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Growth trends between 2001, 2006 and 2011 for commuting by public transport in the Greater Sydney Region

Dr Tim Brooker

Associate- Transport Planning; EMGA Mitchell McLennan Pty Ltd, Sydney

tbrooker@emgamm.com

Abstract

This paper examines changes in commuter travel patterns throughout the Sydney region over the past decade, revealing that in some areas, transit service provision and usage is keeping pace with population growth, while in other mainly outer areas, commuting is becoming increasingly car dependent.

Working population and transit usage growth trends from the ABS Census for journeys to work (JTW) between 2001, 2006 and 2011 are compared for each LGA of Sydney and the adjoining regions of NSW. The LGA level summary data (basic community profiles) from each census give long term population and 'Transit JTW" growth trends and a detailed understanding of local and sub- regional trends for population growth and transit usage.

Many LGAs where transit oriented developments and public transport service improvements have both occurred show a very high percentage of the recent growth in journey to work travel has occurred by transit modes.

The recent and ongoing rail and bus infrastructure and service improvements which are being provided throughout Sydney need to be supported by appropriate local council authority planning controls for the areas surrounding transit nodes. Many potential future locations for transit oriented developments are identified throughout Sydney. In particular major "railway junction" stations and the multiple railway stations which are located along the inter urban railway line corridors in selected outer suburban LGAs.

1. Introduction

1.1 Population and employment growth

Both global and local factors are affecting population growth and workforce travel patterns throughout the Sydney region. Increasing concentrations of commercial centre based office, retailing and service industry employment are occurring in the major urban centres of the region, where commuter travel patterns can be most effectively served by transit (rail and bus based) public transport services.

Strong employment growth is continuing to occur in the Sydney CBD and the other major rail access based urban centres of the region such as Parramatta, North Ryde (Macquarie Park) St Leonards, Olympic Park and the Sydney Airport (Mascot) precinct. Outside these centres, traditional manufacturing and related service industry employment is declining leading to reduced local employment opportunities for many of the established middle and outer suburban residential areas of Sydney.

Where new style factory and warehousing distribution centres are developing in new employment estates in the outer suburban LGAs and adjoining regions to Sydney, these new employment areas are now increasingly remote from public transport. Although the large blocks of level land available are attractive to facilitate these types of developments, public transport access is difficult to provide and the workforce commuter access is virtually 100% car based. Increasingly, access by larger trucks (eg B-Doubles and other over-size vehicles) is becoming the primary transport issue for access to these areas.

1.2 Rail network Improvements completed by 2011

During the period 2006- 2011 several major rail network improvements were completed in Sydney, most notably the Epping to Chatswood Rail Link (ECRL). This project, which opened in early 2009, extended rail services to the North Ryde (Macquarie Park) area of Sydney which had previously been remote from the rail network. The new rail link also greatly improved the accessibility and connectivity by rail services between the central northern and north western LGAs of Sydney (eg Ryde, Hornsby and Baulkham Hills) and the Sydney north shore employment centres (eg North Sydney, St Leonards, Chatswood and Gordon) and also the northern Sydney CBD. Following the opening of the new rail link, the peak hour train service frequencies on the north shore line south of Chatswood were increased from 12 to 18 trains per hour in each direction.

Elsewhere the duplications of the Sutherland to Cronulla and Quakers Hill to Schofields Rail Lines were also completed and opened between 2006 and 2011. These projects were key components of Sydney's rail clearways program (Transport for NSW, 2013), but were completed too late to show any noticeable increase in rail based journey to work travel from the surrounding residential areas at the time of the latest Census in August 2011.

Other "rail turnback" projects, also part of the rail clearways program, were completed in sufficient time to influence journey to work travel patterns at the time of the 2011 Census, most noticeably at Bondi Junction. This turnback also enabled increased peak hour train service frequencies to operate on the Bondi Junction to Illawarra Lines, eg up from 12 to 16 trains per hour in each direction.

During late 2010, almost exactly ten years after the rail line opened, the general commuter fare surcharge was removed from the two non-airport stations on the Sydney Airport Rail Link at Green Square and Mascot. This change also occurred too late to show any noticeable improvement in the rate of new urban development or increase in the rail based journey to work passenger volumes from these areas between the 2006- 2011 Census period. Prior to 2010, the peak hour rail passenger movements at these two stations were

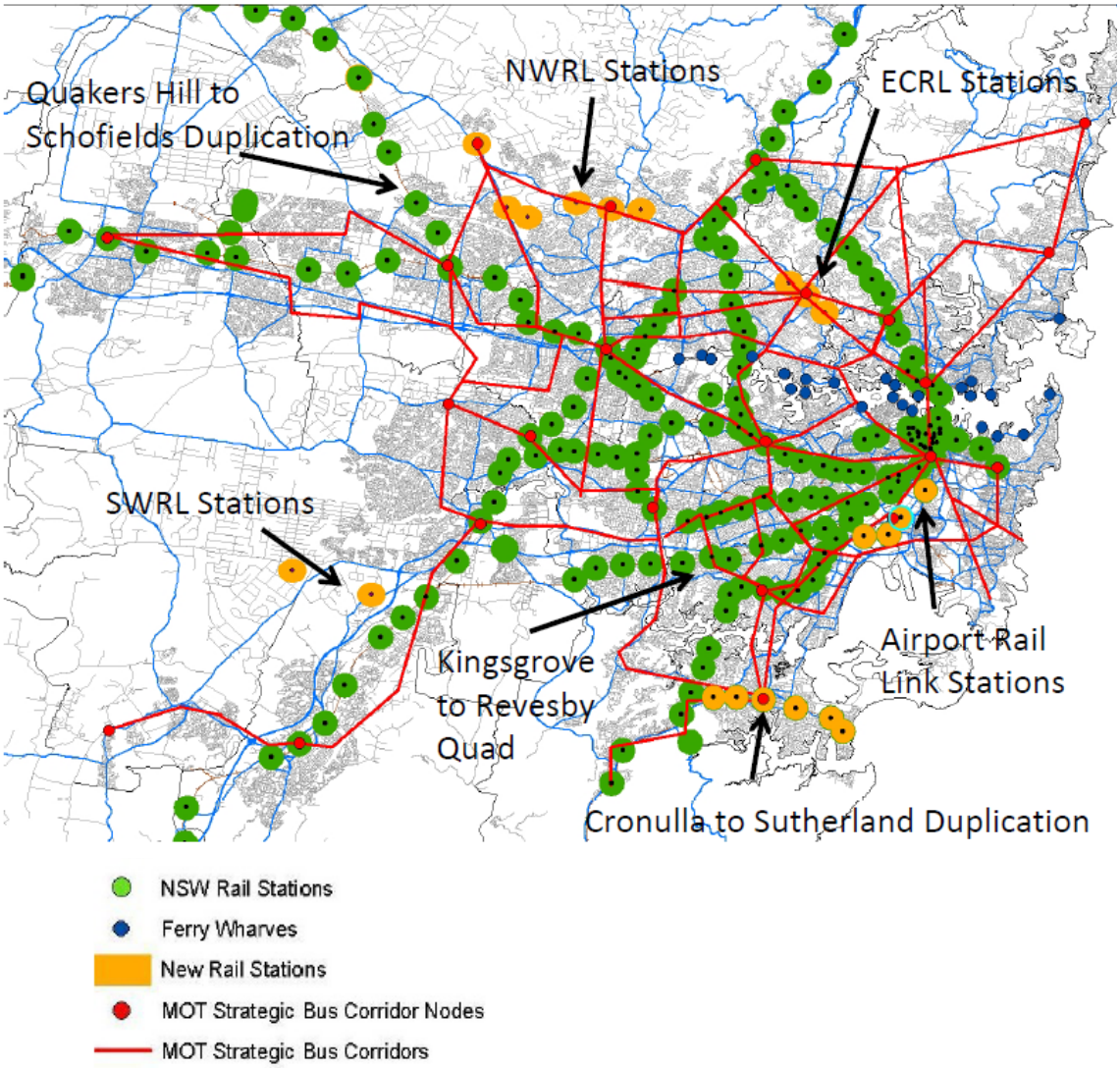
not included in published Cityrail reports, so the actual rail passenger boarding trends at these two stations are difficult to determine.

1.2 Rail network Improvements under construction

In June 2013, the Kingsgrove to Revesby Quadruplication project (K2RQ) was completed which will enable improved train service frequencies, faster trains and reduced journey times for commuters on this line which is the main line connecting the Sydney CBD and Sydney Airport to south western areas of Sydney including Glenfield, Campbelltown and the South West Growth Centre areas.

Looking further forward, within the next five to ten years, by 2016 and 2021 respectively, the much anticipated South West Rail Link and North West Rail Link projects are both due to be completed and operational providing multiple new railway stations for these areas of Sydney.

Figure 1: Sydney metropolitan rail network showing recent and proposed rail improvements



Construction of the South West Rail Link (SWRL) is now well underway with the major civil engineering works completed. The line has recently been renamed the Glenfield to Leppington Rail Link and the new rail services are due to commence in November 2014. The two new stations on this rail link (at Edmonson Park and Leppington) are in “greenfield” areas with predominantly rural “market garden” type land uses currently.

The NSW government has commissioned detailed future land use masterplans for the areas surrounding the new SWRL stations. However, at Leppington a mixture of mainly commercial and civic land uses are proposed with only minimal residential development anticipated within the core walkable catchment area of the new rail station.

The North West Rail Link (NWRL) will mainly serve developed urban areas with relatively few “pockets” of undeveloped land remaining near the proposed railway station sites. The future land use plans for redevelopment of key sites within the new railway station precincts along the line are currently the responsibility of local councils in consultation with the key stakeholders and landowners in each area.

Rail based public transport (either by conventional heavy rail or light rail/ metro lines) is generally the preferred transport mode for major CBD workforces and longer distance commuters because of its higher travel speeds and its significantly higher capacity than other travel modes to move large numbers of people to and from city centre areas during the peak commuter periods.

Also underground rail systems have little or no adverse effects on the traffic congestion, pedestrian safety or amenity of streets within central city areas. Many surface streets of the Sydney CBD, in particular at the northern end around York Street, Clarence Street and Wynyard, are now effectively gridlocked with buses during the morning and afternoon commuter peak hours on weekdays, with stationary bus queues blocking entire street blocks, extending across intersections and restricting surface pedestrian movements. For this reason alone, the replacement of most of the existing North West Sydney peak hour bus services to the Sydney CBD by new rail services is probably justifiable.

