

URBAN CONSOLIDATION VS URBAN SPRAWL IN SYDNEY. THE DEBATE RAGES ON

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ABSTRACT

The challenge of accommodating future population growth and the necessary supporting economic development to a global city such as Sydney are wide ranging and the subject of intensive media debate. Many interest groups in Sydney are seeking to influence government policy and the future demand for new transport infrastructure and improved public transport services is now appearing to overwhelm the resources of either state or federal governments.

In an Australian context, Sydney has a relatively high population density and this has historically helped the city develop significantly higher levels of public transport usage in comparison to other Australian cities, in particular for journey to work travel, which occurs at the time of peak demand when network capacity is most critical. However, the population's increasing desire for fast, convenient and affordable transport in an increasingly sprawling city, now conflicts with a range of sustainability concerns and planning policy objectives.

This paper reviews the current influence of both distance from the central City of Sydney CBD and population density per square kilometre, in terms of how these two factors influence car usage for journey to work travel and are able to contribute positively in the future towards meeting social, economic and environmental, urban development objectives for Sydney in comparison with the Sydney Metropolitan Strategy released in 2005.

INTRODUCTION

Sydney's transport system is largely constrained by its geography, history, and local and state politics. In this relatively young city, growth in population has been matched by growth in its physical boundaries and development of the urban fringe, resulting in urban sprawl.

The Inner Suburbs of Sydney (within 0-10 kilometres of the CBD) exhibit a disproportionately high level of population density when compared with the remainder of the Greater Metropolitan Region of Sydney (GMR), where low-density has historically proved to favour the dominance of private vehicles. (Hamnett and Freestone, 1999)

This paper examines the current population densities of different areas of Sydney in comparison with global benchmark urban densities and mode splits for journey to work travel from each area by six different travel modes. The data used is from the 2006 Census, assessed against both the population density of regions and their distance from the CBD. The paper also examines the areas where a future focus on strategies for

'Active Transport', as well as improved public transport provision and patronage will assist in achieving more sustainable urban development objectives.

GLOBAL CITY BENCHMARKS FOR URBAN POPULATION DENSITY

A range of current Australian and global benchmarks for the bulk urban densities of major cities are summarised in the following table. Sydney has, by a significant margin, the highest urban density of any Australian State Capital City but its density is well below that of comparable European Capital Cities or other Major Southern Hemisphere Cities.

Grouping of Cities	City (Year of Data)	Density (persons per square km)	Population
Australian State Capital Cities	Sydney 2006	2050	3,641,000
	Melbourne 2006	1550	3,372,000
	Adelaide 2006	1400	1,040,000
	Perth 2006	1200	1,256,000
	Canberra 2006	1100	356,000
	Hobart 2001	1000	126,000
	Brisbane 2006	900	1,676,000
Major Southern Hemisphere Cities	Rio de Janeiro 2005	6900	10,900,000
	Santiago 2002	6800	5,390,000
	Buenos Aires 2001	4650	12,000,000
	Cape Town 2001	3950	2,700,000
	Durban 2003	3500	2,900,000
	Johannesburg 2001	2500	6,000,000
	Auckland 2001	2000	1,050,000
Major European Cities	Istanbul 2007	8850	11,100,000
	Athens 2001	5400	3,685,000
	Madrid 2001	5200	4,900,000
	London 2001	5100	8,278,000
	Barcelona 2001	4850	3,900,000
	Manchester 2001	4000	2,245,000
	Berlin 2001	3750	3,675,000
	Paris 2005	3400	10,400,000
	Rome 2001	3200	2,750,000
	Milan 2001	1750	4,200,000

Source: (Demographia, 2008)

The table above shows that for a combination of either major global cities in Europe or in other Southern Hemisphere Countries which could be more legitimately compared with Australia in terms of their historical colonial patterns of development, there is an overall mid-range benchmark urban density of approximately 4000 to 5000 persons per square kilometre for cities which are broadly comparable in their overall size and economic significance to Sydney.

London at 5100 persons per square kilometre has a 25% higher population density than this international Global City benchmark but is nevertheless a useful city with which to make spatial comparisons with Sydney, as in its early years London was very much the model for the types of housing and other urban development which were constructed in Sydney, and there were cultural similarities between the populations also.

