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Population growth, jobs growth and commuting flows in South East Queensland

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Foreword

This report is the fourth in a series of reports which identifies recent spatial changes in employment and the residential population within Australia's largest capital cities and investigates how commuting behaviour has responded to these changes. This report is based on the South East Queensland (SEQ) region, while the previous reports examined Perth, Melbourne and Sydney. It provides evidence about recent spatial development trends in SEQ and Brisbane, and compares the reality of those trends to the strategic direction for the region's growth set out in the Queensland Government's recent regional plans.

The report is part of a broader research project on population, employment and commuting change in Australia's largest capital cities, being undertaken by the Bureau's Cities Research team. The SEQ report was authored by Dr Afzal Hossain, Leanne Johnson, Nathan Brewer, Dr Catharina Williams and Lucy Williams. Dr Gary Dolman provided executive supervision.

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May 2013

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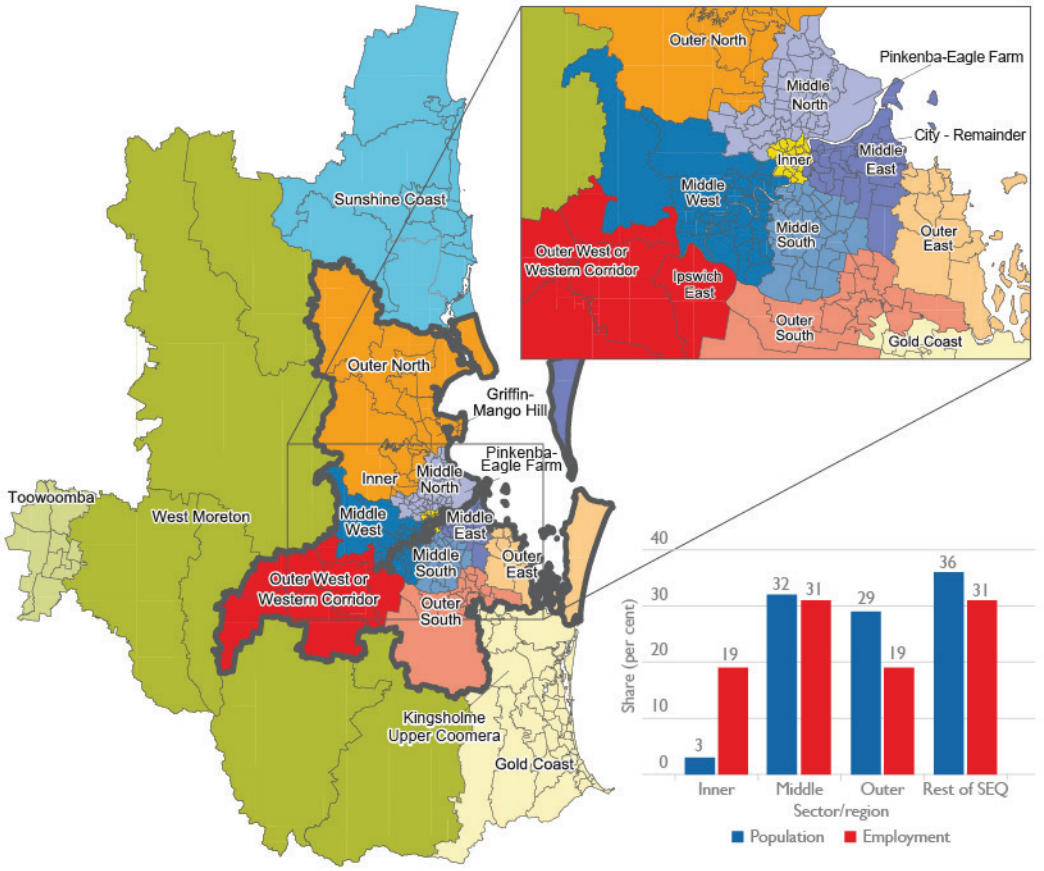
While BITRE is grateful for the assistance provided by these individuals and organisations, the views expressed in this report are those of BITRE, and should not be attributed to any other individual or organisation.

At a glance

- This report is the fourth in a series of investigations into spatial changes in population, jobs and commuting in our largest cities. It covers the South East Queensland (SEQ) region, which includes the Brisbane Statistical Division (SD).
- SEQ's population grew by 694 000 persons from 2001 to 2011 to reach 3.18 million, representing average annual growth of 2.5 per cent. The Brisbane SD grew by about 400 000 persons, while the Gold Coast added 164 000 and the Sunshine Coast gained 88 000. The main growth locations were Ipswich East, Kingsholme-Upper Coomera and Griffin-Mango Hill. The map on the next page presents region, sector and relevant Statistical Local Area (SLA) boundaries.
- Between 2001 and 2011, average annual employment growth rates were 3.6 per cent for SEQ and 3.1 per cent for Brisbane, well above the national growth rate of 2.3 per cent. There were 187 000 jobs added in SEQ from 2001 to 2006, largely in Brisbane's Middle sector (29 per cent), its Outer sector (20 per cent) and the Gold Coast (20 per cent). The Inner sector grew relatively slowly and its share of SEQ employment fell from 19.9 to 18.9 per cent. The main SEQ job growth locations were the City Remainder and Pinkenba-Eagle Farm SLAs.
- Commutes in an inward direction (29 per cent) greatly outnumber those in an outward direction (6 per cent) in SEQ, but the majority of commutes (59 per cent) occur within the home subregion and region. From 2001 to 2006, inward commutes declined from 30.2 to 28.6 per cent of all commutes within SEQ. The proportion commuting to a different SLA within the home subregion/region rose from 36.8 to 37.8 per cent, amounting to an additional 77 900 commuters. Average commuting distances remained stable from 2001 to 2006.
- Gravity model regressions reveal that the spatial distribution of residents and jobs explains 63 per cent of the current pattern of commuting between SLAs in SEQ. Spatial growth in residents and jobs explains 54 per cent of the change in commuting flows from 2001 to 2006. Expansions of SEQ's transport infrastructure also explain some of the changes in commuting patterns.
- The Queensland Government projects that SEQ's population will grow by 1.8 million from 2006 to 2031, with much of the growth in the Gold Coast (371 400) and Outer West (320 600). The available spatial projections of population and jobs imply that much of the increase in commuting in SEQ between 2006 and 2031 will be within Outer Brisbane (17–24 per cent of growth) and within the Gold Coast (15–17 per cent of growth).
- The *SEQ Regional Plan 2009–2031* sets out the strategic direction for the future growth of the SEQ region, and outlines a range of goals that relate to the spatial distribution of population and jobs, or to commuting patterns. Some progress has been made against most of the relevant strategic planning goals since 2001. For example, there was good

progress in increasing residential densities and locating jobs in centres, and in redistributing residential growth to the Western Corridor. There was also some progress in increasing the active transport and public transport mode shares of commuter travel. However, there was a significant net increase in Brisbane's average commuting times between 2002 and 2010.

Map of regions, sectors, and selected subregions and Statistical Local Areas in South East Queensland



Note: The Brisbane SD (black boundary) is classified into Inner, Middle and Outer sectors, and the Middle and Outer sectors have each been disaggregated into four subregions.

Source: BITRE analysis of ASGC 2006 boundaries and ABS 2006 *Census of Population and Housing* data.

Contents

Executive Summary

This report is the fourth in a series of reports which identifies recent spatial changes in employment and the residential population within Australia's largest cities and investigates how commuting behaviour has responded to these changes. The previous reports examined Perth (BITRE 2010), Melbourne (BITRE 2011a) and Sydney (BITRE 2012a).

The principal aim of this study is to identify recent spatial changes in population, employment and commuting in the South East Queensland (SEQ) region[1], with a view to providing a solid evidence base about the trends that have been shaping the region in recent years. A secondary aim is to investigate the extent to which there has been progress in reshaping the region's spatial development and commuting patterns in the direction envisaged by recent strategic plans. Understanding change in the spatial form of cities can assist in formulating urban policy and inform infrastructure investment decisions.

The period of interest for this study is the 2001 to 2011 period. The analysis is based on SEQ, as defined by the *SEQ Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009).[2] SEQ consists of the Brisbane Statistical Division (SD) region, together with the Gold Coast, Sunshine Coast, Toowoomba and West Moreton regions. The analysis is undertaken at a range of geographic scales, including SEQ as a whole, the regions, Brisbane's Inner, Middle and Outer sectors and subregions, Statistical Local Areas (SLAs) and destination zones. Map E.1 shows the SEQ boundary, and displays the regions, sectors and subregions which are used throughout this report.

Australian Bureau of Statistics (ABS) *Census of Population and Housing* data for 2001 and 2006 and *Estimated Resident Population* data for the 2001 to 2011 period are the two primary information sources used in the analysis.[3] Information on post-2006 change has been incorporated from a range of sources, while information on longer term trends is also included to put current changes into their historical context. This report does not incorporate any information from the 2011 ABS *Census of Population and Housing*, since the relevant data

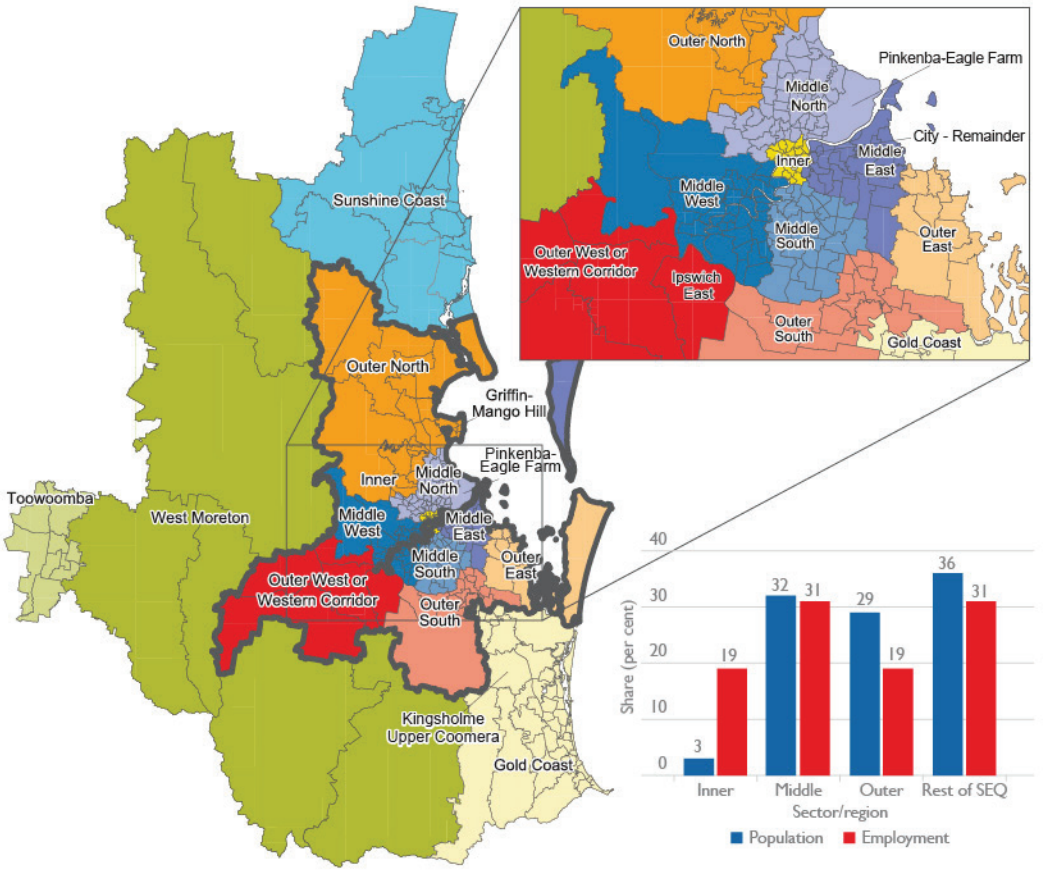
1 The SEQ region includes land covered by 11 local government areas (LGAs), as defined by the *South East Queensland Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009). These LGAs are: Brisbane City Council, Gold Coast City Council, Ipswich City Council, Lockyer Valley Regional Council, Logan City Council, Moreton Bay Regional Council, Redland City Council, Scenic Rim Regional Council, Somerset Regional Council, Sunshine Coast Regional Council and Toowoomba Regional Council (part of) (ibid.,, p.5). The boundary of the SEQ region is shown in Map E.1.

2 The portion of the Toowoomba Regional Council that falls within the SEQ Regional Plan area corresponds to the Toowoomba Statistical Subdivision (SSD), as defined in ABS (2006a), plus one census collection district covering Charlton Wellcamp (3141706). Data for the Toowoomba SSD is used to approximate the in-scope area of Toowoomba Regional Council throughout this report.

3 Apart from those instances where a specific source is given, the data presented in the Executive Summary were largely derived by BITRE through analysis of these two primary data sources and a range of Queensland Government data sources (e.g. the SEQ *Household Travel Survey*, Department of Transport and Main Roads modelled distance estimates, spatial population and dwelling projections). Details of data sources are provided in the relevant chapters.

items were not available at the time the spatial analysis was undertaken.[4] However, BITRE's comparative report—which will bring together results from the Sydney, Melbourne, Perth and SEQ studies—will include some high-level results from the 2011 census. BITRE also intends to produce a series of short information sheets during 2013 which will use 2011 census data to shed light on employment, transport and housing issues in cities.

Map E.1 Map of South East Queensland, displaying regions, sectors and subregions



Notes: The Brisbane SD (black boundary) is classified into Inner, Middle and Outer sectors, and the Middle and Outer sectors have each been disaggregated into four subregions. The Middle sector consists of the Middle East, Middle North, Middle South and Middle West subregions, displayed in various shades of blue. The Outer sector consists of the Outer East, Outer North, Outer South and Outer West subregions, displayed in various shades of red and orange. The Outer West region (in burgundy) corresponds to the Western Corridor.

Source: BITRE analysis of ASGC 2006 boundaries.

4 The 2011 *Census of Population and Housing* data on employment, industry, transport mode and commuting in SEQ was released during October and November 2012.

Residential patterns and trends

The population of Brisbane stood at around 120 000 in 1901 (Spearritt 2010). The Brisbane SD contained 870 100 people by 1971, which rose to 2.03 million by 2011, while the population of SEQ grew from 1.11 million in 1971 to reach 3.18 million in 2011 (ABS 1983, 2012a). The average annual rate of population growth in SEQ was at least 2.5 per cent in each decade from 1971 to 2011. Brisbane's rate of growth tended to be a little lower, with its share of the total SEQ population declining from 78.1 per cent in 1971 to 63.9 per cent in 2011, reflecting a significant rise in the population shares of the Gold Coast and Sunshine Coast.

Brisbane's Outer sector gained nearly 780 000 residents between 1971 and 2011, compared to 364 000 for the Middle sector and 16 000 for the Inner sector. The Gold Coast added 509 000 residents and the Sunshine Coast added 285 000. The Toowoomba and West Moreton regions gained 58 200 and 52 200 residents, respectively. In the 1971 to 1981 period, the Outer sector, Gold Coast and Sunshine Coast all recorded average annual growth rates of over 7 per cent. Since then growth has moderated (particularly in Brisbane's Outer sector), but has continued to exceed the SEQ average growth rate for each decade.

As of 2011[5], 31 per cent of SEQ's population lives in the Middle sector of Brisbane, 30 per cent in the Outer sector and 3 per cent in the Inner sector. The remainder of SEQ's population is distributed between the Gold Coast (19 per cent), Sunshine Coast (14 per cent), Toowoomba (3 per cent) and West Moreton (3 per cent).

The SEQ region is one of the fastest growing regions in Australia, with an average annual population growth rate of 2.5 per cent between 2001 and 2011. The population of the SEQ region increased by nearly 694 000 persons from 2001 to 2011 to reach 3.18 million. Brisbane grew by around 400 000 persons during this period, while the Gold Coast added 164 000 persons and the Sunshine Coast gained 88 000. Within Brisbane, growth was concentrated in the Outer North subregion, which gained 103 000 new residents.

The average annual growth rate of population in Brisbane was 2.2 per cent between 2001 and 2011. Gold Coast experienced a higher average annual growth rate (3.3 per cent), as did the Sunshine Coast (3.1 per cent). Within Brisbane, the annual rate of population growth was greatest for the Inner sector (3.7 per cent), while the Outer West and Outer North subregions grew faster than the other Outer subregions (at 3.2 and 3.1 per cent, respectively). Population growth was lowest for the Middle sector (1.7 per cent), and particularly low for the Middle North subregion (1.3 per cent).

At the SLA scale, the most substantial population increases in Brisbane were in Ipswich East (29 681 persons), Griffin-Mango Hill (17 035) and Ipswich Central (14 478). The Gold Coast and Sunshine Coast regions also saw significant population increases, particularly the SLAs of Kingsholme-Upper Coomera (18 060) and Buderim (15 858).

The population growth that occurred in Brisbane between 2001 and 2011 led to increases in Brisbane's population density. The largest increases in population density were in inner city SLAs, such as Brisbane City Inner and Fortitude Valley.

5 Based on March 2012 release of ERP data. Note that the July 2012 release of ERP data was benchmarked to the 2011 census and revised the SEQ population estimates significantly downwards (by about 44 000 persons). Much of the downwards revision related to the Gold Coast and Sunshine Coast.

The increase in density reflects a shift towards higher density forms of housing being built in SEQ since 2001. In particular, the stock of high rise flats, units and apartments in SEQ's centres expanded by 76 per cent from 2001 to 2006.

Employment and industry

Employment patterns and trends

Employment in SEQ decentralised during the 20 years to 1999, with industrial areas moving from the inner city to greenfield sites in the outer suburbs and office-based employment expanding beyond the Central Business District (CBD) into other inner suburbs (Stimson and Taylor 1999). Based on ABS census data, Robson (2008) calculated that the number of jobs in SEQ[6] grew by 268 900 between 1991 and 2001, representing average annual growth of 3.1 per cent per annum.

SEQ's employment is currently concentrated in the inner and middle suburbs of Brisbane, and is not well matched to the population distribution. The Inner sector contained 19 per cent of SEQ's employment in 2006, but only 3 per cent of its population. The Outer sector also contained 19 per cent of the region's employment, but was home to 29 per cent of the population. The Middle sector accounted for 31 per cent of jobs and 32 per cent of population, while the rest of SEQ contained 31 per cent of jobs and 36 per cent of SEQ's population. While the Inner sector of Brisbane contains 4.6 jobs for every employed resident, the Outer sector of Brisbane offers relatively limited job opportunities to local residents, with less than 0.6 jobs per employed resident.

At the SLA scale, the City Inner SLA was the top employer with 66 300 jobs in 2006. Other major employers included the City Remainder SLA in Inner Brisbane (40 200 jobs), Ipswich Central in the Outer West (29 300), Pinkenba-Eagle Farm in the Middle North (23 300), and Southport on the Gold Coast (22 400).

According to the ABS *Labour Force Survey*, SEQ had very strong job growth of 3.6 per cent per annum between 2001 and 2011, with Brisbane also recording strong job growth (3.1 per cent). Both growth rates were well above the national rate of job growth (2.3 per cent).

ABS census data identifies an increase of 187 000 jobs with a fixed place of work in SEQ from 2001 to 2006, with 115 300 of the new jobs located in Brisbane. Brisbane's Middle sector added 54 000 jobs (29 per cent of the SEQ total), while the Outer sector added 35 500 jobs (20 per cent) and the Gold Coast added 37 800 jobs (20 per cent). The rate of job growth was strongest in the Sunshine Coast (5.1 per cent per annum), with the most rapidly growing subregion in Brisbane being the Outer North (4.7 per cent per annum).

The Inner sector added 25 800 jobs between 2001 and 2006, but its share of SEQ employment declined from 19.9 to 18.9 per cent. About 9200 jobs were added in the Brisbane CBD[7] from 2001 to 2006, which represented a decline from 14.5 to 13.5 per cent of Brisbane employment and from 10.2 to 9.3 per cent of SEQ employment. This reflects a clear reduction in the centralisation of SEQ's employment, continuing the trend of preceding decades.

6 Toowoomba City Council was excluded (see Robson 2008).

7 Defined here as the combination of the City Inner and City Remainder SLAs.

Important locations for job growth between 2001 and 2006 included the City Remainder SLA in Inner Brisbane (which added 6800 jobs), Pinkenba-Eagle Farm in the Middle North (5700), Buderim on the Sunshine Coast (4100), and Murarrie in the Middle East subregion (4000). The proportion of SEQ jobs that involve working from home fell from 5.3 per cent in 2001 to 5.0 per cent in 2006.

Industry patterns and trends[8]

The major employing industries in SEQ in 2006 were *Retail trade* (16 per cent), *Property and business services* (12 per cent) and *Health and community services* (12 per cent). The *Property and business services* industry was the major employer in the Inner sector, with *Retail trade* being the dominant industry in all remaining sectors and regions, apart from West Moreton, which featured *Agriculture, forestry and fishing* as the major employing industry.

Between 2001 and 2011 (using the ANZSIC 2006 classification), the *Health care and social assistance* industry contributed 19 per cent of the jobs added within Brisbane, while the *Construction* industry contributed 14 per cent of job growth.

From 2001 to 2006, the main industry contributors to SEQ's job growth were *Health and community services* (which added 29 000 jobs), *Construction* (25 300) and *Property and business services* (23 500), while the *Agriculture, forestry and fishing* industry lost 2700 jobs.

The industry drivers of employment growth varied greatly across SEQ. Growth in the Inner sector was primarily due to the *Government administration and defence* industry, while job growth in the Middle and Outer sectors was driven by *Health and community services* and *Retail trade*, respectively. The Gold Coast featured Construction as the primary contributor to employment growth. *Retail trade* was the largest growth industry for both the Sunshine Coast and West Moreton, while *Health and community services* was the primary growth industry for Toowoomba.

Transport mode usage: patterns and trends

In the SEQ region, private vehicle was the dominant mode of travel to work on census day 2006, with a 79 per cent mode share.[9] Only 10 per cent used public transport to get to work, while 5 per cent used active transport (i.e. walking or cycling) and 5 per cent worked from home. Toowoomba is the most car dependent region in SEQ, with 88 per cent of Toowoomba residents and workers commuting by private vehicle.

Residents of Inner Brisbane are more likely to use public transport to get to work (20.6 per cent) than residents of other parts of SEQ. Only 1.4 per cent of Toowoomba and West Moreton residents used public transport to get to work in 2006. Those who work in Inner Brisbane are particularly likely to use public transport for the journey to work (39.6 per cent), but only 2.7 per cent of Outer sector jobs and 2.1 per cent of jobs in the rest of SEQ are accessed by public transport. The majority (73 per cent) of SEQ's commutes by public transport are to a place of work in the Inner sector, reflecting the radial nature of the public transport network.

8 This section adopts the ANZSIC 1993 1 digit industry classification, except where otherwise noted.

9 The analysis in this section focuses on those who attended work and provided information on their mode of travel. The mode share calculation differs from the usual method in that those who worked at home were retained in the analysis.

While walking accounted for only 3.5 per cent of SEQ commutes, walking was a common commuting mode for inner city residents, with 19.4 per cent of Inner Brisbane residents walking to work in 2006. Cycling represents just 1.1 per cent of commutes, with a higher proportion of Inner sector residents cycling to work (3.1 per cent).

Between 2001 and 2006, the proportion of SEQ residents commuting by private vehicle fell by 0.3 percentage points. The decline in the private vehicle mode share was due to the reduced car use of Inner and Middle Brisbane residents.

Between 2001 and 2006, the proportion of SEQ residents commuting by public transport rose by 0.5 percentage points and the active transport mode share rose by 0.3 percentage points. Growth in the public transport mode share was concentrated in Inner Brisbane (by place of work) and the Middle South (by place of enumeration), and was driven by growth in bus use, reflecting the new Busway routes. The growth in the active transport mode share was driven by strong increases in the Inner sector, and by growth in walking, rather than cycling. The active transport mode share decreased in a number of regions (i.e. the Gold Coast, Sunshine Coast, West Moreton, Outer South and Outer West).

Commuting patterns and trends

Commuting flows

In 2006, 1.6 per cent of the SEQ workforce lived outside of SEQ, mainly in the Tweed region, and in Toowoomba's hinterland. Commuter flows between Tweed and SEQ grew very strongly between 2001 and 2006.

Trips to work in an inward direction were much more prevalent than those in an outward direction (28.6 versus 5.7 per cent of all SEQ commutes in 2006), but the majority of commutes (59 per cent) occurred within the home subregion and region. About 40 per cent of employed Brisbane residents worked in their home subregion. In the rest of SEQ, 75 per cent of employed residents worked in their home region. The largest volume commuter flows included the 164 000 Gold Coast residents who commuted to a place of work on the Gold Coast and the 64 200 Outer North residents who commuted to a place of work in the Outer North.

The most common cross-region flow related to the 48 800 residents of the Middle North subregion who commuted to a place of work in Inner Brisbane. The most substantial flows between Brisbane and the rest of SEQ were those between Brisbane's Outer South and the Gold Coast, with about 6000 people commuting in each direction in 2006.

The probability of working in the Brisbane CBD was 27 per cent for employed residents of the Inner sector, 15 per cent for the Middle sector, 6 per cent for the Outer sector and 1 per cent in the rest of SEQ.

Between 2001 and 2006, commuting flows *within* SEQ grew by 3.6 per cent per annum, which resulted in an increase of just over 181 000 commuters with a known SLA of work and residence within SEQ. Much of the increase was due to increased commutes within the Brisbane SD (108 013 persons or 60 per cent of the total).

Inward commuting flows declined from 30.2 to 28.6 per cent of all SEQ flows between 2001 and 2006. The proportion of commutes to a different SLA within the same subregion/region rose from 36.8 to 37.8 per cent, which amounted to an additional 77 900 commutes of this type. The proportion of commutes within the home SLA also rose slightly (from 20.6 to 20.9 per cent), representing an additional 41 500 commutes.

The largest increases occurred for flows within the home subregion and region. As a result, the overall self-containment rate for SEQ rose marginally, by 0.5 percentage points, between 2001 and 2006. Commuting flows within the Gold Coast increased by 32 800 persons, while there was also strong growth in the number of people commuting within the Sunshine Coast (20 700 persons) and Outer North (13 900 persons).

The largest change in flows between different subregions was the extra 5263 persons commuting from the Outer North to the Middle North. There were also significant increases in commuting between the Gold Coast and Brisbane. The likelihood of commuting to a place of work in the Inner sector declined by 1.2 percentage points for employed residents of the Outer sector from 2001 to 2006.

Commuting distances and times

SEQ residents commuted an average of 15.2km to work in 2006, based on Queensland Department of Transport and Main Roads (DTMR) modelled distance estimates, aggregated by BITRE using ABS census data on commuting flows. Average commuting distances were low for Inner sector residents (7.2km) and higher for Middle (12.0km) and Outer sector residents (19.6km). Commuting distances were particularly high for West Moreton (25.7km) and Outer North residents (20.6km). While Inner Brisbane residents had the lowest average commuting distance (7.2km), those who worked in Inner Brisbane travelled an average of 17.0km to work.

Average commuting distances show virtually no change between 2001 and 2006, increasing by just 0.1km for SEQ and unchanged for Brisbane. However, the *SEQ Household Travel Survey* identifies a decline of between 0.6 and 1.0km in the average commuting distance of Brisbane and SEQ residents between 2007 and 2009.

The average duration of a commuting trip in SEQ was 31 minutes in 2009, according to the *SEQ Household Travel Survey*. The average duration of a commuting trip was 28 minutes for the Inner sector, 32 minutes for the Middle sector and 35 minutes for the Outer sector. Average commuting trip durations for Gold Coast and Sunshine Coast residents were similar to those of Inner sector residents, at 29 and 27 minutes, respectively.

The HILDA survey identifies a 7 minute net increase in average commuting times for Brisbane from 2002 to 2010, most of which occurred between 2002 and 2006. Several data sources suggest that the upward trend in commuting times seems to have either abated, or reversed, since 2007.

Some drivers of commuting flows

In addition to describing spatial patterns and trends in commuting, this project set out to explore how commuting behaviour has responded to recent spatial changes in population and employment. Regression analysis was used to investigate this issue.

Simple gravity models of commuter flows explained 63–66 per cent of all variation in origin-destination flows within SEQ in 2006. The amount of people commuting between an origin-destination pair tends to increase with the number of employed residents of the origin SLA and with the number of jobs in the destination SLA, but declines as the distance between the two SLAs widens. Distance is less of an impediment to travel for origin-destination pairs that have a direct rail connection or a direct freeway connection. Distance was a greater impediment to travel in 2006 than in 2001, reflecting the 55 per cent increase in nominal automotive fuel prices in Australia over the period (ABS 2009a). Distance was also less of an impediment to travel in Brisbane, than it was for Sydney, Melbourne or Perth.

Spatial patterns of growth in employed residents and jobs also played an important role in explaining changes in commuting flows in SEQ between 2001 and 2006. These two factors alone explained just over half of the variation in commuting growth rates for origin-destination pairs with non-trivial commuter flows. Other factors which helped to explain the rate of growth in commuting flows between 2001 and 2006 were distance and transport infrastructure investments:

- More distant origin-destination pairs tended to experience lower growth in commuting flows over this period.
- Major infrastructure projects completed between 2000 and 2006 included the Inner City Bypass, Port of Brisbane Motorway (stage one), Inner Northern Busway, South East Busway, Airtrain and the Pacific Motorway upgrade. Commuting flows between areas impacted by these projects increased more than otherwise would have been expected given residential and job growth in those areas.

Outlook

The Queensland Government's latest population projections (OESR 2011a) suggest that SEQ will grow at an average annual rate of 2.0 per cent and be home to 4.6 million people by 2031. The population of the Brisbane SD is projected to grow at 1.8 per cent per annum, reaching 2.8 million people by 2031. Of the projected 1.8 million population increase in SEQ, 1.0 million is expected to occur in Brisbane.

These population projections also suggest that the Outer West subregion will grow at the fastest pace (4.8 per cent annually) in SEQ between 2006 and 2031. In terms of the size of the population increase, Gold Coast is expected to increase the most (371 400), followed by the Outer West (320 600). At the SLA level, Ipswich Central and Ipswich East in the Outer West are projected to add the largest number of new residents (141 000 and 124 000 people respectively) (ibid).

To match the population growth in SEQ, about 810 000 new dwellings will be required (OESR 2012b). Most are likely to be built in the Brisbane SD (58 per cent), Gold Coast (19 per cent) and Sunshine Coast (13 per cent).

The SEQ region is also forecast to add 783 000 jobs from 2006 to 2026 (NIEIR 2007),[10] with the *Health and community services* industry expected to make the largest contribution to job growth (16 per cent). About 70 per cent of SEQ's job growth is expected to occur in

10 These projections were commissioned by the Queensland Government (Office of Urban Management) and the Council of Mayors (SEQ). They remain the property of Office of Urban Management, Queensland Government; however they do not represent government policy.

Brisbane—23 per cent in the Outer sector, 24 per cent in the Middle sector and 23 per cent in the Inner sector. The Gold Coast is forecast to contribute 16 per cent of SEQ's job growth. Relatively rapid job growth is forecast for the Outer West (5.0 per cent per annum) and Sunshine Coast (3.2 per cent). At the SLA scale, the largest job creation is expected in Ipswich Central (56 300), City Inner (47 300) and Pinkenba-Eagle Farm (47 000).

SEQ's future spatial distribution of population and employment will shape future spatial patterns of commuting in the region, which will in turn have ramifications for future congestion and infrastructure investment.

BITRE's scenario modelling[11] suggests that, if the available spatial projections of population and employment are realised, a large proportion of the increase in commuting in SEQ between 2006 and 2031 will be increased commutes within Outer Brisbane (17–24 per cent of growth) and within the Gold Coast (15–17 per cent of growth). The relative importance of same SLA commutes rises significantly under all three scenarios, and combined with the modelled reduction in the relative importance of inward commutes, is likely to pose a challenge to growing the public transport mode share. The projected pattern of growth is also expected to involve a small rise in average commuting distances.

Strategic plans

Strategic planning is one of several mechanisms through which governments attempt to influence the spatial allocation of population, jobs and commuting within cities. State and territory governments believe that the management of greenfield development, accommodation of population growth, and the transition to higher densities, are most able to be influenced by planning (Productivity Commission 2011).

Following the change of government in March 2012, a range of changes are being made to the Queensland planning system. In November 2012, amendments were made to the *Sustainable Planning Act 2009* aimed at 'restoring efficiency and consistency to the Queensland's planning and development system'. The government has also commenced transferring state planning powers back to councils from the Urban Land Development Authority. Infrastructure Queensland has been established to advise the State Government on long term infrastructure planning, prioritisation and maintenance.

This BITRE study focuses on the 2001 to 2011 period, in which the *SEQ Regional Plan 2009–2031*, the *SEQ Regional Plan 2005–2026* and the *SEQ Regional Framework for Growth Management* (from 2000) were the operational strategic plans. From 1990 to 2003, a cooperative non-statutory approach to SEQ regional planning was in place, and supported the *SEQ Regional Framework for Growth Management* (RFGM), which received several updates. Public and political concern about the continuation of unplanned growth and acceleration of urban sprawl led to the amendment of the *Integrated Planning Act* in 2004 to provide a statutory basis for regional planning (Heywood 2008). In 2005, Queensland's first statutory plan was released—the *South East Queensland Regional Plan 2005–2026*. It was replaced by the *South East Queensland Regional Plan 2009–2031* in 2009. Planning is carried out on a metropolitan-wide basis—the formal governance structure for the SEQ region consists of the 11 local governments, the State government and the Commonwealth government (ACELG 2011).

11 Three scenarios were considered, based on three different sets of spatial population projections, derived from OESR (2011a), DHA (2009) and Li and Corcoran (2010).

The overarching objective of the current regional plan is to achieve 'a future for SEQ which is sustainable, affordable, prosperous, liveable and resilient to climate change' (Queensland Government and COMSEQ 2009, p.10). It is designed to guide regional growth and development in SEQ, and to protect the region from 'inappropriate urban development' (ibid., p.1). The *SEQ Regional Plan 2009–2031* aims to balance population growth with the need to protect the lifestyle that residents of SEQ value and enjoy (Hinchcliffe 2009). It contributes to the broader strategic vision for the State, as outlined in *Towards Q2—Tomorrow's Queensland* (2008), which was the former government's strategic vision for the entire state and was framed around five ambitions (economy, environment and lifestyle, education and skills, health and community). The *SEQ Regional Plan 2009–2031* is also supported by the regularly updated Infrastructure Plan and a number of other plans, such as the transport plan, *Connecting SEQ 2031—An Integrated Regional Transport Plan for South East Queensland* (2011).

There is a high degree of consistency across the three most recent SEQ regional plans with regard to their population, employment, transport and commuting related objectives. However, strategic planning goals relating to the location of different industries changed significantly over the period. Other changes include the introduction of a statutory basis for regional planning, an urban footprint and a new activity centres hierarchy in the 2005 plan, changes to infill and density targets, and an increased focus on concentrating growth in the west and reducing the length of commuting trips.

Past reviews have identified the strengths of the SEQ strategic planning system as the robust mechanisms to support integration and infrastructure delivery, and the record of engagement and cooperation between state and local governments (COAG Reform Council 2012, Productivity Commission 2011, KPMG 2010). These reviews have also identified a need for improved accountability, openness and performance measurement systems (ibid).

BITRE has analysed the extent to which progress has been achieved from 2001 to 2011 against those metropolitan strategy goals that relate to the spatial distribution of population and employment or to commuting patterns—results are summarised in the table on the following pages (Table E.1). Outcome measures on their own do not provide a reliable indication of how effectively government planning systems are working, due to the many other influences that can impact on outcomes (Productivity Commission 2011), and so this report does not attempt to evaluate the performance of SEQ's strategic planning system. Rather the purpose of this analysis is to provide evidence about the actual 'on the ground' changes that have been occurring with respect to these strategic planning goals, identifying whether such movements are in the desired direction and progressing at the required pace of change. This evidence about the reality of the trends in SEQ's population, employment and commuting flows can then be used to inform future planning initiatives.

The available evidence suggests that there has been some movement in the desired direction for most of these planning objectives since 2001. The principal exception is that SEQ's average commuting time has not moved in the desired direction. A further exception is that residential and job growth has not been concentrated around frequent public transport for SEQ as a whole, even though there was progress in some specific locations. Good progress was achieved against several of these objectives, such as increasing residential densities and locating employment in centres, and redistributing residential growth to the Western Corridor. More often, evidence is mixed. For example, some of the targeted subregions increased their rate of employment self-containment (e.g. Moreton Bay, Redland), while others experienced a significant decline (e.g. Ipswich, Sunshine Coast). Some progress has been made against most

of these planning goals, but it has been incremental in nature as the accumulated effects of decades of residential and industry development do not reverse in just five to ten years.

There are wide-ranging interconnections, and in some cases tensions, between the different strategic planning goals. For example, in line with regional planning objectives, the Western Corridor experienced rapid residential growth between 2001 and 2011, averaging 3.2 per cent per annum compared to 2.5 per cent for SEQ as a whole. However, job growth in the Western Corridor did not keep pace with local population growth between 2001 and 2006, resulting in a decline in self-sufficiency, reduced self-containment of employment, and increased commuting distances for local residents.

Table E.1 Observed change against urban planning goals for South East Queensland from 2001 to 2011

Strategic planning objective	Time period to which evidence relates	Extent of progress	Comments
Spatial patterns of residential development			
Limit urban sprawl	2001 to 2011	Some[#]	The great majority of SEQ's residential development from 2001 to 2011 was contained within the Urban Footprint. Residential densities rose for new detached housing developments, with median lot size trending downward since 2004. Across the entire 2001 to 2011 period, SEQ accommodated 60–70 per cent of residential growth within existing urban areas, which exceeds the current 50 per cent target (and the previous 40 per cent target). However, much of this 'infill' relates to new houses being built on recently subdivided land near the urban fringe, rather than to redevelopment of established suburbs. The sheer magnitude of SEQ's recent growth means that the remaining non-infill development still involved the addition of at least 82 000 dwellings beyond the Existing Urban Area boundary.
Promote infill housing and higher densities in centres	2001 to 2010	Good	From 2001 to 2006, the number of high rise flats, units and apartments in SEQ rose by 9.4 per cent per annum, compared to 2.1 per cent for separate houses. Two-thirds of the increase in high rise dwellings occurred in the primary and regional activity centres, expanding the stock of high rise dwellings in centres by 76 per cent in just five years. The population density of SEQ's centres increased at a more rapid pace than SEQ's overall population density, although much of the density gain of centres was due to the primary centre (i.e. the Brisbane CBD). Dwelling approvals data shows that the shift towards higher density forms of housing continued over the 2006 to 2010 period.
Consolidate rural population growth in existing towns and villages	2001 to 2011	Some	A significant amount of rural population growth occurred outside of SEQ's existing towns and villages between 2001 and 2006, amounting to an additional 17 000 persons, or 5.7 per cent of SEQ's population growth. The 9 per cent increase in the rural population was less than SEQ's total population increase of 12 per cent. With significant declines in rural residential lot approvals and low density lot registrations since 2004, there are indications that rural residential development is starting to be curtailed in SEQ.
Redistribute residential growth to west, and away from coast	2001 to 2011	Good	Since 2001 there has been a partial redirection of SEQ's population growth away from the coast and towards the Western Corridor and other parts of SEQ. The Western Corridor increased its share of SEQ's population growth from just 1 per cent between 1991 and 2001 to 5 per cent for 2001 to 2006, and then to 9 per cent for 2006 to 2011. Between 1991 and 2001, 55 per cent of SEQ's population growth occurred within 10km of the coastline, and this has fallen to 45 per cent for the period since 2001. Growth averaged 3.2 per cent per annum for the Western Corridor from 2001 to 2011, compared to 2.7 per cent for coastal areas.

(continued)

Table E.1 Observed change against urban planning goals for South East Queensland from 2001 to 2011 *(continued)*

Strategic planning objective	Time period to which evidence relates	Extent of progress	Comments
Spatial patterns of jobs growth			
Locate employment in centres	2001 to 2006	Good	From 2001 to 2006, about 56 per cent of all job growth in SEQ occurred in activity centres. The proportion of jobs located in centres rose from 36.3 to 39.5 per cent. This involved an additional 104 000 jobs in centres, with growth averaging 5.4 per cent per annum. Nearly all of SEQ's centres shared in this job growth.
Achieve significant employment growth in Western Corridor~	2001 to 2006	Limited	The Western Corridor (i.e. the Ipswich Local Government Area) gained about 6500 jobs from 2001 to 2006, reaching 45 500 jobs in 2006. However, the average annual rate of job growth in the Western Corridor (3.1 per cent) was not as strong as the SEQ rate (3.6 per cent). Employment growth did not keep pace with residential growth between 2001 and 2006, with self-sufficiency declining from 76 to 72 jobs per 100 employed residents.
Develop diversified subregional economies	2001 to 2006	Some	SEQ's level of industry diversity remained stable from 2001 to 2006, which combined with the high base level of diversity, indicates SEQ is continuing to develop in a diverse fashion. The level of industry diversity either remained stable or increased for most subregions/ regions. West Moreton improved its industry diversity and reduced reliance on agricultural employment. However, the Inner sector reduced its industry diversity, instead building further on its existing specialisations in Government administration and Property and business services.
Relocate manufacturing and logistics employment from Inner Brisbane	2001 to 2006	Some	From 2001 to 2006, SEQ added 14 600 manufacturing jobs and 8 700 transport and storage jobs. There was some redistribution of manufacturing and logistics employment away from Inner Brisbane towards other parts of SEQ. Manufacturing and logistics employment declined by about 400 jobs in Brisbane's Inner sector, while many of the regions targeted for growth showed strong gains, with the Gold Coast adding 4800 jobs. However, Toowoomba reduced its manufacturing and logistics employment from 2001 to 2006.
Locate government and office-based business employment outside the Brisbane CBD	2001 to 2006	Some	The Brisbane CBD activity centre added about 7700 jobs in Finance and insurance and Property and business services and 12 600 jobs in Government administration and Health and community services from 2001 to 2006. While job growth in government and office-based businesses was greatest in the CBD, jobs were also created in other centres. Toowoomba gained about 2800 jobs in these industries, while Ipswich, Caboolture-Morayfield, Maroochydore, Sippy Downs and Kawana each added between 1000 and 1600 jobs.

(continued)

Table E.1 Observed change against urban planning goals for South East Queensland from 2001 to 2011 *(continued)*

Strategic planning objective	Time period to which evidence relates	Extent of progress	Comments
Commuting-related objectives			
Promote public transport use	2001 to 2011	Some	Between 2001 and 2006, public transport's share of commuter travel rose by 0.5 percentage points to reach 10.0 per cent in SEQ and by 0.9 percentage points to reach 13.5 per cent in Brisbane. The increase was largest amongst those who worked in Inner Brisbane and amongst bus users. Across all trip purposes, public transport's share of Brisbane's motorised urban passenger transport task rose by 1.2 percentage points between 2001 and 2011. The *Connecting SEQ* 2031 transport strategy targets a doubling of public transport's share of all trips from 7 per cent in 2006 to 14 per cent in 2031. It stood at 7.9 per cent in 2009, up from 7.0 per cent in 2004.
Promote walking and cycling	2001 to 2009	Some	The active transport mode share of SEQ commuter travel rose from 4.3 per cent in 2001 to 4.6 per cent in 2006. The increase was concentrated amongst inner city residents and driven by walking, rather than cycling. Survey data indicates that active transport's share of SEQ commuter travel grew by 1.1 percentage points from 2004 to 2009, reaching 5.3 per cent. The Connecting SEQ 2031 transport strategy targets a doubling of the active transport mode share (across all trip purposes) from 10 to 20 per cent from 2006 to 2031.
Concentrate residential and job growth around frequent public transport	2001 to 2006	Isolated	From 2001 to 2006, residential growth within 1km of SEQ's transport nodes was notably lower than that occurring outside the 1km catchment (9.2 per cent and 13.7 per cent, respectively), so that the population living within 1km of public transport nodes fell from 19.5 to 18.9 per cent. Population also grew at a marginally slower rate within 500m of transport nodes, although strong growth occurred around Inner Brisbane nodes. Job growth rates were very similar inside and outside the 500m and 1km catchments, although some suburban bus and rail station catchments experienced rapid growth in jobs.
Increase self-containment within subregions	2001 to 2006	Mixed	There was a small increase in SEQ's overall rate of employment self-containment from 51.1 per cent in 2001 to 51.6 per cent in 2006. This reflects mixed results across SEQ. Some of the targeted subregions increased their rate of self-containment (e.g. Moreton Bay, Redland), while others experienced a significant decline (e.g. Ipswich, Sunshine Coast).
Reduce commuting times and distances	2001 to 2010	Mixed	For both Brisbane and SEQ, average commuting distances remained stable from 2001 to 2006. Average commuting distances then fell by between 0.6 and 1.0km from 2007 to 2009. The HILDA survey identifies a 7 minute net increase in average commuting times for Brisbane from 2002 to 2010, most of which occurred between 2002 and 2006. Several data sources suggest that the upward trend in commuting times has either abated, or reversed, since 2007.

Note: Table 2.8 contains details of the relevant strategic planning goals from the *SEQ Regional Framework for Growth Management* (2000), the *SEQ Regional Plan 2005–2026* (2005) and the *SEQ Regional Plan 2009–2031* (2009).

The rating provided reflects BITRE's assessment of the extent to which practical limits have been placed on SEQ's outward expansion since 2001, based on the available evidence, rather than an assessment of progress towards the government's target. Since targets are more ambitious for some cities than others, this approach enables the individual city ratings to be more meaningfully brought together in the final comparative report.

~ This objective was newly introduced in the *SEQ Regional Plan 2005–2026*. It was not pursued by the SEQ RFGM 2000.

^ This objective was newly introduced in the *SEQ Regional Plan 2009–2031*. It was not pursued by the earlier strategic plans.

Source: BITRE analysis—details of assessment and sources provided in body of report.

How does Brisbane compare?

The SEQ study is part of a series of investigations of recent spatial change in employment, residential and commuting patterns in Australia's largest capital cities. The results for Brisbane—rather than those for SEQ as a whole—are most suitable for comparison to the other capital cities. Some insight into how Brisbane compares can be gained from considering the results of this study in the context of our Perth, Melbourne and Sydney results, in BITRE (2010), BITRE (2011a) and BITRE (2012a), respectively. A final comparative report, to be released shortly, will provide an overview of the relevant statistics for these three cities and Brisbane, highlighting commonalities and differences in the ways our cities are evolving over time. The comparative report will also incorporate some high-level results from the 2011 census.

CHAPTER 1
Introduction

Key points

- This South East Queensland (SEQ) study is part of a series of investigations into spatial changes in employment and residential patterns in Australia's largest capital cities, and how commuting behaviour has responded to these changes. The analysis relates to the 2001 to 2011 period. Previous reports have been completed for Perth (BITRE 2010), Melbourne (BITRE 2011a) and Sydney (BITRE 2012a).
- Australian Bureau of Statistics (ABS) *Census of Population and Housing* data for 2001 and 2006 and *Estimated Resident Population* data for the 2001 to 2011 period are the two primary information sources used in the analysis. This report does not incorporate any information from the 2011 ABS *Census of Population and Housing*.
- The analysis is presented at a range of geographic scales, including the SEQ region, Brisbane Statistical Division (SD), the inner, middle and outer sectors, subregions, Statistical Local Areas (SLAs), centres, census collection districts, and travel zones.

Context

This report is part of a set of case studies by BITRE that aims to identify spatial change in employment and residential patterns in our largest capital cities and how commuting behaviour has responded to these changes. A secondary aim is to investigate the extent to which there has been progress in reshaping each city's spatial development and commuting patterns in the direction envisaged by recent metropolitan plans. So far, BITRE has published similar reports for Perth, Melbourne and Sydney.

These in-depth case studies of Australia's four largest capital cities will provide the basis for a final comparative report, which:

- provides an overview of relevant statistics across the cities
- assembles some common themes that emerge from the individual city studies, as well as the difference
- highlights the implications of the analysis.

Understanding changes in the spatial patterns of major city land uses can assist in the development of urban, infrastructure and local government policy.

The aim of this report is to provide key stakeholders with an evidence base on the spatial nature of changes in population, jobs and commuting flows in South East Queensland (SEQ), including the changes that have been occurring with respect to the relevant strategic planning goals. The research is being undertaken in the context of the Australian Government's increased involvement in urban policy and strategic planning issues in recent years, reflected in the establishment of the Major Cities Unit, the release of the *National Urban Policy* (Department of Infrastructure and Transport 2011), and the COAG Reform Council's review of capital city strategic planning systems (COAG Reform Council 2012).

The population in SEQ is heavily urbanised and is concentrated in Brisbane, the Gold Coast and Sunshine Coast. SEQ has experienced rapid and sustained high levels of growth over the past 30 years and continues to face significant population growth and infrastructure development pressures (Council of Mayors South East Queensland (COMSEQ) 2011). The *SEQ Regional Plan 2009–2031* identifies a projected increase in resident population from approximately 2.83 million people in 2006 to around 4.43 million people by 2031. During this projection period, it is anticipated that around 754 000 additional dwellings and a greater diversity in housing options will be needed within SEQ to accommodate the projected resident population.

Study area

SEQ is the most heavily urbanised area of Queensland and is the third most populous urban region in Australia. Historically, the region has experienced a dispersed, low-density pattern of urban development coupled with unevenly distributed settlements (Li 2009). The SEQ region stretches 240 kilometres from Noosa in the north to the Queensland-New South Wales border in the south and 140 kilometres west to Toowoomba.

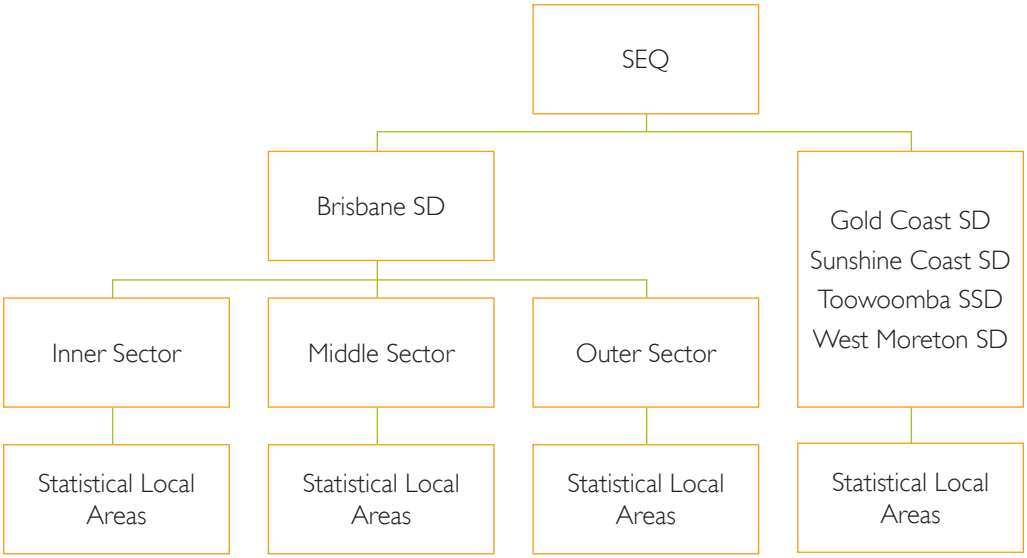
The SEQ region (see Figure 1.1) comprises the:

- Brisbane SD
- Gold Coast SD
- Sunshine Coast SD
- West Moreton SD
- Toowoomba Statistical Subdivision[12] (SSD).

The SEQ region includes land covered by 11 local government areas, as defined by the *South East Queensland Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009). These are: Brisbane City Council, Gold Coast City Council, Ipswich City Council, Lockyer Valley Regional Council, Logan City Council, Moreton Bay Regional Council, Redland City Council, Scenic Rim Regional Council, Somerset Regional Council, Sunshine Coast Regional Council and Toowoomba Regional Council (part of) (Queensland Government and COMSEQ 2009, p.5). Map 1.1 provides the boundary of the SEQ region. The boundaries for councils in Queensland were redefined in 2007 when the Queensland Government amalgamated local councils, reducing the number of councils from 156 to 72.

12 The portion of the Toowoomba Regional Council that falls within the SEQ Regional Plan area corresponds to the Toowoomba SSD, as defined in ABS (2006a), plus one census collection district covering Charlton Wellcamp (3141706). The Toowoomba SSD corresponds exactly to the Toowoomba Statistical District and extends beyond the Toowoomba urban area. Data for the Toowoomba SSD is used to approximate the in-scope area of Toowoomba Regional Council throughout this report.

Figure 1.1 Schematic diagram showing aggregate spatial units of the South East Queensland

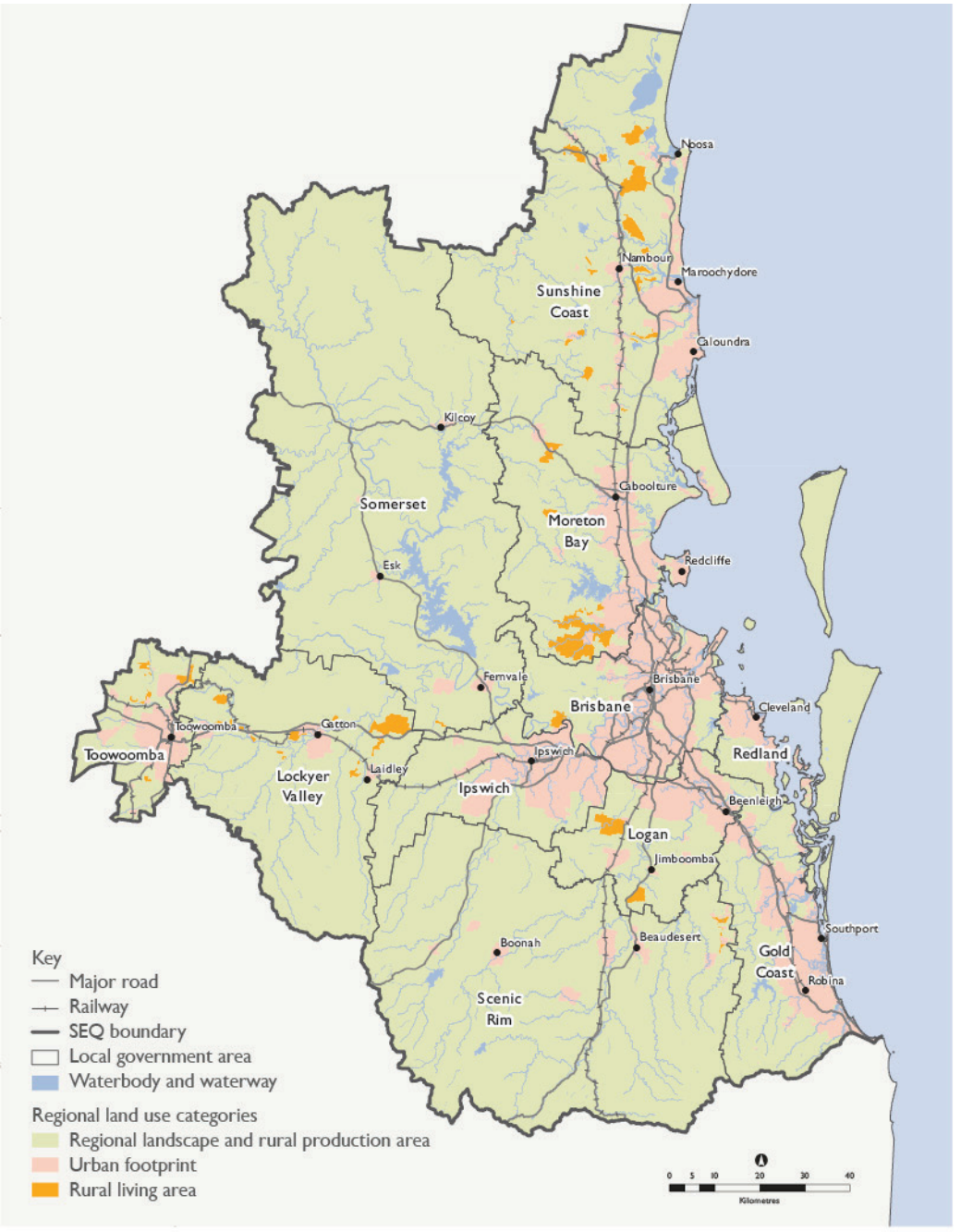


Source: BITRE analysis.

In the *SEQ Regional Plan 2005–2026*, only Toowoomba City was included in SEQ, and not the rest of the Toowoomba SSD. In the subsequent regional plan (i.e. *SEQ Regional Plan 2009–2031*), the boundary of SEQ was expanded to include additional growth areas around Toowoomba, including the Charlton Wellcamp industrial area, Highfields, Glenvale, Drayton and Darling Heights. The main reason behind this expansion was to accommodate long-term future growth of Toowoomba and surrounding areas, and better manage development. The present study adopts the expanded boundary for Toowoomba, which corresponds closely to the Toowoomba SSD.

In this study, BITRE adopts the definition of SEQ presented in the *SEQ Regional Plan 2009–2031*. For the purposes of undertaking statistical analysis of SEQ, this definition has been implemented using ABS 2006 Australian Standard Geographical Classification (ASGC) boundaries (ABS 2006a).

Map 1.1 South East Queensland land use categories



Note: This map is not intended for reference to specific parcels of land and to be treated as indicative only.

Source: *South East Queensland Regional Plan 2009–2031* (p.14).

Information sources

The approach followed is based on the previous investigations completed for Perth (BITRE 2010), Melbourne (BITRE 2011a) and Sydney (BITRE 2012a). The report uses the official population counts (i.e. *Estimated Resident Population* data) and detailed data from the Australian Bureau of Statistics (ABS) *Census of Population and Housing* for 2001 and 2006 to answer the following research question:

> 'What are the recent spatial changes in employment and residential patterns in the largest capital cities and how has commuting behaviour responded?'

The period of interest for this study is the period from 2001 to 2011. However, the principal focus of this series of four cities reports—covering Sydney, Melbourne, Perth and SEQ—is the 2001 to 2006 period for which detailed spatial data is available from the ABS *Census of Population and Housing*. Information on post-2006 change has been incorporated from a range of sources, while information on longer term trends is also incorporated to put current changes into their historical context.

Note that this report does not incorporate any information from the 2011 ABS *Census of Population and Housing,* since the relevant data items were not available at the time the spatial analysis was undertaken.[13] BITRE's comparative report—which will bring together results from the Sydney, Melbourne, Perth and SEQ studies—will include some high-level results from the 2011 census. BITRE also intends to produce a series of short information sheets during 2013 which will use 2011 census data to shed light on recent trends in employment, industry, housing and transport in Australia's major cities.

The datasets examined for the SEQ study are a combination of published and unpublished data, and include:

- *Estimated Resident Population* (ERP) from the March 2012 release of ABS' *Regional Population Growth Australia* (ABS Cat. 3218.0)
- Census data from the ABS' Basic Community Profile, Time Series Profile, Working Population Profile, and ABS' Tablebuilder 2006 and CDATA 2001 software
- Customised unpublished census data from ABS on employment, industry, skills, transport use and commuting flows
- ABS dwelling approvals data, including the detailed time series data available from the Office of Economic and Statistical Research (OESR) website and OESR customised data provided on request
- SEQ *Household Travel Survey* customised unpublished data for 2004, 2007 and 2009
- Outputs from the Queensland Government's South East Queensland Strategic Transport Multi-Modal Model relating to the distance between origin-destination pairs
- Other Queensland Government data sources—OESR population projections, lot registrations and median lot size data and Queensland Rail Passenger Load Survey.

Many of the capital city Central Business District (CBD) councils and state governments have undertaken similar, and sometimes more in-depth, analysis of patterns of residential and jobs

13 The 2011 *Census of Population and Housing* data on employment, industry, transport mode and commuting in SEQ was released during October and November 2012.

growth for their own city. Several studies discuss aspects of population, employment, transport and commuting in Brisbane and also in parts of SEQ (e.g. Li, Corcoran et al. 2012, Trendle and Siu 2007, and Marinelli, Cleary et al. 2010). BITRE's multi-city study will add value by jointly considering spatial patterns of population, employment and commuting growth, by bringing together the different cities on a comparable basis, and highlighting commonalities and differences in the ways the cities are evolving over time.

While the *Census of Population and Housing* and ERP data are the two main information sources, BITRE's study also uses a range of government and academic literature:

- An overview of the planning system and key strategic plans for SEQ is provided in Chapter Two. BITRE's analysis includes reference to the goals of recent strategic plans and compares the actual outcomes in terms of spatial patterns of population and job growth to the expressed goals.
- The report also makes reference to reviews of strategic planning for SEQ. Some academics are critical of metropolitan plans for paying insufficient attention to the reality of the economic and social trends shaping our cities. This study identifies those economic trends, and their spatial implications, which will be of benefit for future planning initiatives.
- Published material on past and projected population growth, job growth, commuting flows and transport usage is incorporated, where relevant.

Geography

This study divides SEQ into two aggregate spatial units–the Brisbane Statistical Division (SD) and the rest of the SEQ region. The rest of the SEQ region comprises the Gold Coast SD, Sunshine Coast SD, West Moreton SD and Toowoomba Statistical Subdivision (SSD) (Table 1.1). This report will on occasion disaggregate the Brisbane SD into further sectors and subregions as shown in Table 1.1 (also see Map 1.2).

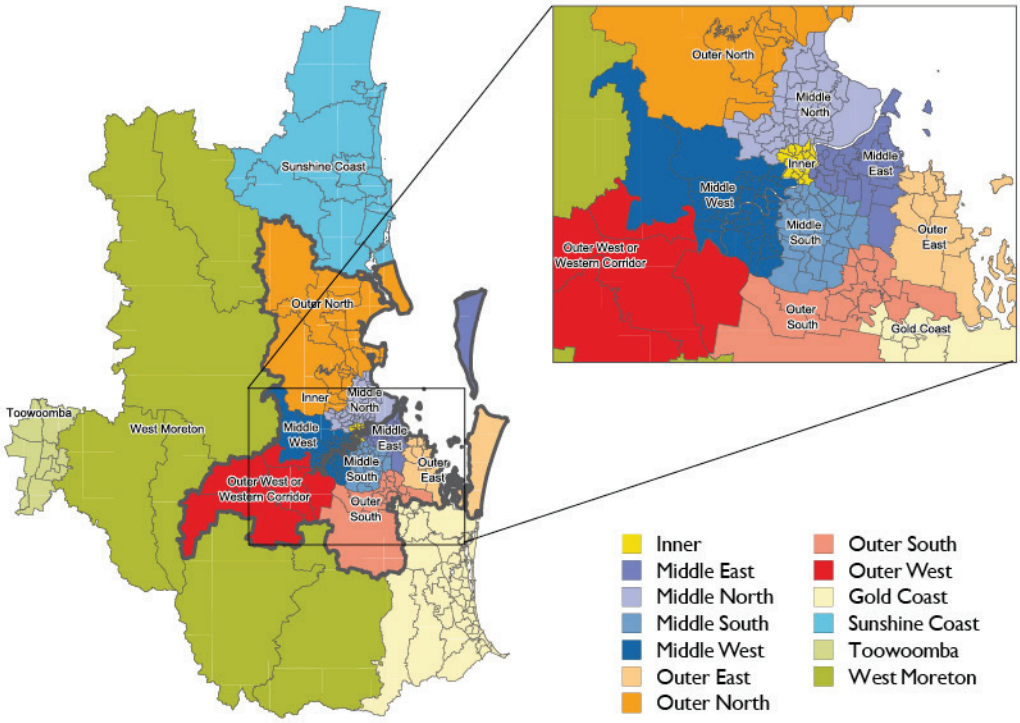
This classification provides a sector or ring structure of Brisbane, and is similar to those that have been utilised for BITRE's other cities studies. The Inner and Middle sectors of the Brisbane SD together correspond to the City of Brisbane Local Government Area (LGA).

Table 1.1 Geography of South East Queensland

South East Queensland (SEQ)	Statistical Local Area
Brisbane SD region	
Inner sector	City Inner, Bowen Hills, Woolloongabba, South Brisbane, etc
Middle sector	
Subregions	
Middle East	East Brisbane, Bulimba, Carindale, Manly, etc.
Middle North	Chermside, Bardon, Enoggera, Clayfield, etc.
Middle South	Annerley, Mount Gravatt, Archerfield, Sunnybank, etc.
Middle West	Toowong, Indooroopilly, Moggill, Wacol, etc.
Outer sector	
Subregions	
Outer East	Redland Bay, Ormiston, Cleveland, etc.
Outer North	Caboolture Central, Hills District, Lawnton, etc.
Outer South	Loganlea, Marsden, Underwood, etc.
Outer West	Ipswich Central, Ipswich East, Ipswich North, etc.
The rest of SEQ	
Gold Coast *region*	Varsity Lakes, Robina, Southport, etc.
Sunshine Coast *region*	Caloundra–Kawana, Maroochy–Nambour, Noosa–Tewantin, etc.
Toowoomba *region*	Toowoomba Central, Toowoomba South-East, Rosalie Part A, etc.
West Moreton *region*	Laidley, Gatton, Boonah, Beaudesert Part C, etc.

Note: The BITRE-defined Toowoomba region includes only part of the Toowoomba Regional Council.
Source: BITRE analysis of ABS 2006 ASGC boundaries.

Map 1.2 South East Queensland, sectors and subregions



Notes: The Brisbane SD (black boundary) is classified into Inner, Middle and Outer sectors. Middle sector consists of Middle East, Middle North, Middle South and Middle West subregions, shown in various shades of blue. Outer sector consists of Outer East, Outer North, Outer South and Outer West subregions, shown in various shades of red and orange.

Source: BITRE analysis of ASGC 2006 boundaries.

The sectors are based on the ABS' Statistical Region Sectors; however, they differ in several respects as demonstrated in Table 1.2. The complete classification of SLAs to SEQ and its component regions, sectors and subregions is detailed in Appendix A.

Table 1.2 Brisbane Statistical Division subregions and corresponding Statistical Region Sectors

Brisbane SD subregions	Corresponding ABS Statistical Region Sectors
Inner	City Core
Middle	
Middle East	Eastern Inner, Eastern Outer
Middle North	Northern Inner, Northern Outer
Middle South	Southern Inner, Southern Outer
Middle West	Western Inner, Western Outer
Outer	
Outer East	Redland Shire
Outer North	Pine Rivers Shire, Redcliffe City, Caboolture Shire
Outer South	Logan City, Beaudesert Shire Part A
Outer West	Ipswich City

Source: BITRE analysis of ASGC 2006 boundaries.

The SEQ geographical area (as defined in the *SEQ Regional Plan 2009–2031*) will be the focus of this report; however, some adjoining areas will also be examined where necessary. For example the Tweed area in NSW and areas surrounding the Toowoomba SSD are relevant, as they have strong commuter links to the Gold Coast SD and Toowoomba SSD, respectively. These additional areas form part of the Gold Coast-Tweed working zone and the Toowoomba working zone and are part of BITRE's working zone classification[14] (BITRE 2009).

This study adopts 2006 ASGC boundaries (ABS 2006a) and the majority of analysis is undertaken at the SLA scale. There were numerous boundary changes within SEQ between 2001 and 2006. Where specific concordance information is available (such as for population), data is directly concorded to 2006 boundaries. In other cases, aggregate SLA regions are constructed to allow for consistent comparison of data over time.

Results from this study will be compared with results from the studies of Perth, Melbourne and Sydney. The SEQ region consists of 291 SLAs, with the Brisbane SD containing 215 SLAs (according to the 2006 ASGC). In contrast the Perth SD has 38 SLAs, the Melbourne SD has 91 SLAs and the Sydney SD has 64 SLAs.

Thus, the spatial analysis in this report is presented at a range of different levels of disaggregation, to convey an understanding of both the overarching patterns and some of the finer detail. The adopted geographies include the SEQ region, Brisbane Statistical Division (SD), the inner, middle and outer sectors, subregions, Statistical Local Areas (SLAs), centres, census collection districts, and travel zones.

14 There are approximately 400 working zones across the country, which represent economic functional units. These working zones are constructed through analysis of the commuting patterns revealed in the 2006 ABS *Census of Population and Housing*.

Structure of the report

Chapter 2 of this report provides an overview of the urban planning system for SEQ. This is followed by a spatial analysis of residential growth between 2001 and 2011 in Chapter 3. Chapter 4 focuses on the spatial dimensions of employment within SEQ, while the location and growth of different industries is examined in Chapter 5. Spatial differences in car, public transport and other transport mode usage are then considered in Chapter 6. This is followed by an investigation of existing commuting flows and changes in these commuter flows. Chapter 8 considers the relationship of changes in commuting flows to population growth, job growth and other key drivers. Chapter 9 explores the implications of the available spatial projections of population and jobs for future commuting patterns in SEQ, while Chapter 10 provides an overview of the main findings.

CHAPTER 2
Strategic planning

Key points

- Key players in the planning system for South East Queensland (SEQ) include the Minister for Planning, the SEQ Regional Planning Committee, the Department of State Development, Infrastructure and Planning, the Council of Mayors SEQ, and local councils.
- The most recent strategic plans for SEQ are the *SEQ Regional Plan 2009–2031* (released in 2009), the *SEQ Regional Plan 2005–2026* (from 2005) and the *Regional Framework for Growth Management for SEQ 2000* (from 2000).
- The *SEQ Regional Plan 2009–2031* was supported by several other initiatives, most notably *Connecting SEQ 2031—An Integrated Regional Transport Plan for South East Queensland* (2011) and the *Queensland Infrastructure Plan* (2011). It contributes to the broader strategic vision for the State, as articulated in the former government's *Towards Q2—Tomorrow's Queensland* (2008).
- Reviews have identified the strengths of the SEQ strategic planning system as the robust mechanisms to support integration and infrastructure delivery, and the record of engagement and cooperation between state and local governments. These reviews have also identified a need for improved accountability, openness and performance measurement systems.
- The three most recent strategic plans have a number of goals that relate to the spatial distribution of population and employment, or to commuting patterns and transport use. These include limiting urban sprawl, locating infill development and job growth in centres, achieving population and job growth in the Western Corridor, promoting public transport and active transport use, and reducing commuting times and distances. This study will analyse the changes that have occurred against these planning goals since 2001.
- There is a high degree of consistency across the three most recent SEQ regional plans with regard to their population, employment, transport and commuting related objectives. However, strategic planning goals relating to the location of different industries changed significantly over the period. Other key changes include the introduction of a statutory basis for regional planning, an urban footprint and a new activity centres hierarchy in the 2005 plan, revisions to the SEQ boundary, changes to infill and density targets, and an increased focus on concentrating growth in the west and reducing the length of commuting trips.
- Following the change of government in March 2012, a range of changes are being made to the Queensland planning system. A review of the *SEQ Regional Plan 2009–2031* is expected to commence in 2013.

The planning system

This section describes the planning system that was in place in Queensland prior to the election of the Liberal National Party (LNP) Government in March 2012. The new State Government is in the process of making a range of changes to the Queensland planning system, which are summarised in Box 2.1.

Box 2.1 The new Queensland Government

The 2012 Queensland state election was held on 24 March 2012 and the Liberal National Party (LNP), led by Campbell Newman, won the election.

One of the five pledges made by LNP before the election was to deliver better infrastructure and better planning (DSDIP 2012a, Liberal National Party 2012). Other pledges include:

- growing a four pillar economy through focussing on Tourism, Resources, Agriculture and Construction
- lowering the cost of living for families
- revitalising frontline services for families
- restoring accountability in government.

On the public transport front, there were election commitments to improved train frequency, upgrading key rail crossings, reducing the cost of commuting and fairer fares for commuters.

The *First 100 Day Action Plan* commenced the Queensland Government's strategy to get Queensland back on track (Liberal National Party 2012). The report card for the first 100 days notes that:

- Infrastructure Queensland has been established to advise the State Government on long term infrastructure planning, prioritisation and maintenance.
- Projects Queensland has been established within Queensland Treasury to drive cooperative funding models to maximise private investment in Queensland's infrastructure.
- Discounted weekly fares were reintroduced for regular commuters on buses, trains and ferries from 25 June 2012. Commuters now receive free travel after nine journeys in a week.
- The process to identify state planning powers that could be transferred to local government has commenced. In particular, the government has commenced transferring state planning powers back to councils from the Urban Land Development Authority (Queensland Government 2012).

The 2012–2013 Queensland Government Budget announced several government initiatives that relate to the scope of this BITRE study:

- First Home Owner Construction Grant of $15 000 for people buying their first home either off the plan or newly constructed.
- The previous Government's scheduled increases in South East Queensland public transport fares for 2013 and 2014 have been halved.
- The government committed to continuing to fund the development of the Gold Coast Rapid Transit Project as well as the Moreton Bay Rail Link (Nicholls 2012).

Recently, work commenced on a new business and innovation precinct at Northshore Hamilton, which is expected to become a new employment hub for Brisbane (Seeney 2012a).

The *Sustainable Planning Act* 2009[15] (Department of State Development, Infrastructure and Planning 2012a) has been amended to identify state planning powers that can be transferred to local governments to better empower them to plan for their communities. The *Sustainable Planning and Other Legislation Amendment Bill 2012* (Bill) introduced seven key amendments and was passed by the Queensland Parliament on 13 November 2012 (Queensland Parliament 2012). The Minister's media release stated that the Bill is aimed at 'restoring efficiency and consistency to Queensland's planning and development system' (Seeney 2012b).

Queensland's planning, development and building system is called 'Qplan'. The *Sustainable Planning Act 2009* provides the legislative foundation of Qplan, outlining the principal tools used in the system. Qplan encompasses the full range of planning instruments, from state planning policies and regional plans, down to the local government planning schemes and building codes (Major Cities Unit 2011, Cairns Regional Council 2009).

The *Sustainable Planning Act 2009* (SPA) is the principal piece of planning legislation in Queensland. It replaced the *Integrated Planning Act 1997* (IPA), which in turn replaced the *Local Government (Planning and Environment) Act 1990*. The introduction of the SPA reflects a shift in focus from individual development approvals towards longer term strategic planning. Lamb (2010, p.24) notes that the introduction of the SPA 'provides the State with more power and enables greater State influence and control over planning and development'. Recently, the SPA was amended by the *Sustainable Planning and Other Legislation Amendment Act 2012* (SPOLAA) which commenced on 17 February 2012. SPOLAA is the result of the first regular review of the SPA and the amendments aim to clarify, simplify or improve operational arrangements (DSDIP 2012b).