1.3 Bus network improvements

After completion of the NWRL and SWRL projects, the Randwick Light Rail route (CSELR) and a potential future light rail or heavy rail based transit line for the Northern Beach suburbs of Sydney, there will remain many suburban areas of Sydney which still require high frequency bus services to provide the necessary level of “Transit” accessibility and connectivity to the Sydney CBD and other popular destinations.

The NSW government is continuing to develop and support improved bus services for these areas. Following the initial schematic identification of a network of 43 strategic bus routes in 2003, which are also shown on the rail network map in Figure 1, the NSW government implemented in 2010 a network of “metro bus” routes for Sydney. This network provided additional high capacity bus services, mainly using articulated buses, which utilise ten key arterial road routes travelling into and out of the Sydney CBD.

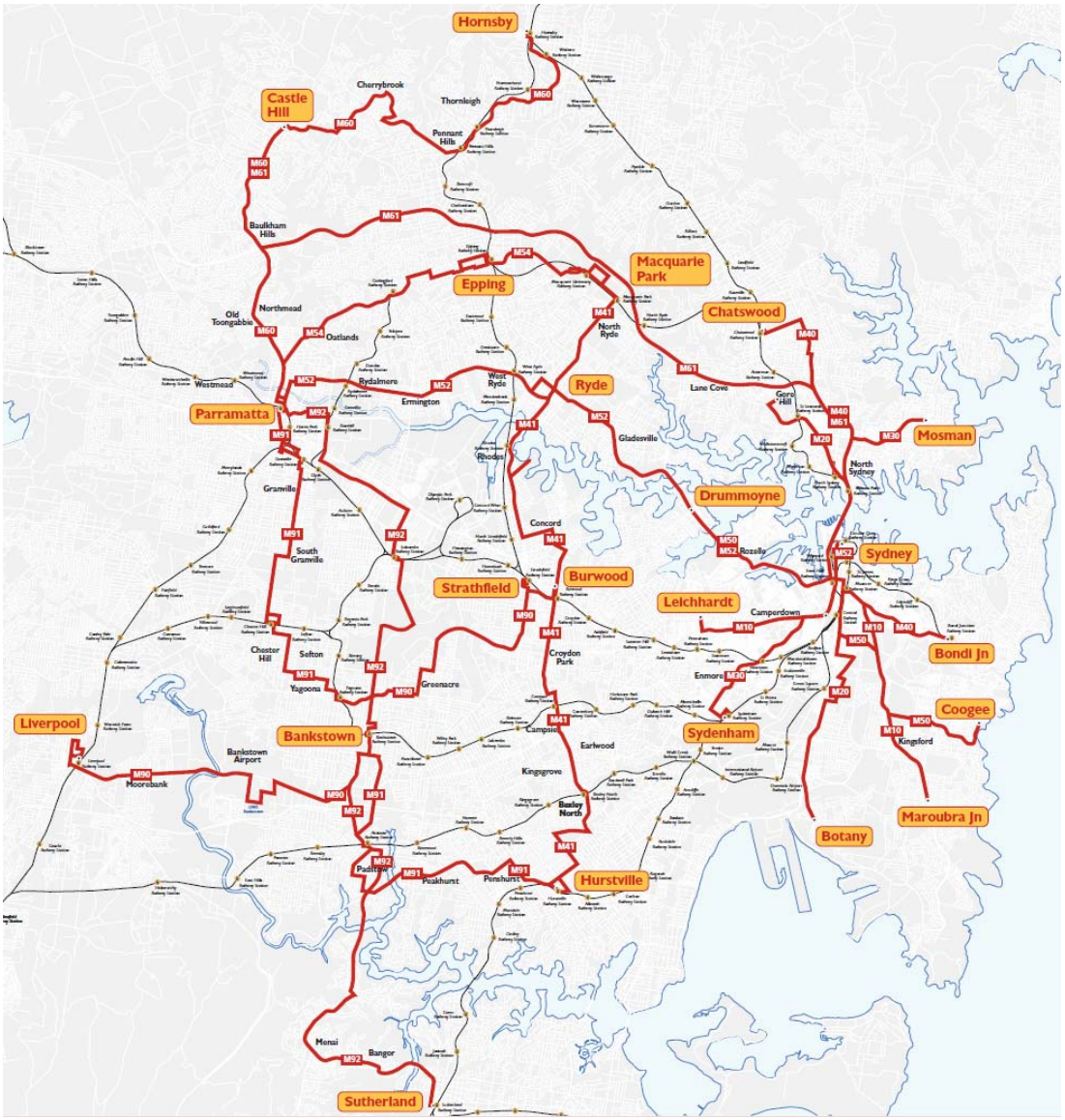
The inner and middle distance suburbs which are served by the metro bus routes are shown in Figure 2. These metro bus routes were provided in addition to the existing STA bus services and have provided much needed additional bus “Transit” capacity on the key CBD access corridors. Also, the “through routing” of the metro bus services (on routes 10, 20, 30, 40, 50) into and out of the Sydney CBD provides good peak direction and contra peak direction bus services. This is an important feature of “Transit” accessibility which was previously lacking on most of the existing peak hour bus routes into the Sydney CBD, where the morning peak hour inbound buses (and the afternoon peak hour outbound buses) would virtually all return empty without picking up passengers on their return trip in the contra-peak direction.

1.4 Future CBD and South East light rail proposal

More investment in high quality urban public transport is now both necessary and justifiable to support the continuing high population and workforce growth in the Sydney CBD and other Inner City areas. Journey to Work travel by Tram (eg Light Rail) in Sydney is not yet showing

significant travel numbers in the ABS Census data. However, several future Inner City Light Rail routes for Sydney have recently been investigated in government feasibility studies.

Figure 2: Map of Sydney Metro Bus routes network



The Dulwich Hill extension of the existing Inner West Light Rail service, Figure 3, is now under construction and the "CSELR route to Randwick is currently under investigation in a series of studies by the City of Sydney and other NSW Government transport planning agencies, eg:

- The Inner West Light Rail extension from Lilyfield to Dulwich Hill, linked to a potential CBD extension, via either George Street or Hickson Road or Castlereagh Street
- The CBD and South East Light Rail route (CSELR), connecting George Street in the Sydney CBD with Anzac Parade via Kensington, Kingsford, the University of NSW and Randwick and potentially further route extensions to Coogee and/or Maroubra

The other potential future light rail routes which have also been investigated but for which there is no definitive current proposal include:

- A future Sydney CBD to Green Square (and potentially extending to Mascot) Light Rail route to operate on-street, through the Suburbs of Surry Hills, Redfern and Victoria Park
- A potential future Parramatta Road and Broadway Light Rail route, which would effectively be an outer extension of the George Street route operating as a loop around the Sydney University Campus. The potential construction of this route has been linked to the future M4 East (West Connex) Motorway project as a potential related project.

The completion of the existing Light Rail route extension to Dulwich Hill and the CSELR route from the Sydney CBD to Randwick and the University of NSW are now eagerly awaited by the potential passengers who would use these “Transit” systems in these areas of Sydney.

Figure 3: Proposed Dulwich Hill and CSELR light rail routes for Sydney

1.5 Integrated ticketing for public transport

The previous non-integration of ticketing for Sydney’s public transport systems has inhibited the full potential use of multi- modal travel. The dual fare “penalty” for multi- mode journeys

historically made regular commuting disproportionately expensive when multiple modes or privately operated modes of public transport had to be used. Also, the lack of formal timetables for some systems made journey planning more difficult and effectively prevented the formal measurement of levels of service which were being provided by these systems to their customers in terms of overall journey time or on-time running performance.

The recent publication of formal timetables for the metro bus network in 2012 has also improved the usability and attractiveness of these services for multi- modal commuter journeys in the areas of Sydney which are served by these bus services.

In April 2010, the MyZone fare structure was introduced to rationalise fares and ticketing across the virtually the entire Sydney public transport system including all heavy rail lines, government ferry routes and public and private bus routes, but excluding the two Sydney Airport rail stations and the privately operated ferries which operate in Sydney Harbour, Port Hacking (Cronulla to Bundeena) and Pittwater.

Fully integrated ticketing of all public transport systems throughout the Sydney Region by means of a single travel card called the “Opal” card (similar to the London Oystercard) is now beginning field trials (commencing on 14 June 2013) for the central Sydney area rail services and since 31st August 2013 has been extended to all Sydney Ferry Services and the north shore rail line as far as Chatswood. The scheme is scheduled to be fully introduced in mid-late 2014 to all the Sydney metropolitan area, bus, rail and ferry services.

Integrated ticketing of all Sydney’s major public transport modes (eg Heavy Rail, Bus, Light Rail and Ferry) has effectively now been provided for regular weekly commuters by the My Zone system which was introduced in 2010. The My Zone fare system was extended to include the Central to Lilyfield Light Rail Services in 2011.

1.6 Infrastructure NSW Transport Proposals

In 2012 a newly created government agency, Infrastructure NSW (INSW) prepared a 20 year infrastructure strategy with 70 transport and other infrastructure projects recommended.

INSW’s number one priority is the West Connex Motorway project. This is actually the combination of two previously identified motorway projects, the M4 East Motorway Tunnel and the M5 East Motorway Tunnel widening, which share common destination linkages to Sydney Airport and Port Botany Port area at the eastern end.

INSW’s overall strategy of 70 projects is supported by a regional economic benefits analysis, based on a Computable General Equilibrium (CGE) model. No detailed project level economic or financial cost benefit analysis has been undertaken for the West Connex Motorway. Nevertheless, the project is attracting strong levels of political support from the NSW government and both the major political parties at federal government level. With such strong government support, the project looks likely to proceed to the detailed feasibility stage (supported also by proposed NSW government Planning Reforms) without any further actual assessment of either its economic or environmental costs and benefits.

2 Regional and Sub Regional Identity and Population Growth

Past NSW Governments have defined a number of regions and sub regions in their planning strategies (NSW Department of Planning, 2005 and 2007) for the Sydney, Newcastle and Wollongong regions of NSW. With the exception of the Central (City of Sydney) sub region, the planning strategy sub regions each contain a group of local government areas.

These regional groupings of local government areas within the GSSR are summarised in Table 1. It is likely that within the next five years, further amalgamations of the existing 53 local government areas will occur, generally along sub regional lines, leading to their local planning functions being combined. This has been foreshadowed in recent NSW government consultation for proposed planning system reforms.