In the 14 Inner London Boroughs, which all lie within an approximate 0-10 kilometre radius of the historic city centre of London (Charing Cross) the population densities in the 2001 Census ranged from 2694 persons per square km in the City of London (which is primarily a commercial district now) to 13,609 persons per square kilometre in the Borough of Kensington and Chelsea. The mid range benchmark of population density for Inner London is denoted by the Boroughs of Camden and Westminster which had population densities of 9498 and 8875 persons per square km in 2001.

In comparison the 18 Inner Ring LGAs and SLAs of Sydney, which lie within a 0-10 kilometre radius of the historic city centre (Martin Place GPO) achieve a typical benchmark urban density of 4000 to 4500 persons per square km in areas such as Marrickville and Drummoyne and only one SLA area (City East) which includes the historic Inner City Terrace Housing suburbs of Woolloomooloo, Kings Cross, Darlinghurst, Surry Hills and part of Paddington achieves anything comparable (7764 persons per square km) to the Inner London benchmark densities.

The comparison is repeated in the 10-20 kilometre radius ring suburbs where the 18 Outer London Boroughs have a benchmark population density of 3900 to 4100 persons per square kilometre, eg Kingston and Croydon, whilst in Sydney only two LGAs achieve comparable 'Middle Ring' population densities to London (Burwood, 4337 and Canterbury, 3869) and the overall average benchmark urban density is approximately 2400 persons per square km (Ryde and NE Parramatta LGAs), The two lowest density 'Middle Ring' LGAs of Sydney, Ku-ring-gai and Warringah, have population densities of less than half this benchmark, eg 1183 and 896 persons per square kilometre respectively.

AVAILABILITY OF DATA SETS FOR SYDNEY

A variety of data resolution types for Journey to Work (JTW) are available from Census and the Transport Data Centre. Some of the most useful data sets are Census Collection Districts, Travel Zones, Statistical Local Areas, and Local Government Area:

- Local Government Area boundaries are useful for comparison as a standard data set, however these often represent areas that are too large to determine subtle phenomena within a highly populated region.
- Statistical Local Areas are Local Government Areas broken down into smaller boundaries for more manageable statistical analysis at a macro level, including an ability to assess trends based on localised factors.

For the purpose of the data mapping in this paper, the Statistical Local Area (SLA) data has been used which gives approximately 64 data points for all the urban and urban fringe areas within an approximate 100 kilometre radius of the central City of Sydney CBD.

RELATIONSHIP BETWEEN MODE OF TRAVEL AND DENSITY VS DISTANCE FROM SYDNEY CBD

In Sydney, increasing distances from the CBD usually correlate with lower population densities. However, there are exceptions to this general rule, in particular the pockets of higher population density which exist along the coastal strips of the northern and eastern beaches, Cronulla, Hurstville, Canterbury, Auburn, Chatswood, Hornsby and Parramatta, Fairfield, Cabramatta and Liverpool in the outer suburbs.