Under the SPA there are four types of state planning instruments (Lamb 2010):

- State planning regulatory provisions are instruments that regulate development in order to support regional planning or master planning, protect areas from adverse impacts, or provide for infrastructure charges. They can apply to all or part of the state, and override

15 The *Sustainable Planning Act 2009* is the foundation of Queensland's planning and development assessment system, which replaced the previous *Integrated Planning Act 1997*. The *Sustainable Planning Act 2009* sets out the laws and the tools to manage land use planning. Strategic components of the system include Regional Plans and State Planning Policies.

other state planning policies and local planning instruments. The most well-known regulatory provisions are those which implement the South East Queensland (SEQ) Regional Plan by allocating land to particular areas (such as the urban footprint) and restricting development in certain areas.

- Regional plans provide an integrated planning policy for a region, identifying the goals for the region (including the desired future spatial structure) and the policies for achieving those desired outcomes. Regional plans are developed by the Queensland Government in conjunction with local government, the community and other stakeholders. Development undertaken within the area covered by a regional plan must align with the strategic direction outlined in the regional plan, and so local governments are required to amend their planning schemes to ensure consistency with the relevant regional plan. Regional plans are usurped only by regulatory provisions. The SEQ Regional Plan is discussed in more detail later in this chapter.
- State planning policies express the state's position about a particular issue related to development, and override local planning instruments where there is an inconsistency.
- The Queensland Planning Provisions provide a consistent format and structure for local government planning schemes in Queensland.

The Queensland planning system is administered at several levels. The following list shows the principal institutions and their roles and responsibilities (focusing on SEQ):

- The Minister for Planning is ultimately responsible for administering the SPA and for oversight of strategic planning. The Minister is responsible for making state planning instruments and declaring master planned areas, and has the power to make certain directions about development applications and to call in a development application which affects a state interest (Lamb 2010).
- The SEQ Regional Planning Committee (RPC)—and its predecessor the Regional Coordination Committee (RCC)—advise on the content and implementation of the SEQ Regional Plan. The RPC is chaired by the Minister for Planning, and consists of relevant State Ministers, selected local government Mayors and a Commonwealth representative (Australian Centre for Excellence in Local Government (ACELG) 2011).
- The Department of State Development, Infrastructure and Planning (DSDIP) works closely with state agencies, local government and other stakeholders to plan for growth and infrastructure provision in Queensland, to maintain a high quality of life and facilitate sustainable development (DSDIP 2012c). The Department manages urban and regional planning as well as infrastructure planning. The state's Coordinator General sits on the Board of Management of DSDIP, has statutory planning powers over major projects and is principally focused on facilitating and regulating private sector infrastructure projects (Department of Employment, Economic Development and Innovation 2012).
- The Council of Mayors South East Queensland (COMSEQ) consists of the mayors of 10 local government areas in SEQ. It seeks to represent the interests of SEQ to state and federal governments and examine strategic issues affecting the region, working closely with the Queensland Government to deliver the SEQ Regional Plan (COMSEQ 2012a). Prior to its formation in 2005, local governments in SEQ were represented via the South East Queensland Regional Organisation of Councils (SEQROC).

- Local governments are responsible for subdivisions, local plan preparation and approval, and processing of development applications (Productivity Commission 2011). Councils prepare planning schemes that articulate a strategic direction for their local government area and describe how and where development should occur in more detail. These planning schemes need to align with the strategic direction of the relevant regional plan and with state planning instruments and the Queensland Planning Provisions, and must be approved by the Minister for Planning (Major Cities Unit 2011). Local governments are also responsible for preparing structure plans for declared master planned sites, which are typically greenfield sites (DSDIP 2012d).
- The Urban Land Development Authority (ULDA) was established in 2007 by the Queensland Government to plan, co-ordinate and deliver commercially viable development of land in selected areas, with a focus on delivering diverse, affordable and sustainable housing. It is responsible for planning and assessing development applications in declared areas, and in some instances acts as a developer (ULDA 2012). The ULDA originally undertook this role at inner metropolitan sites suitable for higher density redevelopment, but in 2010 the Queensland Government expanded its role to include major 'greenfield' developments in the outer suburbs (Johnstone 2010). In SEQ, the current designated areas include both urban infill sites (i.e. Woolloongabba, Bowen Hills, Hamilton and Fitzgibbon) and greenfield sites (i.e. Ripley Valley, Yarrabilba, Greater Flagstone, Caloundra South) (ULDA 2012). The new LNP Government is transferring the functions of the ULDA to a new body (called Economic Development Queensland, which has been created and commenced from 1 February 2013) and to local councils (see Box 2.1, ULDA 2013).

Strategic planning for South East Queensland

Regional strategic planning plays a key role in helping Queensland meet the challenges associated with managing rapid growth, population change, economic development, protecting the environment and infrastructure provision, across multiple local government areas. The regional plan is a framework to achieve good planning, management and development in the region (Queensland Government and COMSEQ 2009, p.151). Regional plans are developed in partnership with local councils, the community and stakeholders, which identify:

- desired regional outcomes
- policies and actions for achieving these desired regional outcomes
- the future regional land use pattern
- regional infrastructure provision to service the future regional land use pattern
- key regional environmental, economic and cultural resources to be preserved, maintained or developed.

The current expansion of Queensland's system of regional planning can be traced back to 1990. The newly elected Goss Labour Government responded to public concern about urban sprawl, environmental damage and high population growth in SEQ by calling a summit to discuss how to tackle these problems (Regional Planning Advisory Group 1993). This led to a cooperative non-statutory approach to SEQ regional planning, which was in place from 1990 to 2003, and supported the *SEQ 2001 Regional Framework for Growth Management* (RFGM) and its updates. According to England (2010, p.61), 'the regional framework plan, on

its own, was an inadequate response to the pace of development in SEQ'. Public and political concern about the continuation of unplanned growth and acceleration of urban sprawl led to the amendment of the IPA in 2004 to provide a statutory basis for regional planning, and the establishment of the Office of Urban Management (Heywood 2008). In 2005, Queensland's first statutory plan was released—*South East Queensland Regional Plan 2005–2026*. It was replaced by the *South East Queensland Regional Plan 2009–2031* in 2009.

The overarching objective of the current regional plan is to achieve 'a future for SEQ which is sustainable, affordable, prosperous, liveable and resilient to climate change' (Queensland Government and COMSEQ 2009, p.10). The *SEQ Regional Plan 2009–2031* contributes to the broader strategic vision for the State, as outlined in *Towards Q2—Tomorrow's Queensland* (2008), where the Queensland Government sets out its ambitions for a strong, green, smart, healthy and fair Queensland by 2020 (Queensland Government 2008a). The regional plan is supported by the regularly updated Infrastructure Plan and a number of other plans, such as the transport plan, *Connecting SEQ 2031—An Integrated Regional Transport Plan for South East Queensland* (Department of Transport and Main Roads 2011a).

The regional plans inform local planning. For example, in the City of Brisbane Local Government Area (LGA), the *Brisbane City Plan 2000* provides 'a comprehensive statement of council's intentions for the future development of Brisbane' which is consistent with and advances the principles of the RFGM 1998 (Brisbane City Council 2000, pp. 3, 6). A new draft Brisbane City Plan has recently been produced (Brisbane City Council 2013).

This section provides a brief overview of the strategic regional planning documents developed over the years for SEQ, focusing on:

- *Regional Framework for Growth Management for SEQ 2000*
- *South East Queensland Regional Plan 2005–2026*
- *South East Queensland Regional Plan 2009–2031*.

South East Queensland Regional Framework for Growth Management

The significant pressures arising from the rapid population growth of the late 1980s to early 1990s led the State government to commission a growth management process—the SEQ 2001 RFGM project. This non-statutory project was initiated by a 1990 conference and covered an area of twenty local governments, including Brisbane, Ipswich and the Gold Coast (Lambert et. al. 1995).

The main purpose of the SEQ 2001 regional planning exercise was to develop strategies to manage future growth in SEQ. The specific objectives were to:

- integrate state, regional and local planning
- introduce a more participative process, which besides federal, state and local government representatives, included business, unions, professional, environmental and welfare groups
- establish a process that was more responsive and more relevant to local and regional circumstances, especially in the area of growth management (Hartley and Higgins 1993).

Queensland State cabinet decided to establish a Regional Planning Advisory Group (RPAG), chaired by the then Deputy Premier, tasked with developing policies for growth management and making provision for ongoing growth. The RPAG established five working groups which

were responsible for analysing 15 major project areas, and producing position papers and policy papers for these project areas. RPAG prepared policy advice for government based on all available information and drafted the *RFGM for SEQ* (RPAG 1994). It presented a preferred indicative growth pattern plan for the development of the Brisbane-SEQ region to the year 2011, and outlined institutional and implementation arrangements (Stimson and Taylor 1999).

The RFGM 1994 was regarded by local governments as a draft plan awaiting testing (Abbott 2012). In 1994, the SEQ RCC assumed authority for RFGM implementation and review (Gleeson et al 2004). It prepared the *SEQ RFGM 1995* (RCC 1995), which was the first to be formally endorsed by federal, state and local governments (Abbott 2012).

The 1996 to 2000 period involved consolidation and implementation of this voluntary and non-statutory growth management approach, including production of several RFGM updates (Abbott 2012). The *RFGM for SEQ 2000* (RCC 2000) was released in December 2000 at a conference held to mark ten years of voluntary regional growth management in SEQ. The RFGM 2000 is guided by six overall objectives: environmental sustainability, economic development, self-containment of employment and population, support major centres, increase residential densities and improve public transport (Gleeson et. al. 2007). Table 2.1 lists the high-level sections and objectives of the RFGM 2000 that relate to population, jobs and commuting in SEQ. Each is supported by a statement of principles and a set of priority actions that identifies the responsible agencies.

Dodson (2009, p.8) points out that 'implementation of the RFGM relied on the cooperation of its constituent municipalities which each had their own growth management concerns and imperatives that didn't necessarily cohere with those pressing at the regional scale. The result was a strategic spatial scheme which lacked the overarching governance capacity to act strategically'.

At the ten year conference, a comprehensive three year review of the RFGM was announced. By early 2004, following a decade of voluntary regional planning initiatives in SEQ, state and local governments agreed to move to a statutory basis for regional planning (Abbott 2012).

Table 2.1 Selected principles and objectives for the South East Queensland Regional Framework for Growth Management

Section	Objective
Urban growth	To establish a pattern of development for the year 2016 which utilises land efficiently and in accordance with social and environmental objectives
	To identify suitable areas for urban expansions to 2016 and a pattern which provides flexibility for expansion beyond 2016
Residential development	To provide a variety of residential densities and living environments
Major centres	To establish a network of major centres which serve the economic, employment, social and environmental needs of the region
Economic development and employment location	To improve the relationship between home and work locations
	To generate sustainable high quality employment and the income necessary to improve living standards by expanding, diversifying and internationalising the SEQ economy
Livability	To ensure SEQ is known for its livability, natural environment and economic viability
Transport	To improve the functioning of existing and future transport networks and facilities in terms of accessibility, costs and environmental impacts

Source: Regional Coordination Committee (2000).

South East Queensland Regional Plan 2005–2026

In 2004, a media campaign in *The Courier Mail* helped to make urban containment and regional planning a hot electoral issue (England 2010). Returning to office, the Beattie government established the Office of Urban Management (OUM). The IPA was also amended in 2004 to provide a statutory, or legal, basis for regional planning, and to ensure the primacy of the regional plan over other planning documents (ibid).

The *SEQ Regional Plan 2005–2026*, released in June 2005, provides an agreed policy position by the Queensland Government and SEQ local governments on growth management in the region through to 2026. It is the first statutory regional planning document for SEQ and provides a framework for managing growth, land use and development in the region (England 2010). The overarching objective is to achieve 'a future for SEQ which is sustainable, affordable, prosperous and liveable' (Queensland Government and SEQROC 2005, p.9).

The *SEQ Regional Plan 2005–2026* identified that the projected population increase, combined with the continuing trend towards smaller households, will require an estimated 575 000 new dwellings (amended to 580 000 in 2006) in the region by 2026 (ibid., p.7). The plan set targets by local government area for increasing the proportion of new dwellings provided through infill or redevelopment to achieve an aggregate target of 40 per cent of all new dwellings constructed in the region between 2004 and 2016, increasing to 50 per cent between 2016 and 2026 (ibid., p.65). The plan identified an 'urban footprint' as a means of controlling unplanned urban expansion. It aimed to locate an increased proportion of the region's population and economic growth in the Western Corridor, thus reducing pressure on the coast. The increased population in SEQ was projected to generate demand for around 425 000 new jobs by 2026 (ibid., p.7).

Key features of the SEQ Regional Plan's approach to managing this growth were:

- clearly identifying and protecting regional landscape and rural production areas from inappropriate development
- allocating adequate land to accommodate future urban growth
- supporting growth in the Western Corridor
- defining principles and policies to guide growth, change and development
- using Regulatory Provisions to prevent development that is not consistent with the intent of the Regional Plan
- ensuring the Regional Plan is the pre-eminent plan for SEQ and is reflected in all other State and local government plans and strategies
- giving direction to the Infrastructure Plan regarding the provision and investigation of regional infrastructure
- linking the Regional Plan with state infrastructure and service delivery programs and budgetary processes
- informing local government infrastructure programs and budgets, and providing certainty to the private sector (ibid., p.8).

The *SEQ Infrastructure Plan and Program 2005–2026*, released earlier in 2005, was a key supporting document for the *SEQ Regional Plan 2005–2026*. The Infrastructure Plan was updated annually.

South East Queensland Regional Plan 2009–2031

In 2008, the Queensland Government commenced a review of the *SEQ Regional Plan 2005–2026* to respond to important growth management issues that had emerged since its release. These issues include continued high population growth, housing affordability pressures, transport congestion, koala protection and climate change (Hinchcliffe 2009).

A draft of the *SEQ Regional Plan 2009–2031* was released by the regional planning Minister on 7 December 2008 and was open for public consultation until 1 May 2009. The final plan and the associated regulatory provisions were released on 28 July 2009. This plan supersedes the previous *SEQ Regional Plan 2005–2026*. The plan and its regulatory provisions are administered by the Department of State Development, Infrastructure and Planning. It was established under the IPA, which has now been replaced by the SPA.

The *SEQ Regional Plan 2009–2031* is designed to guide regional growth and development in SEQ, and to protect the region from 'inappropriate urban development' (Queensland Government and COMSEQ 2009, p. 1). It aims to balance population growth with the need to protect the lifestyle that residents of SEQ value and enjoy (Hinchcliffe 2009).

The *SEQ Regional Plan 2009–2031* divides all land into three categories—'urban footprint', 'rural living area', and 'regional landscape and rural production area'. Some revisions were made to the urban footprint which is intended to provide 'a clear boundary to stop urban sprawl and protect our natural environment, whilst providing enough land for anticipated population growth' through to 2031 (Queensland Government and COMSEQ 2009, p. 1).

The plan anticipates the SEQ population will grow to reach 4.4 million by 2031, requiring an additional 754 000 dwellings. It allocates these additional dwellings to Local Government Areas (LGAs) based on the following principles:

- 'relieving pressures on the coast
- redistributing growth to the Western Corridor
- promoting infill in existing centres
- redeveloping "infrastructure-rich" areas
- maximising residential yield in major new residential developments' (ibid., p.9).

The *SEQ Regional Plan 2009–2031* contributes to the broader strategic vision for the State, as outlined in *Towards Q2—Tomorrow's Queensland* (Queensland Government 2008a) 'by protecting greenspace and supporting a sustainable environment' (ibid., p. 1).

The *SEQ Regional Plan 2009–2031* was supported by the *South East Queensland Infrastructure Plan and Program 2010–2031* (SEQIPP) (2010). It outlined estimated infrastructure investment across SEQ to 2031. SEQIPP has since been replaced by the *Queensland Infrastructure Plan—Building Tomorrow's Queensland* (2011), which is a blueprint to guide the state's infrastructure priorities over the coming decades. The Infrastructure Plan is updated annually and the strategic priorities for SEQ in the Infrastructure Plan mirror those in the SEQ Regional Plan (COAG Reform Council 2012).

The guiding transport planning and policy document, which supports the desired outcomes of the regional plan, is *Connecting SEQ 2031—An Integrated Regional Transport Plan for South East Queensland* (Department of Transport and Main Roads 2011a). This is a 20-year regional

transport plan that serves the long-term needs of the people living, working, recreating and conducting business in SEQ (Department of Transport and Main Roads 2011a). It targets a doubling of the public transport and active transport mode shares between 2006 and 2031 (to 14 and 10 per cent, respectively) (ibid., p.4).

The implementation of the *SEQ Regional Plan 2009–2031* is also supported by several other initiatives, including:

- Draft SEQ Climate Change Management Plan
- SEQ Rural Futures Strategy
- SEQ Natural Resource Management Plan.

Details of the content of the *SEQ Regional Plan 2009–2031* are provided later in this chapter.

Comparison of plans

The key changes between the *SEQ Regional Plan 2005–2026* and the *SEQ Regional Plan 2009–2031* include:

- extending the plan period from 2026 to 2031
- expanding the SEQ boundary to include some additional growth areas near Toowoomba (e.g. the Charlton-Wellcamp industrial area)
- updating SEQ's indicative planning population from 3.8 million by 2026 to 4.4 million people by 2031
- increasing the new dwellings target from 575 000[16] (between 2004 and 2026) to 754 000 additional dwellings (between 2006 and 2031)
- setting a minimum yield of 15 dwellings per hectare for new residential development in 'development areas'
- revisions to the urban footprint, including both additions and deletions
- regulatory changes to allow medium scale economic and tourist development outside of the urban footprint.

The SEQ RFGM 2000 was less detailed than subsequent plans, but pursued goals that were qualitatively very similar. A detailed comparison of selected objectives of these three plans is presented later in this chapter (see Table 2.8).

Key elements of *South East Queensland Regional Plan 2009–2031*

This section describes some key elements of the *SEQ Regional Plan 2009–2031* in greater depth, namely the accommodation of future growth, activity centres, infrastructure planning, and the underlying governance framework.

16 In 2006, this was amended to 580 000 additional dwellings.

Accommodating future growth

SEQ is facing a significant challenge in managing rapid population growth while maintaining the region's liveability, productivity, and overall sustainability. According to the *SEQ Regional Plan 2009–2031*, the indicative planning population of SEQ is expected to increase from 2.8 million in 2006 to 4.4 million in 2031, with a target of an additional 754 000 dwellings between 2006 and 2031 (Table 2.2). Urban development capacity is provided within the urban footprint (Queensland Government and COMSEQ 2009, p.97).

Table 2.2 Indicative planning populations and additional dwelling targets of the *SEQ Regional Plan 2009–2031* by Local Government Area, 2031

LGA	Indicative planning population	Additional dwellings targets
Brisbane	1 270 000	156 000
Gold Coast	749 000	143 000
Ipswich	435 000	118 000
Logan	434 000	70 000
Moreton Bay	513 000	84 000
Redland	169 000	21 000
Sunshine Coast	497 000	98 000
Toowoomba Statistical Subdivision	197 000	31 000
Western councils^	166 000	33 000
SEQ	4 430 000	754 000

Notes: More up to date projections are available in OESR (2011a, 2012b). Chapter 9 presents the latest available projections of population and dwellings.

^ Includes Lockyer Valley, Scenic Rim and Somerset LGAs.

Source: *SEQ Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009).

This future growth will impose significant social, economic and environmental pressures on the region. To manage this future growth, without increasing the urban footprint, the regional plan promotes compact settlement by:

- consolidating growth in existing urban areas, particularly in activity centres on high frequency public transport corridors
- increasing density in broad-hectare developments to a minimum of 15 dwellings per hectare.

The *SEQ Regional Plan 2009–2031* identifies development areas within the urban footprint which will be a key focus for accommodating regional dwelling and employment targets. Development areas are located across the region particularly in areas required to accommodate significant growth. The planning of development areas will facilitate ongoing delivery of residential development and job generation. The plan identifies two types of development areas—regional and local. Regional development areas are likely to require substantial state infrastructure and expected to achieve regionally significant dwelling and employment yields, while local development areas are significant for the delivery of dwelling targets and employment for particular local government areas. Table 2.3 shows the development areas within the urban footprint in SEQ.

Table 2.3 Development areas within the urban footprint, South East Queensland

Residential	Employment	Residential and employment
Regional development areas		
Nil	Ebenezer (Ipswich)	Ripley Valley (Ipswich)
	Bromelton (Scenic Rim)	Caloundra South (Sunshine Coast)
	Elimbah East (Moreton Bay)	Palmview (Sunshine Coast)
		Park Ridge (Logan)
		Flagstone (Logan)
		Coomera (Gold Coast)
		Maroochydore (Sunshine Coast)
		Yarrabilba North (Logan)
Local development areas		
Kinross Road (Redland)	Gatton North (Lockyer Valley)	Nambour (Sunshine Coast)
South East Thornlands (Redland)	Steiglitz (Gold Coast)	Narangba (Moreton Bay)
Bahrs Scrub (Logan)		Greenbank Central (Logan)
Canungra (Scenic Rim)		
Beaudesert (Scenic Rim)		
Victoria Point (Redland)		

Source: *SEQ Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009, p.107).

Identified Growth Areas (IGAs) are areas which will not be required to accommodate projected growth to 2031, but will be considered for future urban development beyond the life of the plan. Table 2.4 shows the IGAs in SEQ. Note that there are no IGAs in the Brisbane LGA.

The *SEQ Regional Plan 2009–2031* does not include employment estimates or forecasts, and does not outline specific targets for employment growth within SEQ. Instead, it requires local government to identify needs for each subregion when preparing strategic frameworks to ensure that there is sufficient employment land across the subregion. The key goals that relate to the location of future employment growth are the goals of supporting economic development of the Western Corridor and locating employment within activity centres. There are several further goals that relate to the spatial distribution of industry growth within SEQ (see Table 2.8).

Table 2.4 Identified Growth Areas outside the urban footprint (within the regional landscape and rural production area), South East Queensland

LGA	Residential	Residential and employment	Employment
Gold Coast			Ormeau
Logan	New Beith-Round Mountain	Greenbank, Yarrabilba and Greater Flagstone	North Maclean
Sunshine Coast		Beerwah-Caloundra South Corridor and Caloundra South (Halls Creek)	Beerwah
Moreton Bay		Caboolture West	
Ipswich	Lanefield-Grandchester		Purga
Scenic Rim	Beaudesert South		Greater Bromelton
Toowoomba	Westbrook		

Source: *SEQ Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009, p.109).

Activity centres

Centre policies are designed to create areas which are centres for business, shopping, working, services and leisure. Part of the rationale for locating activities in centres is to improve accessibility and the efficient use of infrastructure, particularly public transport. However, the effectiveness of activity centre policies depends on their number, type, location, distribution and accessibility (Productivity Commission 2011, p.116).

Centre policies are a key mechanism for managing future population and employment growth in SEQ, and consolidating growth within the existing urban area. The *SEQ Regional Plan* 2009–2031 proposes a network of regional activity centres connected by quality public transport to create compact, self-contained and diverse communities. Regional activity centres are also a key land use element to create an efficient public transport system. To achieve these objectives, regional activity centres need to be more than retail and service providers. High to medium densities are considered appropriate in these precincts. In most cases the transit services will need to be improved to support transit oriented development and to reflect the role of these centres as key destinations that support large catchments.

The *SEQ Regional Plan 2009–2031* establishes a six-tiered network of activity centres, which includes existing and planned activity centres. The six centre types are: primary activity centre, principal regional activity centre, major regional activity centres, specialist activity centres, principal rural activity centres and major rural activity centres (Queensland Government and COMSEQ 2009, p.97). The designated principal and major regional activity centres comprise (ibid.,, p.103):

- traditional town centres undergoing renewal
- major regional shopping centres adapting to become more transit-oriented
- infill opportunities to expand existing centres
- new centres within Development Areas.

A list of regional activity centres in SEQ by type and LGA is provided in Table 2.5, while Table 2.6 summarises the general function of each of the activity centre types and Map 2.1 shows their geographic locations. The structure of this hierarchy was unchanged between the 2005 and 2009 regional plans, but the list of centres in the 2009 plan was more extensive. The SEQ RFGM 2000 was based on a completely different hierarchy, which identified a much smaller number of key metropolitan and regional centres.

Table 2.5 List of activity centres in South East Queensland by type and Local Government Area

LGA	Type	Activity centres
Brisbane	Primary	Brisbane CBD
	Principal	Chermside, Indooroopilly, Carindale, Upper Mt Gravatt
	Major	Toombul, Mitchelton, Wynnum Central, Toowong
	Specialist	University of Queensland, Brisbane Airport, Nathan/Mount Gravatt, Herston/Kelvin Grove, Boggo Road/Buranda
Gold Coast	Principal	Southport, Robina
	Major	Coomera, Helensvale, Nerang, Surfers Paradise, Bundall, Broadbeach, Coolangatta
	Specialist	Gold Coast University Hospital Precinct, Gold Coast Airport
Sunshine Coast	Principal	Maroochydore
	Major	Noosa, Nambour, Kawana, Caloundra, Sippy Downs, Caloundra South, Beerwah
	Specialist	Sunshine Coast Airport
Moreton Bay	Principal	Caboolture–Morayfield
	Major	North Lakes, Strathpine, Redcliffe
Logan	Principal	Springwood, Beenleigh
	Major	Logan Central, Browns Plains, Logan Hyperdome, Yarrabilba, Flagstone, Jimboombab
Redland	Principal	Capalaba and Cleveland
Ipswich	Principal	Ipswich, Springfield
	Major	Goodna, Ripley
	Specialist	Amberley Airbase
Western councils[a]	Principal	Beaudesert[b], Gatton[b]
	Major	Boonah, Esk, Fernvale, Kilcoy, Laidley
Toowoomba	Principal	Toowoomba

Notes: [a] Western councils include Lockyer Valley, Scenic Rim and Somerset regional councils.

[b] Rural activity centres.

Source: *SEQ Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009, pp. 17, 19, 21, 24, 26, 30, 32, 34, 36) and Ireland and Williamson (2011).

Table 2.6 Functions of activity centres, South East Queensland, 2009–2031

Category	Specific activity centres	Functions
Primary activity centre	Brisbane CBD[a]	• Focus of government administration, retail, commercial, and specialised personal and professional services • Accommodates cultural, entertainment, health and education facilities of state, national and international significance • Provides distinct commercial, legal, government, retail, community and entertainment precincts • Focus of the region's radial public transport system • Highest employment mix and density • Should be acknowledged and supported with appropriate forms of development and services
Principal regional activity centres	Springwood, Ipswich, Southport, Chermside, Maroochydore, Cleveland, Capalaba, Beenleigh, Caboolture/Morayfield, Indooroopilly, Robina, Upper Mount Gravatt, Carindale, Springfield, Toowoomba	• Serve catchments of regional significance • Accommodate key employment concentrations • Serve business, major comparison and convenience retail, and service uses • Provide a secondary administrative focus, accommodating regional offices of health, education, cultural and entertainment facilities • Serve as key focal points for regional employment and in-centre regional development • Existing or planned, dedicated public transport, including rail, bus or light rail, and comprise key nodes in the regional public transport system • Residential development densities should be around 40–120 dwellings per hectare (net) or greater
Major regional activity centres	Coomera, Helensvale, Coolangatta, Surfers Paradise, Nerang, Caloundra, Caloundra South, Bundall, Toombul, Toowong, Broadbeach, Noosa, Sippy Downs, Nambour, Beerwah, Kawana, North Lakes, Redcliffe, Strathpine, Mitchelton, Wynnum Central, Browns Plains, Logan Central, Logan Hyperdome, Flagstone, Yarrabilba, Goodna, Ripley	• Complement the principal regional activity centres by serving catchments of sub-regional significance and accommodating key employment concentrations • Provide business, service, and major retail and convenience functions • Accommodate district or branch offices of government facilities, and cultural and entertainment facilities of regional significance • Typically located around key suburban or inter-urban public transport stops, and provide frequent public transport services to link the centre to surrounding communities • Residential development densities should be around 30–80 dwellings per hectare (net) or greater
Specialist activity centres	Brisbane Airport, Boggo Road/ Buranda, Herston/ Kelvin Grove, University of Queensland, Amberley Airbase, Nathan/Mount Gravatt, Gold Coast University Hospital Precinct, Gold Coast Airport, Sunshine Coast Airport	• Primary focus for specialised economic activity, employment or education rather than having a retail function • Core emphasis in high levels of trip generation
Principal rural activity centres	Gatton, Beaudesert	• Important service and community hubs in rural areas • Support a sub-regional rural catchment and contain concentrated rural services and also commercial, retail, government and community activities

(continued)

Table 2.6 Functions of activity centres, South East Queensland, 2009–2031 *(continued)*

Category	Specific activity centres	Functions
Major rural activity centres	Jimboomba, Boonah, Laidley, Esk, Kilcoy, Fernvale	• Provide more than one function to the surrounding rural catchment • Provide concentrated retail, commercial, community and some government services

Note: [a] The role of Brisbane's CBD as the primary activity centre has expanded over time into the surrounding frame area (including Fortitude Valley, Spring Hill, Milton, Albion, Newstead, Woolloongabba, Bowen Hills, South Brisbane and West End).

Source: *SEQ Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009) and Ireland and Williamson (2011).

The *SEQ Regional Plan 2009–2031* encourages that 'centres should be planned as activity centres, not just shopping centres, and provide for high-yielding employment uses as well as retail and residential land uses' (Queensland Government and COMSEQ 2009, p.100). This is to be achieved by:

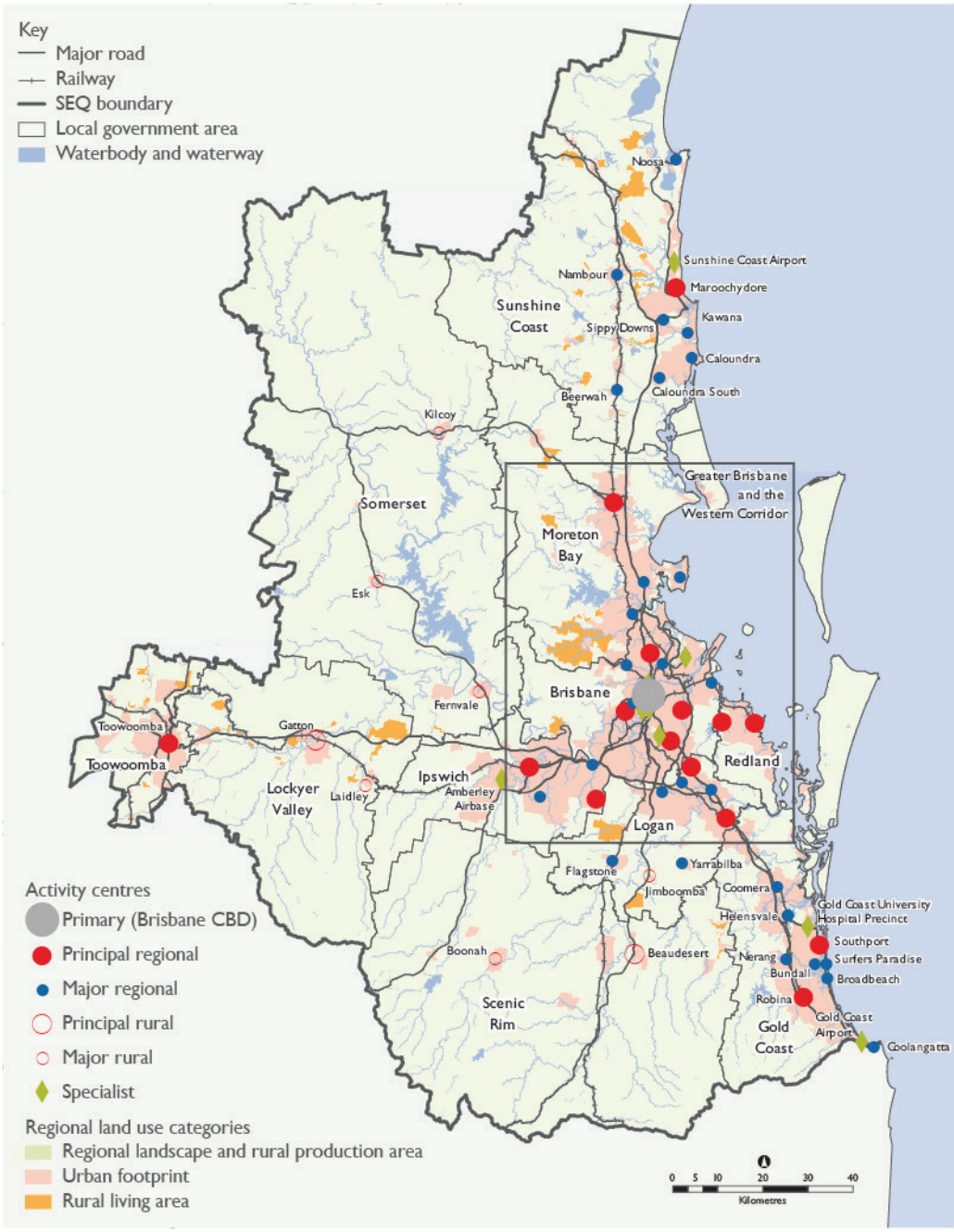
- incorporating a range of land uses into activity centres
- developing new centres with street-fronting retail layouts instead of enclosed or parking-lot dominant retail formats
- ensuring centres include attractive public areas that support social interaction and active lifestyles
- transforming activity centres that are dominated by enclosed retail into a main-street format as redevelopment occurs (ibid., p.100).

Out of centre development is considered 'inconsistent with the SEQ Regional Plan's strategic intent, as it can diminish the vitality of activity centres and detract from economic growth by diluting public and private investment in centre-related activities, facilities and infrastructure' (ibid., p.96). Thus, there is a policy to '[e]xclude out-of-centre land use and development that would detrimentally impact on activity centres' (ibid., p.96).

Ireland and Williamson (2011) examined the network of activity centres in the SEQ Regional Plan and the underlying principles that relate to the development of those activity centres. The authors concluded that '[w]hile the existing centres are not necessarily true activity centres in that in many instances they do not have the complete range of uses now contemplated by the SEQ Regional Plan, it will take some time before we see whether the types of activity centres sought by the SEQ Regional Plan are able to satisfy the commercial requirements of institutional owners. The prescriptive nature of some of the policies about activity centres, and in particular those relating to Principles 8.7 and 8.8, have the potential to act as a major disincentive to investment in Queensland' (ibid., p.6).

Map 2.1 Activity centres network in South East Queensland and Greater Brisbane

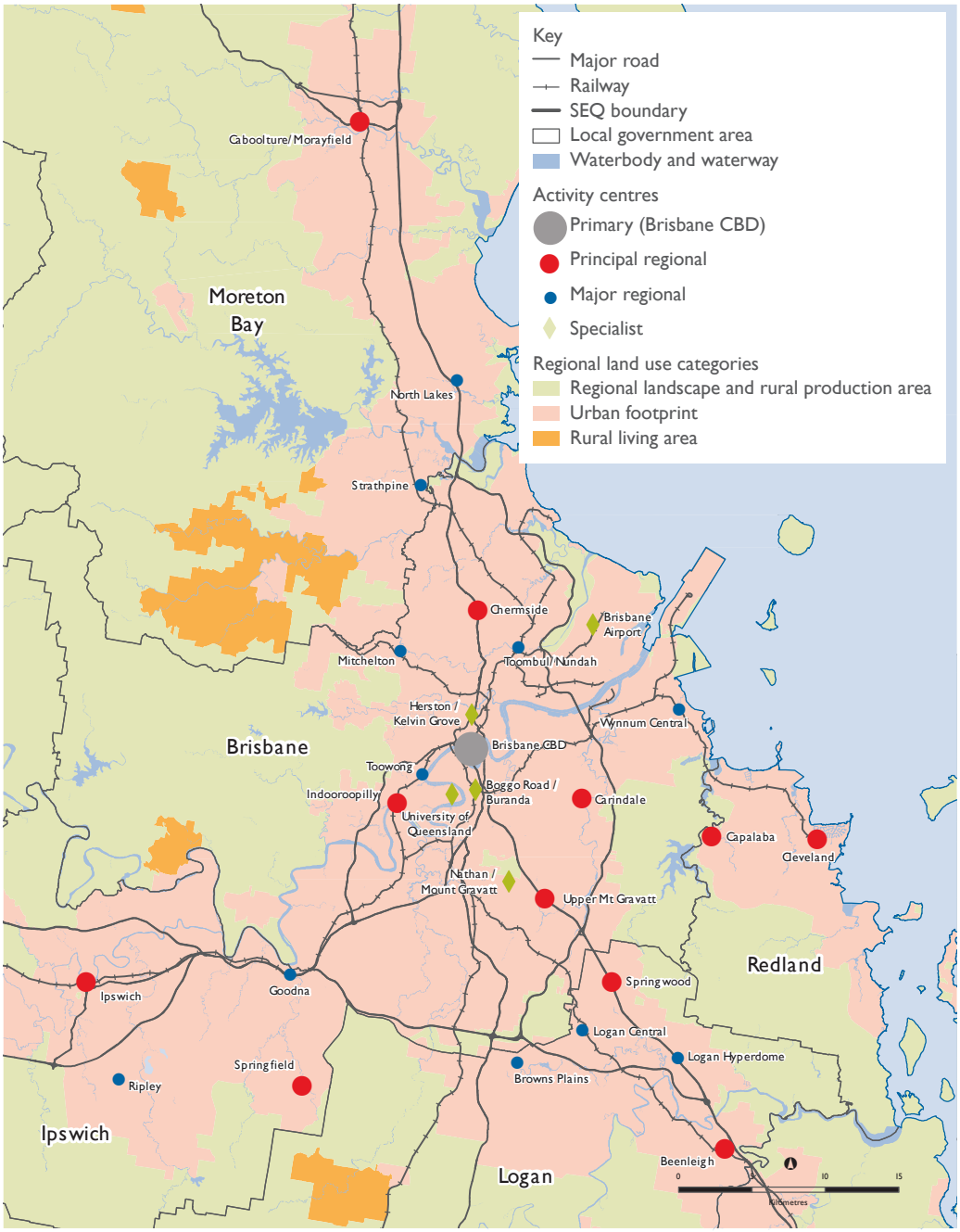
a) South East Queensland



(continued)

Map 2.1 Activity centres network in South East Queensland and Greater Brisbane *(continued)*

b) Greater Brisbane



Note: This map is not intended for reference to specific parcels of land and to be treated as indicative only.

Source: *SEQ Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009, pp. 98–99).

Infrastructure planning

The release of the initial *SEQ Infrastructure Plan and Program (SEQIPP)* 2005–2026 'marked a distinctive shift in the approach to metropolitan infrastructure planning in Australian cities' (Dodson 2009, p.9). It extended beyond the usual transport, energy and water infrastructure, to also include communications and social infrastructure, such as hospitals and schools. The plan included a detailed list of projects, including costs and implementation timeframes (ibid).

The SEQIPP was reviewed annually between 2006 and 2010 in association with the state budget (Abbott 2012). The scale of the planned 20-year infrastructure spend grew significantly between 2005 and 2010 (ibid). Dodson (2009) notes that the 2008 update of the SEQIPP was a much lengthier document than the 2005 plan, involving a broader range of community services infrastructure and an escalation in the spending commitment from $32 billion to $107 billion. Major new transport infrastructure projects (e.g. a Brisbane underground rail system) and water infrastructure projects were introduced (ibid).

In 2011, the SEQIPP was replaced by the *Queensland Infrastructure Plan*. The key SEQ infrastructure projects identified in the 2011 plan included the Gold Coast Rapid Transit, Cross River Rail (followed by a Brisbane subway system), Queensland Children's Hospital, Airport Link, Moreton Bay Rail Link and the Gold Coast University Hospital (Bligh 2011). Following the change of government in early 2012, Infrastructure Queensland has been established to advise on future infrastructure priorities.

The Brisbane City Council has increasingly initiated and sponsored major transport infrastructure projects in SEQ, most notably the TransApex scheme of road, tunnel and bridge projects (Dodson 2009). According to Dodson et. al. (2010, p.197), 'as with the busways, the Brisbane tunnels indicate the problems of a large and entrepreneurial municipality pressuring, leading and in some instances almost dominating, a state government. This phenomenon is unique in Australia'. Gleeson et. al. (2010) identify an 'emerging tendency for infrastructure production to dominate land-use planning' and highlight the risk that 'a continuation of project led planning is likely to contribute to the overcentralisation of employment and transport networks in SEQ' (ibid., p.11).

Governance framework

The concept of governance refers to the 'use of institutions, structures of authority and other bodies to establish policies and rules, to allocate resources for implementation and to coordinate and control the resulting activities' (Productivity Commission 2011, p.358).

Innovative metropolitan regional planning and 'collaborative governance'[17] arrangements have been evolving in SEQ since the early 1990s (Abbott 2012). Planning is carried out on a metropolitan-wide basis—the formal governance structure for the SEQ region consists of the 11 local governments, the State government and the Commonwealth government (ACELG 2011). Nevertheless, the SEQ Regional Plan 'is a "creature" of state administration' (Gleeson et. al. 2010, p.2). Technical work on the preparation of the SEQ Regional Plan is typically undertaken by the state planning department, and the plan is formally made by the Minister for Planning (ACELG 2011).

Governments work together on regional planning matters through the SEQ RPC, and through other regional and sub-regional sectoral committees. The SEQ RPC oversees the preparation and implementation of the SEQ Regional Plan, and consists of eight relevant State Ministers, five senior local government Mayors and a Commonwealth representative. Community, business and environmental groups are not directly represented on the RPC, but are active in regional planning consultation processes and are represented on various sub-committees that report to the RPC, State agencies and local governments (ibid).

Local governments cooperate through the Council of Mayors (COMSEQ) and through numerous other regional and sub-regional arrangements and projects. COMSEQ is a cooperative group of mayors from the councils in SEQ which works closely with the Queensland Government to examine strategic issues affecting the region and also to deliver the SEQ Regional Plan.

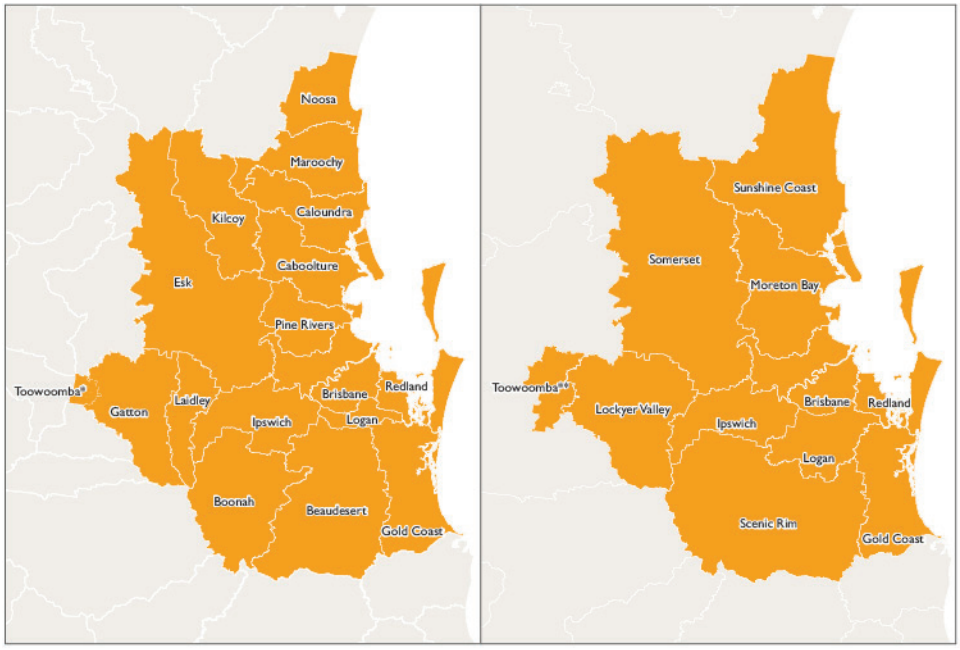
In 2008, the Queensland Government completed a substantial local government reform program, which involved amalgamating councils to form regional councils. The amalgamations in March 2008 created much larger LGAs in SEQ (some of the largest in Australia), which are expected to have a better capacity to undertake planning, development assessment, asset creation and management. Map 2.2 shows how these changes in local government boundaries affected the SEQ region.

Abbott (2012) outlines collaboration of state and local governments in metropolitan planning in SEQ between 1990 and 2010 and also the process by which governance and planning in SEQ evolved, by agreement of all the parties, from a voluntary model to a statutory model of metropolitan planning. The study identifies some implications for ongoing governance and planning in SEQ. He concluded that '[g]overnance in SEQ has occurred through negotiation between independent actors in a collaborative process with generally high levels of trust and commitment. This has delivered significant positive outputs and outcomes' (ibid., p.7).

17 According to Ansell and Gash (2008), collaborative governance is a 'governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets' (ibid., p.544).
Emerson et. al. (2012) define collaborative governance as '[t]he processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished' (ibid., pp. 1–2).
The definition of Emerson et. al. (2012) is broader than that of Ansell and Gash (2008) in that it does not limit collaborative governance to processes involving government and non-government stakeholders, but can also include partnerships among governments or multi-partner governance (Emerson et. al. 2012, p.3). It focuses on all types of engagement and not just consensus based engagement (Abbott 2012).

Map 2.2 Local Government Areas pre- and post-restructuring, South East Queensland

a) Pre-restructuring b) Post-restructuring



Note: * denotes Toowoomba City, while ** denotes Toowoomba Statistical Sub-division (SSD).
Source: Adopted from Australian Centre of Excellence for Local Government (ACELG) (2011).

Gleeson et. al. (2010) considers metropolitan governance in the Australian context. The authors point out that 'good governance must guide and enact the planning of safe urban trajectories', but based on case studies of Brisbane and Melbourne, conclude that the 'present urban governance mechanisms are deeply compromised and under resourced and therefore cannot play this role' (ibid., p.15).

Reviews of recent metropolitan strategic plans

Recently, COAG Reform Council (2012) reviewed the strategic planning system for SEQ against nine criteria and made the following high level findings:

- 'the Queensland planning system has robust mechanisms to support cross-government coordination and implementation. The "line of sight" concept provides a useful means for articulating and driving vertical integration—the link between strategic visions/goals and actions on the ground' (ibid., p.6). In addition, the SEQ Regional Planning Committee and Growth Management Queensland have both been designed to promote cross-government communication, policy coordination and implementation of the SEQ Regional Plan (ibid., p.134).
- '[w]hile the Queensland planning system has strong integration mechanisms, the same cannot be said about its accountability and performance measurement systems. For

example, a set of performance indicators that are clearly linked to the goals and outcomes of the Regional Plan is yet to be developed' (ibid., p.6).

Table 2.7 presents the findings and key points against each criterion for SEQ.

According to an earlier cross-city comparison of the capital city strategic planning systems (KPMG 2010), Brisbane performed comparatively strongly, ranking second behind Melbourne. KPMG (2010) highlighted the strengths for Brisbane as including the integrated approach to planning and infrastructure, and the wide engagement with the community and other levels of government through the Growth Summit. Areas identified as needing improvement included performance reporting and planning for infill development. It also noted that 'implementation of plans and policies are sometimes at odds with each other such as the inconsistency between the plans for growth in South East Queensland and the draft Queensland Koala Conservation Strategy' (KPMG 2010, p.8).

Productivity Commission (2011, p.198) identifies Queensland as one of the best placed jurisdictions for infrastructure delivery (along with Victoria and South Australia) due to 'detailed infrastructure plans with a level of committed funding from the state budget and a committed delivery timeframe' and 'scope to apply alternative planning processes to infrastructure projects'. Productivity Commission (2011) identifies Queensland as having more cooperative relationships between state government and councils than the other states, based on a survey of local government. However, Queensland did not compare as well on openness, with only a limited subset of state-level strategic planning information being made available on the internet (ibid., p.413).

A cross-city comparison undertaken by Bunker and Searle (2009, p.113) noted that '[i]n South East Queensland, local governments and regional groups have been closely involved in the long process of plan formation and this and the relative strength of Brisbane City Council vis-à-vis the state government may explain why the strategy is somewhat less prescriptive than is the case with Sydney and Melbourne.'

Table 2.7 Council of Australian Governments Reform Council's findings of consistency against the criteria for South East Queensland

Criterion	Finding	Key points
1. Integration	Largely consistent	• Clear hierarchy of unifying goals, supported by 'line of sight' approach. • The SEQ Regional Planning Committee and Growth Management Queensland support cross- government communication, policy coordination and implementation.
2. Hierarchy of plans	Consistent	• Queensland has a clear hierarchy of long, medium and near term plans for SEQ. • All plans are consistent and are supported by the 'line of sight' approach.
3. Nationally significant infrastructure	Largely consistent	• The Queensland Infrastructure Plan provides a ten year State-wide pipeline of project priorities, including projects of national significance. • Queensland Infrastructure Plan provides for major investments in road, rail and port infrastructure that support the Regional Growth Strategy.

(continued)

Table 2.7 Council of Australian Governments Reform Council's findings of consistency against the criteria for South East Queensland *(continued)*

Criterion	Finding	Key points
4. Nationally significant policy issues	Largely consistent	• Evidence of serious policy analysis on most issues, particularly: - population growth - efficient development and use of existing and new infrastructure - development of major urban corridors • Least convincingly dealt with: - demographic change - productivity and global competitiveness - connectivity of people to jobs and markets. • Monitoring and review is the weakest element. • Generally demonstrates strong policy content and process for most issues that relate to infrastructure.
5. Capital city networks	Consistent	• Networks and connections are identified in main strategic plans for SEQ. The Queensland Infrastructure Plan reflects a state-wide approach to network planning. • The Queensland Regionalisation Strategy shows strong intent to strengthen capital city networks. • The Queensland Infrastructure Plan reflects a state-wide approach to network planning.
6. Planning for future growth	Consistent	• Mechanisms to provide for planned, sequenced and evidence-based land release are in place.
7. Investment priorities and frameworks	Partially consistent	• Priorities for investment are clearly articulated in the Queensland Infrastructure Plan and SEQ Regional Plan. • Priorities for policy effort, outside of infrastructure, are less clearly articulated. This relates to the lack of implementation timelines in the SEQ Regional Plan. • Reform efforts, at this stage, are focused only on specific components of the planning system.
8. Urban design and architecture	Partially consistent	• Reliance on voluntary use of design guidelines. • Design advice on a wide range of strategic projects but is reliant on the willingness of project proponents.
9a. Accountability, timelines and performance measures	Partially consistent	• No public assignment of responsibility for implementation and outcomes. • The content and public availability of reporting on implementation is unknown. • Indicators for the next State of the Region Report are not clear from the plan.
9b. Intergovernmental coordination	Consistent	• SEQ Planning Committee includes local and Commonwealth Government representation. • Line of sight principle aligns goals and is reinforced by statutory requirements. • Local and Commonwealth government priorities reflected in the Queensland Infrastructure Plan and SEQ Regional Plan.
9c. Evaluation and review cycles	Consistent	• Periodic review and evaluation of plans. • The reviews are used to revise strategic plans and reflect shifting needs and priorities.
9d. Appropriate consultation and engagement	Partially consistent	• Consultation and engagement is largely of an informative nature. • Way to Grow and Building Revival Forum are genuine attempts to engage with stakeholders outside formal plan making processes and on an ongoing basis.

Source: COAG Reform Council (2012), pp. 135–147.

Gleeson et. al. (2010) considers governance of Melbourne and SEQ, concluding the *SEQ Regional Plan 2009–2031* is 'innovative in that it outlines a strategy for metropolitan scale infrastructure enhancement that is closely linked to the land development blueprint for the same region' (ibid., p.2). The authors also identify several issues with the current SEQ model:

- The Brisbane City Council's unusual influence over regional development patterns and policy priorities, particularly in transport planning
- The increasing dominance of infrastructure schemes over planning schemes
- An absence of mechanisms to deliver on structural planning goals, such as centres policy.

Margerum (2002) evaluated the SEQ RFGM process and identified its strengths as including the genuine collaborative approach (with state and local government committing significant staff resources) and the extensive data gathering for the region. Identified weaknesses included limited opportunities for input from the general public, the concentration of power in the highest-level committees, and the inability to achieve consensus on several issues, such as the regional open space system proposal, and density guidelines and future commercial centres in the northern subregion. Gleeson et. al. (2007) highlighted the absence of strong implementation levers and the superficial reviews. The Centre for Policy and Development Systems (1994) identified some further concerns, such as the limited economic basis, the presumption that rapid population growth was inevitable, and unrealistic financing assumptions.

Overall, the Queensland planning system has robust mechanisms to support integration and infrastructure delivery, as well as a record of engagement and cooperation between state and local governments. However, there is considerable scope for improved accountability, openness and performance measurement systems.

Strategic planning objectives of relevance to this study

This section identifies the regional planning goals that specifically relate to the spatial distribution of population and jobs and to commuting patterns in SEQ.

The present BITRE study relates to the 2001 to 2011 period. The SEQ RFGM was the operational strategic plan prior to 2005, while the *SEQ Regional Plan 2005–2026* was in place from 2005 to 2009, and the *SEQ Regional Plan 2009–2031* has been the operational strategic plan since its release in mid-2009. BITRE's analysis of strategic planning objectives for the 2001 to 2011 period considers all three of these regional plans. Greatest attention is given to the most recent plan—*SEQ Regional Plan 2009–2031*—and evaluating how recent spatial trends relate to its expressed spatial vision for SEQ through to 2031.

The scope of these regional plans extends well beyond the scope of this study. Table 2.8 identifies the detailed strategic planning goals which are of most relevance to the present study, grouping them into 14 broad strategic planning goals that relate to either:

- the spatial distribution of the residential population
- the spatial distribution of jobs and industry
- commuter flows and transport use.

Although a similar number of objectives are identified for each of these fields in Table 2.8, the population-related objectives are a much more prominent feature of recent SEQ regional plans than are the employment, transport and commuting objectives. Only a handful of the listed objectives include quantitative targets.

For most of the objectives listed in Table 2.8, there was little or no change between the expression of that objective in the *SEQ Regional Plan 2005–2026* and the *SEQ Regional Plan 2009–2031*. However, there were some changes of note:

- the targets for 'limiting urban sprawl' have changed
- as of the 2009 plan, residential growth is to be redistributed to the South Western Corridor, as well as the Western Corridor
- the three industry location goals differ between the two regional plans—'relocate manufacturing and logistics employment from Inner Brisbane' was a new introduction in the 2009 regional plan, while the remaining two goals have evolved into a significantly different form
- the most recent plan has a greater focus on reducing travel times and distances, as a means of reducing greenhouse gas emissions and responding to oil supply vulnerability.

The SEQ RFGM 2000 uses somewhat different language to the two more recent regional plans, but Table 2.8 makes it clear that the goals being pursued were fundamentally very similar. Key differences include:

- the absence of an urban footprint
- the absence of quantitative infill and density targets
- a different activity centres hierarchy
- much less of a focus on concentrating growth in the Western Corridor
- the inclusion of quantitative targets for the public transport mode share[18].

Table 2.8 Summary of the South East Queensland regional planning objectives of relevance to this study

Broad objective	Detailed objectives from SEQ Regional Framework for Growth Management (2000)	Detailed objectives from *SEQ Regional Plan 2005–2026* (2005)	Detailed objectives from *SEQ Regional Plan 2009–2031* (2009)
Spatial patterns of residential development—Chapter 3			
Limit urban sprawl	The pattern of development in SEQ should reduce encroachment on the natural environment. Accommodate an increased proportion of population growth within existing urban areas through redevelopment and infill. Increase residential densities in new areas (pp. 25, 46, 52).	Contain urban development within the urban footprint. Accommodate a higher proportion of new dwellings through infill and redevelopment of existing urban areas—targeting 40 per cent between 2004 and 2016 and 50 per cent between 2016 and 2026. Maximise residential yield in major new residential developments (pp. 61, 65).	Concentrate urban development within the urban footprint. Accommodate a higher proportion of new dwellings through infill and redevelopment of existing urban areas—at least 50 per cent through to 2031. Achieve a minimum dwelling yield of 15 dwellings per hectare (net) for new residential development in Development Areas (pp. 90–91).

(continued)

18 While *SEQ Regional Plan 2009–2031* does not specify quantitative mode share targets, it is underpinned by the transport plan, *Connecting SEQ 2031*, which details targets for the public transport and active transport mode share in 2031.

Table 2.8 Summary of the South East Queensland regional planning objectives of relevance to this study *(continued)*

Broad objective	Detailed objectives from SEQ Regional Framework for Growth Management (2000)	Detailed objectives from *SEQ Regional Plan 2005–2026* (2005)	Detailed objectives from *SEQ Regional Plan 2009–2031* (2009)
Promote infill housing and higher densities in centres	Residential densities should be increased around major centres (p.51).	Focus higher density residential development in and around regional activity centres. Residential densities should be at least 40–120 dwellings per hectare (net) in principal regional activity centres and 30–80 in major regional activity centres (pp. 65, 72).	Focus higher density residential development in and around regional activity centres. Residential densities should be at least 40–120 dwellings per hectare (net) in principal regional activity centres and 30–80 in major regional activity centres. Within the urban footprint, locate new development at activity centres and other locations with superior transportation choices (pp. 91, 97).
Consolidate rural population growth in existing towns and villages	Identification of new rural residential land should not occur without strong justification. Upgrade designated rural residential areas to a more intensive urban residential use (pp. 49, 53).	Consolidate future rural population growth around existing towns and villages. Limit areas allocated for rural residential development (pp. 48, 70).	Consolidate future rural population growth within existing towns and villages. Limit areas allocated for rural residential development (pp. 74, 110).
Redistribute residential growth to west, and away from coast	Priority should be given to encouraging development in the urban areas of Ipswich City (p.48).	Accommodate an increased proportion of SEQ's future population in the Western Corridor, reducing pressure on the coast (p.12).	Accommodate an increased proportion of SEQ's future population in the Western Corridor and South Western Corridor, reducing pressure on the coast (p.11).
Spatial patterns of jobs and industries—Chapters 4 and 5			
Locate employment in centres	Key metropolitan centres should be a focus for public and private employment growth. Location decisions concerning new major employers should be made in the context of centre policies (pp. 55, 60).	Maximise job creation in regional activity centres. Developments that provide concentrated employment opportunities should be located within activity centres (pp. 71, 90).	Focus employment in accessible regional activity centres (p. 96).
Achieve significant employment growth in Western Corridor	None	Attract increased economic growth and employment growth to the Western Corridor (pp. 12, 90).	Achieve significant employment growth in the Western Corridor. Initiate and implement projects that support economic development of the Western Corridor (pp. 112, 122).
Develop diversified subregional economies	Diversify the SEQ economy (p.60).	A future where communities have diverse employment opportunities. Maximise employment diversity in centres of economic activity (p. 9, 90).	Develop a diversified regional economy with each subregion that retains local jobs and builds on competitive advantages (p.112).
Locate government and office-based business employment outside the Brisbane CBD	Establish or move regional government offices into the key centres (p.57).	Locate suitable government employment activities of regional and sub-regional significance within regional activity centres (p.71).	Ensure that new state government facilities and employment activities are located within regional activity centres. Office-based businesses, government and community services jobs are needed in centres of the Sunshine Coast, Moreton Bay, Gold Coast, Ipswich, Toowoomba and Logan (pp. 96, 111).

(continued)

Table 2.8 Summary of the South East Queensland regional planning objectives of relevance to this study *(continued)*

Broad objective	Detailed objectives from SEQ Regional Framework for Growth Management (2000)	Detailed objectives from *SEQ Regional Plan 2005–2026* (2005)	Detailed objectives from *SEQ Regional Plan 2009–2031* (2009)
Relocate manufacturing and logistics employment from Inner Brisbane	None	None	Encourage the relocation of large-scale industrial, warehousing, transport and storage businesses from inner suburbs to less central locations, particularly on the Sunshine Coast, but also Ipswich, Moreton Bay, Gold Coast, Toowoomba, Scenic Rim, Lockyer Valley, Somerset and Logan (pp. 111, 122).
Commuter transport use and commuting flows—Chapters 6 and 7			
Promote public transport use	Significantly increase the proportion of people using public transport—10.5 per cent public transport mode share target for SEQ by 2011, plus subregional targets (pp. 84–85).	Support public transport use with new infrastructure, improved services and information (p.108).	Promote public transport use with new infrastructure, improved services and information^ (p.139).
Promote walking and cycling	Encourage increased use of cycling and walking (p.84).	Support walking and cycling with new infrastructure, improved services and information (p.108).	Promote walking and cycling through new infrastructure, improved services and information^ (p.139).
Concentrate residential and job growth around frequent public transport	New residential development should be located in areas with high accessibility to public transport. The pattern of development in SEQ should maximise the efficient use of public transport and minimise transport costs (pp. 51, 84).	Integrate development with transport infrastructure. Accommodate residential and employment growth in areas with good access to high frequency public transport. Ensure development of urban areas supports public transport use (pp. 75, 107).	Locate development around nodes or corridors where infrastructure capacity exists or can be created, prioritising locations with high levels of transit service frequency. Ensure that development supports the transport system^ (pp. 96, 102).
Increase self-containment within subregions	Improve the relationship between home and work locations. Encourage greater levels of self-containment (pp. 60, 84).	Promote the self-containment of travel in subregions (p.107).	Support greater levels of trip self-containment within subregions. Local governments to demonstrate employment self-containment in planning decisions (pp. 112, 141).
Reduce commuting times and distances	Employment will be close to where people live to reduce the need for residents to travel long distances in private vehicles. Reduce the extent of long distance commuting from rural areas (pp. 15, 60).	Develop a high quality public transport network that will reduce commuter travel time (p.108).	Reduce travel times and distances through urban consolidation. Reduce the length of trips by localising access to goods, services and employment opportunities. Develop a high quality public transport network that will reduce commuter travel time (pp. 12, 46, 145).

Note: ^ The SEQ Regional Plan's transport components are underpinned by the transport plan, *Connecting SEQ 2031* which contains further detail on these objectives.

Source: BITRE analysis of RCC (2000), Queensland Government and SEQROC (2005) and Queensland Government and COMSEQ (2009).

Most of these differences represent refinements and changes in emphasis, rather than major shifts in direction. Overall, there is a high degree of consistency across the three SEQ regional plans, in terms of their population, employment, transport and commuting related objectives. However, strategic planning goals relating to the location of different industries changed significantly over the period.

The planning objectives from Table 2.8 will be revisited in the chapters that follow, which will include analysis of the changes that have actually occurred against these objectives since 2001. These comparisons are not intended to evaluate the success of any particular regional plan. The purpose is to provide evidence about the reality of the trends that have been shaping the SEQ region, which can then be used to inform future planning initiatives.

In summary

This chapter discussed the planning system in SEQ and has provided an account of various regional planning processes and documents that were developed over the last couple of decades. Special attention has been given to the most recent strategic plan—*SEQ Regional Plan 2009–2031*—which is the major planning document for shaping SEQ over the next 20 years. Policies for accommodating future growth and activity centres were discussed in some detail, along with infrastructure planning, the governance framework and the key messages from past reviews of the SEQ strategic planning system.

The chapter concluded by identifying 14 broad strategic planning objectives for SEQ that relate to the spatial distribution of population, jobs and industry, or to commuting and transport use. These planning objectives will be revisited in the coming chapters, which will discuss recent trends against these objectives since 2001.

CHAPTER 3

Residential patterns and trends

Key points

- In 2006, over 64 per cent of the SEQ population lived in the Brisbane Statistical Division (SD), around 18 per cent in the Gold Coast region, 10 per cent in the Sunshine Coast region, and the rest in Toowoomba and West Moreton. Around 50 per cent of Brisbane's population lived in the Middle sector, 45 per cent in the Outer sector and only 5 per cent in the Inner sector.
- In 2011, the SEQ region had an estimated resident population (ERP) of 3.18 million and Brisbane had an ERP of nearly 2.03 million. This compares to the SEQ region's population of 1.11 million in 1971, when Brisbane had a population of around 870 000.
- Between 2001 and 2011, Brisbane's population increased by 2.2 per cent per annum, which was lower growth than SEQ as a whole (2.5 per cent per annum). The average annual population growth rate in Gold Coast was 3.3 per cent and 3.1 per cent in the Sunshine Coast.
- At the SLA scale, the most substantial population increases in Brisbane between 2001 and 2011 were in Ipswich East (29 681 persons), Griffin-Mango Hill (17 035 persons) and Ipswich Central (14 478 persons). Kingsholme-Upper Coomera (18 060 persons) and Maroochy–Buderim (15 858 persons) added the most population in the Gold Coast and Sunshine Coast, respectively.
- The proportion of Brisbane's population living between 5 and 15 kilometres from the CBD declined from 36.5 per cent in 2001 to 33.6 per cent in 2011, but the proportion living 15 to 45 kilometres away increased.
- The largest increases in population density between 2001 and 2011 were in inner city SLAs, such as Brisbane City Inner and Fortitude Valley.
- There was a shift towards higher density forms of housing being built in SEQ between 2001 and 2010. The stock of high rise flats, units and apartments in SEQ's centres expanded by 76 per cent between 2001 and 2006.
- Since 2001, there has been a partial redirection of SEQ's population growth away from the coast and towards the Western Corridor, and there are some indications that rural residential development is starting to be curtailed.
- The 2001 to 2011 period saw progress in controlling urban sprawl in SEQ, which was achieved by containing the great majority of residential development within the Urban Footprint, increasing residential densities in new detached housing developments, and

accommodating a higher than targeted proportion of growth through the infill and redevelopment of existing urban areas. However, the remaining non-infill development still involved the addition of at least 82 000 dwellings beyond the Existing Urban Area boundary.

Introduction

This chapter provides data on residential patterns and trends in terms of population and dwellings in South East Queensland (SEQ). The data are based on the boundary of SEQ, as defined in the *South East Queensland Regional Plan 2009–2031* (hereafter termed the *SEQ Regional Plan 2009–2031*).

The *SEQ Regional Plan 2009–2031* is the Queensland Government's long-term plan to manage growth and protect the region's lifestyle and environment. It provides a statutory basis to guide appropriate growth, change and development, and to prevent development inconsistent with the plan. This regional plan provides the following key planning directions for the SEQ region:

- Promote a compact urban form
- Identify an urban footprint, as a means to control urban expansion
- Allocate land to accommodate future urban growth
- Support growth in the Western Corridor
- Link the plan to state infrastructure and service delivery
- Inform local government infrastructure programs and budgets, and provide certainty to the private sector.

This chapter consists of three parts.

Firstly, this chapter provides a snapshot of the population distribution of SEQ as of 2006—the Australian Bureau of Statistics (ABS) census year was preferred over more recent Estimated Resident Population (ERP) data, as it allows some more spatially detailed analysis to be undertaken using census collection district data from the ABS' 2006 *Census of Population and Housing*. The ABS census data for 2011 was not available at the time this analysis was undertaken.

Secondly, a discussion of spatial patterns of population growth in SEQ is provided, focusing on the 2001 to 2011 period. This analysis is based on the March 2012 release of ERP data.

Finally, the chapter concludes with an analysis of the recent changes that have occurred with regard to the key regional planning goals that were elaborated in the *SEQ Regional Plan 2009–2031*.

Population snapshot in 2006

Population distribution

The ABS' Estimated Resident Population (ERP) for SEQ was 2.8 million in 2006, up from 2.5 million in 2001 (ABS 2012a). A summary of the total population of SEQ in 2006 is presented in Table 3.1. Brisbane's population accounts for 64.4 per cent of the total population

in SEQ, while Gold Coast and Sunshine Coast account for 18.3 per cent and 10.4 per cent, respectively, of the SEQ population. West Moreton's proportion is only 2.6 per cent, while Toowoomba contributes 4.3 per cent.

Table 3.1 Estimated resident population, South East Queensland, 2006

	Estimated Resident Population	Share of Brisbane population (per cent)	Share of SEQ population (per cent)	Area (km^2)	Population density (persons/ km^2)
Inner	88 327	4.9	3.1	28	3212
Middle	902 933	49.6	31.9	1 299	695
Middle East	162 361	8.9	5.7	355	457
Middle North	306 101	16.8	10.8	268	1144
Middle South	231 783	12.7	8.2	198	1170
Middle West	202 688	11.1	7.2	478	424
Outer	828 502	45.5	29.3	4 575	181
Outer East	131 210	7.2	4.6	537	244
Outer North	332 862	18.3	11.8	2 037	163
Outer South	220 684	12.1	7.8	797	277
Outer West	143 746	7.9	5.1	1 204	119
Brisbane region	1 819 762	100.0	64.4	5 901	308
Gold Coast region	518 178		18.3	1 870	277
Sunshine Coast region	295 084		10.4	3 125	94
Toowoomba region	121 861		4.3	554	131
West Moreton region	72 681		2.6	11 421	11
SEQ Total	2 827 566		100.0	22 871	124
Commuting flow areas outside of SEQ					
Tweed^ (part of Gold Coast-Tweed working zone)	83 089				
Toowoomba commuting zone#	26 160				

Note: Estimates are based on 2006 boundaries. The Brisbane region corresponds to the Brisbane Statistical Division, as defined in the 2006 ASGC. Region totals differ from those reported in Cat 3218.0 (2011 release) due to changes in region boundaries in the ASGC between 2006 and 2011.

^ Tweed Local Government Area.

Includes Cambooya Part B, Crow's Nest Part B, Rosalie Part B, Jondaryan Part B, Clifton and Pittsworth.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth data.

Most people live in the Middle and Outer subregions, representing just over 61 per cent of the SEQ population and 95 per cent of the Brisbane population. Within the Middle sector, the Middle North subregion has the highest percentage at 10.8 per cent of the SEQ population. The Outer North subregion represents the highest proportion of people in the Outer sector with 11.8 per cent of the SEQ population. The Inner sector contributes 3.1 per cent of SEQ's population.

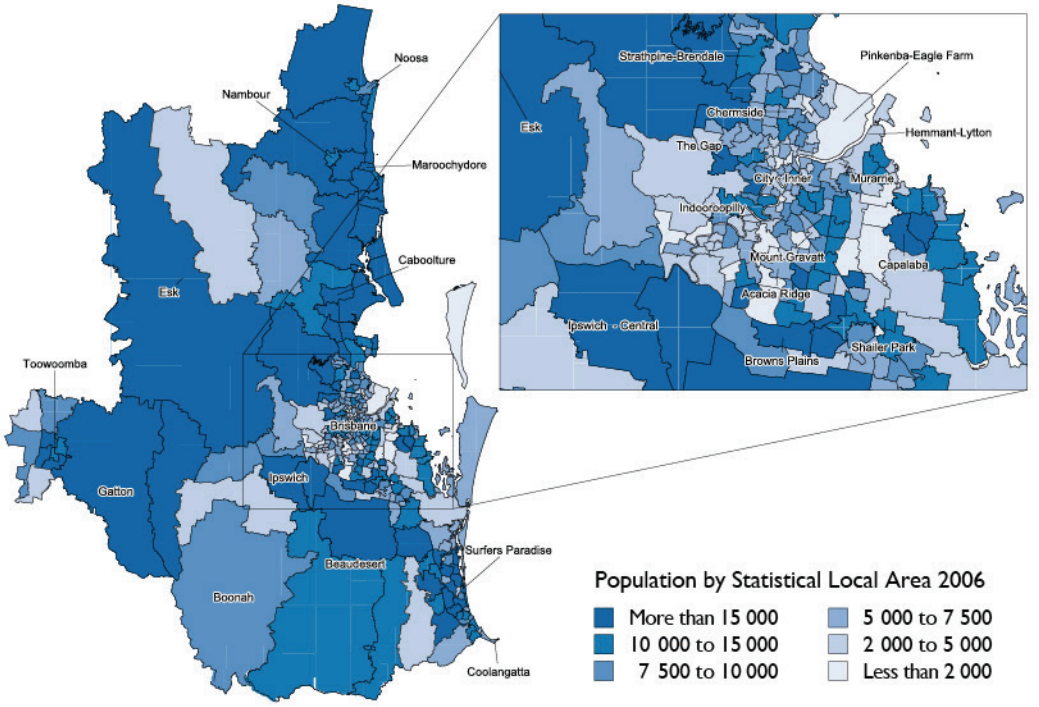
Included in Table 3.1 are two areas that are not part of SEQ—the Tweed Local Government Area (LGA) in New South Wales (NSW) and the remainder of the Toowoomba working zone. These areas have strong connections with SEQ, and as such are important to understanding

the changing nature of demographics. For example, a total of 5 775 people commuted from the Tweed to the Gold Coast in 2006.

In 2006, Brisbane's Inner sector had a population density of 3212 persons per square kilometre, while Brisbane's Middle and Outer sectors had much lower population densities (695 and 181 persons per square kilometre, respectively). Within the Middle sector, the Middle South and Middle North subregions have a much higher average population density than the Middle East and Middle West subregions. Within the Outer sector, the Outer South subregion has the highest population density, while the Outer West subregion is the least densely populated. Of the non-Brisbane regions, the Gold Coast has the highest population density (277 persons per square kilometre) and West Moreton the lowest (11 persons per square kilometre).

To illustrate spatially the distribution of people in SEQ, Map 3.1 presents the number of people within each Statistical Local Area (SLA) in 2006. The two most populated SLAs in SEQ are in the Outer West subregion, namely Ipswich Central and Ipswich East. Ipswich Central had 71 665 residents and Ipswich East had 51 774 residents, while Willawong in the Middle South subregion had just 247 residents. The Tweed Heads SLA that falls in the commuting flow area of the Tweed has a substantial population of 52 823, while 83 089 people live in the Tweed LGA as a whole (see Table 3.1).

Map 3.1 Population by Statistical Local Area, South East Queensland, 2006



Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth data.

On average, the SLAs in SEQ are smaller in geographic area and population than are SLAs in Sydney, Melbourne and Perth. However, the SLAs in SEQ vary considerably in population and area. For example, the Ipswich SLAs are considerably larger in size than most other SLAs in

the Brisbane SD. Other spatial units, such as suburbs and Census Collection Districts (CCDs), provide for less variability in terms of population counts.

The average population size across the 292 SLAs in SEQ was 9684. Typically, the Outer sector and the non-Brisbane SLAs had the highest population levels, whilst the Middle sector SLAs had the lowest populations. In the Inner sector, the most populated SLA was New Farm with 11 507 persons and the least populated was Dutton Park with 1 448.

The City of Brisbane LGA (comprising the Inner and Middle sectors) is split into 158 SLAs, generally based on the 193 suburbs (ABS 2006a). The remainder of SEQ comprises 613 suburbs and only 133 SLAs.