The current sub regional groupings of LGAs within the GSSR area require some minor revisions according to their "Transit" distances from the Sydney CBD, in order to more closely reflect the traditional "inner", "middle" and "outer" ring definitions of the Sydney Metropolitan region, for example:

- Marrickville (10 km) is effectively an inner suburban LGA and should be grouped as part of the Central sub region with the City of Sydney and Leichhardt LGAs (6 km);
- Ryde (22 km) is effectively a "middle ring" suburban LGA and should be considered as part of a future expanded North sub region, and
- Blue Mountains (98 km) and Wollondilly (87 km) are effectively in the adjoining sub-regions to Sydney (they are further away from the Sydney CBD than Gosford) and are effectively "adjoining" rather than "outer" LGA areas.

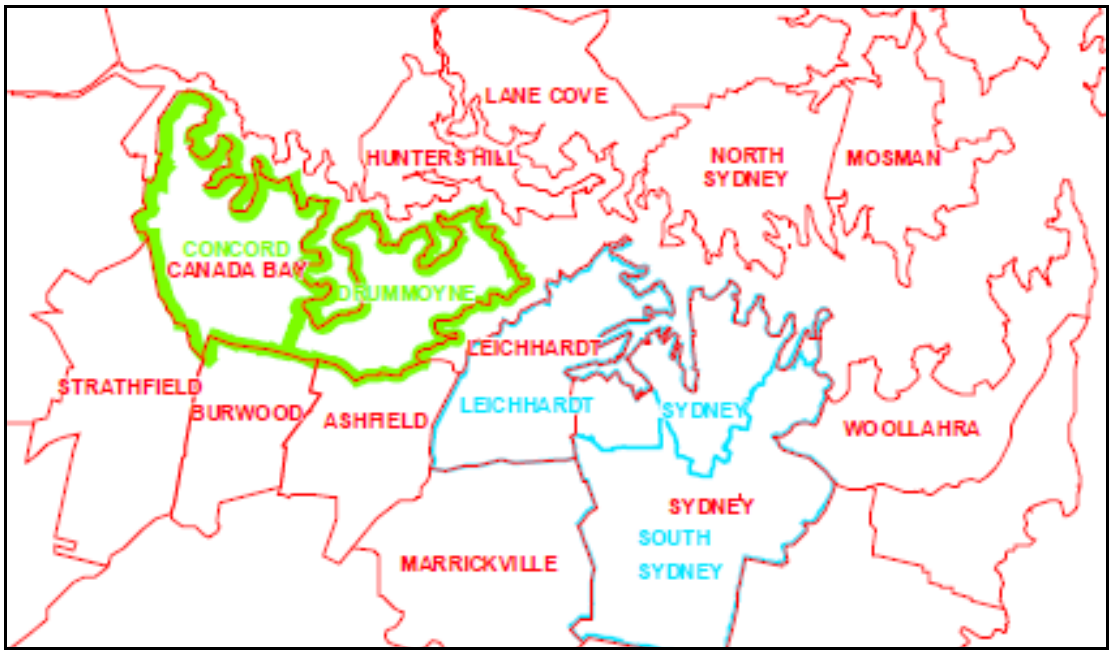
Table 1: Current regional and sub-regional groupings of LGAs in the GSSR region

Location	Region/Sub Region	Local Government Areas (km distance by rail or bus from the CBD)
Inner	Central (City of Sydney)	City of Sydney (2)
Inner	East	Waverley (7), Randwick (7), Woollahra (8), Botany Bay (8)
Inner	Inner North	North Sydney (6), Mosman (8), Lane Cove (9), Hunters Hill (10), Willoughby (14), Ryde (22)
Inner	Inner West	Leichhardt (6), Ashfield (11), Burwood (13), Strathfield (16), Canada Bay (19)
Middle	South	Marrickville (10), Rockdale (13), Canterbury (14), Kogarah (15), Hurstville (19), Sutherland (28)
Middle	West Central	Auburn (21), Bankstown (22), Parramatta (26), Holroyd (28), Fairfield (32)
Middle	North	Ku-ring-gai (18), Hornsby (26)
Middle	North East	Manly (17), Warringah (18), Pittwater (33)
Outer	North West	Baulkham Hills (30), Blacktown (38), Penrith (52), Hawkesbury (58), Blue Mountains (98)
Outer	South West	Liverpool (35), Campbelltown (49), Camden (64), Wollondilly (87)
Adjoining	Central Coast	Gosford (73), Wyong (94)
Adjoining	Lower Hunter	Lake Macquarie (155), Newcastle (165), Cessnock (165), Maitland (185), Port Stephens (210)
Adjoining	Illawarra Shoalhaven and Southern Highlands	Wollongong (90), Shellharbour (110), Kiama (125), Wingecarribee (125), Shoalhaven (175)
Total	**All Areas**	**53 LGAs (2- 210 km) from the Sydney CBD**

Between the 2001 and 2006 census, there were two amalgamations of Councils within the "Inner" sub regions of Sydney. These boundary changes which occurred in 2004 are shown on the map in Figure 4, namely.

- The former Council area of South Sydney was amalgamated with the City of Sydney and part of Leichardt LGA (eg Glebe, Forest Lodge and Camperdown) was transferred to the City of Sydney Council area; and
- The two former Inner West sub regional LGAs of Concord and Drummoyne were directly combined as Canada Bay.

Figure 4: Inner Sydney LGA areas showing the 2004 amalgamation boundaries



CONCORD, DRUMMOYNE, SYDNEY, SOUTH SYDNEY, LEICHHARDT = Pre 2004 Boundaries

CANADA BAY, LEICHHARDT, SYDNEY = Post 2004 Boundaries

During the period 2001 to 2011, there were no other council amalgamations within the Sydney region. However there were many amalgamations of Councils in the inland regions of NSW to the west of the Blue Mountains and Great Dividing Range, some of which are shown on the maps in Appendix A (Figure A1 and Figure A2).

From the Estimated Resident Population (ERP) from the ABS Census, the overall population growth of the GSSR region during the last two inter-censal periods 2001-6 and 2006-11 is listed in Table A1 and Table A2 of Appendix A, for all LGAs.The overall population growth rate for the GSSR region increased from an average annual growth rate of +0.77% per annum between 2001-06 (growth of +194,183 persons) to an average annual growth rate of +1.38% per annum between 2006-11 (growth of +361,114 persons).

Also during the past ten years, there has been well distributed population growth throughout the inner, middle and outer regions of Sydney. The population growth in the adjoining sub region LGAs has been less consistent The following LGAs within each sub region have shown consistently high population growth during both the two inter-censal periods analysed in Table A1 and Table A2.

- High growth inner LGAs = Central Sydney, Canada Bay, North Sydney, Strathfield
- High growth middle LGA = Auburn
- High growth outer LGAs = Blacktown, Camden. Liverpool
- Adjoining LGAs = no LGAs had consistent high growth during both periods

In this analysis, the City of Sydney and Leichhardt LGAs are combined as “Central Sydney” as a result of the amalgamation boundary changes in 2004.

The significant jump in the annual population growth rate for the GSSR from 0.77% pa during 2001-6 to 1.38% pa during 2006-11 is mainly attributable to increasing overseas migration but also reflects a wide range of local, national and global economic, employment and migration trends, which are probably continuing.

The effect of the trend towards higher population growth rates for the Sydney region LGAs since 2006 is a major planning issue for NSW and influences both state and local government residential planning and transport capacity decision making. The GSSR region now needs to plan to accommodate population growth and the related commuter travel demand growth from approximately +72,000 persons per year, compared to the previous prevailing population growth rate of approximately +39,000 persons per year before 2006.

Undoubtedly the urban consolidation in many inner areas of Sydney has helped to accommodate the sub-regional population increases since 2006. Many people (in particular younger people) are now choosing to live in the inner LGAs of Sydney for reasons such as proximity to high earning capacity jobs and the easy access to the many community, cultural and recreational facilities which are located in the CBD.

Urban consolidation in the inner LGAs of Sydney is primarily market driven and is generally occurring without major interventions from the NSW government. Conversely, in the middle, outer and adjoining sub regions, state government planning initiatives are more necessary to facilitate continuing population growth within the walking distance catchments of major railway stations. The new residents of these areas, through their direct easy access to Transit systems connecting to the Sydney CBD, will also share in the economic, community and lifestyle benefits of this connection, similarly to the residents of the inner LGA areas.

3. Active population growth (growth in Journey to Work travel)

The growth in the working population (that proportion of the population which is of working age and travels to and from work each day) for each LGA of the GSSR region, is summarised in Table A3 and Table A4 of Appendix A, for the 2001-6 and the 2006-11 Census intervals.

The relative growth trends of the overall population growth for the region and the working population growth are as follows:

- 2001-6, Overall population growth = +0.77% per annum
- 2001-6, Working population growth = +1.26% per annum
- 2006-11, Overall population growth = +1.38% per annum
- 2006-11, Working population growth = +2.29% per annum

These trends show that the “Active” working population in the region has been growing at a consistently higher rate than overall population during both these inter-censal periods. This shows a higher proportion of the population is now either of working age (15- 65) or is now remaining in the workforce beyond the traditional retirement age of 65.

This trend is actually most apparent in some of the adjoining region LGAs (in particular in the Newcastle and Illawarra regions) where the following LGA’s in each sub region have shown consistently high growth in the “Active” working population during both the two inter-censal periods analysed:

- High growth inner LGAs = Central Sydney, Canada Bay, Strathfield
- High growth middle LGA = Auburn
- High growth outer LGAs =Camden
- High growth adjoining LGAs = Cessnock, Maitland, Port Stephens, Newcastle, Wyong, Shoalhaven.

The overall regional and sub regional distribution of the “Active” working population growth during the most recent inter- censal period 2006- 11 is summarised in Table 2.

Table 2: Regional and sub-regional distribution of Active population growth 2006- 11

Regional Grouping of LGAs	Growth in Active Population (2006-11)	Regional Distribution of Growth
Inner sub regions	+52,845	24%
Middle sub regions	+65,784	31%
Outer sub regions	+44,035	20%
Adjoining sub regions	+53,653	25%
Total	**+216,317**	**100%**

4. Growth in rail and bus based journey to work travel

The past ten years growth in the "transit" rail and bus passenger journey to work travel in the Region is illustrated in Table 3, based on the CityRail passenger boarding statistics and the ABS Census data from Table B46 of the basic community profiles for each LGA.

