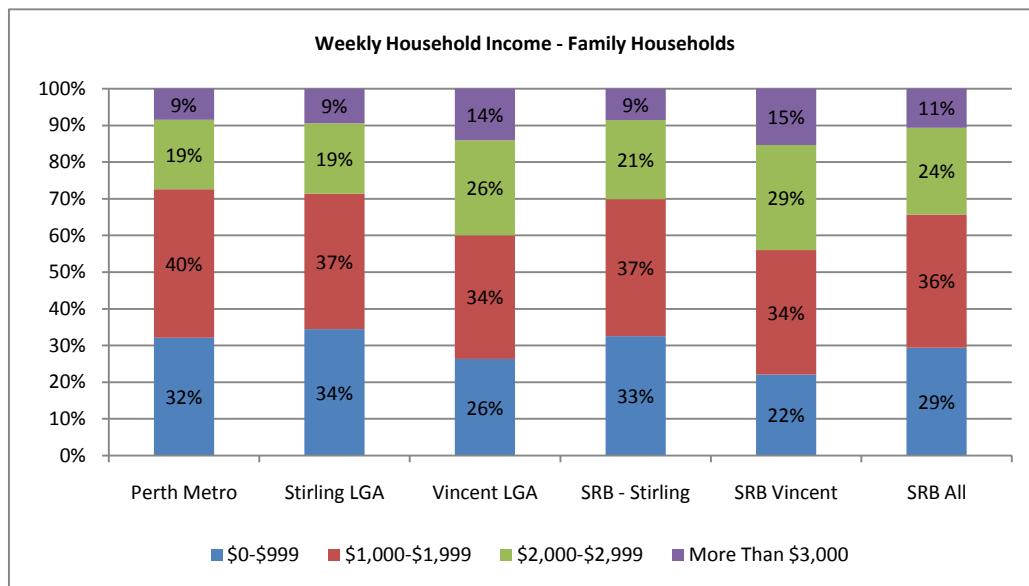
Household Types	Income Range	Stirling LGA Section		Vincent LGA Section		Total Corridor	
		Number of Households	%	Number of Households	%	Number of Households	%
Family	\$0-999	1,154	32.6%	341	22.0%	1,495	29.4%
	\$1,000-\$1,999	1,323	37.4%	526	34.0%	1,849	36.3%
	\$2,000-\$2,999	761	21.5%	443	28.6%	1,204	23.7%
	>=3,000	304	8.6%	237	15.3%	541	10.6%
	Total	3,542	100.0%	1,547	100.0%	5,089	100.0%
Non Family	\$0-999	2,470	70.4%	473	58.3%	2,943	68.1%
	\$1,000-\$1,999	799	22.8%	259	31.9%	1,058	24.5%
	\$2,000-\$2,999	210	6.0%	73	9.0%	283	6.5%
	>=3,000	32	0.9%	6	0.7%	38	0.9%
	Total	3,511	100.0%	811	100.0%	4,322	100.0%
All	Not Known	823	100.0%	246	100.0%	1,069	100.0%

Source – ABS (2006) Census of Population and Housing

This data indicates that the Vincent section of the corridor is generally more affluent than the Stirling section. Analysis at CD level indicates there is a high proportion of low income households along Green St in Joondanna which coincides with a high proportion of over 65's while there are high proportions of high earners in the Egina/Buxton St area of Mr Hawthorn.

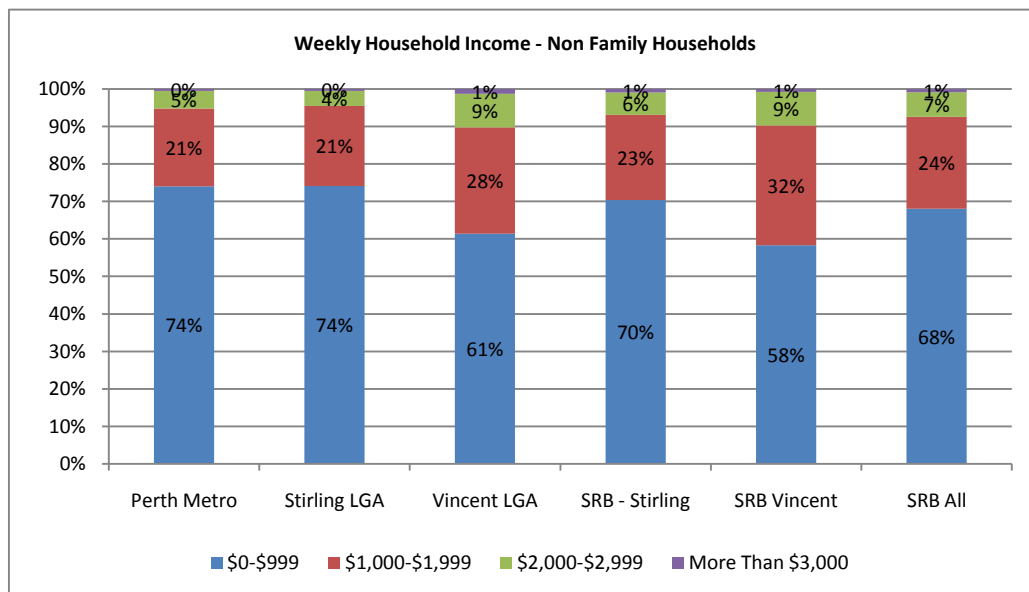
The following charts compare gross weekly household income between the Perth Metro area, the applicable LGAs and the Scarborough Beach Road corridor.

**Figure 5: Comparison of Weekly Household Incomes - Family Households**



Source – ABS (2006) Census of Population and Housing

**Figure 6: Comparison of Weekly Household Incomes - Non Family Households**



Source – ABS (2006) Census of Population and Housing

This data also indicates that the Vincent LGA section of the corridor is relatively more affluent than the wider metropolitan area.

Full thematic mapping of household types and incomes are shown in **Appendix 6 & 7**.

### 4.3 Population Mobility

The census collects information on mobility by recording whether a person lived at the same address at the time of the census as they did 1 year ago and 5 years ago. This data has been collated for the Scarborough Beach Rd corridor and is shown in the following table.

**Table 5: Residence 1 Year & 5 Years Ago**

Time Scales	Residence Situation	Stirling LGA Section		Vincent LGA Section		Total Corridor	
		Number of People	%	Number of People	%	Number of People	%
Residence 1 year ago	Same Address	11,852	67.9%	5,087	75.9%	16,939	70.2%
	Different Address	3,862	22.1%	1,181	17.6	5,043	20.9%
	Not Known	1,729	9.9%	432	6.4%	2,161	8.9%
Residence 5 years ago	Same Address	6,603	39.4%	3,307	52.8%	9,910	43.0%
	Different Address	8,319	49.7%	2,507	40.0%	10,826	47.0%
	Not Known	1,833	10.9%	455	7.3%	2,288	9.9%

Source – ABS (2006) Census of Population and Housing

This data indicates that residents in the Vincent LGA section of the corridor have been less mobile than residents in the Stirling section and it is notable that only 40% of Stirling residents have lived at their current address for the past 5 years. The highest levels of mobility are evident in the Stanley/Hastings St area of Scarborough which also notable for having high levels of lone person households in the 15-39 year old age group.

**Figure 7: Comparison of Mobility for SRB Corridor, Perth Metro Area and Relevant LGAs**



Source – ABS (2006) Census of Population and Housing

Comparisons with the wider metropolitan area indicate that the Stirling LGA section of the corridor is noticeably different when comparing resident mobility. This data should be compared with dwelling tenure type to investigate the connection of mobility to rental accommodation. It is also noticeable that the connection between mobility and location is reversed with regard to the two LGAs, with the corridor section of Vincent LGA having a relatively low level of mobility but the wider LGA being highly mobile while the opposite situation occurs in Stirling LGA.

#### 4.4 Residence Tenure

The breakdown of tenure type for residents in the corridor is shown in the following table

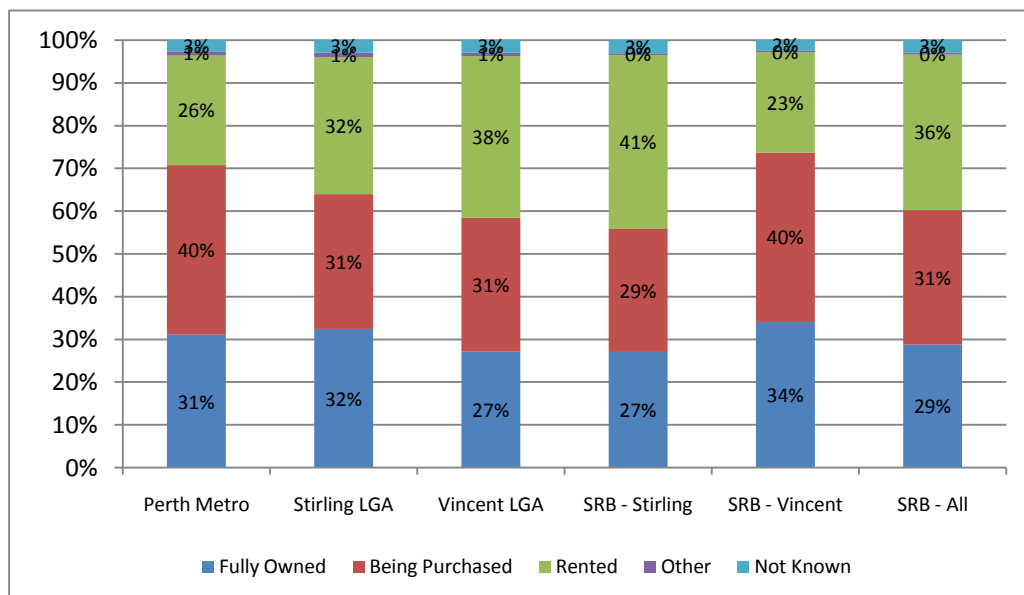
**Table 6: Tenure Type for Scarborough Beach Road Corridor**

Tenure Type	Stirling LGA Section		Vincent LGA Section		Total Corridor	
	Number of Households	%	Number of Households	%	Number of Households	%
Fully Owned	2,135	27.1%	886	34.1%	3,021	28.8%
Being Purchased	2,266	28.7%	1,030	39.6%	3,296	31.4%
Rented	3,208	40.7%	609	23.4%	3,817	36.4%
Other Tenure Type	34	0.4%	10	0.4%	44	0.4%
Not Stated	244	3.1%	64	2.5%	308	2.9%
<b>Total</b>	<b>7,887</b>	<b>100.0%</b>	<b>2,599</b>	<b>100.0%</b>	<b>10,486</b>	<b>100.0%</b>

Source – ABS (2006) Census of Population and Housing

The main highlight of this table is the high proportion of households in the Stirling section who are in rented accommodation. The comparison with the metro area and relevant LGAs is shown in the following chart

**Figure 8: Tenure Type Comparison for SRB Corridor, Perth Metro Area and Relevant LGAs**



Source – ABS (2006) Census of Population and Housing

This data indicates that the Stirling section of Scarborough Beach Road has quite a different tenure profile to the metropolitan area in general. It also indicates that the Vincent section of the corridor is quite different to the rest of Vincent LGA, with the corridor having high levels of ownership whereas the LGA has high levels of rentals

## 4.5 Dwelling Types

The following table illustrates the breakdown of occupied dwelling types in the corridor.

**Table 7: Dwelling Type Breakdown for Scarborough Beach Road Corridor**

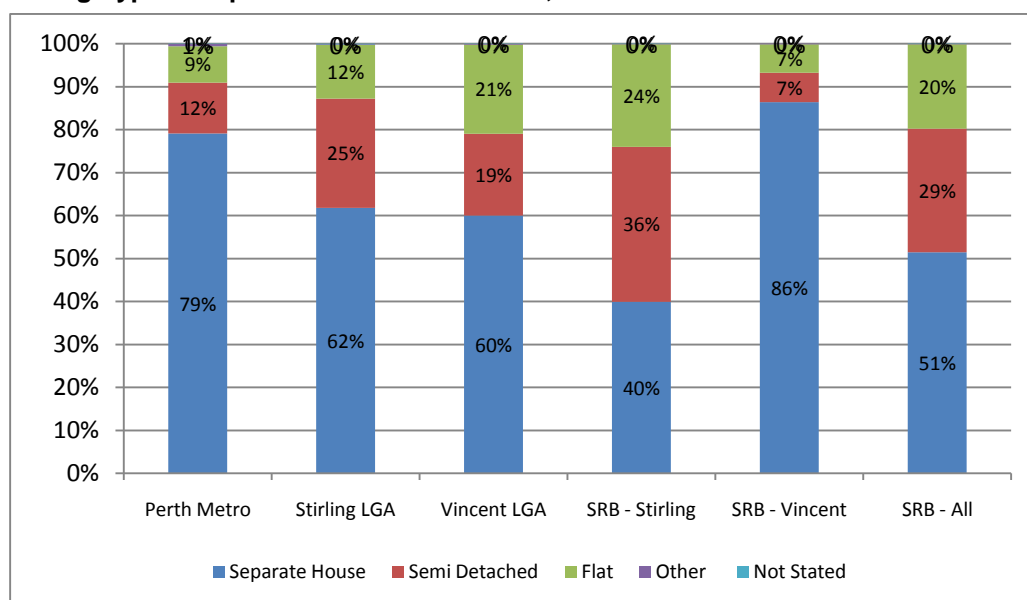
Dwelling Type	Stirling LGA Section		Vincent LGA Section		Total Corridor	
	Number of Dwellings	%	Number of Dwellings	%	Number of Dwellings	%
Separate House	3,155	39.9%	2,248	86.4%	5,403	51.5%
Semi Detached	2,844	36.0%	178	6.8%	3,022	28.8%
Flat or Apartment	1,888	23.9%	173	6.6%	2,061	19.6%
Other Dwelling Type	3	0%	4	0.2%	7	0.1%
Not Known	8	0.1%	0	0%	8	0.1%
<b>Total</b>	<b>7,898</b>	<b>100.0%</b>	<b>2,603</b>	<b>100.0%</b>	<b>10,501</b>	<b>100.0%</b>

Source – ABS (2006) Census of Population and Housing

This table shows that the Stirling section of the corridor has a high proportion of medium and high density dwellings compared to the Vincent section.

The comparison with the metro area and relevant LGAs is shown in the following chart

**Figure 9: Dwelling Type Comparison for SRB Corridor, Perth Metro Area and Relevant LGAs**



Source – ABS (2006) Census of Population and Housing

This chart emphasizes the high proportion of flats and semi detached dwelling along Scarborough Beach Rd in Stirling LGA. A high proportion of these are in Scarborough.

## 4.6 Demographic Summary

The demographic data shows that the sections of the corridor have quite different profiles. The Vincent LGA section has a higher proportion of family households with young children, higher levels of household income, and generally supports groups who are buying or own detached properties. The Stirling section has a high proportion of single person households who are less wealthy, live in rental accommodation that is more likely to be of high and medium density, and who have higher levels of mobility. Both regions have similar proportions of middle aged people but the Stirling section has a lower proportion of young children and higher proportions of elderly people. The demographic makeup of the Stirling section is most likely influenced by the dwelling types prevalent in the Scarborough area, which contributes a considerable proportion of the population for this section of the corridor. There is also some evidence that section of Vincent LGA within the Scarborough Beach Road corridor has different characteristics to the remainder of the LGA and probably represents the most affluent and family oriented part of this LGA. Additional analysis can be undertaken to investigate smaller geographic areas

---

within the corridor to isolate particular localities of interest. A summary of each CD in the corridor and thematic maps showing various characteristics of individual collection districts are shown in the appendices.

## 5. Resident Employment Profile

### 5.1 Occupations and Industries of Employment

The occupations of residents of the Scarborough Beach Corridor are shown in the following table.

**Table 8: Scarborough Beach Road Resident Occupations**

Occupation	Stirling LGA Section		Vincent LGA Section		Total Corridor	
	Number of People	%	Number of People	%	Number of People	%
Managers	1077	11.6%	495	13.6%	1572	12.1%
Professionals	2447	26.3%	1302	35.7%	3749	28.9%
Techicians/Trades	1350	14.5%	432	11.8%	1782	13.7%
Community/Personal Service	857	9.2%	293	8.0%	1150	8.9%
Clerical/Admin	1386	14.9%	460	12.6%	1846	14.2%
Sales	855	9.2%	334	9.1%	1189	9.2%
Machinery/Drivers	464	5.0%	97	2.7%	561	4.3%
Labourers	759	8.1%	207	5.7%	966	7.4%
Not Known	121	1.3%	32	0.9%	153	1.2%
<b>Total</b>	<b>9,316</b>	<b>100.0%</b>	<b>3,652</b>	<b>100.0%</b>	<b>12,968</b>	<b>100.0%</b>

Source – ABS (2006) Census of Population and Housing

The data indicates a high proportion of residents in the Vincent section of the corridor are employed as managers and professionals and this is likely to be related to the high incomes associated with this area, as shown in section 4.2.

The comparison with the Perth Metro area and relevant LGAs is shown below.

**Table 9: Occupation Comparison for SRB Corridor, Perth Metro Area and Relevant LGAs**

Occupation	Perth Metro Area	Stirling LGA	Vincent LGA	SRB Corridor
Managers	11.2%	11.7%	13.1%	12.1%
Professionals	20.6%	24.7%	36.6%	28.9%
Techicians/Trades	16.0%	13.8%	10.6%	13.7%
Community/Personal Service	9.1%	8.8%	8.4%	8.9%
Clerical/Admin	15.7%	16.0%	13.0%	14.2%
Sales	9.8%	9.8%	8.2%	9.2%
Machinery/Drivers	6.3%	4.8%	2.6%	4.3%
Labourers	9.7%	9.0%	6.3%	7.4%
Not Known	1.5%	1.4%	1.3%	1.2%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Source – ABS (2006) Census of Population and Housing

Data in the table indicate that residents of the Scarborough Beach Road Corridor are more likely than Perth metro residents generally to be in managerial and professional occupations and less likely to be in trades and labouring occupations.

The main industries of employment and the percentage of the resident workforce in these industries are shown below

For the Stirling section of the corridor

- Health care – 12%
- Retail trade – 10%
- Construction – 10%
- Professional & Scientific Services – 9.5%
- Education and Training – 8.5%

For the Vincent section of the corridor

- Professional & Scientific Services – 12.5%
- Health care & Social assistance – 12%
- Education and Training – 9.5%

- Retail trade – 9%

For the entire corridor

- Health care & Social assistance – 12%
- Professional & Scientific Services – 10.5%
- Retail trade – 10%
- Construction – 9%
- Education and Training – 9%

## 5.2 Employment Self Sufficiency and Self Containment

Details on the workforce profile are not available at collection district level for the census so it is not possible to directly calculate ratios for employment self sufficiency and self containment for the corridor. However, an estimate of at least employment self sufficiency can be made, based on assumptions of resident work force size and employment data from the commercial and industrial surveys. The 2006 census indicated there were approximately 18,000 residents of the corridor aged between 15 and 65. Assuming a workforce participation rate of 65% and an employment rate of 97% (based on ABS workforce Survey data), the resident workforce of the corridor is estimated to be 11,700. The latest commercial and industrial surveys indicate there is a total of 25,351 people working in the corridor and so the self sufficiency ratio is likely to be in the vicinity of 216%. Similar calculations carried out for the sections of the corridor at LGA level give a self sufficiency ratio of 263% for the Stirling section and 46% for the Vincent section. The primary reason for the high overall and Stirling figure is the location of the Osborne Park industrial area.

Census data on workforce and resident workforce profiles is available at Local Government Authority level and so self sufficiency and self containment ratios can be calculated for the wider area. This data shows the entire, Stirling LGA having a self sufficiency ratio of 70.5% and Vincent LGA having a self sufficiency ratio of 101.5%. In terms of self containment, 27% of the Stirling LGA resident workforce is employed in Stirling while an additional 20% work in the City of Perth. For Vincent LGA, 14% of the resident workforce is employed in the LGA with a further 31% working in the City of Perth and 10% working in Stirling LGA. This data indicates that the region in general is well catered for in terms of employment opportunities and that a considerable proportion of the resident workforce is employed within a reasonably small geographic region, indicating a relatively high degree of self containment.