The average SEQ suburb—as defined in ABS (2006), the 2006 Australian Standard Geographical Classification (ASGC)—had a population of 3356 residents in 2006. Seventeen suburbs had no residents, including Mount Coot-tha, Lake Manchester and Eagle Farm. Other suburbs with low populations included Lytton with 15 people and Augustine Heights with 27. In contrast the most populous suburbs were:

- Buderim with 25 209 residents (Sunshine Coast region)
- Southport with 24 102 residents (Gold Coast region)
- Forest Lake with 21 002 residents (Middle West subregion).

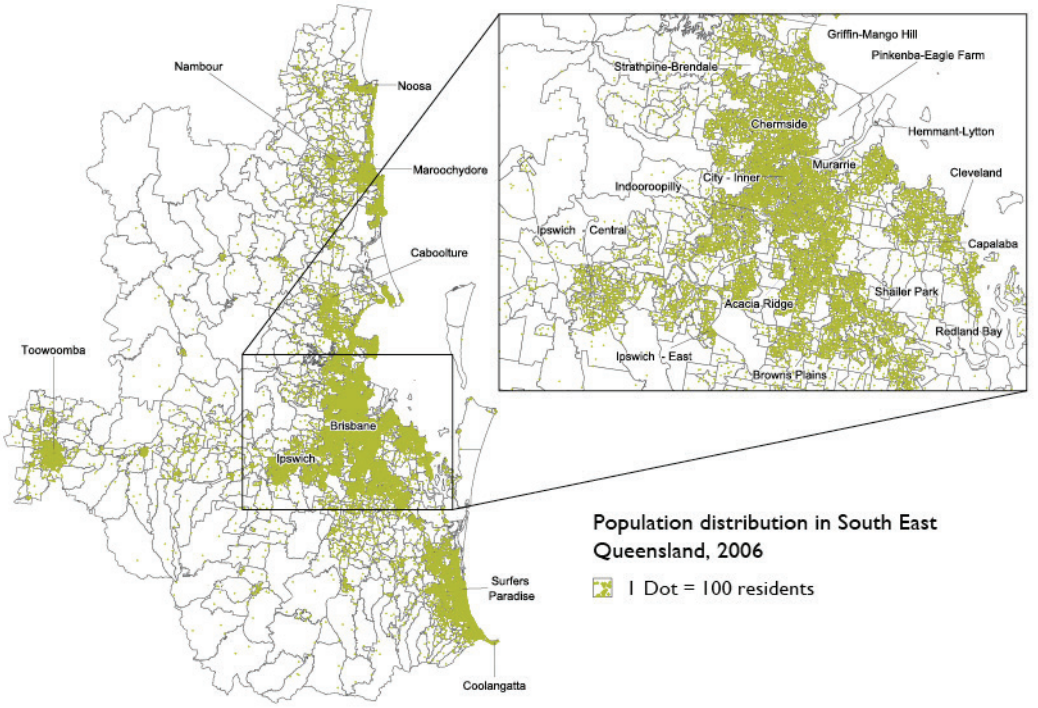
The CCDs are the smallest units of geography, which range from a high of 1782 people to a low of no residents. The average is 572 residents, with a median of 556 people. These regions are used by the ABS for census collection.

Map 3.2 illustrates the population distribution for SEQ using CCDs for 2006. It shows the concentration of population in the urban areas of Brisbane, Gold Coast, Sunshine Coast and Toowoomba. Stimson and Taylor (1999, p.285) describe the SEQ settlement pattern as follows:

> 'This region has evolved into a poli centric, sprawling, low density urban conurbation, which grew from the old Brisbane core along radial road and rail routes to form growth corridors of commuter suburbs. As well there has been a diffusion of urbanisation into periurban areas, and urban growth has engulfed a number of formerly separate centres in the region.'

The settlement pattern in the Brisbane region shows a strong north-south bias, but there is also significant settlement at Ipswich in the Outer West subregion (see Map 3.2). The population of the Gold Coast and Sunshine Coast regions are concentrated at the coast, with settlement patterns extending some distance inland as well as towards the Brisbane region.

Map 3.2 Population distribution within South East Queensland region, 2006

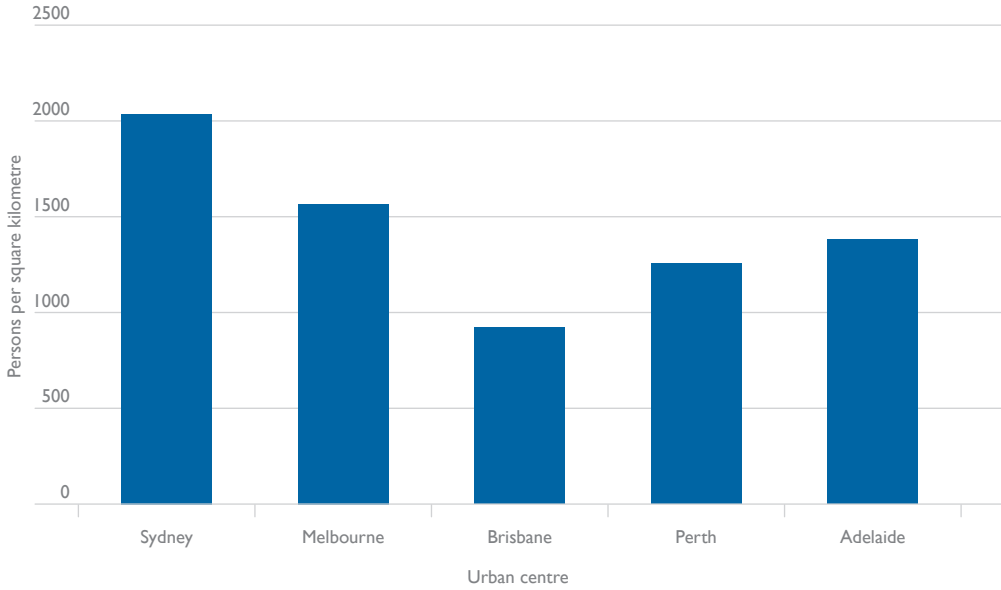


Source: BITRE analysis of 2006 ABS *Census of Population and Housing* usual residence data at CCD scale.

Population density

Population densities vary widely across SEQ, which includes rural land, nature reserves and industrial areas, as well as residential areas. When considering population densities of cities it is appropriate to restrict the focus to the developed urban area. One means of doing this is by using ABS urban centre definitions, as in Figure 3.1, which shows that Brisbane had a relatively low population density of 920 persons per square kilometre in 2006. This is much lower than the average density of 2036 persons per square kilometre for the Sydney urban centre, 1566 for the Melbourne urban centre, 1379 for the Adelaide urban centre, and 1258 for the Perth urban centre (BITRE 2012a, 2011a, 2010).

Figure 3.1 Population density of Brisbane, Sydney, Melbourne and Perth urban centres, 2006



Note: Based on ABS urban centre boundary.

Source: ABS *Census of Population and Housing* 2006 data.

The level of population density in an area is dependent on housing density, average household size and the amount of non-residential land in an area. The most densely populated SLAs are listed in Table 3.2. As expected the Inner sector of Brisbane is well represented, with the four most densely populated SLAs located in the Inner sector. The highest density SLAs are New Farm, Kangaroo Point and Highgate Hill, which all contain more than 4500 persons per square kilometre. The Outer sector's most densely populated area is Margate-Woody Point (2543 persons per square kilometre) which is ranked 37th in the Brisbane region. The Outer sector dominates the low population densities with Moreton Island having a density level of two people per square kilometre.

Similarly to Melbourne, the Brisbane region has 31 per cent of SLAs with more than 2000 people per square kilometre. This is a much higher per cent than Perth which has only six SLAs with more than 2000 people per square kilometre (but has SLAs that typically cover a much larger geographic area than those in Brisbane). It is well below the 55 per cent of Sydney SLAs which have more than 2000 people per square kilometre.

Some of SEQ's regional cities also have relatively high density levels. The Surfers Paradise and Broadbeach-Mermaid Beach SLAs in the Gold Coast region have density levels of 3651 and 3477 people per square kilometre, respectively.

Table 3.2 Population density of Statistical Local Areas in South East Queensland, 2006

Statistical Local Area	Region/Subregion	Person per square kilometre
New Farm	Inner	5673
Kangaroo Point	Inner	5551
Highgate Hill	Inner	4722
Spring Hill	Inner	4400
Fortitude Valley	Inner	4127
City Inner	Inner	4012
Newstead	Inner	4005
Taringa	Middle West	3728
Surfers Paradise	Gold Coast	3651
Annerley	Middle South	3500
Broadbeach-Mermaid Beach	Gold Coast	3477
West End	Inner	3417
Clayfield	Middle North	3417
Paddington	Inner	3365
Hawthorne	Middle East	3298
St Lucia	Middle West	3263
Red Hill	Inner	3253
Lutwyche	Middle North	3141
City Remainder	Inner	3058
Toowong	Middle West	3054

Source: ABS Cat. 3218.0 Regional Population Growth, March 2011 data.

Residential growth

Historic population growth

The population of Brisbane stood at around 120 000 in 1901, which was one-quarter that of Sydney and Melbourne at the time (Spearritt 2010). By 1971, the Brisbane region had a population of 870 100 and the SEQ region had a population of 1.11 million (ABS 1983). In 2011, the Brisbane region had an ERP of 2.03 million and the SEQ region had an ERP of 3.18 million (ABS 2012a).

Table 3.3 shows the population numbers and average annual growth of Brisbane and SEQ between 1971 and 2011 (at 10 year intervals). A variety of data sources have been utilised in producing the table. The SEQ region has seen rapid population growth (averaging at least 2.5 per cent per annum) in each of the last four decades. SEQ experienced higher rates of population growth than the Brisbane region for each of these decade long intervals. The gap between the two growth rates was largest for the 1971 to 1981 period.

Figure 3.2 reveals that the Brisbane region's share of the total SEQ population has declined from 78.1 per cent in 1971 to 63.9 per cent in 2011 (Figure 3.2). The most pronounced decline occurred between 1971 and 1981, and the pace of this decline has lessened in more recent years. The population shares of the Gold Coast and Sunshine Coast rose strongly between 1971 and 2011, while the population shares of West Moreton and Toowoomba have decreased.

Table 3.3 Comparison of historical population and average annual growth in Brisbane region and South East Queensland, 1971 to 2011

	1971	1981	1991	2001	2011
			Population ('000)		
Inner	82.0	66.9	64.4	68.3	97.8
Middle	617.8	618.8	687.6	828.3	981.6
Middle East	117.2	112.0	123.0	148.3	180.0
Middle North	256.6	246.2	255.1	289.0	330.1
Middle South	138.3	148.8	169.4	209.0	252.1
Middle West	105.7	111.8	140.0	182.1	219.4
Outer	170.3	339.9	561.8	732.6	950.0
Outer East	17.0	42.9	80.7	117.3	144.9
Outer North	66.4	117.0	205.8	286.5	389.7
Outer South	23.0	96.7	163.0	202.1	241.2
Outer West	63.9	83.2	112.3	126.6	174.2
Brisbane region	870.1	1025.6	1313.7	1629.2	2029.4
Gold Coast	86.8	177.0	273.7	432.5	596.0
Sunshine Coast	50.1	114.6	167.0	247.2	335.3
Toowoomba	74.7	85.8	108.1	109.4	132.9
West Moreton	32.2	39.2	42.8	65.8	84.4
SEQ Total	1113.9	1442.3	1905.4	2484.1	3178.0

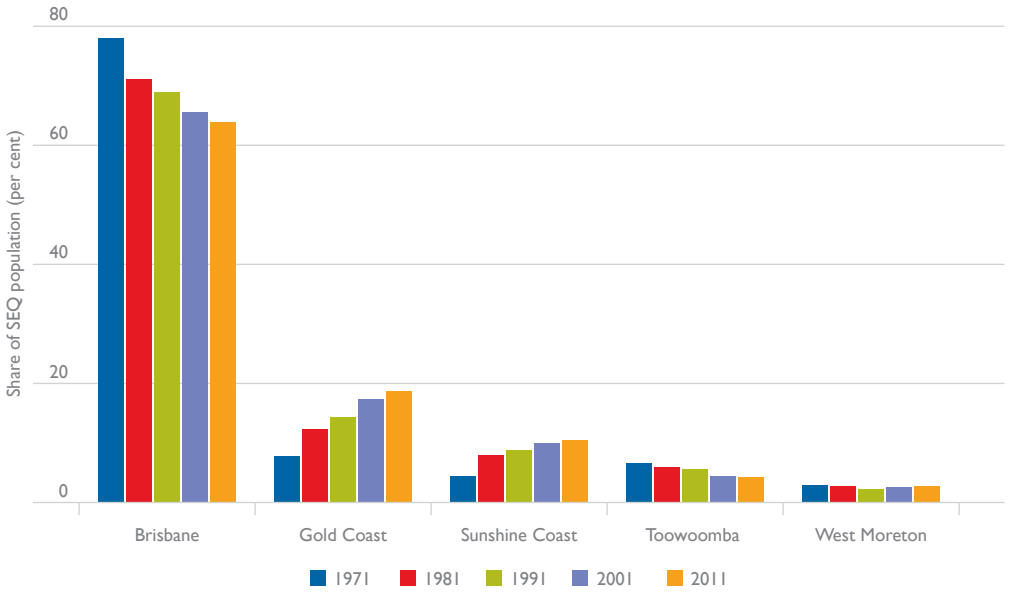
Average annual growth rates (per cent)	1971–1981	1981–1991	1991–2001	2001–2011
Brisbane region	1.7	2.5	2.2	2.2
SEQ Total	2.6	2.8	2.7	2.5

Note: For the period 1971 to 1981, the 1983 Queensland Yearbook was used as it produced data tables that included both the 1971 and 1981 census data, using 1981 Local Authority or suburb boundaries. The 1981 to 1991 growth rate was calculated from data sourced from the 1991 ABS census time series profile for Queensland SLAs. The growth rate from 1991 to 2001 and from 2001 to 2011 used ERP data. ERP data for 2011 remains preliminary.

Sources: ABS Yearbook Queensland 1983 (ABS 1983); ABS 1991 census time series profile for Queensland SLAs; and ABS Cat. 3218.0 Regional Population Growth (various issues).

Figure 3.3 shows the average annual growth across the period for all SEQ regions and the sectors of Brisbane. In the 1971–1981 and 1981–1991 periods the Inner sector was the only region to experience population decline. However, from 2001–2011 the Inner sector experienced a relatively high annual average growth rate (3.7 per cent). The Middle sector experienced minimal growth in the 1971–1981 period (0.02 per cent), with growth in the remaining periods ranging between 1.0 per cent and 1.9 per cent. In the 1971–1981 period, the Outer sector, Gold Coast and Sunshine Coast recorded respective average annual growth rates of 7.2 per cent, 7.4 per cent and 8.6 per cent. Since then growth has moderated (particularly in Brisbane's Outer sector), but Gold Coast and Sunshine Coast continued to record growth well above the SEQ average for each decade. The West Moreton region recorded relatively rapid population growth between 1991 and 2001, while Toowoomba experienced minimal growth during that period.

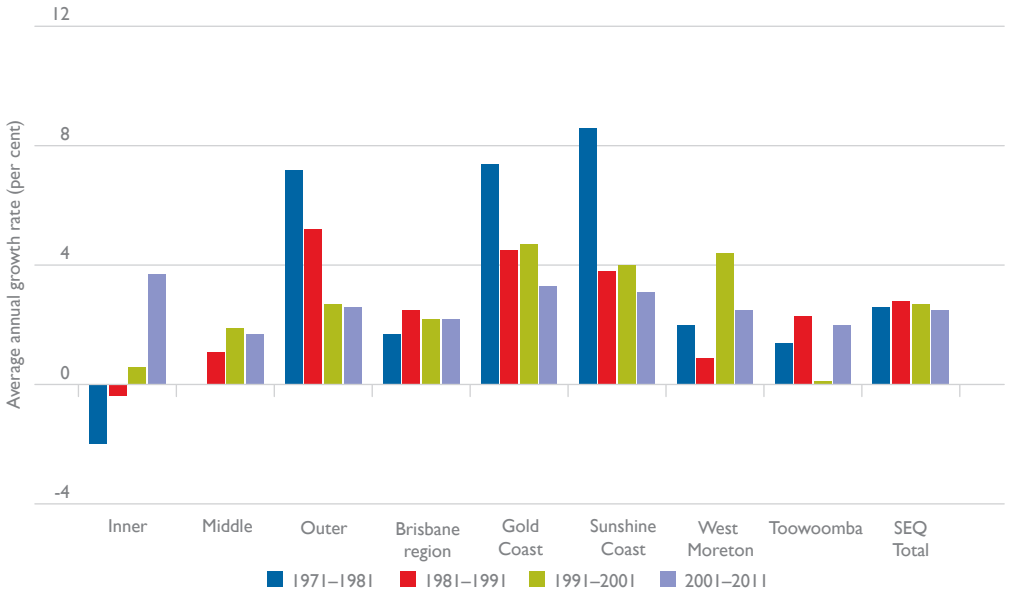
Figure 3.2 Population shares, South East Queensland, 1971 to 2011



Notes: Details of data construction approach described in note to Table 3.3. ERP data for 2011 remains preliminary.

Sources: ABS Yearbook Queensland 1983 (ABS 1983); ABS 1991 census time series profile for Queensland SLAs; and ABS Cat. 3218.0 Regional Population Growth (various issues).

Figure 3.3 Average annual population growth rate, South East Queensland, 1971 to 2011

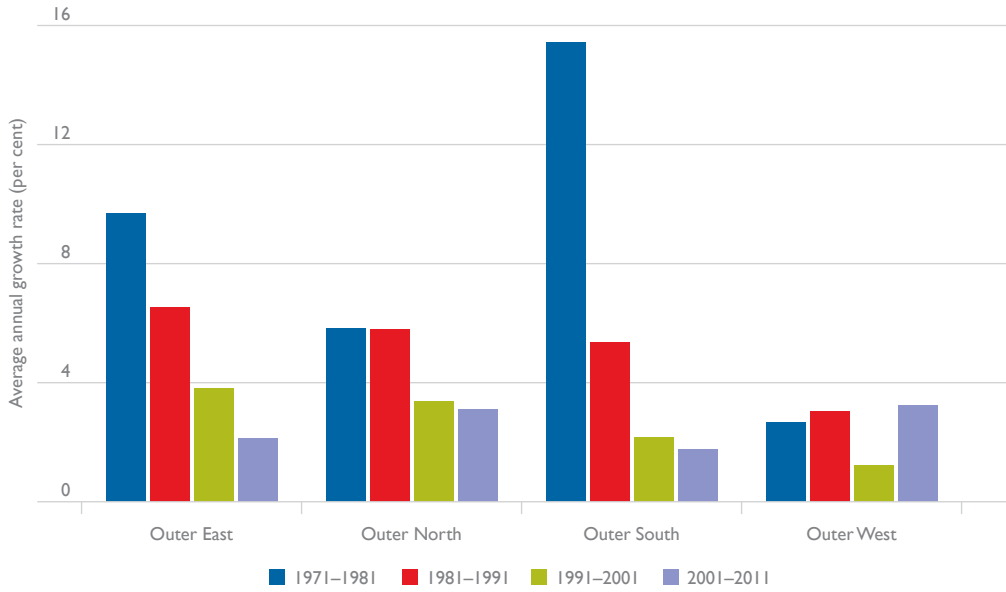


Notes: Details of data construction approach described in note to Table 3.3. ERP data for 2011 remains preliminary.

Sources: ABS Yearbook Queensland 1983 (ABS 1983); ABS 1991 census time series profile for Queensland SLAs; and ABS Cat. 3218.0 Regional Population Growth (various issues).

Figure 3.4 examines population growth in the Outer sector. With the exception of the Outer West subregion, the Outer sector experienced high growth in the 1971–1981 period, with a steady decline in average annual growth rates in the subsequent periods. The Outer South and Outer East sectors experienced particularly high growth in the 1970's, but both grew from relatively low population bases. In contrast, in 1971 the Outer West sector, which is dominated by the City of Ipswich, contained a population almost three times as large as the Outer South subregion. The Outer West is the only Outer subregion to have a higher average annual growth rate for 2001–2011, compared to the 1991–2001 period.

Figure 3.4 Average annual growth rates of Outer subregions, 1971 to 2011



Notes: Details of data construction approach described in note to Table 3.3. ERP data for 2011 remains preliminary.

Sources: ABS Yearbook Queensland 1983 (ABS 1983); ABS 1991 census time series profile for Queensland SLAs; and ABS Cat. 3218.0 Regional Population Growth (various issues).

Population changes from 2001 to 2011

Changes in estimated residential population (ERP)

This section provides an analysis of ERP growth between 2001 and 2011. Note that the 2011 data remain preliminary and are from the March 2012 release of ERP data, which was not benchmarked to 2011 census data.[19]

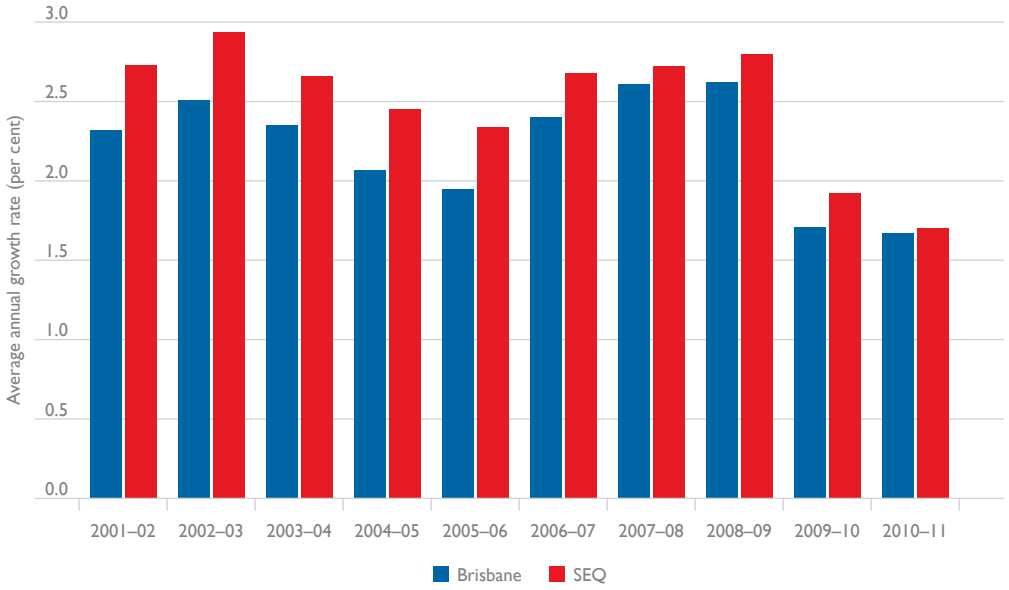
19 The more recent July 2012 release of ERP data was benchmarked to the 2011 census, and the revised population estimates for SEQ were somewhat lower than the estimates reported in this chapter. The total population of SEQ has been revised downwards by about 44 000 persons. Much of the downwards revision of population between the March and July 2012 releases relates to the Gold Coast and Sunshine Coast regions. Note that the 2011 population estimates that were released in July 2012 remain preliminary.

Between 2001 and 2011, the Brisbane region's average annual ERP growth was 2.2 per cent, lower than the average annual ERP growth of 2.5 per cent in SEQ. By contrast, total ERP growth for Australia during the same period was 1.5 per cent per annum.

Figure 3.5 shows the average annual rate of growth of ERP for SEQ and the Brisbane region between 2001 and 2011. In both SEQ and the Brisbane region, there was a decreasing population growth rate from 2002–03 to 2005–06, followed by a significant upturn in 2006–07 of more than 0.4 percentage points. ERP growth exceeded 2.5 per cent in SEQ and Brisbane in 2007–08 and 2008–09, before falling below 2.0 per cent in 2009–10 and 2010–11.

The population of SEQ consistently increased at a faster rate than that of Brisbane. This faster population growth in SEQ is because the rates of population growth were much higher in the Gold Coast and Sunshine Coast regions, than in Brisbane. The proportion of SEQ's population living in Brisbane has decreased gradually from 65.6 per cent in the year ended June 2001 to 63.9 per cent in the year ended June 2011.

Figure 3.5 Average annual rate of growth in Estimated Resident Population, Brisbane region and South East Queensland, 2001 to 2011



Notes: ERP data for 2011 remains preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

Table 3.4 shows the change in population and average annual growth for Brisbane and SEQ by sector and subregion. SEQ's population grew by 693 977 persons or 27.9 per cent over this period, which represents an average annual increase of 2.5 per cent. The Brisbane region accounted for 57.7 per cent of this growth.

Between 2001 and 2011, the average annual growth rate of population in Brisbane was 2.2 per cent, while Gold Coast experienced the highest average annual growth rate (3.3 per cent), followed by Sunshine Coast (3.1 per cent).

The Outer sector contributed 54.3 per cent of the Brisbane region's growth, while the Middle sector contributed 38.3 per cent. The Inner sector experienced the highest growth rate (3.7 per cent per annum) and the Middle sector experienced the lowest rate of growth (1.7 per cent). Within the Middle sector, the population of the Middle North subregion grew less rapidly (averaging 1.3 per cent per annum) than the other Middle subregions. The population of the Outer West and Outer North subregions grew faster (3.2 and 3.1 per cent per annum, respectively) than the other Outer subregions.

Table 3.4 Population growth in the Brisbane and South East Queensland, 2001 to 2011

Region	2001 ERP	2011 ERP	Change (2001–2011)	Average annual growth rate (per cent)	Proportion of Brisbane SD increase (per cent)	Proportion of SEQ increase (per cent)
Inner	68 302	97 798	29 496	3.7	7.4	4.3
Middle	828 347	981 594	153 247	1.7	38.3	22.1
Middle East	148 267	179 997	31 730	2.0	7.9	4.6
Middle North	289 022	330 078	41 056	1.3	10.3	5.9
Middle South	208 997	252 127	43 130	1.9	10.8	6.2
Middle West	182 061	219 392	37 331	1.9	9.3	5.4
Outer	732 561	950 005	217 444	2.6	54.3	31.3
Outer Eastern	117 252	144 936	27 684	2.1	6.9	4.0
Outer Northern	286 532	389 684	103 152	3.1	25.8	14.9
Outer Southern	202 146	241 233	39 087	1.8	9.8	5.6
Outer Western	126 631	174 152	47 521	3.2	11.9	6.8
Brisbane Total	1 629 210	2 029 397	400 187	2.2	100.0	57.7
Gold Coast	432 466	596 016	163 551	3.3		23.6
Sunshine Coast	247 167	335 273	88 106	3.1		12.7
West Moreton	65 763	84 410	18 646	2.5		2.7
Toowoomba	109 449	132 936	23 487	2.0		3.4
SEQ Total	2 484 055	3 178 032	693 977	2.5		100.0

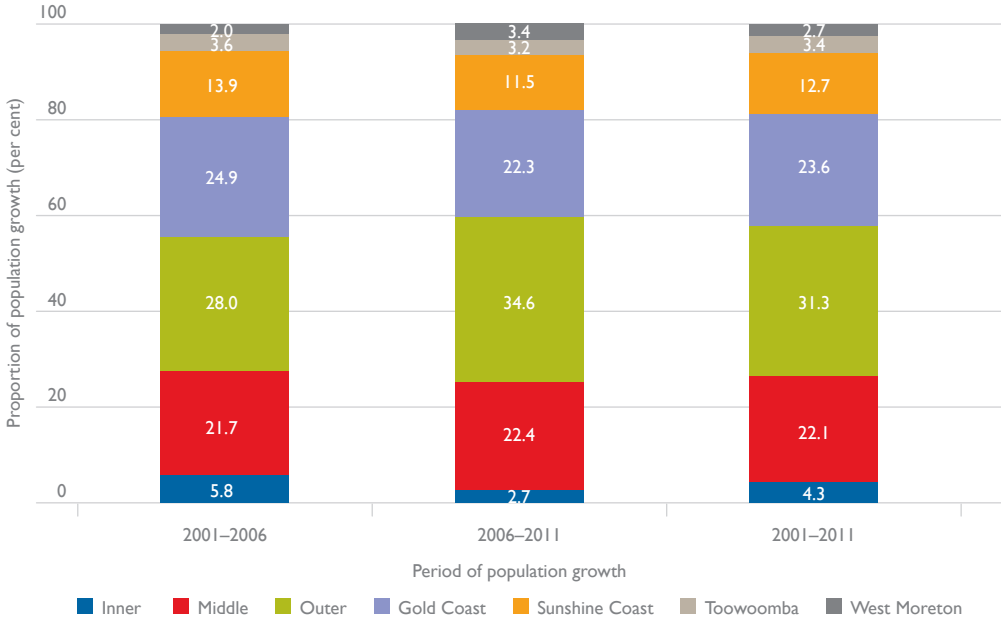
Note: 2011 population estimates are preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

The pattern of growth for SEQ differed between the pre-2006 and post-2006 periods, as can be seen in Figure 3.6. SEQ's growth was more concentrated in the Brisbane region in the later period. Growth in the Outer sector was particularly strong in the later period, whilst the Inner sector's contribution to growth was much smaller between 2006 and 2011 (2.7 per cent). The proportion of growth in the Gold Coast and Sunshine Coast was lower in the 2006–11 period, but they together still contributed over one-third of SEQ's population growth.

Figure 3.7 examines the population living at various distances from the Brisbane CBD and how that has changed between 2001 and 2011. The proportion of Brisbane's population living between 5 and 15 kilometres from the CBD has declined from 36.5 per cent in 2001 to 33.6 per cent in 2011. However, there has been an increase in the proportion of Brisbane's population living 15 to 45 kilometres from the CBD, increasing from 50.0 per cent in 2001 to 52.7 per cent in 2011. During the same period, the proportion of the population living within 5 kilometres of the CBD also increased slightly, from 12.0 per cent in 2001 to 12.3 per cent in 2011.

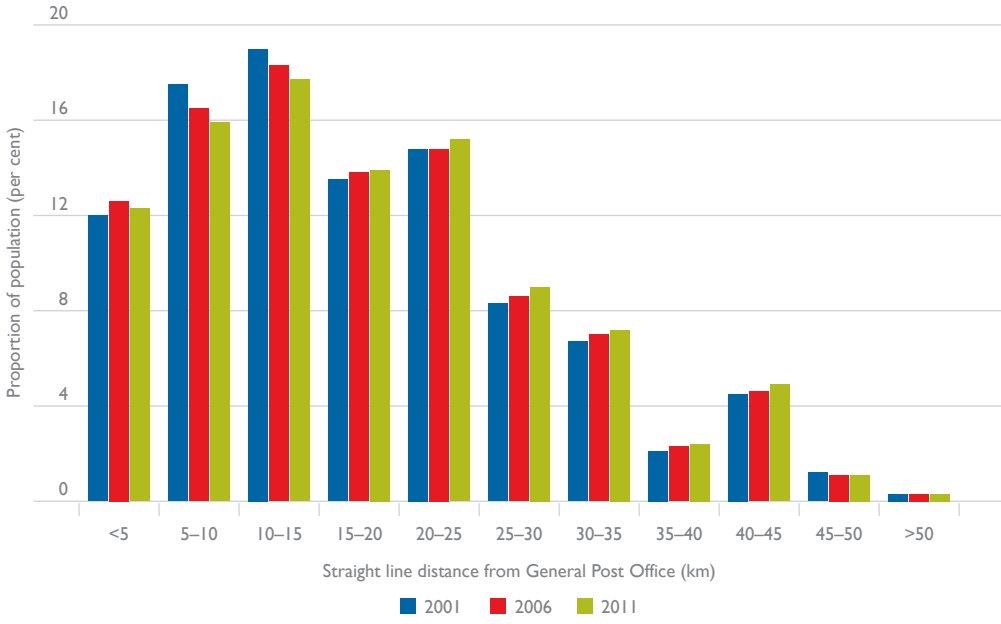
Figure 3.6 Proportion of population growth by region and sector, South East Queensland, 2001–06, 2006–11 and 2001–11



Note: 2011 population estimates are preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

Figure 3.7 Brisbane population at various distances from the Brisbane Central Business District, 2001, 2006 and 2011

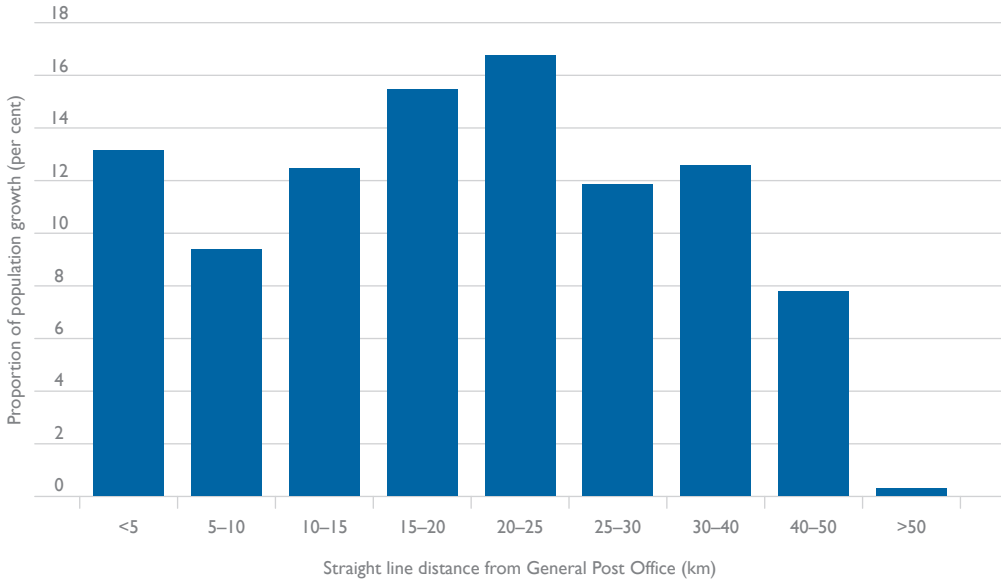


Note: 2011 population estimates are preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

Figure 3.8 is an alternative presentation of the information in Figure 3.7, which shows the distance bands in which Brisbane's population growth was concentrated between 2001 and 2011. Population growth largely occurred between 15 and 20 kilometres from the CBD (16 per cent) and between 20 and 25 kilometres from the CBD (17 per cent). The area within 5 kilometres of the General Post Office (GPO) accounted for 13 per cent of Brisbane's population increase. There was also noticeable population growth occurring at a distance of 30 to 40 kilometres from Brisbane's CBD (13 per cent).

Figure 3.8 Comparison of proportion of population change at various distances from Central Business District, Brisbane, 2001 to 2011

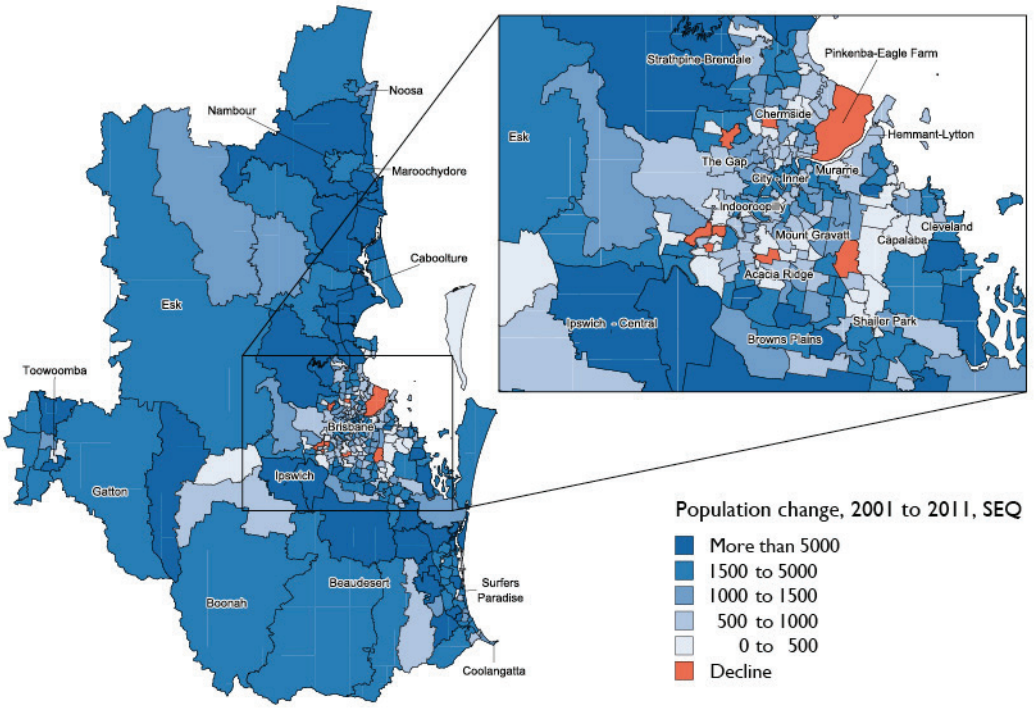


Note: 2011 population estimates are preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

Map 3.3 illustrates the change in population of all SEQ SLAs between 2001 and 2011. The map reveals that the majority of the SLAs that have recorded the greatest increase in population are located in the Outer sector and in the Gold and Sunshine Coast regions. Some isolated areas of population decline are evident in Brisbane's middle suburbs, but no areas of population decline are evident outside the Brisbane region.

Map 3.3 Change in Estimated Resident Population by Statistical Local Area, South East Queensland, 2001 to 2011



Note: 2011 population estimates are preliminary.

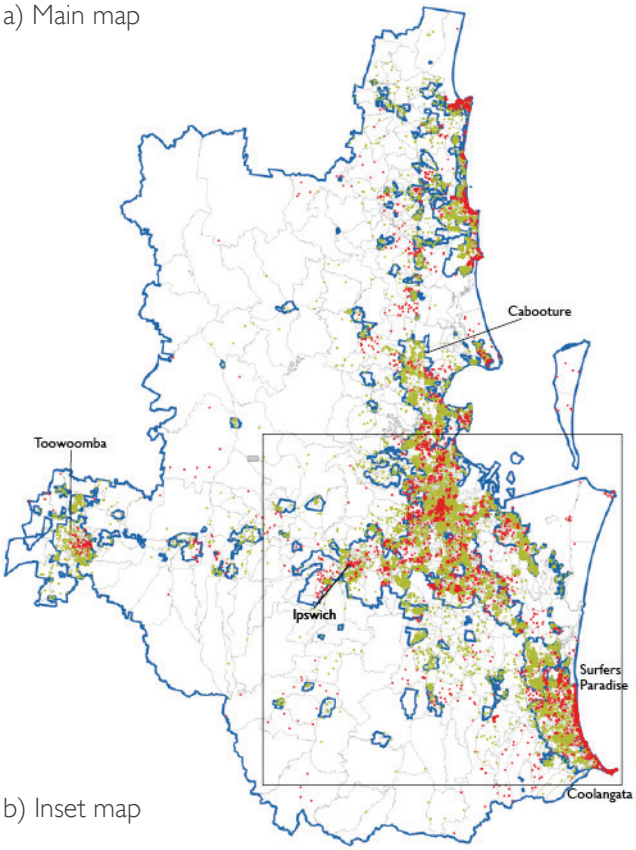
Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011.

Map 3.4 and its inset use ABS census data for CCDs to provide a more detailed representation of population change for SEQ. It focuses on the 2001 to 2006 subperiod. Map 3.4 presents a broadly similar picture to Map 3.3. However, while population growth dominates Map 3.4, the more detailed spatial unit of CCDs reveals that small population losses were experienced in many areas of SEQ between 2001 and 2006, including the central areas of Ipswich and Toowoomba and a coastal strip extending south of Surfers Paradise to the New South Wales border.

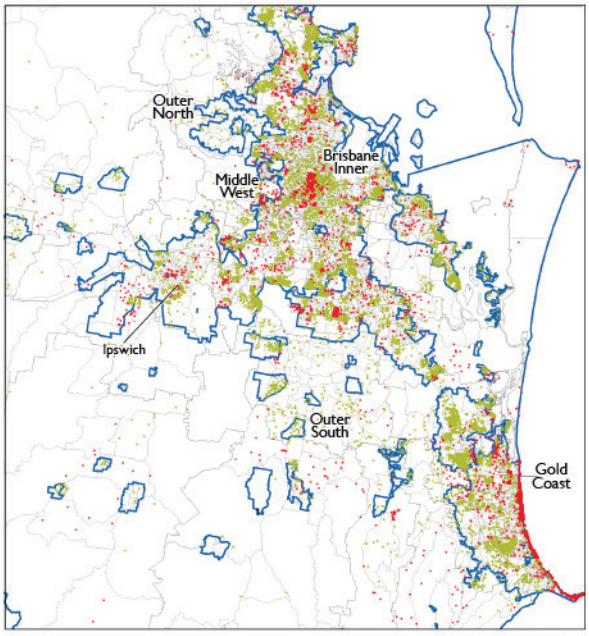
When the growth of population by CCD is examined against the Urban Footprint boundary as shown in Map 3.4, it becomes apparent that some of this growth occurred outside the Urban Footprint. For example, some population growth extended to the west of the Urban Footprint boundary in the Gold Coast region, and there was also notable population growth outside the boundary in the Outer South and Middle West subregions and the Sunshine Coast region.

Map 3.4 Dot density change map of population change including Urban Footprint, South East Queensland, 2001 to 2006

a) Main map



b) Inset map



Population Change
With Urban Footprint (2009) shown in blue

1 Dot = +25 residents

1 Dot = -25 residents

Notes: Urban Footprint boundary for 2009 shown in blue inside SEQ. Urban footprint based on data provided by the Department of State Development, Infrastructure and Planning. The Department of State Development, Infrastructure and Planning gives no warranty in relation to the data (including accuracy, reliability, completeness or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* data for CCDs and 2009 Urban Footprint boundary as supplied by the Department of State Development, Infrastructure and Planning.

Focusing again on the ten-year period ending June 2011, Table 3.5 identifies the SLAs within SEQ which experienced the largest (positive or negative) change in population. The SLAs which grew the most were primarily in the Outer sector, such as Ipswich East (+29 681), Griffin-Mango Hill (+17 035) and Ipswich Central (+14 478). Ipswich East includes the new master-planned suburb of Springfield Lakes which grew from zero population in 2001 to reach a population of 10 600 in June 2011 (ABS 2012a). The Gold Coast and Sunshine Coast regions also saw significant population increases, particularly the SLAs of Kingsholme-Upper Coomera (+18 060) and Maroochy–Buderim (+15 858). The Brisbane City Remainder SLA was the highest contributor from the Inner sector (3332 persons), whilst Parkinson-Drewvale (8784 persons) and Wakerley (6199 persons) were the largest contributors from the Middle sector.

The eight SLAs that showed a decline were all located in the Middle sector The three SLAs with the highest population loss were Stafford Heights (–205 persons), Middle Park (–74 persons) and Jindalee (–64 persons) (Table 3.5).

Table 3.5 Statistical Local Areas with the largest change in population in South East Queensland, 2001 to 2011

SLA name	Region/sector/ subregion	2001 ERP	2011 ERP	Resident change (number)
Largest increases				
Ipswich—East	Outer West	40 239	69 920	29 681
Kingsholme-Upper Coomera	Gold Coast	7 650	25 710	18 060
Griffin-Mango Hill	Outer North	3 103	20 138	17 035
Maroochy—Buderim	Sunshine Coast	33 178	49 036	15 858
Ipswich—Central	Outer West	66 949	81 427	14 478
Beaudesert—Part A	Outer South	34 639	47 847	13 208
Central Pine West	Outer North	12 152	24 000	11 848
Maroochy—Coastal North	Sunshine Coast	18 429	29 918	11 489
Pacific Pines-Gaven	Gold Coast	5 227	15 954	10 727
Burpengary-Narangba	Outer North	17 895	28 256	10 361
Ormeau-Yatala	Gold Coast	6 679	16 870	10 191
Caloundra—Caloundra South	Sunshine Coast	15 778	25 570	9 792
Dakabin-Kallangur-Murrumba Downs	Outer North	21 417	30 340	8 923
Parkinson-Drewvale	Middle South	6 283	15 067	8 784
Robina	Gold Coast	14 209	22 673	8 464
Caloundra—Caloundra North	Sunshine Coast	18 398	26 421	8 023
Varsity Lakes	Gold Coast	7 105	15 091	7 986
Mudgeeraba-Reedy Creek	Gold Coast	18 373	26 034	7 661
Pimpama-Coomera	Gold Coast	3 598	11 251	7 653
Morayfield	Outer North	17 236	24 616	7 380
Southport	Gold Coast	23 040	30 364	7 324
Caboolture—Central	Outer North	16 615	23 887	7 272
Redland Bay	Outer East	7 093	14 055	6 962

(continued)

Table 3.5 Statistical Local Areas with the largest change in population in South East Queensland, 2001 to 2011 *(continued)*

SLA name	Region/sector/ subregion	2001 ERP	2011 ERP	Resident change (number)
Oxenford—Maudsland	Gold Coast	8 536	15 435	6 899
Caloundra—Rail Corridor	Sunshine Coast	16 589	23 473	6 884
Maroochy—Balance	Sunshine Coast	22 574	29 448	6 874
Caloundra—Kawana	Sunshine Coast	17 952	24 772	6 820
Nerang	Gold Coast	21 374	28 101	6 727
Toowoomba—South-East	Toowoomba	23 194	29 762	6 568
Wakerley	Middle East	1 538	7 737	6 199
Largest decreases				
Stafford Heights	Middle North	7 165	6 960	–205
Middle Park	Middle West	4 340	4 266	–74
Jindalee	Middle West	5 298	5 233	–65

Notes: 2011 population estimates are preliminary.

Population increase of less than 6 000 people or decrease of less than 65 people have been excluded from the population change rankings.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011.

An alternative way to view population growth is to examine the growth as a percentage of the existing resident population, which can paint a slightly different picture. Table 3.6 sets out the 11 highest growth SLAs from 2001 to 2011. The highest average annual growth was in Griffin-Mango Hill (20.6 per cent), Wakerley (17.5 per cent) and Pallara-Heathwood-Larapinta (16.0 per cent). The City Inner SLA grew at an average annual rate of 14.0 per cent.

Table 3.6 Highest population growth Statistical Local Areas, South East Queensland, 2001 to 2011

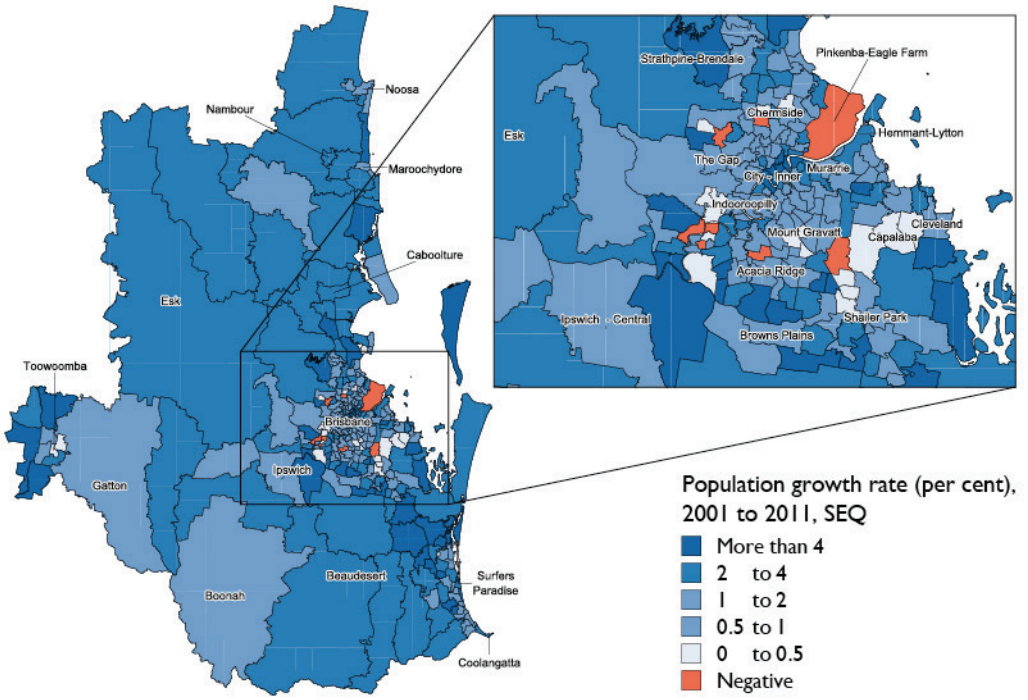
SLA name	Region/sector/subregion	Average annual growth rate (per cent)
Griffin-Mango Hill	Outer North	20.6
Wakerley	Middle East	17.5
Pallara-Heathwood-Larapinta	Middle South	16.0
City Inner	Inner	14.0
Kingsholme-Upper Coomera	Gold Coast	12.9
Moggill	Middle West	12.1
Pimpama-Coomera	Gold Coast	12.1
Pacific Pines-Gaven	Gold Coast	11.8
City Remainder	Inner	10.9
Ormeau-Yatala	Gold Coast	9.7
Parkinson-Drewvale	Middle South	9.1

Notes: 2011 population estimates are preliminary. Average annual growth rates of less than 9.0 per cent have been excluded from the highest growth rankings.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

To illustrate the spatial patterns in population growth across the SEQ region, Map 3.5 presents the average annual growth rates from 2001 to 2011. Strong growth is evident across the region, particularly close to the city centre and in the Gold Coast region.

Map 3.5 Average annual population growth by Statistical Local Area, South East Queensland, 2001 to 2011



Note: 2011 population estimates are preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011.

Sources of population growth

The ABS ERP for Queensland grew by 951 336 people from 2001 to 2011 (ABS 2012a). The Brisbane region accounts for 43 per cent of the state's overall increase, with the remainder of SEQ accounting for 30 per cent. ABS (2012b) decomposes Queensland's population growth between the years ended June 2001 and 2011 into the following three components:

- Natural increase: 309 253 people or 32.5 per cent
- Net interstate migration: 245 751 people or 25.8 per cent
- Net overseas migration: 368 441 people or 38.7 per cent.[20]

Unfortunately, ABS does not publish an equivalent decomposition for Brisbane or SEQ. However, Wilson (2011) decomposed population change in SEQ between 2001 and 2006 into the same three components, as shown in Table 3.7. Of the 331 000 person increase in the

20 The components of population change do not sum to match the total population due to intercensal discrepancy (ABS 2012b).

SEQ population in the five years to the 2006 Census, 25.4 per cent was due to natural increase and the rest was due to net migration. The majority of the net migration gain in SEQ related to overseas migration rather than internal migration. The role of overseas migration has grown, as historically '[n]et overseas migration has contributed relatively little to the Brisbane-SEQ region's growth' (Stimson and Taylor 1999).

Table 3.7 Components of population growth for South East Queensland, 2001 to 2006

Component	Population change	Share (per cent)
Natural increase	84 000	25.4
Net migration	247 000	74.6
Net internal migration	95 000	28.7
Net overseas migration	152 000	45.9
Total population change, SEQ	331 000	100.0

Source: Wilson (2011).

Focusing on the 2001 to 2006 period, BITRE (2011b) reports that new residents of Brisbane (with a known origin) most commonly lived overseas in 2001 (34 per cent) or elsewhere in Queensland (30 per cent), while a smaller proportion migrated from Sydney (11 per cent) or the rest of NSW (9 per cent). New arrivals to Toowoomba and the Sunshine Coast primarily lived in Brisbane in 2001 (19 and 24 per cent, respectively) or overseas (16 and 18 per cent, respectively). New arrivals to Gold Coast-Tweed were more commonly from overseas (26 per cent), but Brisbane (18 per cent) and Sydney (18 per cent) were also important places of origin (ibid).

The sources of population growth will vary for different parts of Brisbane. For example, census data for the 2001 to 2006 period reveals:

- Births have made a relatively strong contribution to population growth in the SLAs of Wakerley, Moggill, Upper Kedron, Griffin-Mango Hill, Ipswich South-West and Marsden. These SLAs have 9 per cent or more of residents aged between zero and four, compared to the 6.7 per cent population share for the Brisbane region.
- The arrival of over 104 840 new migrants from overseas between 2001 and 2006 substantially increased Brisbane's population by 5.6 per cent. The SLAs where population was boosted by over 20 per cent by new overseas migrants were City Inner, South Brisbane and St Lucia.

Changes in population densities

This section provides data on changes in population densities in Brisbane and SEQ between 2001 and 2011.

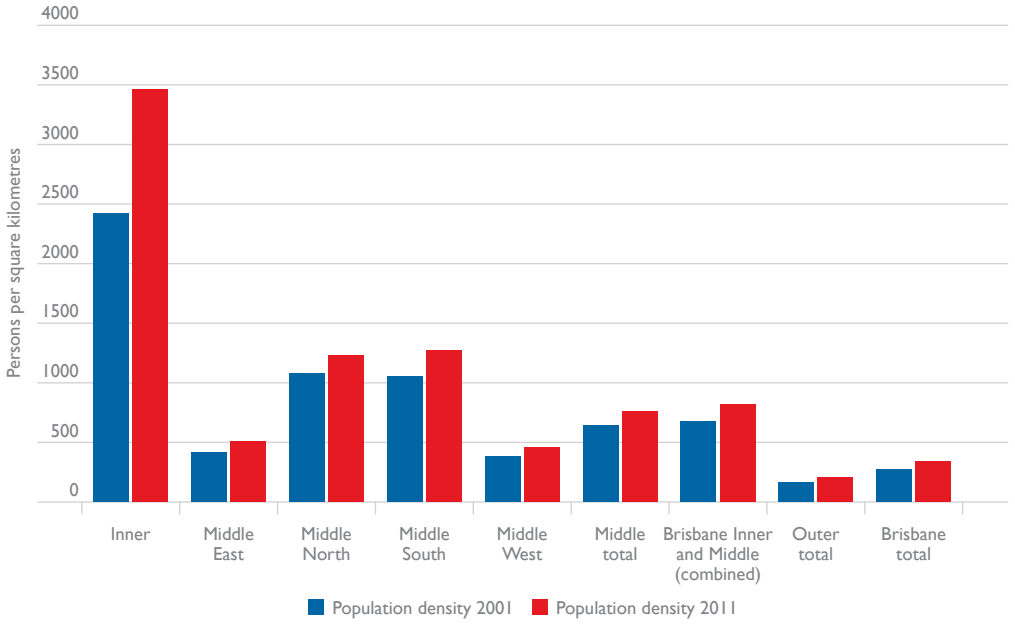
Comparisons of population densities across cities or across time can be misleading if the geographic coverage is not comparable. The ABS urban centre boundary for Brisbane was substantially expanded between 2001 and 2006 so it covered 14 per cent more land area, and this translated into an apparent—but not very meaningful—decline in population density.

Focusing on the established inner and middle suburbs of Brisbane provides an alternative basis for density comparisons (and a fixed boundary over time).

The population growth that occurred in Brisbane between 2001 and 2011 led to increases in Brisbane's population density. Figure 3.9 presents population density for sectors and subregions of Brisbane. In 2001, the Inner and Middle sectors of Brisbane SD had an average population density of 676 persons per square kilometre, which increased by 138 persons per square kilometre to 814 persons per square kilometre in 2011. This is an average annual increase of 1.9 per cent.

Between 2001 and 2011, population density increased from 2418 to 3462 persons per square kilometre in the Inner sector (or an increase of 1044 persons per square kilometre), while population density increased from 638 persons per square kilometre to 756 persons per square kilometre (or an increase of 118 persons per square kilometre) in the Middle sector. The Middle North and Middle South subregions experienced larger absolute density gains from 2001 to 2011 (153 and 218 persons per square kilometre, respectively) than did the less densely populated Middle East and Middle West subregions.

Figure 3.9 Population density of Brisbane by sector and subregion, 2001 to 2011

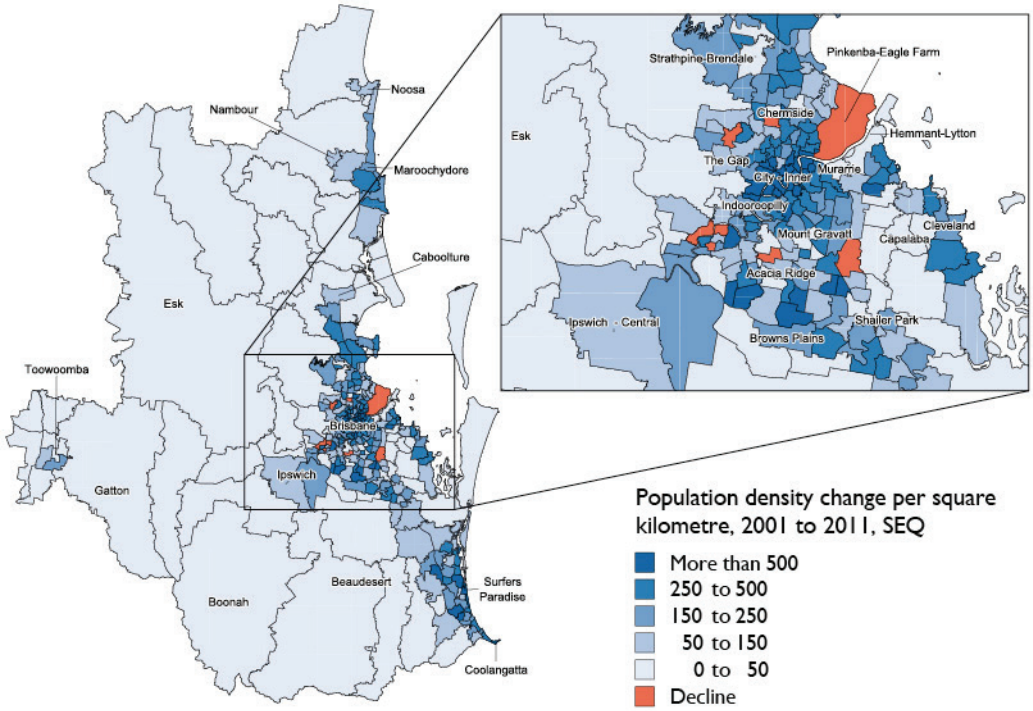


Notes: 2011 population estimates are preliminary. The Inner and Middle sectors of Brisbane together correspond to the Brisbane City Council boundary.

Source: BITRE estimates derived from ABS Cat. 3218.0 Regional Population Growth (March 2012 release).

Map 3.6 shows the change in population density in SEQ between 2001 and 2011, with the largest density gains concentrated in the inner city.

Map 3.6 Change in population density, South East Queensland, 2001 to 2011



Notes: 2011 population estimates are preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

Table 3.8 lists the SLAs in SEQ which experienced a density increase of more than 600 people per square kilometre between 2001 and 2011. The SLAs that dominate the listing are from the Inner sector of Brisbane (eight out of the top ten), while the top ten also features one SLA from the Gold Coast (Varsity Lakes) and one from Brisbane's Middle East subregion (Wakerley). The Brisbane City Inner SLA recorded a dramatic increase in population density between 2001 and 2011, which reflects very rapid population growth of 14 per cent per annum off a low initial base population of just 1021 persons in 2001, occurring in a compact area of just 0.7 square kilometres.

Several SLAs experienced small declines in their population density level. The largest drops were in Stafford Heights in the Middle North of Brisbane (–70 people per square kilometre) and Middle Park in the Middle West of Brisbane (–49 people per square kilometre).

Table 3.8 Statistical Local Areas with the greatest absolute increase and decrease in persons per square kilometre, South East Queensland, 2001 to 2011

SLA name	Subregion	Persons per square kilometre, 2001	Persons per square kilometre, 2011	Increase or decrease in population density, 2001–2011
Greatest increase in population density				
City Inner	Inner	1451	5364	3914
Fortitude Valley	Inner	2260	4639	2379
Newstead	Inner	2254	4518	2264
City Remainder	Inner	1199	3387	2188
Spring Hill	Inner	2796	4842	2045
Kangaroo Point	Inner	4348	5690	1343
Varsity Lakes	Gold Coast	1165	2475	1310
Wakerley	Middle East	312	1570	1258
West End	Inner	3076	4251	1176
South Brisbane	Inner	1502	2558	1056
Bulimba	Middle East	2034	3045	1011
New Farm	Inner	4991	5942	951
Broadbeach-Mermaid Beach	Gold Coast	3117	3910	793
Kelvin Grove	Inner	2431	3178	748
Taringa	Middle West	3225	3916	691
Parkinson-Drewvale	Middle South	494	1184	690
Surfers Paradise	Gold Coast	3048	3728	679
Pacific Pines-Gaven	Gold Coast	330	1006	676
Kuraby	Middle South	1019	1690	672
Calamvale	Middle South	1462	2098	636
Balmoral	Middle East	2701	3319	618
Highgate Hill	Inner	4398	5009	611
Greatest decrease in population density				
Stafford Heights	Middle North	2450	2380	–70
Middle Park	Middle West	2874	2825	–49
Jindalee	Middle West	2080	2054	–26

Note: Increase in population density of less than 600 people have been excluded from the greatest absolute increase. 2011 population estimates are preliminary.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

Households

This section presents a brief overview of spatial differences in average household size and the rate of growth of households. This analysis has been included to provide some understanding of the connection between spatial change in population, households and demand for dwellings.

Table 3.9 summarises household growth and household size at the subregional, regional and Statistical Division level for the 2001 to 2006 period, based on ABS' Estimated Resident Households data.

The Outer sector had the largest household size in 2006 (2.8 persons) in the Brisbane region. Of the subregions, the Outer South had the largest household size in 2006—averaging slightly more than 2.9 persons per household. The smallest household size was in the Inner sector with 2.1 persons per household.

Table 3.9 Household growth and household size, South East Queensland, 2001 to 2006

Region	Average annual growth in households, 2001 to 2006 (per cent)	Average annual growth in ERP, 2001 to 2006 (per cent)	Average household size, 2001	Average household size, 2006	Change in household size, 2001 to 2006
Inner	4.1	5.6	1.9	2.1	0.18
Middle	1.2	1.8	2.6	2.7	0.06
Middle East	1.2	1.9	2.5	2.6	0.08
Middle North	0.6	1.2	2.4	2.5	0.06
Middle South	1.4	2.1	2.6	2.7	0.07
Middle West	1.8	2.3	2.8	2.9	0.04
Outer	2.1	2.5	2.8	2.8	0.03
Outer East	2.2	2.3	2.7	2.7	0.02
Outer North	2.6	3.0	2.8	2.8	0.02
Outer South	1.1	1.8	2.9	2.9	0.06
Outer West	2.1	2.6	2.9	2.9	–0.01
Brisbane region	1.7	2.3	2.6	2.7	0.07
Gold Coast	2.8	3.7	2.5	2.6	0.09
Sunshine Coast	2.8	3.6	2.5	2.5	0.08
Toowoomba	1.9	2.2	2.8	2.8	0.03
West Moreton	1.5	2.1	2.6	2.7	0.07
SEQ Total	2.0	2.6	2.6	2.7	0.07

Note: The estimated resident population used in the table has been based only on residents of occupied private dwellings. This enables valid comparison with household data.

Source: BITRE analysis of ABS Estimated Resident Household data obtained on request.

The average household size in SEQ increased marginally from 2001 to 2006. A similar trend was observed in the Brisbane region as well. All the subregions and Statistical Divisions in SEQ except Outer West experienced an increase in the number of persons per household. The Inner sector experienced the greatest increase of 0.18 persons per household.

Between 2001 and 2006 the number of households in SEQ grew at an average annual rate of 2.0 per cent, with the Brisbane region growing at 1.7 per cent over the same period. This was about 0.6 percentage points lower than the population growth rate, with the gap being reflected in the slight increase in household size between 2001 and 2006. The lowest household growth occurred in the Middle North subregion, with an average annual 0.6 per cent increase

in the number of households during the period. In contrast, the number of households in the Inner sector grew at an average annual rate of 4.1 per cent.

While the average annual growth rate of households is lower than that of population, the spatial patterns of household growth in SEQ are reasonably similar to the spatial patterns of population growth detailed previously in this chapter.

Progress against relevant strategic planning objectives

Background

This section takes a closer look at the strategies in place to manage population growth in SEQ, as set out in the *SEQ Regional Plan 2009–2031* and its two predecessors. The *SEQ Regional Plan 2009–2031* seeks to proactively manage growth by identifying the preferred settlement pattern for the SEQ region in 2031. It identifies the indicative planning population of each SEQ LGA in 2031 and additional dwellings targets for each LGA between 2006 and 2031. The forward outlook for the distribution of population and dwellings growth in SEQ is presented in Chapter 9.

The remainder of this chapter assesses recent trends against those strategic planning goals that relate to the spatial distribution of population in SEQ. The *SEQ Regional Plan 2009–2031* sets out several policy directions that relate to the spatial location of population and dwellings growth, including:

- Redistributing growth to the Western Corridor and relieving pressures on the coast (pp. 9, 11).
- Limiting urban sprawl by locating urban development within the urban footprint, accommodating a higher proportion of growth through infill and redevelopment of existing urban areas, and increasing the density of greenfield developments to at least 15 dwellings per hectare (p. 20, 91).
- Consolidating rural population growth in existing towns and villages (p.74).
- Promoting infill housing and higher densities in existing regional activity centres (pp. 9, 96).

The initial objective relating to the Western Corridor has evolved considerably over the period and has much greater prominence in the two most recent regional plans than it does in the RFGM 2000. The remaining three objectives are common objectives across the SEQ RFGM 2000, the *SEQ Regional Plan 2005–2026* and the *SEQ Regional Plan 2009–2031*, although the language used has changed, as have some of the quantitative targets.

Redistribute residential growth to west and away from coast

A key strategic direction of the *SEQ Regional Plan 2009–2031* is 'facilitating growth in the west'. More specifically, the aim is that an 'increased proportion of the region's future population will be accommodated in the Western Corridor and South Western Corridor, making use of significant areas of available land and reducing pressure on the coast' (Queensland Government and COMSEQ 2009, p.11). This was also a key strategic direction of the *SEQ Regional Plan*

2005–2026, except that the focus was restricted to the Western Corridor, with no mention of the South Western Corridor. Redistributing residential growth to the Western Corridor and redistributing growth away from the coast were not top-level priorities of the SEQ RFGM 2000. However, the detail of the plan noted that '[p]riority should be given to encouraging development in the urban areas of Ipswich City' which had excess capacity to accommodate population growth (RCC 2000, p.41).

In the *South East Queensland Infrastructure Plan and Program 2010–2031*, the Western Corridor is described as including the area covered by the Ipswich City Council, and stretching from Goodna to Ipswich city and Amberley, while also encompassing Ebenezer, Swanbank, Ripley Valley and Springfield[21] (Department of Infrastructure and Planning 2010, pp. 39, 48). Ripley Valley and Springfield in the Ipswich LGA are expected to cater for most of the new residential development in the Western Corridor (ibid). For the purposes of this analysis, BITRE has defined the Western Corridor as equivalent to the Ipswich LGA (i.e. the Ipswich Central, Ipswich East, Ipswich North, Ipswich West and Ipswich South West SLAs). This definition, and those that follow, are based on 2006 ABS ASGC boundaries.

The South Western Corridor is expected to emerge as a key location for residential growth in the medium to long term (Queensland Government and COMSEQ 2009). It includes the southern part of the Logan LGA (e.g. Yarrabilba, Greater Flagstone) and the north-eastern section of the Scenic Rim LGA. For the purposes of this analysis, BITRE has defined the South Western Corridor as consisting of the Greenbank-Boronia Heights, Browns Plains, Marsden, Logan Balance, Waterford West, Loganlea, Tanah Merah, Loganholme, Eagleby, Beenleigh, Edens Landing-Holmview, Mt Warren Park, Wolffdene-Bahrs Scrub, Bethania-Waterford, Beaudesert Part A, Beaudesert Part B and Beaudesert Part C SLAs.[22]

A coastal category is also included as a reference point, because a high proportion of SEQ's residential growth in recent decades has been coastal in nature, and the stated objective involves reducing pressure on the coast. BITRE has defined 'coastal areas' quite broadly as all SEQ SLAs which either adjoin the coast, or have a population-weighted centroid within 10 kilometres of the coast. Thus, we are capturing residential development which is occurring near the SEQ coastline, rather than right on the coast. There are a number of Gold Coast and Sunshine Coast SLAs which are not considered coastal according to this definition (e.g. Nambour, Guanaba-Springbrook).

The above three categories are mutually exclusive, but not mutually exhaustive, in that many SEQ SLAs belong to none of the categories. Table 3.10 summarises population growth for these three categories, and for the rest of SEQ. Between 1991 and 2001, coastal areas accounted for 55 per cent of SEQ's population growth, but the table provides evidence of a redirection of growth away from these coastal areas since 2001, to both the Western Corridor and the rest of SEQ.

21 All of the listed locations are located within the Ipswich LGA.

22 This is a very encompassing definition of the South Western Corridor in that it extends all the way south to the NSW border—unfortunately the 2006 SLA boundaries do not enable the northern part of what is now the Scenic Rim LGA to be separately distinguished.

Table 3.10 Proportion of population growth located in Western Corridor, South Western Corridor and coastal areas, South East Queensland, 1991 to 2011

Per cent	1991 to 2001	2001 to 2006	2006 to 2011
Coastal areas	55	46	44
Western Corridor	1	5	9
South Western Corridor	9	7	7
Rest of SEQ	35	42	40
Total SEQ	100	100	100

Note: Coastal areas defined as SEQ SLAs which either adjoin the coast or have a population-weighted centroid within 10km of coast. Western Corridor defined as equivalent to Ipswich LGA. A listing of South Western Corridor SLAs is provided earlier in this section.

Source: BITRE analysis of ABS Cat. 3218.0 Regional Population Growth 2011 (March 2012 release).

The population of the Western Corridor grew by 47 500 people between 2001 and 2011, compared to growth of just over 6 800 between 1991 and 2001. From 1991 to 2001, coastal areas grew much more rapidly than the Western Corridor (averaging 3.7 and 0.6 per cent per annum respectively). However, growth in the Western Corridor has accelerated rapidly since 2001, with an average annual growth rate of 3.2 per cent, which compares favourably to the 2.7 per cent average growth of SEQ coastal areas.

The South Western Corridor's contribution to SEQ's total population growth has not changed a great deal over the period, adding 49 600 population from 1991 to 2001 and 48 200 population from 2001 to 2011. Average annual growth remained relatively strong at 3.5 per cent between 1991 and 2001 and 2.5 per cent between 2001 and 2011. This reflects strong population growth in parts of the Logan LGA. More southerly parts of the South Western Corridor are expected to play a greater role in catering for SEQ's population growth in the medium to long term.

Thus, since 2001, there has been a partial redirection of SEQ's population growth away from the coast and towards the Western Corridor, as well as to other parts of SEQ (but not as yet to the South Western corridor). This resulted in the Western Corridor increasing its share of SEQ population growth from just 1 per cent between 1991 and 2001, to 5 per cent for 2001 to 2006, and then to 9 per cent for 2006 to 2011. Despite this partial redirection, about 45 per cent of SEQ's recent population growth continues to occur within 10km of the coastline.

Limit urban sprawl

> 'SEQ has developed historically in a dispersed, low-density settlement pattern, which has moved outward into the regional landscape. This pattern has become unsustainable. ... In response, the SEQ Regional Plan concentrates urban development in the Urban Footprint and redirects an increased proportion of new growth to existing communities. Containing urban growth pressures will preserve the region's landscape, open spaces and farmland, and provide significant environmental quality and health benefits' (Queensland Government and COMSEQ 2009, p.90).

The *SEQ Regional Plan 2009–2031* aims to control urban sprawl in SEQ by increasing housing density and restricting development in areas beyond the city's Urban Footprint. A more compact urban structure is to be achieved by:

- accommodating a higher proportion of growth through infill and redevelopment of existing urban areas
- focusing higher density development around activity centres and public transport nodes
- increasing density in new greenfields developments, to reach a minimum dwelling yield of 15 dwellings per hectare
- locating urban development in the Urban Footprint, either within or near existing communities (ibid., pp. 91–92).

The aim is for at least 50 per cent of the additional 754 000 dwellings required in SEQ between 2006 and 2031 to be accommodated within the existing urban area, through infill and redevelopment (ibid., p.91). To help achieve this objective, minimum infill targets have been set for each LGA.

The Urban Footprint 'establishes a boundary for urban development, containing urban growth and promoting a higher density urban form' (ibid., p.12). It identifies land that can meet the region's urban development needs to 2031, and 'has the capacity to accommodate in excess of 754 000 additional dwellings through a mix of additional development in existing urban areas and on broadhectare land' (ibid., p.9). It includes established urban areas, broadhectare land and remnant broadhectare areas that could be suitable for future urban development. Not all land included within the Urban Footprint can be developed for urban purposes. For example, national parks and state forests continue to be protected under state legislation, while some land may be unsuitable for urban development due to constraints such as flooding and land slope (ibid., pp. 15–16).

The *SEQ Regional Plan 2005–2026* also aimed to 'contain urban development within the Urban Footprint' (Queensland Government and SEQROC 2005, p.61). However, it differed from the *SEQ Regional Plan 2009–2031* in that no minimum dwelling yield was set. Furthermore, the target for the proportion of new dwellings to be accommodated through infill and redevelopment of existing urban areas was less ambitious in the short to medium term—targeting 40 per cent between 2004 and 2016, rising to 50 per cent between 2016 and 2026.

While the SEQ RFGM 2000 preceded the introduction of the Urban Footprint, the intent was similar—that the pattern of development in SEQ should reduce encroachment on the natural environment (RCC 2000, p.25). The SEQ RFGM 2000 also pursued the following relevant goals:

- '[a]n increased proportion of the region's population growth should be accommodated within existing urban areas by identifying and developing areas which are suitable for redevelopment or infill' (ibid., p.46)
- '[t]he non-urban, environmental and open space areas between the four major urban areas should be protected from significant urban and rural residential development' (ibid., p.46)
- 'increase average residential densities in new areas and in existing areas' (ibid., p.52).

Thus, the three most recent strategic plans for SEQ pursue a common objective of limiting urban sprawl by aiming to increase densities in new and existing suburbs and restrict the locations in which urban development can occur (so as to preserve the region's natural environment and farmland).