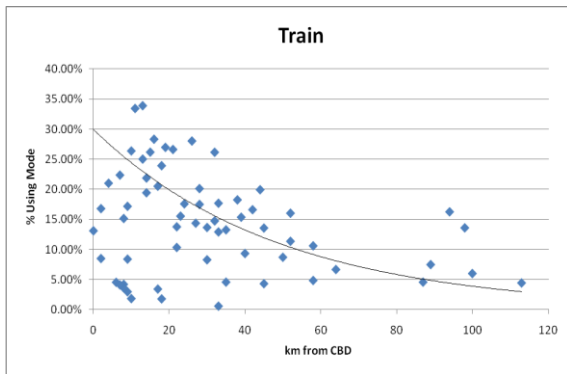


Figure 1 - Train Mode by km from CBD, SLA

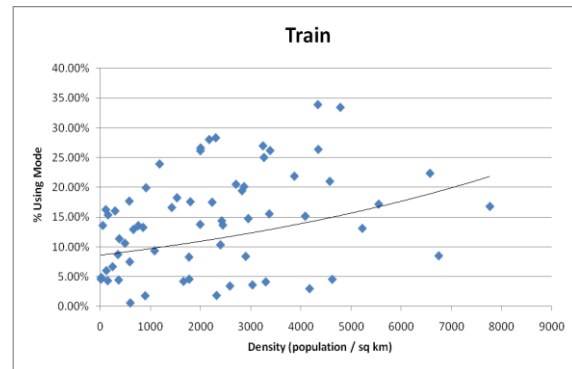


Figure 2 - Train Mode by Density, SLA

The following series of graphs illustrate in pairs the symbiotic relationships between either distance from the CBD, or population density with the use of different modes for Journey to Work. Distances are measured from the main commercial centre of a region (usually the Council Chambers) along the train line, where such a line exists. Figure 1 and Figure 2 indicate the relationship between train use and both density and distance from the CBD, although the spread of data also suggests a strong relationship with other factors eg direct access to a train station. The relationship in this case is more likely to be influenced by train service provision than higher density in specific areas.

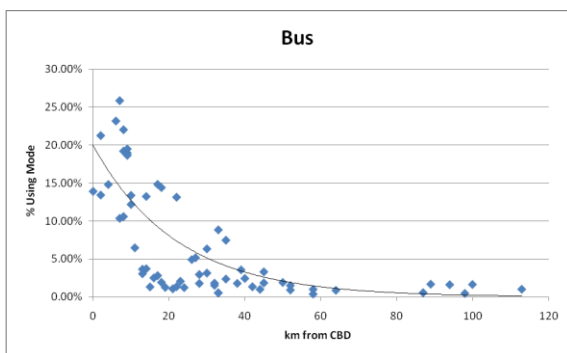


Figure 3 - Bus Mode by km from CBD, SLA

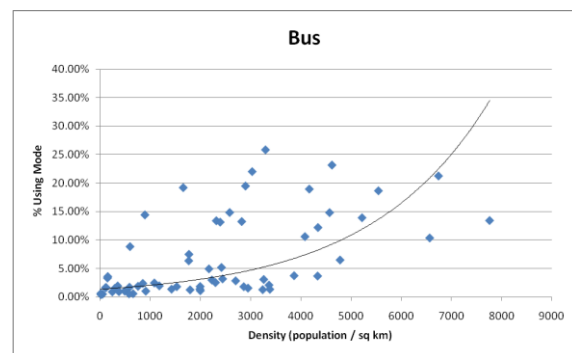


Figure 4 - Bus Mode by Density, SLA

Bus use in Figure 3 and Figure 4 shows that in higher density Inner City areas, primarily areas which have no direct rail services, bus use can achieve comparably high levels of journey to work travel to rail travel from Inner City areas. However, there is a stronger correlation between remoteness and declining bus use than density, indicating that providing additional bus services to urban fringe localities, further than 30-40 kilometres from the Sydney CBD, in place of other public transport measures is not likely to attract similarly high patronage. A number of recent publications have discussed the problem of bus services in Sydney, particularly in densely populated Inner

City areas.(Gehl Architects, 2007; Glazebrook, 2009) Buses in Sydney are now at a point where they are not only affected by traffic congestion, they contribute to it.