It should also be noted that this area attracts a large number of workers from the North West Corridor. Analysis of self containment data for Joondalup and Wanneroo indicates that some 10,900 people are resident in Joondalup LGA and work in Stirling LGA, while 6,300 people are resident in Wanneroo LGA and work in Stirling LGA. The percentage of the resident work force of these LGAs who work in Stirling are 13% for Joondalup and 12% for Wanneroo. Stirling LGA is the third most frequent destination for Joondalup's resident workforce (after Joondalup and Perth) and the second most frequent destination for Wanneroo residents (after Wanneroo it's self). Although it is not possible to disaggregate this data to look at worker numbers specifically in the Scarborough Beach Road Corridor, the number of employment opportunities identified in this region would indicate that the corridor is the destination for a substantial proportion of these people.

## 6. Commercial and Industrial Activity

The spatial location of commercial and industrial zoned areas in the Scarborough Beach Rd corridor is shown in **Appendix 8**

### 6.1 Floor Space Usage and Employment in the Scarborough Beach Road Corridor

As at the time of the 2007 commercial and industrial floor space survey, the Scarborough Beach Road corridor had approximately 351,000m<sup>2</sup> of commercial floor space and 1,156,000m<sup>2</sup> of industrial floor space. With regards to employment, 7,145 were involved in commercial activities while industrial activity employed 18,206. (*note – results for both surveys are still preliminary as at the time of preparation of this report*). Full details of floor space and employment by planning land use categories are shown in **Appendix 9**. The main points identified from the analysis of the data is as follows

- The majority of commercial activity in terms of floor space use is shop/retail (22% of floor space), office/business (15%), residential (14%) storage and distribution (12%) and other retail (11%). The **other retail** category includes retail with extensive land use such as car yards.
- The majority of commercial activity in terms of employment is shop/retail (37% of employees) followed by office business (36%)
- The major industrial activities in term of floor space are storage and distribution (29% of floor space) followed by office/business (19%)
- The major industrial activities in terms of employment are office/business (56% of industrial employment) followed by manufacturing (12%)
- 287,000m<sup>2</sup> of commercial floor space in the corridor (82% of the total) and all industrial floor space is in Stirling LGA
- 5495 of all employees in commercial activity in the corridor (77% of the total) work and all industrial employment is in Stirling LGA
- 35% of commercial floor space and 27% of commercial employment in Stirling LGA is located in the Scarborough Beach Road corridor
- 15% of commercial floor space and 15% of commercial employment in Vincent LGA is located in the Scarborough Beach Road corridor

### 6.2 Comparison of Commercial Activities with Perth Metro Area and Other Activity Areas

The full set of commercial survey data for the Metropolitan area is not currently available so it is not possible to give an exact comparison of the Scarborough Beach Road corridor against the wider background. If the current Perth metropolitan population and previous survey data is used to approximate the current metropolitan commercial floor space, it is estimated there is approximately 11.5 million square metres available in the metro area. The 2007 data is available for the City of Perth and this indicates that the commercial floor area in the CBD and West Perth is 3,178,545m<sup>2</sup> and 538,629m<sup>2</sup> respectively, or 3,717,174m<sup>2</sup> combined. If this data is used in conjunction with the estimate for the entire metro area, it indicates that the Scarborough Beach Rd corridor accounts for approximately 3% of all commercial floor space in the metro area if the CBD/West Perth is included and 4.5% of all commercial floor space if the city is excluded.

The following table provides some comparisons with areas that have the some of the characteristics of an activity corridor and also with the CBD/West Perth area. Due to the disparate size of the areas involved, comparisons are given in terms of percentage of floor area for planning use categories and floor space per employee. The total row gives the magnitude of the data so percentages can be converted to values if required.

**Table 10: Comparison of Commercial Areas**

Planning Land Use Category	Scarborough Beach Rd			Subiaco (Town Centre)			Victoria Park (Albany Hwy)			CBD/West Perth		
	% Floor Space by PLUC	% Employ by PLUC	Floor Space / Employee	% Floor Space by PLUC	% Employ by PLUC	Floor Space / Employee	% Floor Space by PLUC	% Employ by PLUC	Floor Space / Employee	% Floor Space by PLUC	% Employ by PLUC	Floor Space / Employee
Rural	0.0%	0.0%	N/A	0.0%	0.0%	48.50	0.0%	0.0%		0.0%	0.0%	0.00
Manufacturing	5.3%	2.5%	103.09	1.7%	1.9%	27.19	1.2%	1.6%	34.29	0.8%	0.9%	30.75
Storage / Distribution	12.2%	3.9%	154.14	3.2%	1.3%	71.72	22.2%	6.2%	159.52	2.4%	0.6%	146.33
Service	4.5%	4.2%	52.36	3.4%	2.4%	41.78	7.7%	5.5%	62.17	1.3%	1.0%	43.95
Shop Retail	22.2%	37.0%	29.44	23.4%	27.7%	25.30	10.9%	13.5%	35.93	11.7%	9.6%	42.87
Other Retail	10.9%	3.8%	139.40	3.0%	1.4%	66.68	9.0%	5.3%	75.01	0.5%	0.2%	77.35
Office	15.0%	36.4%	20.28	44.5%	57.6%	23.15	33.8%	54.2%	27.67	50.2%	72.4%	24.38
Health	1.1%	1.6%	34.75	3.6%	2.8%	38.71	3.7%	12.1%	13.58	9.1%	9.5%	33.80
Recreation	6.5%	4.9%	65.49	3.9%	2.9%	39.56	1.6%	1.3%	52.51	4.9%	3.0%	55.98
Residential	13.9%	4.8%	143.45	0.1%	0.0%		0.2%	0.0%	949.60	10.0%	1.7%	212.13
Utilities	1.4%	0.9%	74.86	1.5%	1.8%	26.17	2.3%	0.4%	283.33	1.7%	1.0%	57.04
Vacant	7.0%	N/A	N/A	11.6%	N/A	N/A	7.0%	N/A	N/A	7.4%	N/A	N/A
<b>Total</b>	<b>351145 m<sup>2</sup></b>	<b>7145 employees</b>	<b>49.15m<sup>2</sup>/Employee</b>	<b>205,952m<sup>2</sup></b>	<b>6865 employees</b>	<b>30.38m<sup>2</sup>/e employee</b>	<b>197,999m<sup>2</sup></b>	<b>4492 employees</b>	<b>41.66m<sup>2</sup> / employee</b>	<b>3,717,174 m<sup>2</sup></b>	<b>105,795 employees</b>	<b>35.20m<sup>2</sup> / employee</b>

This table indicates that the Scarborough Beach Road corridor has a considerably lower proportion of office space in commercial areas than the comparison areas. However, it must be noted that there is a sizable office component in the Osborne Park industrial area that is not counted as commercial due to the zoning of the locality. If the commercial and industrial office component is combined, the Scarborough Beach Rd corridor has over 260,000m<sup>2</sup> of office space. For comparison, West Perth has slightly more than 380,000m<sup>2</sup> of office space.

Other notable points are

- The highest proportion of employment across all areas is usually in office/business and shop/retail. The CBD/West Perth area has a high proportion of office workers
- Both the Scarborough Beach Rd corridor and Victoria Park have comparable proportions of other retail and these two areas have a higher percentage of overall floor space dedicated to this use;
- The office floor area per employee in Scarborough Beach Rd is lower than the comparison areas. If the office space in Osborne Park is included in the per capita floor space calculation, the ratio is still only 20.96m<sup>2</sup>/employee.
- The per capita shop retail floor area is lower than Perth and Victoria Park but higher than Subiaco. This is likely due to the difference in the types of retail activity found in Subiaco and highlights the different retail functions performed by these areas
- Scarborough Beach Rd has a considerably higher proportion of commercial floor space in the recreation PLUC than the other areas used for comparison, including Subiaco which has a high profile as a destination for recreational activities.

The issue of other retail PLUC in Scarborough Beach Rd and Albany Hwy is significant. Other retail is generally defined as activities that cannot be accommodated in a shopping centre by virtue of their scale or special nature of the goods sold, a prime example of which is car sales. It is anecdotally noted that both Scarborough Beach Rd and Albany Hwy have traditionally been the primary areas in the Perth metro region for these types of activities. Any plans to change the mix of land use in the Scarborough Beach Rd corridor to higher density residential and business activities will need to take into account the difficulty in relocating these types of business and it may require a long planning horizon to fully integrate these changes.

### 6.3 Future Demand for Commercial Floor Space in the Metropolitan Area

The amount of floor space that is developed in the Scarborough Beach Road corridor will be dependant upon both the overall demand in the metro area and also on factors that influence how this demand is distributed. There is estimated to be approximately 3.23 million m<sup>2</sup> of office floor space in Perth and Peel. On the assumption that the ratio of office workers to total remains, at minimum, constant there will be a need for 5.4 million m<sup>2</sup> of office floor space in Perth and Peel by 2031. This means that a net additional 2.1 million m<sup>2</sup> of office space will be required to be constructed in Perth and Peel in the 25 years by and 2031. It is possible that the proportion of workers working in an office environment will grow, so this can be regarded as a conservative estimate.

There is currently a workforce of 109, 700 within the City of Perth. It has an estimated 1.92 million m<sup>2</sup> of office floor space – 53% of all office space in Perth and Peel. The ratio of office workers to total workers is higher in the City of Perth than in Perth and Peel generally and the ratio of office floor space to total workers is consequently also higher at 17.6 m<sup>2</sup> per total worker (i.e. office plus non-office workers).

It is reasonable to assume that the City of Perth will continue to house, at minimum, its current proportion of the metropolitan workforce. On this assumption the workforce in the City of Perth would grow by approximately 62%, or 67,000 to 177,000 by 2031, with a total of 3.1 million m<sup>2</sup> of office floor space, or a net additional 1.2 million m<sup>2</sup> of office floor space, approximately, over 25 years. Based on these assumptions, the remainder of the metropolitan area would be expected to accommodate 2.3 million m<sup>2</sup> of commercial floor space, an increase of 0.9 million m<sup>2</sup> over current levels.

The viability of the Scarborough Beach Rd as a location for the development of office floor space would therefore appear to rest on the following scenarios:

#### *Scenario 1 – Substitute for Development in the Inner Perth Area*

This may be possible to a limited extent, but is not considered highly likely on a very large scale. Most growth is likely to be extensions of current business types, namely companies such as medium level construction firms and wholesalers which seek a generally central metropolitan location but are not closely connected to the Perth inner area economy in the way that would be, for example, a large consulting or services firm as might be found in Subiaco or West Perth. The Perth inner area (i.e. the Perth CBD, West Perth, Subiaco, parts of Leederville, Victoria Park and South Perth) has the highest concentration of economic activity, with the benefits of high levels of business integration reinforcing this concentration. This results in a strong attractive force towards the centre and it is likely that the Herdsman/Osborne Park area is not sufficiently close to the inner area to benefit in large volume from this “agglomeration” effect. The competition from new development in the inner area and from other projects in advanced planning (for example around Curtin and at Perth Airport which are effectively green field sites and therefore have a considerable degree of development flexibility which is likely to offset the agglomeration effect) will effectively limit the development impetus at Herdsman/Osborne Park. As a consequence of the coordinated planning for the Stirling Centre and its direct relationship to the railway station, it is possible that some inner area organisations may be attracted to that location. However, for quite some time these are likely to be single large user projects (e.g. accommodation for Government agencies).

#### *Scenario 2 – Substitute for Development at Joondalup/Yanchep*

This is considered more likely than the first scenario, with the Stirling/Herdsman/Osborne Park region potentially better located to fill the role of a substantial supplier of jobs to the North West Corridor that either Joondalup or Yanchep due to having transport links already in place, although the consequences for land use and transport planning across the North West Corridor would need to be carefully considered. . A major development at Stirling may be in a position to provide an agglomeration effect for business in the Northwest corridor as firms operating in this area are likely to have a regional outlook, rather than state or international scope, and will therefore be likely to require a high level of integration and co-operation at this level. As noted in section 5.2, 13% and 12% respectively of Joondalup and Wanneroo workers are employed in Stirling LGA so there is already a high level of employment integration between these regions. The main competition for Stirling is likely to come from Yanchep rather than Joondalup as the development of a new town centre a considerable distance from the CBD on an essentially green field site is likely to provide more benefits as it will enable the creation of a new regional city to occur, although the effect on the Directions 2031 policy statement on Joondalup still needs to be considered.

These notes of caution serve to indicate the relative importance of the regional economy (i.e. northern metropolitan sector) in the further development of the Stirling / Osborne Park / Herdsman area away from its former industrial and retail base.

As was noted in the previous section, the issue of other retail PLUC is also important in the context of the Scarborough Beach Road corridor. As at 2001 the total amount of other retail floor space in the metro area was 1.12 million m<sup>2</sup>, of which Scarborough Beach Road accounted for 9.1%. Based on WA Tomorrow population projections for the metro area and existing per capita floor space ratios, it is estimated that the total floor space dedicated to this purpose in the metro area will be in excess of 1.6 million m<sup>2</sup>. If the Scarborough Beach Rd corridor was to maintain the current proportion of this total, it would result in approximately 160,000m<sup>2</sup> being dedicated to this purpose. However, this level of activity may not compliment the characteristics of an activity corridor outlined in section 2.3.

Estimation of total floor space and the distribution across the corridor is outlined in section 8.4.

#### 6.4 Osborne Park Industrial Area

The only industrial area within the study area is Osborne Park. A full breakdown of the 2007 survey results for this region is shown **Appendix 9**. As at the time of the 2001 industrial survey, for which data is available for the entire metro area, Osborne Park accounted for approximately 4% of general metropolitan industrial land area (metro total = 6700 ha), 11% of the total occupied industrial floor space (metro total = 9,032,000 m<sup>2</sup>) and 17% of industrial area employment (metro total = 90,400 employees). These figures indicate that Osborne Park plays a very significant role in the provision of industrial land in the metro area. Potential development plans for Scarborough Beach Road that impact on the Osborne Park would therefore need to be considered carefully to allow for possible knock on effects across the entire metro area. A caveat to this comment is that the profile land use in Osborne Park appears to be somewhat different to industrial land in general. The following table gives a comparison of the proportion of floor space for each PLUC for all general industrial areas with the 2001 figure for Osborne Park.

**Table 11: Comparison of Planning Land Use Categories - 2001 Industrial Land Use Survey**

Region	Planning Land Use Category												
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Vacant	Total
Osborne Park	0.0%	16.7%	23.1%	18.2%	4.9%	7.8%	17.7%	1.2%	0.9%	0.0%	0.7%	8.6%	100%
Perth Metro General Industrial	0.3%	19.3%	27.2%	17.8%	2.2%	4.4%	11.0%	0.4%	1.1%	0.0%	3.4%	12.9%	100%

Source – DPI (2001/2) Commercial land Use Survey

The 2001/02 data indicates that the proportion of floor area used for manufacturing in Osborne Park was lower than for the entire metro area average but there was a higher proportion of floor space dedicated to office/business uses and other retail. The point of view that Osborne Park has taken on uses that do not fit with the traditional view of an industrial area has been put forward by SMCO in a number of previous studies<sup>2</sup>. These changes in usage also need to be considered when developing strategies for the corridor. It is also noticeable that the vacant floor space in Osborne Park is considerably lower than for the metro area, possibly giving an indication that this area is a highly desirable business location. A test of proportions indicates that the difference between the proportions of vacant land is highly significant.

<sup>2</sup> SMCO (2006) – Neerabup Industrial Area Demand Study, SMCO (2008) – Industrial Land Needs for Perth and Peel

## 7. Population Growth in the Scarborough Beach Road Corridor

### 7.1 The Effect of Population Growth on Development Strategies

There would be little argument that the primary reason for considering new development strategies is the effect of population growth within a region. Large scale population forecasts recently produced by the Treasury and the Australian Bureau of Statistics anticipate the Australian population almost doubling by 2050, and population growth in Western Australia is predicted to be higher than the national average due to resource developments providing substantial employment opportunities. These issues will eventually have a local impact on all parts of the metro area. The amount by which the population increases within a small area will then be a balance between a rising population forcing new development and new developments attracting a larger number of people than natural growth would assume (essentially the difference between a reactive and proactive approach). The different levels of population that may result from these approaches in relation to Scarborough Beach Rd corridor are outlined below.

### 7.2 Population Projection Data Sets

The main population forecasting data set available at a state level is the WAPC WA Tomorrow publication. This data is now several years old and is based on the 2001 census data. In addition, it appears as if migration patterns have change over the past decade and international migration is now having a much larger effect on Western Australia's population growth than has been the case previously. The Australian Bureau of Statistics has recently published population projections at statistical local area level based on the 2006 census and using more recent migration patterns and fertility rates. This data was prepared for the Department of Health and Aging and has several caveats attached to it. In particular it does not reflect the local knowledge of demographers based in Western Australia and the sustainability of current fertility rates has been questioned. The following analysis uses data from both projections to develop and contrast scenarios for population growth along the Scarborough Beach Road corridor.

### 7.3 Limitations of Population Projections at Small Geographic Scales

It should be noted that population projections for small areas have very large error bounds and for this reason there are no forecasts at collection district level. WA Tomorrow provides forecasts to LGA level while the ABS projections provide forecasts at statistical local area level. In most cases LGAs and SLAs are equivalent; however Stirling LGA is partitioned into three SLAs. To estimate population growth in the region using these data sets, it is therefore necessary to investigate the relationship between the current populations of the study area and the regions for which projections are available and develop extrapolations to the required time horizon.

### 7.4 Population Growth Based on Natural Growth

The following table shows the relationship between the population in the SBR corridor and the Perth Metropolitan area as at the 2001 and 2006 census<sup>3</sup>

**Table 12: Existing Relationship - SBR to Perth Metro Area**

Locality	2001	2006
Perth Metro Area	1,393,002	1,518,748
Scarborough Beach Rd Corridor	22,550	25,819
SBR % of Perth Metro Area	1.6%	1.7%

This data indicates that the Scarborough Beach Rd corridor represents approximately 1.7% of the total metro area population as at 2006. It has slightly increased as a proportion of the overall metro population between 2001 and 2006 by approximately 0.02% per year. If this relationship is used as a starting point and the percentage growth per year is used as an upper and lower bound to extrapolate 20 year time frame forecasts, the following population growth scenarios for the corridor are reached for the period up to 2031.

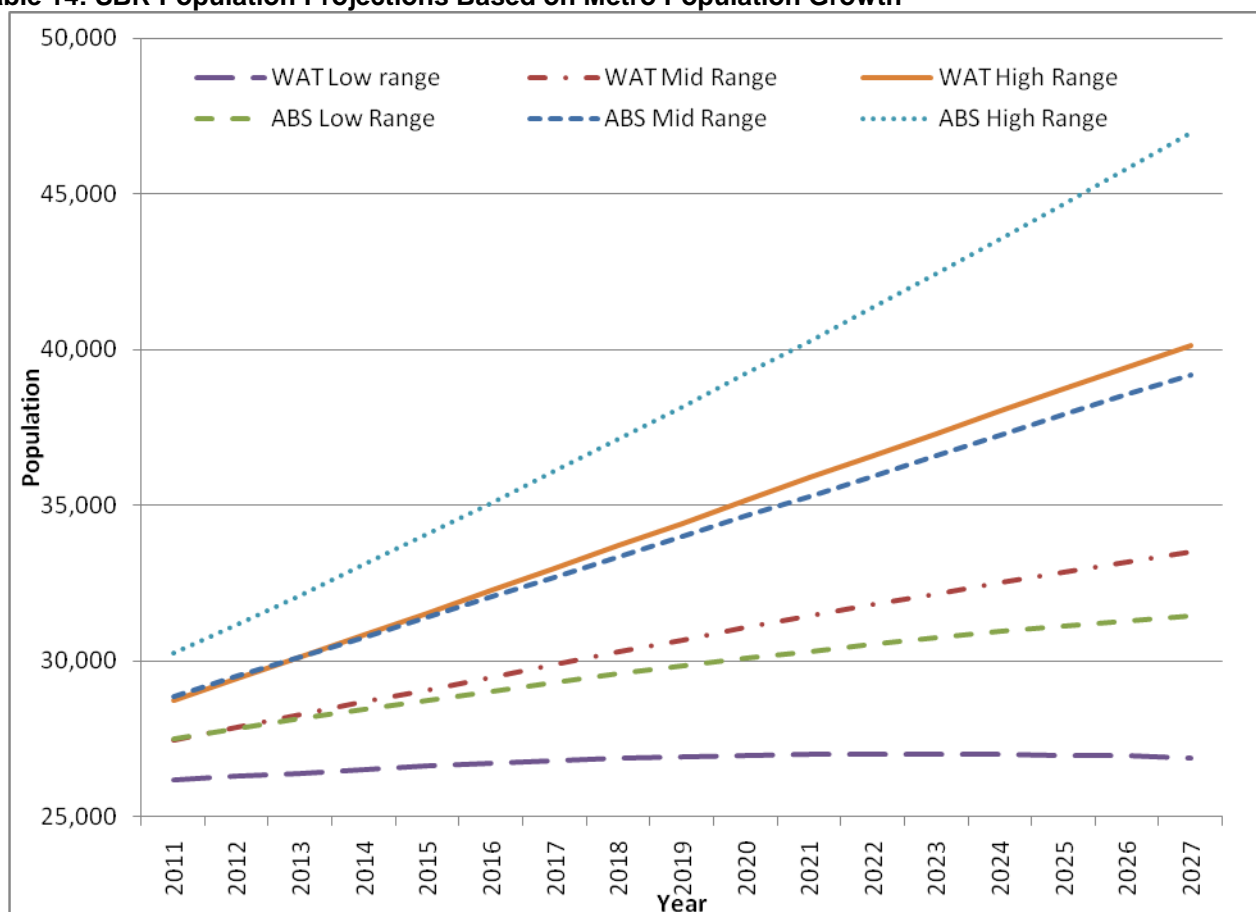
<sup>3</sup> Note – although individual collection districts do not necessarily coincide from census to census, in this case there is a reasonably close relationship between the 2001 and 2006 CDs and so a comparison can be usefully made

**Table 13: Potential Corridor Population Based on Existing Relationship to Perth Metro Area**

Growth Scenario	Forecasting Base	2011	2016	2021	2026	2031
Lower bound – Assume proportion to metro area reduces to 1.3% by 2031	ABS	27,514	29,030	30,309	31,293	N/A
	WA Tomorrow	26,157	26,708	26,998	26,939	26,174
Constant Proportion – Assume proportion to metro area remains constant at 1.7%	ABS	28,873	32,047	35,291	38,549	N/A
	WA Tomorrow	27,449	29,483	31,436	33,186	34,228
Upper bound – Assume proportion to metro area increases to 2.1% by 2031	ABS	30,232	35,063	40,273	45,805	N/A
	WA Tomorrow	28,740	32,258	35,874	39,433	42,281

The following chart illustrates the population growth over the period 2011 to 2027 based on the various scenarios shown in **Table 13**.