Table 3 Growth trends for Rail and Bus Passenger JTW and Cityrail Boardings Since 2000/1

Data Source	Year	Total Journeys	Growth between survey years	Ratio of CityRail Boardings to Census JTW Rail Passengers
3.5 Hour CityRail Boardings	2000	317,250		
	2005	294,495	-22,755	
	2011	337,675	+43,180	
Census JTW By Rail	2001	248,125		1.279
	2006	239,358	-8,767	1.230
	2011	291,639	+52,281	1.158
Census JTW By Bus	2001	99,860		
	2006	105,882	+6,022	
	2011	125,537	+19,655	

Source: (ABS, 2001, 2006, 2011), (CityRail, 2001), (CityRail, 2006), (CityRail 2011)

The overall growth trend for the morning peak rail passenger boardings (from both the CityRail data and the ABS journey to work data shows a reduction in rail travel during the period 2001-6, but a significant turnaround to strong growth between 2006-11. The ratio of the 3.5 hour total morning peak period CityRail passenger boardings to the ABS rail journey to work travel has also been progressively declining, which indicates increasing spreading of the peak period for journey to work rail travel over the ten year period from 2001 to 2011.

During the Census period 2001-6, the potential growth in rail passenger travel in Sydney and the adjoining regions was suppressed by a number of factors, including the opening of two major new Motorway projects (the M5 East and the M7), poor rail service reliability resulting in the deliberate "slowing" of many train journey times to achieve timetable reliability and two high profile rail accidents involving multiple fatalities at Glenbrook and Waterfall.

Although the Census journey to work rail passenger travel in Table 3 shows a decline during the period 2001-6, there was some growth in bus passenger journey to work travel, which resulted in minimal overall decline in the total "Transit" journey to work travel for rail or bus passengers combined. The return to significant rail passenger growth between 2006-11 is clearly evident from both the CityRail passenger boardings data and the Census journey to

work data in Table 3 and was also accompanied by equally significant growth in the Census bus journey to work travel.

The combined 2006-11 “Transit” journey to work travel growth from all LGAs of the region is shown in Table A5 of Appendix A, where each LGAs is ranked in order of the percentage of the overall growth in the journey to work travel demand from the LGA, which occurred by either of the two major “Transit” modes or rail or bus.

In Table A6 and Table A7 further summaries of each LGA show where the 2006-11 growth in the “Transit” journey to work passenger numbers has occurred primarily by rail (Table A6) or primarily by bus (Table A7). Multi modal bus-rail commuter journey are classified as rail journeys in this analysis according to the “priority mode” combination rules which are used for the Census JTW travel analysis in NSW.

The overall LGA “Transit” performance results in Table A5 show the two LGAs with the highest transit performance are Hornsby and Willoughby. These two LGAs are located at each ends of the main new rail infrastructure project, the Epping to Chatswood Rail Link (ECRL), which was completed in the Sydney region during the period 2006-11. This result confirms the effect of a major new rail infrastructure project in generating more “Transit Oriented” travel patterns for the residents and workforces of the LGAs which are most directly served by the new rail link. Also, Hornsby was one of the first Councils in Sydney to prepare an integrated transit and land use strategy in 2004, which has also assisted the LGA in achieving higher transit usage rates from new residential developments in the LGA.

Similarly since 2004, the Willoughby Council and North Sydney Councils have applied highly restrictive car parking provision rates for new residential developments which are located along either the rail or bus based “major public transport corridors” through the LGA. These policies have also assisted these LGAs achieving their high growth in “Transit” usage.

Ryde LGA, which is the 13th highest “Transit Performance” LGA in Table A5, has also benefited from the new ECRL rail infrastructure, although to a lesser extent than Hornsby or Willoughby, as the new railway stations are not particularly conveniently located for its resident commuter access from the main residential precincts of the Ryde LGA.

The high “Transit Performance” of the Baulkham Hills LGA (now known as The Hills) in Table A5 has been achieved despite the repeated delays in the construction of the North West Rail link. The corresponding major investments by the NSW government since 2006 in providing new buses for “interim” bus service improvements for this LGA operating via the M2 Motorway Corridor to the Sydney CBD, have shown that these bus services have (at least in the short term) provided a comparable transit performance to what is likely to be achieved ultimately by the new rail link when it is completed.

Elsewhere, noteable improvements in the transit performance (with transit capture of over 50% of the total growth in journey to work travel demand) has also been achieved in a range of North Shore, Inner West, Illawarra Railway Line and Eastern Suburbs LGAs. The already good train services on the Main Western rail line (Ashfield, Burwood and Strathfield), the improved Eastern Suburbs and Illawarra line train service frequencies following the completion of the Bondi Junction Turnback (Marrickville, Rockdale, Kogarah, Hurstville and Woollahra) and the introduction of the Metrobus network in 2010 (Lane Cove and Mosman) have collectively contributed to the high growth in the transit usage In these LGAs.

5. Summary of the growth and transit performance of each LGA

5.1 Overall population growth

From the “Population Growth” ranking of each LGA by its overall population growth in Table A1 and Table A2, from considering the 15 highest and 15 lowest growth LGAs in each inter-censal period, it is possible to determine which of the LGAs in each region are achieving

either consistently high or consistently low population growth. These LGAs are highlighted in "**bold**" in the summary in Table 4.

Table 4 : Grouping of LGAs with consistently high and consistently low population growth

Grouping of LGAs (time period)	Adjoining Region LGAs	Outer sub region LGAs	Middle sub region LGAs	Inner sub region LGAs
High Growth LGAs (2006- 2011)	Cessnock	**Camden**	**Auburn**	**Canada Bay**
		Liverpool	Parramatta	**Strathfield**
		Blacktown	Holroyd	Botany Bay
			Ku-ring-gai	**Central Sydney**
			Manly	Randwick
				North Sydney
High Growth LGAs (2001- 2006)	Maitland	Baulkham Hills	**Auburn**	**Central Sydney**
	Port Stephens	**Camden**		**Strathfield**
	Wollondilly	**Liverpool**		**Canada Bay**
	Shellharbour	**Blacktown**		Willoughby
				Burwood
				North Sydney
Low Growth LGAs (2006- 2011)	Lake Macquarie	**Campbelltown**	**Sutherland**	Hunters Hill
	Blue Mountains	**Hawkesbury**	Hornsby	
	Wollongong	**Penrith**		
	Gosford			
	Newcastle			
	Wingecarribee			
	Shoalhaven			
	Kiama			
	Shellharbour			
Low Growth LGAs (2001- 2006)	**Blue Mountains**	**Campbelltown**	Ku-ring-gai	Marrickville
	Kiama	**Hawkesbury**	Canterbury	Lane Cove
		Penrith	Fairfield	Mosman
			Sutherland	Woollahra
			Pittwater	Randwick

In the adjoining regions to Sydney, no LGA experienced consistently high population growth during both the intercensal periods analysed. However two LGAs (Blue Mountains and Kiama) experienced consistently low population growth. These two LGAs are both located along railway line corridors such that future population growth (if it were to occur) could potentially include new Transit Oriented Developments located in the walking distance catchments of railway stations.

In the outer areas of Sydney, three LGAs experienced consistently high population growth (Camden, Liverpool and Blacktown) and three LGAs experienced consistently low population growth (Campelltown, Hawkesbury and Penrith). The three "low population growth" LGAs actually had negative population growth rates during the period 2001-6. As these three LGAs are all located along railway line corridors, there is clear potential for their future population growth to include new Transit Oriented Developments. The Baulkham Hills (The Hills) LGA, which is in the outer "North West" subregion of Sydney experienced relatively high population

growth during the period 2001-6 but this high growth was not sustained during 2006-11. Nevertheless, with the future extension of heavy rail services to this LGA, through the completion of the NWRL project, high population growth is likely to resume in this LGA.

In the middle sub region areas of Sydney there were relatively few LGAs which had either consistently high or consistently low population growth. Only Auburn had consistently high population growth and only Sutherland had consistently low population growth during both 2001-6 and 2006-11.

In the inner sub region areas, there were five LGAs which had consistently high population growth during both inter-censal periods (Central Sydney- which includes the City of Sydney and Leichhardt, Canada Bay, Strathfield and North Sydney). No inner sub region LGAs had consistently low population growth during both the inter-censal periods 2001-6 and 2006-11.

5.2 Active population growth

The growth results for each LGA for either consistently high or consistently low “Active” working population growth are listed in Table 5 based on the highest and lowest 15 LGAs in each inter- censal period in the analysis in Table A3 and Table A4. The LGAs in each region which have had either consistently high or consistently low “Active” population growth are highlighted in “**bold**” in Table 5.

The “Active” population growth results in Table 5 are generally similar to the overall population growth results in Table 4 for the inner and middle sub region LGAs but the results for the outer and adjoining sub region LGAs are significantly different to the overall population growth results.

In the adjoining sub region LGAs, six LGAs listed in Table 5 have had consistently high “Active” population growth. These LGAs are Cessnock, Maitland, Port Stephens, Newcastle, Wyong and Shoalhaven and are located mainly in the northern Newcastle (or Lower Hunter) and southern Illawarra (eg Shoalhaven) areas of the GSSR region. No adjoining sub region LGAs have had consistently low “Active” population growth during both the inter-censal periods 2001-6 and 2006-11.

These areas of sustained high “Active” population growth in the adjoining sub regions to Sydney in Table 5, confirm the need for the NSW government to provide improvements to the public transport services in these areas to facilitate more “Transit Oriented” journey to work travel patterns for the future working populations in these areas.

In the outer sub regions of Sydney, in Table 5, there have been relatively few LGAs with consistently high or low “Active” population growth, compared to the overall population growth results in Table 4. Only Camden had consistently high “Active” population growth during both the inter-censal periods analysed and no LGA had consistently low “Active” population growth during both periods.

In Table 5, the numerous LGAs of low “Active” population growth are mainly concentrated in the middle and inner sub regions. In the middle sub region of Sydney, Auburn LGA has had consistently high “Active” population growth and three LGAs (Sutherland, Fairfield and Pittwater) have had consistently low “Active” population growth during both periods.

In the inner sub regions of Sydney, the same LGAs which showed consistently high overall population growth in Table 10 are also showing consistently high “Active” population growth in Table 11 eg Central Sydney (including Leichhardt), Canada Bay and Strathfield. In the inner sub regions, both Mosman and Woollahra have shown consistently low “Active” population growth during both the inter-censal periods considered.