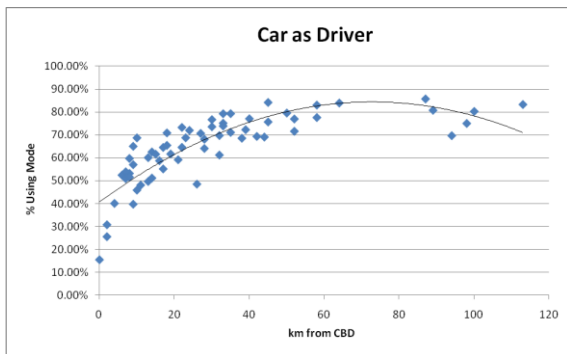


Figure 5 – Car as Driver Mode by km from CBD, SLA

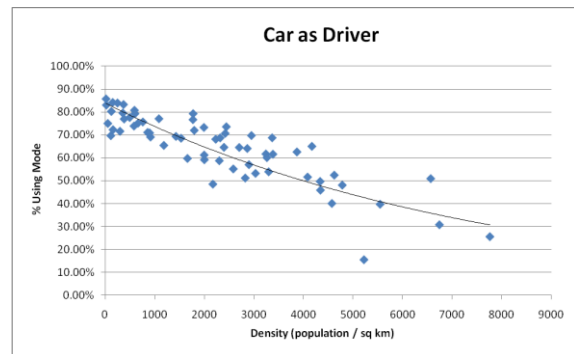


Figure 6 – Car as Driver Mode by Density, SLA

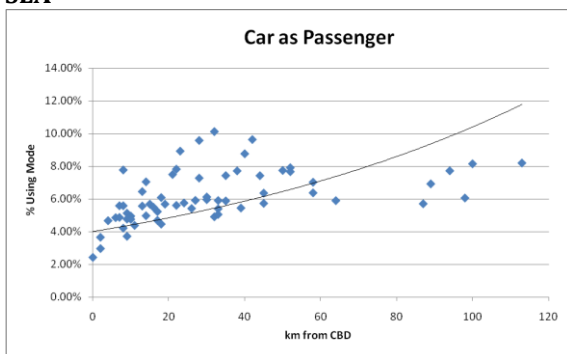


Figure 7 – Car as Passenger Mode by km from CBD, SLA

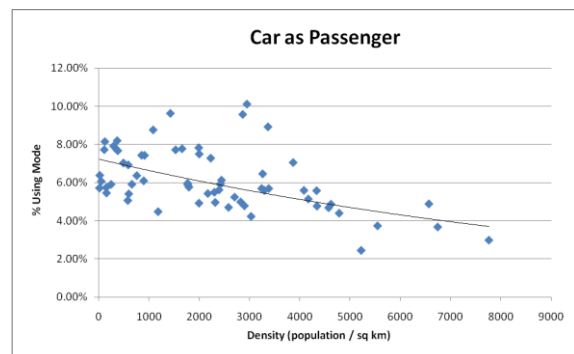


Figure 8 – Car as Passenger Mode by Density, SLA

Car use as either a driver or a passenger tends to show strong relationships that increase mode share with either lower density or increasing distance from the CBD. However the correlation with distance from the CBD appears to be stronger for Car Driver use indicating that this is more likely to be a key factor in increased private vehicle use for an individual.

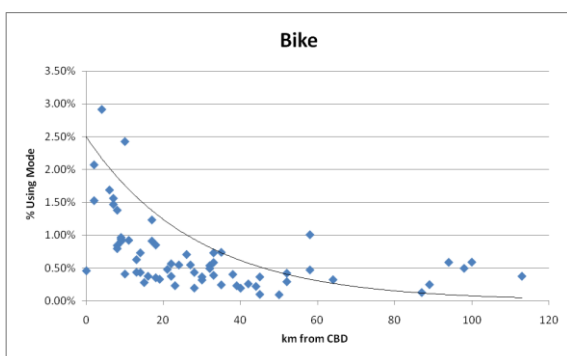


Figure 9 – Bike Mode by km from CBD, SLA

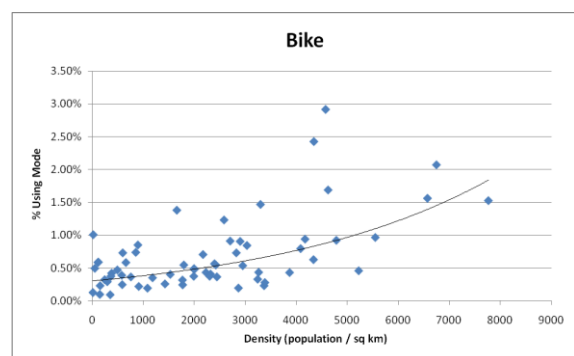


Figure 10 – Bike Mode by Density, SLA

Both bicycle use and walking for journey to work also indicate relatively strong positive and inverse relationships with either population density or distance respectively. However the mode share for either is relatively low currently, except for walking in the highest density Inner City areas which can reach an SLA average level of up to 50%. Cycling reaches a maximum average level of 3% in any SLA area currently.