**Table 14: SBR Population Projections Based on Metro Population Growth**

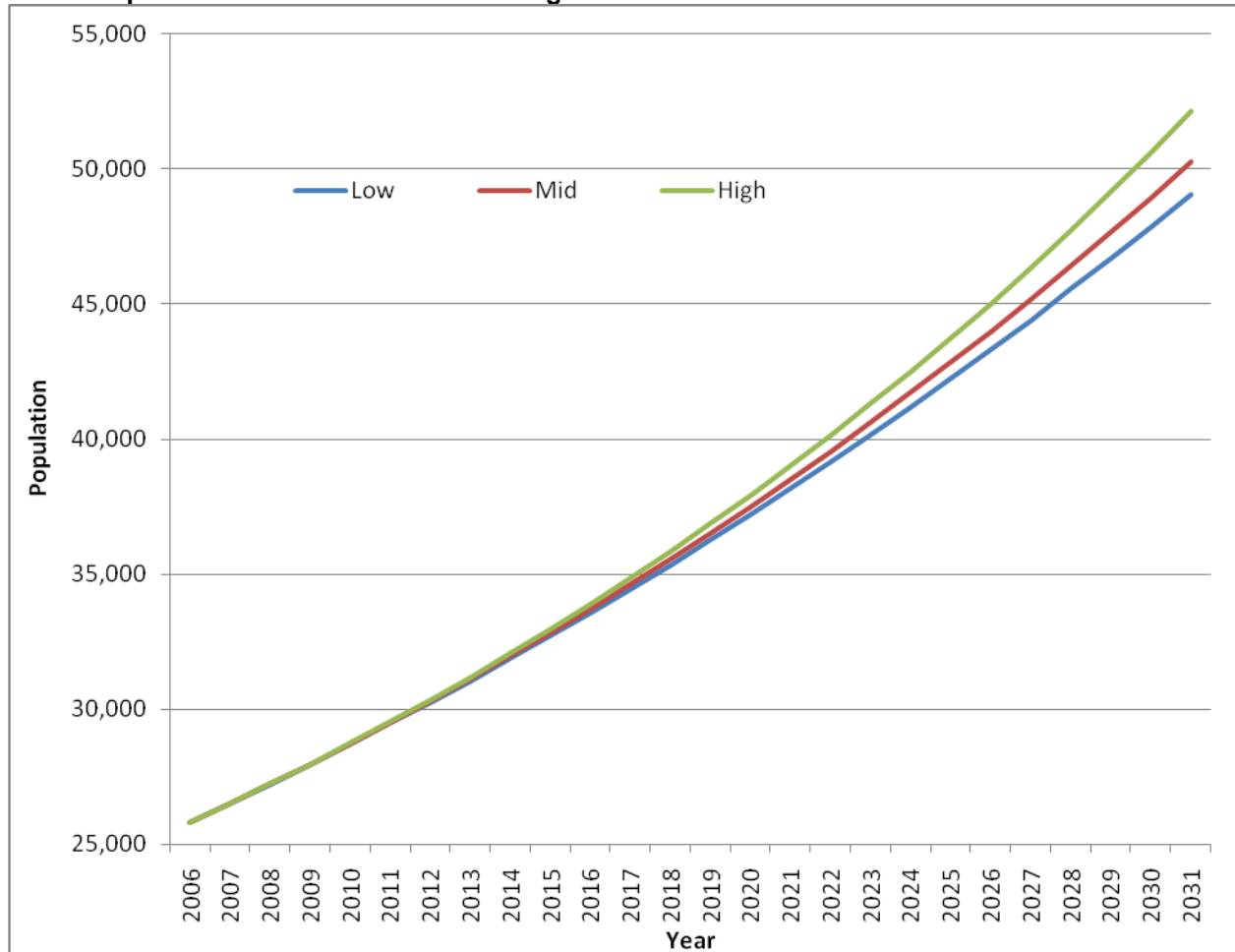


This method gives a range of between approximately 26,000 and 46,000. The low growth WAT projection would imply that the population in the corridor essentially remains at current levels. This is most likely a pessimistic view and some growth would be expected over this time but it is important to recognise population projections are subject to variation and this variability should be considered when assessing the likely size of future

populations. With this caveat in mind, the middle ground would appear to point to a population as at 2031 of approximately 35,000 people based on natural growth, a 10,000 increase on the 2006 figure.

An alternative method is to use the population growth within the Scarborough Beach Road corridor alone as an indicator of future growth, thereby avoiding referencing overall metropolitan growth. The average annual growth rate for the Scarborough Beach Rd corridor collection districts between 2001 and 2006 was 2.7%. If this figure is used as a basis to extrapolate the population to 2031, the follow results are achieved.

**Table 15: Population Growth Based on Existing Corridor Growth**



In this case, three scenarios have been given, with the mid range assuming that the current AAGR applies over the whole period while the low and high scenarios assume that the AAGR reduces to 2.5% or increases to 3.0% respectively by 2031. In this case the projections are considerably higher with the population expected to grow to approximately 50,000 by 2031. Although the metro population has not been used explicitly in this calculation, it is worthwhile noting that this would account for approximately 2.5% of the WA Tomorrow forecast for 2031 and 2% of the likely ABS projection at 2031. This method therefore appears to be consistent with the upper end projections from the previous example.

## 7.5 Potential Development Implications on Population Growth

The two examples shown above look at population growth based solely on forecast data alone. The alternative approach to this is to consider what developments are planned for the region and assess the magnitude of population growth that is likely to result from the provision of additional amenities. This approach effectively assumes potential residents will be attracted to these new developments and population growth may therefore occur at a faster rate than natural growth alone would allow for within a localised area. There are several developments planned for the Scarborough Beach Rd corridor that may have this type of effect.

### 7.5.1 Scarborough Environs Area Strategy

The immediate SEAS project area covers the region west of Edgehill and Hasting Streets, south of Contacio Cove and north of Kay Street in Scarborough. The stated aim of the SEAS project is

*To enhance Scarborough's role as the heart of Sunset Coast by fostering the area's tradition, it's natural attractions and unique life style, whilst welcoming everyone all year around.*

This aim encompasses a number of strategies such as improving traffic movement, protecting the coastal environment and encouraging a diversity of land uses. Of particular importance for the Scarborough Beach Rd corridor, the strategy will significantly increase dwelling densities in this region with plans for some 3,200 additional dwellings. It will also increase the amount of mixed use and short stay accommodation. These aims are likely to lead to a considerable increase in population at the western terminus of Scarborough Beach Rd. This strategy has been through a number of reviews and is now likely to proceed in the form outlined.

### 7.5.2 Stirling City Centre

The Stirling City Centre project takes in the 800m radius around Stirling railway station, including the existing Westfield Innaloo site, IKEA and the cinemas and restaurants on the corner of Liege St and Scarborough Beach Rd. The project has the following aspirational goals

- Activity seven days per week
- 12,000 dwellings
- 30,000 jobs
- 25,000 residents
- A wide mix of affordable and upmarket dwellings, taking in both lone households and families

The project has addition spin offs planned such as a light rail system connecting the new city centre to existing heavy rail stations and/or the Perth CBD

### 7.5.3 Herdsman Business Park

This project would essential spin off from the Stirling City Centre development, especially predicated on the provision of a bus rapid transit or light rail system between Stirling and Glendalough stations. It envisions a substantial change to land uses along Scarborough Beach Rd through the Osborne Park industrial area, in particular along the region on the south side of Scarborough Beach Rd through to Herdsman Lake. These changes would see a more mixed land use through this part of the existing industrial area. Additional roads are proposed to improve access between Scarborough Beach Rd and John Sanders Drive. There has been some discussion within the project working group of the city's preference to explore residential uses in the area, however these ideas have not been subject to further planning or feasibility.

### 7.5.4 Glendalough TOD

There has been a considerable amount of planning already undertaken with regard to the redevelopment of the area in the vicinity of the Glendalough railway station in line with TOD principles. Full build out of this area includes an aspirational proposal for 10,000 dwellings within a radius of 800m of the station

### 7.5.5 Scarborough Beach Rd/Oxford Street

Some additional development is anticipated in Mt Hawthorn near this intersection. Although the development is unlikely to be of the same scale as outlined in the previously listed developments, it may result in estimated 100-200 additional dwellings.

## 7.6 Corridor Populations Resulting From Implementation of Proposed Developments

The population in the region resulting from these developments has been modelled under a range of build out scenarios under the assumption that not all developments can or will proceed to their planned limits within the 2031 time horizon. These scenarios are shown in the following table with the self descriptive titles indicating the level of activity associated with the scenario. The associated dwelling and population numbers resulting from the level of build out are shown for each set of circumstances.

**Table 16: Comparison of Development Scenarios**

Parameter	Conservative Scenario	Medium Scenario	Optimistic Scenario	Full Buildout Scenario
Additional Dwellings	8,000	12,360	18,663	26,500
Total Dwellings as at 2031	18,500	22,850	29,150	36,990
Additional Population	13,000	20,000	30,000	44,130
Total Population as at 2031	37,500	44,460	54,460	68,590

It can be seen that the conservative scenario roughly corresponds with the population growth expected under the natural growth assumptions in section 7.4 while population growth based on existing corridor growth fits between the medium and optimistic scenarios. The full build out scenario is considerably higher than any of these projections and would account for approximately 3.5% of the total metro area as at 2031 under WA Tomorrow projections. To put this in context, it is equivalent to the 2006 comparison of the population of Armadale LGA to the metro area.

## 7.7 Summary of Population Growth

Given the amount of development planned for the Scarborough Beach Rd corridor and the advanced nature of some of these plans, it is likely that population projections based on natural growth will underestimate the magnitude of population growth in the region. However, assuming that all development will occur within the time frame of this project and that the associated increase in the number of residents would follow is likely to lead to a substantial over estimation of population. A number of metro LGAs have ambitious development plans in response to the expected growth in the overall metro population but this growth, although substantial, is unlikely to allow every development to proceed to completion. It is therefore considered that the most likely population projection for 2031 will lie between the medium and optimistic scenario and will give a corridor population of approximately 50,000. The distribution of this population is covered in the following section.

## 8. Activity Centre Hierarchy

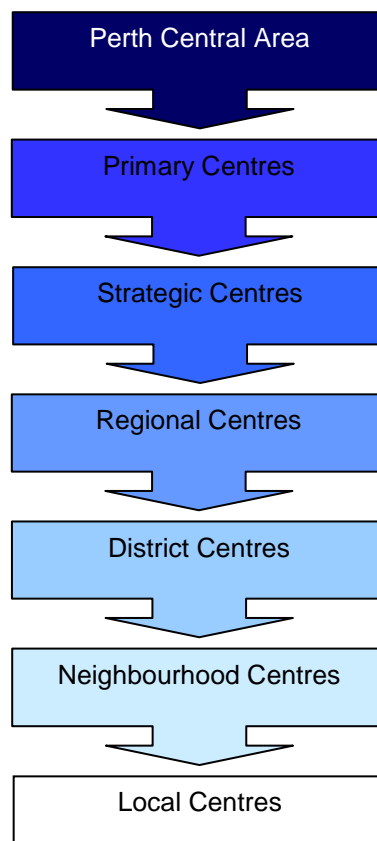
### 8.1 Introduction

As can be seen from the broad outline given in sections 4 & 6, the Scarborough Beach Road corridor currently encompasses a range of demographic and land use characteristics. Plans for developing the corridor will need to take into account these differences to allow for optimum integration of future land use and population densities. In this context, it is useful to more specifically define areas of the corridor that have similar characteristics and match these with the development plans outlined in section 7.5 to establish how the population as at 2031 is likely to be distributed along the corridor, the types of employment opportunities that may arise and the types services these residents and workers will require.

### 8.2 Current State Planning Strategies

The future direction of development in the Scarborough Beach Road corridor will be affected by the guidelines set out in Directions 2031, the WAPC's strategic framework for managing growth across the entire metropolitan area. Additionally, the draft Activity Centre Policy also needs to be accounted for as it outlines the broad planning requirements for planning/developing of new centres and the renewal of existing centres.

The hierarchy of centres outlined in Directions 2031 is as follows;



These two policy documents have relevance to the SBR corridor as Stirling has been identified as a strategic city centre, Scarborough, Glendalough and Mt Hawthorn as district town centres and Osborne Park as a regional industrial centre. The generic characteristics associated with these classifications are outlined in the following table

**Table 17: Activity Centre Hierarchy as per WAPC Guidelines**

Activity Centre Type	Role and Function
Strategic City Centre	These are multi-purpose activity centres that will ideally provide a balanced mix of retail, office, community, entertainment and higher-density residential uses that are well serviced by high-frequency public transport and overtime develop as significant employment nodes. Continued development of these centres will see them evolve to accommodate ongoing investment and change in retail, office, service and residential markets.
Regional Industrial Centre	Are areas designated for industries that predominantly serve a metropolitan, regional and/or district purpose. These are usually characterised by the need to have access to suitable land parcels, and regional and local movement networks. These centres can be significant regional employers.
District Town Centre	Most of these centres generally serve the main weekly household shopping and community needs of the district. Many are predominantly retail but are likely to include a limited mix of other uses such as offices and medical services, and medium and higher-density residential development. Others may be dominated by or associated with community and recreation facilities or office development.

Source – WAPC (2009) Activity Centre for Perth and Peel

This identification of these centres as part of state planning policy has the effect of predefining a hierarchy along the corridor and the analysis outlined in section 8.1 therefore will need to include these conditions.

### 8.3 Proposed Differentiation of Centres and Associated Regions

As noted above, centres have been identified along the Scarborough Beach Rd corridor but the boundaries of these centres need to be established to establish the full extent of current and future activity. An extensive on site analysis has been carried out to identify these boundaries and this has been supplemented with a desk top study of available data and consideration of potential development plans. The following areas are proposed:

1. Scarborough/SEAS – Incorporating the area between the coast (including the defined SEAS project area) and Deanmore Rd;
2. Stirling Residential – Deanmore Rd to Odin Rd;
3. Stirling Central – Odin Rd to King Edward Rd/Selby St North, as outlined by the Stirling City Centre plan and centred on development around Stirling railway station to TOD principles ( *Note – part of this area lies to the north of the Mitchell Fwy and is therefore outside the bounds initially set for the study but it is considered more important to consider this development as a whole* ) ;
4. Osborne Park – King Edward Rd/Selby St North to Gould St, enclosed to the north by the Mitchell Freeway;
5. Glendalough – Gould St to approximately Brady St, also including the area north of Scarborough Beach Rd enclosed by Main St, Roberts St and the Freeway, this area is centred on the Glendalough railway Station as the basis for a TOD development;
6. Mt Hawthorn – Approximately the area bounded by Egina St, Oxford St, Edinboro St and Woodstock St;
7. Remainder Stirling/Vincent – The remaining area not covered by the regions defined above.

The locations of these regions are shown in **Figure 10**. The existing characteristics are summarized in the following table.

**Table 18: Current Characteristics of Proposed Centres**

Parameter	Scarborough / SEAS	Stirling Residential	Stirling Central	Osborne Park	Glendalough	Mt Hawthorn	Remainder
Activity Centre Hierarchy	District Centre	None Given	Strategic City Centre	Regional Industrial Centre	District Centre	District Centre	None Given
Total Area (Ha)	200	313	324	232	191	60	243
Area exc Roads/Reserves	110	219	210	192	146	42	170
Current Population	4163	8288	2570	66	3390	1557	6750
Population/Ha	37.8	37.8	12.2	0.3	23.2	37.1	39.7
% Separate Houses	16%	57%	52%	18%	16%	90%	77%
% Semi Detached	45%	36%	19%	82%	34%	6%	13%
% Apartments	39%	7%	29%	0%	50%	4%	10%
Total Current Dwellings	1896	3593	1169	38	1610	563	2732
Dwellings/Ha	17	16	6	0	11	13	16
Shop/Retail (m <sup>2</sup> )	11,300	5,400	57,100	70,000		10,900	4,400
Office Business (m <sup>2</sup> )	2,750	1,700	42,800	200,000		9,400	3,400
Ent/Rec/Culture (m <sup>2</sup> )	9,650	440	11,200	14,500		2,200	2,100
Other Retail (m <sup>2</sup> )	700	730	45,900	100,000		1,600	2,200
Other Categories (m <sup>2</sup> )	53,700	1,400	111,500	760,000		10,100	6,700
Total Commercial / Industrial (m <sup>2</sup> )	78,100	9,700	268,500	1,115,000		34,200	18,800
Major Transport Infrastructure			Stirling Railway Station		Glendalough Railway Station		

Source – ABS (2006) – Census of Population and Housing, DPI (2007) – Industrial/Commercial Land Use Survey

Note – Floor space figures for Osborne Park and Glendalough are a mixture of commercial and industrial zoned areas, other areas are solely commercial

It is notable that a number of these centres currently have reasonably similar populations/Ha and dwelling/Ha ratios. However, it is also evident that the centres not explicitly listed in the Activity Centre policy (Stirling Residential and Remainder Stirling/Vincent) have low levels of commercial and/or industrial activity and are primarily residential areas with a high proportion of detached dwellings. Given that they have not been identified either as activity centres or have specific development plans, it is likely that they will retain their current characteristics and have minimal population increase for the foreseeable future. The following comments are noted with regard to the remaining centres;

Scarborough/SEAS	<ul style="list-style-type: none"> <li>Development plans aim to more than double the number of dwellings in this region with a dwelling/Ha ratio of approximately 45, this should give a population of approximately 8,000.</li> <li>The area has a high proportion of entertainment/recreation floor space and this is likely to increase as the area gains a higher profile as a tourist destination.</li> <li>Per capita shop/retail floor space is high for a district centre given the floor space guidelines in the Activity Centre Policy document but this again likely reflects the tourist/entertainment profile of the area with large numbers of day visitors adding to the residential population in the catchment.</li> <li>The high proportion of other commercial activity primarily reflects tourism accommodation and this will increase under the SEAS plan.</li> <li>It is envisioned that this area would not have a significant increase in office/business development as other locations are better placed to capture this market</li> </ul>
Stirling Central	<ul style="list-style-type: none"> <li>Proposed high rise development under review due to cost issues specific to WA building industry but intensive development of medium rise apartments</li> </ul>