Table 5 : Grouping of LGAs with consistently high and low "Active" population growth

Grouping of LGAs (time period)	Adjoining Region LGAs	Outer sub region LGAs	Middle sub region LGAs	Inner sub region LGAs
High Growth LGAs (2006- 2011)	**Cessnock**	**Camden**	**Auburn**	**Central Sydney**
	Maitland	Blacktown	Parramatta	**Strathfield**
	Port Stephens		Manly	**Canada Bay**
	Newcastle			Waverley
	Wyong			
	Shoalhaven			
High Growth LGAs (2001- 2006)	**Maitland**	**Camden**	**Auburn**	**Strathfield**
	Wollondilly	Baulkham Hills		**Central Sydney**
	Wyong			**Canada Bay**
	Port Stephens			
	Shoalhaven			
	Newcastle			
	Cessnock			
	Shellharbour			
	Wingecarribee			
Low Growth LGAs (2006- 2011)	Blue Mountains	Campbelltown	**Sutherland**	**Mosman**
	Gosford	Baulkham Hills	Warringah	Hunters Hill
		Penrith	Hornsby	**Woollahra**
		Hawkesbury	**Fairfield**	Willoughby
			Pittwater	
Low Growth LGAs (2001- 2006)			Ku-ring-gai	**Woollahra**
			Canterbury	Waverley
			Fairfield	**Mosman**
			Sutherland	Lane Cove
			Pittwater	Marrickville
			Manly	North Sydney
			Ryde	Randwick
			Bankstown	

5.3 Transit growth performance

From the ranking of the LGAs by transit journey to work growth in Table A5, the 15 highest and lowest performing LGAs during the most recent inter- censal period 2006-11, in terms of the 'Transit" proportion of journey to work travel growth are listed in Table 6.

Table 6 shows that 14 of the 15 highest 'Transit Performance" LGAs are located in the inner and middle sub regions of Sydney with only one LGA (Baulkham Hills) located in an outer sub region. Conversely 14 of the 15 lowest performing LGAs are located in the outer and adjoining sub regions of Sydney with only one LGA (Pittwater) located in the middle sub region. The overall "Transit Performance" of individual sub regions has been calculated according to the percentage of the overall growth in journey to work travel which has occurred by either bus or rail based travel as the primary travel mode. This analysis is shown in Table 7.

Table 6 : Summary of LGAs with high and low "Transit" JTW travel growth factors

Grouping of LGAs (time period)	Adjoining Region LGAs	Outer sub region LGAs	Middle sub region LGAs	Inner sub region LGAs
High % Transit Growth LGAs (2006- 2011)		Baulkham Hills	Hornsby Kogarah Hurstville Ryde Rockdale	Willoughby Lane Cove Mosman North Sydney Burwood Woollahra Ashfield Marrickville Strathfield
Low % Transit Growth LGAs (2006- 2011)	Shoalhaven Lake Macquarie Cessnock Port Stephens Maitland Wollondilly Wyong Kiama Shellharbour Newcastle Wingecarribee Wollongong	Hawkesbury Camden	Pittwater	

The overall transit (bus or rail) factor in journey to work travel growth throughout the Sydney sub regions (excluding the south west) has been relatively high (at least 30-40%) during the period 2006 to 2011.

However, in the outer "South West" Sydney sub region and the three adjoining sub regions, this transit growth factor drops off dramatically, reaching its lowest level (2.7% growth in the regional journey to work travel is by "Transit" modes) for the five combined LGAs of the Lower Hunter sub region, including Newcastle.

6. Future transit patronage growth and transit oriented development

6.1 Growth in transit patronage demand

The high rate of growth of the "Active" working population in the GSSR area, most recently +2.3% per annum between 2006-11, indicates that the capacity of all rail and bus based transit systems will probably need to be expanded by approximately 9-10% every four years to keep pace with increasing growth in the journey to work travel demand by public transport throughout the region.

In the short term, for the heavy rail network, sufficient additional rail projects are now planned and under construction, (including the SWRL, NWRL and the completion of various rail line duplication and station turnback projects under the "rail clearways program") that there is a reasonable possibility of achieving this objective, for the next 4-8 years generally. Beyond

that timeframe, a major increase in the overall rail network capacity, such as additional tracks at the Sydney Harbour crossing, is increasingly likely to be needed.

Table 7 Sub regional transit (Bus or Rail) growth factors in the 2006-11 journey to work travel

Sub Region	Name	Overall Growth in Journey to Work Travel	Growth in Bus or Rail Based Journey to Work Travel	% Transit Factor in JTW Travel Demand Growth
1	East	11,396	4,837	42.4%
2	Inner North	10,751	7,053	65.6%
3	South	22,348	11,428	51.1%
4	Inner West	10,113	5,052	50.0%
5	West Central	28,572	11,934	41.8%
6	Central (inc' Leichhardt)	20,585	8,755	42.5%
7	North	7,700	5,495	71.4%
8	North East	7,164	2,410	33.6%
9	North West	28,348	9,683	34.2%
10	South West	15,687	2,440	15.6%
11	Central Coast	10,457	963	9.2%
12	Lower Hunter	29,395	803	2.7%
13	Illawarra Shoalhaven and Wingecarribee	13,801	1,083	7.9%
Total	**All Areas**	**216,317**	**71,936**	**33.3%**

The metro bus network which has now been established for identified major bus based public transport corridors in Sydney, Figure 2, will permit the service frequencies of buses to be increased progressively to meet the overall increase in the bus passenger transit demand over the next 4-8 years and beyond that time, the network can be extended into other areas.

The proposed Randwick "CSELR" light rail project and a future northern beaches rail based transit project are also likely to be required within and towards the end of this timeframe to further improve the overall peak hour transit capacity for the public transport systems serving these areas of Sydney.

6.2 Transit Oriented Development in the inner and middle sub regions

The NSW Government's Regional and Sub Regional planning strategies for Sydney and other parts of the GSSR were mainly prepared during the period 2005-7 and are now due for updating. A draft updated Metropolitan Strategy was released by the NSW Government for discussion and public comment in March 2013, in conjunction with a White Paper for proposed planning reform in NSW.

The previous which was released in December 2005 (NSW Department of Planning 2005) proposed future dwellings growth targets for the period 2004-2031 for each of twelve sub regions based on detailed analysis of the development potential of individual areas at a micro (Census Collector District) level.

The subsequent Metropolitan Strategy Sub Regional Strategy documents for the Central Coast and eight of the ten Sydney sub-regions were progressively released during 2007 (NSW Department of Planning 2007). In many cases these strategies revised upwards the future 2004-2031 dwellings growth targets for each sub region in comparison to the Metropolitan Strategy "City of Cities" report and also formally distributed these dwellings growth targets between the individual LGAs in each sub region.

The most visible type of Transit Oriented Developments which have occurred in the Sydney region since 2000 are the "high rise" developments which have grown up close to major railway stations such as Bondi Junction, Strathfield and Parramatta and in many locations in and around the Sydney CBD. Highly visible Transit Oriented Developments have also occurred near North Sydney, St Leonards and Chatswood railway stations and at Wolli Creek Junction, Rockdale, Kogarah and Hurstville stations on the Illawarra Rail Line.

These new "high rise" developments are all generally located within the prime 200-400 metre walking distance catchments of these railway stations. However, other Transit Oriented Developments of a more low rise character, can also occur and should be supported by planning legislation, within the outer walking distance catchments such as the 400-800 metre radius of railway stations. These low rise Transit Oriented Developments can also contribute significantly to achieving regional or sub regional "Transit Oriented Development" growth outcomes for the Sydney region, in a less visible manner than high rise development.

In the inner and middle sub region LGAs of Sydney, the best future opportunities for "Transit Oriented Development" on the railway network are represented by the major railway junction stations eg:

- Epping, Chatswood, Hornsby, Strathfield, Granville, Sutherland, Wolli Creek Junction and Redfern

These eight major junction stations on the railway network, as well as providing the highest frequencies of train services from the combination of all-stations, semi fast and express train services, also provides direct transit access to a wider range of destinations along multiple rail routes, thereby making a lifestyle without car ownership or regular car use more feasible.

At these major railway junction stations, the primary walking distance catchment (generally up to a 400 metre radius from the railway station) typically represents the core retail and commercial area where higher density residential flats, including "medium rise and high rise" residential development above commercial or retail development should also be permitted and should be supported by appropriate local zoning and planning controls.

For the secondary walking distance catchments at these railway junction stations (e.g. the area between the 400 metre radius and the 800 metre radius limits), and the primary walking distance catchments of most other railway stations (up to 400 metre radius), the type of Transit Oriented Development which is most appropriate and should be supported by the local zoning and development controls, is low rise two or three storey "medium density" townhouse type development, which is generally similar in terms of the building footprint to the traditional Inner City style of terrace housing.

6.3 Transit Oriented Development in the outer and adjoining sub regions

In the outer and adjoining sub regions of Sydney, the best future opportunities for "Transit Oriented Development" along the railway network are represented by the major railway junction stations, such as Blacktown, Cabramatta and Glenfield.

Additionally the new railway stations which are being created with the Richmond Rail Line duplication (Schofields) the SRWL (Edmonson Park and Leppington) and the NWRL rail projects (Cherrybrook, Castle Hill, The Hills Centre, Norwest Boulevard, Kellyville, Rouse Hill and Cudgegong) will also provide major opportunities for new "Transit Oriented Developments" to occur along these railway lines.

In the population growth analysis in this study, the following six outer Sydney and adjoining sub region LGAs have been identified as having consistently low or negative population growth rates during both the growth periods 2001-06 and 2006-11 (Table A1 and Table A2):

- Blue Mountains, Kiama, Campbelltown, Hawkesbury, Penrith, and Sutherland.

These six LGAs all have a good level of accessibility to the rail network, with multiple railway stations where increased residential population densities can be facilitated by low rise Transit Oriented Developments within the primary walking distance catchments of railway stations. These LGAs also have good access to National Parks and related recreational areas which can provide good amenity for their residents.

In the Newcastle area, the attractiveness of living close to the railway lines is currently compromised by the heavy freight trains using the rail network where coal and other freight trains operate at most times of the day and night. A future freight rail bypass of the Newcastle Urban Area (eg from Fassifern to Hexham), which has been identified by recent NSW government Transport and Infrastructure Planning Strategies (Transport for NSW, 2012) and (NSW Government, 2012) primarily for reasons of freight rail capacity and efficiency, will nevertheless also provide significant urban consolidation benefits for the Newcastle area by improving the amenity for new residential developments to be located closer to existing railway stations in Newcastle, in particular near the inner city railway stations such as Adamstown, Kotara, Waratah and Mayfield.