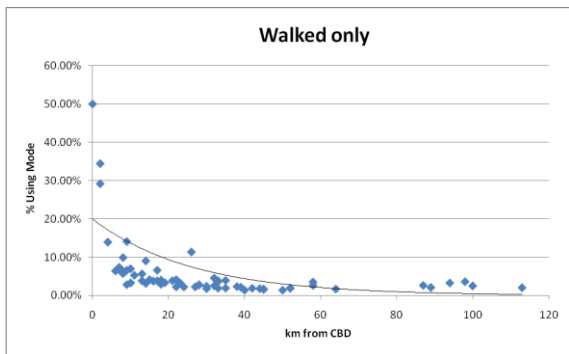


Figure 11 – Walking Only Mode by km from CBD, SLA

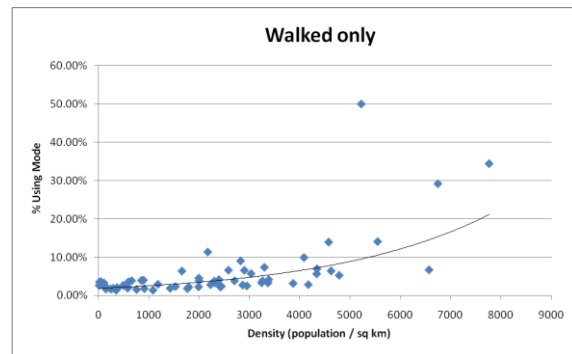


Figure 12 – Walking Only Mode by Density, SLA

These results all demonstrate the opposing relationships between “Active Transport” or public transport patronage with private vehicle use, which are strongly linked to both the density and remoteness of an area. These relationships highlight the key issue which is currently being experienced in the Sydney GMR where transport is dominated by the layout and density of the city, which in turn is constrained by the political acceptance of higher population densities requiring more urban consolidation in established urban areas of the city.

As well as the clearly identified need to improve public transport access with new rail lines serving the outer suburbs of Sydney, in the Inner City suburbs of Sydney (within 0-10 kilometres of the CBD), there are still numerous areas with relatively high (above 50%) levels of car usage for the journey to work where much could also be done, with much sustainability benefits to be gained, by improving public transport services and provision for “Active Transport” to reduce car usage for the substantial existing populations in these areas.

OTHER FACTORS INFLUENCING PRIVATE VEHICLE USE IN SYDNEY

Several different studies have indicated a strong correlation between ownership of private vehicles and community wealth (TDC - Transport Data Centre, 2008) and similarly Figure 13 indicates on a global scale the relationship in different countries between vehicle kilometres travelled (VKT) and Gross Domestic Product (GDP) per capita.

However, within the different suburbs of a major city such as Sydney, the relationship is less straightforward. Figure 14 does not demonstrate any definable relationship between car use for the journey to work and personal wealth (the proportion of high income households in an area) for Sydney.

The affluence factor influencing the use of vehicles is an issue that requires consideration in the context of the current environmental and economic climate. In the more affluent Inner Suburbs of Sydney car usage can still be high through choice despite public transport alternatives being available. In comparison in the Outer Suburbs, the situation is more like car dependence. In the future potentially rising fuel costs will make up a more significant proportion of household living costs and may change this situation.