Recent trends in population change and housing development

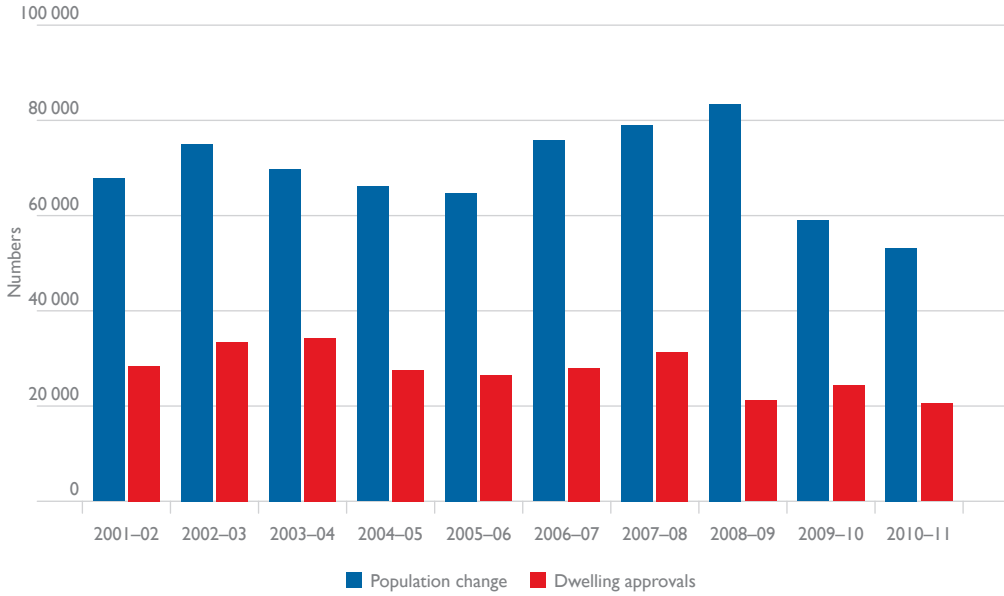
Figure 3.10 shows the trends in population increase and dwelling approvals for SEQ between 2001–02 and 2010–11. The estimated resident population of SEQ increased by close to 694 000 people in the ten years ended June 2011. The period between June 2006 and June 2009 saw average population growth of about 80 000 per year in SEQ, but the two most recent years saw population gains of less than 60 000. There were 275 600 dwelling approvals between July 2001 and June 2011. Dwelling approvals have also fluctuated, decreasing from a peak of 34 343 in 2003–04 to 20 501 in 2010–11. Information was not available on dwelling completions for SEQ, so this section uses dwelling approvals data to proxy for growth in the dwelling stock.

The two series in Figure 3.10 are moderately well correlated with one another, but dwelling approvals tend to lead population change by about one year. Each dwelling approval in SEQ is associated with an average population growth of 2.4 persons in the following year.

According to Growth Management Queensland (2011), new dwelling approvals were tracking around the pro-rata target for total additional dwellings from July 2006 until about June 2008. However, as Figure 3.10 shows, new dwelling approvals dropped significantly after June 2008. Consequently, while an additional 120 640 dwellings were targeted for SEQ between July 2006 and June 2010 (an average of 30 160 per year), the cumulative total was 103 986 new dwelling approvals (an average of 25 996 per year), which equates to 86 per cent of the target (ibid).[23] BITRE's update of the analysis so it covers the July 2006 to June 2011 period shows that this pattern has continued, with cumulative new dwelling approvals in SEQ equating to 83 per cent of the pro-rata target. Thus, SEQ is currently tracking somewhat below the pro-rata dwellings target from the latest SEQ Regional Plan.

23 While the Brisbane, Ipswich, Moreton Bay, Redland and Somerset LGAs exceeded their targets as at June 2010, the other six LGAs did not fulfil the target (Growth Management Queensland 2011).

Figure 3.10 Comparison of population increase and dwelling approvals, South East Queensland, 2001–02 to 2010–11



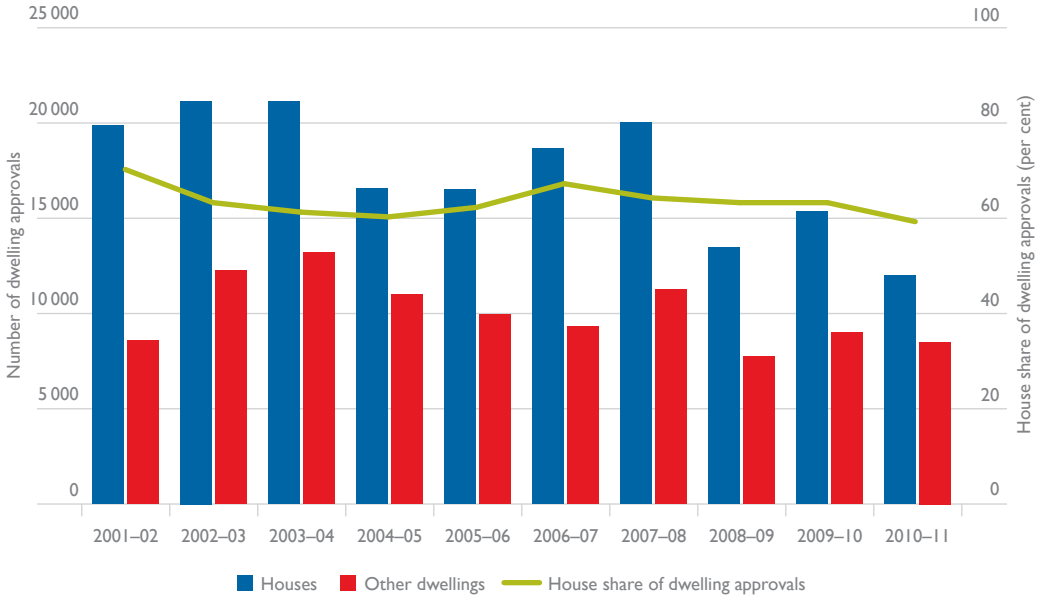
Note: 2011 population estimates are preliminary.

Sources: BITRE analysis of population change data from ABS Cat. 3218.0 and dwelling approvals data from OESR (2011b) and Queensland Regional Statistical Information System (2001–02 data only).

Figure 3.11 shows the number of new dwelling approvals by type in SEQ between 2001–02 and 2010–11. Approvals of separate houses fluctuated around a declining trend over the period. On average, 63 per cent of all dwelling approvals in SEQ relate to separate houses, with the proportion fluctuating between 58 and 70 per cent over the period.

In Brisbane, 65 per cent of dwelling approvals in the nine year period ended June 2010 related to separate houses. This is comparable to Melbourne (67 per cent), but lower than Perth (79 per cent), and much higher than Sydney (37 per cent), where multi-unit dwellings approvals were of greater significance (BITRE 2012a).

Figure 3.11 New dwelling approvals by type, South East Queensland, 2001–02 to 2010–11



Source: BITRE analysis of ABS dwelling approvals data from OESR (2011b) and Queensland Regional Statistical Information System (2001–02 data only).

Table 3.11 compares population increase and new dwelling approvals by type for Brisbane between 2001–02 and 2010–11. Brisbane's house approvals display a very similar pattern to house approvals in SEQ as a whole (see Figure 3.11). However, other dwelling approvals have picked up strongly since June 2009, contributing over 40 per cent of Brisbane's total dwelling approvals in 2009–10 and 2010–11. While Brisbane was responsible for between 50 and 60 per cent of other dwelling approvals in SEQ from 2001–02 to 2008–09, Brisbane accounted for 76 per cent of other dwelling approvals in 2009–10 and 2010–11. These results suggest that infill developments may have played an expanded role in accommodating population growth in Brisbane in the last few years.

Figure 3.12 shows that the median size of new standard lot registrations (intended for detached dwellings) in SEQ declined from 675 square metres in the year ended March 2004 to 556 square metres in the year ended March 2012 (OESR 2012). The decline in median lot size was widespread, but was particularly pronounced for the Moreton Bay LGA (from 715 to 482 square metres). The proportion of all standard lot registrations that were less than 600 square metres roughly doubled from 24 per cent in 2004 to 49 per cent in 2009. These results suggest there has been considerable progress in increasing the residential density of new detached housing developments since 2004,[24] although median lot sizes in Brisbane remained higher than those in other major Australian capitals as of 2009 (Urban Development Institute of Australia 2011).

24 The available information does not distinguish between the Development Areas (to which the 15 dwellings per hectare target specifically relates) and other locations in SEQ.

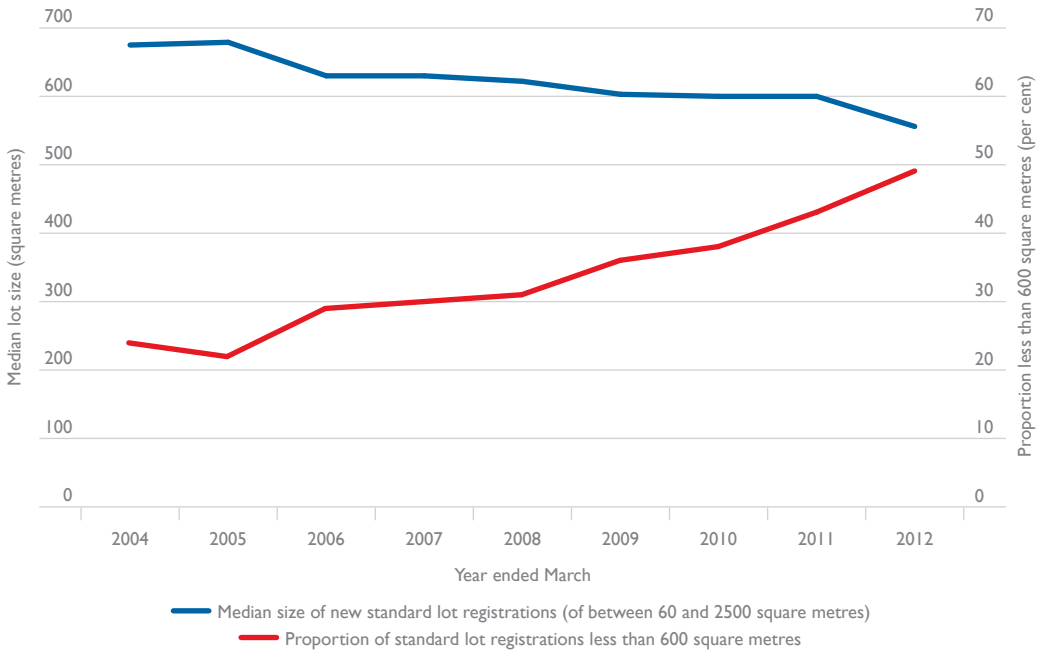
Table 3.11 Comparison of population change and dwelling approvals by type, Brisbane, 2001–02 to 2010–11

Year	Population change ('000)	Dwelling approvals (number)			Houses as a share of dwelling approvals (per cent)	Brisbane houses as a share of SEQ house approvals (per cent)	Brisbane other dwellings as a share of SEQ other dwelling approvals (per cent)
		Houses	Other	Total			
2001–02	37.8	12 245	5 190	17 435	70	na	na
2002–03	41.8	13 064	6 282	19 346	68	62	51
2003–04	40.1	12 966	6 931	19 897	65	61	52
2004–05	36.2	9 816	6 494	16 310	60	59	59
2005–06	34.7	9 918	5 862	15 780	63	60	59
2006–07	43.7	10 775	4 880	15 655	69	58	52
2007–08	48.7	11 935	6 256	18 191	66	60	55
2008–09	50.1	8 401	4 244	12 645	66	62	55
2009–10	33.6	9 253	6 854	16 107	57	60	76
2010–11	33.4	7 979	6 484	14 463	55	67	76

Note: 2011 population estimates are preliminary.
n.a. = Not available.

Source: BITRE analysis of ABS Cat. 3218.0 and 8731.0.

Figure 3.12 New standard lot registrations, South East Queensland, 2004 to 2012



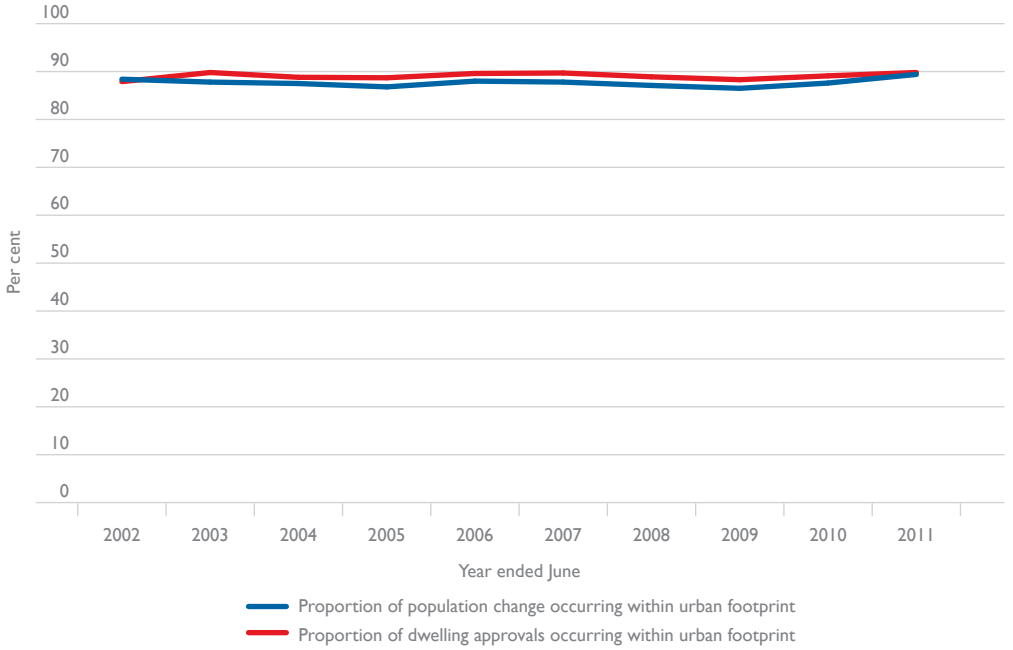
Note: Standard lots are lots on a standard format plan intended for detached dwellings. Also includes lots intended for detached dwellings within a community title scheme.

Source: BITRE analysis of OESR Residential land development activity profile, SEQ (March 2012 release).

Location of population change and housing development

Since the *SEQ Regional Plan 2009–2031* aims to concentrate urban development within the Urban Footprint, it is worth considering the extent to which population and dwellings growth are occurring within the Urban Footprint, and whether that is changing over time. Figure 3.13 plots BITRE's estimates of the percentage of SEQ's population growth and dwelling approvals that occurred within the Urban Footprint. The calculation is based on SLA data and adopts the 2009 Urban Footprint, which 'remains mostly unchanged' relative to the 2006 Urban Footprint (Queensland Government and COMSEQ 2009, p.1).

Figure 3.13 Estimated proportion of South East Queensland's population increase and dwelling approvals occurring within Urban Footprint, 2002 to 2011



Notes: 2011 population estimates are preliminary. The 2009 Urban Footprint was overlaid with 2006 CCD boundaries, and the proportion of each CCD located within the Urban Footprint was derived. This proportion was then applied to 2006 CCD population data and aggregated to provide the estimated proportion of each SLA's population who lived within the Urban Footprint. This population-based concordance for 2006 was then applied to the population and dwelling approvals time series data at the SLA scale. These estimates produced through application of a population-weighted concordance involve some degree of approximation, particularly for years well removed from the base year of 2006, and moreso for dwelling approvals than for the population estimates.

Based on data provided by the Department of State Development, Infrastructure and Planning, Queensland, which gives no warranty in relation to the data (including accuracy, reliability, completeness or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data.

Sources: BITRE analysis of population change data from ABS Cat. 3218.0 and the ABS 2006 *Census of Population and Housing*, dwelling approvals data from Queensland Regional Statistical Information System, and SEQ Urban Footprint for 2009.

Between July 2001 and June 2011, BITRE estimates that about 88 per cent of SEQ's population growth and 89 per cent of dwelling approvals[25] occurred within the Urban Footprint boundary. These proportions remained relatively stable throughout the period (see Figure 3.13). Thus, SEQ's urban development has been largely concentrated within the Urban Footprint since 2001.

Of the residential growth that occurred outside the Urban Footprint, much of it occurred within the Sunshine Coast region, which had a 26 per cent share of population growth and a 28 per cent share of dwelling approvals outside the Urban Footprint. The Gold Coast and West Moreton regions and the Outer Northern subregion also had significant shares of the residential growth that occurred outside the Urban Footprint between 2001 and 2011. However, nearly all of the residential growth in the Inner and Middle sectors and the Outer Western subregion occurred within the SEQ Urban Footprint. At the SLA scale, the Caloundra Rail Corridor and Maroochy Balance SLAs on the Sunshine Coast and the Beaudesert Part A SLA in the Outer Southern subregion were prominent locations for residential development located outside the Urban Footprint between 2001 and 2011. The latter two SLAs were two of the main locations for rural residential development in SEQ, an issue which is discussed in more detail towards the end of this chapter.

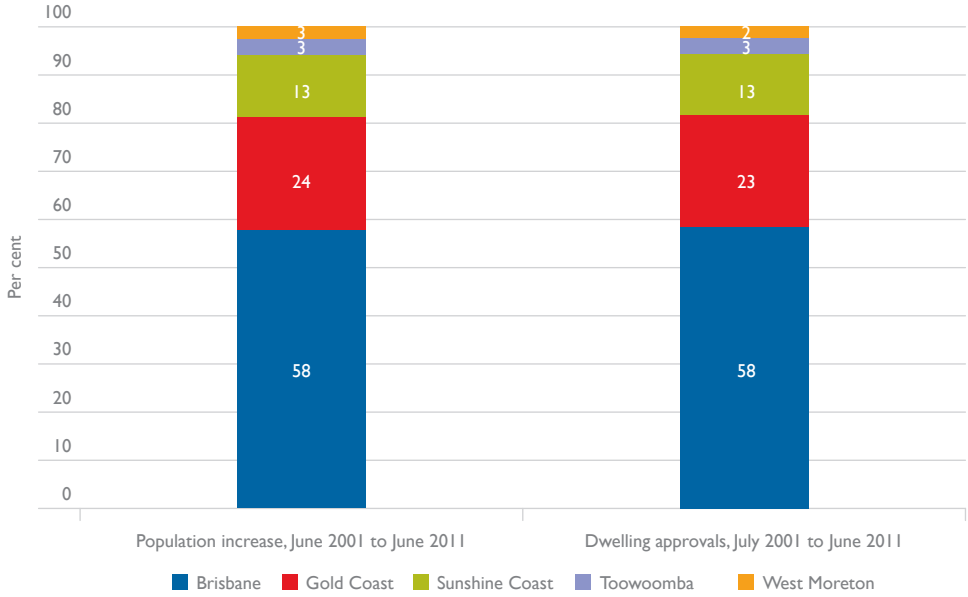
Figure 3.14 shows how the population growth and dwelling approvals that occurred between July 2001 and June 2011 were distributed across SEQ. About 58 per cent of SEQ's population increase occurred within Brisbane, 24 per cent in the Gold Coast and 13 per cent in the Sunshine Coast. Toowoomba and West Moreton were responsible for only a small fraction of SEQ's growth over this period. The location split for dwelling approvals was very similar to that of population growth.

Figure 3.15 presents the split for the Brisbane region. About half of Brisbane's population growth and dwelling approvals occurred in the Outer sector. As a result, Outer Brisbane was responsible for about 30 per cent of SEQ's population growth and dwelling approvals in the ten years ended June 2011.

The population growth in Brisbane's Outer sector reflects a mix of growth in established suburbs and greenfield developments. The distinction between infill and greenfield development is not always straightforward, as there can be delays of many years between an initial land release and a suburb being fully populated, and significant new land releases can occur in an established suburb.

25 Queensland Government (2008b) estimates that about 94 per cent of new dwelling approvals were within the SEQ Urban Footprint (as defined in 2006) during the 2004 to 2007 period. It is not clear if the estimate is based on dwelling approvals data for SLAs (as used here) or for CCDs (in which case the resulting estimate would be more accurate). We note that if we categorise each 2006 CCD as being either inside or outside the Urban Footprint, we obtain a very similar estimate of 93 per cent for 2006. Instead, BITRE's estimates in Figure 3.13 allow for many CCDs to be partly inside and partly outside the Urban Footprint boundary.

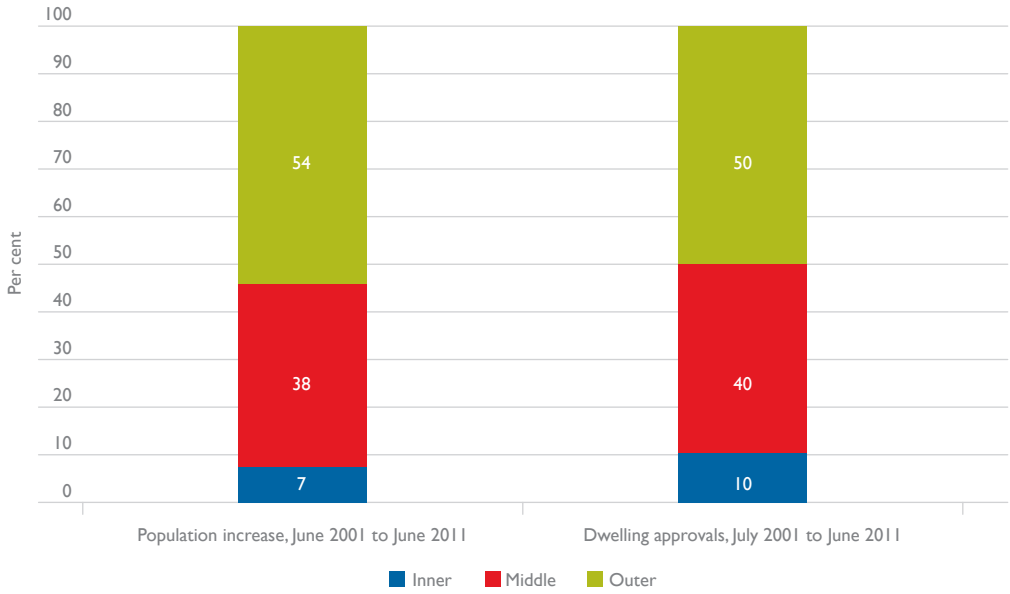
Figure 3.14 Proportion of population increase and dwelling approvals occurring in each region of South East Queensland, 2001 to 2011



Note: 2011 population estimates are preliminary.

Sources: BITRE analysis of population change data from ABS Cat. 3218.0 and dwelling approvals data from Queensland Regional Statistical Information System.

Figure 3.15 Proportion of population increase and dwelling approvals occurring in each sector of Brisbane, 2001 to 2011



Note: 2011 population estimates are preliminary.

Sources: BITRE analysis of population change data from ABS Cat. 3218.0 and dwelling approvals data from Queensland Regional Statistical Information System.

The Queensland Government has dealt with this lack of clarity by creating an Existing Urban Area (EUA) boundary in 2005 so that infill and redevelopment activity could be monitored against the *SEQ Regional Plan 2005–2026* targets (OESR 2009). Any residential development occurring within the EUA boundary is considered infill (ibid.,).

Performance monitoring found that during the three year period ended September 2007, there were 43 889 new infill dwellings, which was 38 per cent higher than the pro-rata target of 31 836 dwellings from the *SEQ Regional Plan 2005–2026* (Queensland Government 2008b). Over this period, infill dwellings accounted for 60 per cent of new dwellings, which was well above the 40 per cent target (ibid).

A revised EUA boundary was introduced, based on circumstances as at December 2008, and has been used to report against *SEQ Regional Plan 2009–2031* infill targets (OESR 2009). The new EUA boundary is considerably more expansive than the previous boundary, so that a great deal of development that was not previously classified as infill, is now classified as infill. The change to the EUA boundary almost doubled the estimated number of infill dwellings in SEQ for the year ended September 2007,[26] highlighting the sensitivity of infill estimates to the adopted definition.

Table 3.12 presents information from Growth Management Queensland (2011) on infill performance for the 2006 to 2010 period, together with an update to June 2011 based on information in OESR (2011c). It shows that, for the period since July 2006, the SEQ region has been tracking well ahead of the pro-rata infill target. In the year ended June 2011, infill dwelling approvals were below the pro-rata annual target, which resulted in some closing of the gap between actual and targeted infill dwellings. Almost 70 per cent of dwelling approvals in SEQ are classified as infill from 2006 to 2011, well in excess of the 50 per cent target from the *SEQ Regional Plan 2009–2031*.

Across the entire 2001–02 to 2010–11 period, OESR estimates that 73 per cent of all dwelling approvals in SEQ occurred within the current EUA boundary, and would thus be classified as infill development based on current definitions.[27] However, much of the early 2000s development that falls inside the 2008 EUA boundary would not have been considered infill development at the time. Application of the 2008 EUA boundary produces rather more meaningful results when the focus is restricted to recent years (as in Table 3.12).

26 This is illustrated by comparing data for the year ended September 2007 across the two assessment reports:

- Based on the old EUA boundary, Queensland Government (2008b p.287) reports 10 973 infill dwellings in SEQ in the year ended September 2007, representing 44 per cent of total new dwellings.
- Based on the revised EUA boundary, Figure 13 of Growth Management Queensland (2011) identifies 21 446 infill dwellings in SEQ in the year ended September 2007, representing about 74 per cent of total new dwelling activity.

27 These figures are Australian Bureau of Statistics unpublished building approvals data aggregated from Census Collection District level, with data manipulations by Office of Economic and Statistical Research.

Table 3.12 Comparison of infill dwelling activity to South East Queensland Regional Plan targets, 2006 to 2011

	Infill dwelling approvals, 1 July 2006 to 30 June 2010	Infill dwelling approvals, 1 July 2006 to 30 June 2011	Targeted additional infill dwellings from *SEQ Regional Plan 2009–2031*
Cumulative infill total	73 079	86 246	59 840 for 4 year period / 74 800 for 5 year period
Pro-rata annual infill	18 270	17 249	14 960
Current activity as a percentage of the pro-rata infill target	122 per cent	115 per cent	na
Current percentage of infill to total new dwelling approvals	70 per cent	69 per cent	50 per cent

Note: Any residential development occurring within the EUA boundary (as of December 2008) is classified by the Queensland Government as infill.

na = Not available.

Source: BITRE analysis of Growth Management Queensland (2011)—South East Queensland Growth Management Program, Annual Report 2010, and OESR (2011c)—Residential infill development profile, Number 6, June 2011.

Of the 86 246 infill dwelling approvals in SEQ between July 2006 and June 2011, the Brisbane LGA was responsible for 37 per cent, while Gold Coast (19 per cent), Moreton Bay (13 per cent) and Sunshine Coast (11 per cent) also made important contributions. The non-infill dwelling approvals primarily occurred in the Moreton Bay (22 per cent), Gold Coast (21 per cent) and Sunshine Coast LGAs (14 per cent).[28]

Of the new infill dwelling approvals between 2006 and 2010, 53 per cent were for separate houses (Growth Management Queensland 2011). Most of these infill house approvals would have been located 'on recently subdivided land in the Existing Urban Area. This type of dwelling activity is expected to decline in the short to medium-term as remnant broadhectare land in the Existing Urban Area is taken up' (ibid., p.31).

Between 2006 and 2011, about 57 per cent of house approvals were classified as infill.[29] BITRE analysis shows that only 19 per cent of house approvals in SEQ between 2006 and 2011 related to the Inner and Middle sectors of Brisbane, with 39 per cent relating to Outer Brisbane and 41 per cent to the rest of SEQ. So while 57 per cent of house approvals were classified as infill by the SEQ Growth Management Program, only 19 percentage points of that relates to the established inner and middle suburbs of Brisbane, and much of the remaining 38 percentage points relates to new houses being built on recently subdivided land near the urban fringe (but within the most recent EUA boundary).

The Ipswich East SLA has been a significant location for new house approvals in SEQ. Figure 3.16 uses a series of satellite images of part of the suburb of Redbank Plains, in the Ipswich East SLA, to illustrate how infill development is defined in SEQ. The red line approximates the current EUA boundary, signifying that the displayed area is located on the urban fringe. Figure 3.16 shows there were no completed dwellings in the displayed area as of September 2003. Property sales records show numerous sales of vacant land commencing in 2003, but the first sale of a completed dwelling was not until 2007. The majority of residential development was completed after 2006, with the July 2008 image showing that around half of dwellings were

28 Based on BITRE analysis of Growth Management Queensland (2011)—South East Queensland Growth Management Program, Annual Report 2010, and OESR (2011c)—Residential infill development profile, Number 6, June 2011.

29 Data source as described in previous footnote.

either completed or under construction, and by June 2010 only a few vacant blocks of land remained. Because the development occurred within the EUA boundary (i.e. to the north of the red line), it is classified as infill development in the SEQ Growth Management Program.

Figure 3.16 Satellite images of part of Redbank Plains, 2003 to 2011

Note: The red line at the bottom of each map represents the EUA boundary (as defined in December 2008) and applied in Growth Management Queensland (2011) to dwelling approvals data for the July 2006 to June 2010 period. Residential development falling within the EUA boundary (i.e. above the red line) is classified as infill development by Growth Management Queensland.

Source: BITRE analysis of Google Earth satellite images, ©2012 Whereis® Sensis Pty Ltd Image © 2012 DigitalGlobe.

Population and dwelling growth within newly developing suburbs

While the SEQ Growth Management Program data informs questions about the containment of new housing development within the existing urban area, it does not directly provide information on the location of population growth and nor does it support comparison between cities (given differences in the approach used to delineate infill from greenfield development). Census data can provide some information relevant to these matters.

BITRE has developed a census-based methodology for classifying all ABS suburbs within capital city regions as either a 'newly developed suburb' or part of the 'existing urban area' for the

2001 to 2006 period (see BITRE 2010, 2011a, 2012a). To avoid confusion with the Queensland Government's EUA boundary, the term 'existing urban area' has been replaced here with 'established suburb'. In this classification method, all Middle and Inner sector suburbs were classified as established suburbs, whereas Outer sector suburbs were classified as either a newly developed suburb or an established suburb, depending on whether certain growth criteria were met.[30] The newly developed suburb category is intended to capture urban fringe locations that have experienced a very rapid increase in the number of dwellings, typically off a low base. Initially this classification method was applied to Perth (see BITRE 2010, pp. 44–45) and subsequently to Melbourne and Sydney (see BITRE 2011a, pp. 85–86; BITRE 2012a, pp. 84–85).

In 2006, there were 805 suburbs designated by the ABS as being located in SEQ. Applying the aforesaid classification method for SEQ, a total of 70 newly developing suburbs have been identified (8.7 per cent of total suburbs) for the period between 2001 and 2006, which are listed in Table 3.13.[31] Among these 70 newly developed suburbs, 44 suburbs satisfied Criterion 1, while 26 suburbs satisfied Criterion 2. The location of newly developed suburbs shows that 30 suburbs are in Outer Brisbane, 20 suburbs are in the Gold Coast region, 14 suburbs are in the Sunshine Coast region, four suburbs are in Toowoomba and two suburbs are in West Moreton (Table 3.13).

30 Specifically a newly developed suburb needed to meet one of the two following criteria:

- Criterion 1: A suburb located in the Outer sector or the rest of SEQ in which the number of occupied private dwellings increased by more than 50 per cent over the period ***and*** this involved an increase of at least 100 additional dwellings ***and*** the growth was fringe development.
- Criterion 2: A suburb located in the Outer sector or the rest of SEQ in which the number of occupied private dwellings increased by between 30 and 50 per cent over the period ***and*** at least one CD within the suburb more than doubled its number of dwellings ***and*** this involved at least 100 additional dwellings ***and*** the growth was fringe development.

The second criterion loosens the growth cut-off a little to ensure the definition is able to capture suburbs which contain some established residential areas, but in which substantial new land releases occurred during or just prior to the period of interest.

31 Some additional suburbs satisfied BITRE's quantitative growth criteria, but were not considered to be newly developed suburbs, because the growth estimates were distorted by boundary change between 2001 and 2006. Examples include three suburbs in West Moreton (Aratula, Gleneagle and Kooralbyn) and two suburbs in Sunshine Coast (Meridan Plains and Belli Park).

Table 3.13 List of newly developed suburbs in South East Queensland, 2001 to 2006

Satisfied criterion 1	Satisfied criterion 2
Brisbane (30 suburbs)	
Redland Bay (Redland Shire)	Thornlands (Redland Shire)
Burpengary (Caboolture Shire Balance)	Brendale (Pine Rivers Shire)
Cashmere (Pine Rivers Shire Balance)	Eatons Hill (Pine Rivers Shire)
Dakabin (Pine Rivers Shire)	Kurwongbah (Pine Rivers Shire)
Delaneys Creek (Caboolture Shire)	Murrumba Downs (Pine Rivers Shire)
Griffin (Pine Rivers Shire)	Rothwell (Redcliffe City)
Highvale (Pine Rivers Shire)	Greenbank (Beaudesert Shire)
Mango Hill (Pine Rivers Shire)	Tamborine (Beaudesert Shire)
Narangba (Caboolture Shire)	Underwood (Logan City)
Sandstone Point (Caboolture Shire)	
Warner (Pine Rivers Shire)	
Heritage Park (Logan City)	
Logan Reserve (Logan City)	
Meadowbrook (Logan City)	
New Beith (Beaudesert Shire)	
Brookwater (Ipswich City)	
Deebing Heights (Ipswich City)	
Karalee (Ipswich City Balance)	
Redbank Plains (Ipswich City Balance)	
Springfield (Ipswich City)	
Springfield Lakes (Ipswich City)	
Gold Coast (20 suburbs)	
Bonogin (Gold Coast City Balance)	Hope Island (Gold Coast City)
Coomera (Gold Coast City Balance)	Jacobs Well (Gold Coast City)
Gaven (Gold Coast City)	Molendinar (Gold Coast City)
Maudsland (Gold Coast City Balance)	Reedy Creek (Gold Coast City)
Mount Nathan (Gold Coast City)	Robina (Gold Coast City)
Ormeau (Gold Coast City Balance)	Upper Coomera (Gold Coast City)
Ormeau (Gold Coast City)	Witheren (Beaudesert Shire)
Ormeau Hills (Gold Coast City)	
Oxenford (Gold Coast City Balance)	
Pacific Pines (Gold Coast City Balance)	
Pacific Pines (Gold Coast City)	
Upper Coomera (Gold Coast City Balance)	
Varsity Lakes (Gold Coast City)	
Sunshine Coast (14 suburbs)	
Bli Bli (Maroochy Shire Balance)	Black Mountain (Noosa Shire)
Caloundra West (Caloundra City)	Doonan (Maroochy Shire)
Little Mountain (Caloundra City)	Marcoola (Maroochy Shire)
Parrearra (Caloundra City)	Minyama (Caloundra City)
Pelican Waters (Caloundra City)	Mooloolah Valley (Caloundra City)
Peregian Beach (Maroochy Shire Balance)	Palmwoods (Maroochy Shire)
Sippy Downs (Maroochy Shire)	
Twin Waters (Maroochy Shire)	
Toowoomba (4 suburbs)	
Meringandan West (Rosalie Shire)	Highfields (Crows Nest Shire)
Westbrook (Jondaryan Shire)	Middle Ridge (Toowoomba City)
West Moreton (2 suburbs)	
(None)	Esk (Esk Shire)
	Laidley Heights (Laidley Shire)

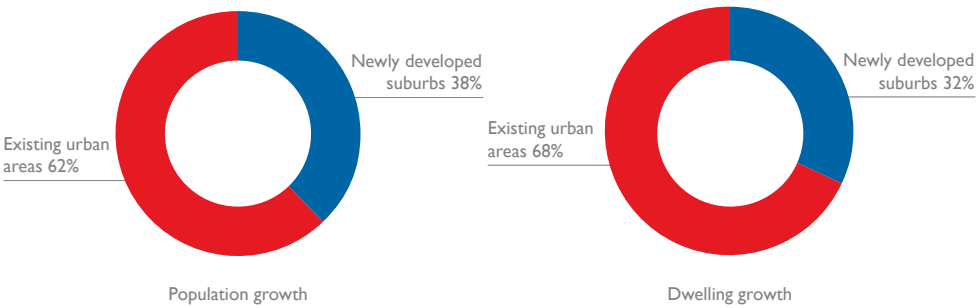
Note: BITRE classified all ABS ASGC 2006 suburbs in SEQ as either established suburbs or newly developed suburbs based on a set of criteria outlined on the preceding pages. For some suburbs, the contributing 2001 CCDs were more aggregated than the contributing 2006 CCDs, and where this is the case, the measurement of change for the suburb between 2001 and 2006 may be less accurate.

Source: BITRE analysis of ABS *Census of Population and Housing* suburb and CCD data on occupied private dwellings for 2001 and 2006.

The growth in these newly developed suburbs provides a conservative guide to growth in greenfield land releases because considerable greenfield development has occurred in suburbs which are not listed in Table 3.13. Examples include Deception Bay and Morayfield in Brisbane's Outer North—both were relatively established suburbs in 2001 (containing more than 4000 dwellings) and have added many new dwellings, but have not grown rapidly enough since 2001 to meet the BITRE definition of a newly developed suburb. Further examples include the Middle West suburbs of Parkinson and Forest Lake, which are located on Brisbane's urban fringe (as defined by the EUA boundary) and grew strongly from 2001 to 2006, but do not qualify as newly developed suburbs as the standard definition applied across cities classifies all Inner and Middle sector suburbs as established suburbs.

According to the ABS census data, the usual resident population of SEQ increased by 296 600 (or 12 per cent), to reach 2 704 800 in 2006. Occupied dwellings increased by around 116 900 (or 13 per cent), to 1 045 300 dwellings in 2006. Figure 3.17 illustrates the distribution of population and dwellings growth. Thirty eight per cent of the population growth and 32 per cent of the dwelling growth has occurred in the newly developed suburbs. The established suburbs account for a slightly greater proportion of dwellings growth than population growth (68 per cent versus 62 per cent). This pattern is due to a combination of factors, such as lower birth rates than newly developed suburbs, and smaller household sizes, with young families being less prominent in established suburbs compared to the newly developed suburbs.

Figure 3.17 Proportion of population and dwelling growth attributable to newly developed suburbs and established suburbs, South East Queensland, 2001 to 2006



Note: Newly developing suburbs are listed in Table 3.13. Results relate to the usual resident population and to occupied private dwellings.

Source: BITRE analysis of ABS *Census of Population and Housing* data for suburbs for 2001 and 2006.

Brisbane was responsible for 43 per cent of population growth and 41 per cent of dwelling growth in SEQ's newly developed suburbs from 2001 to 2006. The Gold Coast contributed a further 35 per cent of population and dwellings growth in newly developed suburbs.

Table 3.14 lists the newly developed suburbs and established suburbs that added the most dwellings between 2001 and 2006. Of the listed newly developed suburbs, three were from Brisbane's Outer sector, three from Gold Coast and one from Sunshine Coast. The large increases in dwellings in the City and Fortitude Valley reflect the process of inner city redevelopment, with significant construction of new flats and apartments.

Table 3.14 Largest dwelling and population increases by suburb, South East Queensland, 2001 to 2006

Suburb	Ring structure	Dwelling change	Population change
Newly developed suburbs			
Mango Hill (Pine Rivers Shire)	Outer North	2114	6426
Robina (Gold Coast City)	Gold Coast	2066	5561
Varsity Lakes (Gold Coast City)	Gold Coast	1982	5151
Springfield Lakes (Ipswich City)	Outer West	1630	4839
Upper Coomera (Gold Coast City Balance)	Gold Coast	1484	4843
Narangba (Caboolture Shire)	Outer North	1426	4714
Sippy Downs (Maroochy Shire)	Sunshine Coast	1312	3616
Established suburbs			
City (Brisbane City)	Inner	3157	4731
Forest Lake^ (Brisbane City)	Middle West	2084	6059
Fortitude Valley (Brisbane City)	Inner	1367	1418
Deception Bay (Caboolture Shire)	Outer North	1359	5056
Buderim	Sunshine Coast	1289	3459

Notes: Cut-off for inclusion in table was a dwelling increase of 1250.

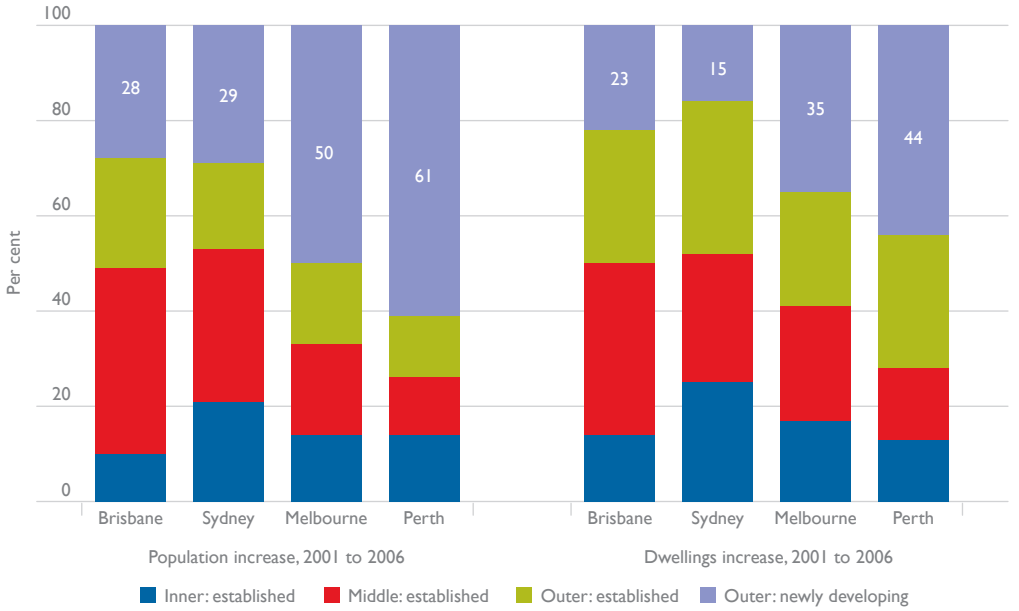
^ Forest Lake shares the growth characteristics of the listed newly developed suburbs, but because it is located within Brisbane's Middle sector is classified as an established suburb, in line with the approach adopted for the other cities.

For some suburbs, the contributing 2001 CCDs were more aggregated than the contributing 2006 CCDs, and where this is the case, the measurement of change for the suburb between 2001 and 2006 may be less accurate.

Source: BITRE analysis of ABS *Census of Population and Housing* suburb data on occupied private dwellings and usual resident population for 2001 and 2006.

The proportion of population and dwellings growth which occurred in newly developed suburbs of Brisbane is compared with the other major capital city statistical divisions (SDs) in Figure 3.18. Between 2001 and 2006, Brisbane had a much lower proportion of its population increase occurring within the newly developed suburbs (28 per cent) compared to Melbourne (50 per cent) and Perth (61 per cent), but was similar to Sydney (29 per cent). Brisbane also had a lower proportion of its dwelling increase occurring within the newly developed suburbs (23 per cent) compared to Melbourne (35 per cent) and Perth (44 per cent), but was higher than Sydney (15 per cent). In each capital city, the newly developed suburbs accommodated a much larger proportion of the population increase than of the dwelling increase, reflecting the larger household sizes and higher birth rates in the newly developed suburbs, compared to the existing urban areas (BITRE 2012a).

Figure 3.18 Comparison of distribution of population and dwelling growth within Brisbane, Sydney, Melbourne and Perth, 2001 to 2006



Notes: The analysis relates to suburbs within capital city statistical divisions. Definition of newly developed suburbs is provided in Table 3.13 for Brisbane, Table 3.12 of BITRE (2012a) for Sydney, Table 3.18 of BITRE (2011a) for Melbourne, and Table 3.8 of BITRE (2010) for Perth. Results relate to the usual resident population and to occupied private dwellings.

The estimates for Melbourne and Perth differ slightly from those in BITRE (2010) and BITRE (2011a), as the population increase and dwelling increase for the statistical division was used as the denominator to enable valid comparisons to be made with the Sydney and Brisbane results (whereas the previous denominator was the sum of growth across suburbs).

Source: BITRE analysis of ABS *Census of Population and Housing* data for 2001 and 2006.

This relatively limited accommodation of growth in the newly developed suburbs on the urban fringe of the Brisbane SD (as shown in Figure 3.18) is somewhat misleading, because a great deal of the growth pressures are being absorbed by newly developed suburbs in the rest of SEQ, and particularly in the Gold Coast. When the focus is shifted to SEQ as a whole (as in Figure 3.17), 38 per cent of population growth and 32 per cent of dwellings growth has been accommodated in newly developed suburbs. The latter result is similar to that observed for the Melbourne SD for the 2001 to 2006 period.

Overall assessment

The recent strategic plans aim to control urban sprawl in SEQ by:

- locating urban development in the Urban Footprint
- accommodating a higher proportion of growth through infill and redevelopment of existing urban areas[32]
- increasing density in new greenfields developments.

32 A particular component of infill development is locating higher density development around activity centres, an objective which is assessed in its own right later in this chapter.

Between July 2001 and June 2011, BITRE estimates that about 88 per cent of SEQ's population growth and 89 per cent of dwelling approvals occurred within the Urban Footprint boundary. These proportions remained relatively stable throughout the period. Thus, SEQ's urban development has been largely concentrated within the Urban Footprint since 2001.

For the five year period ended July 2011, new dwelling approvals were tracking at 83 per cent of the *SEQ Regional Plan 2009–2031* pro-rata target, while infill dwelling approvals were tracking at 115 per cent of the target. Consequently, 69 per cent of all dwelling approvals were due to infill, well above the targeted 50 per cent (see Table 3.12). Earlier performance reporting for the three years ended September 2007 found that 60 per cent of new dwellings were infill dwellings (Queensland Government 2008b). BITRE analysis of census data finds that 62 per cent of population growth and 68 per cent of dwellings growth from 2001 to 2006 related to established suburbs, rather than newly developed suburbs on the urban fringe.

Taken together, these results consistently indicate that SEQ has accommodated 60–70 per cent of residential growth within existing urban areas during the 2001 to 2011 period, which exceeds the 50 per cent target (and the previous target of 40 per cent).

BITRE analysis shows that the Inner and Middle sectors of Brisbane together accounted for only 26 per cent of population growth and 29 per cent of dwelling growth in SEQ between 2001 and 2011. Thus, of the 60–70 per cent of SEQ's residential growth occurring within the existing urban area, 25–30 per cent relates to Inner and Middle Brisbane, while much of the remainder relates to new houses being built on recently subdivided land near the urban fringe.

Between 2001 and 2006, infill development within established suburbs has played a greater role in accommodating growth in Brisbane, than it has in either Melbourne or Perth (see Figure 3.18). The gap is less pronounced when SEQ is used as the comparison point.

Table 3.15 shows that the *SEQ Regional Plan 2009–2031* sets the highest target for new dwellings compared to other cities (over a similar timeframe), but it has the lowest infill target in percentage terms. SEQ's infill target appears modest not just in comparison to other Australian cities, but also in light of its own infill performance over the past decade.[33]

Between 2004 and 2012, there was considerable progress in increasing the density of new detached housing developments in SEQ, with median lot size trending downwards (OESR 2012).

Table 3.15 Infill targets for major Australian cities

City	Strategic planning document	Time-frame	Target dwellings (number)	Percentage from infill (per cent)
South East Queensland	South East Queensland (SEQ) Regional Plan	2009–2031	754 000	50
Sydney	City of Cities: A Plan for Sydney's Future	2005–2031	640 000	60 to 70
Melbourne	Melbourne 2030: A Planning Update – Melbourne @ 5 million	2009–2030	600 000	53
Perth	Directions 2031 Spatial Framework for Perth and Peel	2009–2031	328 000	55
Adelaide	The 30-Year Plan for Greater Adelaide	2010–2040	258 000	Moving from 50 to 70

Source: Adapted from National Housing Supply Council (2011a, p.112).

33 Growth Management Queensland (2011 p.31) points out that the level of infill development is expected to decline over time as recently subdivided and remnant broadhectare land in the Existing Urban Area is taken up. This may significantly reduce the overall rate of infill development activity compared to the pro-rata infill targets.

Overall, the evidence consistently points to progress being made in controlling urban sprawl in SEQ between 2001 and 2011. This has been achieved by containing the great majority of residential development within the Urban Footprint, increasing residential densities in new detached housing developments, and accommodating a higher than targeted proportion of growth in existing urban areas. However, the sheer magnitude of residential growth in SEQ—as shown by the dwellings target in Table 3.15—means that the 30–40 per cent of residential development that is not infill does actually represent a rather significant addition (of at least 82 000 dwellings)[34] beyond the EUA boundary since 2001.

Consolidate rural population growth in existing towns and villages

The SEQ region is recognised as Queensland's urban heart, yet rural areas make up about 1.9 million hectares or 85 per cent of the region's land area (Council of Mayors SEQ 2012b). Rural areas are expected to absorb about 10 per cent of the region's population growth to 2031, predominantly in rural towns and villages (ibid).

The *SEQ Regional Plan 2009–2031* aims to 'consolidate future rural population growth within existing towns and villages' and to 'contain and limit areas allocated for rural residential development' (Queensland Government and COMSEQ 2009, pp. 74, 110). The *SEQ Regional Plan 2005–2026* pursued very similar objectives. The intent behind this consolidation of growth in discrete and serviceable centres is to reduce isolated rural residential development, ensure efficient provision of services and infrastructure, and prevent inappropriate fragmentation of productive rural land. Rural residential development is defined as 'large lot residential subdivision in a rural, semi-rural or conservation setting' (ibid., p.110).

The SEQ RFGM 2000 pursued similar principles, specifying that 'identification of new rural residential land should not occur without strong justification' and prioritising the upgrade of 'designated rural residential areas to a more intensive urban residential use, where such areas are in close proximity to existing urban areas, transport services and community infrastructure and do not conflict with nature conservation and cultural heritage values' (RCC 2000, pp. 49, 53).

Queensland Government (2008b) identifies a SEQ rural population of 346 245, based on ABS ERP data for June 2006. It reports that 87.6 per cent of SEQ's population lived in urban areas, 2.1 per cent in rural towns and villages, 1.1 per cent in rural residential areas, and 9.2 per cent in the general rural area. The methodology and definitions underlying these estimates is not spelt out.

BITRE has used the ABS section of state classification, and specifically the 'rural balance' category of this classification to investigate changes in the SEQ rural population from 2001 to 2006. The 'rural balance' category captures settlements of less than 200 people, farms and lifestyle acreages, and thus includes a great deal of rural residential development. According to this classification, settlements of 200 to 999 persons are referred to as 'bounded localities', while settlements of more than 1000 persons are 'urban centres'. Using this classification, analysis of 2001 and 2006 ABS census data (see Table 3.16) reveals that:

- The estimated number of people living in the rural balance of SEQ was 212 002 persons in 2006, which represents a 7.8 per cent share of the total SEQ population. There were

34 This is derived by applying the 30 per cent minimum to the total of 275 600 dwelling approvals in SEQ between July 2001 and June 2011 (see Figure 3.10). Applying 40 per cent gives an upper limit estimate of about 110 000 dwellings.

73 385 dwellings in the rural balance of the SEQ region, representing a 7.0 per cent share of the SEQ total.

- Between 2001 and 2006, the rural balance of SEQ added about 17 000 people and 5700 dwellings. This represented a population increase of 9 per cent, compared to 13 per cent for urban areas of SEQ. The rural balance contributed 5.7 per cent of SEQ's population growth and 4.9 per cent of dwellings growth.
- About 94 per cent of population and dwellings growth in SEQ was in urban centres, and the great majority of that growth was in the major urban centres of Brisbane, Gold Coast and Sunshine Coast.

Table 3.16 shows that 8.7 per cent of SEQ's population lived in rural areas in 2006 and rural areas were responsible for 6.5 per cent of the 2001 to 2006 population growth. The rural population growth largely related to the rural balance (87 per cent), and only a small proportion of rural population growth was consolidated within existing localities of 200 to 999 persons (i.e. villages). Some of the rural population growth may have been consolidated in existing towns located in a rural setting, as the smallest urban centres (1000 to 4999 persons) grew rapidly, particularly on the Sunshine Coast.

Table 3.16 Population and dwellings change in rural areas of South East Queensland, 2001 to 2006

Section of state classification	Population (number)		Dwellings (number)	
	2006	Change (2001–2006)	2006	Change (2001–2006)
Rural areas	234 062	19 354	81 996	6 701
Localities	22 060	2 359	8 611	1 005
Rural balance	212 002	16 995	73 385	5 696
Urban centres	2 470 662	288 817	963 373	111 443
Major urban (> 100 000)	2 263 637	261 719	883 704	101 157
Other urban	207 025	27 098	79 669	10 286
SEQ total^	2 704 831	296 635	1 045 349	116 895
Rural balance share of SEQ (per cent)	7.8	5.7	7.0	4.9
Rural share of SEQ (per cent)	8.7	6.5	7.8	5.7

Notes: Based on ABS section of state classification and data at CCD scale.

^ Components do not sum to SEQ total, as SEQ total is derived from aggregate SD and SSD data, rather than from CCD-level data.

Source: ABS *Census of Population and Housing* data, 2001 and 2006.

The below-average growth rate of 9 per cent for the rural balance between 2001 and 2006 provides some indication that rural residential development is starting to be curtailed in SEQ. Much of the rural balance growth relates to the Brisbane and Sunshine Coast SDs. In particular, the Beaudesert Part A SLA—which includes the rapidly growing urban centre of Jimboomba as well as the southern extreme of the Brisbane urban centre—was responsible for 27 per cent of the population increase and 22 per cent of the dwelling increase in the rural balance of SEQ. The development in the 'rural balance' parts of this SLA consists largely of low density rural residential development. Other key areas for 'rural balance' growth are the Maroochy Balance, Noosa Balance, Pine Rivers Balance and Laidley SLAs.

Rural residential lot approvals accounted for about 13 per cent of SEQ lot approvals from 2003 to 2011, while low density lot registrations accounted for 8 per cent of SEQ lot registrations (OESR 2012). Since October 2004, regulatory provisions have limited the areas in which rural residential development can occur in SEQ (Queensland Government 2008b). According to OESR (2012), the number of rural residential lot approvals peaked at 4079 in 2004, but has been much lower in recent years, with an average of about 1700 rural residential lot approvals per year between 2008 and 2011. The number of low density lot registrations also peaked in 2004 (at 2846 registrations), and has been trending downwards since then, averaging around 1500 registrations per year from 2008 to 2011.

In summary, a significant amount of rural population growth occurred outside of SEQ's existing towns and villages between 2001 and 2006, amounting to an additional 17 000 persons, or 5.7 per cent of SEQ's population growth. However, the 9 per cent increase in the rural population was less than SEQ's total population increase of 12 per cent. With declines in rural residential lot approvals and low density lot registrations since 2004, there are some early indications that rural residential development is starting to be curtailed in SEQ.

Promote infill housing and higher densities in centres

One of the key policy objectives of compact settlement highlighted in both SEQ Regional Plans is to '[f]ocus higher density residential development in and around regional activity centres' (Queensland Government and SEQROC 2005, p.65; Queensland Government and COMSEQ 2009, p.91). To achieve this, both SEQ Regional Plans have outlined density guidelines, which state that residential densities should be at least 40–120 dwellings per hectare (net) in principal regional activity centres and 30–80 dwellings per hectare in major regional activity centres (ibid). A similar policy objective was set out in the earlier SEQ RFGM 2000, which states that '[r]esidential densities should be increased in existing and new areas, particularly around major centres' (RCC 2000, p.51).

This section examines the broad aim of promoting infill housing and increasing residential densities in regional activity centres, focusing on the changes in population, dwellings and densities that occurred in activity centres—especially in primary, major regional and principal regional activity centres—between 2001 and 2006. ABS census data was used for this exercise.

To produce estimates for activity centres, the destination zones that overlap the activity centre boundaries presented in local government planning documents35 were identified, and used to approximate the centre's location. Population and dwellings data for census collection districts was aggregated to the destination zone scale, and then used to produce estimates for the activity centres. This destination zone approach results in a consistent definition of activity centres being adopted for both this residential analysis and for Chapter 4's employment analysis. Specialised centres, major rural activity centres and principal rural activity centres were not included in the analysis. Certain proposed centres which are contained within the same destination zone (Yarrabilba and Flagstone) or are part of greenfields development that had not begun by 2006 (Caloundra South) have not been included.

35 Note that for some activity centres, the destination zone containing the centre is significantly larger than the activity centre itself. This means that population estimates for some activity centres may be higher than actual population within the centre.

Population and population density

Of particular interest in this study is the extent to which SEQ's population is concentrated within activity centres, and how this is changing over time. Table 3.17 presents BITRE's estimates of the distribution of the population across the different types of activity centre in 2006, while Table 3.18 shows how population has changed in activity centres between 2001 and 2006.

In 2006, there were around 342 500 residents of SEQ's existing primary and regional activity centres, representing 12.7 per cent of the total SEQ population. Much of this relates to major regional activity centres, which were home to over 204 100 residents, and accounted for 7.5 per cent of the total SEQ population. Principal regional activity centres were home to 95 600 residents. Nearly 43 000 residents lived in the primary activity centre (Table 3.23).

Table 3.17 Population by type of activity centre, South East Queensland, 2006

Centre type	Population ('000)	Share of centres (per cent)	Share of SEQ (per cent)
Primary	42.8	12.5	1.6
Major regional	204.1	59.6	7.5
Principal regional	95.6	27.9	3.5
Total in centres	342.5	100.0	12.7
Total SEQ	2704.8		100.0

Notes: 1. Activity centres in SEQ are classified as follows:

Primary activity centre is Brisbane CBD.

Major regional centres are Wynnum Central, Coolangatta, Bundall, Ripley, Mitchelton, Surfers Paradise, Logan Central, Noosa, Goodna, Redcliffe, Toombul/Nundah, Broadbeach, Strathpine, Caloundra, Logan Hyperdome, Browns Plains, Nambour, Toowong, Helensvale, Beerwah, Sippy Downs, Kawana, Nerang, Coomera and North Lakes.

Principal regional centres are Springwood, Ipswich, Southport, Chermside, Maroochydore, Capalaba, Beenleigh, Caboolture/Morayfield, Indooroopilly, Robina, Upper Mount Gravatt, Carindale, Springfield, Toowoomba and Cleveland.

2. Major and Principal rural activity centres were not included in the analysis.
3. Specialised centres were not included in the analysis, because they were not a focus for population in centres in the SEQ Regional Plan.

Source: BITRE analysis of ABS 2006 *Census of Population and Housing* place of usual residence data for CCDs.

The population of SEQ's primary and regional activity centres is estimated to have risen by 56 600 between 2001 and 2006, representing an increase from 11.9 per cent of the SEQ population in 2001 (Table 3.18) to 12.7 per cent in 2006 (Table 3.17). This indicates a shift towards a greater concentration of population within activity centres from 2001. This shift was evident for all three listed activity centre types between 2001 and 2006.

Each of the different types of activity centres experienced more rapid population growth than SEQ as a whole between 2001 and 2006. The most rapid growth occurred in the primary activity centre (8.0 per cent per annum), followed by principal regional activity centres (4.0 per cent per annum), with growth slowest in major regional activity centres (2.8 per cent per annum) (Table 3.18).

Table 3.18 Changes in population by type of activity centres, South East Queensland, 2001 to 2006

Centre type	Share of SEQ (per cent), 2001	Change in population ('000), 2001–2006	Average annual growth rate (per cent), 2001–2006	Proportion of SEQ population growth (per cent), 2001–2006
Primary	1.2	13.7	8.0	4.6
Major regional	7.2	26.0	2.8	8.8
Principal regional	3.2	17.0	4.0	5.7
Total in centres	11.9	56.6	3.7	19.1
Total SEQ	100.0	296.6	2.4	100.0

Note: For details of centre type, see Table 3.17.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* place of usual residence data for CCDs.

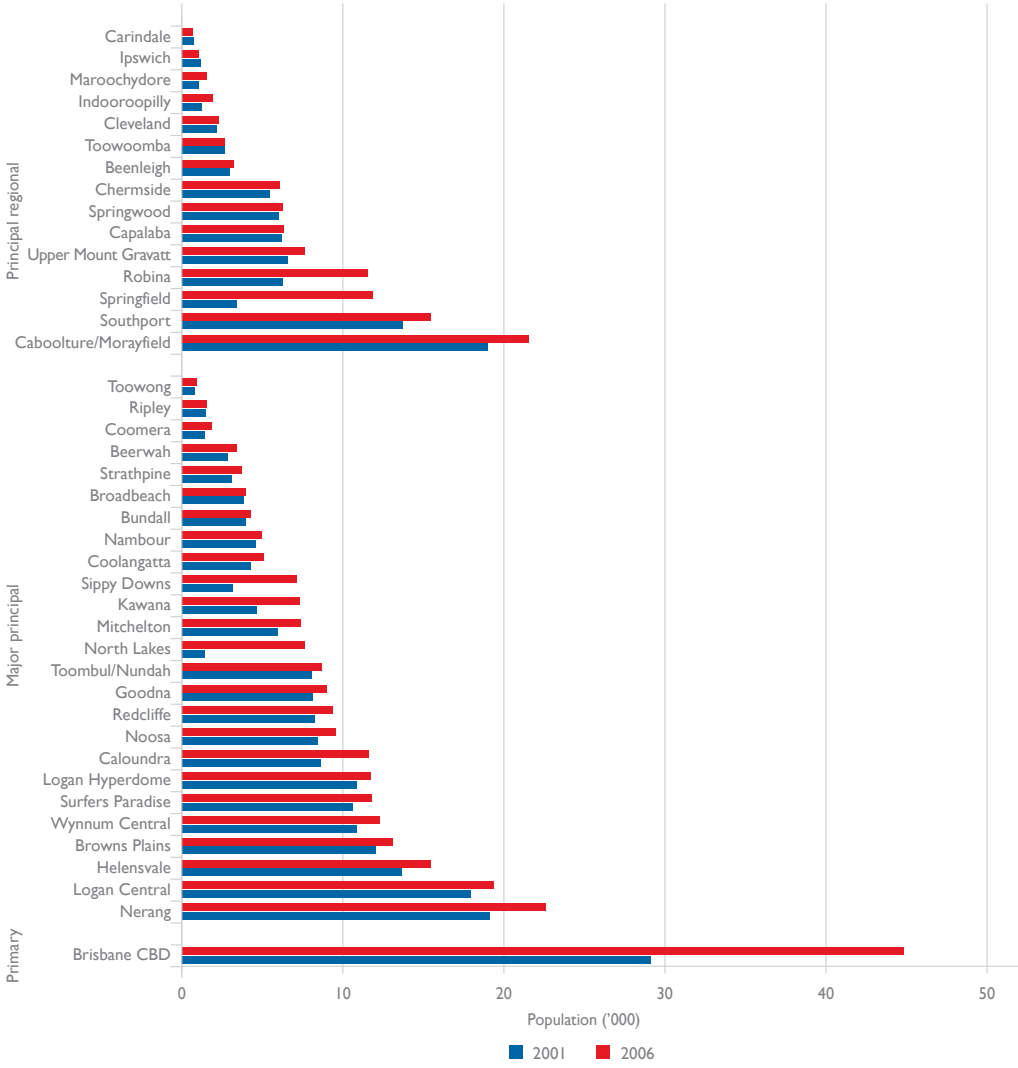
Figure 3.19 presents the results for individual activity centres—the greatest population growth occurred in the Brisbane CBD[36] (13 700) and Springfield (7900), with North Lakes (5900) and Robina (4800) also experiencing significant growth. Those four centres together accounted for 57 per cent of population growth in SEQ's primary and regional activity centres. By contrast, there were four activity centres that experienced a loss of 50 or more residents between 2001 and 2006 (i.e. Ipswich, Capalaba, Carindale and Toowoomba).

Table 3.19 reports population density by type of activity centre in SEQ for 2001 and 2006. The average population density of SEQ's primary and regional activity centres increased from 663 to 794 persons per square kilometre over the period, representing a 20 per cent increase. Population density increased at a more rapid pace for SEQ's centres than it did for SEQ as a whole or for Brisbane's established inner and middle suburbs (20 per cent versus 12 and 10 per cent, respectively).

During this period, population density significantly increased in the Brisbane CBD primary activity centre by 7100 persons per square kilometre, from 15 100 persons per square kilometre in 2001 to 22 200 persons per square kilometre in 2006. Significant increases in population density also occurred for the major regional activity centres and the principal regional activity centres. In particular, in the principal regional activity centre of Indooroopilly, population density rose by 1127 persons per square kilometre to reach 3501 persons per square kilometre in 2006. The principal regional activity centre of Carindale recorded the largest decline in population density, from 1220 to 1116 persons per square kilometre between 2001 and 2006.

36 The Brisbane CBD activity centre includes the frame area described in Queensland Government and COMSEQ (2009 p.97), and thus extends well beyond the City Inner and City Remainder SLAs.

Figure 3.19 Population of South East Queensland's centres, 2001 and 2006



Note: Sorted by activity centre type and 2006 population.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* place of usual residence data for CCDs.

Table 3.19 Population density by type of activity centre, South East Queensland, 2001 and 2006

Centre type	Population density (persons per square kilometre)			Percentage change in density, 2001 to 2006
	2001	2006	Change (2001 to 2006)	
Primary	15 103	22 188	7085	47
Major regional	597	684	87	15
Principal regional	601	731	130	22
All centres	663	794	131	20

Note: For details of centre type, see Table 3.17.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* place of usual residence data for CCDs.

Dwellings

Table 3.20 reports on changes in the number of occupied private dwellings in SEQ between 2001 and 2006, by type of activity centre. In 2001, there were nearly 125 000 dwellings in activity centres, which increased to 151 000 in 2006, giving an overall increase of more than 26 000 dwellings. Of this increase, more than 11 400 dwellings were added to major regional activity centres (or around 44 per cent). Between 2001 and 2006, dwelling numbers grew much more rapidly in the primary centre than in the other types of activity centres.

The greatest dwelling growth occurred in the Brisbane CBD activity centre (8066) and Springfield (2556), with North Lakes (1977) and Robina (1684) also experiencing significant growth. Those four centres together accounted for 54 per cent of dwelling growth in SEQ's primary and regional activity centres. By contrast, there were two centres that experienced a loss of over 30 occupied private dwellings between 2001 and 2006 (i.e. Toowoomba and Ipswich).

Table 3.20 Dwelling numbers by type of activity centres, South East Queensland, 2001 to 2006

Centre type	Dwellings, 2001		Dwellings, 2006		Change in number of dwellings, 2001 to 2006	Average annual growth rate, 2001 to 2006 (per cent)
	Number	Share (per cent)	Number	Share (per cent)		
Primary	14 076	1.5	22 142	2.1	8 066	9.5
Major regional	79 118	8.5	90 559	8.7	11 441	2.7
Principal regional	31 668	3.4	38 279	3.7	6 611	3.9
Total in centres	124 862	13.4	150 980	14.4	26 118	3.9
Total SEQ	928 454	100.0	1 045 349	100.0	116 895	2.4

Note: For details of centre type, see Table 3.17.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* place of enumeration data for CCDs on occupied private dwellings.

Higher density forms of housing

Table 3.21 summarises the changes in the dwelling mix in SEQ between 2001 and 2006. The number of occupied private dwellings increased by 116 900, with an increase of 78 400 separate houses, 18 000 semi-detached dwellings, and 27 000 flats, units and apartments. High rise flats, units and apartments (i.e. in blocks of four or more storeys) experienced the most rapid growth, with an average annual increase of 9.4 per cent per annum, compared to 2.1 per cent for separate houses. The table reveals a shift towards higher density forms of housing being built in SEQ between 2001 and 2006. This reflects a continuation of the significant shift towards higher density housing between 1981 and 2001, when the stock of multi-unit dwellings in Brisbane expanded by 146 per cent (Randolph 2006).

Table 3.21 Occupied private dwellings by dwelling type, South East Queensland, 2001 and 2006

Type of dwelling	Occupied private dwellings, 2001 (per cent)	Occupied private dwellings, 2006 (per cent)	Average annual growth rate, 2001 to 2006 (per cent)
Separate house	76.4	74.8	2.1
Semi-detached, row or terrace house, townhouse etc	8.4	9.1	4.3
Flat, unit or apartment, block of three storeys or less (includes flats attached to houses)	10.6	10.4	2.2
Flat, unit or apartment, four or more storey block	3.1	4.2	9.4
Other (e.g. caravan, cabin, houseboat, flat attached to shop or office)	1.5	1.5	1.5
Total	100.0	100.0	2.4

Notes: 'Dwelling structure not stated' was excluded when calculating percentages.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* place of enumeration data for CCDs.

As of census night 2006, the SEQ dwelling mix was 75 per cent separate houses, 24 per cent multiple dwellings (semi-detached dwellings and flats, units and apartments) and 1 per cent other types of dwelling (see Table 3.21). Between July 2006 and June 2010, 35 per cent of SEQ dwelling approvals related to multiple dwellings, rather than houses (Growth Management Queensland 2011). This indicates that the shift towards higher density forms of housing in SEQ has continued over the 2006 to 2010 period.

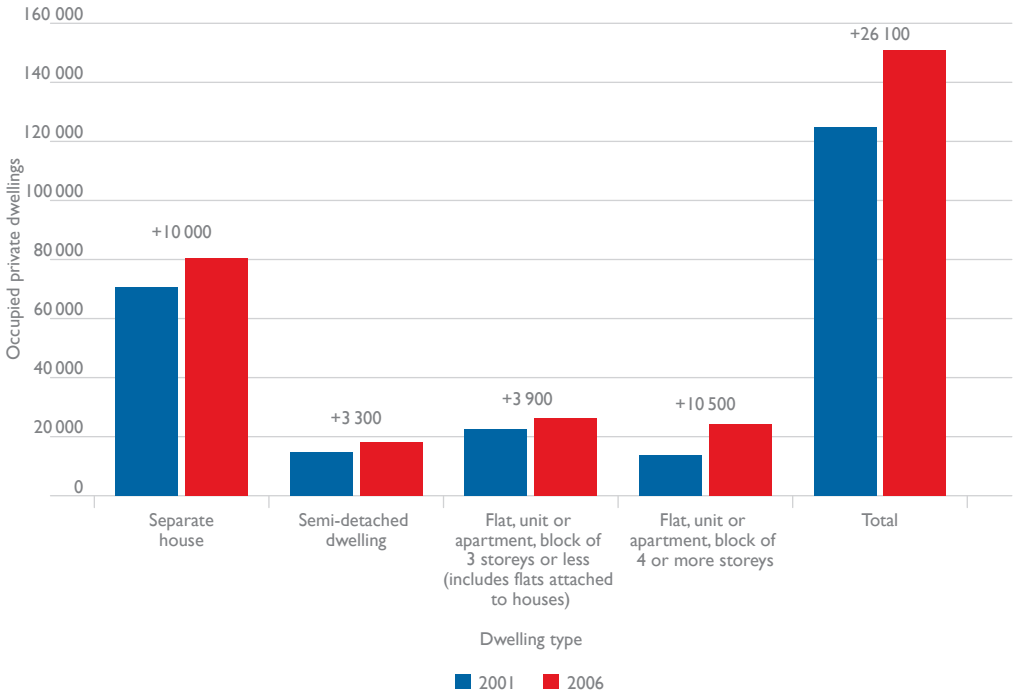
How did this shift towards higher density forms of housing translate to activity centres? Twenty two per cent of SEQ's total increase in dwellings between 2001 and 2006 occurred in the primary and regional activity centres (i.e. 26 100 out of the 116 900 increase). Figure 3.20 makes it clear that the majority of this increase was due to flats, units and apartments (55 per cent). SEQ contained 16 000 more high rise flats, units and apartments in 2006 than it did in 2001, and 66 per cent of the increase occurred in the primary and regional centres. This expanded the stock of high rise flats, units and apartments in these centres by 76 per cent. There was also a very substantial increase in the number of separate houses in centres between 2001 and 2006,[37] and a smaller increase in the number of semi-detached dwellings.

The increase in high density housing in SEQ's centres was heavily concentrated in just two key centres:

- The Brisbane CBD primary activity centre, which added 6000 high rise flats, units and apartments
- The major regional centre of Surfers Paradise, which added close to 1600 high rise flats, units and apartments.

37 The destination zone based approach to defining centres means that the adopted centre definitions tend to be relatively encompassing, and will often incorporate a significant amount of detached housing.

Figure 3.20 Number of occupied private dwellings by dwelling type in South East Queensland's centres, 2001 and 2006



Notes: Data relates to primary activity centres, major regional activity centres and principal regional activity centres. Specialised centres and rural activity centres are excluded. 'Dwelling structure not stated' and 'other dwelling' are not separately presented, but are included in the total. The data labels refer to the change in the number of occupied private dwellings of that type in SEQ's activity centres between 2001 and 2006.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* place of enumeration data for CCDs.

Excluding the Brisbane CBD primary activity centre identifies a gain of 4500 high rise flats, units and apartments across SEQ's major and principal regional activity centres between 2001 and 2006. These regional activity centres showed a shift towards higher density forms of housing, with high rise flats, units and apartments increasing from 8.9 per cent to 11.0 per cent of the dwelling stock, and separate houses declining from 60.5 to 58.9 per cent of the dwelling stock. Searle (2010) argues that opportunities for developing more regional centres in inner and middle suburban Brisbane have been missed. These areas have relatively good transport access and tend to be more attractive to those willing to live in flats and apartments than the nominated outer suburban centres that are not located on the coast.

Overall assessment

From 2001 to 2010, there was a shift towards higher density forms of housing being built in SEQ. From 2001 to 2006, the number of high rise flats, units and apartments grew from 3.1 per cent to 4.2 per cent of the dwelling stock. The stock of high rise flats, units and apartments in SEQ's centres expanded by 76 per cent in just five years. As a result, the population density of SEQ's centres increased at a more rapid pace than SEQ's overall population density. While the density gains have been concentrated in the primary centre (i.e. the Brisbane CBD activity centre), significant density gains also occurred in SEQ's regional activity centres between 2001 and 2006.

Summary

This chapter has summarised the population distribution in the SEQ region, as well as the Brisbane region, and how it has changed in recent years. The SEQ region added 694 000 residents between 2001 and 2011 to reach a population of 3.18 million. Population growth averaged 2.5 per cent per annum between 2001 and 2011 in SEQ, 2.2 per cent in Brisbane, 3.3 per cent for the Gold Coast and 3.1 per cent for the Sunshine Coast.

At the SLA scale, the most substantial population increases in the Brisbane region between 2001 and 2011 were in Ipswich East, Griffin-Mango Hill and Ipswich Central. Similarly, Kingsholme-Upper Coomera added the most population in the Gold Coast region, while Maroochy—Buderim added the most population in the Sunshine Coast region. The largest increases in population density between 2001 and 2011 were in the Brisbane City Inner and Fortitude Valley SLAs.