On the Illawarra Rail Line, the current highly convoluted rail track alignment between Waterfall and Bulli, including the single track section at the Coal Cliff Tunnel, is a major constraint to improving the rail passenger capacity and travel times for Illawarra commuters.

This rail network capacity constraint can be addressed in the future either by a new rail bypass corridor route running generally along the coastal corridor, in a tunnel directly from near Waterfall to Thirroul, or via an alternative route further inland potentially utilising a higher speed rail route into Sydney via the East Hills Line, Campbelltown and Douglas Park, also utilising the partly constructed Maldon to Dombarton railway alignment to reach the Wollongong urban area near Kembla Grange and Dapto.

7. Conclusion

The last Sydney Metropolitan Region growth strategies which were completed in 2005/7 are currently under review by the NSW government, including significant proposed changes to the NSW planning system. The future residential dwellings growth targets for all LGAs of Sydney and the surrounding sub regions are now undergoing review and updating.

Over the past 10 years there has been a relatively even distribution of population growth achieved through new dwelling construction across the four (inner, middle, outer and adjoining) sub regions of the Sydney region. This uniform population growth distribution represents a significant change from the predominantly urban sprawl type growth which was envisioned for Sydney throughout the 1960’s to 1990’s.

The future role of the NSW state government in transport and infrastructure planning is clear in providing new transit services and in amending the planning controls in the areas near railway stations, for the purpose of facilitating higher residential development densities which will permit higher transit journey to work travel throughout the Sydney region.

The state government’s intervention in the planning controls around transit nodes nevertheless needs to be treated sensitively as it can generate significant community opposition. The results of the population growth analysis in this study show Ku-ring-gai LGA, within the “North” sub region of Sydney, had the lowest population growth during 2001-6 of all the LGAs considered at -0.5% per annum (Table A1). However by 2006-11, as shown in Table A2, this low population growth rate had been successfully turned around such that Ku-ring-gai was now in the top 15 LGAs for population growth at +1.8% per annum. Although the

state government intervention in the planning controls within Ku-ring-gai was controversial at the time, it was arguably necessary and justifiable in achieving this outcome.

The analysis in this study shows the following six outer Sydney and adjoining sub region LGAs have also had consistently low or negative population growth rates during both the 2001-06 and 2006-11 inter- censal periods, as shown in Table A1 and Table A2, eg:

- Blue Mountains, Kiama, Campbelltown, Hawkesbury, Penrith, and Sutherland.

These six LGAs all have a good level of accessibility to the rail network, with multiple railway stations where increased residential population densities could be facilitated by Transit Oriented Developments within the primary walking distance catchments of railway stations. These six LGAs also have good access to National Parks and related recreational areas which can provide good amenity for their residents.

In the inner and middle sub region of Sydney, the best opportunities for Transit Oriented Development along the railway network are represented by the major railway junction stations. These eight stations, eg Epping, Chatswood, Hornsby, Strathfield, Granville, Sutherland, Wolli Creek Junction and Redfern, are all located at major nodes on the railway network, which provide fast and direct transit access to the Sydney CBD and also to wide range of other local and regional employment and recreational destinations, making a lifestyle without car ownership or regular car use more viable. Sydenham is also a major railway junction station but is not included in this group due to aircraft noise issues in the nearby area.

Transit Oriented Developments involving both high density high rise development and low rise “medium density” townhouse style development, within the primary and secondary walking distance catchments respectively (400 metre radius and 800 metre radius) of these major junction railway stations, should be supported by reviews of the local zoning and development controls.

In the outer and adjoining sub regions of Sydney, the best opportunities for “Transit Oriented Development” are also represented by major railway junction stations, such as Blacktown, Cabramatta and Glenfield and the ten new railway stations which are being created by new rail infrastructure projects. These are the Richmond Rail Line Duplication (Schofields), the SRWL (Edmonson Park and Leppington) and the NWRL rail projects (Cherrybrook, Castle Hill, The Hills Centre, Norwest Boulevard, Kellyville, Rouse Hill and Cudgegong).

Future NSW government planning initiatives, including the master planning which has been undertaken by the NSW Growth Centres Commission in the North West and South West Growth Centres can provide major opportunities for new “Transit Oriented Development” to occur along the railway network by planning improved railway station precincts at each railway station within the Growth Centres areas. Also the railway station precincts within the six identified low growth outer LGAs (Blue Mountains, Kiama, Campbelltown, Hawkesbury, Penrith, and Sutherland) can also have new “Transit Oriented Development” opportunities identified by railway station precinct masterplanning.

References

ABS (2001, 2006, 2011) ABS Census, Journey To Work Travel Data from the Basic Community Profiles for each LGA (Table B46) 2001, 2006 and 2011

ABS (2013) Data Series 3218.0, Estimated Resident Population 2001, 2006 and 2011 for Sydney and NSW LGA’s

CityRail (2001) Compendium of CityRail Travel Statistics, June 2001

CityRail (2006) Compendium of CityRail Travel Statistics, April 2006

CityRail (2011) Compendium of CityRail Travel Statistics, June 2011

NSW Department of Planning (2005) Metropolitan Strategy – City of Cities, released December 2005.

NSW Department of Planning (2007) Sub Regional Planning Strategies for the East, Inner North, North, North East, North West, South West and West Central Sub Regions, released in July, October and December 2007.

GHD, 2010, Sydney Light Rail Inner West Extension Study, Final Study, July 2010.

NSW Government, 2010, Metropolitan Transport Plan, *Connecting The City of Cities*

NSW Government, 2012, State Infrastructure Strategy, prepared by Infrastructure NSW

Transport for NSW 2012, Draft Long Term Transport Plan for Sydney.

Transport for NSW 2013, see website

http://www.transport.nsw.gov.au/Projects-Completed-Projects/Rail-Clearways-Program

Appendix A (Maps and Figures)

Figure A1: Names of the Middle and Outer LGA areas of Sydney, up to 60 km from the centre

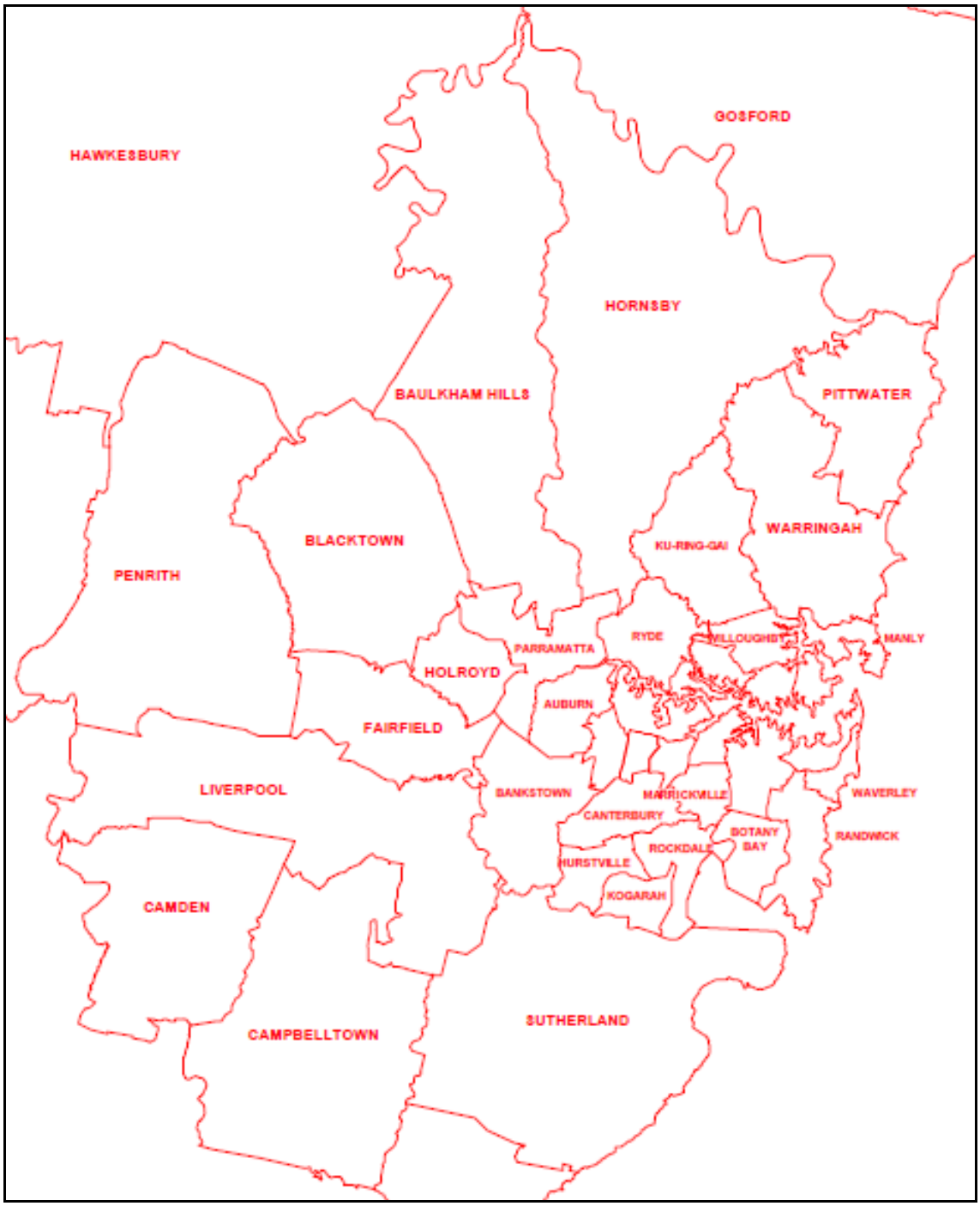


Figure A1: Names of the adjoining region LGA areas to Sydney, up to 200 km from the centre