	<p>and semi detached dwellings is likely with an estimated 8,000 additional dwellings over 2031 time frame. This will give a dwelling/Ha ratio in line with the draft WAPC guidelines for a strategic town centre</p> <ul style="list-style-type: none"> <li>• This number of dwellings would give a population increase of approximately 14,000.</li> <li>• As a strategic centre, Stirling Central will be the focus of a catchment in excess of 300,000 people by 2031 under WA Tomorrow and will justify substantial increase in shop/retail floor space.</li> <li>• As an existing major transport hub, Stirling has an advantage when considering the location of some of the estimated additional 1 million m<sup>2</sup> of business/commercial floor space likely to be located outside the CBD as at 2031. Examples of factors that may result in commercial development in Stirling include <ul style="list-style-type: none"> <li>◦ Smaller business displaced from the Perth CBD</li> <li>◦ As a site for the relocation of government offices out of Perth</li> <li>◦ As a major job provider for the north west corridor in lieu of development at Joondalup and Yanchep</li> </ul> </li> </ul> <p>The last example would need to be reviewed in line with the identification of Joondalup and Yanchep as primary/strategic centres respectively in Directions 2031.</p> <ul style="list-style-type: none"> <li>• Current entertainment/recreation floor space is low and this would be expected to rise as the centre develops more fully.</li> </ul>
Osborne Park	<ul style="list-style-type: none"> <li>• Although ambitious development plans have been put forward for this area, the identification of Osborne Park in Directions 2031 as a regional industrial area indicate it is still looked upon to provide a major component of land for this activity in the metro area. This identification is supported by findings resulting from the Perth and Peel Industrial Land Needs study.</li> <li>• With this in mind, it is proposed that no further commercial or residential proceed within Osborne Park. This recommendation is likely to require further consideration amongst all parties</li> <li>• A caveat to the above comment is the existing identification of Osborne Park with other retail land uses (eg car yards, bulky items). Population induced demand for this type of activity is estimated to result in a requirement for additional 400,000m<sup>2</sup> across the metro area by 2031 and it is highly likely that some of this demand will be located within Osborne Park, although efforts should be made to minimize this impact</li> </ul>
Glendalough	<ul style="list-style-type: none"> <li>• Although Glendalough is identified as a district centre and has the comparative advantage of a railway station, it is less developed than comparably classified centres in the corridor and is therefore likely to experience lower population growth over the period to 2031</li> <li>• A considerable amount of work is required to facilitate the types of development planned for the area and for this reason the aspirational figure of 10,000 dwellings proposed are unlikely to occur. However, development in the vicinity of the railway station is likely to see some 2-3,000 additional dwellings and an additional 3-5,000 residents.</li> <li>• The area already has a considerable amount of shop/retail floor space but much of this is spill over from Osborne Park and so it does not fully represent the needs of the immediate area. The increase in population is likely to lead to some additional floor space dedicated to uses such as food retail</li> </ul>
Mt Hawthorn	<ul style="list-style-type: none"> <li>• Mt Hawthorn has already undergone considerable development over recent time and has established an identity that fulfills a particular niche for the surrounding residential population</li> <li>• Although some additional residential development is planned it is unlikely to be substantial compared with the population increases noted in other parts of the corridor and will likely result in approximately 500 additional residents</li> <li>• Mt Hawthorn has an ample supply of shop/retail floor space for the catchment population within the WAPC guidelines for a district centre but the</li> </ul>

	<p>area is well located for specialty/niche stores and may see some future growth in this direction</p> <ul style="list-style-type: none"> <li>There is little attraction in the area to provide large amounts of office/business floor space and so there is unlikely to be considerable additional employment in this type of activity</li> </ul>
--	---

In addition to the areas listed above, a supplementary area has been identified to allow for the provision of office business development. This area overlaps parts of the Glendalough and Osborne Park and reflects the fact there is a substantial amount of office/business development that currently exists on these sites. The location of this office area is particularly predicated as being centred on Glendalough station to provide the necessary transport links to enable a large potential work force to access the site.

#### 8.4 Projected Centre Characteristics as at 2031

Based on the points outlined in the previous section, the projected characteristics of the centres as at 2031 is shown in the following table. There is some overlap between Glendalough and Osborne Park as the industrial area currently extends into the proposed Glendalough centre. As a consequence, it is difficult to separate the various PLUC between industrial and commercially zoned areas and therefore to determine the amount by which the floor areas will vary over time. This is likely to become less so as Glendalough develops a higher residential/mixed use profile. In particular, the 70,000m<sup>2</sup> of shop/retail floor space is mostly associated with activities related to the Osborne Park industrial area. A small amount of additional shop floor space is likely to be developed in the area to 2031 and this will be more closely associated with the requirements of Glendalough residents than the traditional types of activities associated with this area.

A spatial representation of this data is shown in **Figure 10** while the amount of change expected from 2006/2007 data is shown in **Figure 11**

**Table 19: Projected Centre Parameter Values as at 2031**

Parameter	Scarborough / SEAS	Stirling Residential	Stirling Central	Osborne Park	Glendalough	Mt Hawthorn	Remainder	Total
Population	8,300	9,000	14-18,000	0	6,300-8,000	2,000	7,000	46-52,000
Shop Retail Floor Space (m <sup>2</sup> )	15-20,000	5-6,000	120-160,000	70,000		10-15,000	3-4,000	220-270,000
Office Business Floor Space (m <sup>2</sup> )	2-3,000	Minimal	200-300,000	250-300,000		Minimal	Minimal	450-600,000
Other Retail Floor Space (m <sup>2</sup> )	Minimal	Minimal	Minimal	120-140,000	Minimal	Minimal	Minimal	120-140,000
Tourist Accommodation (m <sup>2</sup> )	100-150,000	0	0	0	0	0	0	100-150,000
Other Industrial categories (m <sup>2</sup> )	0	0	0	900,000	0	0	0	900,000

The aggregate population of these individual centres is approximately 50,000, which corresponds with the overall projection for the corridor given in section 7.

*Additional Note for Figure 10 (page 32) – The original projection of shop retail floor space for Osborne Park was 25-30,000m<sup>2</sup>, with this analysis only considered projections based on existing commercially zoned areas. However the baseline for the analysis has subsequently been amended to include existing shop retail in both commercial AND industrial zones which currently includes some 70,000m<sup>2</sup> of this PLUC. This has required some amalgamation of the Osborne Park and Herdsman data, hence these two areas are combined in Table 18 and Table 19. The latest analysis indicates this figure is likely to remain at about this level these two areas but the distribution is likely to result in a migration of some of this PLUC from Osborne Park to Glendalough as the population in this suburb increases. Additionally, the type of shop retail activity that occurs in Glendalough is likely to change to cater for the local population (eg food shopping) rather than the types of activities that currently occur in Osborne Park. A similar process has been applied to the office/business component, with the*

amalgamation of existing floor space for this use in Osborne Park and Glendalough resulting in a higher forecast than prior analysis had suggested

## 8.5 Employment

An estimate can be made as to the amount of employment that may be generated by these developments by using existing floor space per employee ratios. The following ratios are based on the 2001 and 2007 commercial and industrial surveys for establishments across the entire Perth Metropolitan area.

**Table 20: Estimated Floor Space per Employee**

Shop/Retail	Office/Business	Other Retail	Tourist Related	Industrial
30m <sup>2</sup>	25.5m <sup>2</sup>	63m <sup>2</sup>	166m <sup>2</sup>	114m <sup>2</sup>

The amount of employment in the corridor will be affected by both the level of development and also variation on the floor space/employee values. A range of scenarios have been modeled to allow for these variations and the following results have been generated as an estimate of employment by centre

**Table 21: Projected Employment Numbers by Centre as at 2031**

	Scarborough SEAS	Stirling Residential	Stirling Central	Osborne Park/Glendalough	Mt Hawthorn	Remainder	Total
Minimum	1,100	150	11,000	20,000	300	90	33,000
Mid Range	1,2-1,700	160-200	12-17,000	22-24,000	330-500	100-130	35-43,000
Maximum	1,800	220	18,500	26,300	550	150	47,000

*Note – due to rounding and approximation, aggregation of centre employment estimates may not match total figures.*

These projections indicate that the number of employees in the corridor may increase by between 8,000 and 22,000 over 2007 workforce estimates, with a most likely estimate of approximately 15,000.

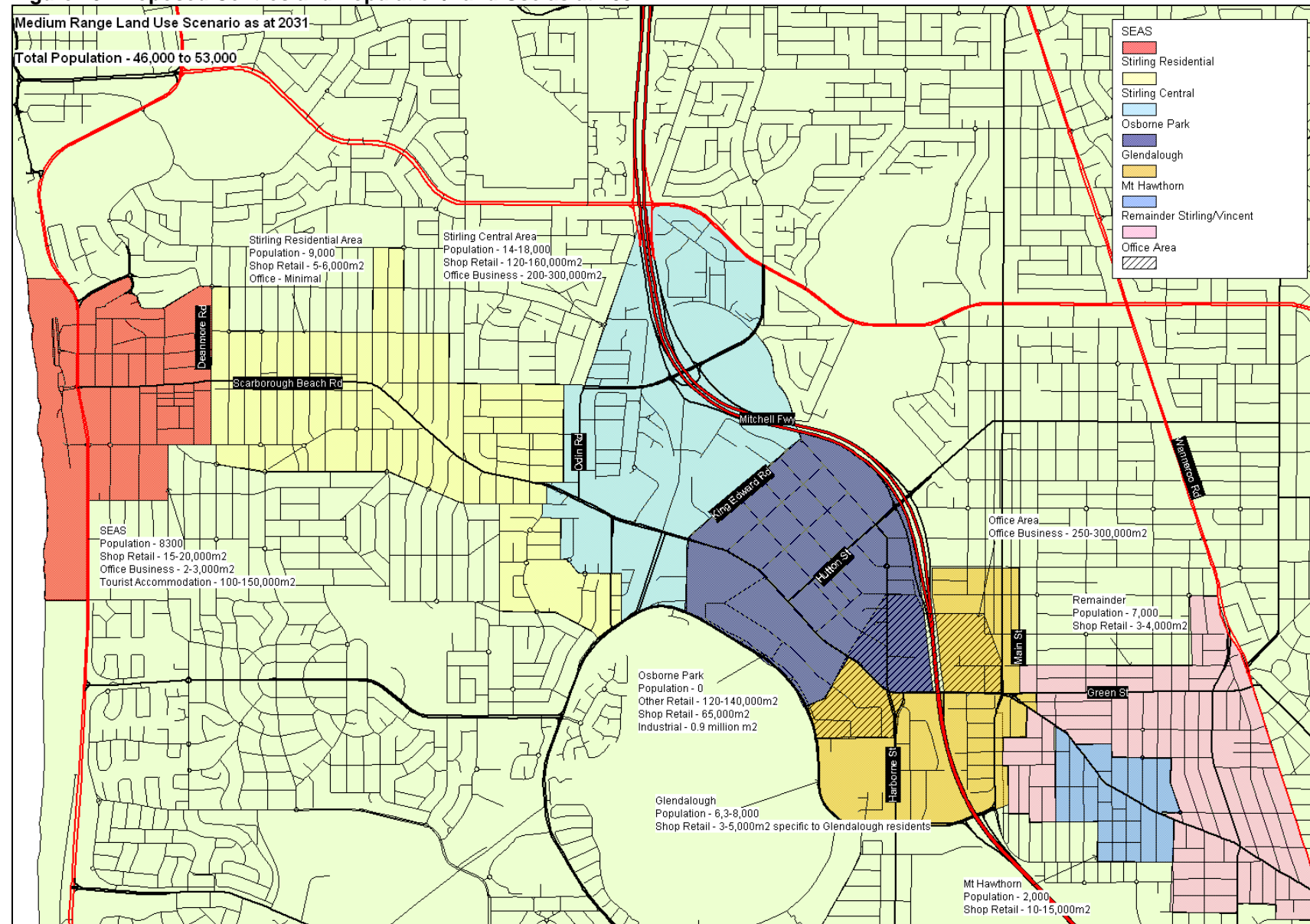
These estimates can be used to develop employment self-sufficiency ratios for each centre. WA Tomorrow projects that approximately 68% of the metropolitan area population will be of working age (ie between 15 and 67). While the demographic profile of the current population of the corridor indicated that there are areas with higher concentrations of older people, at this level of spatial analysis it is difficult to accurately establish the age profile of individual centres and so the metro wide age profile proportion is used across all centres to establish an estimate of the resident workforce. The projected employment self sufficiency ratios for each centre based on this assumption are shown in **Table 22**

**Table 22: Projected Employment Self Sufficiency Ratios as at 2031**

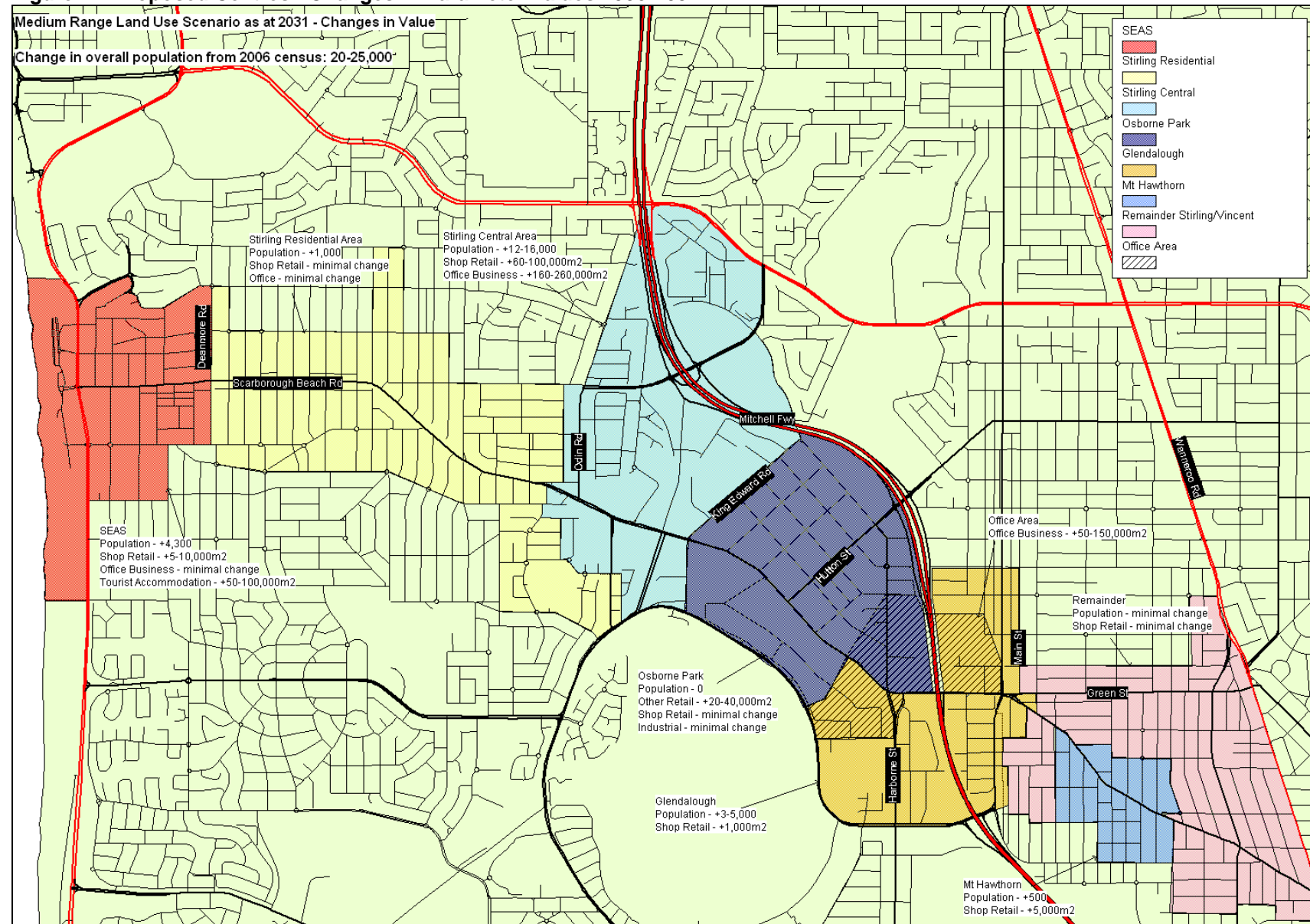
	Scarborough SEAS	Stirling Residential	Stirling Central	Osborne Park/Glendalough	Mt Hawthorn	Remainder	Total
Resident Workforce	3,400	3,700	6,700	3,000	900	3,000	20,700
Number of Jobs	1,500	180	15,000	23,000	400	110	40,100
Self Sufficiency Ratio	44%	5%	223%	766%	45%	4%	193%

These calculations show that while there are large variations between centres, overall self sufficiency for the corridor is extremely high. Residents of centres with low levels of employment will still be very close to a large number of employment opportunities.

**Figure 10: Proposed Centres and Population/Land Use as at 2031**



**Figure 11: Proposed Centres - Changes in Parameter Values 2006-2031**



## 9. Public Transport

### 9.1 Existing Public Transport Situation

The Scarborough Beach Rd corridor currently has several major public transport assets. In particular, two railway stations on the Joondalup line, Stirling and Glendalough, are located in the vicinity. Stirling has approximately 4,600 boardings per weekday and is the 8<sup>th</sup> busiest station on the Perth metro network, while the figures for Glendalough are 3,900 and 9<sup>th</sup> respectively. The following table gives a comparison of stations on the Joondalup line as at March 2009.

Station	Boardings Per Week Day
Warwick	5,676
Joondalup	5,238
Whitfords	4,645
Stirling	4,619
Glendalough	3,873
Clarkson	3,658
Leederville	2,646
Greenwood	2,012
Edgewater	1,870
Currambine	1,814

If the catchment for the Joondalup line is taken to be the LGAs of Wanneroo, Joondalup, Stirling (excluding south east SLA) and Vincent, the per capita boarding ratio for the line is approximately 0.07. Defining the catchment of Stirling and Glendalough stations is slightly more difficult but, assuming it takes in the southern two thirds of Stirling Coastal and Central SLAs and the northern section of Vincent LGA, it is estimated to be approximately 120,000 people. With aggregate boardings of 8,492, the per capita ratio for these two stations is also approximately 0.07. To give a comparison of these ratios with selected stations on the Mandurah line, Cockburn also has an estimated ratio of 0.07 while Murdoch is 0.11, although this figure is highly influenced by the location of Murdoch University.

The corridor is serviced by a number of bus routes. In particular the circle routes 99/98 travel to/from Stirling station and cross Scarborough Beach Rd at Ellen Stirling Bvd while route 400 travels from Scarborough to the CBD. These routes are respectively the 1<sup>st</sup>, 2<sup>nd</sup> and 4<sup>th</sup> most heavily patronaged services in the Perth Metro area. Assessing the level of patronage on the circle routes attributable to the Scarborough Beach Rd corridor is difficult as these routes cover a large proportion of the entire metro area and the boarding data is not broken down to small scale geographic areas. However, as the 400 route essentially travels the whole length of the corridor, the population estimate for the corridor (with a slight adjustment for the additional distance travelled into the CBD) could also be assumed to be the catchment for the service. This service has 4,818 daily boardings but this figure most likely double counts individual patrons as most people would be assumed to take the service in both directions in the course of a day. If this figure is therefore halved, 2,400 daily individual passengers on this service translated to a per capita boarding ration of approximately 0.08. This would appear to indicate this service has a per capita patronage in line with the rail services.

An additional consideration is the number of transfers that occur between buses and trains. The PTAs Smart Rider data indicates that approximately 2,200 people transfer between buses and trains at Stirling station. This accounts for 50% of total boardings at this station. For Glendalough the corresponding figures are 900 and 23%

### 9.2 Projected Public Transport Usage By Residents

The Public Transport Authority has established a number of multiplier values based on their analysis of existing public transport patterns and also on projected patterns of future use. Some relevant values are shown in the following table

**Table 23: Transport Multiplier Values**

Daily per Capita Trips (all modes)	3.5
Percentage of daily trips involving travel to work/peak period	40%
Percentage of daily trips by public transport as at 2008	5.5%
Estimated percentage of daily trips by public transport as at 2031	7%
Percentage of peak trips by public transport	9.2%
Percentage of public transport trips for work/education	65%

These values are based on data from the entire metro area and may not accurately reflect variations in public transport usage within small geographic regions. In particular, there is some evidence that public transport usage is higher in inner metro areas as opposed to outer areas. However, in the absence of more specific values, they have been used to provide a basis for making preliminary estimates of the likely changes of public transport usage. The following tables outlines the potential change in public transport usage by residents for daily travel and also the sub set peak period travel disaggregated to centre level using the population projections derived in section 8.4 and the multipliers from **Table 23**. Although not given in the PTA multipliers, it is expected that the percentage of peak period trips by public transport will rise by 2031 in line with the expected increase in overall public transport usage. For these calculations it is assumed to be 12% by 2031.