This chapter has also considered the strategies in place for managing spatial aspects of population growth in the SEQ region. The available population data was used to assess the changes that have occurred since 2001 with respect to key planning objectives such as limiting urban sprawl, redirecting growth to the Western corridor, consolidating rural population growth in existing towns and villages, and concentrating residential development around centres.

CHAPTER 4

Employment location and trends

Key points

- In 2006, the Inner sector contained 19 per cent of employment in South East Queensland (SEQ), but only 3 per cent of its population. The Outer sector also contained 19 per cent of the region's employment, but was home to 29 per cent of population. Much of the Outer sector, with the exception of the Outer West, offers relatively limited job opportunities to local residents.
- The major employment locations were City Inner (66 300 jobs), City Remainder (40 200), Ipswich Central (29 300), Pinkenba-Eagle Farm (23 300) and Southport (22 400).
- SEQ's overall employment growth rate between 2001 and 2011, according to the ABS *Labour Force Survey,* was 3.6 per cent. The growth rate for the region slowed between 2006 and 2011 when compared to 2001 to 2006, declining from 4.1 per cent per annum to 3.0 per cent per annum.
- There were 187 000 jobs added in SEQ from 2001 to 2006, largely in Brisbane's Middle sector (29 per cent), its Outer sector (20 per cent) and the Gold Coast (20 per cent). The rate of jobs growth was strongest in the Sunshine Coast (5.1 per cent per annum), with the strongest growing subregion in Brisbane being the Outer North, at 4.7 per cent per annum. The slowest jobs growth was in Toowoomba (2.4 per cent per annum) and the Inner sector (2.6 per cent per annum).
- In 2006, 5.0 per cent of SEQ jobs involved working from home, a decline from the 2001 figure of 5.3 per cent.
- The Inner sector added 25 800 jobs between 2001 and 2006, but its share of SEQ employment declined from 19.9 to 18.9 per cent. About 9200 jobs were added in the Brisbane CBD (i.e. the City Inner and City Remainder SLAs), which represented a decline from 10.2 to 9.3 per cent of SEQ employment. This reflects a reduction in the centralisation of SEQ's employment, continuing the trend of preceding decades.
- Employment growth from 2001 to 2006 was largest in City Remainder (+6800), Pinkenba-Eagle Farm (+5700), Buderim (+4100) and Murarrie (+4000). Areas displaying declines in employment were relatively rare across SEQ. The largest declines were in Sunnybank (–1200), Coopers Plains (–800) and Currumbin (–800).
- The Western Corridor experienced slightly slower jobs growth than the rest of SEQ, with an average annual growth rate of 3.1 per cent. Between 2001 and 2006, the self-sufficiency rate of the Western Corridor declined from 76 to 72 jobs per 100 employed residents.

- In 2006, 40.0 per cent of SEQ's employment was located in major, primary, principal or specialist activity centres, up from 36.9 per cent in 2001. Between 2001 and 2006, 56 per cent of total job growth in SEQ occurred in these types of activity centres.

Context

> 'Plan for employment to support a strong, resilient and diversified economy that grows prosperity in the region by using its competitive advantages to deliver exports, investment and sustainable and accessible jobs' (Queensland Government and COMSEQ 2009, p. 111).

Provision for sufficient employment and its suitable location within South East Queensland is an important element of the *South East Queensland Regional Plan 2009–2031*. The plan aims to achieve this by focusing employment in a network of activity centres—accessible locations that provide higher density residential development, concentrated businesses and employment related services.

This chapter begins with a snapshot of the state of employment within the South East Queensland (SEQ) region in 2006 at various spatial levels. It then identifies changes to the level and distribution of employment throughout the region since 2001. The chapter concludes with an assessment of how this change coincides with the planning goals identified in the *SEQ Regional Plan 2009–2031*.

The spatial analysis of employment within this chapter primarily uses data from the 2001 and 2006 Australian Bureau of Statistics (ABS) *Censuses of Population and Housing*. The ABS *Labour Force Survey* is also used to provide a broad overview of employment change within SEQ between 2001 and 2011.

The census datasets used are subject to census undercount. Comparison of the August 2006 employment figures from the ABS *Labour Force Survey* with employment levels from the 2006 Census indicate that this undercount was approximately 10 per cent (ABS 2007). This limitation should be kept in mind when making use of the data presented here.

Place of work—2006 snapshot

There were 1 287 912 employed people living in SEQ at the time of the 2006 Census. Information on place of work was available for 1 224 246 (95 per cent) of these employed residents. The majority of employed residents of SEQ who provided place of work information worked at a location within SEQ (1 126 071 persons). Of the remaining people, 23 007 people worked at a location within Queensland, with 11 474 working interstate. Of people who worked interstate, 3745 were employed within the Tweed area in northern NSW, a large employment district within commuting distance of parts of SEQ. Five per cent of employed residents (63 694 people) reported no fixed working address. This category includes many construction workers, tradespeople, couriers, drivers and labourers (BITRE 2011a), many of whom were likely working within SEQ.

The analysis in this section is based on the 1 145 139 people who reported a fixed place of work within SEQ in 2006.[38] Of this group, 98 per cent live and work within SEQ, with 8424 travelling from elsewhere in Queensland, 6357 from the Tweed area and 4266 from other interstate locations.

Regional overview

Table 4.1 presents the place of work data by sector within the SEQ area. The Brisbane SD, which contains 69 per cent of SEQ's total employment, has been further decomposed into sectors and subregions as defined in Chapter 1. Almost 19 per cent of the total employment within SEQ is located within the Inner sector of Brisbane, despite the fact that only 3 per cent of SEQ's population resides within the sector.

The Middle sector accounts for 31 per cent of employment within the region, and a similar proportion of population. The Middle North subregion represents the largest subregion within this sector, containing more than twice as many workers as the Middle East subregion. The Outer sector contains almost 19 per cent of SEQ's employment while housing 29 per cent of its population, with the Outer North containing more jobs than the other Outer subregions.

Both the Gold Coast and Sunshine Coast sectors represented a significant proportion of the employment within the SEQ area, having 16 and 9 per cent of employment, respectively.

While employment density is extremely high within the Inner sector, with over 7500 jobs per square kilometre, employment density outside this sector drops to just over 275 jobs per square kilometre in the Middle sector and less than 50 jobs per square kilometre in the Outer sector. The West Moreton sector has an extremely low employment density, with fewer than 2 jobs per square kilometre.

The self-sufficiency ratio is the ratio of the number of workers in an area to the number of employed residents. Places with a self-sufficiency ratio well above 0.90[39] can be considered employment orientated, while places with a ratio well below 0.90 can be considered residentially orientated.

The Inner sector is the only sector of SEQ that is significantly employment oriented. Much of the rest of SEQ is residentially oriented, although there is at least one job for every two employed people across the entirety of SEQ. The Outer Northern and Outer Eastern subregions have the lowest self-sufficiency ratio in the SEQ area. Outside of the Inner sector, the highest self-sufficiency ratio was found in the Toowoomba Statistical Subdivision (SSD).

38 The place of work analysis in this chapter excludes those who reported no fixed address, work in 'Undefined QLD' or did not respond. Due to these issues, together with undercount and inadequately described place of work, the number of people employed in SEQ in August 2006 is likely to be significantly higher than the figures reported here.

39 If 100 per cent of employed people provided valid information on a fixed place of work in the census, the appropriate benchmark would be 1.0. Since only 90 per cent of employed SEQ residents could be coded to a fixed place of work in 2006, 0.90 is a more appropriate benchmark.

Table 4.1 Place of work data by sector, South East Queensland, 2006

	People who work in area	Proportion of SEQ employment (per cent)	Proportion of SEQ ERP (per cent)	Employment density (jobs per square kilometre)	Self- sufficiency ratio
Inner	216 676	18.9	3.1	7670.5	4.63
Middle	359 806	31.4	31.9	277.1	0.81
Middle East	61 097	5.3	5.7	172.1	0.74
Middle North	126 146	11.0	10.8	471.3	0.83
Middle South	97 523	8.5	8.2	492.1	0.88
Middle West	75 040	6.6	7.2	157.1	0.77
Outer	212 988	18.6	29.3	46.6	0.57
Outer East	32 111	2.8	4.6	59.8	0.52
Outer North	78 126	6.8	11.8	38.4	0.52
Outer South	57 300	5.0	7.8	71.9	0.57
Outer West	45 451	4.0	7.9	37.8	0.72
Brisbane Total	789 470	68.9	64.4	133.8	0.92
Gold Coast	184 613	16.1	18.3	98.7	0.83
Sunshine Coast	98 053	8.6	10.4	31.4	0.82
Toowoomba	48 339	4.2	4.3	87.3	0.93
West Moreton	20 290	1.8	2.6	1.8	0.71
Other SEQ Total	351 295	30.7	35.6	20.7	0.83
Unknown Address	4 374	0.4	na	na	na
SEQ Total*	1 145 139	100.0	100.0	50.1	0.89

Note: The self-sufficiency ratio is the ratio of people who work in the sector to the number of employed people who live in the sector. The ratio for SEQ is less than one due to non-response, out of region employment and no fixed place of work responses.

na – Not available.

* Includes unknown address in Brisbane.

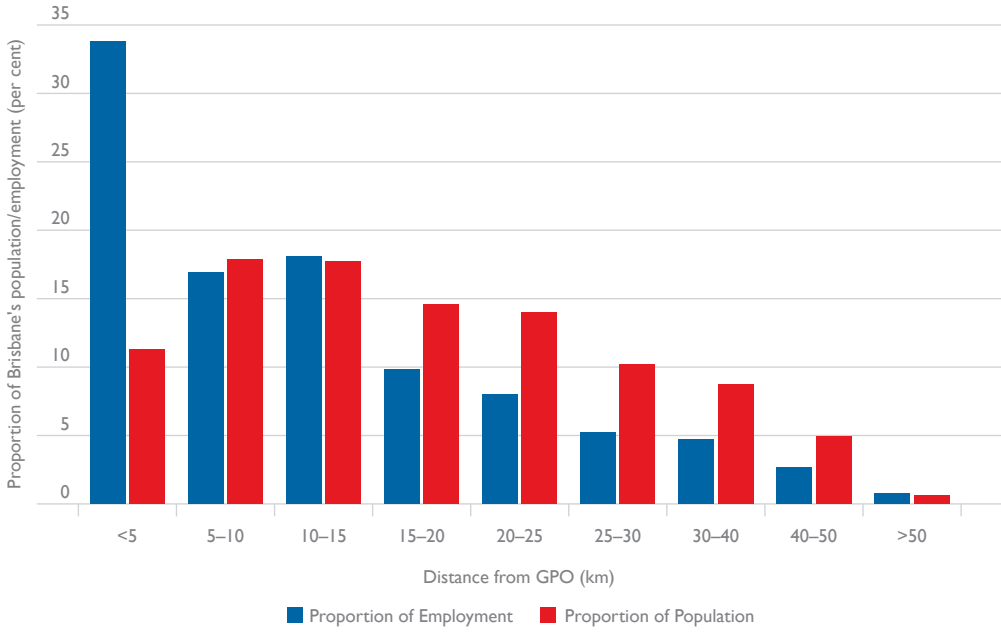
Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for SLAs and ABS Cat. 3218.0.

Figure 4.1 presents the distribution of jobs in 2006 according to distance from the General Post Office (GPO) for the Brisbane SD, and compares it to the population distribution for the same time period. Areas of SEQ outside of Brisbane were excluded from this analysis, as they have their own central districts, and as such their distance from Brisbane's CBD is not relevant.

Over a third of Brisbane's jobs are located within 5 kilometres of the GPO. A further 45 per cent of jobs are located between 5 and 20 kilometres of the GPO. There are a number of large employment areas in the 10 to 15 kilometre ring, such as Brisbane Airport and the Acacia Ridge industrial area.

Brisbane's jobs were far more centralised than its population in 2006. All of the rings outside the 5 kilometre range, except for the 10 to 15 kilometre ring, featured a higher proportion of population than jobs. Over 53 per cent of Brisbane's population live 15 kilometres or more from the GPO, while only 31 per cent of jobs are located there.

Figure 4.1 Proportion of population and employment located at various distances from the General Post Office, Brisbane, 2006



Note: Population values in this figure differ from those in Figure 3.7 as they use data from different sources.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for DZs and place of usual residence data for CCDs.

Statistical Local Areas

Table 4.2 lists the ten Statistical Local Areas (SLAs) containing the largest number of jobs in the Brisbane SD in 2006. The City Inner SLA is the place of work for 66 333 people, representing almost six per cent of employment within SEQ. City Inner is bounded by Charlotte street to the south, the Brisbane River to the east and west, and Roma and Ann streets to the north (plus Brisbane Central Station). Locations within the SLA include the Queen Street mall, Brisbane City Hall and the Supreme and District Courts. There are over 47 times as many people working in this SLA as there are living in it, reflecting the CBD's very strong employment orientation. Employment density is extremely high within the SLA, with 94 263 jobs per square kilometre, which is significantly higher than the employment density of the Sydney Inner SLA (55 003) (BITRE 2012a, p.107), the Melbourne Inner SLA (79 893) (BITRE 2011a, p.96) or the Perth Inner SLA (33 949) (BITRE 2010, p.61).

The City Remainder SLA also reflects the high employment and self-sufficiency ratio of the inner city, containing 3.5 per cent of the region's employment while housing only 0.2 per cent of its population.

Table 4.2 Top employing Statistical Local Areas, Brisbane, 2006

SLA of work	Sector/ Subregion	People who work in area	Proportion of SEQ employment (per cent)	Proportion of SEQ ERP (per cent)	Employment density (jobs per square kilometre)	Self-sufficiency ratio
City Inner	Inner	66 333	5.8	0.1	94 263	47.52
City Remainder	Inner	40 161	3.5	0.2	26 367	18.51
Ipswich Central	Outer West	29 263	2.6	2.5	142	0.97
Pinkenba-Eagle Farm	Middle North	23 306	2.0	0.0	438	133.18
South Brisbane	Inner	16 152	1.4	0.2	8 165	8.03
Fortitude Valley	Inner	15 268	1.3	0.2	11 108	4.86
Spring Hill	Inner	14 450	1.3	0.2	11 595	5.97
Ipswich East	Outer West	12 755	1.1	1.8	106	0.55
Woolloongabba	Inner	12 025	1.1	0.1	5 076	5.99
Strathpine-Brendale	Outer North	11 703	1.0	0.4	650	2.08

Note: The self-sufficiency ratio is the ratio of people who work in the sector to the number of employed people who live in the SLA.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data and ABS Cat. 3218.0.

The SLAs that cover much of the city of Ipswich—Ipswich East and Ipswich Central—contribute a combined total of 3.7 per cent of the total employment within SEQ. The comparatively low self-sufficiency ratio seen in these SLAs indicates that their high employment contribution is the result of the large area and population base of each of these SLAs rather than a particularly high concentration of employment.

The Pinkenba-Eagle Farm SLA contains the Brisbane International Airport in addition to being a major industrial area within the City of Brisbane. The SLA contains very little residential land, which is reflected in its extremely high self-sufficiency ratio, which is by far the highest within SEQ. Strathpine-Brendale encompasses the suburb of Brendale, a largely industrial suburb housing a power substation and a waste treatment facility in addition to other industrial estates.

The Inner SLAs of South Brisbane, Fortitude Valley, Woolloongabba and Spring Hill make up the remainder of the top 10, with each contributing between 1.1 and 1.4 per cent of SEQ's employment. These Inner SLAs are strongly employment oriented with high employment densities and low resident population.

Table 4.3 lists the five SLAs with the largest number of jobs outside of Brisbane within SEQ.

The SLAs with the highest employment in SEQ outside of Brisbane all contain areas which have been identified as activity centres in the *SEQ Regional Plan 2009–2031*. The high level of employment within Southport, Toowoomba Central and Maroochydore in particular reflects their status as principal regional centres.

Table 4.3 Top employing Statistical Local Areas, South East Queensland excluding Brisbane, 2006

SLA of work	Region	People who work in area	Proportion of SEQ employment (per cent)	Proportion of SEQ ERP (per cent)	Employment density (jobs per square kilometre)	Self-sufficiency ratio
Southport	Gold Coast	22 427	2.0	0.9	1 570	2.15
Toowoomba Central	Toowoomba	18 126	1.6	0.5	1 901	3.03
Maroochy—Maroochydore	Sunshine Coast	13 278	1.2	0.6	940	1.85
Surfers Paradise	Gold Coast	12 168	1.1	0.7	2 195	1.55
Maroochy—Buderim	Sunshine Coast	11 934	1.0	1.5	192	0.68

Note: The self-sufficiency ratio is the ratio of people who work in the sector to the number of employed people who live in the SLA.

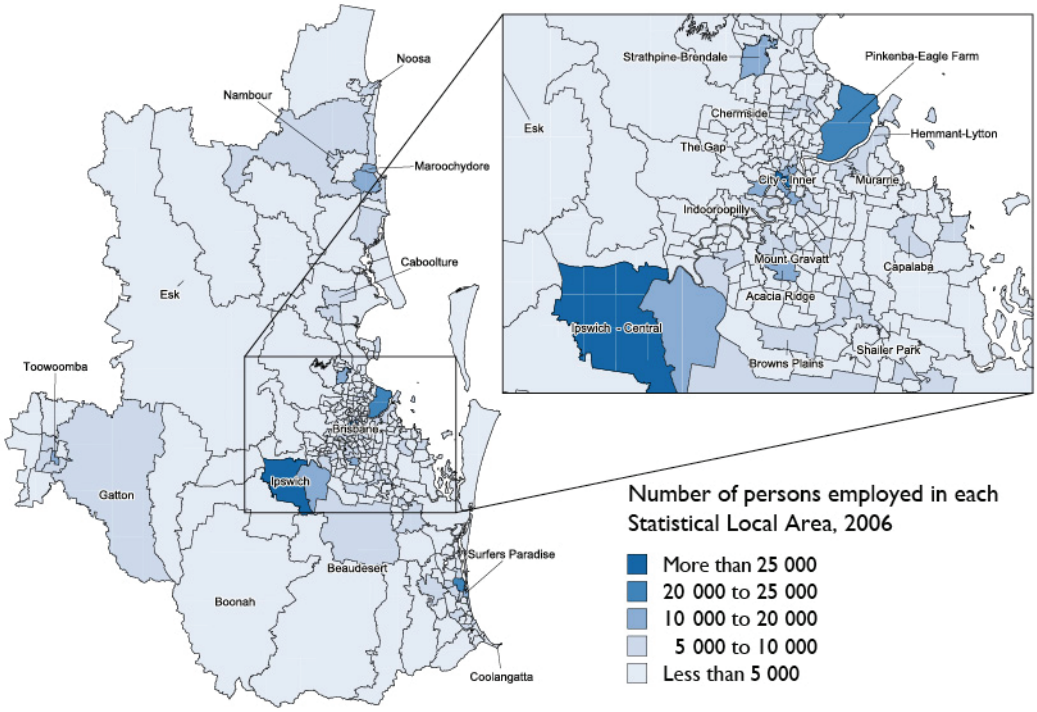
Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data and ABS Cat. 3218.0.

Map 4.1 maps the number of people working in each SLA in 2006. While employment is concentrated in the central SLAs, there is also a number of high employment SLAs in regional centres outside Brisbane (particularly the Gold Coast, Sunshine Coast and Toowoomba). Brisbane's western suburbs, particularly Ipswich, also showed high employment levels.

Within Brisbane, employment density is highest in City Inner (95 000 jobs per square kilometre), with three other Inner SLAs also having over 10 000 jobs per square kilometre: City Remainder (26 000), Spring Hill (11 500) and Fortitude Valley (11 000). Outside of Brisbane, Broadbeach-Mermaid Beach (2500) and Surfers Paradise (2000) were the only SLAs with a density of 2000 persons per square kilometre or higher. Numerous SLAs had an employment density of less than ten jobs per square kilometre, with the Kilcoy, Esk and Moreton Island SLAs having less than one job per square kilometre.

The number of jobs is more than double the number of employed residents in 36 SLAs within the SEQ region, four in the Gold Coast, one in Toowoomba and the remaining 31 in Brisbane. Of the SLAs located in Brisbane, nine were in the Inner sector, 20 in the Middle sector and the remaining two in the Outer sector. The presence of so many highly employment oriented zones indicates that significant amounts of SEQ's employment is not located where people live, relying instead on commuters from other parts of the city.

Map 4.1 People working in each Statistical Local Area, South East Queensland, 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data.

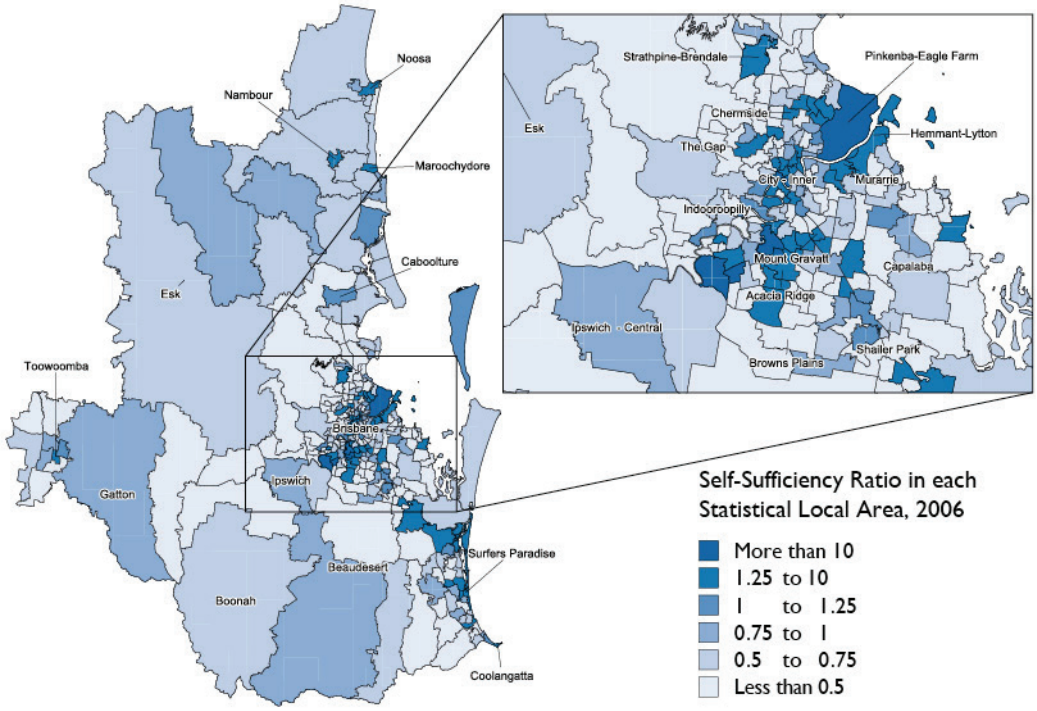
Map 4.2 shows the self-sufficiency ratio for each SLA within SEQ for 2006. A key feature is the dispersal of highly employment oriented SLAs across the region. Strongly employment oriented clusters appear around the Port of Brisbane, the Brisbane CBD, the central Gold Coast and around Acacia Ridge, with a corridor running inland from Coomera towards Brisbane.

The Australia TradeCoast is identified in the *SEQ Regional Plan 2009–2031* as an important employment location within SEQ. Consisting of parts of the SLAs of Pinkenba-Eagle Farm, Hemmant-Lytton and Murarrie, including Brisbane Airport and the Port of Brisbane, the area stands out in Maps 4.1 and 4.2 as having both high employment and high self-sufficiency.

There are many SLAs within SEQ with a self-sufficiency ratio of below 0.5 (i.e. there is less than one job for every two employed residents). These residentially-oriented SLAs represent dormitory suburbs, where there are few local employment opportunities.

Map 4.2 also shows large areas of highly residentially oriented SLAs extending to Brisbane's north and south, with an additional cluster stretching west from Ipswich. While many of these dormitory suburbs are located on the periphery of the region's cities, two of them, Red Hill and Highgate Hill, are located within the Inner sector.

Map 4.2 Self-sufficiency ratio in each Statistical Local Area, South East Queensland, 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data.

According to census data, the proportion of SEQ jobs which involve working from home decreased from 5.3 per cent in 2001 to 5.0 per cent in 2006, while in Brisbane it decreased from 4.4 per cent to 4.1 per cent. This reflects a general trend that has also been evident in Perth, Melbourne and Sydney (BITRE 2010, BITRE 2011a, BITRE 2012a).

West Moreton has the highest proportion of people who work from home in SEQ, with 12.3 per cent of people working in the region working from home in 2006. In contrast, the Inner sector has the lowest proportion, with only 1.3 per cent of employment in the sector based in people's homes. The proportion of jobs involving working from home is highest in the Upper Kedron SLA, with 41 per cent of people who work in the SLA working from home. A number of other nearby SLAs, including Anstead, Karana Downs-Lake Manchester and Pine Rivers Balance also have high rates of people working from home. Many Inner sector SLAs, including the City Inner SLA, Fortitude Valley and Woolloongabba, have rates of people working from home below 1 per cent. The Pinkenba-Eagle Farm and Archerfield SLAs—both home to airports—have the lowest rates of jobs that involve working from home.

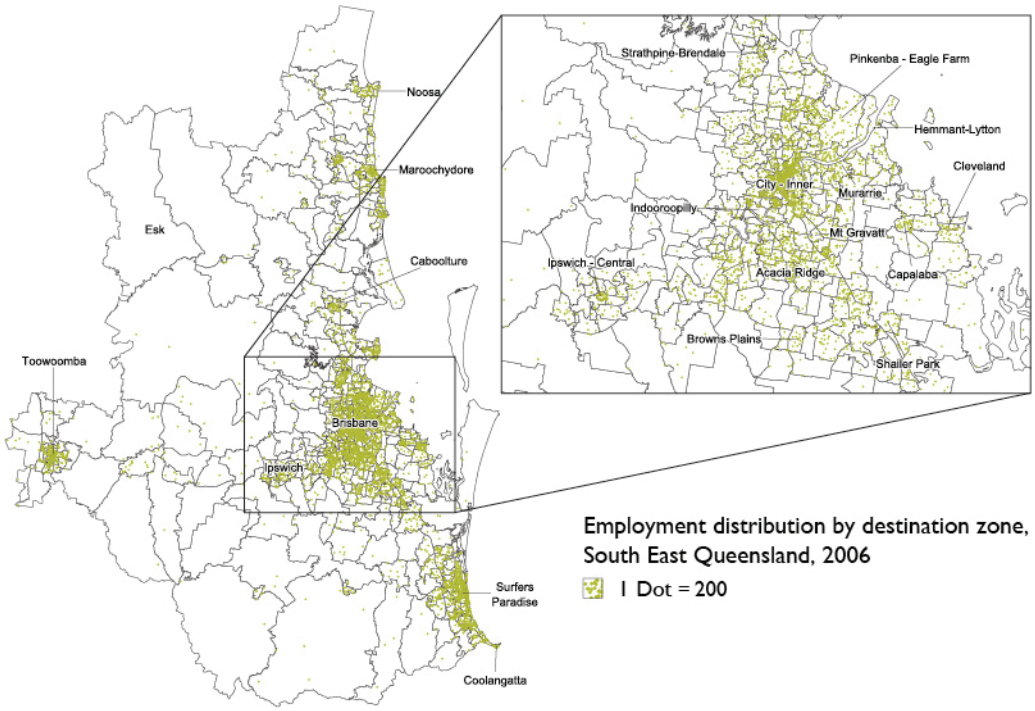
Destination zones

Place of work data can be disaggregated to a finer level—destination zones (DZs). The spatial information for destination zones was obtained from the Queensland Government's Department of Transport and Main Roads.

The destination zones in SEQ vary greatly in size, ranging from only a few streets in Brisbane's CBD up to entire SLAs in other areas. For example, while the City Inner SLA is divided into 23 destination zones, the nearby Inner sector SLA of Milton consists of only a single destination zone.

Map 4.3 represents the distribution of jobs across the SEQ region, based on destination zone data. As expected, the map follows the urban pattern of the region, with jobs heavily concentrated through most of Brisbane's inner suburbs and the central cores of other major settlements within the region. These high employment clusters typically correspond to specific activity centres, which are discussed in more detail later in the chapter. The map also shows that the peri-urban and rural parts of SEQ contain very low amounts of employment.

Map 4.3 Dot density map of job distribution, South East Queensland, 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for DZs.

The twenty highest employing destination zones in Brisbane in 2006 are listed in Table 4.4. The inner suburb of Milton, which is represented by a single destination zone, is the single highest employing destination zone in Brisbane. Numerous other destination zones from the Inner sector have also made the top 20 list, although these are generally the whole SLA destination zones. Only one destination zone from the City Inner SLA made the top 20, the Riverside Centre. The two destination zones that make up the Pinkenba-Eagle Farm SLA, the Brisbane

Airport and Eagle Farm, come in as the second and third highest employing destination zones in Brisbane, reflecting the importance of the airport as a location for employment.

Table 4.4 Top employing destination zones, Brisbane, 2006

Destination zone code	Statistical Local Area	Description of destination zone	People who work in zone
78	Milton	Milton. Contains Suncorp stadium.	11 492
135	Pinkenba-Eagle Farm	Brisbane Airport.	10 428
134	Pinkenba-Eagle Farm	Eagle Farm. Industrial suburb.	9 123
224	Murarrie	Murarrie. Contains News Corporation printing facility, Southgate Corporate Park.	8 473
90	Herston	Royal Brisbane Hospital.	8 036
339	Ipswich Central	Ipswich CBD.	7 543
166	Acacia Ridge	Acacia Ridge East. Heavy industrial area. Contains railway freight yard.	7 316
264	Strathpine-Brendale	Brendale. Industrial suburb. Contains South Pine power substation and waste treatment facility.	7 170
396	Capalaba	Capalaba Shops.	6 784
192	Woolloongabba	Woolloongabba. Contains the Brisbane Cricket Ground.	6 724
369	Slacks Creek	Slacks Creek. Contains largest IKEA store in the southern hemisphere.	6 626
119	Virginia	Virginia. Mixed residential/industrial suburb.	6 591
131	Bowen Hills	Bowen Hills. Contains Virgin Village, headquarters of Virgin Australia Holdings, headquarters of the Courier-Mail and the Sunday Mail.	6 569
179	Salisbury	Salisbury. Mixed residential/industrial suburb.	6 414
187	West End	West End. Retail and commercial area with some industrial.	6 325
138	Wacol	Carole Park. Half industrial, half residential suburb.	6 308
105	Chermside	Chermside. Local employment and retail hub. Contains largest shopping centre in SEQ.	6 144
164	Archerfield	Archerfield. Contains Archerfield Aerodrome.	6 002
71	St Lucia	University of Queensland.	5 966
26	City Inner	Riverside Centre.	5 950

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data.

Outside of Brisbane, the top five destination zones in SEQ are listed in Table 4.5. Three destination zones—Toowoomba, Southport and Nambour—represent the centres of major regional hubs within SEQ. Nerang is a large destination zone that covers the Gold Coast suburb of Nerang, which contains several shopping centres and is a transportation hub for the area. Ormeau-Yatala is a particularly large destination zone, with an area of over 72 square kilometres (as compared to Southport CBD's 1.74 square kilometres). In addition to the size of the destination zone, Yatala is a major location of industrial land for the Gold Coast.

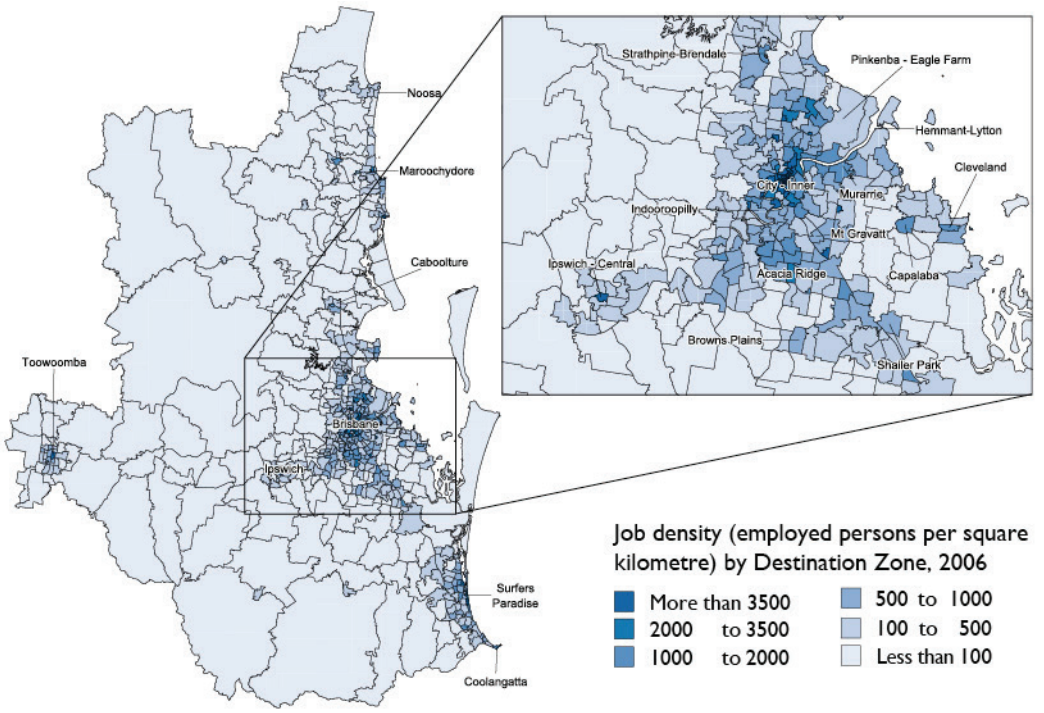
Table 4.5 Top employing destination zones, South East Queensland excluding Brisbane, 2006

Destination zone code	Statistical Local Area	Description of destination zone	People who work in zone
570	Toowoomba Central	Toowoomba City	15 101
436	Southport	Southport CBD	11 709
429	Nerang	Nerang	8 771
389	Ormeau-Yatala	Ormeau-Yatala	7 688
511	Maroochy—Nambour	Nambour CBD and East	6 935

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data.

Map 4.4 shows the job density (number of jobs per square kilometre) of destination zones in SEQ for 2006. It shows a core of high employment density in Brisbane's CBD. There are sixteen destination zones which have a density of more than 100 000 jobs per square kilometre (i.e. 1000 jobs per hectare), and all of them are located in either the City Inner or City Remainder SLAs.

Map 4.4 Employment density of each destination zone, South East Queensland, 2006



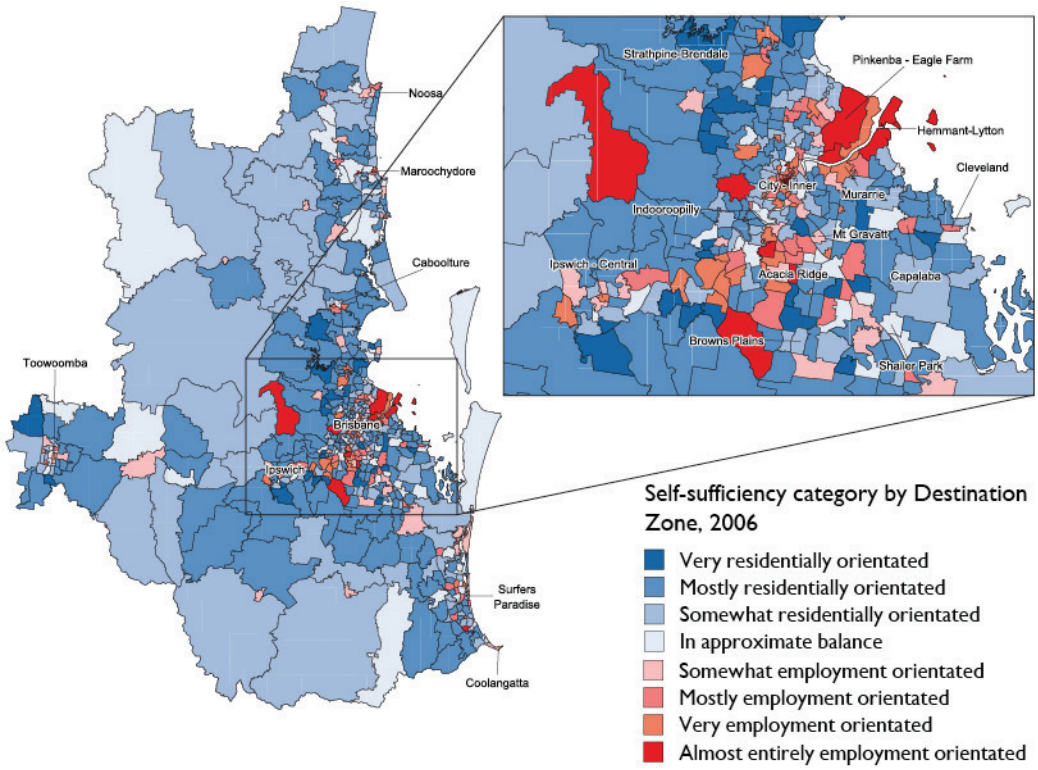
Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data.

Most of the destination zones with job densities of over 10 000 jobs per square kilometre (100 jobs per hectare) are a part of the Inner sector. Only three destination zones that exceeded a density of 10 000 jobs per square kilometre were located outside of the Inner

sector, two destination zones in Toowong and one in Surfers Paradise. The latter of these was the only destination zone outside of Brisbane with such a high employment density.

Map 4.5 shows the self-sufficiency ratio for each destination zone in SEQ in 2006, which is calculated as the ratio of jobs to employed residents of the destination zone. Population figures were not directly available at the destination zone level, and so were constructed from Census Collection District (CCD) data using an area-weighted concordance. Strongly employment oriented clusters stand out in central Brisbane, the mouth of the Brisbane River, and in Brisbane's south around the suburbs of Acacia Ridge and Archerfield.

Map 4.5 Self-sufficiency ratio of each destination zone, South East Queensland, 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for DZs and place of usual residence data for CCDs.

Most of the destination zones in SEQ are residentially oriented, with more employed residents than jobs.

The self-sufficiency ratios of destination zones can be used to understand the extent to which SEQ employment is concentrated in employment focused areas. Employment can be split as follows:

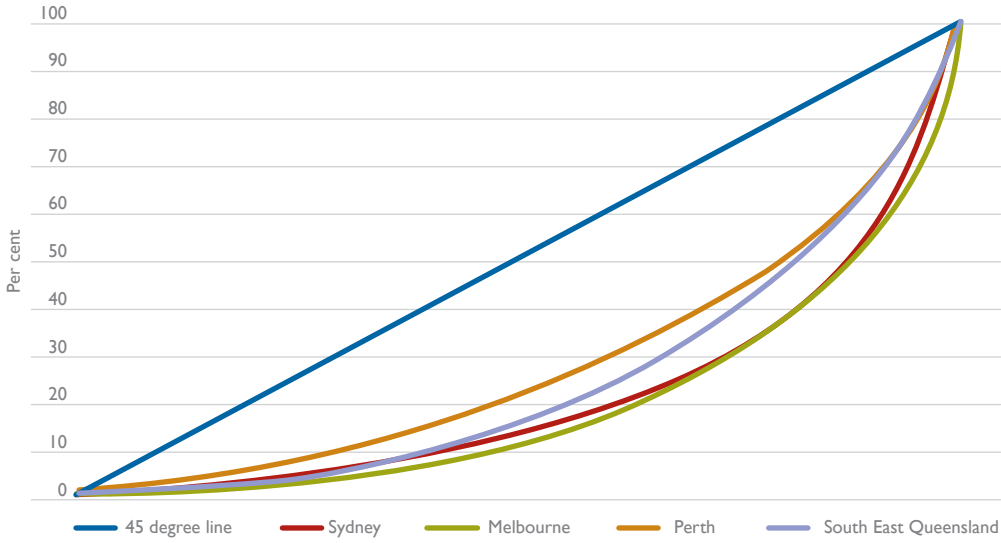
- 45 per cent of workers have a job in an employment focussed destination zone, which has at least twice as many jobs as employed residents (a self-sufficiency ratio of at least two)
- 19 per cent of workers have a place of work in a residentially focused destination zone, which has at least twice as many employed residents as workers (a self-sufficiency ratio of less than 0.5)

- The remaining 36 per cent of employment is located in 'mixed use' destination zones, containing an approximate balance of residential areas and places of employment.

This distribution shows that a similar proportion of jobs are located in residentially focussed areas in SEQ to Melbourne and Sydney. However, SEQ has a much higher proportion of employment located in mixed use destination zones than Melbourne or Sydney (BITRE 2011a, BITRE 2012a).

The destination zone data can also be used to construct Lorenz curves to show how much jobs are concentrated within SEQ. Figure 4.2 presents Lorenz curves for SEQ, Sydney, Melbourne and Perth. These curves show that SEQ has a spatial concentration of jobs that is lower than Sydney and Melbourne, but higher than Perth.

Figure 4.2 Lorenz curves for spatial distribution of jobs in South East Queensland, Sydney, Melbourne and Perth, 2006



Note: The smaller the distance between the city's curve and the 45 degree line the more even the distribution of jobs across destination zones for that city. Lorenz curves are presented for the Sydney Greater Metropolitan Area, Melbourne working zone and Perth working zone

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for DZs.

The spatial distribution of jobs can also be summarised with a Gini coefficient. The Gini coefficient ranges between zero and one, with zero indicating that all destination zones have an equal number of jobs, and one indicating that all jobs are located in a single destination zone. The Gini coefficient for SEQ is 0.54. Gini coefficients for the other areas studied by BITRE are Perth 0.46 (BITRE 2010), Melbourne 0.62 (BITRE 2011a) and Sydney 0.60 (BITRE 2012a).

The Gini coefficient for SEQ is higher than for Perth, indicating that employment in Perth is less spatially concentrated than SEQ. Conversely, SEQ has a lower Gini coefficient than Sydney or Melbourne, indicating that SEQ is less spatially concentrated than either of those cities. The destination zones for SEQ are less disaggregated than for any of the other cities studied, with an average employment of 1934, as compared to Sydney (759), Melbourne (780) or Perth (1090). The lack of direct comparability of destination zones for different cities may contribute to the difference in results.

Historic trends in place of work

This section details some of the longer term historical changes to the spatial distribution of employment across the SEQ region.

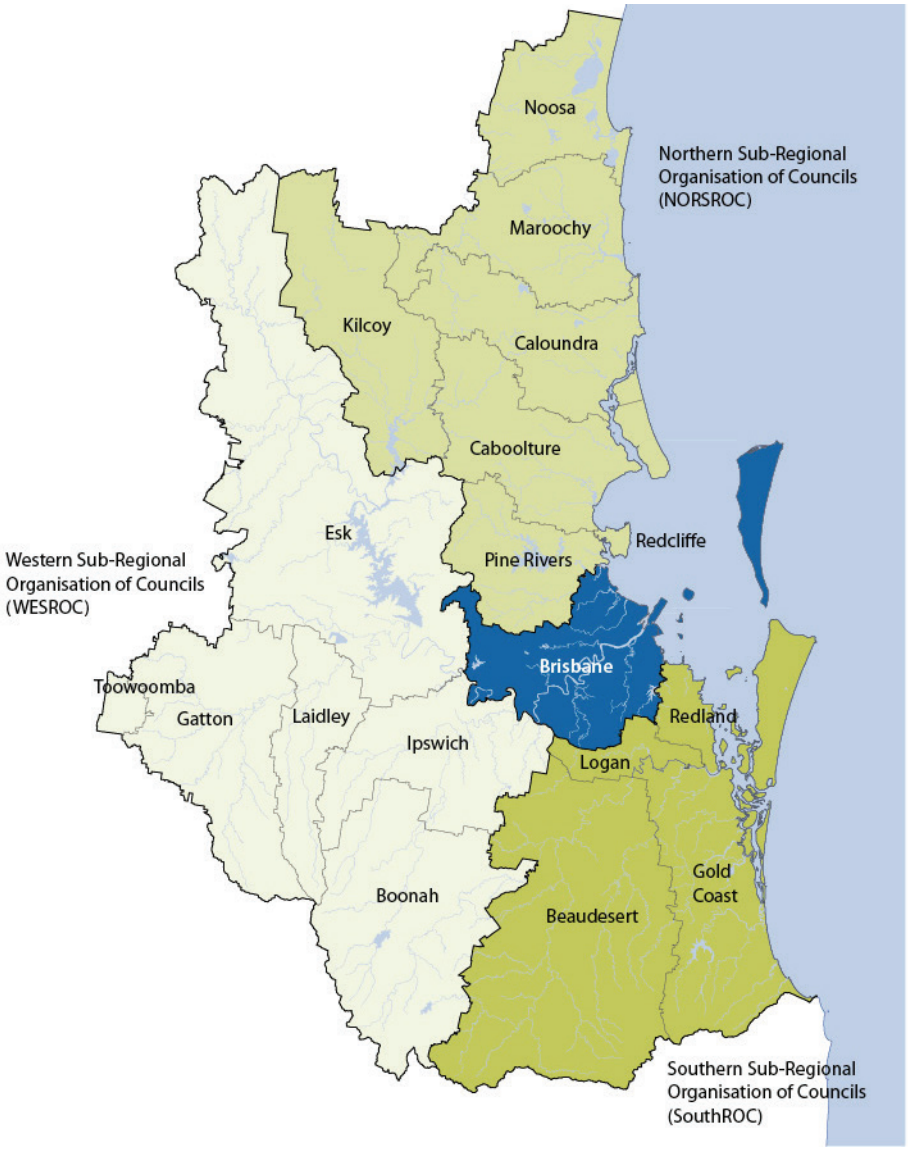
Based on ABS Census data, Robson (2008) calculated that the number of jobs in SEQ[40] grew by 268 900, from 764 300 in 1991 to 1 033 200 in 2001. This represents an overall increase of 35 per cent, or average annual growth of 3.1 per cent per annum, over the 10 year period.

Stimson and Taylor (1999) indicate that employment in SEQ has been decentralising for the 20 years to 1999, with industrial areas moving from the inner city to greenfield sites in the outer suburbs. They also state that office-based employment expanded beyond the CBD into other inner suburbs during this period. This decentralisation and suburbanisation is similar to that experienced by Sydney (BITRE 2012a), although it appears to have occurred more recently in SEQ.

Analysis of spatial changes to employment in the ten years to 2001 by Robson (2008) is based on (Sub-)Regional Organisations of Councils, which are detailed in Map 4.6. Robson indicates that growth in SEQ was quite different within different (Sub-)Regional Organisations of Councils, with regional growth ranging from an increase of 51 per cent between 1991 and 2001 in NORSROC to an increase of only 15 per cent in WESROC during the same period. Absolute growth of employment in these areas also varied greatly, with SouthROC adding 102 148 jobs, Brisbane adding 85 453, NORSROC 72 051 and WESROC 9221. It is important to note that Toowoomba was excluded from WESROC in Robson's analysis. Population growth in the same period was also relatively high, with the population in Brisbane growing by 16 per cent, SouthROC by 37 per cent, WESROC by 13 per cent and NORSROC by 42 per cent.

40 Toowoomba City Council was excluded (see Robson 2008).

Map 4.6 Regional Organisations of Councils, South East Queensland, 2005



Source: Queensland Government and SEQROC (2005, p.2) (*SEQ Regional Plan 2005–2026*).

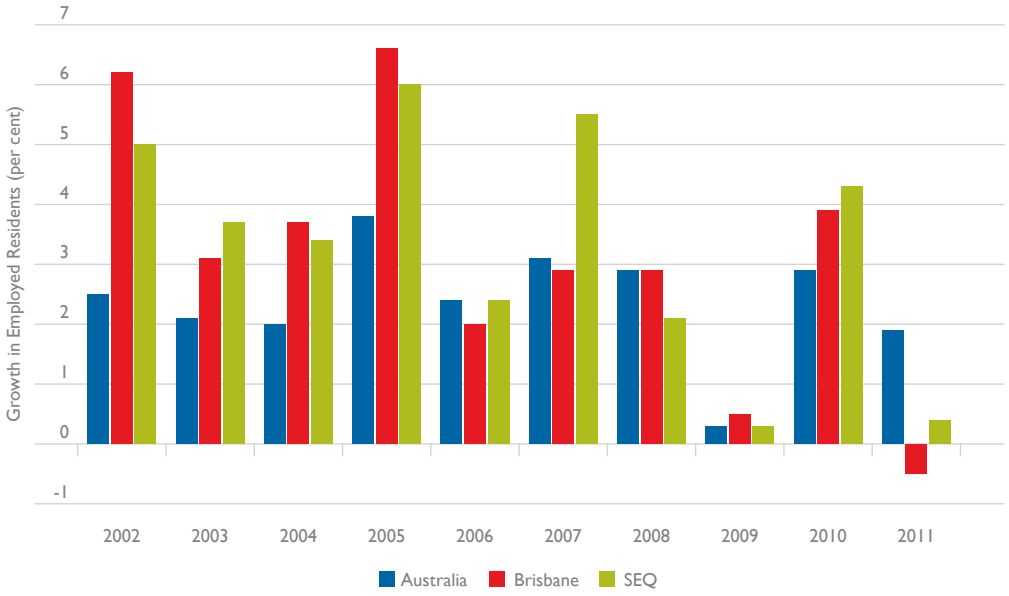
Changes in place of work since 2001

Changes 2001 to 2011

The *Labour Force Survey* (LFS, ABS Cat. 6202) presents data on employment for the whole of Australia on a monthly basis. LFS data is used here to provide an overview of employment change for Brisbane and SEQ as a whole since 2001. Changes to the geographical regions underlying the LFS have made it impossible to construct a complete time series for SEQ from a single release of LFS data for 2001 to 2011. As a result, the growth values for 2001 to 2007 for SEQ are derived from a different LFS release than the growth values for 2007 to 2011. The outer boundary of the SEQ area has not changed significantly between these two releases, and values for Brisbane and Australia are not affected. The LFS and Census figures for the 2001 to 2006 period do not align closely, due to differing methodologies and census undercount and non-response.

Figure 4.3 plots the annual growth in employed residents for Brisbane and SEQ since 2001. The rate of growth has fluctuated substantially in this period. Both Brisbane and SEQ outperformed the national growth rate in six of the ten years examined, with SEQ outperforming the national average on a seventh occasion. Growth in SEQ was particularly strong in the first half of the decade examined. The negative employment effect of the Global Financial Crisis can be seen in the dramatic drop in the growth rate of Australia, Brisbane and SEQ in the year ending June 2009. While growth slowed across the board in this time period, Brisbane continued to outperform the national growth rate. Major flooding strongly impacted SEQ in early 2011 and this appears to have had a strong negative impact on employment growth in the region. The average annual growth rate for Brisbane between 2001 and 2011 was 3.1 per cent, which compares with SEQ's average annual growth rate of 3.6 per cent and the national average of 2.4 per cent. This is a higher average annual rate of jobs growth than that experienced by Sydney (at 1.4 per cent per annum) and Melbourne at (2.5 per cent per annum), but slightly lower than Perth at 3.2 per cent per annum.

Figure 4.3 Growth in employed residents of Brisbane, South East Queensland and Australia, 2001 to 2011



Note: Time series data for statistical regions is not available on a consistent basis for the entire time span listed. As such, the data presented for SEQ uses different releases of the *Labour Force Survey* for the periods 2001–2007 and 2007–2011. The outer boundary of the SEQ region has not undergone significant change. Values for Brisbane and Australia have not been affected. Major flooding has increased the standard error for 2011 estimates within SEQ.

Source: BITRE analysis of ABS Cat. 6202.

The LFS reports that between June 2001 and June 2006 there was average annual growth of employed residents of 4.1 per cent in SEQ. From June 2006 to June 2011, the average annual growth rate in SEQ was 3.0 per cent, showing that jobs growth in SEQ has slowed compared to the 2001 to 2006 period. Census estimates show an average annual growth rate of 3.6 per cent in employed residents from 2001 to 2006, with the number of jobs[41] growing at the same rate. Both of these values are lower than the growth rate indicated by the LFS.

Changes 2001 to 2006

The analysis of changes in SEQ's spatial employment distribution in the following section relies on data from the *Census of Population and Housing for 2001 and 2006*.[42]

The spatial analysis is based on 2006 Australian Standard Geographical Classification (ASGC) boundaries. Between 2001 and 2006, there were numerous substantial changes to boundaries within SEQ. Affected SLAs have been merged into larger aggregate regions with consistent boundaries for 2001 and 2006.

41 Excluding those with no fixed place of work or no stated place of work.

42 Place of work results of Census 2011 were not available at the time this analysis was undertaken.

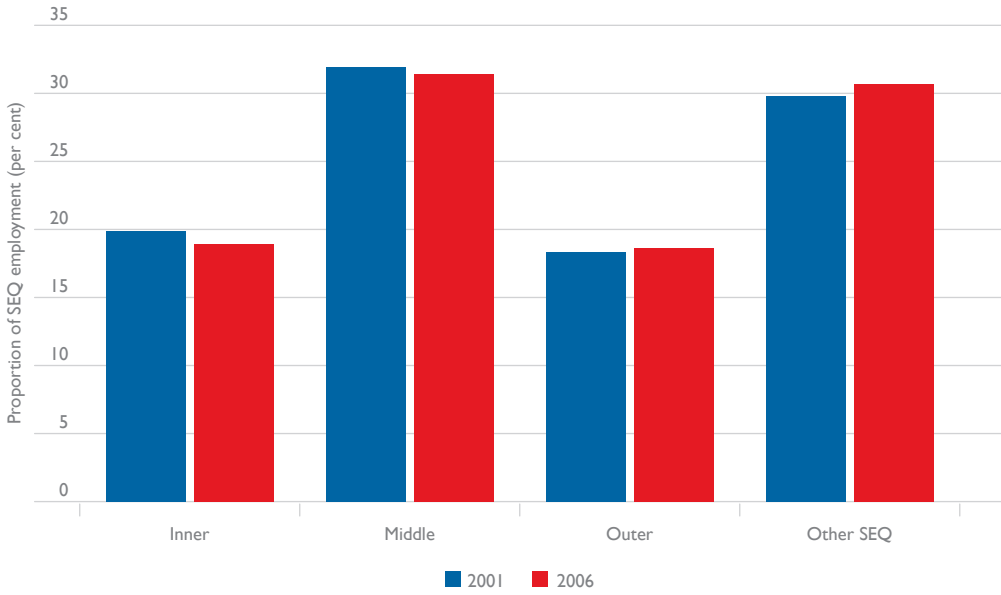
Regional overview

Between 2001 and 2006, the number of employed residents in SEQ grew by 3.6 per cent per annum, growing from 1.08 million to 1.29 million. The number of people who reported a fixed place of work within SEQ also grew by 3.6 per cent per annum, from 0.96 million to 1.15 million.

Similarly to Sydney, Melbourne and Perth, the number of employed residents in SEQ grew at a faster rate between 2001 and 2006 than population. In SEQ, approximately 46 per cent of residents were employed in 2006.

Figure 4.4 shows the distribution of employment in different parts of SEQ in 2001 and 2006. While the distribution is relatively stable, there is a noticeable shift of jobs from the Inner and Middle sectors to other parts of SEQ. The largest change was the Inner sector, which decreased its share from 19.9 per cent (191 000 of 959 000) to 18.9 per cent (217 000 of 1 145 000), with other SEQ increasing its share by 0.9 of a percentage point. The Middle sector declined by 0.5 of a percentage point, the Outer sector increased by 0.3 of a percentage point, and the remaining 0.4 percentage point increase went to people who reported an unknown address within Brisbane.

Figure 4.4 Contribution of sectors to total employment, South East Queensland, 2001 and 2006



Note: These values do not sum to 100 per cent as they do not include people who could not be allocated to a specific sector.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* place of work data for SLAs.

Table 4.6 summarises changes in place of work in SEQ between 2001 and 2006 by sector. Approximately 187 000 additional people were employed within SEQ in 2006 compared to 2001, with 115 300 of those new jobs being located in Brisbane. This increase is greater than that seen in Sydney SD (47 300, BITRE 2012a), Perth SD (65 300, BITRE 2010) and Melbourne

SD (107 200, BITRE 2011a). Employment growth exceeded population growth in percentage terms in all sectors save one, the Inner sector.

Employment grew strongly across the entire SEQ region during the 2001 to 2006 period, with the lowest growth rates in the region being higher than the highest growth rates for Sydney (BITRE 2012a). The lowest growth rates in SEQ were in the Toowoomba region, which experienced 2.4 per cent per annum employment growth, and the Inner sector, with 2.6 per cent per annum employment growth. The Sunshine Coast had the highest growth rate, with employment increasing by 5.1 per cent per annum.

Despite its low growth percentage, the Inner sector added 25 800 jobs, 14 per cent of SEQ's total growth over the period. The Inner sector's share of SEQ employment fell from 19.9 to 18.9 per cent between 2001 and 2006. The Gold Coast added 37 800 jobs, representing over 20 per cent of jobs growth in the region. The Sunshine Coast also saw a large growth in job numbers, containing 12 per cent (21 400) of SEQ's new jobs.

The Middle and Outer sectors of Brisbane together accounted for almost half of the jobs growth between 2001 and 2006, with the Middle sector containing 29 per cent and the Outer sector containing 20 per cent of new employment. Both the Middle East and Outer North subregions have exhibited particularly strong employment growth, at 4.6 and 4.7 per cent per annum, respectively.

Table 4.6 Changes in place of work data by sector, South East Queensland, 2001 to 2006

	Change in employment	Average annual employment growth (per cent)	Sector's share of SEQ employment growth	Average annual population growth (per cent)
Inner	25 800	2.6	13.9	5.3
Middle	54 000	3.3	28.9	1.7
Middle East	12 300	4.6	6.6	1.8
Middle North	17 000	2.9	9.1	1.2
Middle South	14 200	3.2	7.6	2.1
Middle West	10 400	3.0	5.6	2.2
Outer	35 500	3.7	20.0	2.3
Outer East	5 900	4.2	3.2	2.3
Outer North	16 000	4.7	8.6	3.0
Outer South	7 100	2.7	3.8	1.8
Outer West	6 500	3.1	3.5	2.6
Brisbane Total	115 300	3.2	62.8	2.2
Gold Coast	37 800	4.7	20.3	3.7
Sunshine Coast	21 400	5.1	11.5	3.6
Toowoomba	5 400	2.4	2.9	2.2
West Moreton	2 600	2.8	1.4	2.0
Other SEQ Total	67 300	3.5	35.1	3.4
Unknown Address	3 900	57.1	2.1	na
SEQ Total*	186 600	3.6	100.0	2.6

Notes: * Includes unknown address in Brisbane.
na – Not available.

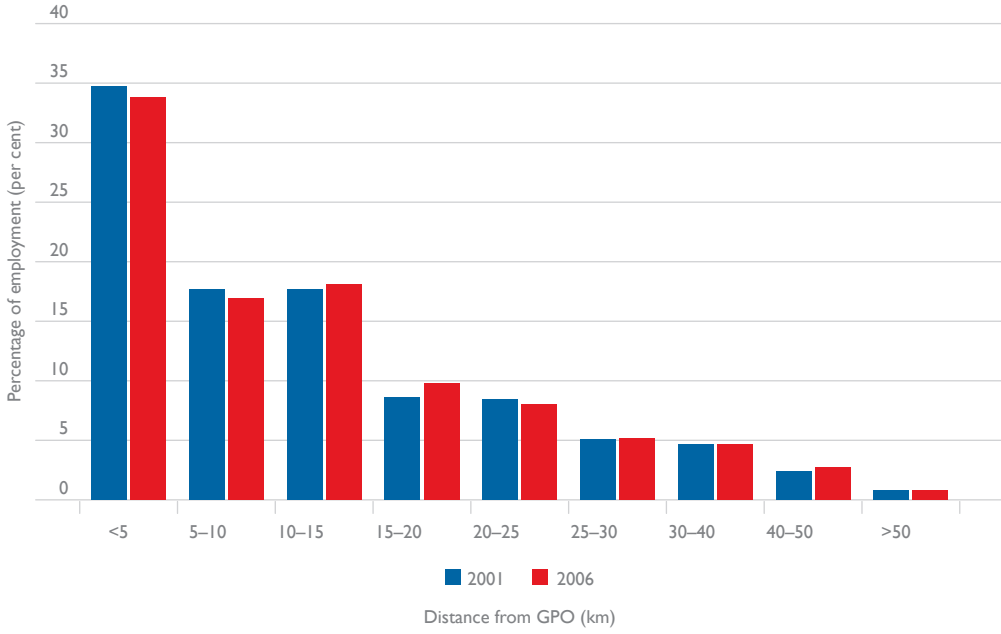
Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for SLAs and ABS Cat. 3218.0.

Across the region, self-sufficiency remained relatively stable between 2001 and 2006, with the most sizeable change occurring in the Inner sector, which experienced a decline in its self-sufficiency ratio of 0.76 due to the relatively large increase in the population of Inner Brisbane. Otherwise, the largest changes occurred in the Middle East (+0.06), the Middle North (+0.04) and the Outer West (–0.03).

Figure 4.5 shows the distribution of employment in Brisbane for 2001 and 2006, relative to distance from the CBD. While the distribution of employment has remained relatively stable during the period, there is an apparent trend of jobs moving from the heart of the city to the Middle and Outer sectors. The percentage of jobs located within 10 kilometres of the CBD has declined from 52.4 per cent to 50.7 per cent. The proportion of jobs situated between 10 and 20 kilometres from the CBD increased from 26.3 per cent to 27.9 per cent. Interestingly, the 20 to 25 kilometre distance band evidenced a decline of 0.4 percentage points in its share of employment. Jobs growth in Outer regions has increased the share of employment located 25 kilometres or further from the CBD by 0.5 percentage points.

The declining proportion of Brisbane's employment located within 5km or 10km of the CBD is consistent with the decline in the Inner sector's share of Brisbane's employment from 28.4 to 27.4 per cent between 2001 and 2006. Both point to reduced centralisation of employment within Brisbane.

Figure 4.5 Employment by distance from General Post Office, Brisbane, 2001 and 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for DZs.

Statistical Local Areas

Between 2001 and 2006, the spatial concentration of employment decreased slightly in SEQ, with the top five employing SLAs decreasing from 16.8 per cent of the region's total employment

in 2001 to 15.6 per cent in 2006. A similar decrease in employment share from 23.5 per cent in 2001 to 22.6 per cent in 2006 was observed across the region's top 10 employing SLAs.

In 2001, the City Inner SLA held a strong lead in employment within the region, being home to 64 000 jobs. City Remainder (33 300), Ipswich Central (26 200), Southport (19 600) and Pinkenba-Eagle Farm (17 600) rounded out the top five. This ranking was similar in 2006, with the sole change being the switching of Southport and Pinkenba-Eagle Farm. This ranking change may, however, be due to a change in the Southport SLA boundary between 2001 and 2006.

The Brisbane CBD—defined here as the combination of the City Inner and City Remainder SLAs[43]—increased its employment by about 9200 jobs from 2001 to 2006, which represented a decline from 14.5 to 13.5 per cent of Brisbane SD employment and from 10.2 to 9.3 per cent of SEQ employment. Together with the Inner sector's declining share of SEQ employment (and the evidence presented in Figure 4.5), this reflects a clear reduction in the centralisation of SEQ's employment between 2001 and 2006, representing a continuation of the decentralisation trend identified by Stimson and Taylor (1999) for SEQ for the 20 years to 1999.

Numerous SLAs in SEQ underwent significant boundary changes between 2001 and 2006. These changes took many different forms, from simple splitting of a single 2001 SLA into two or more SLAs in 2006, merging of two or more 2001 SLAs into a single SLA in 2006, and more complex changes involving several SLAs. The complexity of these changes makes it impossible to use either 2001 or 2006 boundaries directly as a geographical basis for comparison.

To allow for direct comparison, SLAs with changed boundaries were extracted, and the smallest aggregate regions which share a common boundary in both 2001 and 2006 were identified. These aggregate SLAs were then treated as a single region for further change analysis. The details of the aggregate SLA regions and their component 2001 SLAs and 2006 SLAs are presented in Appendix B (see Table B.1).

Table 4.7 lists the change in employment and average annual employment growth rate of these aggregate SLAs between 2001 and 2006. The Central Gold Coast aggregate region, containing 19 SLAs using 2006 boundaries, experienced growth in employment of 6.0 per cent per annum between 2001 and 2006, and accounted for 13.9 per cent of growth in SEQ. The North Gold Coast aggregate region, containing 5 SLAs using 2006 boundaries, also grew strongly—with a growth rate of 14 per cent per annum, the region contained 4.0 per cent of job growth in SEQ. However, population growth was much higher (10.4 per cent per annum) in the North Gold Coast aggregate region between 2001 and 2006 compared to the Central Gold Coast aggregate region (3.7 per cent per annum).

Between 2001 and 2006, Fortitude Valley in the Inner sector and Nambour in the Sunshine Coast region each experienced a similar increase in employment (2976 and 2804, respectively), but the average annual employment growth was higher in Fortitude Valley (4.4 per cent per annum) than in Nambour (3.2 per cent per annum). Toowoomba experienced a slightly higher employment increase (3329 people) than Fortitude Valley and Nambour, but the average annual employment growth was much slower (1.6 per cent) (Table 4.7).

43 Note that this differs from the definition of the Brisbane CBD activity centre, which includes the frame area described in Queensland Government and COMSEQ (2009 p.97), and thus extends well beyond the City Inner and City Remainder SLAs. Table 4.12 presents employment change data for the more encompassing Brisbane CBD activity centre (defined based on more detailed data for destination zones), which shows a smaller decline from 17.4 per cent of SEQ employment in 2001 to 17.2 per cent in 2006.

Due to their increased size, these aggregate SLAs have been excluded from tables listing the SLAs with the highest employment growth and decline in this chapter. Maps in this section use these aggregate regions where required and 2006 SLA boundaries otherwise.

Table 4.7 Aggregate Statistical Local Area regions, South East Queensland, 2001 and 2006

Aggregate SLA name	Region/ subregion	Change in employment, 2001 to 2006	Average annual employment growth rate (per cent)	Share of SEQ employment growth (per cent)	Average annual population growth rate (per cent)
Central Gold Coast Aggregate Region	Gold Coast	25 690	6.0	13.9	3.7
North Gold Coast Aggregate Region	Gold Coast	7 315	14.0	4.0	10.4
Toowoomba	Toowoomba	3 329	1.6	1.8	1.3
Fortitude Valley	Inner	2 976	4.4	1.6	11.4
Nambour	Sunshine Coast	2 804	3.2	1.5	2.7
Beaudesert	Gold Coast, West Moreton, Outer South	1 645	2.8	0.9	3.6
Bilinga-Tugun	Gold Coast	1 003	9.1	0.5	1.7
Mt Gravatt	Middle South	488	0.8	0.3	1.3
Currumbin	Gold Coast	362	2.2	0.2	1.0
South Stradbroke-Runaway Bay	Gold Coast	271	0.8	0.1	1.7
Broadbeach-Mermaid Beach	Gold Coast	186	0.3	0.1	1.5
Gumdale-Ransome	Middle East	146	8.8	0.1	1.2
Nudgee	Middle North	107	3.2	0.1	2.0
The Gap	Middle West, Middle North	84	0.5	0.0	0.6
Chandler-Capalaba West	Middle East	67	1.8	0.0	1.7

Note: The Aggregate SLA regions are defined in Appendix B (Table B.1).

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data and ABS Cat. 3218.0.

Table 4.8 lists the non-aggregate SLAs which have had growth in employment of at least 3000 jobs between 2001 and 2006. City Remainder and Pinkenba-Eagle Farm each experienced an increase of employment of more than 5000 people. The Inner sector SLAs of City Remainder and South Brisbane both saw population rise more quickly than employment in percentage terms, while other SLAs in the table saw higher growth in employment than population. This is particularly notable in Pinkenba-Eagle Farm, where population declined despite a strong annual growth of 5.8 per cent in employment. Growth in employment was well dispersed across SEQ, with the highest employment growth in a single SLA—City Remainder—accounting for only 3.7 per cent of total growth in the SEQ region.

Hemmant-Lytton and Murarrie are both part of the Australia TradeCoast trade and industry region, and both of them saw significant development between 2001 and 2006. There has been significant development of business parks and other employment based infrastructure

in the Australia TradeCoast area, and this is reflected in the strong growth seen in the SLAs which house it.

Table 4.8 Increases in place of work data by Statistical Local Area, South East Queensland, 2001 to 2006

SLA of work	Region/Sector/ Subregion	Change in employment, 2001 to 2006	Average annual employment growth (per cent)	Share of SEQ employment growth (per cent)	Average annual population growth (per cent)
City Remainder	Inner	6 800	3.8	3.7	20.6
Pinkenba-Eagle Farm	Middle North	5 700	5.8	3.1	–1.4
Maroochy—Buderim	Sunshine Coast	4 100	8.9	2.2	5.2
Murarrie	Middle East	4 000	13.6	2.2	–0.2
South Brisbane	Inner	3 900	5.7	2.1	8.3
Hemmant-Lytton	Middle East	3 400	10.4	1.8	4.3
Ipswich Central	Outer West	3 100	2.2	1.7	1.4

Note: The Aggregate SLA regions listed in Table 4.7 are excluded from the table.

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data and ABS Cat. 3218.0.

Table 4.9 lists the SLAs that experienced an absolute decrease of 500 or more jobs between 2001 and 2006. All three of these SLAs experienced an increase in population, although this was below the SEQ average growth of 2.6 per cent in all cases.

Table 4.9 Decreases in place of work data by Statistical Local Area, South East Queensland, 2001 to 2006

SLA of work	Subregion	Change in employment, 2001 to 2006	Average annual employment growth (per cent)	Share of SEQ employment growth (per cent)	Average annual population growth (per cent)
Wynnum	Middle East	–531	–2.8	–0.3	1.4
Coopers Plains	Middle South	–833	–3.1	–0.5	0.6
Sunnybank	Middle South	–1242	–8.4	–0.7	0.6

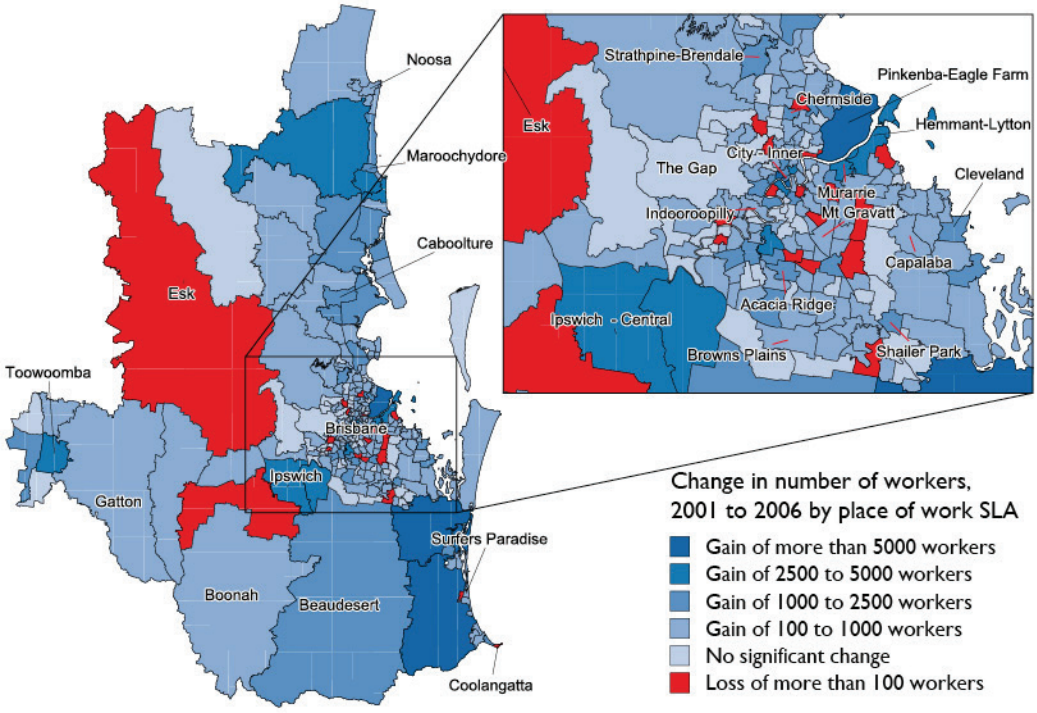
Note: The Aggregate SLA regions listed in Table 4.7 are excluded from the table. The three listed SLAs are adjacent to SLAs with similar or larger increases in employment in the same period, so the decrease may be due to data reporting changes between censuses in 2001 and 2006.

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data and ABS Cat. 3218.0.

Map 4.7 shows the change in employment in each SLA in SEQ between 2001 and 2006, and Map 4.8 shows the change in employed residents at the same scale and time period.

There are few spatial patterns evident in the changes to employment in SEQ between 2001 and 2006. There are clusters of high job growth SLAs at the mouth of the Brisbane River, in inner city Brisbane and in the Gold Coast and Sunshine Coast regions. Brisbane's west exhibits a cluster of SLAs which show little growth in employment, a trend which stretches North West through Esk to the boundaries of the SEQ region.

Map 4.7 Change in employment, South East Queensland, 2001 to 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for SLAs.

Between 2001 and 2006, the rate of employment growth was the highest for:

- Griffin-Mango Hill (average annual growth of 41 per cent)
- Willawong (34 per cent)
- Jondaryan Part A (33 per cent)
- Holland Park West (31 per cent).

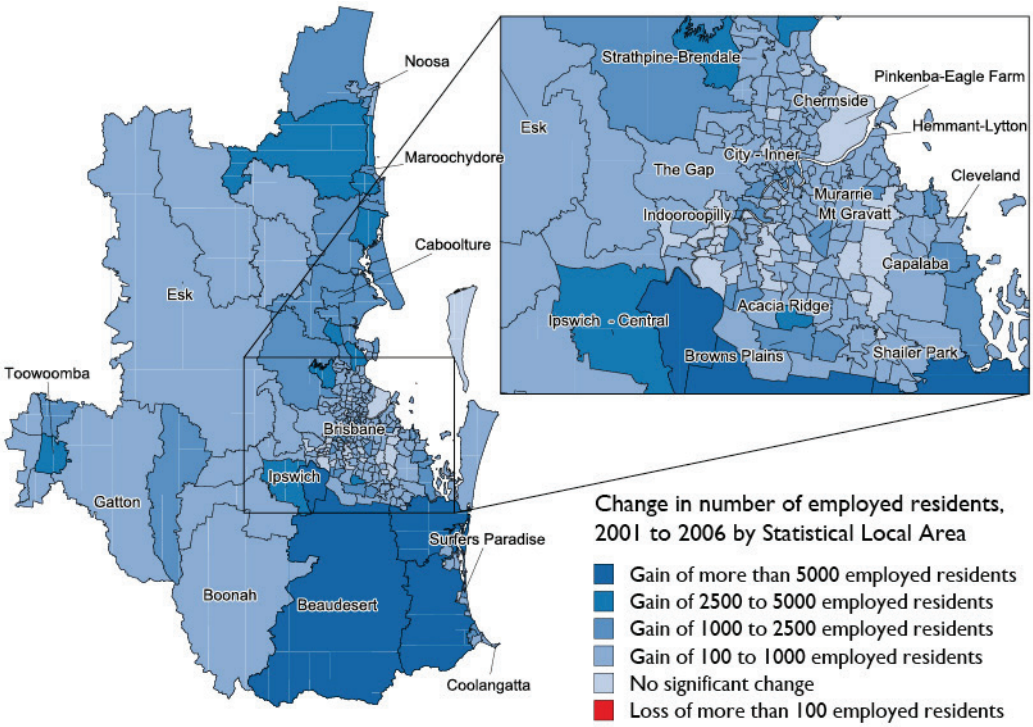
While these SLAs have experienced significant percentage growth in jobs, in the case of Willawong and Holland Park West, this growth is only around 420 jobs. Griffin-Mango Hill (a new development with a major shopping mall opened between 2001 and 2006) and Jondaryan Part A (containing the growing suburbs of Westbrook and Glenvale) each added approximately 1400 jobs.