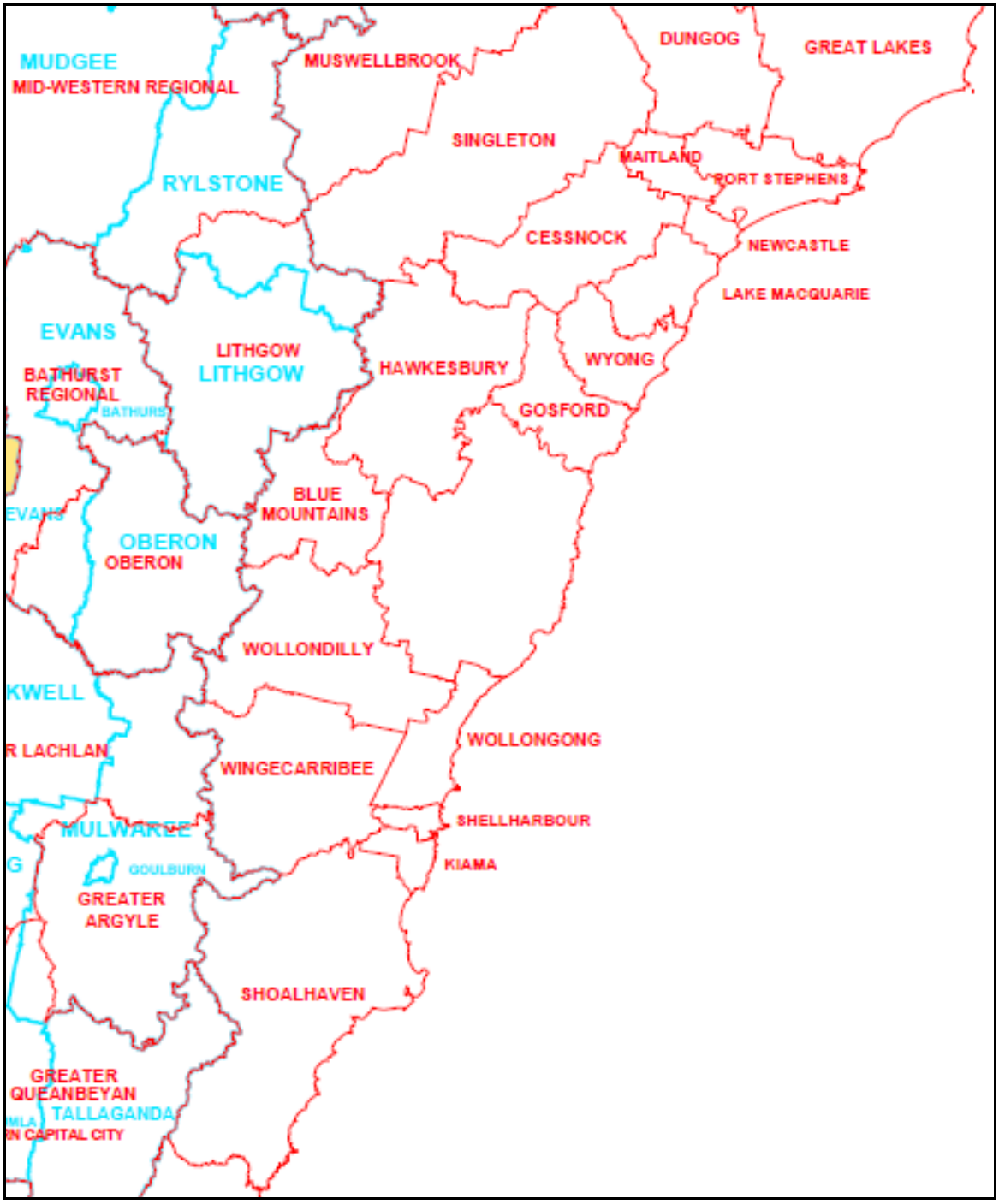


Table A1: Census 2001-2006 annual population growth rates for each LGA

LGA NAME	2006 Population	2001 Population	Growth 01-06	%Growth 01-06
Central Sydney	217150	180152	36998	4.11%
Auburn	68231	58678	9553	3.26%
Maitland	64670	56492	8178	2.90%
Baulkham Hills	165931	146045	19886	2.72%
Strathfield	33231	29433	3798	2.58%
Camden	50940	45454	5486	2.41%
Canada Bay	68725	62322	6403	2.05%
Willoughby	66891	61795	5096	1.65%
Liverpool	170915	159046	11869	1.49%
Port Stephens	63272	58965	4307	1.46%
Wollondilly	41221	38424	2797	1.46%
Blacktown	280612	264799	15813	1.19%
Shellharbour	63434	59862	3572	1.19%
Burwood	32395	30580	1815	1.19%
North Sydney	61891	58713	3178	1.08%
Shoalhaven	92346	87650	4696	1.07%
Wyong	142686	135498	7188	1.06%
Newcastle	149313	142101	7212	1.02%
Kogarah	54910	52463	2447	0.93%
Holroyd	93323	89236	4087	0.92%
Parramatta	153891	147882	6009	0.81%
Rockdale	96334	92676	3658	0.79%
Wingecarribee	44374	42740	1634	0.76%
Hurstville	76469	74088	2381	0.64%
Bankstown	176857	171994	4863	0.57%
Hunter's Hill	13746	13382	364	0.54%
Wollongong	194543	189776	4767	0.50%
Ashfield	41520	40521	999	0.49%
Hornsby	156808	153200	3608	0.47%
Cessnock	48296	47188	1108	0.47%
Waverley	64684	63241	1443	0.46%
Lake Macquarie	191960	187803	4157	0.44%
Warringah	139163	136175	2988	0.44%
Ryde	100962	99151	1811	0.37%
Manly	39263	38665	598	0.31%
Botany Bay	37680	37193	487	0.26%
Gosford	162058	160760	1298	0.16%
Randwick	126108	125223	885	0.14%
Woollahra	53317	53002	315	0.12%
Pittwater	56595	56390	205	0.07%
Kiama	20007	19959	48	0.05%
Penrith	177152	177413	-261	-0.03%
Mosman	27737	27851	-114	-0.08%
Sutherland	212531	213828	-1297	-0.12%
Fairfield	187263	189034	-1771	-0.19%
Hawkesbury	62105	62814	-709	-0.23%
Lane Cove	31721	32086	-365	-0.23%
Blue Mountains	76066	77021	-955	-0.25%
Canterbury	135605	137492	-1887	-0.27%
Marrickville	75546	76743	-1197	-0.31%
Campbelltown	147440	150154	-2714	-0.36%
Kuringgai	105103	107655	-2552	-0.47%
Totals	5214991	5020808	194183	0.77%

Table A2: Census 2006-2011 annual population growth rates for each LGA

LGA NAME	2011 Population	2006 Population	Growth 06-11	%Growth 06-11
Canada Bay	79905	68725	11180	3.25%
Auburn	78286	68231	10055	2.95%
Camden	58376	50940	7436	2.92%
Parramatta	174554	153891	20663	2.69%
Strathfield	37141	33231	3910	2.35%
Blacktown	312479	280612	31867	2.27%
Holroyd	103869	93323	10546	2.26%
Botany Bay	41674	37680	3994	2.12%
Central Sydney	239149	217150	21999	2.03%
Liverpool	188083	170915	17168	2.01%
Randwick	137757	126108	11649	1.85%
Kuringgai	114704	105103	9601	1.83%
Cessnock	52493	48296	4197	1.74%
Manly	42531	39263	3268	1.66%
North Sydney	67033	61891	5142	1.66%
Hurstville	82569	76469	6100	1.60%
Wyong	153992	142686	11306	1.58%
Marrickville	81489	75546	5943	1.57%
Bankstown	190637	176857	13780	1.56%
Wollondilly	44403	41221	3182	1.54%
Maitland	69646	64670	4976	1.54%
Ryde	108371	100962	7409	1.47%
Kogarah	58938	54910	4028	1.47%
Willoughby	71637	66891	4746	1.42%
Rockdale	102843	96334	6509	1.35%
Canterbury	144751	135605	9146	1.35%
Baulkham Hills	176986	165931	11055	1.33%
Pittwater	60260	56595	3665	1.30%
Mosman	29475	27737	1738	1.25%
Warringah	147611	139163	8448	1.21%
Waverley	68567	64684	3883	1.20%
Port Stephens	67058	63272	3786	1.20%
Burwood	34305	32395	1910	1.18%
Woollahra	56324	53317	3007	1.13%
Ashfield	43683	41520	2163	1.04%
Fairfield	196622	187263	9359	1.00%
Lane Cove	33197	31721	1476	0.93%
Hornsby	163865	156808	7057	0.90%
Penrith	184681	177152	7529	0.85%
Shellharbour	66054	63434	2620	0.83%
Kiama	20832	20007	825	0.82%
Shoalhaven	96043	92346	3697	0.80%
Wingecarribee	46042	44374	1668	0.75%
Newcastle	154896	149313	5583	0.75%
Gosford	167693	162058	5635	0.70%
Wollongong	201215	194543	6672	0.69%
Hawkesbury	64234	62105	2129	0.69%
Sutherland	219751	212531	7220	0.68%
Blue Mountains	78391	76066	2325	0.61%
Campbelltown	151221	147440	3781	0.51%
Lake Macquarie	195909	191960	3949	0.41%
Hunter's Hill	13880	13746	134	0.19%
Totals	5576105	5214991	361114	1.38%

Table A3: Active population growth rates ie growth in the journey to work travel demand which originates from each LGA 2001-2006