**Table 24: Estimated Changes in Daily Trip Numbers 2006-2031 – Residents Only**

Parameter	Estimated Trips Per Day – All (2006)	Estimated Trips Per Day – All (2031)	Estimated Additional Daily Trips - All	Percentage Change All Trips 2006-2031	Estimated Trips Per Day – Public Transport (2006)	Estimated Trips Per Day – Public Transport (2031)	Estimated Additional Daily Trips – Public Transport	Percentage Change Public Transport 2006-2031
Scarborough SEAS	14000	29050	15050	108%	770	2034	1264	164%
Stirling Residential	28000	31500	3500	13%	1540	2205	665	43%
Stirling Central	8750	56000	47250	540%	481	3920	3439	715%
Osborne Park	0	0	0	0	0	0	0	0
Glendalough	10500	24500	14000	133%	578	1715	1138	197%
Mt Hawthorn	5250	7000	1750	33%	289	490	201	70%
Remainder	21000	24500	3500	17%	1155	1715	560	48%
<b>Total</b>	<b>87500</b>	<b>175000</b>	<b>87500</b>	<b>100%</b>	<b>4813</b>	<b>12250</b>	<b>7438</b>	<b>155%</b>

**Table 25: Estimated Change in Peak Period Trips 2006-2031 - Residents Only**

Parameter	Estimated Trips Per Day – All (2006)	Estimated Trips Per Day – All (2031)	Estimated Additional Daily Trips - All	Percentage Change All Trips 2006-2031	Estimated Trips Per Day – Public Transport (2006)	Estimated Trips Per Day – Public Transport (2031)	Estimated Additional Daily Trips – Public Transport	Percentage Change Public Transport 2006-2031
Scarborough SEAS	5600	11620	6020	108%	515	1394	879	171%
Stirling Residential	11200	12600	1400	13%	1030	1512	482	47%
Stirling Central	3500	22400	18900	540%	322	2688	2366	735%
Osborne Park	0	0	0	0%	0	0	0	0%
Glendalough	4200	9800	5600	133%	386	1176	790	204%
Mt Hawthorn	2100	2800	700	33%	193	336	143	74%
Remainder	8400	9800	1400	17%	773	1176	403	52%
<b>Total</b>	<b>35000</b>	<b>70000</b>	<b>35000</b>	<b>100%</b>	<b>3220</b>	<b>8400</b>	<b>5180</b>	<b>161%</b>

This analysis provides some indication that the 5.5% multiplier for public transport underestimates the existing amount of patronage in the corridor. The estimated current total public transport daily daily boardings in **Table 24** is 4,800 but the daily boardings solely for bus route 400 is also 4,800 and this does not account for other bus routes or railway services. Even allowing for cross transfers from the 400 service to trains, this appears to indicate that substantially more people catch public transport in this area at present than across the metro area in general. This also indicates that the estimate of 12,000 daily public transport trips for residents as at 2031 is likely to be conservative.

### 9.3 Projected Public Transport Usage By Workforce

In addition to public transport usage by residents, the effect of workers travelling to the area needs to be considered. There is no specific data available to calculate employment self containment in the corridor and it is therefore very difficult to assign a value to the number of people coming into the area to work. As a very

approximate estimate, it appears as if 62% of the entire Stirling LGA workforce lives outside the LGA. If this proportion is taken as appropriate for the Scarborough Beach Rd corridor, it implies that approximately 15-16,000 workers travel from elsewhere to work in the corridor and that these workers would generate approximately 2,800 public transport trips using the standard multipliers. The following table gives a number of scenarios as at 2031 to assess the number of public transport trips the work force is likely to generate. In all cases it is assumed that the corridor will have 40,000 workers in total but the employment self containment ratio has been given a range of values. The percentage of trips using public transport is assumed to 12%

**Table 26: Public Transport Trips Generated By External Workforce**

Employment Self Containment	40%	60%	80%
Number of Workers Travelling into SBR Corridor	24,000	16,000	8,000
Number of Trips by Public Transport	5,800	3,800	2,000

## 9.4 Transit System Viability

A number of studies have been carried out to estimate the number of trips required to make various transit systems viable. The following figures have been suggested by Sinclair, Knight, Mertz<sup>4</sup> based on traffic and land use analysis for the Sydney region. This study suggests viability figures can be subject to considerable variation and the threshold levels may be somewhat lower for a Perth context.

**Table 27: Patronage Required to Establish Viability of Transit Systems**

Transit System	Patronage
Suburban Bus	Upto 3,000 passengers per hour
Bus Rapid Transit	1-10,000 passengers per hour
Light Rail Transit	3-15,000 passengers per hour
Heavy Rail	Above 4,500 passengers per hour

The analysis in section 9.2 & 9.3 suggests that there may be 15-18,000 public transport trips per week day along various sections of the Scarborough Beach Rd corridor by 2031. Of these it is estimated 80%, or some 12-14,000 trips, occur in the morning and evening peak periods. Assuming that the two peak periods account for 6 hours in a day, this would suggest a load of 2-2,300 passengers per hour during the times of heaviest use. According to the SKM figures, this level of patronage would support a viable bus rapid transit system in this area.

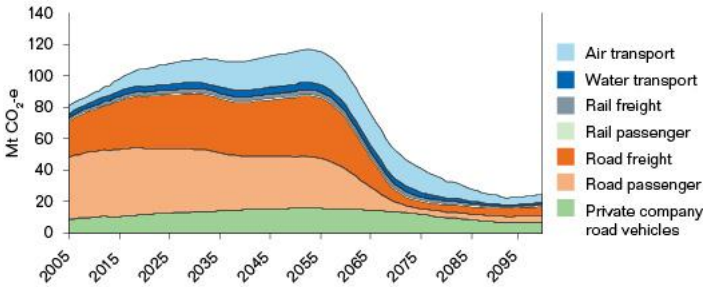
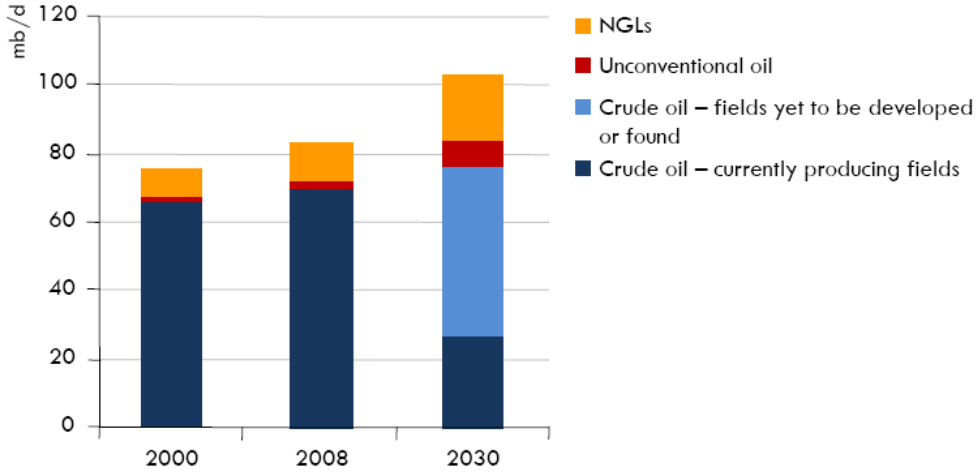
If a transit system was developed, current public transport usage indicates that initial patronage patterns would most likely be uneven with high usage during peak periods and relatively low levels of usage for the remainder of the day, especially in the evenings. However, this pattern is likely to become more uniform over time as the population densities increase and residents adapt to a culture of public transport usage. Ideally this would see residents using the transit system for purposes that currently are almost exclusively the domain of the car such as going to the beach or travelling to pubs, clubs and restaurants on weekend nights.

## 9.5 Additional Considerations

The outcomes outlined in section Error! Reference source not found. largely follow a business as usual scenario. However, there are a number of issues that may have a substantial impact on transportation over the short to medium term but are difficult to quantify at a small spatial region such as the Scarborough Beach Rd corridor.

The following table outlines some of these issues and indicates some relevant key points and quotes

<sup>4</sup> Sinclair Knight Mertz - Southern Metropolitan East -West Public Transport Study

<p>Climate change and schemes to limiting CO<sub>2</sub> emissions<sup>5</sup></p>	<ul style="list-style-type: none"> <li>• Transport accounted for 14% of all Australia's CO<sub>2</sub> equivalent emissions in 2006, with private use responsible for approximately half the total</li> <li>• Australia's per capita transport related emissions are 30% higher than the OECD average and 4 times the world average</li> <li>• An ETS that includes private vehicles and prices CO<sub>2</sub> (e) at \$200 per tonne would increase the cost of petrol by \$0.5 per litre</li> <li>• The reduction in Australian transport emissions by sector to achieve a 550ppm scenario are shown in the following chart</li> </ul>  <ul style="list-style-type: none"> <li>• European cities have on average 60% of the per capita emissions of Australian cities and the difference is largely due to public transport infrastructure and usage</li> <li>• <i>Governments have a strategic choice about whether to invest in mode shift and more compact urban forms. The need to plan our towns and cities for population growth provides us with an opportunity to plan for different densities and public transport structures. Changes in urban structure and mode could be implemented immediately in new suburbs and settlements. In established areas, it will take longer for the necessary system-wide changes to transport and land use to evolve. Significant mode shift will not occur overnight, or within one electoral cycle. However, a steady improvement in transport facilities and urban form over several decades accumulate to major effects on total travel demand and shifts in mode</i></li> </ul>
<p>Peak Oil and Subsequent increases in oil prices</p>	<ul style="list-style-type: none"> <li>• World oil prices have tripled in the period between 1997 and 2008 and peaked at US\$150 in July 2008</li> <li>• Existing increases in oil prices have increased travel costs for a medium sized car by approximately 10%</li> <li>• The 2009 IEA World Energy Report<sup>6</sup> appears to show a substantial gap between known oil supplies and required production over the next 20 years</li> </ul> 

<sup>5</sup> Ross Garnaut (2008 Cambridge University Press) - The Garnaut Climate Change Review

<sup>6</sup> IEA (2009) - World Energy Outlook 2009

Traffic Congestion Costs <sup>7</sup>	<ul style="list-style-type: none"> <li>• Estimated US congestion external costs, including delay and increased fuel consumption totalled US\$34-146 billion in 1991, equivalent to US\$52-222 billion in 2007 dollars</li> <li>• Vehicle fuel consumption increases 30% under heavy congestion, with increased fuel costs and air pollution representing 17% of external costs</li> <li>• Perth 1996 estimated marginal external congestion costs (Aus cents/Km) Freeways – 14c, CBD streets – 40c, Inner arterials – 16c, Outer arterials – 5c</li> </ul>
---------------------------------------	--

This is necessarily a very brief summary of these issues but it provides some indication that the traditional concepts underlying how transport is organised could be forced to undergo major changes in the near future. Consideration of these issues may require relaxing the measures used to assess viability in the near term to enable the region to cope with changes in the medium to long term.

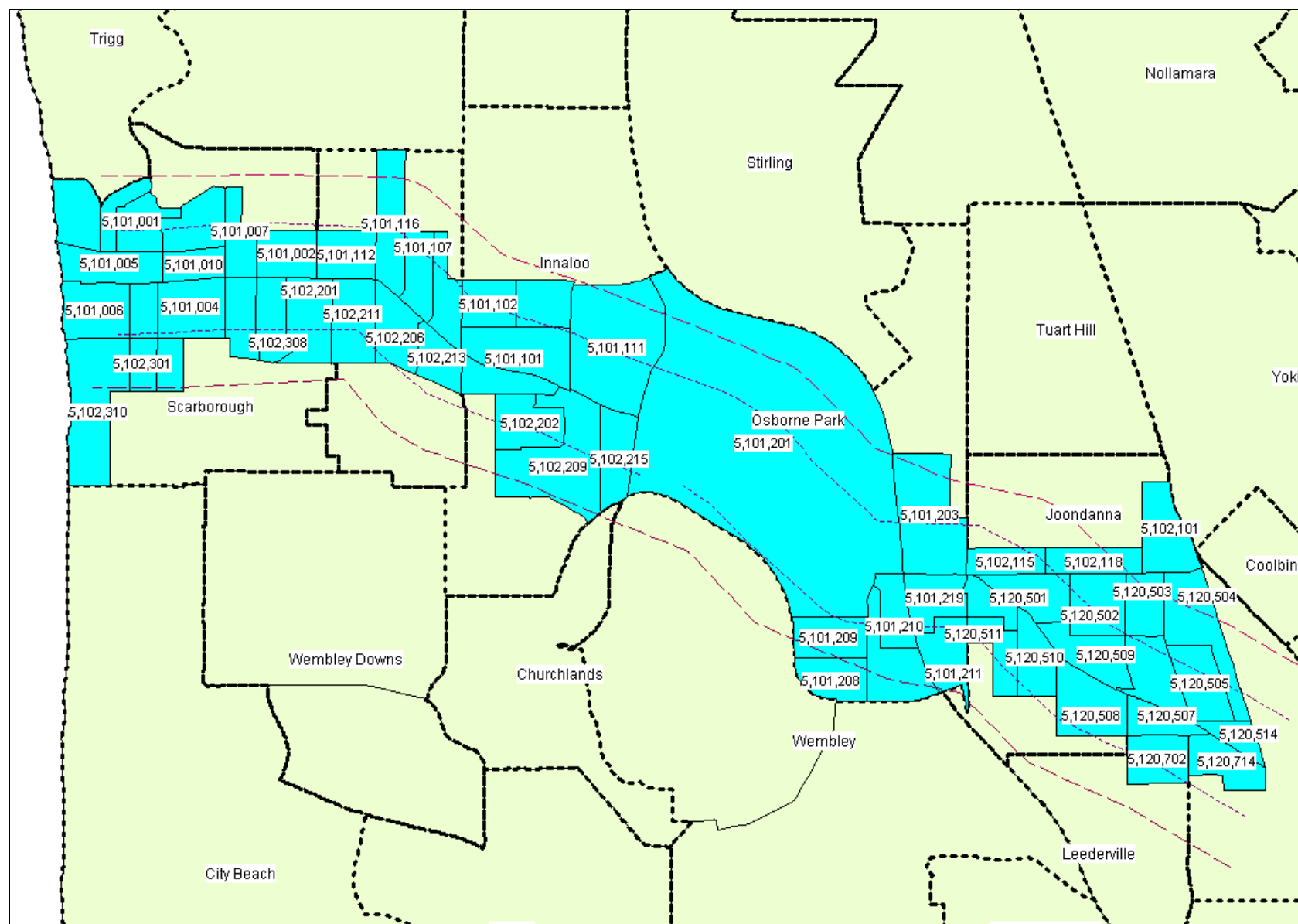
<sup>7</sup> VTPI (2009) – Transport Cost and Benefit Analysis II – Congestion Costs

## Appendix 1 – Scarborough Beach Road Collection District Summary

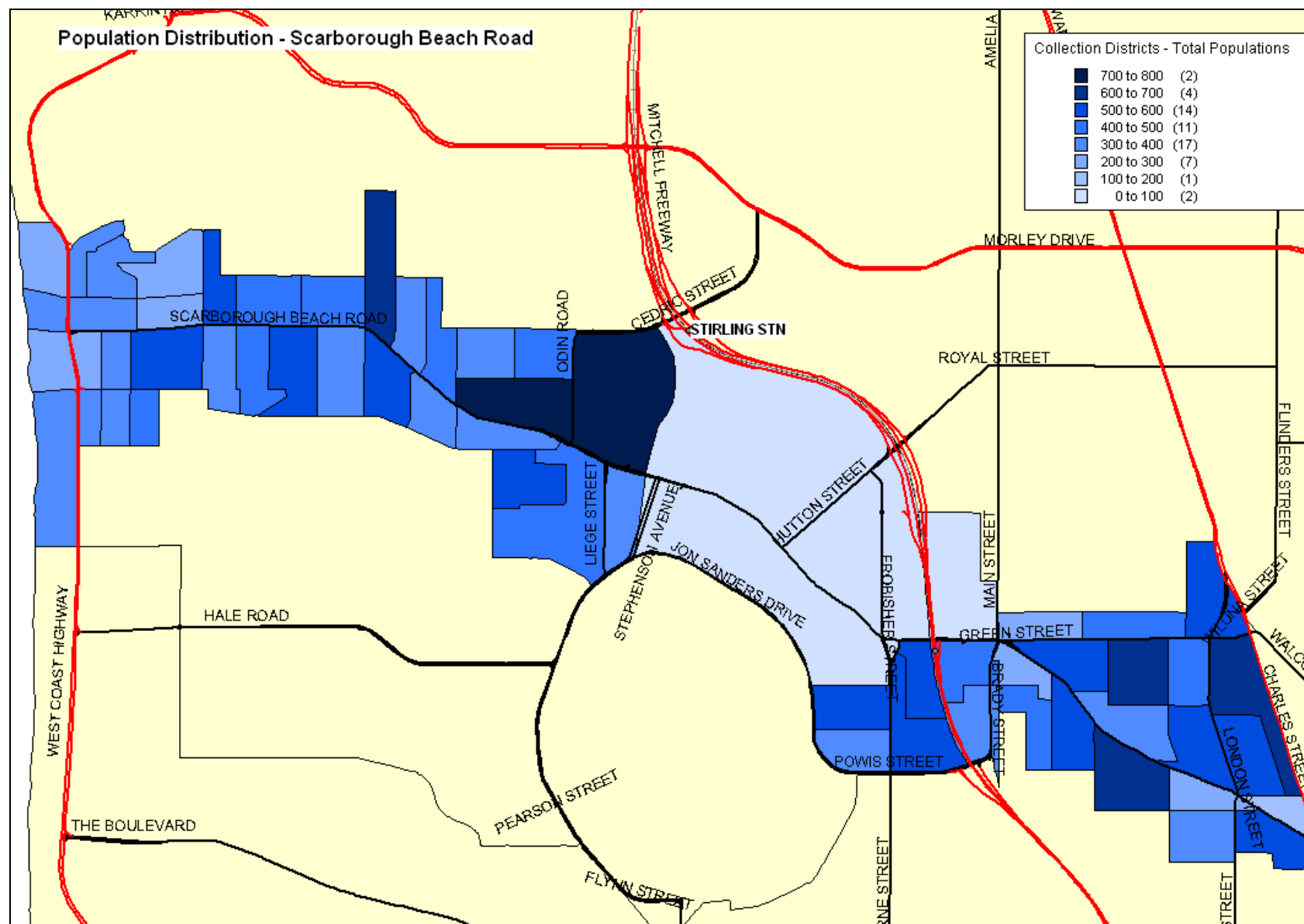
CD	LGA	Suburb	Total Pop	Median age of persons	Median individual income (\$/week)	Median family income (\$/week)	Median household income (\$/week)	Median housing loan repayment (\$/month)	Median rent (\$/week)	Average number of persons per bedroom	Average household size	% Same Address 1 year ago	% Same Address 5 years ago
5101110	Stirling	Doubleview	451	32	674	1416.6	1066.3	1350	190	1.1	2.3	70%	33%
5101107	Stirling	Doubleview	379	32	633	1570.9	1144.3	1733	210	1	2.2	67%	39%
5101116	Stirling	Doubleview	690	33	518	1172.5	859.7	1560	130	1.1	2.2	65%	42%
5101112	Stirling	Doubleview	426	36	597	1276.5	1083.8	1527.5	200	1	2.1	70%	45%
5102213	Stirling	Doubleview	316	36	723	1909.3	1716.1	2000	250	1	2.7	76%	50%
5102206	Stirling	Doubleview	500	37	689	1789.7	1313.7	1380.5	195	1.1	2.3	78%	52%
5102211	Stirling	Doubleview	381	38	659	1661.6	1136.8	1630	215	1	2.3	73%	55%
5101219	Stirling	Glendalough	415	32	462	1007.7	921.6	1300	210	1	2.2	56%	29%
5101211	Stirling	Glendalough	349	37	451	1421.4	833.2	1450	118.5	1.1	2	70%	43%
5101210	Stirling	Glendalough	552	35	365	899.5	592.6	1083	130	1.1	1.6	58%	35%
5101213	Stirling	Glendalough	566	40	408	1052.7	853.1	1200	150	1.1	1.9	73%	36%
5101209	Stirling	Glendalough	533	28	502	1064	713.6	943	140	1.1	1.6	50%	21%
5101208	Stirling	Glendalough	318	34	425	1099.5	596.6	995	130	1.1	1.6	69%	40%
5101111	Stirling	Innaloo	749	44	471	1099.5	833.2	1355.5	200	1	2.1	76%	50%
5101115	Stirling	Innaloo	448	35	660	1389.1	1077.9	1300	230	1	1.9	70%	40%
5101101	Stirling	Innaloo	750	37	579	1309.5	919.4	1517	180	1	1.9	74%	35%
5101102	Stirling	Innaloo	308	35	674	1493.4	1132.7	1508.5	250	1	2.1	73%	39%
5102101	Stirling	Joondanna	509	35	553	1288.4	1039.8	1300	175	1.1	2.1	73%	43%
5102118	Stirling	Joondanna	472	43	463	1289.6	705.9	1324	132.5	1.1	1.9	71%	46%
5102115	Stirling	Joondanna	278	37	719	1586.9	1132.7	1300	197.5	1	1.8	77%	48%
5101203	Stirling	Osborne Park	62	36	365	899.5	627.7	732	140	1	1.6	80%	46%
5101201	Stirling	Osborne Park	4	58	1350	2749.5	2349	0	0	1	1.5	0%	43%
5101002	Stirling	Scarborough	483	34	762	1780.5	1332.7	1517	232.5	1	2.2	69%	34%
5101007	Stirling	Scarborough	502	36	664	1489.7	977.7	1517	230	1	1.9	70%	40%
5101014	Stirling	Scarborough	266	41	618	1534.6	1006.6	1625	200	1	1.8	68%	35%
5101010	Stirling	Scarborough	239	35	654	1574.4	1089.6	1350	200	1	1.8	63%	39%
5101001	Stirling	Scarborough	398	34	768	1737.4	1140.5	1551.5	200	1	2.1	61%	33%
5101015	Stirling	Scarborough	314	31	679	1724.9	959.2	1200	170	1.1	1.8	49%	22%
5101012	Stirling	Scarborough	270	39	790	1721.4	1483.1	2000	287.5	1.1	1.8	47%	23%