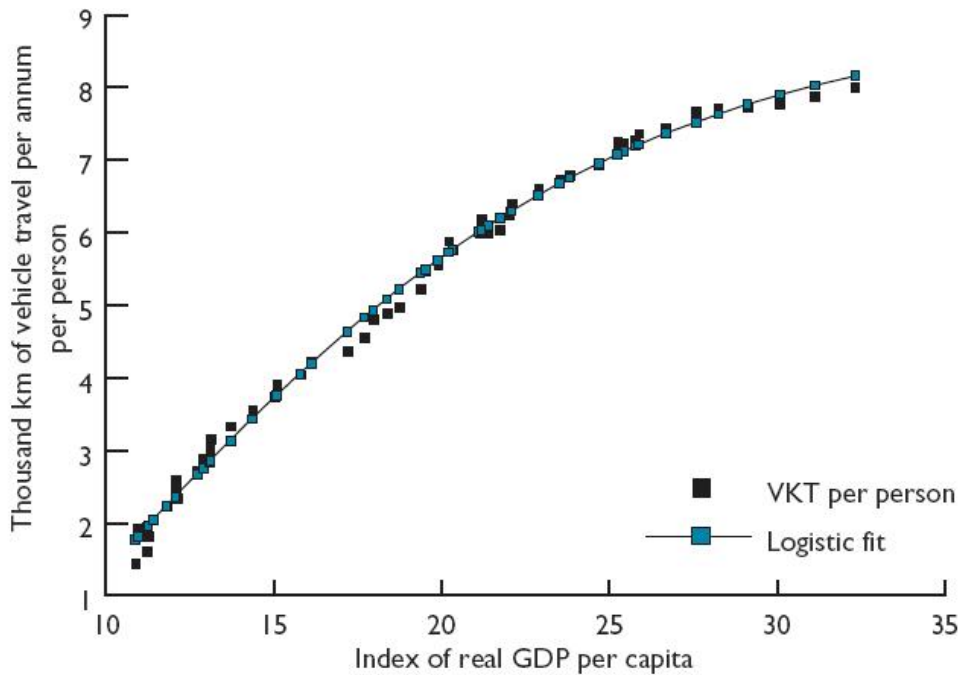


Figure 13 – GDP vs VKT (Gargett and Gafney, 2007)

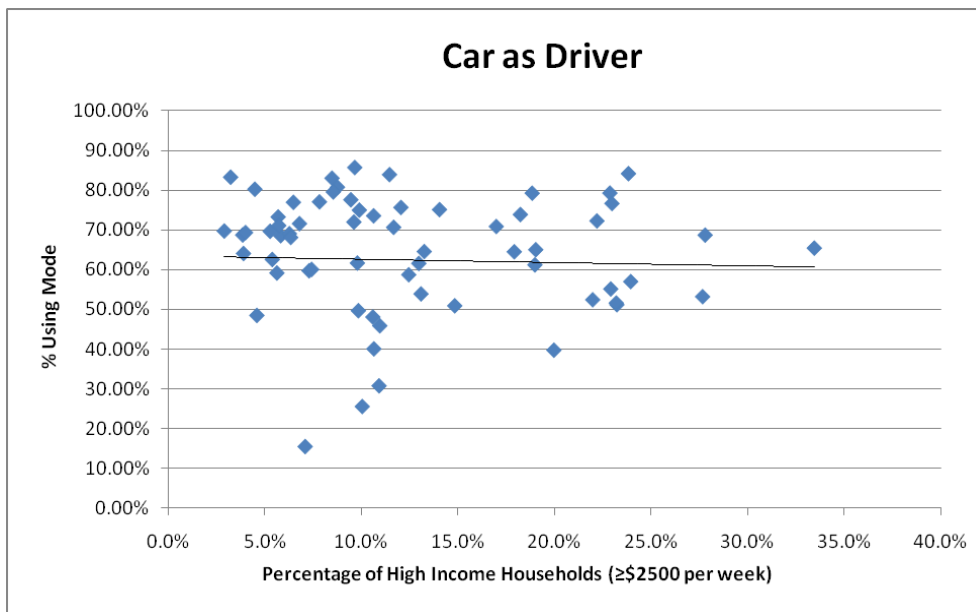


Figure 14 – Car as Driver Mode by High Income Household Percentage, SLA

A number of other factors can also influence individual choice for or against car usage currently. Most recently environmental awareness has been cited as a reason for selecting public transport, alongside parking problems, and lack of access to a vehicle. (Corpuz, 2008)

METROPOLITAN STRATEGY AND GROWTH CENTRES

The Sydney Metropolitan Strategy (Metro Strategy) was released in 2005 by the NSW Government as a plan to manage future growth in the city over the following 25 years. It

covers the area known as the Greater Metropolitan Region bordered by the Newcastle and Illawarra regions. (Metropolitan Strategy, 2005)

The Growth Centres Commission (GCC) is a subset of the NSW Department of Planning that is targeting particular regions of Greater Metropolitan Sydney for growth in population by 2031, and the resulting infrastructure, employment, and community growth as detailed in the Metro Strategy. (Growth Centres Commission, 2008)

Between the years 2004 and 2031, Sydney’s population is expected to expand by approximately 1.1 million people, demanding an additional 640,000 dwellings, in addition to land for retail, commercial, industrial, and infrastructure purposes. (Metropolitan Strategy, 2005) The existing strategy of the GCC is to direct a proportion of this growth to two relatively undeveloped (greenfield) regions in Sydney’s west.