The rate of employment growth exceeded the rate of growth of employed residents by more than 2.5 per cent in 63 SLAs within SEQ between 2001 and 2006, indicating an increase in self-sufficiency within these SLAs. Conversely, 37 SLAs became significantly more residentially oriented, with growth in employed residents exceeding employment growth by over four per cent.

Self-sufficiency change was not strongly related to sector, with all sectors containing an approximate balance of SLAs with an increase and SLAs with a decrease in self-sufficiency.

At the SLA scale, there is a positive correlation between the growth rates for employment and employed residents of 0.33. This indicates that the growth in employed residents in an area is likely to be associated with a growth in employment in that area.

Map 4.8 Change in employed residents, South East Queensland, 2001 to 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for SLAs.

Destination zones

Destination zone boundaries for SEQ vary greatly between 2001 and 2006. Due to these boundary changes and data quality issues, change analysis at this scale has not been conducted for SEQ as a whole.

South East Queensland's strategic planning objectives

The *SEQ Regional Plan 2009–2031* has few specific targets and policies relating to employment in a general sense. The plan does not include employment estimates or forecasts, and does not outline specific targets for employment growth within SEQ. Instead, it requires local government to identify needs for each subregion when preparing strategic frameworks to ensure that there is sufficient employment land across the subregion.

The document does specify two spatial employment goals for SEQ as a whole—achieving employment and economic growth in the Western Corridor and locating employment within activity centres. Both of these goals have been present in past SEQ planning documents. Activity centres have played a significant role in employment planning in both the *Regional*

Framework for Growth Management for SEQ 2000 and the *SEQ Regional Plan 2005–2026.* The *SEQ Regional Plan 2005–2026* also identifies the Western Corridor as an important location for employment generation. The remainder of this chapter uses the available place of work data to assess the extent to which these goals have been met since 2001.

Achieve significant employment growth in the Western Corridor

> 'Initiate and implement programs that support economic development of the western corridor' (Queensland Government and COMSEQ 2009, p.112).

The Western Corridor stretches from Goodna to Grandchester, and includes the City of Ipswich Local Government Area (LGA) (Department of Infrastructure and Planning 2010). The *SEQ Regional Plan 2009–2031* describes this area as playing a key role in SEQ's preferred settlement pattern. In addition to employment growth being a strong indicator of general economic growth, the regional plan also specifically calls for 'significant employment growth in the Western Corridor' (Queensland Government and COMSEQ 2009, p.122).

In line with the approach adopted in Chapter 3, the Western Corridor has been defined as equivalent to the Ipswich LGA. The employment change in the five SLAs which make up the LGA of Ipswich are summarised in Table 4.10.

In 2001, the Ipswich LGA was home to 38 992 jobs. In 2006, this had increased to 45 451 jobs, an average growth of 3.1 per cent per annum. This is lower than SEQ's average growth of 3.6 per cent per annum, indicating that employment growth in the Western Corridor is not keeping pace with the rest of the region.

Table 4.10 Employment change in the Western Corridor, 2001 to 2006

SLA Name	Employment 2001	Employment 2006	Change in employment, 2001 to 2006	Average annual employment growth (per cent)
Ipswich Central	26 185	29 263	3 078	2.2
Ipswich East	9 927	12 755	2 828	5.1
Ipswich North	738	1 014	276	6.6
Ipswich South-West	899	796	–103	–2.4
Ipswich West	1 243	1 623	380	5.5
Western Corridor Total	38 992	45 451	6 459	3.1

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data.

Despite overall employment growth being below the SEQ average, the Ipswich North, Ipswich East and Ipswich West SLAs all exhibited strong employment growth in percentage terms. In particular, Ipswich East added 2800 jobs between 2001 and 2006, with a growth rate of 5.1 per cent per annum. Self-sufficiency in the Western Corridor declined from 76 jobs per 100 employed residents in 2001 to 72 jobs per 100 employed residents in 2006, indicating that increases in employed residents outpaced increases in employment in the area.

The 'Ipswich Community Plan i2031' describes plans to enable further employment growth in the region, with Ripley in particular set to become a major master planned community

with significant residential and employment potential. This and other proposed developments should serve to accelerate employment growth in the Western Corridor beyond the levels seen between 2001 and 2006.

Employment growth in the Western Corridor was not as strong as employment growth elsewhere in SEQ during the 2001 to 2006 period, and it did not keep pace with local residential growth. This indicates that further efforts will need to be made in order to support development in the Western Corridor.

Locate employment in activity centres

> 'Locate major employment and trip-generating activities in regional activity centres and on priority transit corridors and other high-frequency transit corridors' (Queensland Government and COMSEQ 2009, p.96).

The *SEQ Regional Plan 2009–2031* proposes a network of regional activity centres as the backbone of compact, self-contained and diverse communities. These activity centres are to be the focus of employment, infill housing and community development within the SEQ region. The plan also specifies that out-of-centre development should be discouraged, as it 'can diminish the vitality of activity centres and detract from economic growth by diluting public and private investment in centre-related activities, facilities and infrastructure' (ibid.,).

Burke, Dodson and Gleeson (2010) detail the importance of decentralisation, particularly of 'new economy' employment within Brisbane. They highlight the potential positive impacts of spreading employment to areas outside of the CBD, such as improving commuting times and increasing the environmental sustainability of the city.

The *SEQ Regional Plan 2009–2031* defines sixty one activity centres, both planned and existing. These centres are divided into six categories: Primary (1), Principal Regional (15), Major Regional (28), Specialist (9), Principal Rural (2) and Major Rural (6). Chapter 2 contains more detail about these centre types (see Table 2.6). Map 2.1 shows the locations of these activity centres within SEQ.

This section focuses on primary, principal regional, major regional and specialist activity centres. Data on employment within each activity centre is not directly available. To estimate employment concentration within activity centres, the destination zones that overlap the activity centre boundaries presented in local government planning documents[44] are used to approximate the centre's location. Specialist centres were not clearly defined in local government planning documents, and so their boundaries were estimated based on satellite imagery. Certain proposed centres which are contained within the same destination zone (Yarrabilba and Flagstone) or are part of greenfields development that had not begun by 2006 (Caloundra South) have not been included in this analysis.

Priority transit corridors have been defined based partially on the criteria that they support a regional activity centre (Department of Transport and Main Roads 2011a). As a result of both this and difficulty in acquiring data that specifically covers the geography of transit corridors, we have not included them in the following analysis.

44 Note that for some activity centres, particularly specialist centres, the destination zone containing the centre is significantly larger than the activity centre itself. This means that employment estimates for some activity centres may be higher than actual employment within the centre.

2006 snapshot

Table 4.11 summarises the 2006 employment information for the primary, principal, major and specialised activity centres identified in the *SEQ Regional Plan 2009–2031*. In 2006, 39.5 per cent of employment within SEQ was located in one of these activity centres. The remaining 60.5 per cent of employment was located in one of the activity centre types not included in this analysis or outside an activity centre entirely.

The Brisbane CBD activity centre, consisting of both the CBD and several surrounding suburbs,[45] accounts for almost 200 000 jobs, approximately 44 per cent of centred employment. This is only a little lower than employment in the Melbourne Central Activities District, which totalled 216 300 in 2006 (BITRE 2011a).

Other activity centres with significant levels of employment in the SEQ region are:

- Southport, on the Gold Coast (16 000 jobs)
- Toowoomba, in the Toowoomba statistical subdivision (15 100 jobs)
- Caboolture/Morayfield, in the Outer Northern subregion (10 900 jobs)
- Strathpine, in the Outer Northern subregion (10 700 jobs)
- Brisbane Airport, in the Middle North subregion (10 400 jobs)
- Herston/Kelvin Grove, in the Inner sector (10 000 jobs).

The non-specialist centres with fewer than 3000 jobs in 2006—Ripley, Goodna, Beerwah, Sippy Downs, North Lakes and Springfield—are all either planned or very newly developed activity centres, with employment generating infrastructure in these areas either in early stages of completion or still under construction in 2006.

It is interesting to note that the number of jobs located in a particular centre in 2006 is not closely related to that centre's classification as either a major or principal activity centre. In some cases the classification will reflect that centre's planned future role, rather than its existing role.

45 The Brisbane CBD activity centre includes the frame area described in Queensland Government and COMSEQ (2009, p.97), and thus extends well beyond the City Inner and City Remainder SLAs.

Table 4.11 Employment in activity centres, South East Queensland, 2006

Centre type	Activity centre	Employed persons 2006	Proportion of employment (per cent)
Primary	Brisbane CBD[a]	196 879	17.2
Principal	Beenleigh	3 915	0.3
	Caboolture/Morayfield	10 919	1.0
	Capalaba	6 784	0.6
	Carindale	3 030	0.3
	Chermside	6 144	0.5
	Cleveland	3 294	0.3
	Indooroopilly	3 534	0.3
	Ipswich	7 543	0.7
	Maroochydore	5 754	0.5
	Robina	5 865	0.5
	Southport	16 057	1.4
	Springfield	1 587	0.1
	Springwood	3 622	0.3
	Toowoomba	15 101	1.3
	Upper Mount Gravatt	7 733	0.7
	Principal Activity Centres Total	100 882	8.8
Major	Beerwah	1 764	0.2
	Broadbeach	5 832	0.5
	Browns Plains	3 619	0.3
	Bundall	6 618	0.6
	Caloundra	7 504	0.7
	Coolangatta	2 629	0.2
	Coomera	2 713	0.2
	Goodna	1 882	0.2
	Helensvale	4 185	0.4
	Kawana	4 559	0.4
	Logan Central	5 602	0.5
	Logan Hyperdome	4 511	0.4
	Mitchelton	2 834	0.2
	Nambour	6 935	0.6
	Nerang	8 771	0.8
	Noosa	7 353	0.6
	North Lakes	1 417	0.1
	Redcliffe	4 397	0.4
	Ripley	301	0.0
	Sippy Downs	1 791	0.2
	Strathpine	10 691	0.9

(continued)

Table 4.11 Employment in activity centres, South East Queensland, 2006 *(continued)*

Centre type	Activity centre	Employed persons 2006	Proportion of employment (per cent)
	Surfers Paradise	9 853	0.9
	Toombul/Nundah	3 574	0.3
	Toowong	4 499	0.4
	Wynnum Central	3 406	0.3
	Major Activity Centres Total	117 240	10.2
Specialist[b]	Amberley Airbase	3 732	0.3
	Brisbane Airport	10 428	0.9
	Gold Coast University Hospital Precinct	3 046	0.3
	Herston/Kelvin Grove	10 045	0.9
	Nathan/Mount Gravatt	2 564	0.2
	Sunshine Coast Airport	1 124	0.1
	University of Queensland	5 966	0.5
	Specialist Activity Centres Total	36 905	3.2
	Activity Centre Total	451 906	39.5
	Non-Activity Centre Total[c]	693 233	60.5
	Total SEQ	1 145 139	100.0

Notes: [a] Includes the frame area described in Queensland Government and COMSEQ 2009 p.97, and thus extends well beyond the City Inner and City Remainder SLAs.

[b] The specialist centres of Boggo Road/Buranda and Gold Coast Airport are contained within the area belonging to Brisbane CBD and Coolangatta respectively and so have not been included here.

[c] Includes principal rural and major rural activity centres.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for DZs.

Change 2001 to 2006

Table 4.12 summarises BITRE's estimates of employment change in activity centres within SEQ from 2001 to 2006. As boundaries for 2001 and 2006 destination zones varied considerably between 2001 and 2006, the 2001 place of work data for destination zones has been concorded to reflect 2006 boundaries using an area-weighted concordance.

There was a 104 000 person increase in the number of jobs in primary, major regional, principal regional and specialist activity centres between 2001 and 2006, which represents 55.7 per cent of SEQ's growth. Employment in activity centres grew at 5.4 per cent per annum, doubling the rate of out of centre growth of 2.6 per cent.

Between 2001 and 2006, the share of SEQ's employment located in activity centres increased from 36.3 per cent to 39.5 per cent, which is consistent with the goals presented in the *SEQ Regional Plan 2009–2031* to locate employment in centres.

Major, principal and specialist activity centres grew at approximately the same rate from 2001 to 2006, with major centres growing at an average of 7.0 per cent per annum, principal centres at 7.2 per cent per annum and specialist centres at a rate of 7.3 per cent per annum. The primary centre grew at the lowest rate, 3.3 per cent per annum, but this was from a substantially higher base.

Several centres experienced explosive employment growth during the period investigated, with both North Lakes (+1300) and Coomera (+2500) growing at over 60 per cent per annum. In both of these cases, the centre has had major employment infrastructure completed between 2001 and 2006, and as a result the area has seen a surge in employment due to the sudden availability of new jobs.

Strong growth dominates the behaviour of employment at centres between 2001 and 2006, with very few activity centres experiencing a decline in employment. Only the major centres of Wynnum Central (–500) in the Middle East subregion, and Coolangatta (–300) and Bundall (–400) in the Gold Coast region experienced decreases in employment, and these were relatively small.

Queensland Government (2008b) presents estimates of employment growth for SEQ's centres between 2001 and 2006, which differ from the estimates presented here, due to differences in which centres are considered, as well as in the definitions of individual centres and the estimation approach. Employment growth in the primary, principal and specialist centres (excluding Toowoomba and Griffith University) was estimated to have accounted for 34 per cent of SEQ employment growth (ibid). This compares to BITRE's estimate of 32 per cent for the primary, principal and specialist centres (excluding Toowoomba and Nathan-Mount Gravatt).

Table 4.12 Employment change in activity centres, South East Queensland, 2001 to 2006

Centre type	Activity centre	Change in employed persons, 2001 to 2006	Proportion of SEQ employment (per cent)		Average annual growth (per cent)	Contribution to total growth (per cent)
			2001	2006		
Primary	Brisbane CBD[a]	29 600	17.4	17.2	3.3	15.9
Principal	Beenleigh	700	0.3	0.3	4.2	0.4
	Caboolture/Morayfield	2 400	0.9	1.0	5.2	1.3
	Capalaba	1 100	0.6	0.6	3.7	0.6
	Carindale	1 400	0.2	0.3	12.9	0.7
	Chermside	800	0.6	0.5	2.8	0.4
	Cleveland	2 035	0.2	0.3	21.2	1.1
	Indooroopilly	900	0.3	0.3	6.2	0.5
	Ipswich	900	0.7	0.7	2.5	0.5
	Maroochydore	800	0.5	0.5	2.9	0.4
	Robina	2 300	0.4	0.5	10.5	1.2
	Southport	1 900	1.5	1.4	2.6	1.0
	Springfield	900	0.1	0.1	16.9	0.5
	Springwood	100	0.4	0.3	0.6	0.1
	Toowoomba[b]	10 200	0.5	1.3	25.4	5.5
	Upper Mount Gravatt	3 000	0.5	0.7	10.5	1.6
Principal Activity Centres Total		29 600	7.4	8.8	7.2	15.9

(continued)

Table 4.12 Employment change in activity centres, South East Queensland, 2001 to 2006 *(continued)*

Centre type	Activity centre	Change in employed persons, 2001 to 2006	Proportion of SEQ employment (per cent)		Average annual growth (per cent)	Contribution to total growth (per cent)
			2001	2006		
Major	Beerwah	900	0.1	0.2	14.4	0.5
	Broadbeach	1 500	0.5	0.5	5.9	0.8
	Browns Plains	1 500	0.2	0.3	11.5	0.8
	Bundall	–400	0.7	0.6	–1.1	–0.2
	Caloundra	2 400	0.5	0.7	8.1	1.3
	Coolangatta	–300	0.3	0.2	–1.9	–0.1
	Coomera	2 500	0.0	0.2	62.8	1.3
	Goodna	300	0.2	0.2	2.9	0.1
	Helensvale	2 000	0.2	0.4	13.5	1.1
	Kawana	3 000	0.2	0.4	23.2	1.6
	Logan Central	600	0.5	0.5	2.3	0.3
	Logan Hyperdome	1 600	0.3	0.4	9.3	0.9
	Mitchelton	100	0.3	0.2	1.1	0.1
	Nambour	3 000	0.4	0.6	11.7	1.6
	Nerang	5 800	0.3	0.8	24.5	3.1
	Noosa	800	0.7	0.6	2.4	0.4
	North Lakes	1 300	0.0	0.1	63.8	0.7
	Redcliffe	700	0.4	0.4	3.5	0.4
	Ripley	0	0.0	0.0	0.7	0.0
	Sippy Downs	1 100	0.1	0.2	20.9	0.6
	Surfers Paradise	600	1.0	0.9	1.2	0.3
	Strathpine	2 800	0.8	0.9	6.2	1.5
	Toombul/Nundah	700	0.3	0.3	4.3	0.4
	Toowong	2 000	0.3	0.4	12.3	1.1
	Wynnum Central	–500	0.4	0.3	–2.9	–0.3
Major Activity Centres Total		33 800	8.7	10.2	7.0	18.1
Specialist[c]	Amberley Airbase	1 300	0.3	0.3	8.8	0.7
	Brisbane Airport	3 200	0.8	0.9	7.7	1.7
	Gold Coast University Hospital Precinct	400	0.3	0.3	2.9	0.2
	Herston/Kelvin Grove	3 000	0.7	0.9	7.4	1.6
	Nathan/Mount Gravatt	200	0.2	0.2	1.5	0.1
	Sunshine Coast Airport	700	0.0	0.1	20.7	0.4
	University of Queensland	2 100	0.4	0.5	9.3	1.1
Specialist Activity Centres Total		10 900	2.7	3.2	7.3	6.5
Activity Centre Total		104 000	36.3	39.5	5.4	55.7
Non-Activity Centre Total[d]		82 600	63.7	60.5	2.6	44.3
Total SEQ		186 600	100.0	100.0	3.6	100.0

Notes: [a] Includes the frame area described in Queensland Government and COMSEQ 2009 p.97, and thus extends well beyond the City Inner and City Remainder SLAs.

[b] Employment values for Toowoomba appear to have undergone coding changes between 2001 and 2006 which has caused a large number of jobs to be moved between adjacent SLAs and DZs. As a result, growth values for the Toowoomba principal activity centre are higher than expected.

[c] The specialist centres of Boggo Road/Buranda and Gold Coast Airport are contained within the area belonging to Brisbane CBD and Coolangatta respectively and so have not been included here.

[d] Includes principal rural and major rural activity centres.

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for DZs.

The SEQ region has made progress towards increasing employment in activity centres between 2001 and 2006, with a strong increase in the proportion of jobs located in centres, in addition to strong job growth within almost all activity centres. With significant future construction planned for many of these centres, particularly in the Western Corridor (Ipswich City Council 2011, p.80), there is strong potential for this trend to continue. A report by the Productivity Commission (Productivity Commission 2011) highlights that development in SEQ is strongly affected by activity centre policy, with more development applications refused due to being located at unsuitable sites in Queensland than any other state. This strict adherence to activity centre policy also increases the likelihood that future employment growth will be focussed in activity centres.

Summary

This chapter provided a detailed description of the spatial distribution of employment within SEQ and changes to that distribution between 2001 and 2006. Jobs growth was strong throughout the period across much of SEQ, with the jobs growth strongest in the City Remainder SLA and the Pinkenba-Eagle Farm SLA, which houses the Brisbane International Airport and parts of the Australia TradeCoast. Average annual jobs growth in SEQ has been well above the national average for the past decade.

This chapter has also investigated how employment change between 2001 and 2006 relates to the strategies in the *SEQ Regional Plan 2009–2031* which are relevant to the spatial distribution of jobs—in particular the relationship between employment and activity centres, and employment within the Western Corridor. The key findings are summarised at the beginning of this chapter.

CHAPTER 5
Industry

Key points

- South East Queensland's (SEQ) major employing industries in 2006 were *Retail trade* (16 per cent), *Property and business services* (12 per cent) and *Health and community services* (12 per cent).
- The *Property and business services* industry is the major employer in the Inner sector, with *Retail trade* dominating in all other sectors and regions other than West Moreton, which features *Agriculture, forestry and fishing* as the major employing industry.
- The industry mix in SEQ's SLAs exhibits a significant amount of diversity. *Retail trade* was the largest employing industry in 93 SLAs in 2006. The *Education* industry was the primary industry of employment in 48 SLAs, with *Construction* being the highest employing industry in 46 SLAs. Employment in *Construction, Retail trade* and *Education* is well dispersed across SEQ at the Statistical Local Area (SLA) level.
- Between 2001 and 2011 (using the ANZSIC 2006 industry classification) the *Health care and social assistance* industry contributed the most jobs to Brisbane, adding 51 000 jobs (19 per cent of new employment). The *Construction* industry added 38 000 jobs (14 per cent of new employment).
- Using Census data, the primary contributors to SEQ's job growth from 2001 to 2006 were *Health and community services* (gain of 29 000 jobs), *Construction* (25 300 jobs) and *Property and business services* (23 500 jobs). The only industry to feature a decline between 2001 and 2006 in SEQ was *Agriculture, forestry and fishing* (decline of 2700 jobs).
- Industry drivers of employment growth between 2001 and 2006 vary greatly across SEQ. Growth in the Inner sector was driven by *Government administration and defence*, while the Middle and Outer sectors were driven by *Health and community services* and *Retail trade* respectively. The Gold Coast featured *Construction* as the primary growth industry. *Retail trade* was the largest growth industry for the Sunshine Coast and West Moreton. *Health and community services* was the primary growth industry for Toowoomba.
- In line with the goals presented in the *SEQ Regional Plan 2009–2031*, from 2001 to 2006 there was strong growth in office-based business and government and community services employment in centres outside the CBD, while the declines in manufacturing and logistics employment in the Inner sector were coupled with strong gains in manufacturing and logistics employment in many of the regions targeted for growth. Industrial diversity remained largely unchanged across SEQ from 2001 to 2006.

Context

> 'Plan for employment to support a strong, resilient and diversified economy that grows prosperity in the region by using its competitive advantages to deliver exports, investment and sustainable and accessible jobs' (Queensland Government and COMSEQ 2009, p.111).

In addition to understanding the distribution of overall employment within SEQ, it is important to understand the industry structure that makes up this employment. The *SEQ Regional Plan 2009–2031* highlights the importance of industry diversity within SEQ to support and develop the high living standard within SEQ.

This chapter begins with a snapshot of employment distribution by industry throughout SEQ in 2006 at the SLA level. It then explores in depth the changes in industry of employment that have occurred since 2001. The chapter concludes with an assessment of the relationship between the planning goals identified in the *SEQ Regional Plan 2009–2031* and the changes observed.

The spatial analysis of industry of employment within this chapter is based on data from the ABS *Census of Population and Housing* for 2001 and 2006. The ABS *Labour Force Survey* is also used to provide a broad overview of industry change for SEQ between 2001 and 2011.

Employment by industry in 2006

This section considers the location of industries within SEQ in 2006 using census data on employment by industry. The ANZSIC 1993 classification at the 1 digit level, which consists of 17 different industries, is used in this chapter. This analysis is conducted on a place of employment basis except where otherwise noted.

Regional overview

The largest employing industries for SEQ were *Retail trade* (16.0 per cent), *Property and business services* (11.9 per cent) and *Health and community services* (11.6 per cent).

Table 5.1 presents the major employing industries for each sector, as well as each sector's main industry specialisation. A place can have a very high degree of specialisation without that industry being one of the top employers. For example, the *Cultural and recreational services* industry in the Gold Coast accounts for 4.4 per cent of employment, but this is well above the national average of 2.3 per cent. The top specialisation for each sector was identified using location quotients, which in this example would equal 1.9 (i.e. 4.4 divided by 2.3).

Retail trade is the major employing industry for the Middle sector, particularly the North, South and West subregions. *Retail trade* was also strongly represented in the Outer sector, Toowoomba, the Sunshine Coast and the Gold Coast. West Moreton is primarily focussed on *Agriculture, forestry and fishing*, and the Outer West and Middle East subregions are focussed on *Manufacturing*. The Inner sector's major employer is the *Property and business services* industry, which is the same as for Perth, Melbourne and Sydney (BITRE 2010, 2011a, 2012a). SEQ uniquely features an Inner sector top specialisation of *Government administration and defence*.

Table 5.1 Major employing industry and main specialisation by subregion, South East Queensland, 2006

	Major employing industry	Employment share (per cent)	Main specialisation	Employment share (per cent)
Inner	Property and business services	21.8	Government administration and defence	13.2
Middle	Retail trade	16.5	Transport and storage	7.2
Middle East	Manufacturing	19.3	Transport and storage	8.2
Middle North	Retail trade	16.6	Transport and storage	9.0
Middle South	Retail trade	17.2	Wholesale trade	10.2
Middle West	Retail trade	15.4	Education	14.1
Outer	Retail trade	20.4	Retail trade	20.4
Outer East	Retail trade	22.0	Retail trade	22.0
Outer North	Retail trade	21.3	Retail trade	21.3
Outer South	Retail trade	22.7	Retail trade	22.7
West	Manufacturing	21.4	Manufacturing	21.4
Brisbane	Retail trade	14.9	Transport and storage	5.6
Gold Coast	Retail trade	18.4	Cultural and recreational services	4.4
Sunshine Coast	Retail trade	19.7	Accommodation, cafes and restaurants	8.5
Toowoomba	Retail trade	18.2	Education	10.9
West Moreton	Agriculture, forestry and fishing	18.7	Agriculture, forestry and fishing	18.7
Other SEQ	Retail trade	18.6	Accommodation, cafes and restaurants	7.9
Total SEQ	Retail trade	16.0	Retail trade	16.0

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for SLAs.

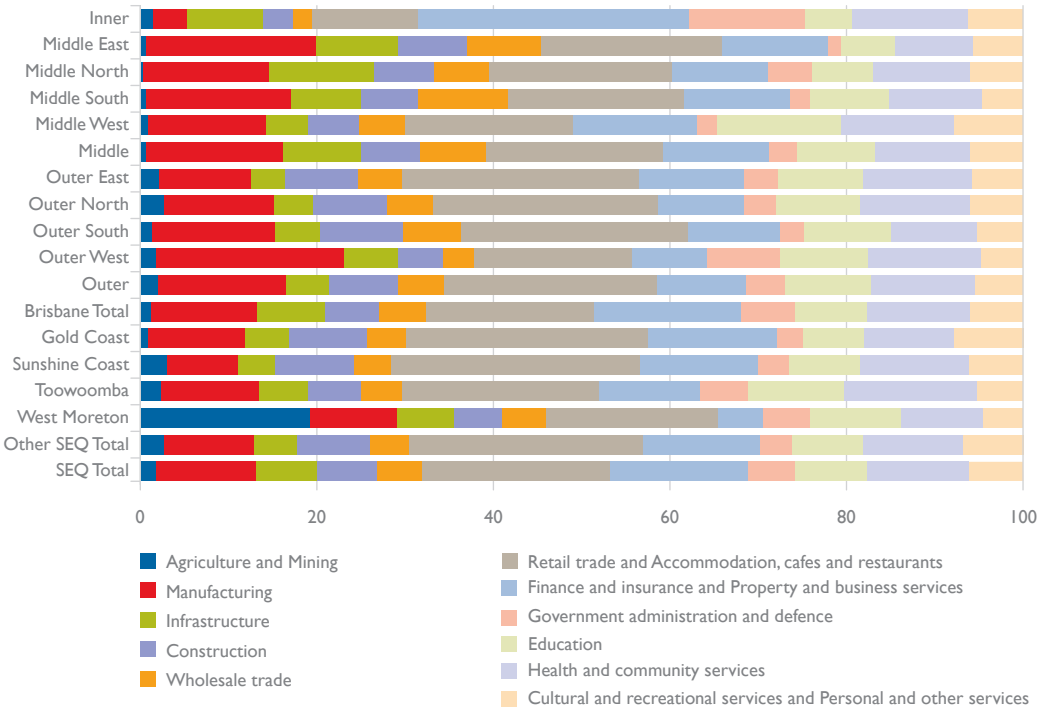
Figure 5.1 presents the industry mix by subregions within SEQ. The 17 industries have been condensed into 11 industries for presentation purposes. Key features of the figure are:

- *Agriculture, forestry and fishing* is a major employer in West Moreton (accounting for 18.7 per cent of employment in the sector), but only plays a very minor role in employment in the remainder of SEQ.
- While *Manufacturing* jobs are strongest in the Outer West subregion, manufacturing jobs are generally stronger in the Middle sector than the Outer sector. *Manufacturing* provides the lowest proportion of jobs in the Inner sector, at 3.9 per cent.
- The combined *Finance and insurance and Property and business services* industry is the largest employer in the Inner sector, representing a combined 30.6 per cent of employment within the sector. This is substantially higher than the second highest representation, a 14.6 per cent employment share in the Gold Coast.

- A major employer for all sectors is *Retail trade* and *Accommodation, cafes and restaurants,* which have the highest employment share in eleven of the thirteen subregions presented.[46] The Sunshine Coast has the highest level of employment in this category, at 28.3 per cent.
- *Government administration and defence* is strongly represented in the Inner sector, where it has a 13.2 per cent employment share. The Outer West subregion also has a relatively high proportion of employment in this category, at 8.2 per cent, owing to the presence of Amberley airbase.
- *Health and community services* is an important industry for employment in all sectors, with a minimum employment share of 8.8 per cent in the Middle East subregion. Its employment share is highest in Toowoomba, at 15 per cent.

The *Mining* industry has a high level of centralisation, with 51.3 per cent of people employed in this industry working in the Inner sector. *Finance and Insurance, Electricity, gas and water supply* and *Communication services* were also strongly concentrated, with 45.2 per cent, 38.2 per cent and 37.0 per cent of jobs respectively located in the Inner sector. In contrast, *Agriculture, forestry and fishing* has 88.7 per cent of its employment located in either the Outer sector or outside Brisbane.

Figure 5.1 Employment by industry in each subregion within South East Queensland, 2006



Note: Infrastructure includes Communication services, Transport and storage and Electricity gas and water supply.
Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for SLAs.

46 When taken as the sum of the two classifications.

Statistical Local Areas

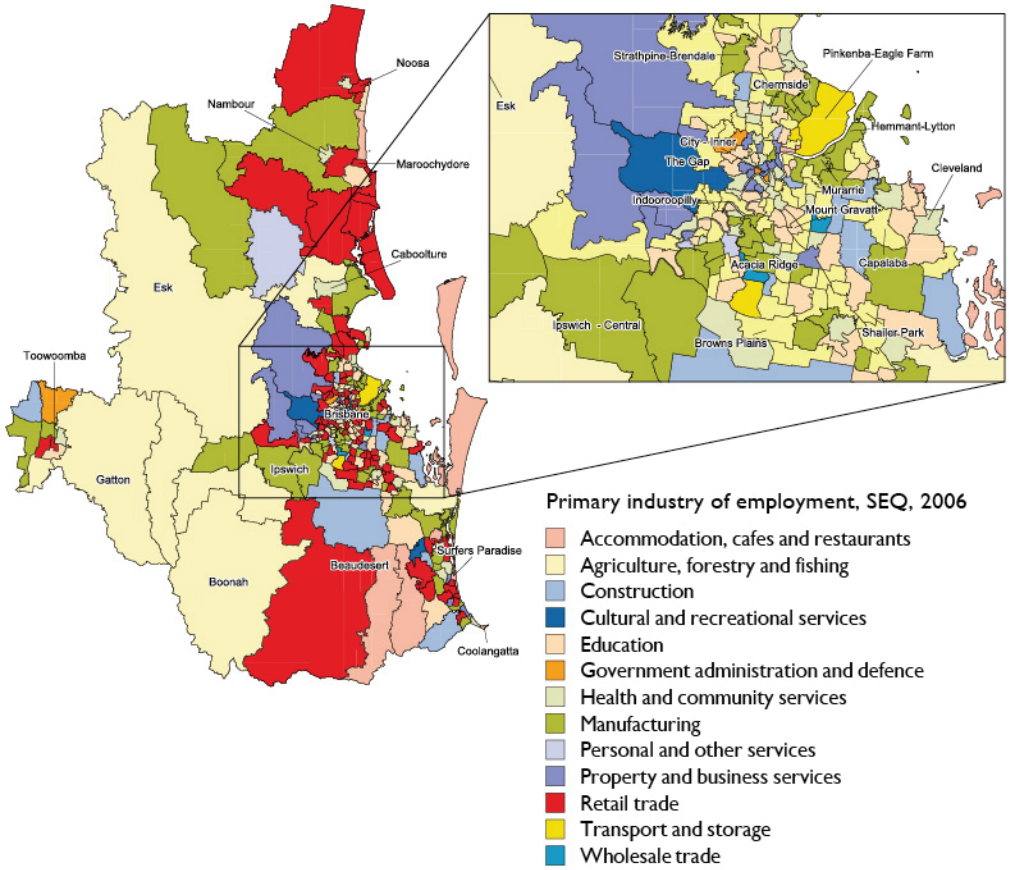
Looking at a smaller geographical scale shows us a more diverse set of industries. Map 5.1 shows the largest employing industry in each SLA within SEQ in 2006. Overall, *Retail trade* has the highest representation, being the largest employing industry in 93 SLAs within SEQ. The second most represented largest employing industry, *Education*, is the primary source of employment in 48 SLAs.

In the Inner sector, *Property and business services* was the leading employer in eight of the eighteen SLAs, with *Health and community services* claiming a further six.

One of the more striking features of the map is a band of large agriculture based SLAs in the west. While this represents relatively few SLAs, their combined area shows that agriculture is still an important industry within SEQ. The cluster of *Property and business services* to Brisbane's north-west is unusual, as this type of industry is typically only highly concentrated in a city centre. This area has a very high proportion of people who work from home.

Also of note are the clusters of *Manufacturing* based employment surrounding Ipswich, Acacia Ridge, Toowoomba and the mouth of the Brisbane River (excluding Pinkenba-Eagle Farm). *Manufacturing* is highly represented across the map, as the largest employing industry in 43 SLAs.

Map 5.1 Largest employing industry in each Statistical Local Area, South East Queensland, 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data.

Table 5.2 lists the top ten employing SLAs in Brisbane along with the main employing industry and main specialisation industry.

Table 5.2 Main employing industries and specialisation by Statistical Local Area of work, Brisbane, 2006

SLA Name	People working in SLA	Major employing industry	Employment share (per cent)	Main specialisation
City Inner	66 333	Property and business services	27.5	Finance and insurance
City Remainder	40 161	Government administration and defence	26.4	Government administration and defence
Ipswich Central	29 263	Manufacturing	17.6	Government administration and defence
Pinkenba-Eagle Farm	23 306	Transport and storage	31.9	Transport and storage
South Brisbane	16 152	Health and community services	29.1	Health and community services
Fortitude Valley	15 268	Property and business services	24.0	Electricity, gas and water supply
Spring Hill	14 450	Property and business services	24.2	Government administration and defence
Ipswich East	12 755	Manufacturing	31.9	Manufacturing
Woolloongabba	12 025	Health and community services	42.2	Health and community services
Strathpine-Brendale	11 703	Manufacturing	31.8	Manufacturing

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data.

Table 5.3 lists the top five employing SLAs in SEQ that are located outside of Brisbane, along with the main employing industry and main specialisation industry.

Table 5.3 Main employing industries and specialisation by Statistical Local Area of work, South East Queensland excluding Brisbane, 2006

SLA Name	People working in SLA	Major employing industry	Employment share (per cent)	Main specialisation
Southport	22 427	Health and community services	24.5	Health and community services
Toowoomba Central	18 126	Retail trade	23.8	Finance and insurance
Maroochy—Maroochydore	13 278	Retail trade	28.4	Retail trade
Surfers Paradise	12 168	Accommodation, cafes and restaurants	28.0	Accommodation, cafes and restaurants
Maroochy—Buderim	11 934	Education	15.1	Education

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data.

Over 65 000 people work in the City Inner SLA, where the largest employing industry is *Property and business services*. City Remainder is home to over 40 000 jobs, and has *Government administration and defence* as its main employing industry and main specialisation. Another Inner sector SLA, South Brisbane houses the Mater Health Services campus, which is reflected in its main specialisation of *Health and community services*. The Pinkenba-Eagle Farm SLA has a main specialisation of *Transport and storage,* due to the presence of the Brisbane Airport in

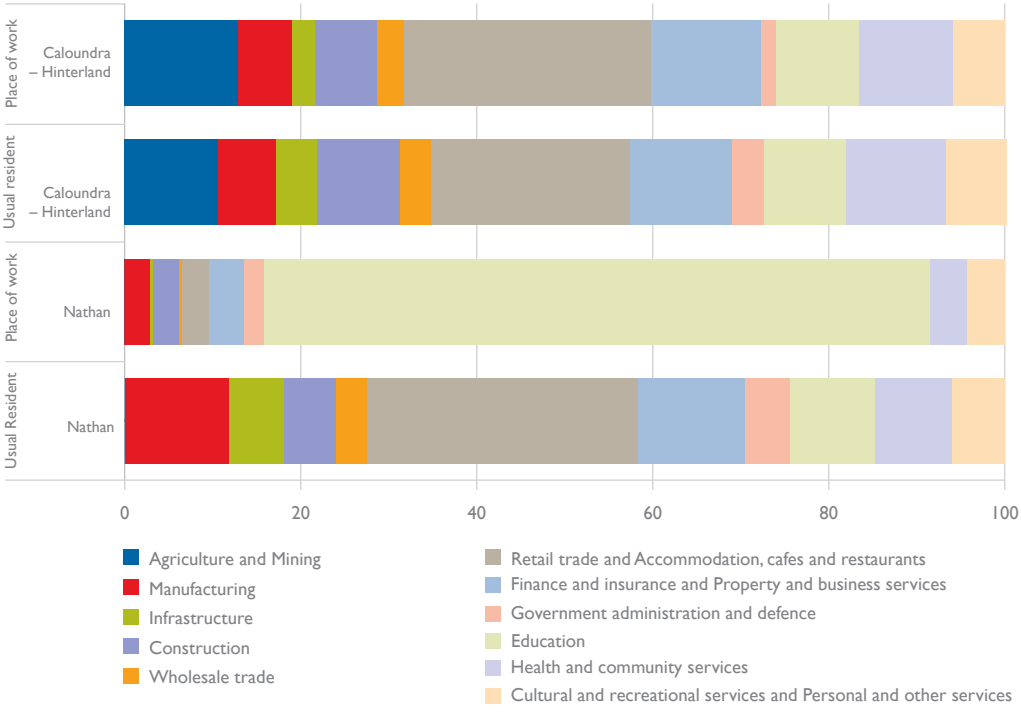
the SLA. Both *Manufacturing* and *Property and business services* are represented three times in Brisbane's top 10 employing SLAs, indicating the high importance of these industries to employment in Brisbane.

Outside of Brisbane, Southport has a main employing industry and specialisation of *Health and community services*, as it includes the Southport District Hospital. Surfers Paradise has *Accommodation, cafes and restaurants* as both its major employing industry and main specialisation, owing to its popularity as a tourist destination. Buderim's top employing industry is *Education*, due to the fact that the SLA is home to the University of the Sunshine Coast.

While a great deal of diversity is present in SEQ's industry structure, some SLAs exhibit a very high degree of specialisation in a single industry. For example, Herston has close to 80 per cent of employment in the *Health and community services* industry, Nathan SLA has over 75 per cent employment in *Education*, and Moreton Island has 72 per cent of employment in *Accommodation, cafes and restaurants.*

In some parts of SEQ, there is a poor match between available jobs and the industries that local residents are employed in. Figure 5.2 compares the employed resident industry mix with the place of work industry mix for two SLAs—Caloundra Hinterland and Nathan. The Nathan SLA exhibits a very high mismatch, with a very high proportion of employment in the SLA (75.7 per cent) being in the *Education* industry (owing to the presence of the Griffith University in the SLA), with a relatively small proportion of people who live in the SLA (9.6 per cent) working in that industry. In contrast, Caloundra Hinterland has quite a good alignment between the available jobs and the industries in which local residents are employed.

Figure 5.2 Industry mismatch in Caloundra Hinterland and Nathan, 2006



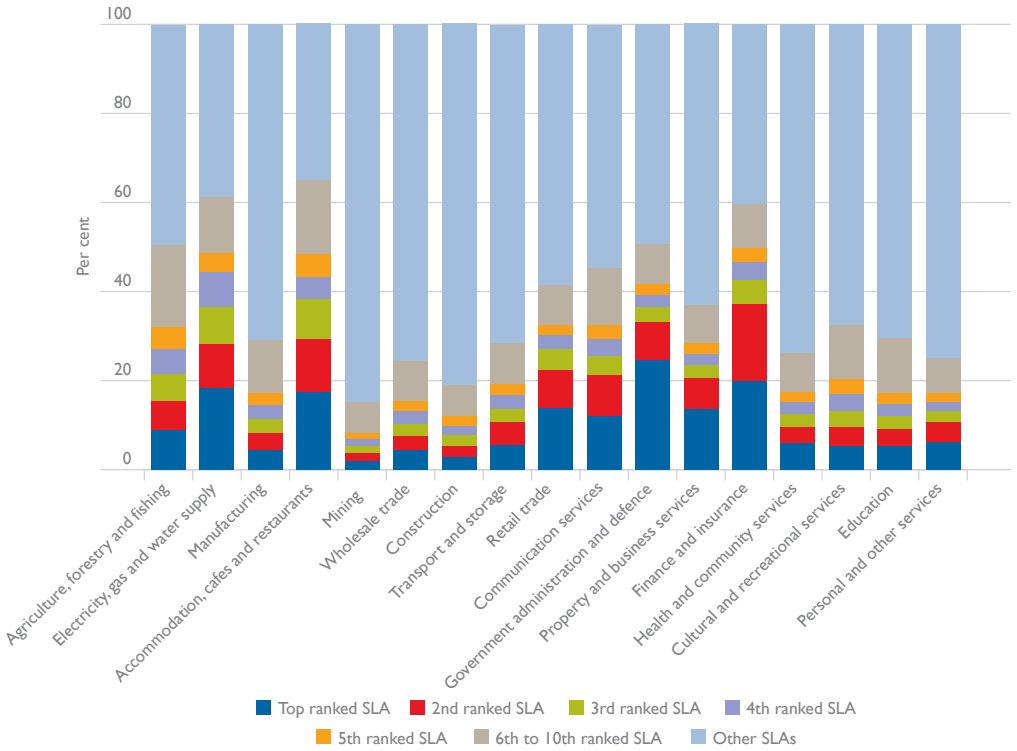
Note: Infrastructure includes Communication services, Transport and storage and Electricity gas and water supply.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for SLAs.

The industry mismatch per SLA is quite strongly correlated with the self-containment ratio—the number of people who live and work in the same SLA—with a correlation coefficient of –0.46. This implies that as the mismatch decreases and there are more opportunities available for people to work in their chosen industry locally, the number of people who actually work locally increases.

Different industries have different spatial structures, with some being very spatially concentrated and others dispersed. Figure 5.3 presents the spatial concentration of each industry's employment for 2006. *Construction* represents a well dispersed industry, with the top ranked SLA containing less than two per cent of employment in construction across SEQ. In contrast, 24.6 per cent of *Finance and insurance* employment is located within a single SLA—City Inner.

Figure 5.3 Spatial concentration of each industry's employment within South East Queensland, 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2006 place of work data for SLAs.

The different spatial concentration of industries affects commuting behaviour, especially those with specialised skills that tie them to a particular industry. About 37 per cent of employees of the *Government administration and defence* industry are required to commute to one of two adjacent SLAs—City Inner or City Remainder. While 23 per cent of *Finance and insurance* employees live in the Outer sector, only 10 per cent of the industry's jobs are located there. Jobs in *Retail trade* and *Education*, on the other hand, are widely distributed across SEQ, and so it is more likely that someone employed in these industries has a place of work close to their place of residence. BITRE (2012a) found that in Sydney, people who work in *Financial and insurance services* and *Information media and telecommunications* are less deterred by

the prospect of a lengthy commute to work than are people who work in more dispersed industries such as *Retail trade* and Health care and social assistance.

Historic trends in industry

This section identifies some of the longer-term historical changes in the spatial distribution of industry within SEQ.

Changes in the industrial makeup of SEQ between 1991 and 2001 are detailed in Robson (2008). Changes in employment by industry are discussed at the (sub-) Regional Organisations of Councils spatial level, as shown in Map 4.6. The industry structure used in the paper matches that used in this chapter.

Across SEQ as a whole, employment increased in all industries (other than 'not stated') between 1991 and 2001, with *Property and business services* growing the most strongly, adding 53 594 jobs. *Retail trade* added 48 183 jobs and *Health and community services* increased employment by 40 624. The smallest growth was in *Electricity, gas and water supply*, which added only 188 jobs in the decade to 2001.

At a smaller spatial level, both NORSROC and SouthROC saw increases in employment across all industries, with the *Retail trade* industry providing the largest increase in employment in both areas, increasing by 14 305 jobs in NORSROC and 19 757 in SouthROC. *Mining* was the industry with the smallest growth in both regions, adding only 193 jobs in NORSROC and 112 in SouthROC.

Both Brisbane city and WESROC had some industries which experienced a decline in employment. Brisbane City saw declines in Wholesale trade, *Government administration and defence* and *Electricity, gas and water supply* of 628, 189 and 53 jobs, respectively. Offsetting these relatively minor declines are increases in other industries, including an increase of 27 294 jobs in *Retail trade*. WESROC experienced declines in *Government administration and defence, Mining, Finance and insurance services* and *Electricity, gas and water supply* of 1011, 206, 153 and 76 respectively. Overall employment gains in WESROC were modest, with the largest growth in a single industry being 2246 in *Health and community services.*

Changes in industry since 2001

Understanding the changes in the industrial makeup of SEQ is as important as understanding the spatial aspects of industry. In this section, we look at industrial change across SEQ as a whole between 2001 and 2011 before looking in more detail at change in smaller geographical areas within SEQ.

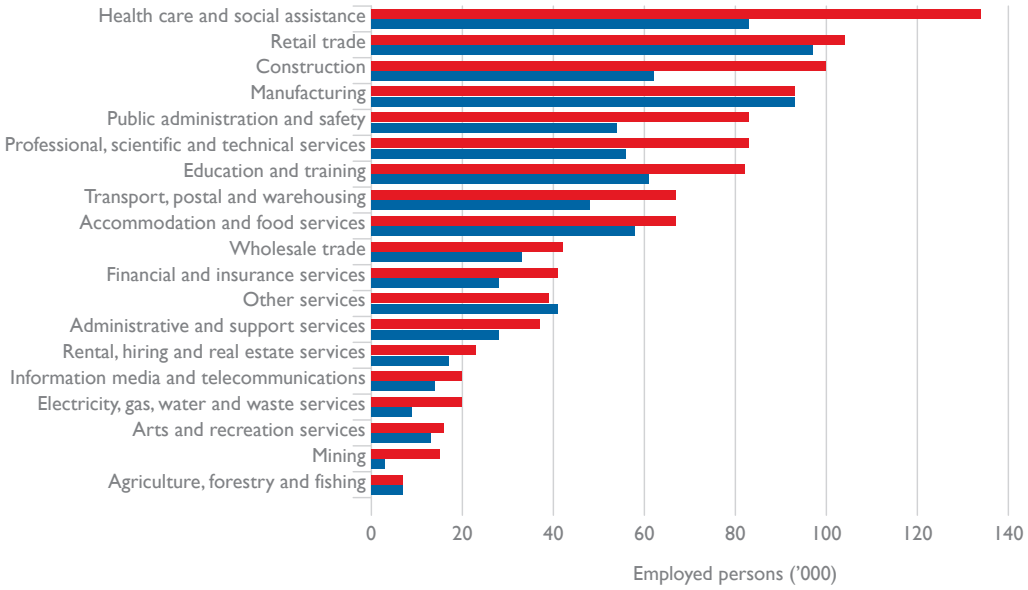
Changes 2001 to 2011

The *Labour Force Survey* (LFS, ABS Cat. No. 6202) presents data on employment for the whole of Australia on a monthly basis. LFS data is used here to provide an overview of employment change for Brisbane since 2001. Changes to the geographical regions underlying the LFS and to the industry classifications used have made it impossible to construct a time series for SEQ as a whole. As a result, we are only able to present analysis of changes to the industry structure for

Brisbane in this section. The LFS and Census figures for the 2001 to 2006 period do not align closely, due to differing methodologies and census undercount and non-response.

Figure 5.4 shows the employment in each industry by ANZSIC06 division in 2001 and 2011. In 2011, *Health care and social assistance* is the largest employing industry, employing 134 000 residents of Brisbane. This is followed by *Retail trade* with 104 000 jobs and *Construction* with 100 000. In 2001, *Retail trade* was the largest employing industry, followed by *Manufacturing*, but these industries have grown more slowly across the decade than *Health care and social assistance*.

Figure 5.4 Employed persons by industry, Brisbane, 2001 and 2011



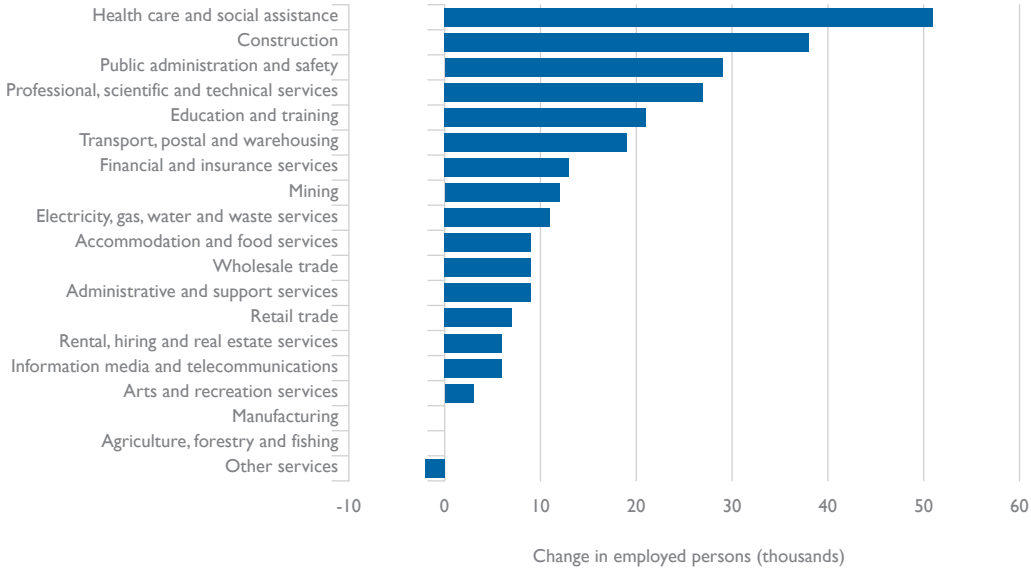
Note: Based on Brisbane only. Based on ANZSIC 2006 industry classification.

Source: ABS Cat. 6291.0.55.003 (May 2012 issue), based on November quarter of 2001 and 2011 data.

Of the 270 000 jobs added to Brisbane between 2001 and 2011, the largest share—18.9 per cent—were in the *Health care and social assistance* industry. Figure 5.5 shows the change in employment in each industry between 2001 and 2011. The only industry to record a decline in employment during the period is *Other services*, which shrank by 2000 jobs.

In annual growth terms, *Mining* grew the most strongly, with a growth rate of 17.5 per cent per annum between 2001 and 2011. *Electricity, gas, water and waste services* also grew strongly, at 8.3 per cent per annum. Both *Health care and social assistance* and *Construction* grew at 4.9 per cent per annum during the period. *Other services* shrank at a rate of 0.5 per cent per annum, while *Manufacturing* remained stable, exhibiting a growth rate of 0.0 per cent per annum.

Figure 5.5 Change in employed persons by industry, Brisbane, 2001 to 2011



Note: Based on Brisbane only. Based on ANZSIC 2006 industry classification.

Source: ABS Cat. 6291.0.55.003 (May 2012 issue), based on November quarter of 2001 and 2011 data.

Some differences appear when we consider the period 2001 to 2006 separately from the period 2006 to 2011. Between 2001 and 2006, the main industry contributor to employment growth in Brisbane was *Construction* (adding 35 000 jobs), followed by *Professional, scientific and technical services* (adding 26 000 jobs). *Health care and social assistance* accounted for only 19 000 additional jobs during the period. Between 2006 and 2011, *Health care and social assistance* added 32 000 jobs, while *Construction* and *Professional, scientific and technical services* added only 3000 and 1000, respectively.

The difference between the two time periods is most stark in the *Manufacturing, Retail trade, Agriculture, forestry and fishing* and *Rental, hiring and real estate services* industries, all of which experienced growth between 2001 and 2006 before experiencing declines between 2006 and 2011. In the case of *Manufacturing*, the increase in the earlier time period is entirely negated by the loss in the latter.

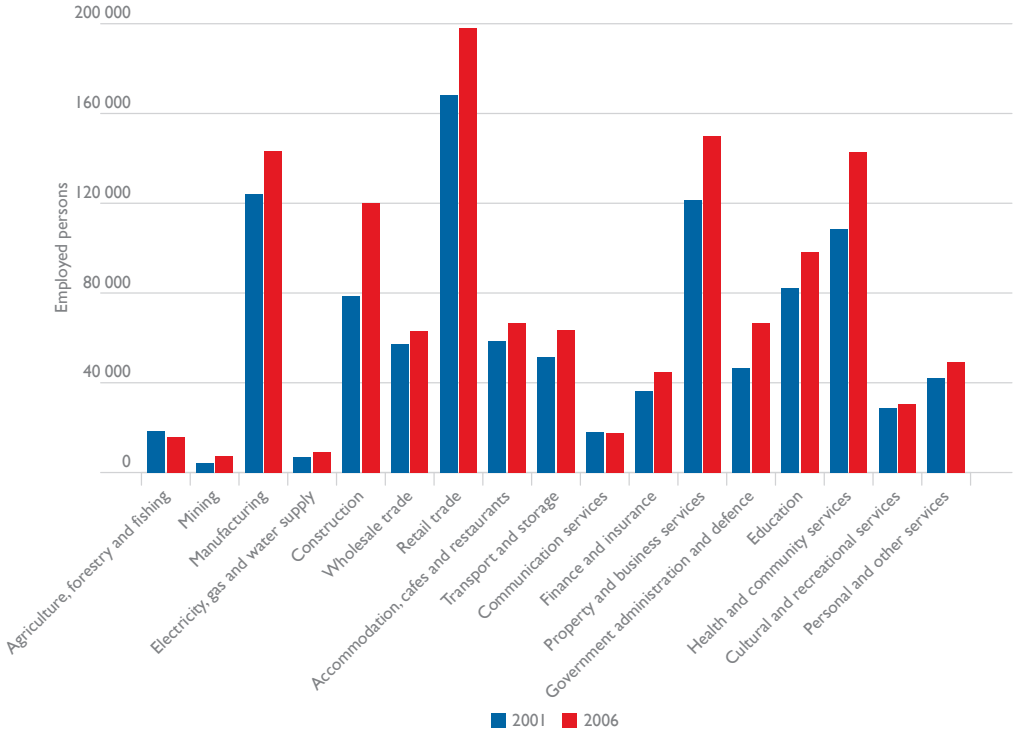
Changes 2001 to 2006

As discussed in Chapter 4, aggregate estimates of Brisbane's employment growth for the 2001 to 2006 period differ between the *Census of Population and Housing* and the *Labour Force Survey*. For similar reasons, the two sources also differ when looking at industry change, providing different pictures of the shape of industry change within SEQ between 2001 and 2006. In addition to the issues presented in Chapter 4, the Census-based analysis in much of this chapter makes use of the ANZSIC 1993 industry classification, while the *Labour Force Survey* uses the ANZSIC 2006 industry classification.

Regional overview

Figure 5.6 shows the industry of employment for residents of SEQ for both 2001 and 2006. *Retail trade* was the major employing industry for both periods, followed by *Manufacturing* in 2001 and *Property and business services* in 2006.

Figure 5.6 Employment by industry for residents of South East Queensland, 2001 and 2006



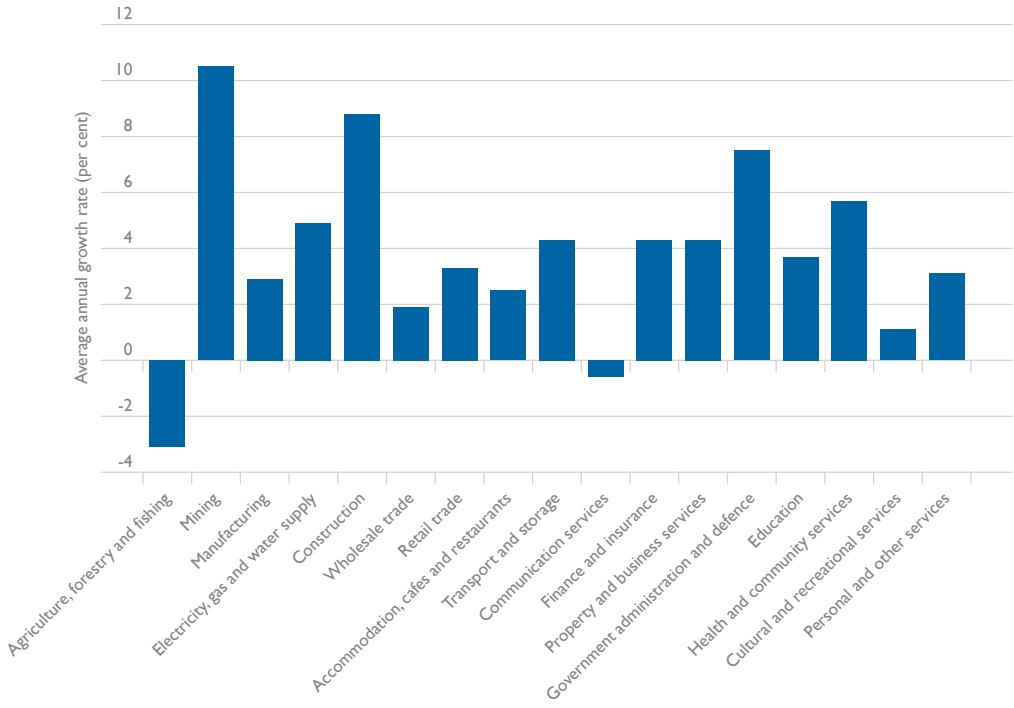
Note: This analysis is performed on a place of residence basis

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of usual residence data for SLAs.

Construction experienced the highest absolute growth, adding over 41 000 jobs between 2001 and 2006, representing a growth rate of 8.8 per cent per annum. *Health and community services* accounted for an additional 34 500 jobs within SEQ. Both *Retail trade* and *Property and business services* also grew strongly, adding 30 000 and 28 300 jobs respectively. Job losses were seen in two industries, with *Agriculture, forestry and fishing* losing 2 700 jobs and *Communication services* 500.

As shown in Figure 5.7, the most rapidly growing industries in SEQ between 2001 and 2006 were *Mining* (10.5 per cent per annum), *Construction* (8.8 per cent per annum) and *Government administration and defence* (7.5 per cent per annum). The *Mining* industry is relatively small in SEQ, adding only 2900 employed persons between 2001 and 2006. Overall, most industries in SEQ showed strong growth during the period, with only *Agriculture, forestry and fishing* and *Communication services* declining, at –3.0 per cent per annum and –0.6 per cent per annum respectively.

Figure 5.7 Employment average annual growth rates by industry for residents of South East Queensland, 2001 to 2006



Note: This analysis is performed on a place of residence basis.

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of usual residence data for SLAs.

The remaining analysis in this section again makes use of place of employment data from the *Census of Population and Housing* for 2001 and 2006 and represents a decomposition of the employment change analysis presented in Chapter 4.

As previously mentioned, employment growth in SEQ between 2001 and 2006 was largely driven by *Construction, Health and community services* and *Retail trade*. Table 5.4 describes the industries which contributed the most to the strong employment growth observed in each of SEQ's subregions. *Health and community services* is one of the top three sources of growth in eleven of the thirteen subregions, with *Retail trade* and *Construction* appearing as an important growth industry in eight subregions each.

Table 5.4 Main industry contributors to employment growth by subregion of work, South East Queensland, 2001 to 2006

Region/Sector/ Subregion	Largest source of growth	2nd largest source of growth	3rd largest source of growth	Largest source of decline
Inner	Government administration and defence	Property and business services	Finance and insurance	Wholesale trade
Middle	Health and community services	Construction	Manufacturing	Agriculture, forestry and fishing
Middle East	Manufacturing	Construction	Transport and storage	Agriculture, forestry and fishing
Middle North	Health and community services	Construction	Property and business services	Agriculture, forestry and fishing
Middle South	Health and community services	Manufacturing	Construction	Communication services
Middle West	Education	Health and community services	Retail trade	Electricity, gas and water supply
Outer	Retail trade	Health and community services	Construction	Agriculture, forestry and fishing
Outer East	Retail trade	Health and community services	Manufacturing	Agriculture, forestry and fishing
Outer North	Retail trade	Health and community services	Construction	Agriculture, forestry and fishing
Outer South	Construction	Retail trade	Health and community services	Electricity, gas and water supply
Outer West	Manufacturing	Health and community services	Property and business services	Mining
Brisbane	Health and community services	Property and business services	Construction	Agriculture, forestry and fishing
Gold Coast	Construction	Retail trade	Health and community services	Agriculture, forestry and fishing
Sunshine Coast	Retail trade	Health and community services	Construction	Agriculture, forestry and fishing
Toowoomba	Health and community services	Construction	Retail trade	Agriculture, forestry and fishing
West Moreton	Retail trade	Government administration and defence	Health and community services	Agriculture, forestry and fishing
Other SEQ	Construction	Retail trade	Health and community services	Agriculture, forestry and fishing
Total	Health and community services	Construction	Property and business services	Agriculture, forestry and fishing

Note: The ranking of industries for all of SEQ in this table differs from that seen in Figure 5.6 due to the difference in counting method. This table is based on place of work data, while figure 5.6 is based on place of usual residence data. Due to boundary changes between 2001 and 2006, the Beaudesert part B SLA has been assigned wholly to West Moreton for this analysis.

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for SLAs.

The table also shows that *Agriculture, forestry and fishing* was the industry which suffered from the strongest decline in eight of the thirteen subregions, while not contributing in a significant way to growth in any subregion. *Electricity, gas and water supply* is the industry of largest decline in both the Outer South and Middle West.

Statistical Local Areas

Looking at further disaggregated areas allows us to get a better picture of the way that the industry mix in SEQ has changed between 2001 and 2006. Similarly to Chapter 4, boundary changes have made direct comparison between SLAs impossible in some parts of SEQ, and so we adopt the same aggregate SLAs for this section as listed in Table 4.7 and described in Appendix B.

Table 5.4 summarises the main industry drivers for the SLAs in SEQ which added more than 3000 jobs between 2001 and 2006. A high degree of diversity is evident in the industry mix of these high-growth SLAs, five different industries providing the highest level of growth across the seven areas.

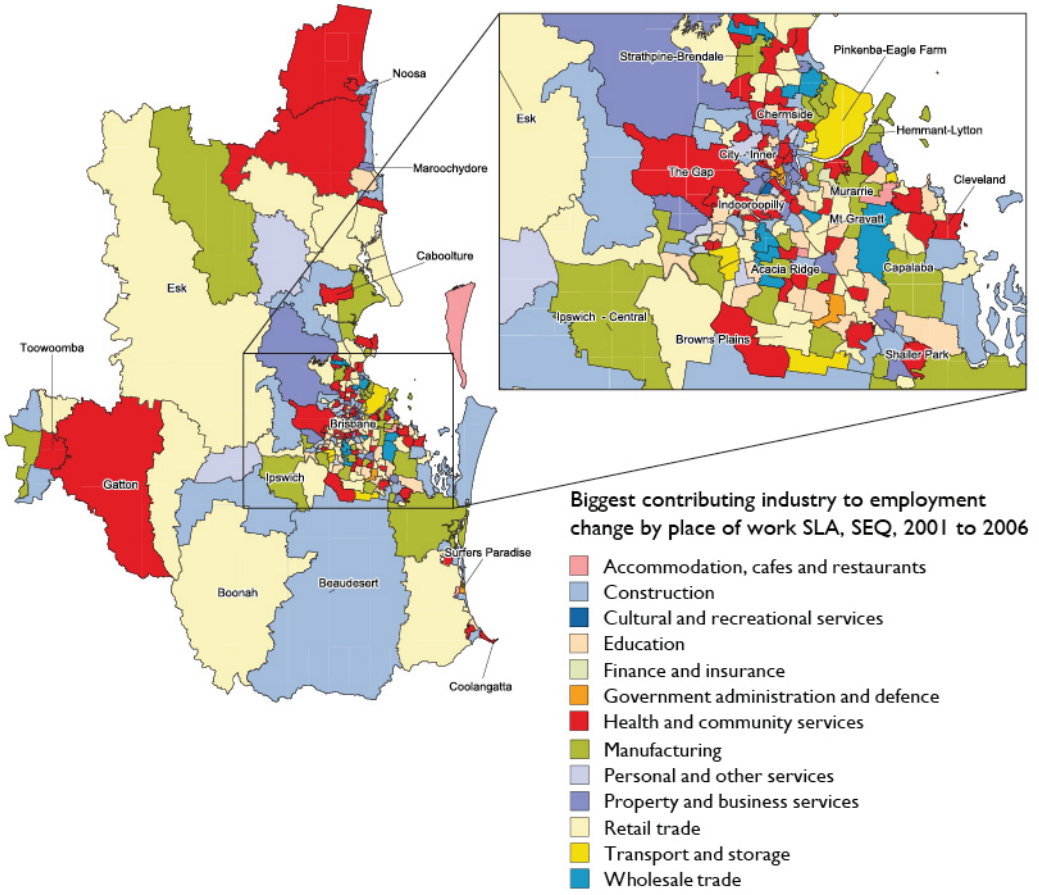
Table 5.5 Main industry contributors to employment growth for Statistical Local Areas that added more than 3000 jobs, South East Queensland, 2001 to 2006

SLA	Largest source of growth	2nd largest source of growth	3rd largest source of growth
City Remainder	Government administration and defence	Property and business services	Finance and insurance
Pinkenba-Eagle Farm	Transport and storage	Manufacturing	Property and business services
Maroochy—Buderim	Education	Retail trade	Construction
Murarrie	Health and community services	Manufacturing	Wholesale trade
South Brisbane	Health and community services	Construction	Finance and insurance
Hemmant-Lytton	Manufacturing	Transport and storage	Wholesale trade
Ipswich Central	Manufacturing	Health and community services	Property and business services

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data.

Map 5.2 shows the industry which contributed the most jobs to employment growth within each SLA between 2001 and 2006. *Health and community services* was the most common primary growth industry, having the highest net employment growth in 57 SLAs in SEQ during the period, with *Retail trade* the largest contributor in 48 others. *Construction* and *Education* are also well represented, contributing the largest amount to employment growth between 2001 and 2006 in 39 and 32 SLAs respectively. Overall, there is significant diversity in the primary industry behind employment growth within each SLA in SEQ.

Map 5.2 Main industry contributor to employment growth by aggregate Statistical Local Area, South East Queensland, 2001 to 2006



Source: BITRE analysis of ABS *Census of Population and Housing*, 2001 and 2006 place of work data.

Job growth in SEQ is arising from a diverse range of industries. The remainder of this section investigates employment growth within SEQ on a per industry basis, particularly focussing on the industries which have seen the largest growth between 2001 and 2006.

The SLA which contained the largest growth in employment for each industry is presented in Table 5.6. City Inner was the top contributor for three industries— *Government administration and defence; Electricity, gas and water supply;* and *Mining*. City Remainder was also the largest contributor in three industries—*Property and business services; Finance and insurance;* and *Communication services*. Employment in *Health and community services* grew the most strongly in Herston, which houses the Royal Brisbane and Women's Hospital. For the *Construction* industry, the strongest growth SLA was Maroochy—Buderim.

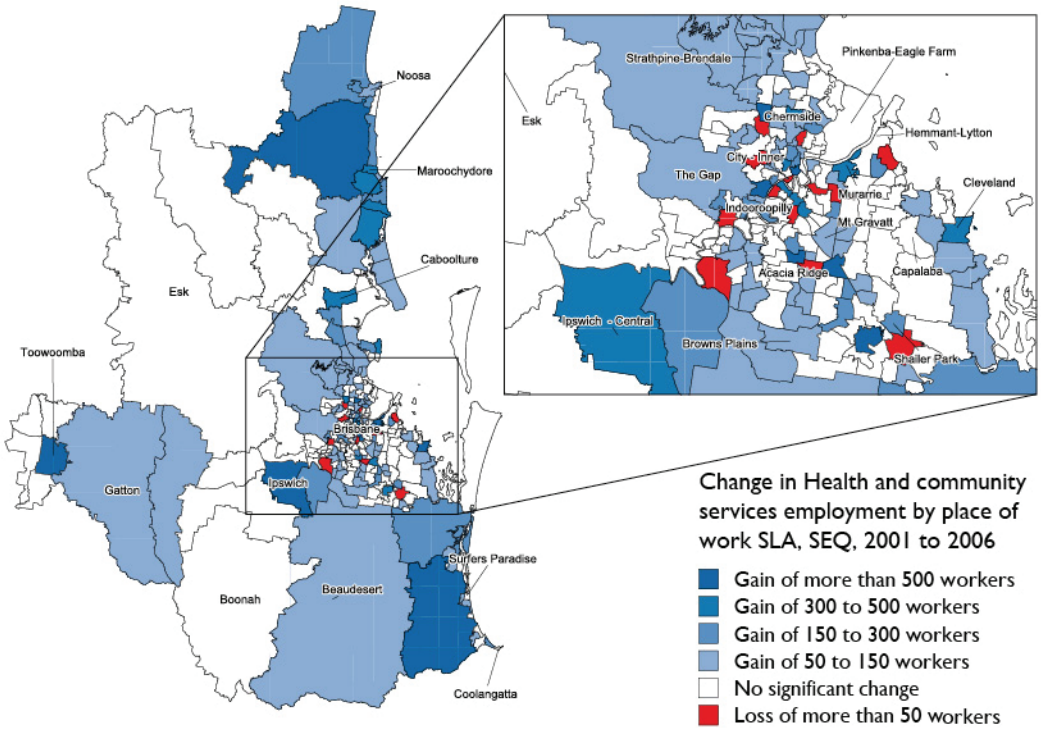
Table 5.6 Statistical Local Areas which had the largest increase in employed persons for each industry, South East Queensland, 2001 to 2006

Industry	Growth	SLA Name
Agriculture, forestry and fishing	66	Caboolture—Midwest
Mining	519	City Inner
Manufacturing	1225	Hemmant-Lytton
Electricity, gas and water supply	407	City Inner
Construction	706	Maroochy—Buderim
Wholesale trade	709	Rocklea
Retail trade	723	Pinkenba-Eagle Farm
Accommodation, cafes and restaurants	372	Spring Hill
Transport and storage	1576	Pinkenba-Eagle Farm
Communication services	316	City Remainder
Finance and insurance	1094	City Remainder
Property and business services	1920	City Remainder
Government administration and defence	3949	City Inner
Education	1109	St Lucia
Health and community services	1896	Herston
Cultural and recreational services	253	Caloundra—Rail Corridor
Personal and other services	410	Wooloowin

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data.

Map 5.3 presents the spatial distribution of the 2001 to 2006 change in the number of persons employed in the *Health and community services* industry—the strongest growth industry in SEQ during the period. The SLAs of Herston, Woolloongabba and South Brisbane all added over 1000 jobs in this industry between 2001 and 2006, as did the aggregate SLA region of Toowoomba and the Central Gold Coast Aggregate Region.

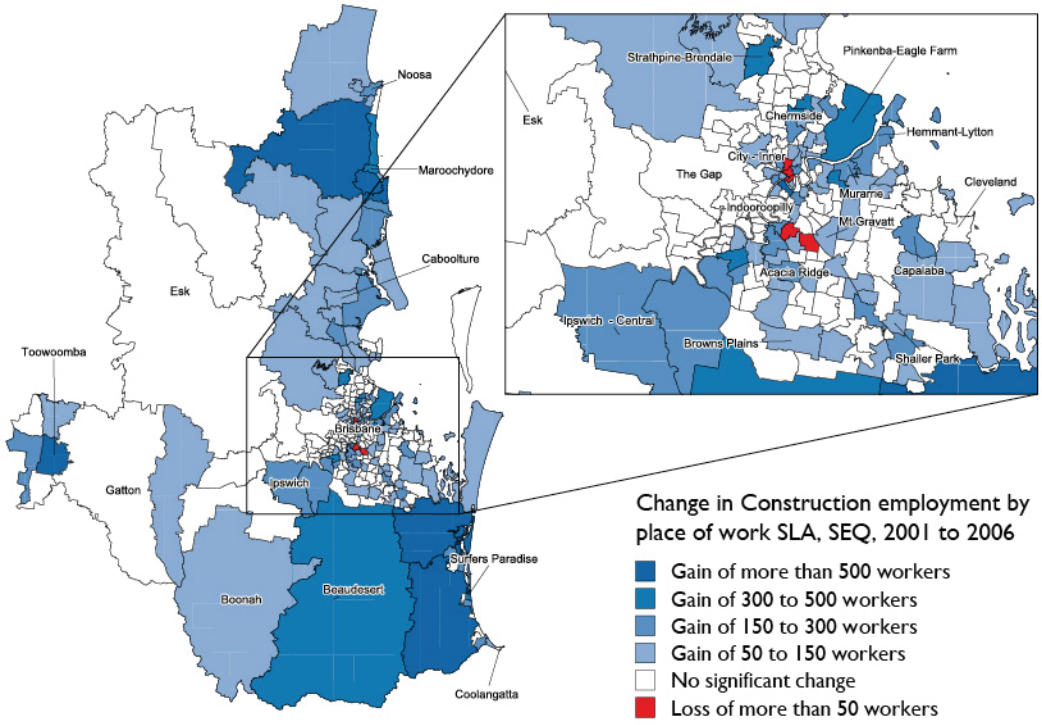
Map 5.3 Change in Health and community services employment by aggregate Statistical Local Area, South East Queensland, 2001 to 2006



Source: BITRE analysis of ABS *Census of Population and Housing*, 2001 and 2006 place of work data.