CD	LGA	Suburb	Total Pop	Median age of persons	Median individual income (\$/week)	Median family income (\$/week)	Median household income (\$/week)	Median housing loan repayment (\$/month)	Median rent (\$/week)	Average number of persons per bedroom	Average household size	% Same Address 1 year ago	% Same Address 5 years ago
5101005	Stirling	Scarborough	363	34	747	1384.8	1046.8	1000	200	1	1.7	50%	23%
5102201	Stirling	Scarborough	539	38	632	1344.7	1092.1	1397.5	210	1	2.1	75%	49%
5102308	Stirling	Scarborough	427	36	595	1609.3	1160.3	1625	200	1	2.2	72%	44%
5102307	Stirling	Scarborough	370	34	636	1370.6	1054.7	1500	200	1.1	2.1	76%	42%
5101004	Stirling	Scarborough	542	34	689	1332.7	1132.7	1094	200	1	2.2	64%	39%
5102311	Stirling	Scarborough	410	30	671	1170.6	841	1083	175	1	1.6	58%	27%
5102301	Stirling	Scarborough	355	31	668	1156.4	782.4	1100	175	1	1.6	57%	27%
5101009	Stirling	Scarborough	395	32	684	1132.7	899.5	1248	180	1.1	1.7	57%	29%
5101006	Stirling	Scarborough	281	34	709	1464.1	1082.9	1300	190	1.1	1.7	37%	23%
5102310	Stirling	Scarborough	330	36	766	1549.5	1130.6	1300	233.5	1	1.8	60%	30%
5102215	Stirling	Woodlands	355	77	388	1016.6	554.7	1077.5	175	1	1.5	77%	51%
5102209	Stirling	Woodlands	486	41	488	1499.7	993.5	1796	182.5	1	2.5	90%	61%
5102202	Stirling	Woodlands	500	39	539	1724.9	1433.2	1841.5	237.5	1	2.8	86%	60%
5102210	Stirling	Woodlands	332	37	636	1271.1	1068.9	1300	180	1.1	1.9	73%	39%
5120702	Vincent	Leederville	376	37	534	1615.9	1271.1	1695	200	1.1	2.5	84%	59%
5120506	Vincent	Mt Hawthorn	516	35	772	1985.4	1424.9	1600	175	1	2.3	77%	54%
5120503	Vincent	Mt Hawthorn	473	34	657	1849.5	1676	1700	220	1.2	2.8	76%	55%
5120509	Vincent	Mt Hawthorn	362	35	666	1649.2	1190.7	1800	212.5	1.1	2.4	75%	56%
5120502	Vincent	Mt Hawthorn	611	36	574	1636.7	1263.3	1700	220	1.1	2.6	77%	58%
5120501	Vincent	Mt Hawthorn	507	36	659	1757.5	1236.2	1733	210	1.1	2.4	75%	53%
5120507	Vincent	Mt Hawthorn	296	38	838	2027.7	1499.7	1571	210	1.1	2.4	81%	49%
5120508	Vincent	Mt Hawthorn	679	36	665	1941.5	1527.1	1508.5	270	1.1	2.4	73%	51%
5120510	Vincent	Mt Hawthorn	516	35	689	1987.5	1787.9	1800	197.5	1.2	2.7	78%	58%
5120516	Vincent	Mt Hawthorn	217	35	588	1524.6	1437.4	1100	225	1.2	2.7	87%	73%
5120511	Vincent	Mt Hawthorn	400	35	707	1849.5	1374.1	1475	215	1.1	2.4	79%	54%
5120514	Vincent	North Perth	190	37	531	1365.8	828.4	1250	150	1	1.8	71%	50%
5120504	Vincent	North Perth	620	35	584	1320.8	1183.7	1733	230	1.1	2.5	70%	45%
5120505	Vincent	North Perth	538	36	658	1734.5	1433.2	1560	225	1.1	2.3	80%	54%
5120714	Vincent	North Perth	548	32	789	1671.8	1453.8	1733	250	1.1	2.1	65%	37%

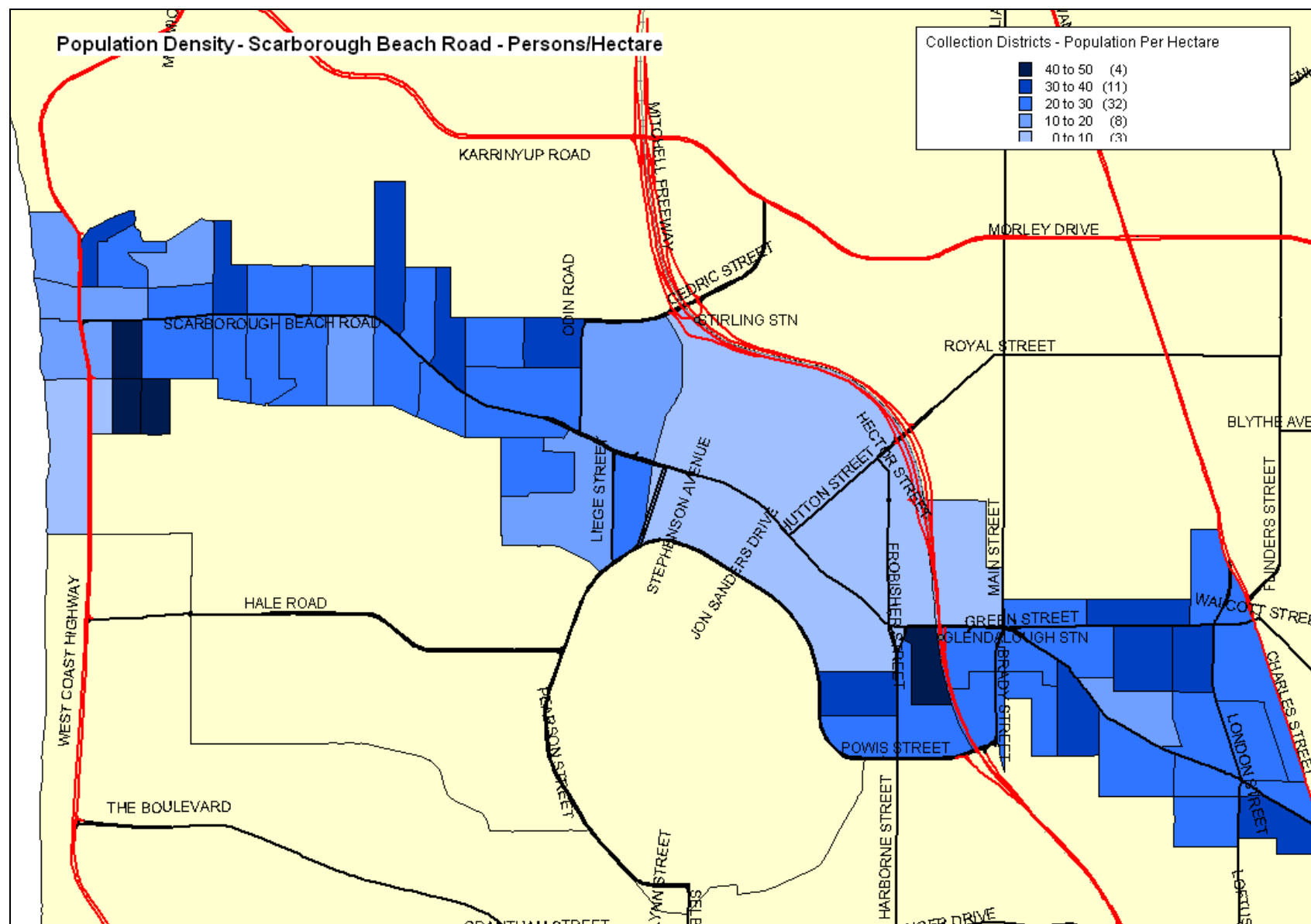
## Appendix 2 – Spatial Distribution of Collection Districts



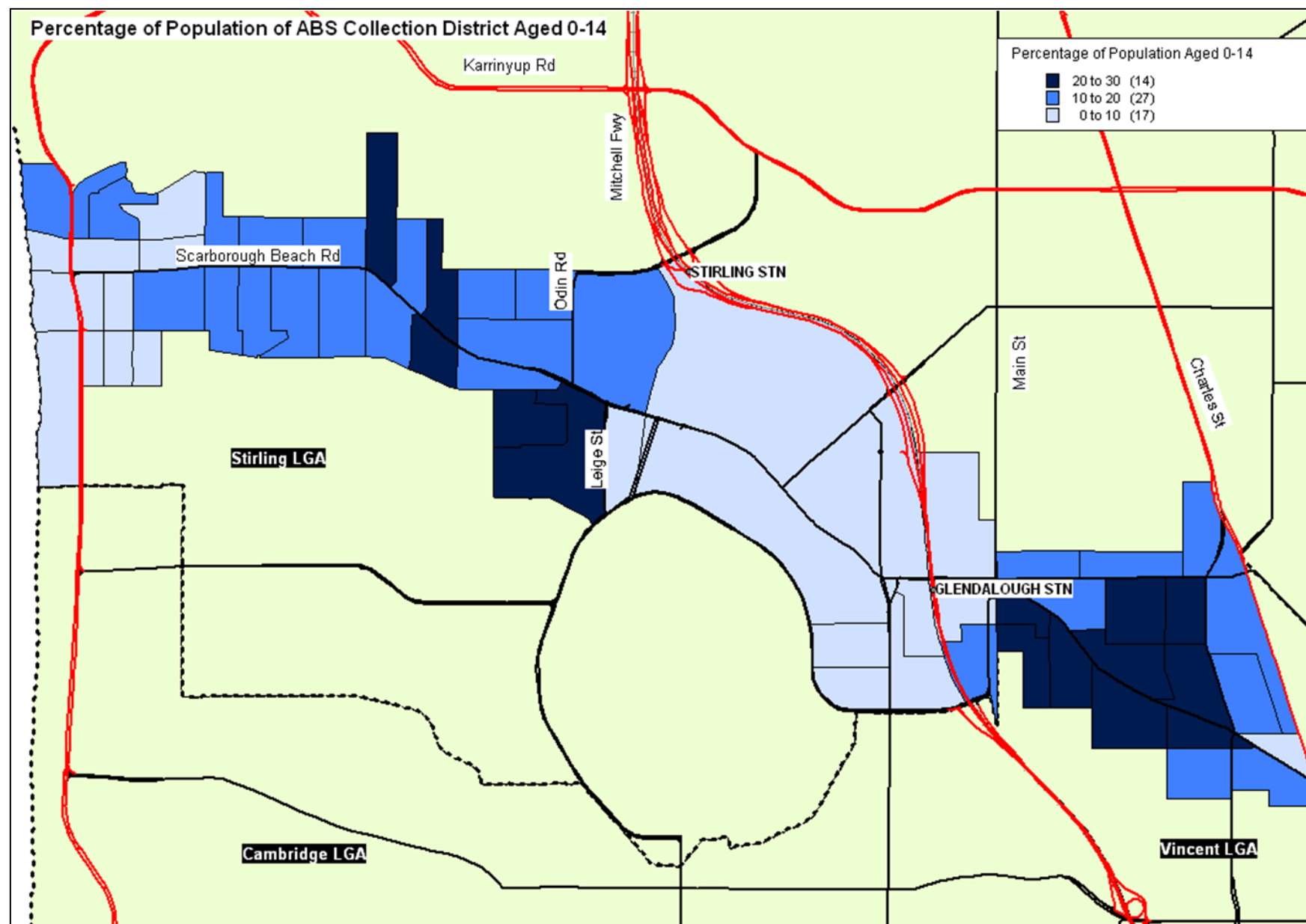
## Appendix 3 – Population Distribution by Collection District as at 2006 Census

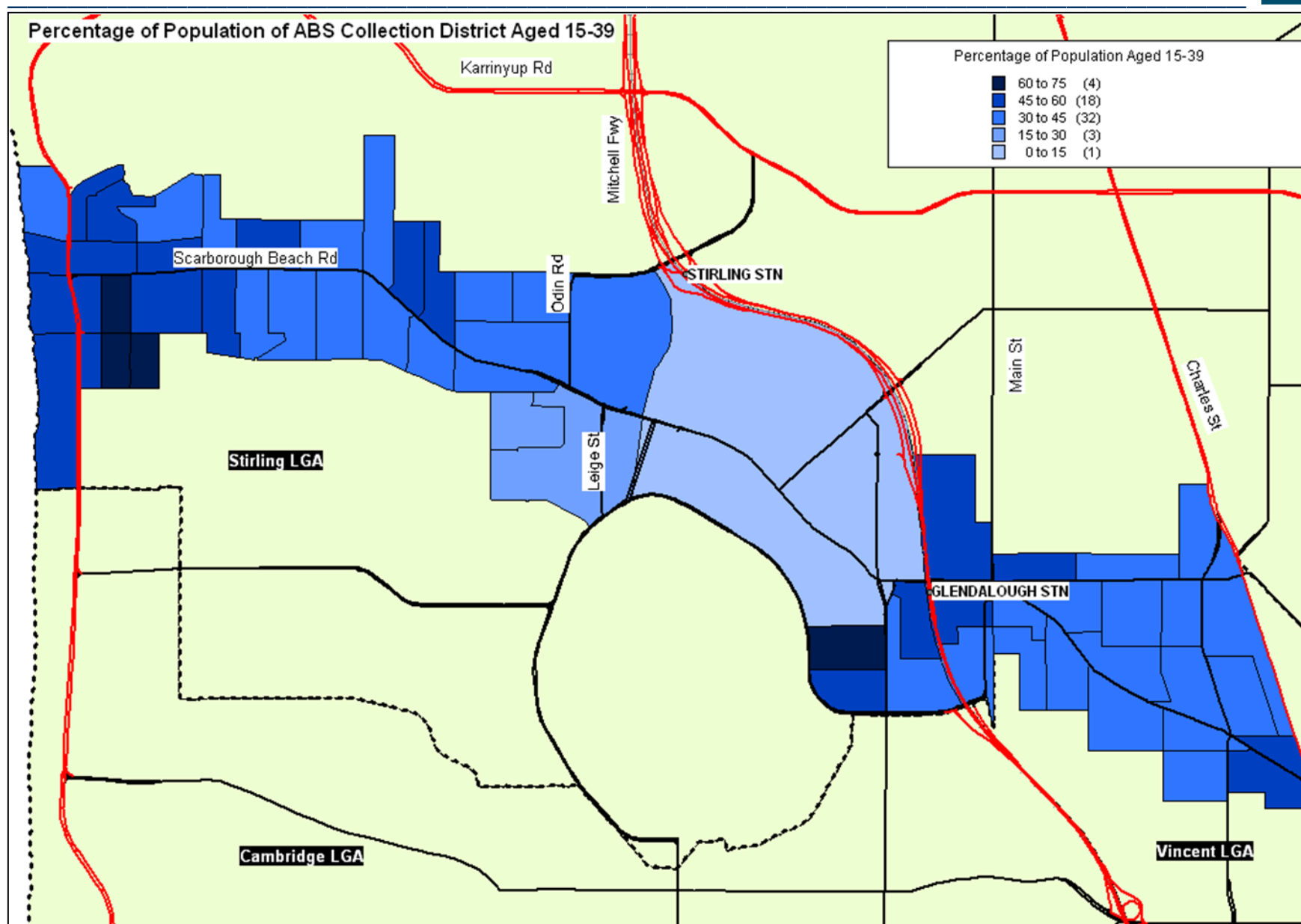


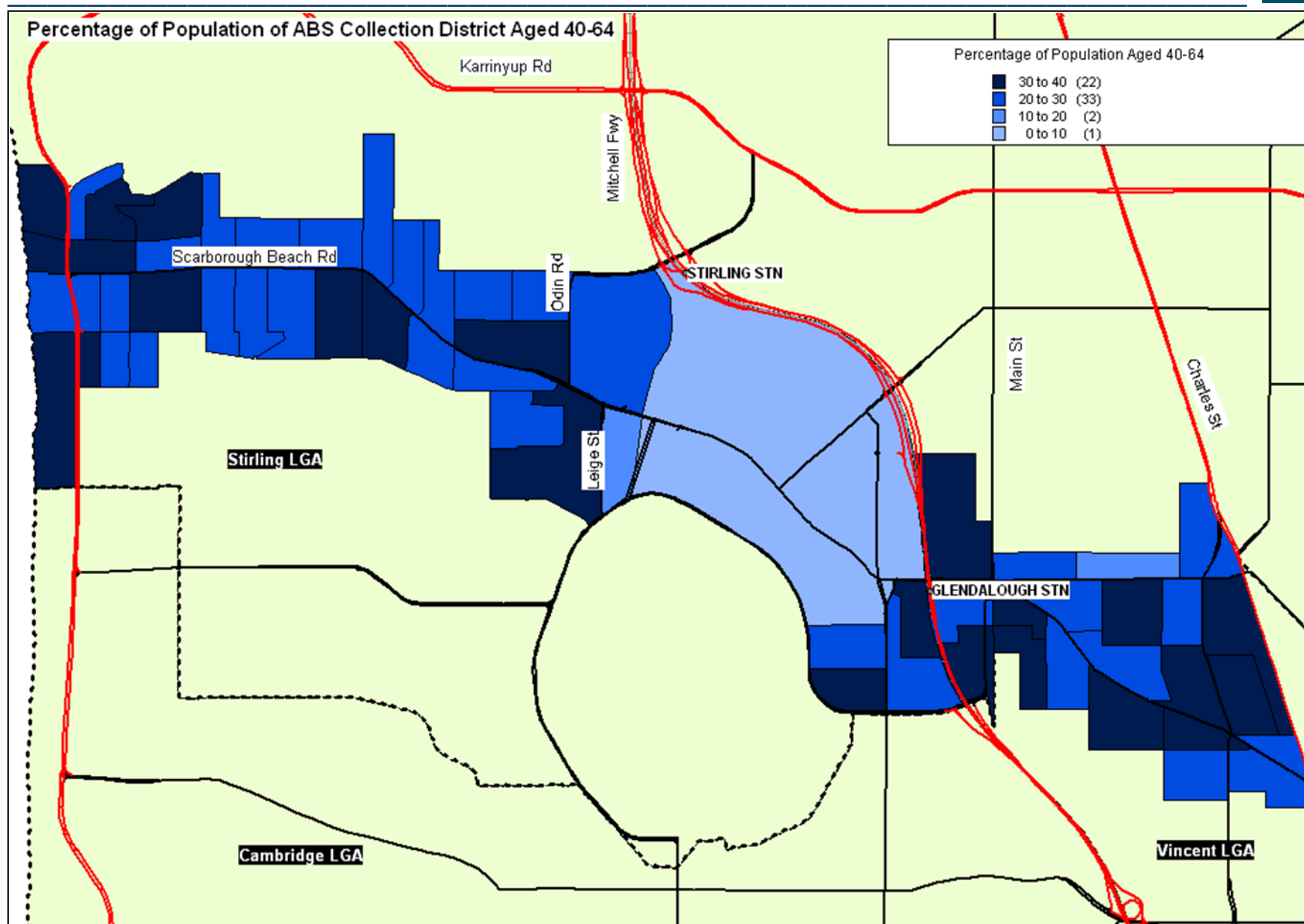
## Appendix 4 – Population Density by Collection District as at 2006 Census