Approximately 70,000 homes are intended for the North Western Growth Centre (NWGC) development, 10,000 ha incorporating the local government areas (LGAs) of Baulkham Hills, Blacktown, and Hawkesbury. The South Western Growth Centre (SWG) will include approximately 17,000 ha for 110,000 new homes within the council regions of Liverpool, Camden, and Campbelltown. Both of these regions are adjacent to major city motorways and partially serviced by major arterial roads as shown in Figure 15 and Figure 16.

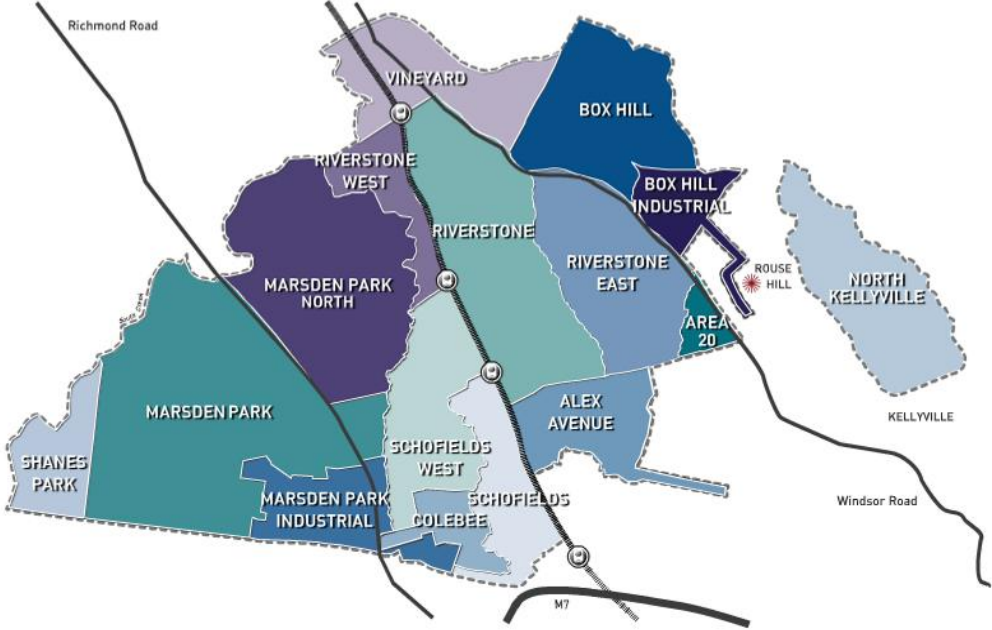


Figure 15 – North West Growth Centre of Sydney

The Blacktown to Richmond train line bisects the NWGC district. Additional public transit support was also intended for area, to be provided by the proposed North West Rail Link heavy rail line extension from Beecroft to Castle Hill and Rouse Hill. However, the NSW State Government has effectively deferred all versions of this project, including an alternative North West Metro Line proposal, indefinitely in a Mini Budget in November 2008, due to shortage of funds in the foreseeable future.