NAME	2006 Total JTW	2001 Total JTW	Growth 2001-2006	% JTW Growth 06-11
Maitland	20528	16571	3957	4.78%
Auburn	20383	16596	3787	4.56%
Strathfield	11990	10058	1932	3.84%
Wollondilly	15707	13548	2159	3.19%
Camden	20522	17762	2760	3.11%
Wyong	43457	37714	5743	3.05%
Port Stephens	18524	16178	2346	2.90%
Shoalhaven	23954	20931	3023	2.89%
Newcastle	50263	44128	6135	2.78%
Baulkham Hills	69446	60982	8464	2.78%
Cessnock	12577	11180	1397	2.50%
Central Sydney	89957	80372	9585	2.39%
Canada Bay	28916	25971	2945	2.27%
Shellharbour	20722	18671	2051	2.20%
Wingecarribee	13799	12507	1292	2.07%
Lake Macquarie	61776	55997	5779	2.06%
Blacktown	102168	93532	8636	1.85%
Rockdale	35767	32770	2997	1.83%
Burwood	11685	10740	945	1.76%
Kogarah	21204	19544	1660	1.70%
Kiama	6597	6087	510	1.68%
Willoughby	26568	24600	1968	1.60%
Liverpool	58527	55028	3499	1.27%
Parramatta	55437	52176	3261	1.25%
Gosford	53323	50190	3133	1.25%
Hurstville	28688	27108	1580	1.17%
Wollongong	63185	59983	3202	1.07%
Hornsby	62260	59189	3071	1.04%
Botany Bay	14407	13735	672	0.98%
Ashfield	16411	15737	674	0.86%
Hunter's Hill	4597	4424	173	0.78%
Holroyd	33275	32024	1251	0.78%
Warringah	57473	55347	2126	0.77%
Penrith	70281	67949	2332	0.69%
Campbelltown	54143	52392	1751	0.67%
Hawkesbury	24265	23650	615	0.52%
Blue Mountains	27163	26484	679	0.51%
Canterbury	43803	42877	926	0.43%
Fairfield	57457	56324	1133	0.40%
Kuringgai	37037	36344	693	0.38%
Randwick	50028	49102	926	0.38%
North Sydney	30056	29544	512	0.35%
Marrickville	32186	31747	439	0.28%
Bankstown	56496	55783	713	0.26%
Sutherland	88605	87622	983	0.22%
Ryde	39652	39377	275	0.14%
Manly	15179	15247	-68	-0.09%
Pittwater	21334	21663	-329	-0.30%
Lane Cove	13158	13452	-294	-0.44%
Mosman	10708	11091	-383	-0.69%
Waverley	25349	26268	-919	-0.70%
Woollahra	20579	21373	-794	-0.74%
	1891572	1779669	111903	1.26%

Table A4: Active population growth rates ie growth in the total journey to work travel demand which originates from each LGA 2006-2011

NAME	2011 Total JTW	2006 Total JTW	Growth 2006-2011	% JTW Growth 06-11
Cessnock	17035	12577	4458	7.09%
Auburn	25993	20383	5610	5.50%
Maitland	26054	20528	5526	5.38%
Central Sydney	110542	89957	20585	4.58%
Strathfield	14554	11990	2564	4.28%
Camden	24471	20522	3949	3.85%
Parramatta	65587	55437	10150	3.66%
Port Stephens	21871	18524	3347	3.61%
Newcastle	58637	50263	8374	3.33%
Blacktown	118151	102168	15983	3.13%
Canada Bay	33414	28916	4498	3.11%
Waverley	29259	25349	3910	3.08%
Wyong	49619	43457	6162	2.84%
Shoalhaven	27261	23954	3307	2.76%
Manly	17218	15179	2039	2.69%
Burwood	13219	11685	1534	2.63%
Holroyd	37527	33275	4252	2.56%
Botany Bay	16246	14407	1839	2.55%
Wollondilly	17701	15707	1994	2.54%
Lake Macquarie	69466	61776	7690	2.49%
Marrickville	36134	32186	3948	2.45%
Liverpool	65645	58527	7118	2.43%
Shellharbour	23094	20722	2372	2.29%
Kogarah	23580	21204	2376	2.24%
Hurstville	31870	28688	3182	2.22%
Rockdale	39681	35767	3914	2.19%
Kuringgai	40908	37037	3871	2.09%
Wingecarribee	15207	13799	1408	2.04%
Canterbury	48233	43803	4430	2.02%
Ryde	43611	39652	3959	2.00%
Kiama	7251	6597	654	1.98%
Wollongong	69245	63185	6060	1.92%
North Sydney	32903	30056	2847	1.89%
Ashfield	17928	16411	1517	1.85%
Bankstown	61332	56496	4836	1.71%
Randwick	54175	50028	4147	1.66%
Lane Cove	14224	13158	1066	1.62%
Gosford	57618	53323	4295	1.61%
Hawkesbury	26185	24265	1920	1.58%
Willoughby	28670	26568	2102	1.58%
Pittwater	22938	21334	1604	1.50%
Woollahra	22079	20579	1500	1.46%
Penrith	75147	70281	4866	1.38%
Fairfield	61181	57457	3724	1.30%
Baulkham Hills	73853	69446	4407	1.27%
Hunter's Hill	4885	4597	288	1.25%
Hornsby	66089	62260	3829	1.23%
Warringah	60994	57473	3521	1.23%
Sutherland	93103	88605	4498	1.02%
Campbelltown	56769	54143	2626	0.97%
Mosman	11197	10708	489	0.91%
Blue Mountains	28335	27163	1172	0.86%
	2107889	1891572	216317	2.29%

Table A5: Ranking of LGAs by the 2006-11 Transit based proportion of growth in journey to work travel

Ranking	LGA Name	Growth in Total JTW	Growth in Transit JTW	Transit % of JTW Growth
1	Hornsby	3829	3618	94.49%
2	Willoughby	2102	1637	77.88%
3	Lane Cove	1066	769	72.14%
4	Baulkham Hills	4407	3155	71.59%
5	Mosman	489	341	69.73%
6	N. Sydney	2847	1949	68.46%
7	Burwood	1534	1037	67.60%
8	Woollahra	1500	952	63.47%
9	Ashfield	1517	937	61.77%
10	Marrickville	3948	2368	59.98%
11	Kogarah	2376	1414	59.51%
12	Hurstville	3182	1855	58.30%
13	Ryde	3959	2287	57.77%
14	Rockdale	3914	2172	55.49%
15	Strathfield	2564	1378	53.74%
16	Ku-ring-gai	3871	1877	48.49%
17	Parramatta	10150	4865	47.93%
18	Waverley	3910	1806	46.19%
19	Manly	2039	897	43.99%
20	Auburn	5610	2428	43.28%
21	Central Sydney	20585	8755	42.53%
22	Holroyd	4252	1802	42.38%
23	Sutherland	4498	1855	41.24%
24	Canterbury	4430	1764	39.82%
25	Canada Bay	4498	1700	37.79%
26	Warringah	3521	1323	37.57%
27	Randwick	4147	1458	35.16%
28	Bankstown	4836	1647	34.06%
29	Botany	1839	621	33.77%
30	Blacktown	15983	5319	33.28%
31	Fairfield	3724	1192	32.01%
32	Hunters Hill	288	70	24.31%
33	Campbelltown	2626	624	23.76%
34	Liverpool	7118	1358	19.08%
35	Blue Mountains	1172	206	17.58%
36	Penrith	4866	818	16.81%
37	Gosford	4295	699	16.27%
38	Wollongong	6060	795	13.12%
39	Pittwater	1604	190	11.85%
40	Camden	3949	392	9.93%
41	Hawkesbury	1920	185	9.64%
42	Wingecarribee	1408	103	7.32%
43	Newcastle	8374	515	6.15%
44	Shellharbour	2372	134	5.65%
45	Kiama	654	29	4.43%
46	Wyong	6162	264	4.28%
47	Wollondilly	1994	66	3.31%
48	Maitland	5526	121	2.19%
49	Port Stephens	3347	54	1.61%
50	Cessnock	4458	42	0.94%
51	Lake Macquarie	7690	71	0.92%
52	Shoalhaven	3307	22	0.67%

Table A6: Ranking of LGAs where 2006-11 growth in Transit JTW has been primarily rail based

Ranking	LGA Name	Growth in Total JTW	Growth in Transit JTW	Transit % of JTW Growth	Growth in Rail JTW	Growth in Bus JTW
1	Hornsby	3829	3618	94.49%	2604	1014
2	Willoughby	2102	1637	77.88%	1325	312
3	North Sydney	2847	1949	68.46%	1283	666
4	Burwood	1534	1037	67.60%	943	94
5	Woollahra	1500	952	63.47%	695	257
6	Ashfield	1517	937	61.77%	903	34
7	Marrickville	3948	2368	59.98%	2345	23
8	Kogarah	2376	1414	59.51%	1369	45
9	Hurstville	3182	1855	58.30%	1737	118
10	Ryde	3959	2287	57.77%	2223	64
11	Rockdale	3914	2172	55.49%	2149	23
12	Strathfield	2564	1378	53.74%	1327	51
13	Ku-ring-gai	3871	1877	48.49%	1707	170
14	Parramatta	10150	4865	47.93%	3776	1089
15	Waverley	3910	1806	46.19%	1281	525
16	Auburn	5610	2428	43.28%	2345	83
17	Central Sydney	20585	8755	42.53%	5353	3402
18	Holroyd	4252	1802	42.38%	1573	229
19	Sutherland	4498	1855	41.24%	1761	94
20	Canterbury	4430	1764	39.82%	1729	35
21	Canada Bay	4498	1700	37.79%	1598	102
22	Bankstown	4836	1647	34.06%	1454	193
23	Botany	1839	621	33.77%	677	-56
24	Blacktown	15983	5319	33.28%	3182	2137
25	Fairfield	3724	1192	32.01%	921	271
26	Campbelltown	2626	624	23.76%	554	70
27	Liverpool	7118	1358	19.08%	1183	175
28	Blue Mountains	1172	206	17.58%	210	-4
29	Penrith	4866	818	16.81%	655	163
30	Gosford	4295	699	16.27%	641	58
31	Pittwater	1604	190	11.85%	96	94
32	Camden	3949	392	9.93%	378	14
33	Hawkesbury	1920	185	9.64%	114	71
34	Wingecarribee	1408	103	7.32%	67	36
35	Kiama	654	29	4.43%	26	3
36	Wollondilly	1994	66	3.31%	49	17
37	Maitland	5526	121	2.19%	62	59
38	Shoalhaven	3307	22	0.67%	16	6

Table A7: Ranking of LGAs where 2006-11 growth in Transit JTW has been primarily bus based

Ranking	LGA Name	Growth in Total JTW	Growth in Transit JTW	Transit % of JTW Growth	Growth in Bus JTW	Growth in Rail JTW
1	Lane Cove	1066	769	72.14%	439	330
2	Baulkham Hills	4407	3155	71.59%	3453	-298
3	Mosman	489	341	69.73%	231	110
4	Manly	2039	897	43.99%	538	359
5	Warringah	3521	1323	37.57%	927	396
6	Randwick	4147	1458	35.16%	870	588
7	Hunters Hill	288	70	24.31%	61	9
8	Wollongong	6060	795	13.12%	685	110
9	Newcastle	8374	515	6.15%	293	222
10	Shellharbour	2372	134	5.65%	78	56
11	Wyong	6162	264	4.28%	203	61
12	Port Stephens	3347	54	1.61%	49	5
13	Cessnock	4458	42	0.94%	27	15
14	Lake Macquarie	7690	71	0.92%	64	7