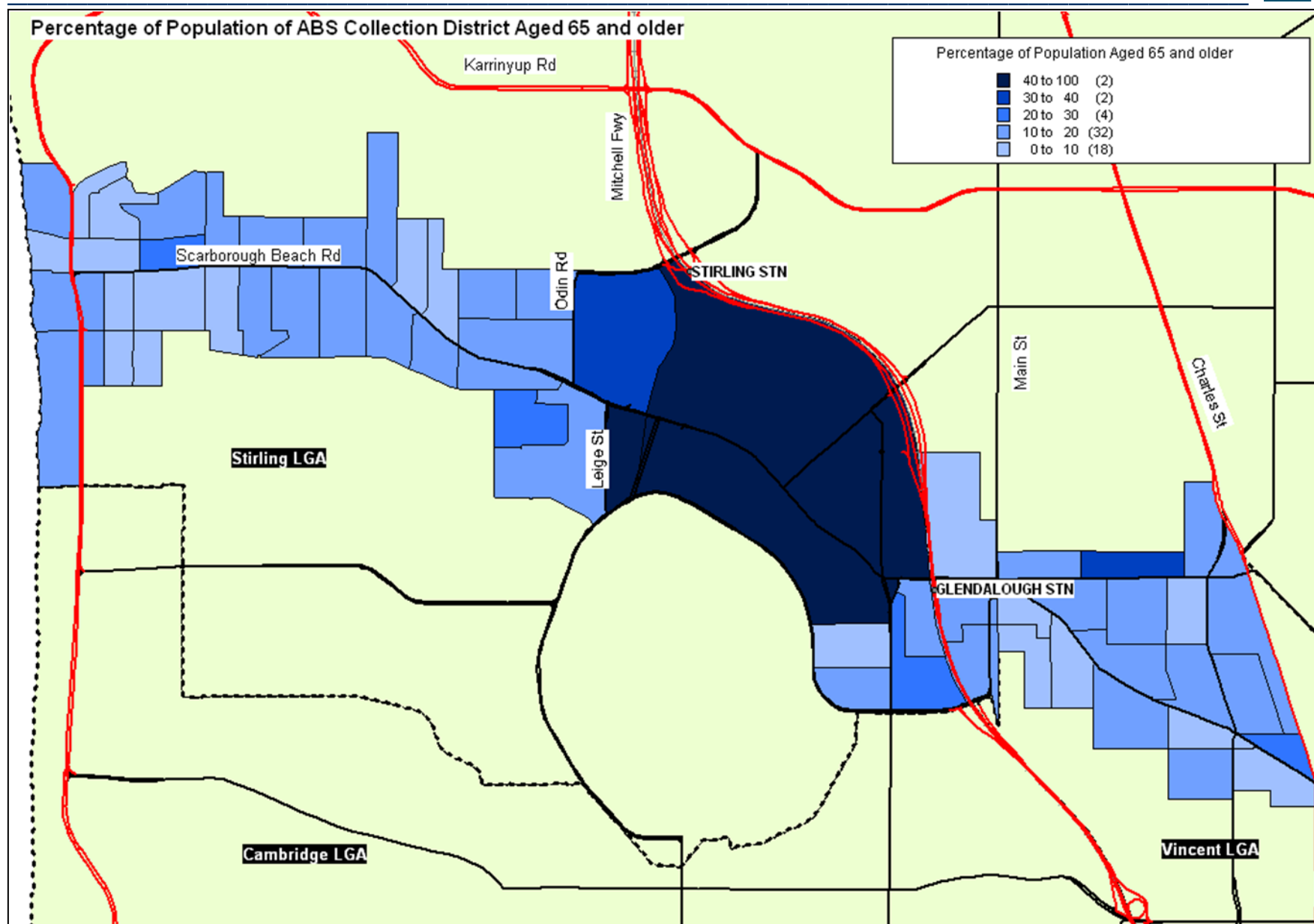


## Appendix 5 – Age Distribution as at 2006 Census

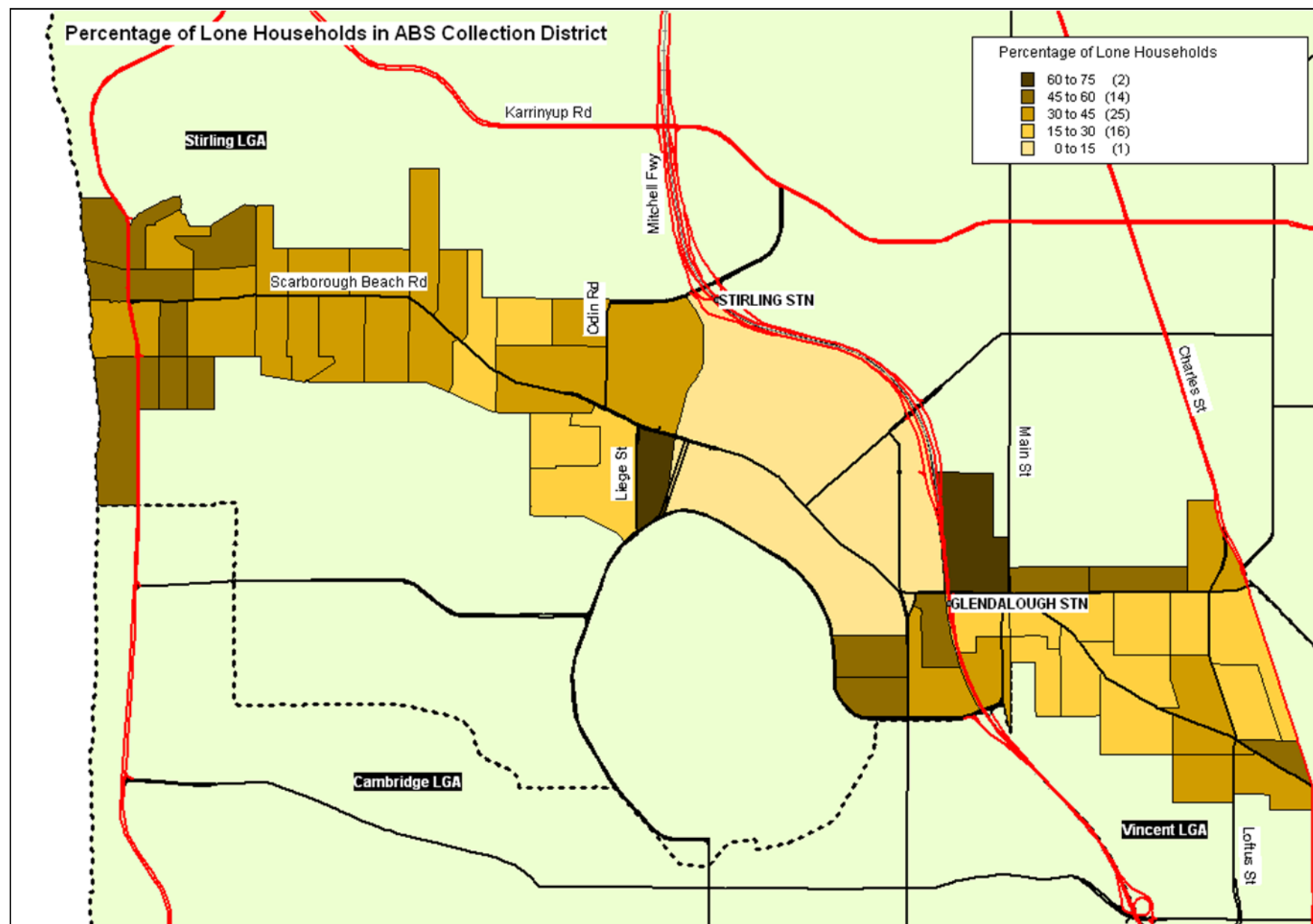




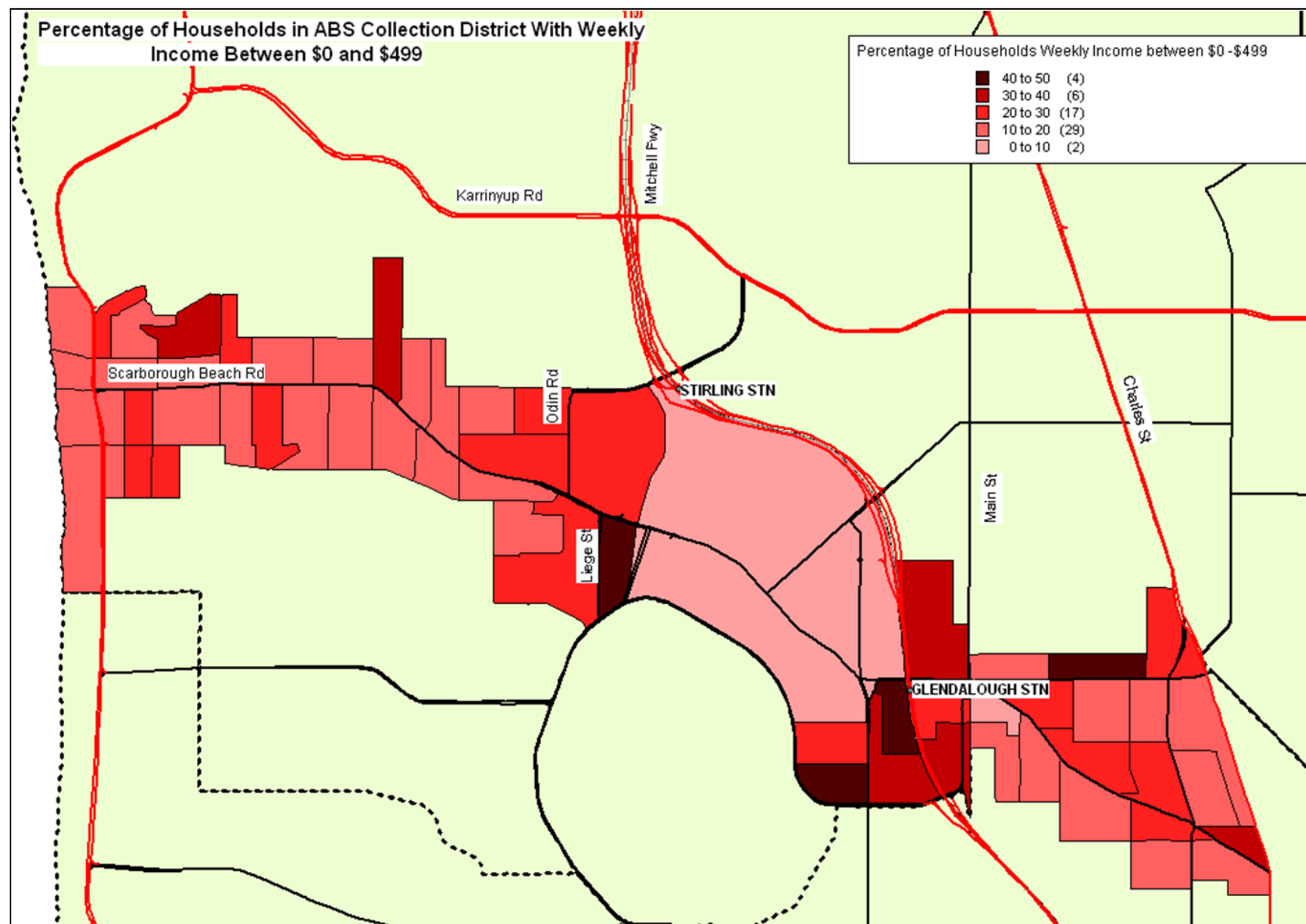


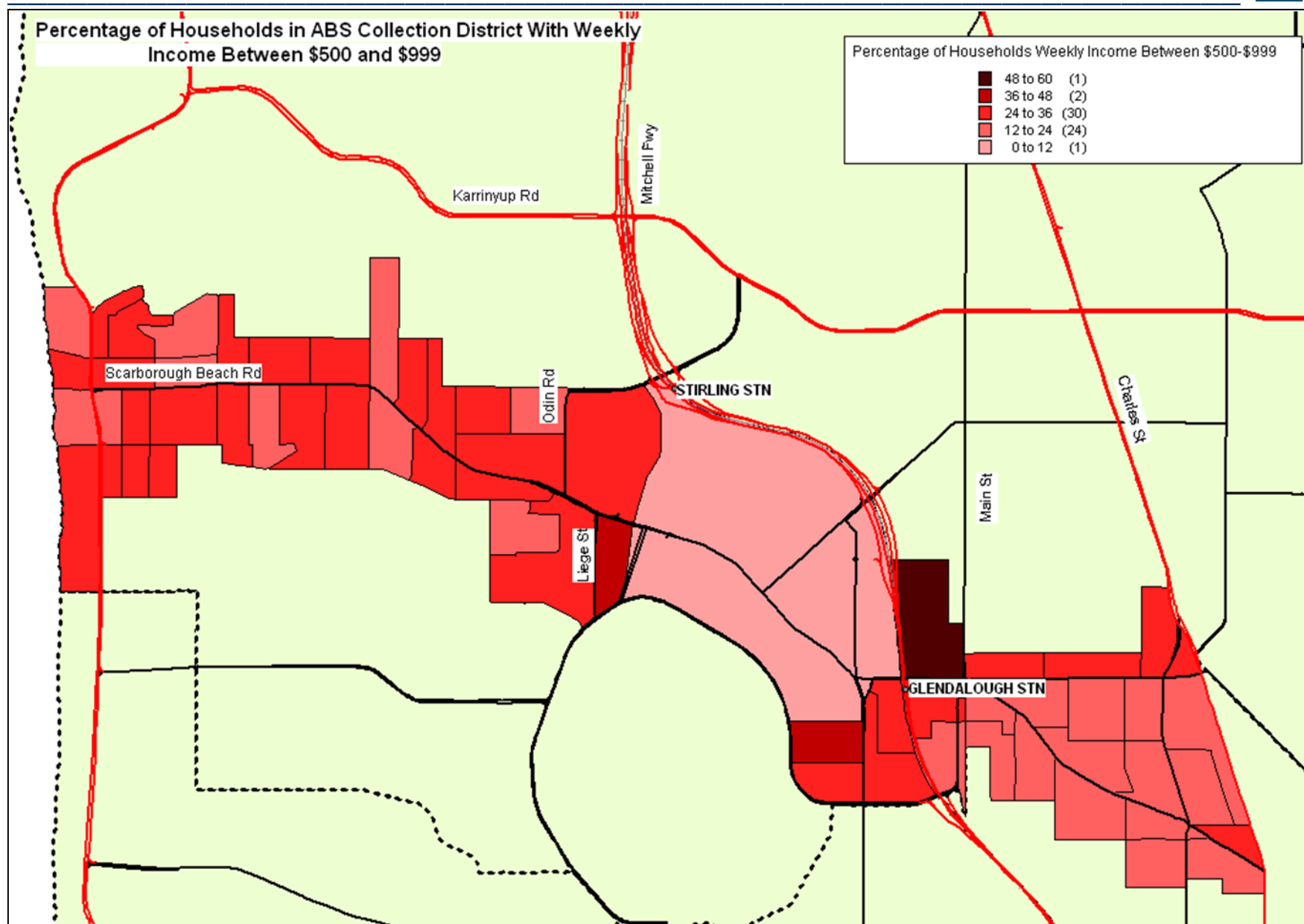


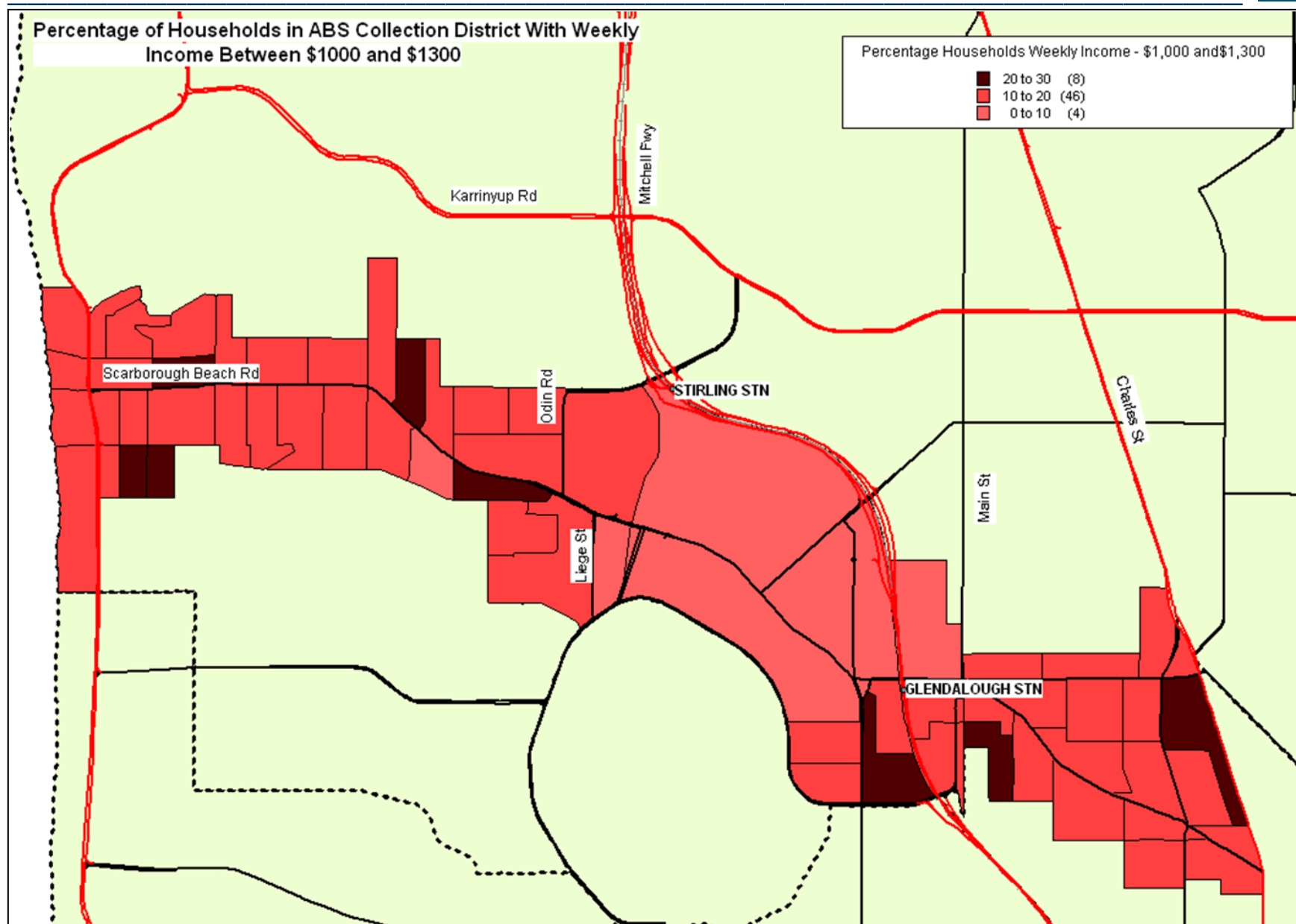
## Appendix 6 – Lone Households Distribution as at 2006 Census