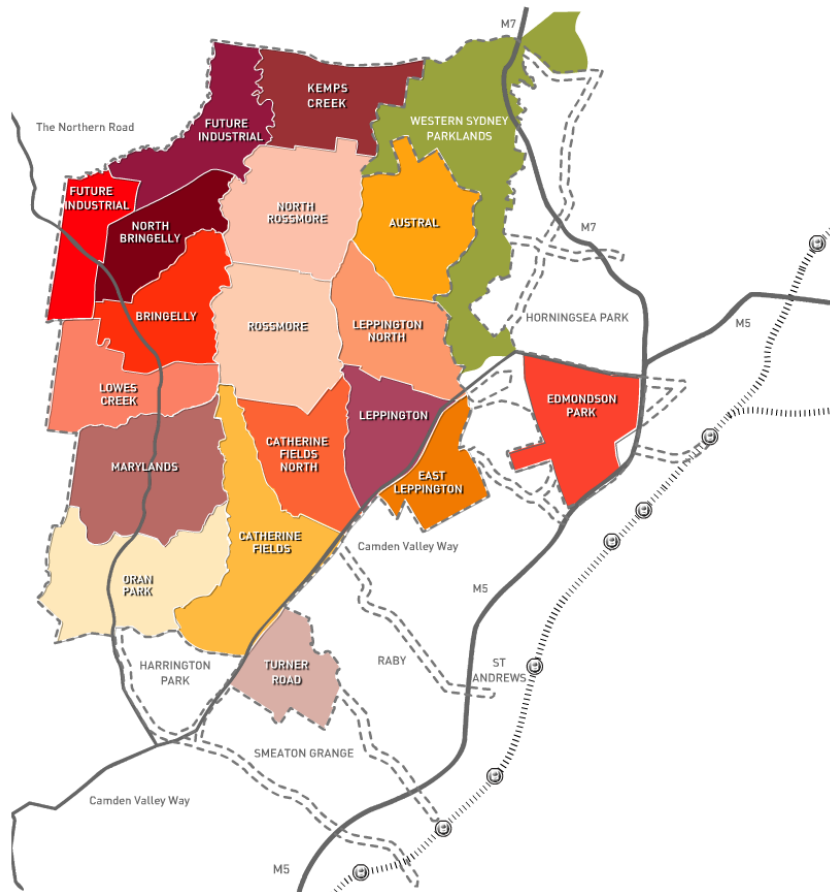


Figure 16 – South West Growth Centre of Sydney

Shortly following this decision, plans for the proposed South West Rail Link suffered a similar fate. This heavy rail line would have joined the SWGC to the Inner West, South, and Airport / East Hills lines at Glenfield Station, adjacent to the region. (Growth Centres Commission, 2008; Benson, 2008; Benson and Haynes, 2008)

In the past 20 years, infrastructure investment for Sydney has favoured roads, producing at least eight major projects and many more minor projects, when only two new rail lines incorporating six new train stations and two bus-transit ways have been completed in the same period. (Glazebrook, 2009).

A potential issue is that in spite of initial intentions, the Growth Centres of Sydney may experience the same trends, and result in car-dominated communities. However some benefit to more sustainable travel patterns can be hoped for with these development areas as the proposed ultimate urban population densities for the North West Growth and South West Growth Centres with 2.8 persons per dwelling in the future are 2000 and 1800 persons per square kilometre respectively. This is approximately twice the prevailing population density level (1000 persons per square kilometre) of most recent urban fringe residential development in Sydney.

The increased proposed population densities for the Growth Centres, in conjunction with improved access facilities and amenity for “Active Transport” and public transport systems could potentially reduce the future car driver journey to work travel mode share in these areas from approximately 75% in the “business as usual” default development scenario (1000 persons per square kilometre), to 65% with the higher

overall development density scenario which is represented by the proposed 1800 to 2000 persons per square kilometre target development density.

CONCLUSIONS – INTEGRATING TRANSPORT AND URBAN PLANNING

Sydney's planning system, the 2005 Metropolitan Strategy, is currently under review.

The problems associated with accommodating the future growth of the city within a limited space, as determined by the geographical boundaries of the coastal plain and designated National Park areas, are now well known. As the growth which is planned for strategic areas such as the NWGC and SWGC is continuing, the demand increases for additional transport infrastructure to serve the Sydney urban fringe, which is currently dominated by road transport and the private vehicle.

Public transport infrastructure in the Sydney Greater Metropolitan Region is already stretched under existing conditions, and provides for a limited proportion of the population who have relatively convenient and direct access to services.

Several factors appear to influence the demand for public transport in an area, and strong relationships can be demonstrated with population density and proximity to the city centre, and also in the case of rail, access to the rail services.

By encouraging higher development densities in an area, the economic viability of public transport provision increases. Higher development density can be implemented with sensitivity in all areas of the city, by means such as Transit Oriented Development

With the encouragement of "Placemaking" improved mode shares of 'Active Transport' options such as walking and cycling can be achieved which will also have an impact on community health and the general liveability of an area. A reduction in private vehicle reliance in these areas can be seen as a step forward in increasing their sustainability, both economically and environmentally.

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