The second largest source of employment growth between 2001 and 2006 was the *Construction* industry. Map 5.4 shows the main areas in which *Construction* based employment grew strongly. The map shows that growth was particularly strong in the Sunshine Coast, with Buderim, Kawana and the Nambour aggregate region all adding over 500 jobs in the *Construction* industry between 2001 and 2006.

Map 5.4 Change in Construction employment by aggregate Statistical Local Area, South East Queensland, 2001 to 2006

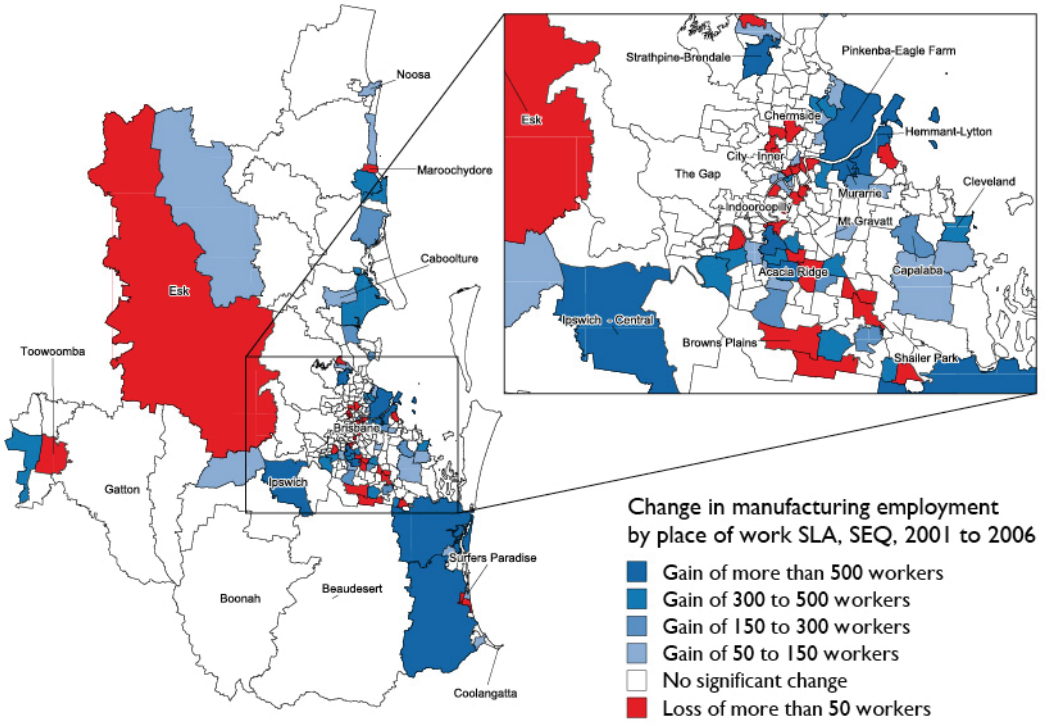


Source: BITRE analysis of ABS *Census of Population and Housing*, 2001 and 2006 place of work data.

Growth in the *Manufacturing* industry in SEQ between 2001 and 2006 stands in contrast to the industry changes in Sydney and Melbourne (BITRE 2012a, BITRE 2011a), both of which experienced significant declines in *Manufacturing* employment. Map 5.5 shows the spatial growth in *Manufacturing* in SEQ during the period. The Australia TradeCoast area stands out as a strong growth location in *Manufacturing*, with other clusters evident near Acacia Ridge and the inland part of the Gold Coast. The largest growth in the *Manufacturing* industry was in Hemmant-Lytton, which grew by 1225 jobs.

While growth in the industry was strong overall, several SLAs saw a decline in *Manufacturing* related employment, with Coopers Plains losing over 500 *Manufacturing* jobs between 2001 and 2006. The Inner sector SLAs of Fortitude Valley and West End also saw declines in *Manufacturing* employment.

Map 5.5 Change in Manufacturing employment by aggregate Statistical Local Area, South East Queensland, 2001 to 2006



Source: BITRE analysis of ABS *Census of Population and Housing*, 2001 and 2006 place of work data.

South East Queensland's strategic plan

The *SEQ Regional Plan 2009–2031* indicates a desire to shape the industrial landscape of SEQ to increase employment diversity, competitive advantage and to capitalise on market opportunities.

This section focuses on three spatial industry goals identified in the plan—developing a diversified economy in each subregion, relocating manufacturing and logistics employment away from Brisbane's Inner region to other specified areas of SEQ, and locating office based businesses, government and community services employment outside of the CBD.

Develop diversified subregional economies

> 'Develop a diversified regional economy within each subregion that retains local jobs and builds on regional and sub-regional competitive advantages and specialisations' (Queensland Government and COMSEQ 2009, p.112).

The *SEQ Regional Plan 2009–2031* identifies diversity as important to the health of the SEQ economy. This goal has also been present in earlier planning documents, with both the *Regional Framework for Growth Management* for SEQ 2000 and the *SEQ Regional Plan 2005–2026* expressing a desire to develop a diverse SEQ economy. Within this context, we

have investigated the industry diversity in each sector and subregion of SEQ in both 2001 and 2006 to identify how diversified the economy is across the region and to identify how this diversity is changing with time.

Table 5.7 shows the industry diversity in each sector within SEQ in 2001 and 2006 and the change observed during this period. Diversity was calculated using a Herfindahl index approach, which ranges from 0, when all of the jobs in an area belong to a single industry, to 94.1, when employment is evenly distributed across all 17 industries within the region. A change in index indicates that different industries have grown at different rates within the region. If the change is in the negative direction, it implies that this divergent growth is decreasing diversity by further strengthening already overrepresented industries, while a positive change indicates that the divergent growth is bringing industrial shares of employment closer together.

Table 5.7 Industry diversity in South East Queensland's regions and subregions, 2001 and 2006

Region/Sector/Subregion	Industry Diversity 2001	Industry Diversity 2006	Change in Industry Diversity 2001 to 2006
Inner	89.9	89.1	–0.8
Middle	89.8	90.0	0.2
Middle East	88.6	89.1	0.5
Middle North	90.3	90.4	0.1
Middle South	89.3	89.4	0.1
Middle West	89.3	89.6	0.3
Outer	89.1	89.2	0.1
Outer East	89.4	89.0	–0.4
Outer North	89.0	89.1	0.1
Outer South	88.0	88.5	0.5
Outer West	88.7	88.6	–0.1
Brisbane	90.8	90.8	0.0
Gold Coast	90.0	90.1	0.1
Sunshine Coast	89.9	89.9	0.0
Toowoomba	89.8	89.9	0.1
West Moreton	88.6	89.8	1.2
Total	90.8	90.8	0.0

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for SLAs.

Industry diversity across SEQ is quite high in both 2001 and 2006, with all sectors having similar diversity index values. Diversity within SEQ as a whole did not change, although some sectors have undergone observable changes. In particular, the Inner sector saw a notable decline in diversity while West Moreton has seen an increase in diversity. Employment growth in the Inner sector has built on the sector's existing specialisations in *Government administration and defence* (an increase of 10 100 jobs) and Property and business services (an increase of 6 300 jobs), which is reflected in a lower level of industry diversity in 2006, compared to 2001. In West Moreton, strong job growth in *Retail trade, Health and community services* and

Government administration and defence has reduced reliance on the *Agriculture, forestry and fishing* industry, which reduced its share of the region's employment from 22.9 per cent in 2001 to 18.7 per cent in 2006.

Overall, table 5.7 indicates that industry diversity has not increased in all subregions of SEQ. Despite this, the small changes in diversity and the high base level of diversity indicate that SEQ is continuing to develop in a diverse fashion.

Relocate manufacturing and logistics employment from Inner Brisbane

> 'Encourage the relocation of large-scale industrial, warehousing, transport and storage businesses from inner suburbs to release these sites for higher and better use' (Queensland Government and COMSEQ 2009, p.122).
>
> 'In particular, there is need for... manufacturing and logistics employment in the Sunshine Coast, Ipswich, Moreton Bay, Gold Coast, Scenic Rim, Toowoomba, Lockyer Valley, Somerset and Logan' (ibid., p.112).

A desire to adjust the location of manufacturing and logistics employment is highlighted in two different ways within the *SEQ Regional Plan 2009–2031*. Earlier planning documents do not discuss this goal. The first of these ways involves reducing the amount of these industries present in Brisbane's inner suburbs, and the second involves increasing employment in these industries in outlying regions. For this section, we have used employment in the ANZSIC 1993 one digit industry classifications of *Manufacturing* and *Transport and storage* to capture the number of manufacturing, warehousing, transport and storage jobs.

Manufacturing and *Transport* and storage employment have both grown strongly between 2001 and 2006, growing by 14 591 and 8 732 jobs respectively during the period. Despite this strong growth, employment in these two industries declined within the Inner subregion, as indicated in Table 5.8. This indicates that manufacturing and logistics employment is successfully being relocated from the Inner sector to other parts of SEQ. The proportion of SEQ's *Manufacturing* employment located in the Inner sector declined from 7.5 per cent in 2001 to 6.5 per cent in 2006, while the proportion of *Transport* and *storage* employment located in the Inner sector declined from 20.9 to 17.3 per cent over the same period.

Table 5.8 also shows the number of *Manufacturing* and *Transport and storage* jobs located in other sectors and regions of SEQ. It shows that there has been mixed success in increasing manufacturing and logistics employment in the specified regions. In the Gold Coast, Sunshine Coast, West Moreton (which contains the Lockyer Valley, Somerset and much of the Scenic Rim), the Outer North (which contains Moreton Bay) and the Outer West (which corresponds to the Ipswich LGA), growth has been strong. In Toowoomba and the Outer South (which contains Logan), growth was limited or negative.

Manufacturing and logistics employment in SEQ has, by and large, met the goals presented in the *SEQ Regional Plan 2009–2031,* with employment in these industries falling in the Inner sector, and many of the regions targeted for growth exhibiting strong gains in manufacturing and logistics employment. However, not all of the identified growth areas saw growth, with Toowoomba losing almost 200 jobs in these industries between 2001 and 2006.

Table 5.8 Manufacturing and Transport and storage employment, South East Queensland, 2001 and 2006

Region/ Sector/ Subregion	Manufacturing employment, 2001	Manufacturing employment, 2006	Change in Manufacturing employment, 2001 to 2006	Transport and storage employment, 2001	Transport and storage employment, 2006	Change in Transport and storage employment, 2001 to 2006
Inner	8 578	8 308	–270	9 319	9 211	–108
Middle	48 900	54 852	5 952	19 851	25 439	5 588
Middle East	9 619	11 620	2 001	3 277	4 902	1 625
Middle North	16 067	17 660	1 593	9 386	11 213	1 827
Middle South	13 862	15 746	1 884	5 180	6 307	1 127
Middle West	9 352	9 826	474	2 008	3 017	1 009
Outer	26 748	30 384	3 636	5 595	7 091	1 496
Outer East	2 607	3 301	694	789	888	99
Outer North	8 006	9 595	1 589	1 782	2 335	553
Outer South	7 868	7 845	–23	1 529	1 840	311
Outer West	8 267	9 643	1 376	1 495	2 028	533
Brisbane	84 226	93 544	9 318	34 765	41 741	6 976
Gold Coast	16 280	20 091	3 811	5 117	6 137	1 020
Sunshine Coast	6 715	7 715	1 000	2 183	2 833	650
Toowoomba	5 280	5 311	31	1 930	1 707	–223
West Moreton	1 528	1 959	431	663	972	309
Other SEQ	29 803	35 076	5 273	9 893	11 649	1 756
Total	114 029	128 620	14 591	44 658	53 390	8 732

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for SLAs.

Locate government and office-based business employment outside the Brisbane Central Business District

> 'In particular, there is need for ... office-based businesses and government and community services in centres outside the Brisbane CBD, particularly in high growth areas such as the Sunshine Coast, Moreton Bay, Gold Coast, Ipswich, Toowoomba and Logan' (Queensland Government and COMSEQ 2009, p.112).

The *SEQ Regional Plan 2009–2031* highlights the importance of broadening the presence of office-based employment and government and community services in SEQ in activity centres beyond the CBD, particularly outside of Brisbane. This drive to decentralise office based employment is supported by Burke, Dodson and Gleeson (2010), who identify a range of positive benefits that such decentralisation can potentially bring.

The *SEQ Regional Plan 2005–2026* and the *Regional Framework for Growth Management SEQ 2000* also aimed to locate government employment in key regional activity centres, but did not specify goals relating to the location of employment in office-based businesses.

Industry data is not available at the destination zone level that was used to construct employment estimates for activity centres in Chapter 4. To approximate the industry mix within activity centres outside the CBD, we use data at the level of SLAs which contain activity centres. Analysis of several centres on the Gold Coast, including Southport, was made difficult by the changes in ABS geographic boundaries between 2001 and 2006.

For this section, we define people employed by office based businesses as those employed in the *Finance and insurance* and *Property and business services* industries. While these industries have components which are not office-based, and other industries have office-based employment components, the adopted measure should provide a useful guide to employment change for office-based businesses. Government and community services are defined as the *Government administration and defence* and *Health and community services* industries.

Table 5.9 shows the levels of office-based business employment in selected activity centres within SEQ in 2001 and 2006 and the change in employment observed during the period. While employment gains were greatest for the Brisbane CBD activity centre, the rate of growth in office-based business employment was strong in most centres. In percentage terms, the largest gains in office-based business employment between 2001 and 2006 were made in North Lakes (in Moreton Bay) and Logan Hyperdome (in Logan), both more than tripling the amount of office based business employment they support. Outside the CBD, Ipswich, Toowoomba and Maroochydore, Sippy Downs and Kawana in the Sunshine Coast all added over 500 office based business jobs between 2001 and 2006. None of the centres analysed exhibited a loss in office-based business employment during the period.

Table 5.9 Office based business employment in selected activity centres, South East Queensland, 2001 and 2006

Centre type	Activity centre	Office based business employment		Change in office based business employment 2001 to 2006 (jobs)	Change in office based business employment 2001 to 2006 (per cent)
		2001	2006		
Primary	Brisbane CBD[a]	55 781	63 463	7 682	13.8
Principal	Beenleigh	594	784	190	32.0
	Broadbeach	1 520	1 577	57	3.8
	Caboolture/Morayfield	910	1 160	250	27.5
	Cleveland	916	1 013	97	10.6
	Ipswich	2 070	2 680	610	29.5
	Maroochydore	2 028	2 551	523	25.8
	Springwood	872	919	47	5.4
	Toowoomba	4 239	5 259	1 020	24.1
Major	Bundall	2 191	2 218	27	1.2
	Kawana	609	1 339	730	119.9
	Logan Central	407	504	97	23.8
	Logan Hyperdome	292	957	665	227.7
	Noosa	1 031	1 110	79	7.7
	North Lakes	55	214	159	289.1
	Redcliffe	594	670	76	12.8
	Sippy Downs	835	1 359	524	62.8
	Surfers Paradise	2 603	2 759	156	6.0
	Strathpine	812	1 005	193	23.8

Notes: All listed activity centres are approximated by one or more SLAs. Table includes Brisbane CBD and activity centres in the Sunshine Coast, Gold Coast, West Moreton, Toowoomba, Ipswich and Logan for which comparable data was available at the SLA level in 2001 and 2006.

[a] Includes the frame area described in Queensland Government and COMSEQ 2009 p.97, and thus extends well beyond the City Inner and City Remainder SLAs.

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for SLAs.

Changes in the levels of government and community service based employment are shown in table 5.10. The Brisbane CBD activity centre experienced by far the greatest gain in government and community services employment (12 600 jobs). Government and community service based employment grew very strongly across most centres, with only Bundall in the Gold Coast exhibiting a decline in government and community service related employment. The largest growth in government and community services occurred in Toowoomba, which added over 1800 jobs between 2001 and 2006. Caboolture/Morayfield and Ipswich also added a significant number of jobs during the period, adding 1007 and 955 jobs respectively.

While additional office-based business and government and community services employment was generated in the CBD, significant numbers of these types of jobs were also created in other centres. This strong growth in office-based business and government and community services employment in centres outside the CBD indicates that progress is being made against the goals presented in the *SEQ Regional Plan 2009–2031*.

Table 5.10 Government and community services employment in selected activity centres, South East Queensland, 2001 and 2006

Centre type	Activity centre	Government and community services employment		Change in Government and community services employment 2001 to 2006 (jobs)	Change in Government and community services employment 2001 to 2006 (per cent)
		2001	2006		
Primary	Brisbane CBD[a]	34 303	46 901	12 598	36.7
Principal	Beenleigh	727	879	152	20.9
	Broadbeach	538	653	115	21.4
	Caboolture/Morayfield	2 314	3 321	1 007	43.5
	Cleveland	1 556	2 314	758	48.7
	Ipswich	7 163	8 118	955	13.3
	Maroochydore	1 189	1 814	625	52.6
	Springwood	305	377	72	23.6
	Toowoomba	7 511	9 339	1 828	24.3
Major	Bundall	705	585	–120	–17.0
	Kawana	443	753	310	70.0
	Logan Central	1 421	1 813	392	27.6
	Logan Hyperdome	98	294	196	200.0
	Noosa	573	631	58	10.1
	North Lakes	8	132	124	1 550.0
	Redcliffe	1 603	2 028	425	26.5
	Sippy Downs	1 174	1 710	536	45.7
	Surfers Paradise	576	1 159	583	101.2
	Strathpine	896	1 302	406	45.3

Notes: All listed activity centres are approximated by one or more SLAs. Table includes Brisbane CBD and activity centres in the Sunshine Coast, Gold Coast, West Moreton, Toowoomba, Ipswich and Logan for which comparable data was available at the SLA level in 2001 and 2006.

[a] Includes the frame area described in Queensland Government and COMSEQ 2009 p.97, and thus extends well beyond the City Inner and City Remainder SLAs.

Source: BITRE analysis of ABS *Census of Population and Housing* 2001 and 2006 place of work data for SLAs.

Summary

This chapter has helped provide additional context for the employment information presented in Chapter 4 by identifying the principal industry drivers of jobs growth across SEQ. While growth was strongest in *Health and community services* between 2001 and 2006 for SEQ as a whole, different sectors saw different primary industry contributors. For example, the Inner sector saw the strongest growth in the *Government administration and defence industry* and the Outer sector saw the strongest growth in *Retail trade*.

The chapter has also investigated how the change in the industrial landscape between 2001 and 2006 relates to the strategies in the *SEQ Regional Plan 2009–2031* which are associated with the spatial location of particular industries.

CHAPTER 6
Transport mode

Key points

- The transport-related objectives of SEQ regional plans include encouraging use of public transport, encouraging active transport (walking and cycling), and concentrating residential and job growth around frequent public transport.
- Since 2001, the key network changes have been the establishment of TransLink, which integrated ticketing and fares across public transport providers and modes, and the construction of Busways (dedicated bus corridors).
- As in other capital cities, car use dominates journeys to work. Approximately 4 in 5 employed SEQ residents going to work on census day 2006 used a private vehicle (78.9 per cent), mostly cars. Ten per cent travelled to work via public transport, mostly by train (5.0 per cent) and bus (4.5 per cent).
- The majority (73 per cent) of SEQ's public transport commutes are to an Inner Brisbane workplace. Those who work in Inner Brisbane are particularly likely to use public transport (39.6 per cent), but only 2.7 per cent of Outer sector jobs and 2.1 per cent of jobs in the rest of SEQ are accessed by public transport.
- From 2001 to 2006, the proportion of SEQ residents commuting by private vehicle fell by 0.3 percentage points. The private vehicle mode share fell in the Inner and Middle sectors, and increased in the Outer sector, and in every region outside Brisbane.
- From 2001 to 2006, the proportion of SEQ residents commuting by public transport rose by 0.5 percentage points. Growth in mode share was concentrated in Inner Brisbane (by place of employment) and the Middle South and Outer South (by place of enumeration), and has been driven by growth in the bus share. This reflects the new Busway routes. Brisbane's public transport patronage has grown more strongly in the past decade than in the few decades prior, but the growth has been modest compared to that required to meet targets in the regional and transport plans.
- Less than 1 in 20 resident workers either cycled or walked to work (active transport) in 2006. The growth in active transport modes of just over 0.3 percentage points from 2001 to 2006 was driven by strong increases in the Inner sector. The active transport share decreased in a number of regions (the Gold Coast, Sunshine Coast, West Moreton, Outer South and Outer West).

- The spatial variation in the mode shares of public and active transport and private vehicle use has been exacerbated by changes between 2001 and 2006. Regions with low shares of public and active transport tended to have their shares decline, and regions with high shares tended to have their shares grow.
- The proportion of total employment within 500m and 1000m catchments of transport nodes remained very similar between 2001 and 2006 (within 0.1 percentage point). This was also the case for population within 500m of transport nodes. Population grew at a stronger rate outside 1000m buffers of transport nodes than within them.

Background

This chapter looks at modes of travel used by commuters in South East Queensland (SEQ), using the journey to work data collected by the ABS in its *Census of Population and Housing*. It examines regional shares in methods of commuting both by place of residence and place of work in 2006, and examines what changes have occurred since 2001. It also considers more recent evidence in the period since the 2006 census.

Transport in recent metropolitan strategies

Both the most recent *SEQ Regional Plan 2009–2031* and the previous *SEQ Regional Plan 2005–2026* have similar transport objectives, namely:

- Promoting public transport
- Promoting walking and cycling (active transport)
- Concentrating residential and job growth around frequent public transport.

The transport aims of the earlier *SEQ Regional Framework for Growth Management* (RFGM 2000) are similar. However, the RFGM also includes the regional mode share targets from the previous 1997 *Integrated Regional Transport Plan* (the 1997 Transport Plan).

The current transport plan, *Connecting SEQ 2031—An Integrated Regional Transport Plan for South East Queensland* (2011), is described as the 'guiding transport planning and policy document to support the desired outcomes of the SEQ Regional Plan' (Department of Transport and Main Roads 2011a, p.3). It sets out targets for changing mode shares as follows:

- Increasing the active transport mode share from 10 per cent (2006) to 20 per cent by 2031
- Increasing the public transport mode share from 7 per cent (2006) to 14 per cent in 2031
- Reducing the private car mode share from 83 per cent (2006) to 66 per cent in 2031.

In other words, it has the aim of doubling both the active and public transport mode shares within this 25 year period.

While this report has a focus on commuter travel, the scope of the regional and transport plans is wider (encompassing all trips, not just travel to work). However, conclusions can still be drawn on the basis of whether these transport mode shares have increased for commuters between 2001 and 2006.

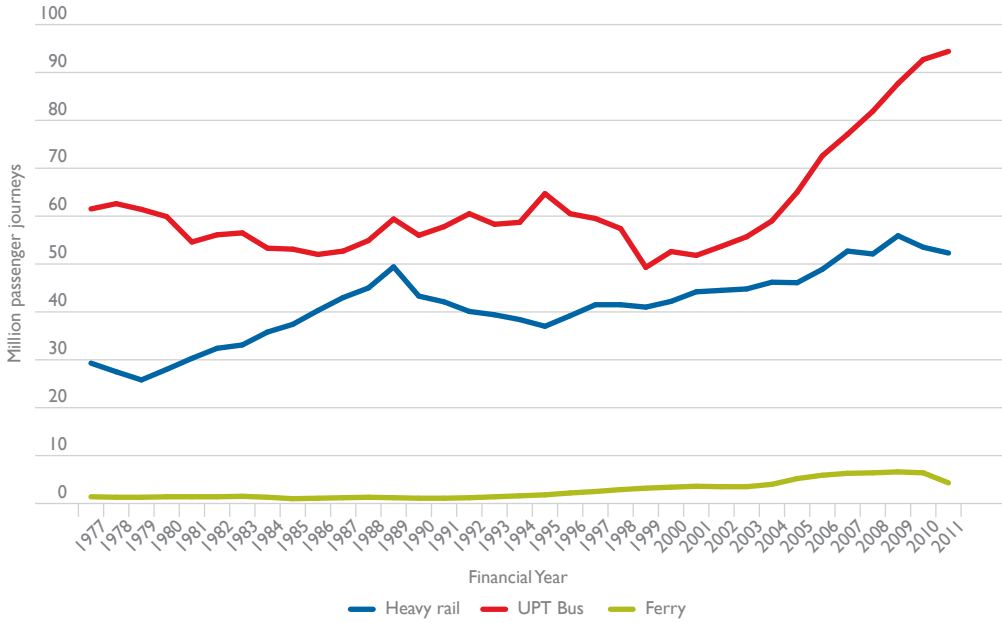
Historical trends

Figure 6.1 shows the Urban Public Transport (UPT) patronage estimates for the Brisbane Statistical Division for the period 1976–77 to 2009–10. This is presented in terms of million passenger journeys and reveals that bus travel has been the dominant mode of public transport for the whole period.

Strikingly, the number of bus journeys stayed relatively flat between 1976–77 and the mid 1990s, despite the population growth over the period. However, after a decline from the mid to late 1990s, the number of bus journeys has grown quite rapidly over the past decade. The number of ferry journeys steadily increased since the early 1990s, but has flattened and decreased in the last few years.

The figure also shows a slight decline in the patronage of heavy rail in recent years, which follows strong growth since 2004–05. However, this appears to be due to a correction in the method of counting trips, based on better data from Go cards.[47]

Figure 6.1 Historical trends in public transport patronage, Brisbane, 1976–77 to 2010–11



Source: BITRE (2012b).

The stronger public transport patronage growth from the mid 2000s can be seen in some other cities' patronage data (in particular, see the Melbourne report in this series, BITRE 2011a). One factor in this growth is likely to be the rising cost of petrol from the mid 2000s to 2008 (BITRE 2012c).

47 TransLink (2010a) determined that if the patronage is calculated using the previous method, then the number of passengers in 2009–10 (quarter 2) would be similar to the same period a year earlier.

Mees, Sorupia and Stone (2007) examined trends in travel to work mode across the capital cities from 1976 to 2006. This revealed that public transport's share of travel to work declined in Brisbane from 1976 to 1996, with only a slight increase between 1981 and 1986. However, it grew between 1996 and 2006. This turnaround from 1996 after a decline since 1976 was also the general pattern observed in Melbourne, Adelaide and Perth, and all the capitals (including Canberra) had their public transport shares grow between 2001 and 2006, except for Sydney. Mees et al. attributed this turnaround to increased employment in the cities' CBDs and improvements in public transport services. For Brisbane specifically, they cite TransLink's introduction of multi-modal ticketing as being a major reason for the increase in public transport mode share between 2001 and 2006.

Infrastructure and network changes

Improvements to transport networks and infrastructure (whether relating to bus, rail, private or active transport) are likely to encourage use of benefitting transport modes. Other improvements to the public transport system such as integrated ticketing and improved customer information are also likely to have a positive impact on patronage.

Connecting SEQ 2031 discusses some of the key improvements to the SEQ transport network in the past 15 years, both in terms of public transport-related changes made to ticketing, signage and operation, and in terms of infrastructure additions and upgrades for rail, buses and road.

One of the major network changes was the establishment of TransLink Transit Authority in 2003, which introduced integrated fares and ticketing across the public transport mode types (rail, bus, ferry) on 1 July 2004[48] and the Go card (a smartcard which replaces paper tickets) in 2008.[49] The TransLink network area is different to that of the Regional Plans, in that it goes from Noosa to Coolangatta but only as far west as Helidon, therefore excluding Toowoomba (Queensland Transport 2005).

Other network improvements over the past 15 years include:

- Bus Upgrade Zone (BUZ) (frequent) services
- Upgrading bus shelters and bus fleet, more timetable information at stops, NightLink services
- Extension/upgrade of the rail network and rail stations, park 'n' ride facilities
- Increased rolling stock on rail network from 113 in 1997 to 211 in 2012
- Start of construction of the Gold Coast light rail system (Department of Transport and Main Roads 2011a).

There have also been some major infrastructure additions and improvements since 2000. These are summarised in Table 6.1.

48 See Queensland Transport (2005) for further information.

49 Note that the Go card was introduced in 2008, after the census period for which we have data.

Table 6.1 Key transport network improvements, South East Queensland, 2000 to 2012

Project	Type	Date opened
Busways		
South East Busway (CBD to Woolloongabba)	Busway	October 2000
South East Busway (extension to Eight Mile Plains)	Busway	April 2001
(Inner) Northern Busway (Roma Street to QUT Kelvin Grove) - single station	Busway	February 2004
(Inner) Northern Busway (added Normanby and RCH Herston stops)	Busway	December 2005
(Inner) Northern Busway (King George Square station)	Busway	May 2008
Northern Busway (RCH Herston to Windsor/Royal Brisbane and Women's Hospital)	Busway	August 2009
Eastern Busway (UQ Lakes to Buranda)	Busway	August 2009
Eastern Busway (Buranda to Langlands Park)	Busway	August 2011
Northern Busway (Windsor to Kedron)	Busway	June 2012
Rail Network		
Airtrain (new rail line to the Brisbane domestic and international airports)	Rail network	May 2001
Ormeau to Coomera rail duplication	Rail network	September/ October 2006
Duplication of Ferny Grove line (Mitchelton to Keperra) including station upgrades	Rail network	February 2008
New (third) track from Salisbury to Kuraby, and seven station upgrades	Rail network	March 2008
Helensvale to Robina rail duplication	Rail network	July 2008
Caboolture to Beerburrum rail duplication including two new stations	Rail network	April 2009
Extension of the Gold Coast rail line to Varsity Lakes	Rail network	December 2009
Two new tracks on the Ipswich rail line (Corinda to Darra) including station upgrades	Rail network	January 2011
The Darra to Springfield Transport Corridor (Stage 1 – Darra to Richlands) Darra to Richlands rail line	Rail network	January 2011
Road Network		
Pacific Motorway upgrade (eight lanes from Logan Motorway to Smith Street and six lanes from Smith Street to Pappas Way, Nerang)	Road network	October 2000
Pacific Motorway transit lanes from Klumpp Road to Miles Platting Road	Road network	May 2001
Nundah bypass (Sandgate Road)	Road network	December 2001
Bruce Highway upgrade (six lanes from Gateway Motorway to Dohles Rocks Road)	Road network	April 2002
Inner City Bypass	Road network	July 2002
Port of Brisbane Motorway, Stage 1	Road network	December 2002
Bruce Highway Yandina to Cooroy Duplication	Road network	September 2003
Gatton bypass duplication	Road network	October 2003
Bruce Highway upgrade (from Dohles Rocks Road to Boundary Road)	Road network	January 2005
Eleanor Schonell Bridge (pedestrian, cycle and bus bridge)	Road network	December 2006
Bruce Highway upgrade (from Boundary Road to Uhlmann Road)	Road network	March 2007
Tugun bypass	Road network	June 2008
Centenary Highway extension, Springfield to Yamanto	Road network	June 2009
Bruce Highway upgrade (from Uhlmann Road to Caboolture)	Road network	November 2009

(continued)

Table 6.1 Key transport network improvements, South East Queensland, 2000 to 2012 *(continued)*

Project	Type	Date opened
Brisbane Airport Northern Access Road	Road network	December 2009
Sunshine Motorway upgrades (including Pacific Paradise interchange and bypass)	Road network	2008 and 2009
Clem Jones Tunnel (Clem7)	Road network	March 2010
Gateway Motorway upgrades, including the Gateway Bridge duplication (Sir Leo Hielscher) and Gateway deviation	Road network	May 2010 (bridge), November 2010 (original scope), July 2011 (Southern extension)
Ted Smout Memorial Bridge (from Clontarf to Brighton)	Road network	July 2010
Go Between Bridge	Road network	July 2010
Centenary Highway duplication, Richlands to north of the Logan Motorway Interchange	Road network	January 2011
Airport Link tunnel	Road network	July 2012
Ipswich Motorway upgrades	Road network	2009 to 2012
Airport roundabout upgrade	Road network	November 2010 (eastbound), February 2011 (all)
Pacific Motorway upgrades (sections between the Gateway Motorway and Tugun)	Road network	2009 to 2012 (and ongoing)

Notes: Includes selected infrastructure projects only.

Sources: Albanese, Sullivan and Wallace 2009, Anderson and Lucas 2005, Anderson 2003, Department of Transport and Main Roads 2011a, Department of Transport and Regional Services 2004, Lloyd and Brough 2005, statements.cabinet.qld.gov.au, www.tmr.qld.gov.au, www.airtrain.com.au, www.queenslandrail.com.au, www.ombudsman.qld.gov.au, www.leighton.com.au, www.parliament.qld.gov.au, www.infrastructure.gov.au, parlinfo.aph.gov.au, www.brisbane.qld.gov.au, www.minister.infrastructure.gov.au, bne.com.au, www.clem7.com.au, www.qldmotorways.com.au, www.brisbanetimes.com.au, www.nationbuildingprogram.gov.au, www.airportlinkm7.com.au, translink.com.au

One of the most significant SEQ public transport infrastructure projects in the last decade is the Busway network. Buses travel in a dedicated corridor, separate from other traffic, to avoid congestion. The Busway system currently has the following components:

- South East Busway, from the CBD to Eight Mile Plains (completed in two stages, opened October 2000 and April 2001)
- Northern Busway, from the CBD to Kedron Brook (completed in stages between February 2004 and June 2012)
- Eastern Busway, from UQ Lakes to Langlands Park (completed in stages in August 2009 and August 2011) (Department of Transport and Main Roads 2012a, TransLink 2012).

Martin (2011) examined the 33 largest public transport infrastructure projects (ie, relating to rail and buses) in Australia and New Zealand, between 2000 and 2009. Eleven of these projects were in SEQ, including the construction of Busways (4) and creation, extension or duplication/triplication of segments of the SEQ commuter rail system (7). The Busways collectively cost $1835 million and the rail projects $1406 million, together totalling $3241 million, or 30 per cent of the $10 900 million of the 33 projects in Martin's study.

For active transport, there has also been a number of improvements over the last 15 years including pedestrian and cycle bridges, cycleways, the inclusion of cycling facilities in road projects, a veloway from Brisbane CBD to Eight Mile Plains and cycle centres/active transport facilities (for example, showers and bicycle lockers) (Department of Transport and Main Roads 2011a).

Notes on census journey to work data

Many commuters use more than one mode of transport to get to work, and up to three modes can be recorded in the census data. In the tables and figures presented in this chapter, data with multiple modes (up to three) will only appear in a specific mode category if a train or bus is one of the modes.

The multiple mode data with neither a train nor a bus as one of the modes appears in 'other'. For instance, if a person's journey to work involved a car trip and then cycling, it would appear in 'other' and not in the car or cycling figures. This means that apart from the 'train', 'bus', 'other' figures and the totals, the remaining data is for single-mode trips only. The train mode is given preference over bus, so that if a person had a multiple mode journey that included both a train and a bus, then it will appear under 'train'.

This has implications for the interpretation of the statistics presented in this chapter, particularly when considering common activities involving multiple modes such as park-and-ride.

However, of those SEQ-resident workers who reported on their mode of travel to work (ie, excluding those who did not go to work and not stated), only 3.1 per cent reported two or three modes. Therefore, this issue does not greatly affect the data overall.

Analysis by place of residence

This section examines how people travel to work in SEQ, by place of usual residence. It looks at use of different transport modes based on where a person lives by reporting on the transport mode shares in 2006 and how these have changed since 2001.

2006 snapshot

Table 6.2 summarises the mode shares of transport used by employed usual residents of SEQ to get to work on census day in 2006. About 11 per cent of employed SEQ residents did not go to work on census day, and another 2 per cent did not report a method of travel. The analyses in this section and elsewhere in this chapter focus on those who attended work and provided information on their mode of travel. The mode share calculation differs from the usual method in that those who worked at home were retained in the analysis.

Of those who reported a mode of travel to work, over two thirds (68.8 per cent) drove a car to work, and another 10.1 per cent were either driven to work, or drove in another private vehicle. In other words, almost 4 in 5 workers (78.9 per cent) travelled to work in a car or other private vehicle.

Table 6.2 Journey to work by transport mode for employed usual residents of South East Queensland, 2006

Mode of transport	Employed usual residents (number)	Employed usual residents (per cent of subtotal)
Car (as driver)	773 989	68.8
Car (as passenger)	80 822	7.2
Other private vehicle	32 461	2.9
Train	56 433	5.0
Bus	50 918	4.5
Other public transport	5 639	0.5
Cycling	11 819	1.1
Walking	39 880	3.5
Other modes	13 519	1.2
Worked at home	59 233	5.3
Subtotal	1 124 713	100.0
Did not go to work	140 570	—
Method of travel not stated	20 496	—
Total employed residents	1 285 779	—

Notes: Percentages are of total employed persons who attended work on census day and who stated their method of travel. Individual figures may not sum to totals due to rounding and confidentialisation. 'Other private vehicles' includes trucks and motorbikes/scooters. 'Other public transport' includes ferries, trams and taxis.

Source: BITRE analysis using ABS 2006 Census DataPacks: basic community profile release 2 (Cat. 2069.0.30.001).

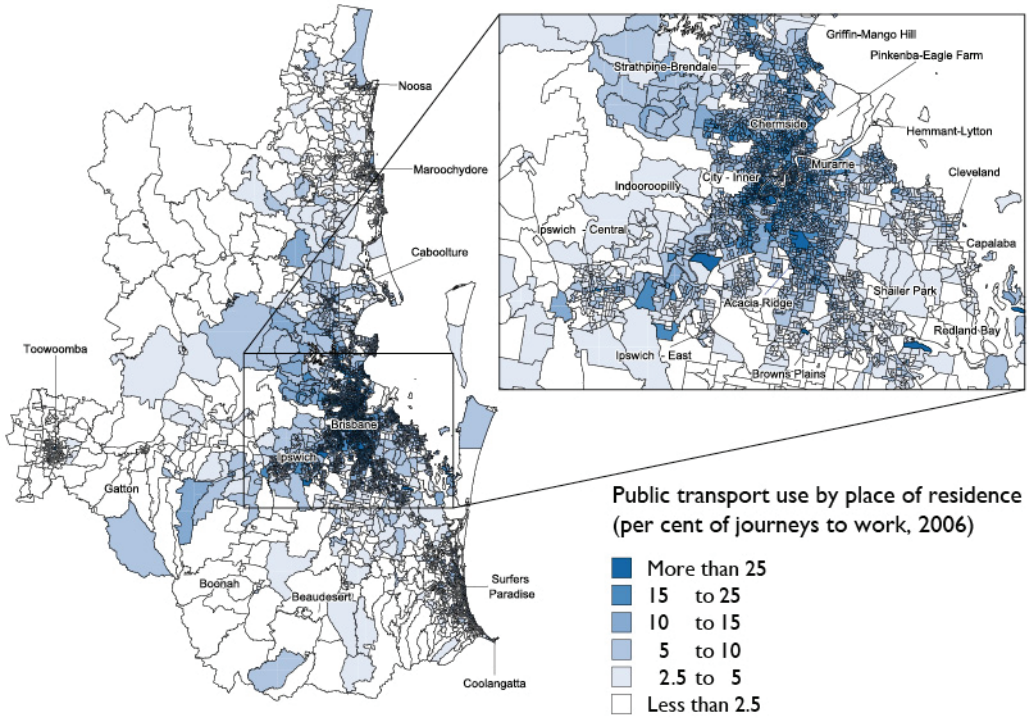
Ten per cent of workers used public transport to get to work, comprised mostly of train (5.0 per cent) and bus (4.5 per cent) travel. In comparison, the residents of Sydney and Melbourne were much more likely to catch a train than a bus, while in Perth, like in SEQ, the train and bus shares were very similar (although unlike SEQ, the bus share was slightly higher).[50]

Less than 1 in 20 workers (4.6 per cent) either cycled or walked to work (known collectively as active transport), while a slightly higher proportion (5.3 per cent) worked from home.

Map 6.1 illustrates the public transport mode share for people's journeys to work by the Census Collection District (CCD) in which they live. This reveals that public transport use is higher in the CCDs closer to the city centre, and also in certain corridors (such as between Brisbane and Ipswich in the west).

50 Residents of the Sydney Greater Metropolitan Area were more than twice as likely to use a train than a bus (12.0 per cent train share compared with 5.3 per cent bus share). In the Melbourne working zone, residents were almost seven times more likely to catch a train to work (9.4 per cent mode share) than bus (1.4 per cent), but tram (2.2 per cent) also played a significant role. In the Perth working zone, the train mode share (4.0 per cent) was slightly lower than the bus share (4.3 per cent). For more information, please see BITRE (2010, 2011a, 2012a).

Map 6.1 Public transport mode share for journeys to work by Census Collection District of residence, South East Queensland, 2006



Source: BITRE analysis of ABS 2006 Census Basic Community Profile release 2 (Cat. 2069.0.30.001).

Regions

Table 6.3 shows the journey to work transport mode shares by region of residence in 2006. This reveals some considerable spatial variation.

In particular, Inner Brisbane's commuting transport mode use is quite different from that of the other regions. Workers who lived in Inner Brisbane in 2006 were much more likely than workers in other areas to walk to work, with just under one in five (19.4 per cent) travelling to work in this way, compared to about one in 28 (3.5 per cent) employed residents in SEQ overall. Residents of Inner Brisbane were also more likely to cycle to work (3.1 per cent, compared to the overall SEQ figure of 1.1 per cent).

Table 6.3 Transport mode share for journey to work by sector and subregion of residence, South East Queensland, 2006

Region/Sector/ Subregion	Car	Other private vehicle	Public transport	Cycling	Walking	Other modes	Worked at home
				(per cent)			
Inner	49.1	1.7	20.6	3.1	19.4	1.4	4.7
Middle	70.6	2.3	17.1	1.3	3.0	1.1	4.6
Middle East	71.6	2.4	16.0	1.2	2.7	1.4	4.7
Middle North	69.7	2.5	18.1	1.3	3.1	1.0	4.2
Middle South	72.0	2.2	16.9	1.1	2.5	1.0	4.3
Middle West	69.6	1.9	16.6	1.5	3.7	1.2	5.4
Outer	79.7	3.7	8.3	0.6	2.0	1.2	4.4
Outer East	79.6	3.2	7.3	0.5	2.2	1.9	5.3
Outer North	77.8	3.6	9.8	0.7	2.1	1.2	4.7
Outer South	81.7	4.1	6.8	0.4	1.6	1.0	4.2
Outer West	80.9	3.5	8.4	0.4	2.3	1.0	3.4
Brisbane Total	73.4	2.9	13.5	1.1	3.5	1.2	4.5
Gold Coast	81.9	2.7	3.9	1.0	3.2	1.2	6.1
Sunshine Coast	79.9	3.0	2.5	1.1	3.9	1.3	8.4
Toowoomba	84.8	3.0	1.4	1.3	4.4	1.2	4.0
West Moreton	76.6	4.9	1.4	0.4	4.9	1.4	10.3
SEQ Total	76.0	2.9	10.0	1.1	3.5	1.2	5.3

Notes: Percentages are of total employed persons who attended work on census day. Individual figures may not sum to totals due to rounding and confidentialisation. 'Other private vehicles' includes trucks and motorbikes/scooters. 'Public transport' includes trains, buses, ferries, trams and taxis.

Source: BITRE analysis of ABS 2006 Census Basic Community Profile release 2 (Cat. 2069.0.30.001).

The higher takeup of these modes in Inner Brisbane is likely to reflect their nature as short-distance methods of travel. In a Sydney study, mode share was examined in terms of journey length. This revealed that walking dominated trips of less than 5 kilometres (just under half of all journeys), but this share dropped to virtually nothing for longer journeys (Xu, Milthorpe and Tsang 2011). On the other hand, the train mode share increased with length of journey, up to 30 kilometres. The bus mode had its largest share in journeys of 5 to 10 kilometres, but for longer journeys, its share decreased as the length of journey increased, in each 5 kilometre increment, up to 30 kilometres (ibid).

Aside from the high proportion of active transport use in Inner Brisbane, the remaining regions had active transport mode shares of between 2.1 and 5.7 per cent.

The four areas with the lowest percentages of active transport modes were the Outer subregions of Brisbane (Outer East, Outer North, Outer South, Outer West), all with less than three per cent. West Moreton had the lowest cycling share (0.4 per cent), along with the Outer subregions (0.4 to 0.7 per cent).

Public transport use was higher than the overall SEQ figure of 10 per cent in the Inner sector (21 per cent) and in all four Middle subregions (ranging from 16.0 to 18.1 per cent).

Car use tended to dominate method of travel to work in all regions. With the exception of Inner, the car share ranged from 69.6 per cent (Middle West) to 84.8 per cent (Toowoomba). In the Inner sector, corresponding to its higher use of active and public transport, car use represented just under half of all commutes (49.1 per cent).

The four Middle subregions had smaller car use shares than the Outer subregions (a range of 69.6 to 72.0 per cent, compared with 77.8 to 81.7 per cent in the four Outer subregions).

Table 6.4 shows the use of public transport modes, by region of residence. The varying composition of transport mode shares across regions is likely to be due to proximity to public transport (both at the home and work locations) and suitability of routes and connections.

Table 6.4 Detailed public transport mode share for journey to work by sector and subregion of residence, South East Queensland, 2006

Region/Sector/ Subregion	Public transport mode				Total public transport
	Train	Bus	Ferry	Taxi	
	(per cent)				
Inner	4.5	13.1	2.1	0.9	20.6
Middle	8.1	8.3	0.3	0.4	17.1
Middle East	6.6	7.8	1.2	0.4	16.0
Middle North	10.8	6.8	0.0	0.4	18.1
Middle South	4.4	12.1	0.0	0.4	16.9
Middle West	9.4	6.5	0.5	0.3	16.6
Outer	5.9	2.3	0.0	0.2	8.3
Outer East	4.3	2.7	0.1	0.2	7.3
Outer North	8.3	1.3	0.0	0.2	9.8
Outer South	2.3	4.4	0.0	0.2	6.8
Outer West	7.4	0.7	0.0	0.2	8.4
Brisbane Total	6.9	5.9	0.3	0.3	13.5
Gold Coast	1.6	2.0	0.0	0.2	3.9
Sunshine Coast	0.7	1.6	0.0	0.1	2.5
Toowoomba	0.1	0.8	0.0	0.5	1.4
West Moreton	0.9	0.5	0.0	0.0	1.4
SEQ Total	5.0	4.5	0.2	0.3	10.0

Notes: Percentages are of total employed persons who attended work on census day. Individual figures may not sum to totals due to rounding and confidentialisation.

Source: BITRE analysis of ABS 2006 Census Basic Community Profile release 2 (Cat. 2069.0.30.001).

This table reveals that there are some regions with a proportionately greater level of train use (such as the Middle North and Middle West subregions), and some with a greater use of buses (such as the Middle South subregion and the Inner sector).

The ferry and taxi modes have smaller shares overall, and both have higher shares in the Inner sector, which tend to decrease with distance from the city centre. This is unsurprising as the ferry network is limited, and taxis are more likely to be used for shorter trips.

Statistical Local Areas

Map 6.2 illustrates how the private vehicle mode share for journey to work varies for residents across Statistical Local Areas (SLAs) in SEQ. Private vehicles include cars (as driver or passenger), trucks, motorcycles and scooters. The private vehicle mode share in each SLA ranged from 20 per cent to 92 per cent of employed residents.

Car use (as a driver) represented most of private vehicle use in each SLA. Across SLAs, in the private vehicle category:

- Between 71 per cent and 92 per cent of private vehicle use was 'car as driver'
- Between 4 and 16 per cent was 'car as passenger'
- Between 0 and 6 per cent was 'truck'
- Between 0 and 17 per cent was 'motorcycle'.

As shown on the map, the pattern of private vehicle use follows a clear pattern of being lower in the CBD and increasing with distance from the city centre. The level of dependence on private vehicles is pervasive outside the core area of Brisbane, but even amongst Inner SLAs, private vehicle use ranges from 31 per cent to 63 per cent of all commuting.

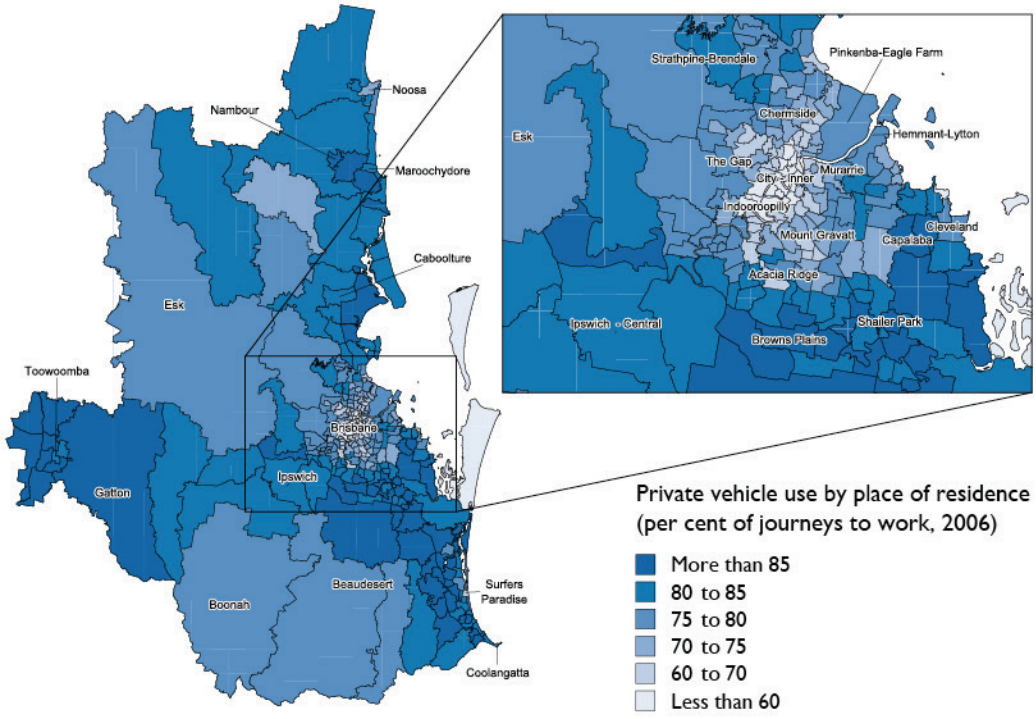
Of the 291 SLAs, 283 (97.3 per cent) have a private vehicle journey to work mode share of 50 per cent or more, and just under half of the SLAs (140) have an 80 per cent private vehicle share or more.

The SLAs with the highest levels of private vehicle share are:

- Rosalie Part A (92 per cent)
- Jondaryan Part A (91 per cent)
- Pacific Pines-Gaven (90 per cent)
- Cambooya Part A (90 per cent)
- Toowoomba South-East (90 per cent).

With the exception of Pacific Pines-Gaven on the Gold Coast, all these SLAs are in Toowoomba. This may reflect public transport access, as three of the SLAs have some of the lowest shares of public transport (under one per cent: Jondaryan Part A, Rosalie Part A and Cambooya Part A). While Toowoomba does have a bus service, it is not part of the TransLink service area, and has no commuter trains to Brisbane.

Map 6.2 Private vehicle mode share for journey to work by Statistical Local Area of residence, South East Queensland, 2006



Source: BITRE analysis using ABS 2006 Census Basic Community Profile release 2 (Cat. 2069.0.30.001).

Among the 25 SLAs with the highest private vehicle shares, 15 are Gold Coast SLAs, 5 are Toowoomba SLAs, and 5 are Outer South SLAs. Conversely, of the 25 SLAs with the lowest private vehicle mode levels, 16 are Inner SLAs, 8 are Middle SLAs, and one is an Outer East SLA (Redland Balance).

The SLAs with the lowest levels of private vehicle mode share are Moreton Island (20 per cent—although this only represents 24 trips), City Inner (31 per cent), Spring Hill (32 per cent) and City Remainder (34 per cent).

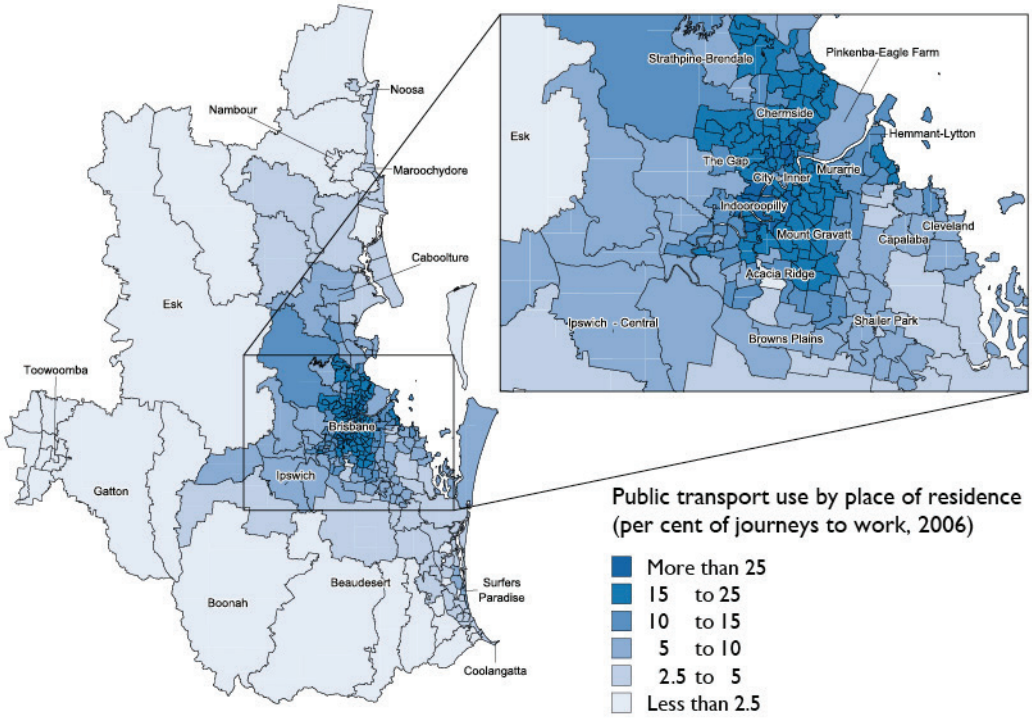
Of the 37 SLAs which have truck mode shares of 3.5 per cent or more, 16 are in the regions outside Greater Brisbane (including all six West Moreton SLAs), 18 are in the Outer sector and 6 are in the Middle sector.

Map 6.3 illustrates the proportion of employed residents in each SLA using public transport to travel to work. This ranged from 0 per cent to 29 per cent of employed residents in each SLA.

An interesting feature of this map is how the innermost SLAs do not have the highest public transport mode shares on a place of residence basis. In fact, the City Inner SLA only has a public transport mode share of 8.8 per cent. This is due to the use of active transport (walking, cycling).

The three SLAs with the highest public transport mode share (all about 29 per cent) are Taringa, Lutwyche and Toowong. These SLAs are in the Middle sector, but very close to Inner Brisbane, and either contain one or more train stations (Taringa and Toowong), or are adjacent to SLAs with train stations (Lutwyche).

Map 6.3 Public transport mode share for journey to work by Statistical Local Area of residence, South East Queensland, 2006



Source: BITRE analysis using ABS 2006 Census Basic Community Profile release 2 (Cat. 2069.0.30.001).

Of the 25 SLAs with the highest public transport mode shares, four are in the Inner sector of Brisbane, with all remaining 21 in the Middle sector of Brisbane, as follows: Middle North (ten SLAs), Middle West (six SLAs), Middle South (four SLAs) and Middle East (one SLA).

The SLAs with the lowest share are Willawong (0.0 per cent), Jondaryan Part A (0.4 per cent) and Crow's Nest Part A (0.7 per cent).

Most of the SLAs with the lowest public transport commuting use are outside the Brisbane region. Of the 25 SLAs with the lowest public transport journey to work mode shares, there are nine in Toowoomba, six each in West Moreton and the Gold Coast, three in the Sunshine Coast and one in Middle South Brisbane.

Census Collection Districts

Maps 6.4 and 6.5 illustrate the train and bus shares for journeys to work by Census Collection District (CCD) of residence in 2006. It is important to note that the bus map includes the 'train and bus' multiple mode category, whereas in other parts of the chapter this is classed under train travel. It is also included in the train map.

Map 6.4 includes the TransLink city rail network as it existed in 2006, and the individual stations. Since then, the Gold Coast line has been extended by an additional stop to Varsity Lakes, and the Ipswich/Rosewood Line has an additional, single station branch from Darra to Richlands. This map, as with the other data presented for rail, also includes multiple mode trips with a

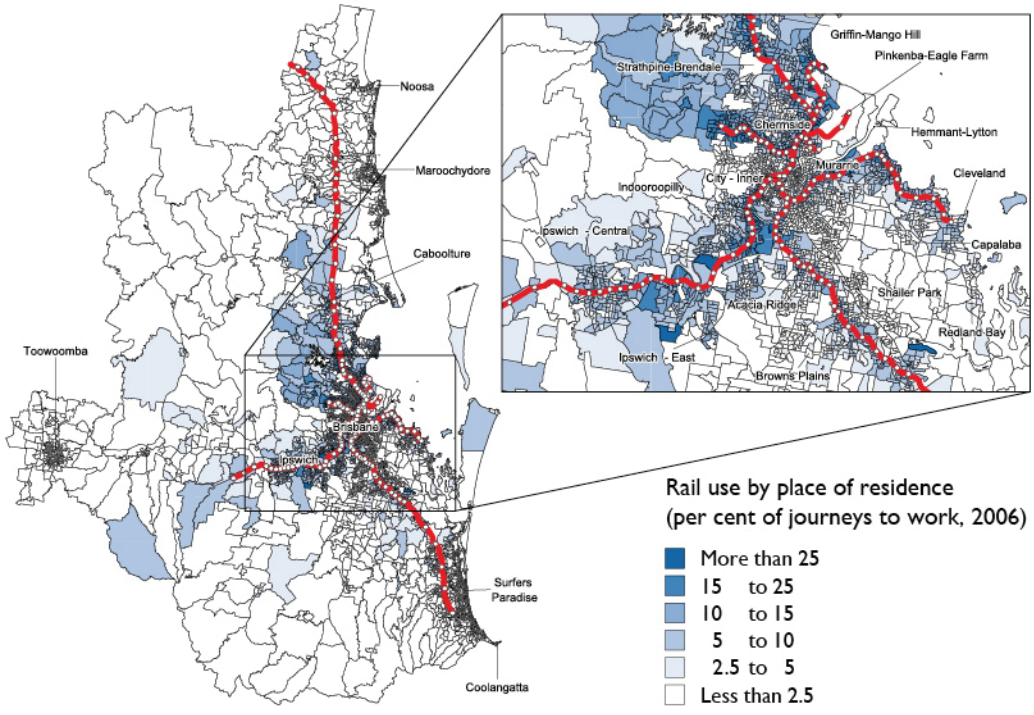
train and one or two other modes. It will therefore capture people who use other means (such as car, bus, cycling, etc) to either reach the train station from home, or to reach their place of employment from the train station.

This multiple mode use is reflected on the map. Extending beyond the Ferny Grove Line (from the northwest of the CBD) are CCDs within the Pine Rivers Balance SLA which have relatively high rail mode shares. In the vast majority of these CCDs, most of the train mode share is comprised of the multiple mode 'train and car' travel. This indicates that a system of parking and catching the train into work is a popular method of travel for the area. Less than two weeks before the 2006 census was taken, a Park 'n' Ride facility with 130 car parks opened at Ferny Grove Station, taking the total car parking spaces at the station to 546 (Oliver 2006).

Unsurprisingly, train use tends to be highest in CCDs which contain or are very close to a railway station. However, it perhaps is surprising that many CCDs which are still within several kilometres of a train station have such low train mode shares. It does therefore seem that decisions by commuters to use the train as their method of travel to work is quite sensitive to distance to the station.

The other notable feature of the map is that very central CCDs do not appear in the higher categories unless they are right on the train line.

Map 6.4 **Heavy rail mode share for journey to work by Census Collection District of residence, South East Queensland, 2006**

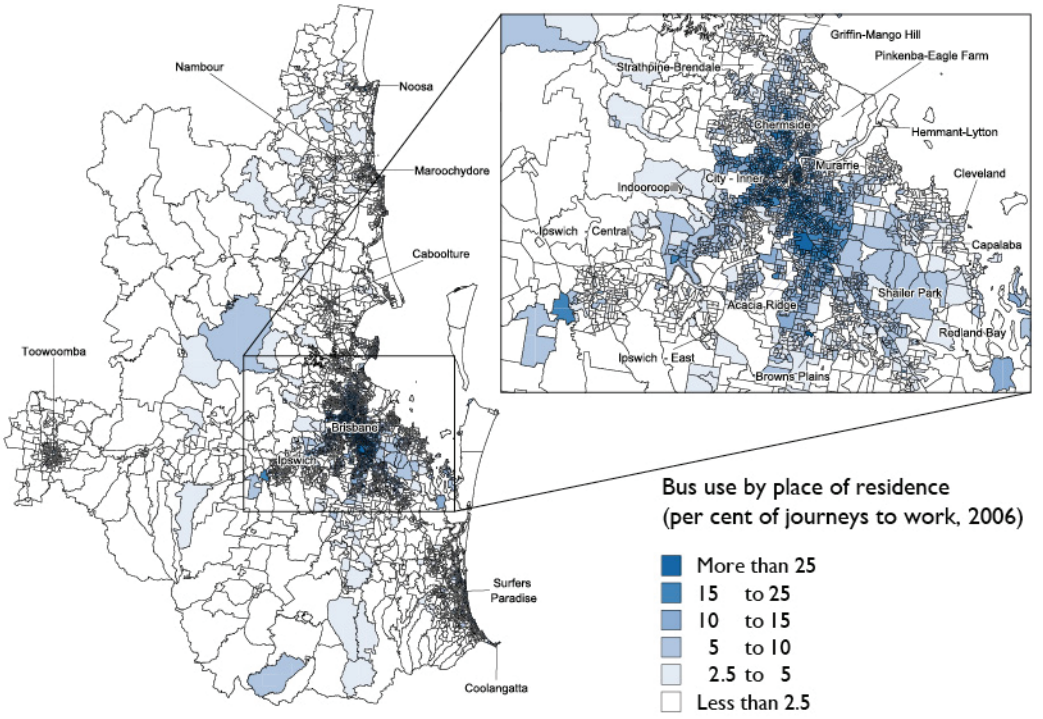


Note: The train network is represented by the red lines (with stations as white dots).

Source: BITRE analysis using ABS 2006 Census Basic Community Profile release 2 (Cat. 2069.0.30.001).

Map 6.5 shows the bus mode share for journey to work by residence, including bus and one or two more modes. This is a complementary picture to that shown on the train map. Close to the city, the areas in between the train lines with low train use have high bus use on this map.

Map 6.5 Bus mode share for journey to work by Census Collection District of residence, South East Queensland, 2006



Notes: Includes journeys involving both bus and train, which are classified as train journeys elsewhere.
Source: BITRE analysis using ABS 2006 Census Basic Community Profile release 2 (Cat. 2069.0.30.001).

Changes from 2001 to 2006

As 2001 census data for place of usual residence is not available, place of enumeration data for both 2001 and 2006 has been used to compare census results. Although this is slightly different data to that used above, it allows a like-for-like comparison to be made while not substantially affecting the interpretation of the results. Some SLAs needed to be aggregated to allow data to be compared across time on a consistent boundary, and this was done using the aggregate SLA regions presented in Appendix B.

Regions

Table 6.5 shows the change between 2001 and 2006 in journey to work transport mode share, by place of enumeration. For SEQ overall, the biggest changes were the increase in the public transport share (0.5 percentage points), the increase in the walking share (0.4 percentage points) and the decrease in the share of people working from home (–0.4 percentage points).

The cycling, car and other private vehicle shares all declined very slightly, by only 0.1 or 0.2 percentage points.

Table 6.5 Change in mode share for journeys to work by place of enumeration, South East Queensland sectors and subregions, 2001 to 2006

Region/Sector/ Subregion	Car	Other private vehicle	Public transport	Cycling	Walking	Worked at home
	(percentage point change)					
Inner	–4.8	0.3	0.2	0.2	5.2	–0.5
Middle	–1.4	0.0	1.4	0.0	0.4	–0.3
Middle East	–1.2	–0.1	1.2	0.0	0.3	–0.1
Middle North	–1.1	0.1	1.0	0.0	0.3	–0.3
Middle South	–1.8	–0.1	2.2	0.1	0.2	–0.3
Middle West	–1.8	0.1	1.4	0.1	0.7	–0.4
Outer	0.4	–0.3	0.6	–0.1	0.1	–0.5
Outer East	0.7	–0.4	0.2	–0.1	0.3	–0.6
Outer North	0.5	–0.2	0.1	–0.1	0.1	–0.4
Outer South	0.0	–0.2	1.3	0.0	–0.2	–0.7
Outer West	0.4	–0.2	0.3	–0.2	0.1	–0.2
Brisbane Total	–0.9	–0.1	0.9	0.0	0.6	–0.4
Gold Coast	1.0	–0.3	0.1	–0.3	0.0	–0.3
Sunshine Coast	1.5	–0.5	0.3	–0.1	–0.1	–0.8
Toowoomba	1.2	–0.1	–0.2	–0.1	0.1	–0.8
West Moreton	3.7	0.0	0.0	0.0	–0.7	–2.6
SEQ Total	–0.1	–0.2	0.5	–0.1	0.4	–0.4

Notes: Percentages are of total employed persons who attended work on census day. Change in mode share for 'other modes' not shown.

Source: BITRE analysis using ABS 2006 Census DataPack: place of enumeration profile release 2 (Cat. 2069.0.30.004) and ABS CDATA 2001.

In the Brisbane region, the car share dropped by 0.9 percentage points, while the public transport share grew by the same amount. However, the table reveals that there is not a simple relationship between changes in car and public transport use. In the Middle subregions, car use tends to decrease by a similar magnitude to the increase in public transport. However, in other areas, including the Outer sector and the Gold and Sunshine Coasts, both car and public transport shares grew. This is related to changes in other modes, most notably the across-the-board decreases in the share of people working from home. This decrease tended to be higher in the regions outside the Brisbane region, with the greatest decrease occurring in West Moreton (–2.6 percentage points).

The car share showed some comparatively large changes across the regions. It decreased in the Inner (–4.8 percentage points) and Middle (–1.4 percentage points) sectors, and increased in the Outer sector (0.4 percentage points), and in every sector outside Brisbane, with the greatest increase in West Moreton (3.7 percentage points).

There was very little change for the cycling share in any sector or subregion. The greatest change was in the Gold Coast, where the cycling share fell by 0.3 percentage points.

Inner Brisbane had some of the largest transport share changes over the five year period. In addition to the car share decreasing, the walking share increased by 5.2 percentage points.

The greatest increase in the public transport mode share was in Middle South (2.2 percentage points). Overall, the Middle sector's public transport share grew by 1.4 percentage points. The four Outer subregions all experienced an increase in their public transport shares, with an overall increase for the Outer sector of 0.6 percentage points. This was driven by the Outer South (1.3 percentage points), with more modest growth in the other Outer subregions.

The likely explanation for the larger increases in the Middle South and Outer South is the South East Busway, which opened in April 2001 to Eight Mile Plains, which is in the Middle South, but adjacent to the Outer South subregion. Table 6.6 shows how the change in public transport shares is distributed across the different mode types. This confirms that the growth in these two areas has been driven by increases in their bus shares, while the train shares remained unchanged, or fell slightly. This could be because the bus became more convenient to people who had previously used the train. Overall, the 0.5 percentage point growth in the public transport share in SEQ is almost entirely due to an increase in the bus share.

Table 6.6 Percentage point change in detailed public transport mode share for journeys to work by place of enumeration, South East Queensland, 2001 to 2006

Region/Sector/ Subregion	Public transport mode				Total public transport
	Train	Bus	Ferry	Taxi	
	(percentage point change)				
Inner	0.4	0.4	–0.2	–0.4	0.2
Middle	0.4	0.9	0.1	0.0	1.4
Middle East	0.5	0.3	0.4	0.0	1.2
Middle North	0.5	0.5	0.0	0.0	1.0
Middle South	0.0	2.3	0.0	0.0	2.2
Middle West	0.9	0.4	0.2	0.0	1.4
Outer	0.0	0.5	0.0	0.0	0.6
Outer East	–0.1	0.3	0.0	0.0	0.2
Outer North	–0.1	0.2	0.0	0.0	0.1
Outer South	–0.2	1.6	0.0	0.0	1.3
Outer West	0.3	0.0	0.0	0.0	0.3
Brisbane Total	0.2	0.7	0.1	0.0	0.9
Gold Coast	0.0	0.0	0.0	0.0	0.1
Sunshine Coast	0.0	0.3	0.0	0.0	0.3
Toowoomba	0.0	–0.1	0.0	–0.1	–0.2
West Moreton	0.1	0.0	0.0	0.0	0.0
SEQ Total	0.1	0.5	0.0	0.0	0.5

Notes: Figures may not add to totals, due to rounding.

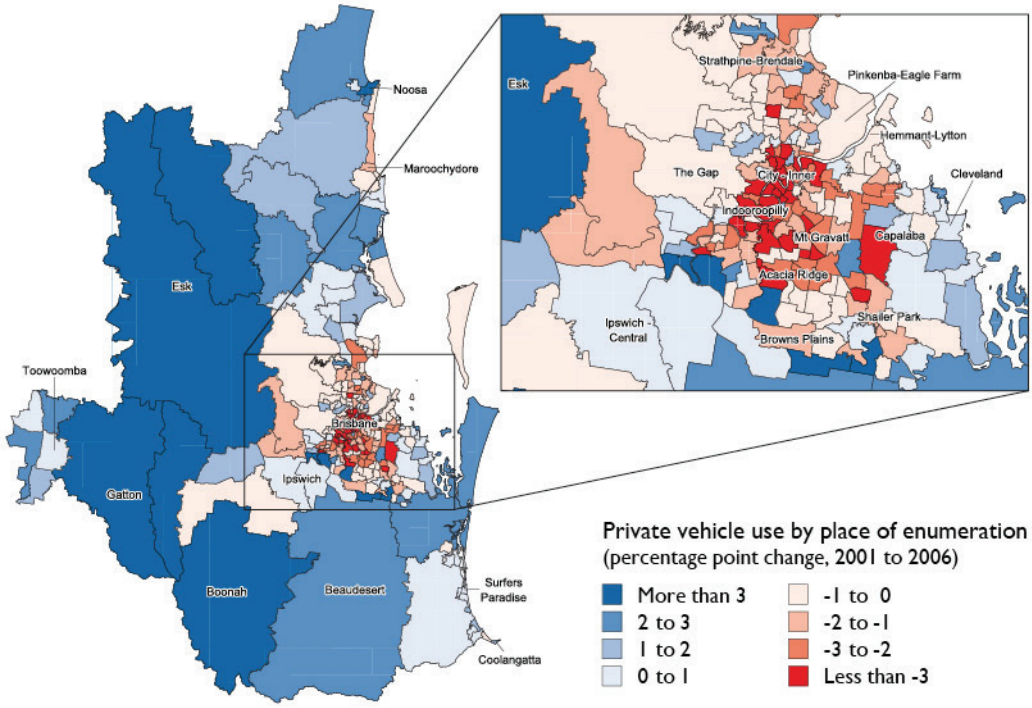
Source: BITRE analysis using ABS 2006 Census DataPack: place of enumeration profile release 2 (Cat. 2069.0.30.004) and ABS CDATA 2001.

Statistical Local Areas

Map 6.6 shows the how the private vehicle mode share has changed between 2001 and 2006, by place of enumeration.

The map reveals that the private vehicle mode share decreased in the inner areas of Brisbane, and increased in the outer areas of SEQ. This only exacerbates the regional differences that already exist between the car-dominated outer subregions and the inner areas, which are more likely than other regions to use other modes (active and public transport).

Map 6.6 **Change in private vehicle mode share for journey to work by Statistical Local Area of enumeration, South East Queensland, 2001 to 2006**



Note: Where boundary changes occurred, change comparisons were undertaken for aggregate SLA regions, as described in Appendix B.

Source: BITRE analysis using ABS 2006 Census DataPack: place of enumeration profile release 2 (Cat. 2069.0.30.004) and ABS CDATA 2001.

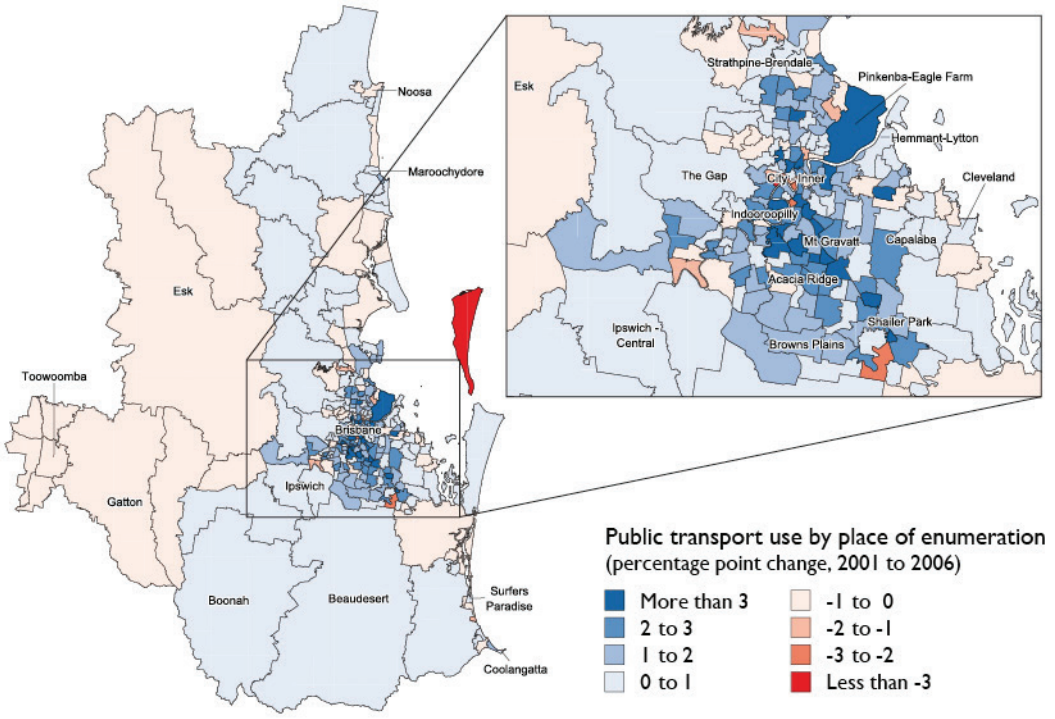
Of the 13 SLAs which experienced a reduction in the private vehicle share of more than 5 percentage points, 6 were in Inner Brisbane, 5 were in the Middle South and the remaining two were in other Middle subregions. Widening this to the 34 SLAs whose private vehicle share fell by more than 3 percentage points, 12 were in Inner and 21 were in Middle Brisbane, with only one other (in Outer South).