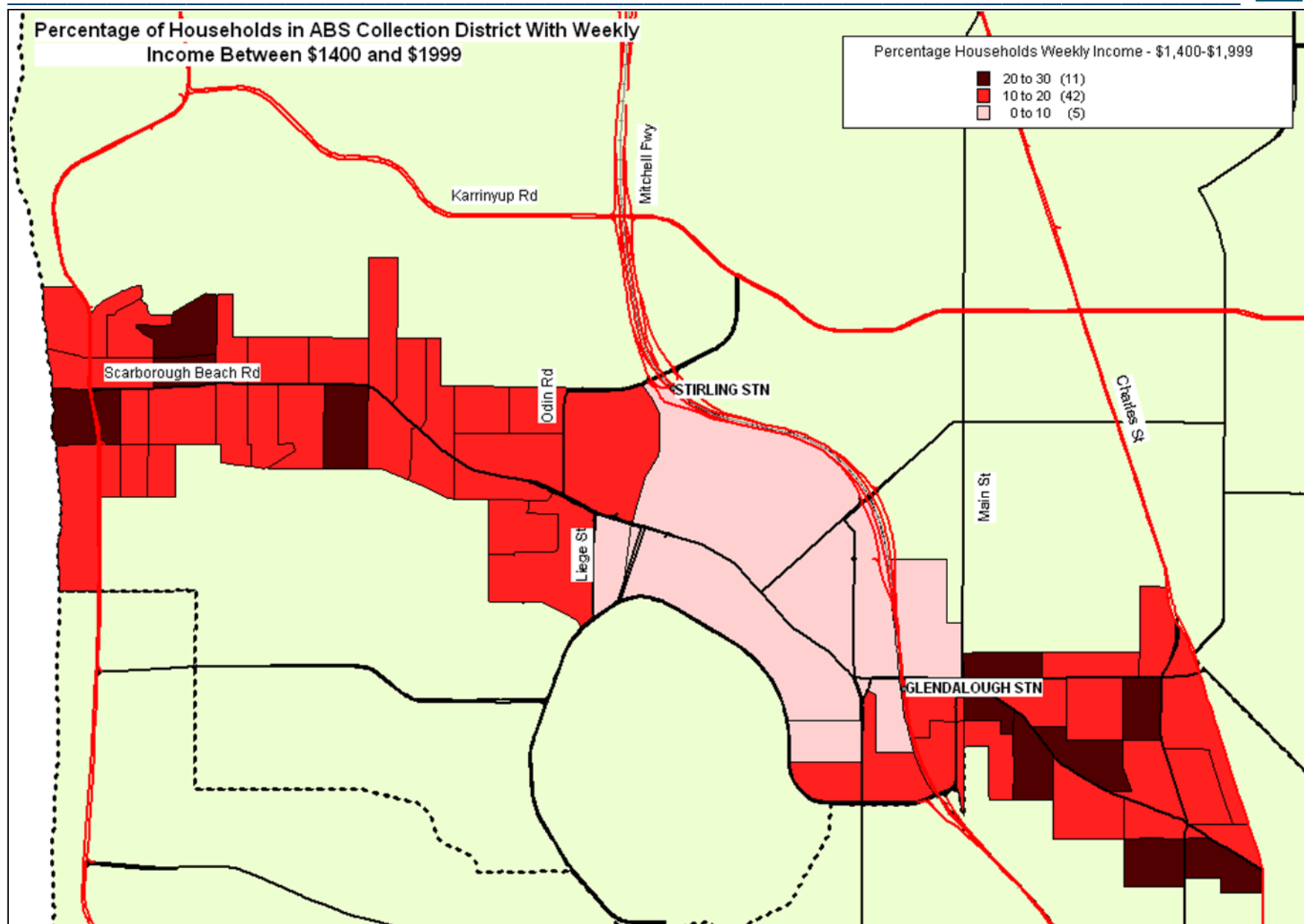


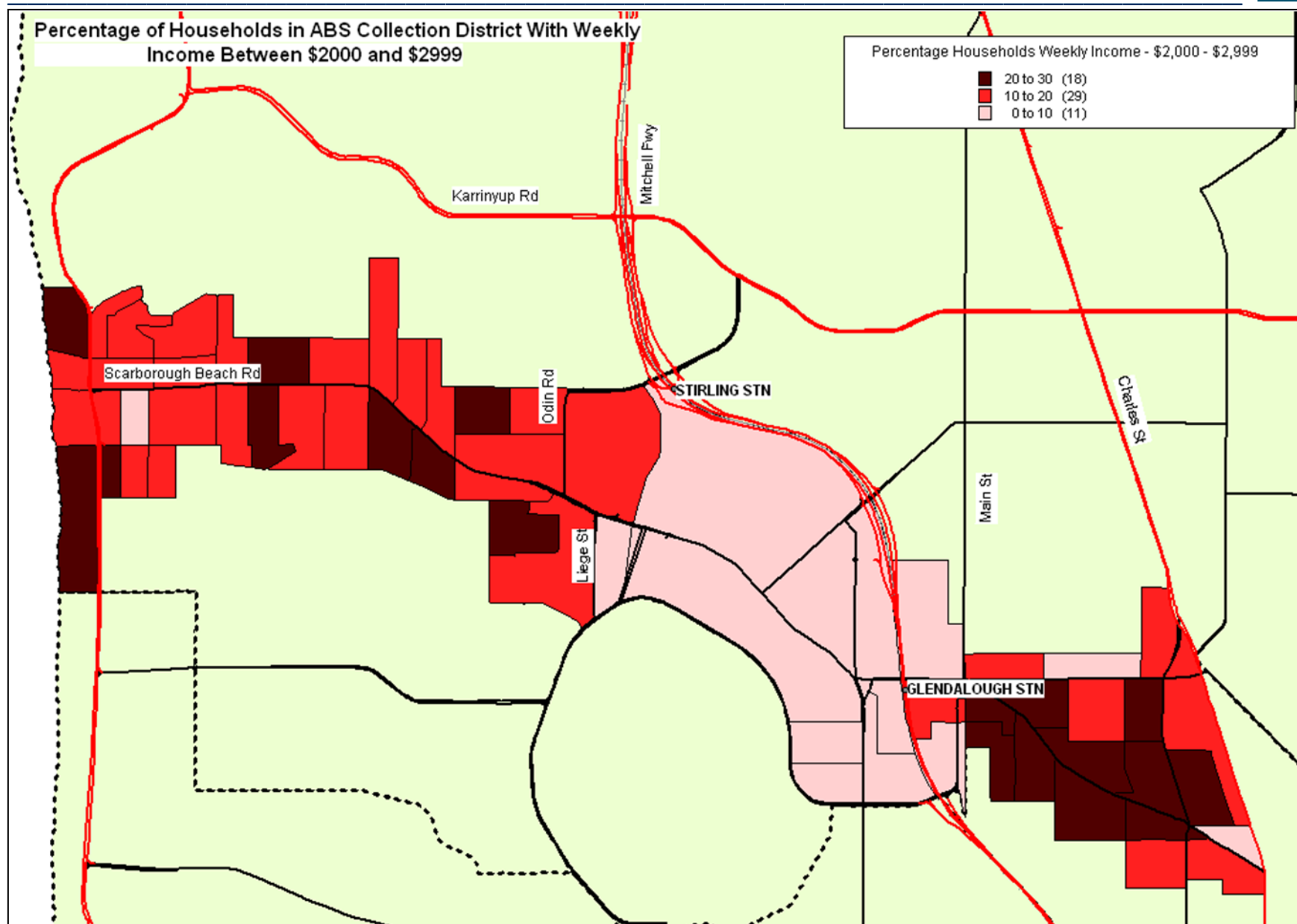
## Appendix 7 – Income Distribution as at 2006 Census

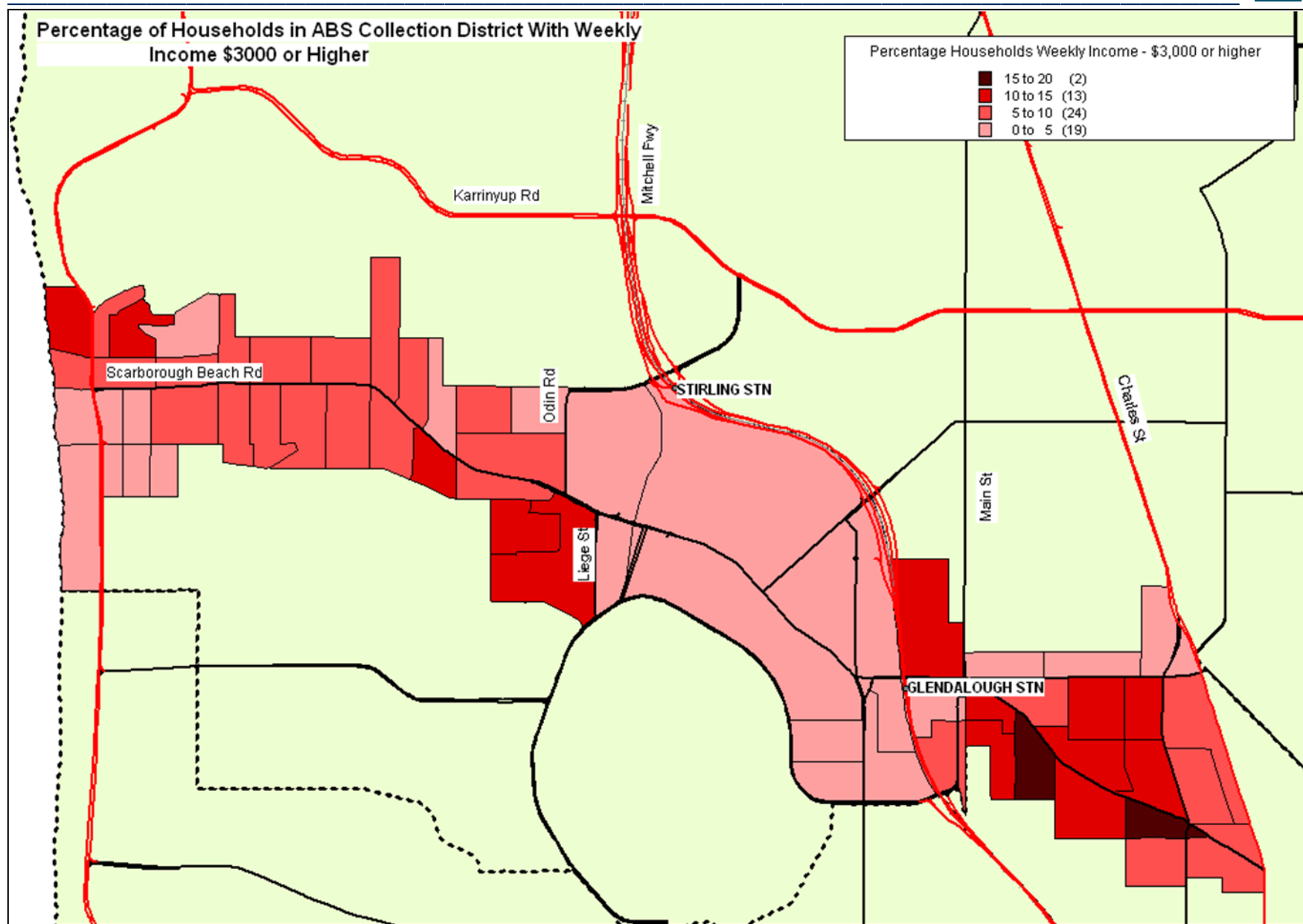




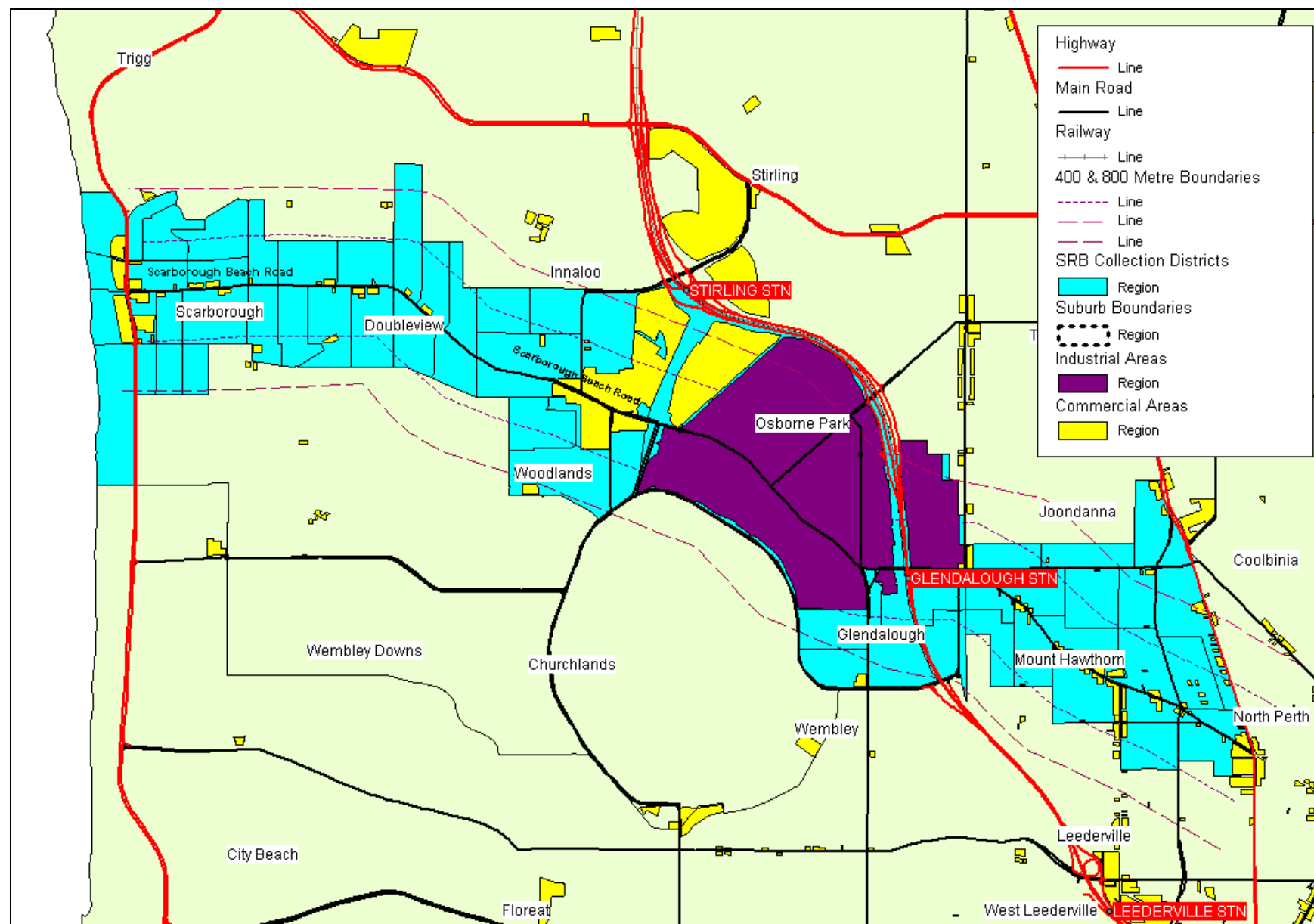








## Appendix 8 – Location of Existing Commercial and Industrial Areas in SBR Corridor



## Appendix 9 – Commercial and Industrial Activity by Planning Land Use

The following tables outline the situation with regard to commercial and industrial land use as at the time of the 2007 land use survey. It should be noted that the survey results are still considered preliminary and are subject to change. show the land use data disaggregated by the relevant LGAs while show the aggregate data for the corridor.

**Table 28: Estimated Commercial Floor Space (m2) by PLUC – Stirling LGA & Stirling Section of Scarborough Beach Rd Corridor**

	Planning Land Use Category												
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Vacant	Total
Stirling LGA	440	24,114	67,154	31,269	297,446	63,228	131,891	29,574	61,283	48,042	21,434	51,047	826,922
SRB Corridor – Stirling	0	14,718	36,717	11,861	60,675	34,525	37,529	3,093	17,893	46,882	4,191	18,869	286,952
SRB Corridor as % of LGA	0%	61%	55%	38%	20%	55%	28%	10%	29%	98%	20%	37%	35%
SRB Corridor - % Planning Land Use	0.0%	5.1%	12.8%	4.1%	21.1%	12.0%	13.1%	1.1%	6.2%	16.3%	1.5%	6.6%	100.0%

Source – DPI (2008) Commercial land Use Survey

**Table 29: Commercial Employment by PLUC - Stirling LGA & Stirling Section of Scarborough Beach Rd Corridor**

	Planning Land Use Category											
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Total
Stirling LGA	24	294	505	435	9,921	570	5,853	748	917	341	379	<b>19,987</b>
SRB Corridor – Stirling	0	122	240	158	2,114	196	1,949	80	247	327	62	<b>5,495</b>
SRB Corridor as % of LGA	0%	42%	48%	36%	21%	34%	33%	11%	27%	96%	16%	<b>27%</b>
SRB Corridor - % Employment by Planning Land Use	0	2.2%	4.4%	2.9%	38.5%	3.6%	35.5%	1.5%	4.5%	6.0%	1.1%	<b>100.0%</b>

Source – DPI (2008) Commercial land Use Survey

**Table 30: Estimated Commercial Floor Space (m2) by PLUC - Vincent LGA & Vincent Section of Scarborough Beach Rd Corridor**

	Planning Land Use Category												
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Vacant	Total
Vincent LGA	66	17,096	36,202	23,742	90,481	20,849	131,472	16,449	28,083	13,154	2,453	49,902	<b>429,949</b>
SRB Corridor – Vincent	0	3,735	6,288	3,847	17,198	3,811	15,175	834	5,027	1,892	750	5,637	<b>64,193</b>
SRB Corridor as % of LGA	0%	22%	17%	16%	19%	18%	12%	5%	18%	14%	31%	11%	<b>15%</b>
SRB Corridor - % Planning Land Use	0	5.8%	9.8%	6.0%	26.8%	5.9%	23.6%	1.3%	7.8%	2.9%	1.2%	8.8%	<b>100.0%</b>

Source – DPI (2008) Commercial land Use Survey

**Table 31: Commercial Employment by PLUC - Vincent LGA & Vincent Section - Scarborough Beach Rd Corridor**

	Planning Land Use Category											
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Total
Vincent LGA	2	385	250	480	3,064	308	5,485	444	588	104	52	11,162
SRB Corridor – Vincent	0	57	39	142	531	80	651	33	103	13	4	1,651
SRB Corridor as % of LGA	0%	15%	15%	30%	17%	26%	12%	7%	18%	13%	8%	15%
SRB Corridor - % Employment by Planning Land Use	0.0%	3.5%	2.4%	8.6%	32.2%	4.8%	39.4%	2.0%	6.2%	0.8%	0.2%	100.0%

Source – DPI (2008) Commercial land Use Survey

**Table 32: Total Estimated Commercial Floor Space (m2) by PLUC - Scarborough Beach Road Corridor**

	Planning Land Use Category											
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Vacant
Floor Space	0	18,453	43,005	15,708	77,873	38,336	52,704	3,927	22,920	48,774	4,941	24,506
% of Overall Floor Space By PLUC	0%	5%	12%	4%	22%	11%	15%	1%	7%	14%	1%	7%
												<b>100%</b>

Source – DPI (2008) Commercial land Use Survey

**Table 33: Total Commercial Employment by PLUC - Scarborough Beach Road Corridor**

	Planning Land Use Category											
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Total
No of Employees	0	179	279	300	2,645	275	2,599	113	350	340	66	7,145
% of Overall Employment by PLUC	0%	2%	4%	4%	37%	4%	36%	2%	5%	5%	1%	100%

Source – DPI (2008) Commercial land Use Survey

**Table 34: Estimated Industrial Floor Space (m2) by Planning Land Use Category – Osborne Park**

	Planning Land Use Category												
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Vacant	Total
Floor Space	846	190,083	331,095	143,205	67,286	107,446	214,931	17,247	14,484	124	5,437	64,038	1,156,222
% of Overall Floor Space By PLUC	0%	16%	29%	12%	6%	9%	19%	1%	1%	0%	0%	6%	100%

Source – DPI (2008) Commercial land Use Survey

**Table 35: Total Industrial Employment by Planning Land Use Category – Osborne Park**

	Planning Land Use Category											
	Rural	Manufacturing	Storage & Distribution	Service Industry	Shop Retail	Other Retail	Office	Health	Recreation	Residential	Utilities	Total
No of Employees	27	2,174	1,562	1,863	862	1,043	10,168	231	187	9	80	18,206
% of Overall Employment by PLUC	0%	12%	9%	10%	5%	6%	56%	1%	1%	0%	0%	100%

Source – DPI (2008) Commercial land Use Survey