Of all the SLAs experiencing a reduction in the private vehicle share, ten per cent were Inner SLAs, and 68 per cent were Middle SLAs. Conversely, 70 per cent of SLAs experiencing an increase in their private vehicle share were in Outer Brisbane or the regions outside of Brisbane, and only two were in Inner Brisbane.

Of the 25 SLAs with a 2 percentage point or more increase in their private vehicle share, 15 (60 per cent) were outside the Brisbane region, 4 were in Outer Brisbane, 6 were in Middle Brisbane and none were in Inner Brisbane.

Map 6.7 shows the change in public transport mode share between 2001 and 2006, revealing that the majority of SLAs experienced growth in their public transport mode share. However, the fastest growers were still in the more central areas.

Map 6.7 Change in public transport mode share for journey to work by Statistical Local Area of enumeration, South East Queensland, 2001 to 2006



Note: Where boundary changes occurred, change comparisons were undertaken for aggregate SLA regions, as described in Appendix B.

Source: BITRE analysis using ABS 2006 Census DataPack: place of enumeration profile release 2 (Cat. 2069.0.30.004) and ABS CDATA 2001.

Of the 21 SLAs whose public transport share increased by 3 or more percentage points, 3 were in Inner Brisbane and 16 were in Middle Brisbane, with the remaining 2 in Outer South. Of the 112 SLAs with public transport share growth of 1 percentage point or more, 80 per cent were in Inner or Middle Brisbane, with another 18 per cent in Outer Brisbane (mostly Outer South).

There were only 14 SLAs whose public transport share decreased by 1.0 per cent or more. Five of these were Inner SLAs, four were Middle SLAs, three were Outer SLAs and two were in the Gold Coast.

Analysis by place of work

2006 snapshot

This section examines the modes of transport used to travel to work in 2006, based on place of employment. This uses 2006 census journey to work data.

On census day 2006, 11 per cent of the 1.14 million employed in SEQ did not attend work. Another one per cent did not provide any information on their mode of travel to work. The analysis in this section is for the remaining approximately 1 million people employed in SEQ who provided information in the census on their method of travel to work.

Table 6.7 reveals a very similar picture to the journey to work data by usual residence in Table 6.2, in that car travel (as driver) dominates, with 68.7 per cent of workers in SEQ use this method of commuting (compared with 68.8 for usual residents). Likewise, the remaining transport mode shares are much the same as those for place of usual residence at the overall SEQ level, and are all within half a percentage point.

Table 6.7 Transport mode share for journey to work by place of employment, South East Queensland, 2006

Mode of transport	Employed (number)	Employed (per cent of subtotal)
Car (as driver)	691 154	68.7
Car (as passenger)	69 813	6.9
Other private vehicle	24 706	2.5
Train	52 915	5.3
Bus	47 069	4.7
Other public transport	4 976	0.5
Cycling	10 963	1.1
Walking	36 596	3.6
Other modes	10 609	1.1
Worked at home	56 778	5.6
Subtotal	1 005 579	100.0
Did not go to work	124 463	–
Method of travel not stated	10 768	–
Total employed	1 140 810	–

Notes: 'Other private vehicle' includes trucks and motorbikes/ scooters. 'Other public transport' includes ferries, trams and taxis. The 5.6 per cent who worked at home differs from the 5.0 per cent figure given for 2006 in Chapter 4, which used total employed persons as the denominator.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006)

Overall, public transport accounts for 10.4 per cent of commuting among workers in SEQ, and active travel accounts for 4.7 per cent.

Regions

Table 6.8 shows method of travel to work by region of employment in 2006.

The most striking difference between the spatial patterns by workplace compared with place of residence relates to the public transport share. For those working in the Inner Brisbane subregion, the public transport share was 39.6 per cent. This was vastly higher than any other region, with the next highest being Middle West (7.6 per cent). This is likely to be due to the radial nature of the rail and bus networks, designed to convey people from all over the region to the centre of Brisbane. Burke, Li and Dodson (2010) note that, due to their radial rail networks, Australian cities have 'a high degree of residential dispersion but relatively low levels of employment dispersion, especially in terms of commercial office employment' (ibid., p.2). While the Inner sector contains 19 per cent of total SEQ employment, about 73 per cent of public transport commuting in SEQ involves people who work in the Inner sector.

Table 6.8 Transport mode share for journey to work by sector of employment, South East Queensland, 2006

Region/Sector/ Subregion	Car	Other private vehicle	Public transport	Cycling	Walking	Other modes	Worked at home
				(per cent)			
Inner	49.7	1.7	39.6	1.6	5.0	1.0	1.5
Middle	81.7	2.6	5.5	0.9	3.0	1.0	5.2
Middle East	82.4	2.7	4.6	0.7	2.8	1.0	5.8
Middle North	82.0	2.7	5.4	1.0	3.1	1.0	4.8
Middle South	84.2	2.7	4.5	0.7	2.2	0.9	4.6
Middle West	77.4	2.3	7.6	1.2	3.9	1.3	6.3
Outer	82.1	3.0	2.7	0.8	3.0	1.1	7.3
Outer East	78.8	2.7	2.6	0.9	3.7	1.7	9.6
Outer North	80.6	3.1	2.6	1.1	3.3	1.0	8.3
Outer South	83.6	3.1	2.4	0.6	2.4	1.0	7.0
Outer West	85.2	2.8	3.2	0.5	2.8	1.0	4.5
Brisbane region	73.0	2.4	14.2	1.1	3.5	1.1	4.8
Gold Coast	82.6	2.2	2.7	1.1	3.5	1.0	6.9
Sunshine Coast	80.0	2.5	1.7	1.2	4.0	1.1	9.6
Toowoomba	85.6	2.5	1.2	1.3	4.3	1.0	4.1
West Moreton	73.1	4.3	0.6	0.5	6.4	1.4	13.9
Total SEQ	75.7	2.5	10.4	1.1	3.6	1.1	5.6

Notes: 'Other private vehicle' includes trucks and motorbikes/scooters. 'Public transport' includes trains, buses, ferries, trams and taxis.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006).

Car travel (either as a driver or passenger) was the predominant mode of travel to work for those employed in SEQ in 2006 (75.7 per cent). The Brisbane region had a slightly lower figure of 73.0 per cent, due to the Inner sector's share of 49.7 per cent. All the subregions in the

Middle and Outer sectors had car mode shares of between 77.4 per cent (Middle West) and 85.2 per cent (Outer West).

The active transport share (walking and cycling) was highest in West Moreton (6.8 per cent) and Inner Brisbane (6.6 per cent). Only three other regions had an active transport share of more than 5 per cent (or 1 in 20 employed people)— Toowoomba (5.5 per cent), Sunshine Coast (5.2 per cent) and Middle West (5.1 per cent).

West Moreton has a different profile to the other three regions outside the Brisbane region. People who worked in West Moreton in 2006 were less likely to use a car to get to work than the other sectors (about the same as the Brisbane region overall), but just under twice as likely to use another type of private vehicle (motorcycle/scooter or truck) as the other sectors. West Moreton also had a smaller public transport share, a greater share of people walking to work, and a greater share of people working from home. In fact, like 'other private vehicle' use, the walking and 'worked at home' modes were higher in West Moreton than in any of the other regions.

About 14 per cent of people who worked in West Moreton worked from home on the day of the census, or approximately one in seven people employed in this region. The regions with the next highest shares were Sunshine Coast and Outer East, both with 9.6 per cent. In the Brisbane region, the broad trend was that the closer to the city centre a person worked, the less likely they were to work from home. Only 1.5 per cent of people employed in the Inner sector worked from home, compared with 5.2 in the Middle sector and 7.3 in the Outer sector.

The large percentage of people working at home in West Moreton (13.9 per cent of its total employment) is due to agriculture. Among the people that worked from home in West Moreton, more than half (53 per cent) worked in *Agriculture, forestry and fishing*. This industry category also accounts for 24 per cent of people walking to work in West Moreton, while another 17 per cent of people walking to work in this area had jobs in the *Retail trade*.

Table 6.9 shows the public transport mode shares in more detail. This reveals that for those working in SEQ, train travel is only a marginally more popular method of travel to work than bus travel, and together those account for almost all of the public transport use. In the Brisbane region, train travel accounts for 7.5 per cent of all journeys to work, and bus travel 6.1 per cent.

However, for those working in the areas outside the Brisbane region, train travel has a smaller mode share than bus travel, and public transport overall has a very low share. Public transport shares outside the Brisbane region range from 2.7 per cent in the Gold Coast to just 0.6 per cent in West Moreton.

In the three subregions with the highest public transport share (Inner, Middle West and Middle North), the pattern is similar to that of the Brisbane region and SEQ overall, namely, that train and bus are the predominant public transport modes, with train being slightly more used than bus.[51] The only regions in which the bus share is higher than the train share are Middle South (which the South East Busway travels though), Outer South (just beyond the end of the Busway) and Outer East. However, these subregions' bus shares are still much lower than in Inner Brisbane (less than 3 per cent).

51 It is worth remembering that multi-mode journeys with both train and bus components are counted under 'train'. In SEQ overall, the 'train and bus' two-mode journeys account for 0.4 per cent of all commutes, while 'train and other two methods' (which can also include bus) accounts for 0.2 per cent. So if only single-method train and bus journeys are considered, then their shares would be very similar for SEQ overall.

Table 6.9 Detailed public transport mode share for journey to work by sector of employment, South East Queensland, 2006

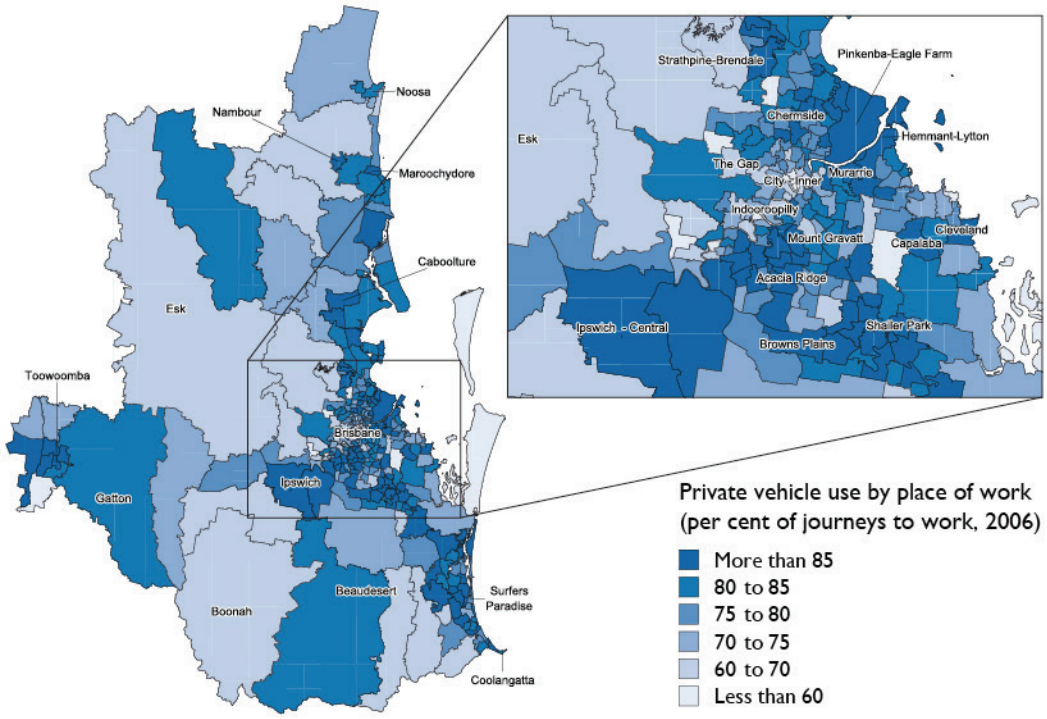
Region/Sector/	Train	Bus	Ferry	Taxi	Total public transport
			(per cent)		
Inner	21.4	16.8	1.0	0.4	39.6
Middle	2.7	2.4	0.1	0.2	5.5
Middle East	2.3	2.0	0.1	0.3	4.6
Middle North	3.1	2.0	0.0	0.3	5.4
Middle South	1.5	2.7	0.0	0.3	4.5
Middle West	3.9	3.0	0.4	0.2	7.6
Outer	1.3	1.2	0.0	0.2	2.7
Outer East	0.8	1.5	0.2	0.2	2.6
Outer North	1.4	1.0	0.0	0.2	2.6
Outer South	0.8	1.4	0.0	0.2	2.4
Outer West	1.9	1.0	0.0	0.2	3.2
Brisbane region	7.5	6.1	0.3	0.3	14.2
Gold Coast	0.4	2.0	0.0	0.2	2.7
Sunshine Coast	0.1	1.4	0.0	0.1	1.7
Toowoomba	0.0	0.7	0.0	0.5	1.2
West Moreton	0.1	0.4	0.0	0.1	0.6
Total SEQ	5.3	4.7	0.2	0.3	10.4

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006)

Statistical Local Areas

Map 6.8 illustrates the private vehicle mode share for journeys to work in 2006 by place of work. This is strikingly different from the pattern by place of residence. Many SLAs outside the Inner sector have high private vehicle use, despite having train lines running through them. This is likely to be because, while there is public transport in these areas, the train lines and busways are radial in nature, and would not suit an individual attempting to commute across the region, rather than commuting to the city centre.

Map 6.8 Private vehicle mode share for journey to work by Statistical Local Area of employment, South East Queensland, 2006



Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006).

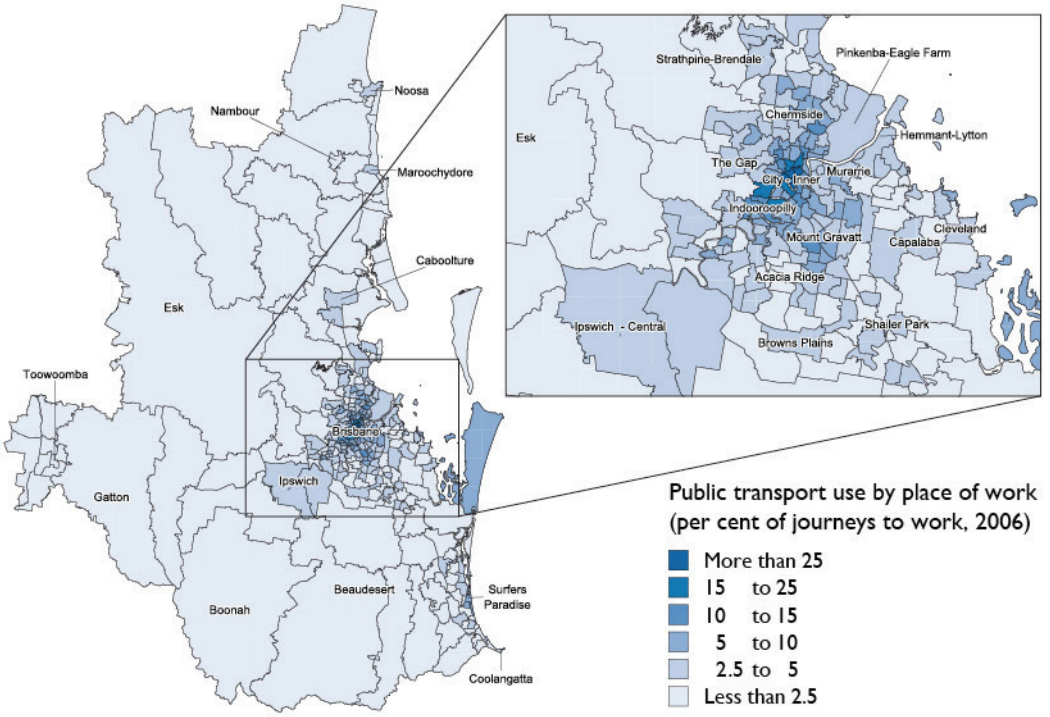
This issue of cross-city connection has been acknowledged by TransLink for some time. The most recent two TransLink Network Plans indicate that they will enhance public transport cross-town connectivity, to enable people to travel across the region without going into the city centre and back out again (TransLink 2010b, 2011). Earlier, the draft 2005 TransLink Network Plan included the key service improvement of 'delivering more cross-town services in Brisbane and better east-west connections on the Gold Coast and Sunshine Coast' (Queensland Transport 2005, p.1).

Another feature of the map is that many of the non-urban SLAs have lower car shares. This is a reflection of their higher shares of working from home.

Map 6.9 shows the public transport mode share for commuting by SLA of employment in 2006. This shows that the use of public transport is very spatially concentrated, with highest use among CBD workers.

Workers in the City Inner SLA account for about a third of all public transport journeys to work in SEQ, while workers in City Remainder account for 19 per cent. This means that over half of public transport commuting (54 per cent) is by people employed in these SLAs, and yet together they account for only 9 per cent of total SEQ employment.

Map 6.9 Public transport mode share for journey to work by Statistical Local Area of employment, South East Queensland, 2006



Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006)

Changes from 2001 to 2006

Regions

The following section looks at the changes between 2001 and 2006 of journey to work transport mode by place of employment. Table 6.10 shows how the share for each mode of travel has changed from 2001 to 2006.

This reveals that there was a fall of 0.3 percentage points in the percentage of SEQ workers who used cars to commute to work. Similar to the place of enumeration findings, this reveals that in several of the regions, car and public transport shares both increased.

People working in the Inner sector were less likely to use a car to get to work in 2006 compared with 2001 (a 5.9 percentage point decrease in the share) and more likely to use public transport (a 3.4 percentage point increase) or to walk (a 1.9 percentage point increase).

The public transport share grew by 0.9 percentage points in the Brisbane region, driven by those working in Inner (3.4 percentage points), while Middle (0.4) and Outer (0.2) saw positive but modest increases.

Table 6.10 Change in mode share for journey to work by sector of employment, South East Queensland, 2001 to 2006

Region/Sector/Subregion	Car	Other private vehicle	Public transport	Cycling	Walking	Worked at home
			(percentage point change)			
Inner	–5.9	0.3	3.4	0.3	1.9	0.2
Middle	0.2	–0.1	0.4	0.0	0.2	–0.5
Middle East	0.9	–0.1	0.4	–0.2	0.0	–0.7
Middle North	0.2	0.0	0.3	–0.1	0.1	–0.5
Middle South	0.4	–0.2	0.5	0.1	0.1	–0.6
Middle West	–0.6	0.0	0.5	0.0	0.7	–0.4
Outer	1.0	–0.3	0.2	–0.2	0.0	–0.6
Outer East	1.2	–0.3	0.4	–0.2	0.4	–1.3
Outer North	1.4	–0.3	0.1	–0.2	–0.1	–0.7
Outer South	0.7	–0.2	0.3	0.0	–0.1	–0.6
Outer West	0.9	–0.3	0.0	–0.3	0.0	–0.2
Brisbane region	–1.1	0.0	0.9	0.0	0.6	–0.3
Gold Coast	0.8	–0.1	0.0	–0.3	0.0	–0.3
Sunshine Coast	1.4	–0.4	0.2	–0.1	–0.2	–0.7
Toowoomba	1.3	–0.2	–0.2	–0.1	0.1	–0.8
West Moreton	4.4	–0.3	–0.3	–0.1	–0.7	–2.7
SEQ Total	–0.3	–0.1	0.5	–0.1	0.4	–0.3

Notes: Figures may not add to totals due to rounding. Change in mode share for 'other modes' not shown. To account for boundary changes between 2001 and 2006, this table was constructed by assigning 2001 SLAs as closely as possible to the 2006 sectors/subregions. As Beaudesert Part B was split across the 2006 sectors, it was divided between Outer South, Gold Coast and West Moreton based on the percentage of its population which fell within those areas.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

The share of car use grew in each of the sectors outside the Brisbane region, most strikingly in West Moreton (4.4 per cent), although due to the smaller employment numbers, share changes can be more pronounced in this region.

This relates to the large fall in the share of people working from home (–2.7 percentage points). The fall is likely to be related to the decline of agriculture as a share of West Moreton employment (see Chapter 5). Over half of the people working from home in West Moreton in 2006 were employed in Agriculture, forestry and fishing.

The car share in other areas outside the Brisbane region grew by between 0.8 and 1.4 percentage points.

Table 6.11 shows changes in the public transport shares between 2001 and 2006 in more detail. Very few regions experienced declines in either the train or bus modes, but the rise in the public transport share for SEQ overall (0.5 percentage points) is driven by Inner Brisbane (3.4 percentage points).

The change in the Inner sector was mostly due to growth in the bus share (2.4 percentage points), which was a considerably greater increase than the change in any other public transport mode within any region. This is likely to be due to the busways.

The increase in train use in the Inner sector, while only a third that of bus use (0.8 percentage points), was very strong compared with the other regions.

Table 6.11 Change in public transport mode shares for journey to work by sector of employment, South East Queensland, 2001 to 2006

Region/Sector/ subregion	Train	Bus	Ferry	Taxi	Total public transport
			(percentage point change)		
Inner	0.8	2.4	0.2	–0.1	3.4
Middle	0.3	0.1	0.0	0.0	0.4
Middle East	0.4	0.0	0.0	0.0	0.4
Middle North	0.3	0.1	0.0	0.0	0.3
Middle South	0.1	0.4	0.0	0.0	0.5
Middle West	0.5	–0.1	0.1	0.0	0.5
Outer	–0.1	0.3	0.0	0.0	0.2
Outer East	0.1	0.3	0.0	0.0	0.4
Outer North	–0.1	0.2	0.0	0.0	0.1
Outer South	0.0	0.4	0.0	0.0	0.3
Outer West	–0.3	0.4	0.0	–0.1	0.0
Brisbane region	0.2	0.7	0.1	0.0	0.9
Gold Coast	0.1	0.0	0.0	0.0	0.0
Sunshine Coast	0.0	0.3	0.0	0.0	0.2
Toowoomba	0.0	–0.2	0.0	0.0	–0.2
West Moreton	–0.2	–0.1	0.0	0.0	–0.3
SEQ Total	0.0	0.4	0.0	0.0	0.5

Notes: Figures may not add to totals due to rounding. To account for boundary changes between 2001 and 2006, this table was constructed by assigning 2001 SLAs as closely as possible to the 2006 sectors/subregions. As Beaudesert Part B was split across the 2006 sectors, it was divided between Outer South, Gold Coast and West Moreton based on the percentage of its population which fell within those areas.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

The change in the Middle sector was much less pronounced, and had more of an emphasis on train travel (increasing by 0.3 percentage points, compared with 0.1 percentage points for bus travel). Within the Middle sector, three of the four subregions (Middle East, Middle North and Middle West) had comparatively moderate growth in the train share (0.3 to 0.5 percentage points), and negligible or negative change in the bus share. In the Middle South subregion, this pattern is reversed, with stronger growth in the bus share (0.4 percentage points) reflecting the location of the Busway stations.

Like the Middle South, the Outer subregions all had moderate growth in their bus shares (0.2 to 0.4 percentage points) and little or negative growth in their train shares.

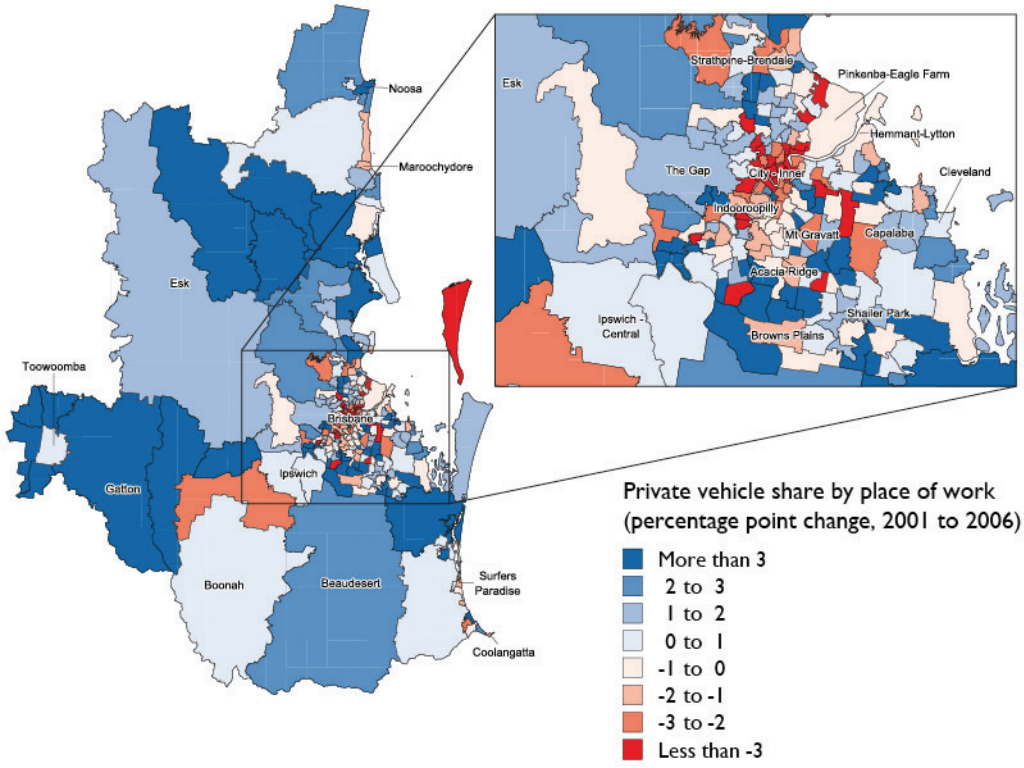
In the regions outside Brisbane, the change in the train share was negligible or negative, while the bus share change varied between a high of 0.3 (Sunshine Coast) and a low of –0.2 percentage points (Toowoomba).

The only two regions in which the public transport share actually declined over the five year period were Toowoomba (–0.2 percentage points) and West Moreton (–0.3 percentage points).

Statistical Local Areas

Map 6.10 illustrates the change in the private vehicle commuting trip share by place of employment between 2001 and 2006. Note that a number of SLAs whose borders changed between 2001 and 2006 have been aggregated to allow consistent comparisons across time.

Map 6.10 Change in private vehicle mode share for journey to work by Statistical Local Area of employment, South East Queensland, 2001 to 2006



Note: Where boundary changes occurred, change comparisons were undertaken for aggregate SLA regions, as described in Appendix B.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

Map 6.6, which showed the same information by place of enumeration, had a very clear pattern of regions with declining private vehicle shares close to the city centre, and regions with growing private vehicle shares further out. In contrast, this map reveals an interesting pattern of SLAs in close proximity with growing and declining shares in the private vehicle mode. However, as with the enumeration-based data, SLAs in the city centre have strong declines.

The SLAs with the greatest declines in private vehicle mode share between 2001 and 2006 are listed in Table 6.12. There are 29 SLAs (or aggregated SLAs, in the case of Fortitude Valley or Nudgee) whose private vehicle share fell by more than 3 percentage points between 2001 and 2006.

Table 6.12 Change in private vehicle mode shares for journey to work by sector of employment, declining Statistical Local Areas, South East Queensland, 2001 to 2006

SLA name	Region/ Sector/ Subregion	Private vehicle journeys to work, 2001 census	Private vehicle journeys to work, 2006 census	Private vehicle mode share 2001 (per cent)	Private vehicle mode share 2006 (per cent)	Percentage point change 2001 to 2006
Kuraby	Middle South	342	329	80.9	70.0	–10.9
Fortitude Valley^	Inner	7 798	8 414	70.9	61.6	–9.4
Chelmer	Middle West	234	213	67.8	59.2	–8.7
Moreton Island	Middle East	36	24	26.7	18.0	–8.6
South Brisbane	Inner	8 136	9 572	76.8	68.3	–8.5
City Inner	Inner	21 466	18 124	37.8	30.6	–7.2
Milton	Inner	6 841	7 361	78.3	71.1	–7.2
City Remainder	Inner	12 475	12 711	41.9	35.2	–6.7
Belmont-Mackenzie	Middle East	309	238	66.7	60.3	–6.5
Spring Hill	Inner	7 289	7 499	63.3	57.6	–5.7
Graceville	Middle West	502	502	75.8	70.5	–5.3
New Farm	Inner	1 928	2 099	70.4	65.6	–4.9
Carina	Middle East	1 466	1 175	84.8	80.0	–4.7
Nudgee^	Middle North	495	549	91.3	86.6	–4.7
Newstead	Inner	2 934	3 244	84.0	79.3	–4.7
Alderley	Middle North	646	478	79.2	74.6	–4.6
Herston	Inner	4 438	5 442	79.4	74.9	–4.5
Hamilton	Middle North	1 557	1 202	83.0	78.6	–4.4
Sherwood	Middle West	1 046	1 160	85.4	81.3	–4.0
Doolandella-Forest Lake	Middle West	1 152	1 381	81.1	77.2	–3.9
Toowong	Middle West	5 634	6 486	75.7	71.9	–3.9
Northgate	Middle North	3 412	3 279	88.0	84.2	–3.8
Albion	Middle North	2 512	3 088	84.6	81.0	–3.6
Red Hill	Inner	949	872	77.8	74.3	–3.5
Hawthorne	Middle East	379	333	68.4	65.0	–3.4
Everton Park	Middle North	1 289	961	82.6	79.3	–3.3
Westlake	Middle West	139	120	52.7	49.4	–3.3
Newmarket	Middle North	921	1 058	78.9	75.8	–3.1
Ascot	Middle North	891	899	78.4	75.4	–3.0

Note: ^ Fortitude Valley and Nudgee are aggregates of multiple SLAs, to allow comparisons across time where boundaries have changed.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

As can be seen from the table, these are all in the Inner (10) and Middle (19) sectors. Middle North (8) and Middle West (6) are more represented in the table than Middle East (4) and Middle South (1).

The SLAs which have the greatest percentage point decreases in their private vehicle mode share between 2001 and 2006 are quite varied in terms of their absolute shares in 2006, which in Table 6.12 range from 18.0 per cent (Moreton Island) to 86.6 per cent (Nudgee).

Kuraby experienced the greatest percentage point decline in the private vehicle mode share. While the number of private vehicle trips decreased only marginally (342 to 329), employment in the area increased from 503 to 538. The public transport trips only increased from 9 to 17 trips over the period. Far more striking was the change in the number of people who worked from home: 58 in 2001 compared with nearly double (109) in 2006.

The spatial distribution of SLAs with large increases in their private vehicle mode share is very different from the SLAs with large declines, as can be seen in Table 6.13. The table shows the 28 SLAs whose private vehicle mode shares have increased by 5 percentage points or more. Of these, only one is an Inner SLA, while 18 are in the Middle sector. Middle South SLAs dominate (7), with slightly fewer in Middle West (5), Middle East (3) and Middle North (3). Another 4 SLAs are in the Outer sector, with a further 4 in Toowoomba and 1 in the Gold Coast.

Among the 11 SLAs with an increase in the private vehicle mode share of more than 10 percentage points, Middle South (4 SLAs) and Middle West (3 SLAs) feature prominently.

The largest increase was in Holland Park West, south of the city centre. Over the period, total employment in this SLA grew from 150 to 569. The biggest category of employment was preschool and school education (116 people).

The increase at first seems surprising because Holland Park West is one of the stops on the South East Busway, in the section that opened in April 2001 (Department of Transport and Main Roads 2012). However, it should be remembered that these numbers are about SLAs as places of work, and due to the radial design of the transport system (the Busway, like the train lines, runs to the CBD), it would be difficult for people living in other areas to use it in order to access work in locations such as Holland Park West. The radial system is more useful for accessing the CBD, and so proximity of employment location to a public transport node (particularly for those not employed in the Inner sector) does not guarantee its usefulness as a method of journey to work.

Very few commuters reached their workplace at Holland Park West using public transport: just three commuters in 2001 and 21 commuters in 2006. By contrast, 18 per cent of all journeys to work made by residents of Holland Park West were by bus. This indicates that the station is well used, but that its usefulness is primarily benefitting residents, not those employed in the area. On a place of enumeration basis, Holland Park West's share of public transport as a journey to work mode grew by 4.5 percentage points between 2001 and 2006 (which was the seventh strongest growth of all the SEQ SLAs).

Table 6.13 Change in private vehicle mode shares for journey to work by sector of employment, growing Statistical Local Areas, South East Queensland, 2001 to 2006

SLA name	Region/ Sector/ Subregion	Private vehicle journeys to work, 2001 census	Private vehicle journeys to work, 2006 census	Private vehicle mode share 2001 (per cent)	Private vehicle mode share 2006 (per cent)	Percentage point change 2001 to 2006
Ipswich West	Outer West	827	1132	74.4	79.6	5.2
Dutton Park	Inner	597	652	80.9	86.2	5.3
Cambooya Part A	Toowoomba	155	203	53.8	59.7	5.9
Rochedale	Middle South	989	926	79.1	85.0	5.9
Griffin-Mango Hill	Outer North	205	1141	74.0	80.0	6.0
Ellen Grove	Middle West	143	332	66.8	73.1	6.3
Deagon	Middle North	507	571	81.4	87.7	6.3
Manly West	Middle East	444	809	69.2	75.5	6.4
Rochedale South	Outer South	308	731	63.2	70.4	7.2
Edens Landing-Holmview	Gold Coast	227	654	74.2	81.9	7.7
Parkinson-Drewvale	Middle South	187	543	64.0	71.7	7.7
Durack	Middle West	251	323	70.3	78.2	7.9
Gumdale-Ransome^	Middle East	181	283	68.6	76.5	7.9
Carina Heights	Middle East	344	711	75.3	83.3	8.0
Crow's Nest Part A	Toowoomba	646	1057	64.3	72.4	8.2
McDowall	Middle North	383	933	72.7	81.8	9.1
Pallara-Heathwood-Larapinta	Middle South	344	1287	83.7	93.3	9.6
Rosalie Part A	Toowoomba	125	165	60.1	70.2	10.1
Bridgeman Downs	Middle North	209	291	47.6	58.1	10.5
Kenmore Hills	Middle West	233	430	67.9	78.5	10.5
Chapel Hill	Middle West	324	643	48.9	60.7	11.8
Moggill	Middle West	150	175	62.0	73.8	11.9
Calamvale	Middle South	472	885	66.4	78.7	12.4
Stretton-Karawatha	Middle South	100	226	52.1	65.3	13.2
Willawong	Middle South	91	477	78.4	92.6	14.2
Tanah Merah	Outer South	96	246	70.6	86.0	15.4
Jondaryan Part A	Toowoomba	282	1514	69.5	85.9	16.5
Holland Park West	Middle South	73	367	56.2	72.7	16.5

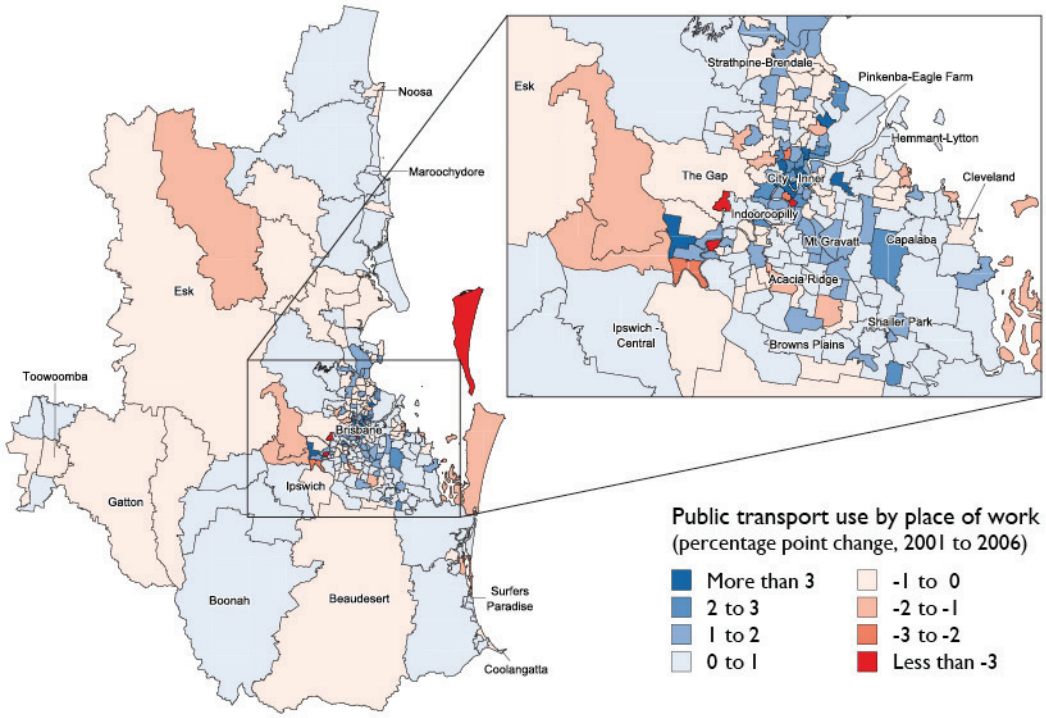
Note: ^ Gumdale-Ransome is an aggregate of multiple SLAs, allowing comparisons across time where boundaries have changed.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

This is an important point from the planning perspective because one of the objectives of the Regional Plan is to have mixed development (residential and employment) around transport nodes. While the above comments only relate to one SLA, it does highlight the trends observed in the above maps and tables, specifically relating to high private vehicle use by people employed in public transport corridors outside the Inner and Middle areas, and only modest growth in bus use for people working in proximity to new Busway stations outside the city. This all suggests that employment-related development outside the city centre may be less useful in stimulating public transport use on radial lines, which are designed to carry people from dormitory areas to the city centre for work, and that cross-city transport would be needed in order to make this effective. Therefore transport nodes in and of themselves cannot be assumed to create high use, as some public transport nodes are more utilised by residents, and some are more utilised by workers in the area.

Map 6.11 shows the change in public transport mode share between 2001 and 2006 by SLA of employment. This reveals that some of the areas furthest from the Brisbane city centre have falling shares in public transport, while there is moderate growth in the public transport share in most of Brisbane and along the coast. In particular, SLAs with strong growth (more than 3 percentage points over the period) tend to be very close to the city centre. There were very few SLAs whose public transport share declined by more than 3 percentage points over the five years.

Map 6.11 Change in public transport mode share for journey to work by Statistical Local Area of employment, South East Queensland, 2001 to 2006



Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

Table 6.14 shows the SLAs whose public transport shares have decreased by 1.0 percentage points or more.

It is worth noting that many of the SLAs which had extreme declines have very small numbers, so that only a few trips can influence the figures considerably. Several of the SLAs with the largest declines (for example, Westlake and Moreton Island) started from a very low base (9 and 11 trips respectively). Of the 20 SLAs with a decline of more than 1 percentage point, there are only 5 with more than 50 public transport trips in 2001, and 8 have less than 15 trips.

Table 6.14 Change in public transport mode shares for journey to work by sector of employment, declining Statistical Local Areas, South East Queensland, 2001 to 2006

SLA name	Region/Sector/ Subregion	Public transport journeys to work, 2001 census	Public transport journeys to work, 2006 census	Public transport mode share 2001 (per cent)	Public transport mode share 2006 (per cent)	Percentage point change 2001 to 2006
Moreton Island	Middle East	11	0	8.1	0.0	–8.1
Dutton Park	Inner	81	49	11.0	6.5	–4.5
Kenmore Hills	Middle West	27	24	7.9	4.4	–3.5
Westlake	Middle West	9	0	3.4	0.0	–3.4
Highgate Hill	Inner	48	43	11.4	8.7	–2.7
Wilston	Middle North	44	33	8.5	5.8	–2.7
Moggill	Middle West	6	0	2.5	0.0	–2.5
Lota	Middle East	9	4	3.3	1.4	–1.9
Nundah	Middle North	327	358	13.6	11.9	–1.6
Keperra	Middle North	40	33	4.9	3.3	–1.6
Ipswich North	Outer West	13	5	2.0	0.6	–1.5
Willawong	Middle South	3	6	2.6	1.2	–1.4
Karana Downs-Lake Manchester	Middle West	7	0	1.4	0.0	–1.4
Kilcoy	West Moreton	16	3	1.4	0.3	–1.2
South Stradbroke-Runaway Bay^	Gold Coast	263	209	4.6	3.5	–1.1
Ashgrove	Middle North	125	100	5.6	4.5	–1.1
Stretton-Karawatha	Middle South	6	7	3.1	2.0	–1.1
Redland Balance	Outer East	66	61	6.5	5.4	–1.1
Manly	Middle East	49	44	4.5	3.5	–1.0
Bracken Ridge	Middle North	41	29	2.7	1.7	–1.0

Note: ^ South Stradbroke-Runaway Bay is an aggregate of multiple SLAs, allowing comparisons across time where boundaries have changed.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

Conversely, the SLAs where the public transport share has increased tend to have larger absolute trip numbers. Table 6.15 shows the 25 SLAs with a 2 or more percentage point increase over the five years. The largest in terms of absolute increase were City Remainder (an increase of 4679 trips) and City Inner (4139 trips).

The new Busway stations between the two censuses were Roma Street and QUT Kelvin Grove in February 2004, and Normanby and Royal Children's Hospital (RCH) Herston in December 2005. The SLAs containing these stops were:

- City Remainder (Roma Street Busway station)
- Herston (RCH Herston, QUT Kelvin Grove)
- Kelvin Grove (Normanby).

All of these appear in the table, with public transport share increases between 2.9 and 4.0 percentage points.

Table 6.15 Change in public transport mode shares for journey to work by sector of employment, growing Statistical Local Areas, South East Queensland, 2001 to 2006

SLA name	Region/ Sector/ Subregion	Public transport journeys to work, 2001 census	Public transport journeys to work, 2006 census	Public transport mode share 2001 (per cent)	Public transport mode share 2006 (per cent)	Percentage point change 2001 to 2006
Victoria Point	Outer East	17	77	1.2	3.2	2.0
Bowen Hills	Inner	911	1 114	16.7	18.8	2.1
Hamilton	Middle North	86	104	4.6	6.8	2.2
Chelmer	Middle West	20	29	5.8	8.1	2.3
Graceville	Middle West	38	57	5.7	8.0	2.3
Woolloongabba	Inner	1 038	1 402	11.3	13.6	2.3
Newmarket	Middle North	91	143	7.8	10.2	2.4
Toowong	Middle West	1 000	1 454	13.4	16.1	2.7
Nudgee^	Middle North	6	24	1.1	3.8	2.7
Spring Hill	Inner	3 518	4 341	30.6	33.4	2.8
Burbank	Middle East	0	6	0.0	2.8	2.8
Ascot	Middle North	52	89	4.6	7.5	2.9
Herston	Inner	745	1180	13.3	16.2	2.9
Edens Landing-Holmview	Gold Coast	5	37	1.6	4.6	3.0
Cannon Hill	Middle East	122	299	5.6	8.8	3.1
Kelvin Grove	Inner	241	409	10.8	13.9	3.2
Albion	Middle North	241	432	8.1	11.3	3.2
Northgate	Middle North	221	368	5.7	9.5	3.8
City Remainder	Inner	15 324	20 003	51.5	55.5	4.0
New Farm	Inner	283	460	10.3	14.4	4.0
Anstead	Middle West	0	4	0.0	4.1	4.1
City Inner	Inner	32 031	36 170	56.4	61.0	4.6
Milton	Inner	1 324	2 192	15.2	21.2	6.0
Fortitude Valley^	Inner	2 487	3 988	22.6	29.2	6.6
South Brisbane	Inner	1 853	3 375	17.5	24.1	6.6

Note: ^ Fortitude Valley and Nudgee are aggregates of multiple SLAs, to allow comparisons across time where boundaries have changed.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

Strategic planning objectives

This section examines the key transport-related objectives of the three most recent SEQ regional plans, investigating the changes that have occurred since 2001. These transport objectives have been consistent since the RFGM 2000, and are:

- Promote public transport
- Promote walking and cycling (active transport)
- Concentrate residential and job growth around frequent public transport.

The *Connecting SEQ 2031* transport plan, which complements the *SEQ Regional Plan 2009–2031,* specifies targets to reduce the private car mode share from 83 per cent (2006) to 66 per cent in 2031, and correspondingly increase the public transport and active transport mode shares as discussed below.[52] This is a continuation of the policies expressed in the 1997 *SEQ Integrated Regional Transport Plan.*

Promote public transport use

Relevant regional and transport planning goals

The recent SEQ regional and transport plans all have the clear objective of promoting public transport use, in order to increase its mode share.

The *SEQ Regional Plan 2009–2031* states that it 'strongly supports' public transport, and aims to increase its provision within the contexts of reducing greenhouse gas emissions, responding to oil supply vulnerability, providing accessibility for the whole community (including those without cars), supporting sustainability, and supporting increased urban densities around public transport nodes (Queensland Government and COMSEQ 2009, p.146).

The 2011 *Connecting SEQ 2031* plan sets a target of increasing the public transport mode share from 7 per cent (2006) to 14 per cent in 2031 for all trips (Department of Transport and Main Roads 2011a). This target is for all trips, not just the commuting trips captured in the census data. However, *Connecting SEQ 2031* indicates that monitoring progress in relation to the targets will be done using the *SEQ Household Travel Survey* and the ABS journey to work data, so it is appropriate to use these two sources in our analysis (ibid).

The 1997 *SEQ Integrated Regional Transport Plan* emphasises the need to improve the quality of public transport service with a more customer-centric approach, so that it can better compete with car travel (Queensland Transport 1997).

The promotion of public transport also ties in with goals of the wider state plans, *Toward Q2—Tomorrow's Queensland* (2008) and *ClimateQ—toward a greener Queensland* (2009), as it relates to cutting car use (Department of Transport and Main Roads 2011a). Likewise, the Queensland Government's Passenger Transport Strategy (2007–2017) includes key result

52 It should be noted that *Connecting SEQ 2031* defines SEQ in a slightly different way than the *SEQ Regional Plan 2009–2031*. *Connecting SEQ 2031* defines SEQ as the local government areas of the following city and regional councils: Brisbane, Moreton Bay, Ipswich, Logan, Redland, Gold Coast, Sunshine Coast, Scenic Rim, Somerset, and Lockyer Valley. It does not include Toowoomba Regional Council (although considers strategic links to the city), whereas the *SEQ Regional Plan 2009–2031* includes the above local government areas as well as part of the Toowoomba Regional Council in its definition of SEQ.

areas of 'changing behaviour to encourage sustainable transport choices' and 'providing high quality public transport services' (Queensland Transport 2006, p.6).

The *SEQ Regional Plan 2009–2031* does not indicate a spatial dimension to the goal of promoting public transport use—in other words, whether a spatially concentrated or more evenly distributed improvement is preferred. However, the 2000 RFGM, which was active during this report's primary study period (2001 to 2006), included a transport principle of incorporating the 1997 *SEQ Integrated Transport Plan's* increased public transport mode share targets and increased vehicle occupancy into future transport planning calculations and road capacity planning. These targets are spatially based, and are reproduced in Table 6.16.

The 1997 *SEQ Integrated Regional Transport Plan* gives an indication of how the regional figures were determined. While the overall figure is based on a 50 per cent increase from 1992 (7 per cent to 10.5 per cent, or a required annual change of 0.2 percentage points over the 19 years), a 100 per cent increase in the City of Brisbane was considered achievable, due to its population density and tradition of public transport use. Higher traffic congestion was also cited as a factor in setting the target at this more ambitious level (Queensland Transport 1997). The spatial distribution of recent growth in the public transport mode shares—at least in terms of the strongest growth occurring for workers in the city centre (see Table 6.10)—does seem consistent with this.

Table 6.16 Public transport mode share targets from 1997 Integrated Regional Transport Plan

Region	2011 public transport mode share target (per cent)
South East Queensland	10.5
Sunshine Coast	6.5
Gold Coast	6.5
Metropolitan Brisbane	13.0
Brisbane City	17.0
Ipswich City	13.0
Toowoomba City	6.5
Balance of region	4.3

Notes: Balance is North West, South West and Laidley corridor.
Source: RFGM (2000, p.85) and Queensland Transport (1997, p.19).

Connecting SEQ 2031 also has regionally based public transport mode share targets, for both all trips, and work trips, as seen in Table 6.17. Notably, the Gold Coast and Sunshine Coast targets are set considerably higher than their 2006 shares.

Table 6.17 Public transport mode share targets from Connecting SEQ 2031

Region	All trips			Work trips		
	2006	2031	required percentage point change per year	2006	2031	required percentage point change per year
Brisbane City	10.3	20	0.4	18.1	35	0.7
Ipswich City	6.5	12	0.2	8.6	17	0.3
Moreton Bay	6.2	11	0.2	7.1	22	0.6
Logan City	5.5	10	0.2	7.0	22	0.6
Redland City	5.7	10	0.2	8.4	20	0.5
Gold Coast City	4.4	15	0.4	3.8	20	0.6
Sunshine Coast	3.6	10	0.3	2.5	15	0.5
SEQ	7	14	0.3	–	–	–

Note: The required percentage point change per year was calculated by dividing the percentage point change by 25 years. Regions refer to relevant Local Government Areas.

Source: Department of Transport and Main Roads 2011a, *Connecting SEQ 2031—An Integrated Regional Transport Plan for South East Queensland*.

Change between 2001 and 2006 censuses

The analysis of census journey to work data earlier in this chapter produced the following findings on commuter use of public transport:

- 10 per cent of SEQ employed residents use public transport to get to work (2006), with considerably higher use in the Inner (21 per cent) and Middle (17 per cent) sectors.
- Between 2001 and 2006, workers enumerated in SEQ had an increase in the public transport commuting share of 0.5 percentage points, with the Middle South subregion experiencing the highest increase (2.2 percentage points), due to an increase in the bus share.
- Around 10 per cent of workers employed in SEQ use public transport to commute in 2006, including 40 per cent of people working in the Inner sector.
- Between 2001 and 2006, the share of workers employed in SEQ who used public transport to travel to work rose 0.5 percentage points, mostly due to increase in bus use. This was highest in the Inner sector (3.4 percentage points for overall public transport, including a 2.4 percentage point increase in bus use).

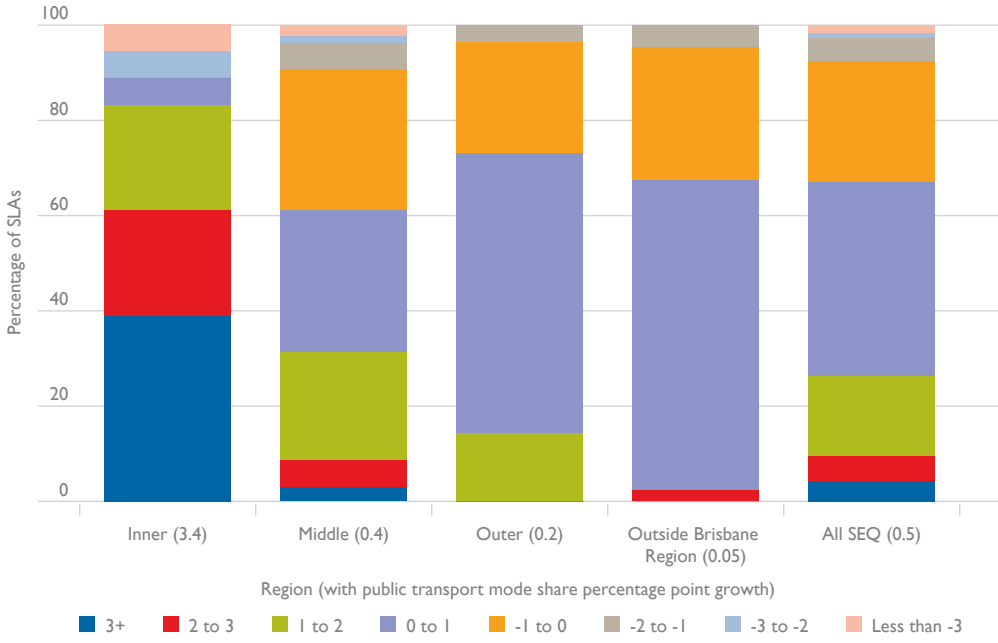
As the above indicates, the SEQ public transport share increase for commuters from 2001 to 2006 was due to greater use of bus, mostly for people enumerated in the Middle South subregion, and people working in the Inner sector.

The likely explanation for this is the creation of the Busway system. The first segment of the South East Busway (CBD to Woolloongabba) opened in September 2000, and its second (longer) segment between Woolloongabba and Eight Mile Plains opened in April 2001 (Department of Transport and Main Roads 2012). While the opening of the first segment predates the August 2001 census collection date by nearly a year, and the second segment by some four months, it is likely that patronage would not have reached its peak straight away.

Likewise, the first segments of the Inner Northern Busway opened in 2004 and 2005, and this is likely to have contributed to the increase in patronage in the Inner sector.

The key result of the census analysis is the spatial concentration of the increase in the public transport mode share between 2001 and 2006. Figure 6.2 shows the frequency of public transport share growth in different categories for employment SLAs across the SEQ regions. This reveals that the public transport share of most SLAs in SEQ either increased or decreased by only a small amount over the five years (between –1 and 1 percentage points), and that the greatest changes were occurring in Inner SLAs.

Figure 6.2 Statistical Local Area frequency of public transport mode share change, 2001 to 2006, by place of employment



Notes: Includes the aggregate SLAs described in Appendix B. Excludes the Beaudesert aggregate SLA, as it falls within multiple sectors/regions.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

Change in the South East Queensland Household Travel Survey

In 2008, the Queensland Government released its *State of the Region* report, which assessed progress on the desired regional outcomes of the *SEQ Regional Plan 2005–2026*, and fed into the development of the current *SEQ Regional Plan 2009–2031* (Queensland Government 2008b).

Using the *SEQ Household Travel Survey,* this report revealed that there was an increase in the public transport mode share for the Brisbane SD of 0.9 percentage points between 1992 and 2003–04, from 7.5 per cent to 8.4 per cent.[53] There was a 5.2 percentage point increase in

53 Queensland Government (2008b) does not report results for SEQ as a whole, and as the reported data relates to all trips, rather than just commuting trips, it differs from the data for 2004 presented in Tables 6.18 and 6.19.

the vehicle driver mode share over the same period, with decreases in the vehicle passenger share (–1.9 percentage points), walking (–3.1 percentage points) and cycling (–0.9 percentage points) (ibid). While this is a small public transport mode share increase for a 12 year period relative to the target shares, as Figure 6.1 shows, Brisbane's public transport patronage (in absolute numbers) has increased more rapidly in recent years.

Queensland Government (2008b) also reports that the public transport mode share rose from 3.3 to 4.3 per cent for the Gold Coast, but declined from 3.9 to 3.3 per cent for the Sunshine Coast, between 1992 and 2003–04.

As the current transport plan was produced in 2011, it was able to report on the mode shares in 2009 based on the results of the latest SEQ *Household Travel Survey*. The public transport share, across all trip purposes, increased from 7.0 per cent for SEQ in 2004 to 7.5 per cent in 2007 and 7.9 per cent in 2009 (Department of Transport and Main Roads 2011a).

Being a sample survey, there is some uncertainty associated with *Household Travel Survey* results, particularly for the less commonly used transport modes and for the less populated regions.

Table 6.18 provides information on growth trends from 2004 to 2009 using the SEQ *Household Travel Survey*. The definition of SEQ differs for this survey, as it only includes Greater Brisbane, the Gold Coast and the Sunshine Coast, and excludes West Moreton and Toowoomba.

This data for weekday journeys to work[54] reveals that the public transport mode share in SEQ was 12.2 per cent in 2004, decreased to 11.3 per cent in 2007, and rose to 12.6 per cent in 2009. However, the decrease from 2004 to 2007 related almost entirely to a corresponding increase in the active transport share (0.8 percentage points), with only a small increase in the private vehicle share (0.1 percentage points). This is important because the rationale for increasing the use of public transport also applies to active transport (sustainability, environmental concerns).

The stronger growth in the public transport share between 2007 and 2009 (1.3 percentage points) corresponded with a decrease in private vehicle use (1.6 per cent), while active transport grew by 0.3 percentage points.

Over the whole period (2004 to 2009), the public transport share increased by only a small amount (0.4 percentage points), the private vehicle share decreased by 1.5 percentage points, and the active transport share rose by 1.1 percentage points. So the overall aim of the plan to increase sustainable transport is progressing (with an increase of 1.5 percentage points, from 16.4 to 17.9 per cent), but this is driven by active transport, and not public transport.

54 Please note that these numbers cannot be directly compared with the figures relating to the census data in the rest of this chapter. The census numbers include more categories, most importantly, 'worked from home', and the figures in Table 6.18 are survey based.

Table 6.18 Public transport mode share, journeys to work, South East Queensland, 2004, 2007 and 2009

Region	Year	Private vehicle	Public transport	Active transport	Sustainable transport (public and active transport)
		(per cent)			
Greater Brisbane	2004	80.2	15.5	4.3	19.8
	2007	80.4	14.1	5.5	19.6
	2009	78.4	16.0	5.6	21.6
South East Queensland	2004	83.6	12.2	4.2	16.4
	2007	83.7	11.3	5.0	16.3
	2009	82.1	12.6	5.3	17.9

Notes: Greater Brisbane includes Moreton Bay, Brisbane, Ipswich, Redland, and Logan. South East Queensland includes Greater Brisbane and the Gold Coast and Sunshine Coast Local Government Areas (2008 boundaries), and excludes Toowoomba and West Moreton. Mode shares are based on number of journeys to work (weekdays). 'Other' category is not shown (typically less than 1 per cent).

Source: Queensland Department of Transport and Main Roads Modelling, Data and Analysis Centre 2012, *South East Queensland Household Travel Survey* BITRE Data Request.

Changes in public transport patronage and kilometres travelled

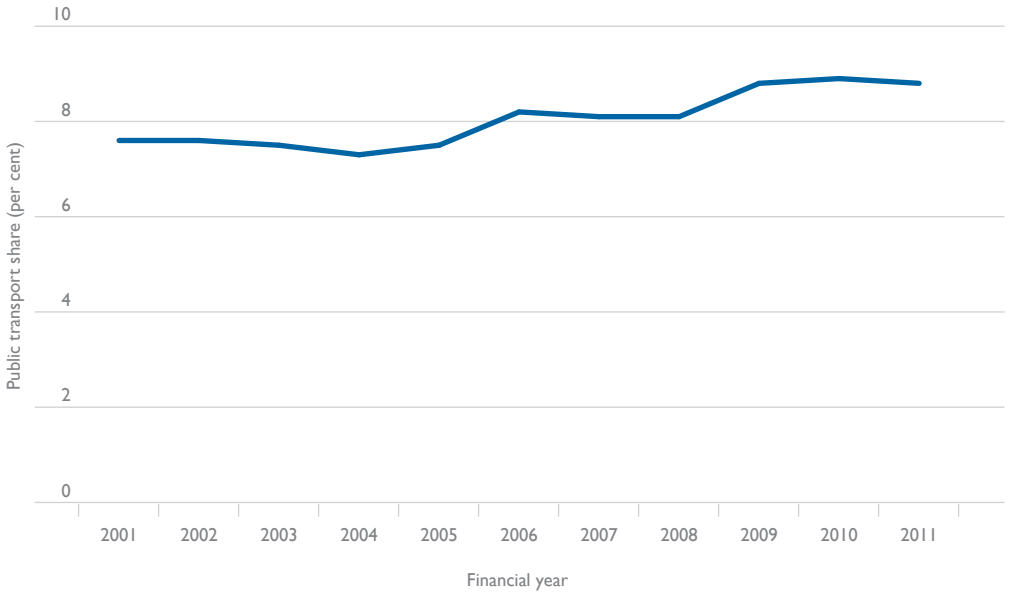
Figure 6.1 summarised historical trends in public transport patronage for Brisbane, based on BITRE (2012b). Total public transport patronage rose from 99.5 million trips in 2000–01 to 151.1 million trips in 2010–11, representing an average annual growth rate of 4.3 per cent. Rail patronage growth averaged 1.7 per cent per annum, lower than that for bus (6.2 per cent) and ferry (1.9 per cent).

Expressed in terms of passenger kilometres travelled, public transport's share of Brisbane's total motorised metropolitan passenger transport task increased from 7.7 per cent in 2000–01 to 8.9 per cent in 2010–11 (Figure 6.3).

While there was virtually no net change in public transport's share of kilometres travelled between 2000–01 and 2004–05, there were two strong rises since, one from 7.6 per cent in 2004–05 to 8.3 per cent in 2005–06, and another from 8.2 per cent in 2007–08 to 8.9 per cent in 2008–09, with little change in the next two years (ibid).

The *Queensland Rail Passenger Load Survey Q1 2012* provides data on train passenger boardings and alightings during peak periods, with annual time series data by station and line segment, between 2008 and 2012. This shows how patronage has changed for stations and segments over these four years, and also what proportion of services were operating at close to or full capacity by line (Queensland Rail 2012).

Figure 6.3 Public transport share of total motorised metropolitan passenger task, Brisbane, 2000–01 to 2010–11



Source: BITRE (2012b).

The AM peak is defined as inbound services arriving at Brisbane Central station between 6am and 9am. For the AM peak, the survey reports on trains travelling towards the CBD, while results for the PM peak refer to trains leaving the CBD. The purpose of the survey is to report on capacity to ensure use falls within design load guidelines, so the survey focuses on maximum demand. Unfortunately, this means that we do not have a figure for the amount of people travelling to work using trains going from inner to outer locations, and so the data does not represent complete information for all commuter journeys.

Between 2008 and 2012, there was a 1.5 per cent average annual increase of passengers boarding trains to the city in the morning peak period, or a 6.2 per cent increase over the four years. This represented an increase of 3 878 boardings to bring the total to 66 383.

The change between 2008 and 2012 was not a steady increase, but represents a growth of 5.2 per cent between 2008 and 2009, followed by a fall of 4.4 per cent between 2009 and 2010, then a 7.3 per cent increase between 2010 and 2011 before a slight decline of –1.5 per cent between 2011 and 2012 (ibid).

The increase over these four years is therefore characterised by volatility, similar to the passenger journey numbers for rail in recent years (Figure 6.1).

Overall assessment

Table 6.19 summarises the different indicators of change in the public transport mode share that have been discussed in this section. It is evident that the different indicators all identify a positive change in the public transport mode share, despite significant differences in the underlying data sources, scope and geographic coverage of the measures.

Table 6.19 Different measures of change in public transport mode share since 2001 for Brisbane and South East Queensland

Source	Time period	Scope	Change in public transport mode share (percentage points)
ABS *Census of Population and Housing*	2001 to 2006	Brisbane commuters	+ 0.9
ABS *Census of Population and Housing*	2001 to 2006	SEQ commuters	+ 0.5
SEQ Household Travel Survey	2004 to 2009	Brisbane commuters^	+ 0.5
SEQ Household Travel Survey	2004 to 2009	SEQ commuters^	+ 0.4
SEQ Household Travel Survey	2004 to 2009	All SEQ trips&	+ 0.9
BITRE urban passenger transport dataset#	2001 to 2011	All Brisbane passengers	+ 1.2

Notes: ^ Brisbane includes Moreton Bay, Brisbane, Ipswich, Redland, and Logan. South East Queensland includes Greater Brisbane and the Gold Coast and Sunshine Coast Local Government Areas (2008 boundaries). Mode shares are based on number of journeys to work (weekdays).

& SEQ includes Greater Brisbane and the Gold Coast and Sunshine Coast LGAs only.

This mode share is based on motorised passenger kilometres travelled, not the number of trips (which is the basis of the other mode shares presented in the table).

Source: BITRE analysis of BITRE urban passenger transport dataset, ABS *Census of Population and Housing* data for 2001 and 2006, Queensland Department of Transport and Main Roads *South East Queensland Household Travel Survey* data request by BITRE.

The census data reveals that between 2001 and 2006 there was stronger growth in the share of public transport within Brisbane itself (an increase of 0.9 percentage points) than in SEQ overall (0.5 percentage points). The SEQ *Household Travel Survey* similarly reveals that in the period between 2004 to 2009, the public transport share of commuter travel grew more strongly in Brisbane than in SEQ overall. This difference between Brisbane and SEQ overall was marginal (0.1 percentage points), but this is likely to reflect the fact that the SEQ *Household Travel Survey* includes less of the surrounding areas in its definition of SEQ than the definition used for the census data analysis.

The information from the BITRE urban passenger transport dataset only relates to the Brisbane SD, but also indicates growth in the public transport share, of 1.2 percentage points over the decade to 2010–2011. However, this share relates to motorised passenger kilometres travelled rather than trips, and to all types of travel, not just commutes.

Growth in public transport patronage as a share of motorised transport in Brisbane was strongest between 2004–05 and 2005–06, and between 2007–08 and 2008–09, increasing each time by 0.7 percentage points (BITRE 2012b). In absolute terms, the BITRE (2012b) public transport patronage data (Figure 6.1) similarly reveals that growth in patronage was strong between 2004–05 and 2008–09, with train patronage showing the most volatility. Train boardings in the morning peak period between 2008 and 2012 had the same volatility over this more recent four year period, but also an overall increase of 6.2 per cent (Queensland Rail 2012).

Overall, there has been progress made against the objective of promoting public transport since 2001, with an increase in the public transport mode share. The increase in public transport as a share of all commuting trips was highest in the Inner sector (for workers) and the Middle South subregion (for those enumerated there).

Promote walking and cycling

The *SEQ Regional Plan 2009–2031* also strongly supports the promotion of walking and cycling, for similar reasons to public transport, relating to sustainability, oil supply vulnerability, health and flexibility. This was also the case in the 2000 RFGM and the *SEQ Regional Plan 2005–2026*.

Similar to promoting public transport, the promotion of active transport is supported by the wider state plans *Toward Q2—Tomorrow's Queensland* (2008) and *ClimateQ—toward a greener Queensland* (2009) (Department of Transport and Main Roads 2011a).

The *Queensland Cycle Strategy 2011–2021* has a goal of doubling the share of cycling commutes from 1.4 per cent in 2006 to 2.8 per cent in 2021, and tripling the number of trips by 2031 (Department of Transport and Main Roads 2011b, p.6). The strategy indicated that in 1986 there was no major cycle infrastructure in inner Brisbane, and only a few areas, close to the city centre, had more than one per cent cycling mode share. In 2006, after the construction of 75 km of major cycle infrastructure, the majority of areas in inner Brisbane had between 2 and 10 per cent cycle mode share (ibid., p.20).

Connecting SEQ 2031 specifies a target to increase the active transport mode share from 10 per cent (2006) to 20 per cent by 2031. This is for all trips, not just the commuting trips captured in the census data (Department of Transport and Main Roads 2011a, p.4). The 2009 share was 10.7 per cent (ibid., p.25).

However, we can look at what the journey to work data says about the changes between 2001 and 2006, as an important subset of overall trips. *Connecting SEQ 2031* indicates that monitoring progress in relation to the targets will be done using the SEQ *Household Travel Survey* and the ABS journey to work data (ibid., p.25), so it is appropriate to use the ABS data in this analysis.

Table 6.20 shows the number of active transport journey to work trips in 2001 and 2006 made by people enumerated in SEQ. This indicates that for SEQ as a whole, the share of active transport in total journeys to work rose from 4.3 per cent in 2001 to 4.6 per cent in 2006 (0.3 percentage points).

Table 6.20 Change in mode share for active transport journey to work by sector of enumeration, South East Queensland, 2001 to 2006

Region/Sector	Numbers		Regional share of SEQ (per cent)		Share of total journeys to work (per cent)		Percentage point change in shares
	2001	2006	2001	2006	2001	2006	2001–2006
Inner	5 935	10 289	15.0	20.0	17.6	23.1	5.4
Middle	12 511	15 911	31.5	31.0	3.7	4.1	0.4
Outer	6 731	8 021	17.0	15.6	2.5	2.5	0.0
Brisbane region	25 177	34 221	63.5	66.6	4.0	4.5	0.6
Gold Coast	7 087	8 473	17.9	16.5	4.5	4.3	–0.2
Sunshine Coast	3 954	4 916	10.0	9.6	5.0	4.8	–0.3
Toowoomba	2 119	2 457	5.3	4.8	5.4	5.5	0.1
West Moreton	1 318	1 284	3.3	2.5	6.0	5.2	–0.8
Total SEQ	39 655	51 351	100.0	100.0	4.3	4.6	0.3

Notes: Percentages are of total employed persons who attended work on census day. Change in mode share for 'other modes' not shown.

Source: BITRE analysis using ABS 2006 Census DataPack: place of enumeration profile release 2 (Cat. 2069.0.30.004) and ABS CDATA 2001.

In comparison, the required increase in the active transport share in the 25 years between 2006 and 2031 is from 10 to 20 per cent. Therefore, while the growth rate is positive, the speed of growth would have to increase in order to meet the target. This, of course, assumes that the growth in the share of active transport commuting trips is similar to the growth in its share of all trips.

Within this overall growth rate there are significant spatial differences, with a general trend of strong growth in the city centre, decreasing (and becoming negative) further out. In Inner Brisbane, the increase was 5.4 percentage points, whereas the other regions ranged from 0.4 (Middle) to –0.8 percentage points (West Moreton). All of the regions outside Brisbane had negative change, except for Toowoomba, which only grew marginally (0.1 percentage points).

The second column shows the share of total active transport commuting trips of each region. In 2001, 15 per cent of all active transport trips were from people enumerated in the Inner sector, which increased to 20 per cent in 2006. The Middle sector accounted for almost a third of all active transport trips in both census years, without much change.

Table 6.21 shows the change in mode share for cycling and walking between 2001 and 2006. There was some similarity between the two modes in that the larger positive change was in the Inner, with progressively smaller changes (including negative for cycling) in the Middle and Outer sectors, with negative change in the regions outside Brisbane. However, the magnitude of the change is very different.

Table 6.21 Change in mode share for cycling and walking journey to work by sector of enumeration, South East Queensland, 2001 to 2006

Region/ Sector	Numbers				Shares (per cent)				Percentage point change in shares	
	2001	2001	2006	2006	2001	2001	2006	2006	2001–2006	2001–2006
	Cycling	Walking	Cycling	Walking	Cycling	Walking	Cycling	Walking	Cycling	Walking
Inner	907	5 028	1 299	8 990	2.7	14.9	2.9	20.2	0.2	5.2
Middle	4 060	8 451	4 827	11 084	1.2	2.5	1.3	2.9	0.0	0.4
Outer	1 743	4 988	1 792	6 229	0.6	1.9	0.6	1.9	–0.1	0.1
Brisbane region	6 710	18 467	7 918	26 303	1.1	2.9	1.1	3.5	0.0	0.6
Gold Coast	2 087	5 000	2 068	6 405	1.3	3.2	1.1	3.3	–0.3	0.0
Sunshine Coast	939	3 015	1 111	3 805	1.2	3.8	1.1	3.7	–0.1	–0.1
Toowoomba	540	1 579	589	1 868	1.4	4.0	1.3	4.1	–0.1	0.1
West Moreton	89	1 229	90	1 194	0.4	5.6	0.4	4.8	0.0	–0.7
Total SEQ	10 365	29 290	11 776	39 575	1.1	3.1	1.0	3.5	–0.1	0.4

Notes: Percentages are of total employed persons who attended work on census day. Change in mode share for 'other modes' not shown.

Source: BITRE analysis using ABS 2006 Census DataPack: place of enumeration profile release 2 (Cat. 2069.0.30.004) and ABS CDATA 2001.

The walking journey to work mode share grew by 0.4 percentage points between 2001 and 2006, and by 0.6 percentage points in the Brisbane region. In contrast, cycling marginally declined by –0.1 percentage points in SEQ, but there was no change in Brisbane overall. So while the two modes have conceptual similarities (active, non-motorised, personal, environmentally friendly travel), they are clearly separate in terms of their growth patterns.

The spatial distribution of this change is also illuminating. In every sector within the Brisbane region, the walking share either stayed the same or increased. In every region outside Brisbane, the walking share either declined (Sunshine Coast, West Moreton) or increased only marginally (Toowoomba, Gold Coast).

The change in the cycling share was slight in almost all regions, with the largest changes being Gold Coast (–0.3 percentage points) and Inner (0.2 percentage points).

Table 6.22 shows journey to work data by place of work. This reveals that there was an increase from 2001 (when 4.4 per cent of employed people used active transport to get to work) to 4.7 per cent in 2006. The place of employment data follows the same pattern as the place of enumeration data—specifically, that Inner Brisbane has the strongest growth and that growth decreases with distance from the city centre and is mostly negative in the regions outside Brisbane.

Table 6.22 Change in mode share for active transport journey to work by sector of employment, South East Queensland, 2001 to 2006

	Numbers		Active transport regional share of SEQ (per cent)		All modes regional share of SEQ (per cent)		Share of total journeys to work (per cent)		Percentage point change in shares
Region/ Sector	2001	2006	2001	2006	2001	2006	2001	2006	2001–2006
Inner	7 450	12 677	20.3	26.7	20.1	19.1	4.4	6.6	2.2
Middle	10 007	12 320	27.2	25.9	31.9	31.5	3.7	3.9	0.2
Outer	6 057	7 020	16.5	14.8	18.4	18.5	3.9	3.8	–0.1
Brisbane region	23 514	32 017	64.0	67.3	70.4	69.2	4.0	4.6	0.6
Gold Coast	6 333	7 512	17.2	15.8	15.4	16.3	4.9	4.6	–0.3
Sunshine Coast	3 655	4 448	9.9	9.4	7.9	8.5	5.5	5.2	–0.3
Toowoomba	2 054	2 354	5.6	4.9	4.4	4.2	5.5	5.5	0.0
West Moreton	1 192	1 228	3.2	2.6	1.9	1.8	7.6	6.8	–0.7
Total SEQ	36 749	47 559	100.0	100.0	100.0	100.0	4.4	4.7	0.4

Note: To be consistent with transport mode data, 'all modes regional share of SEQ' excludes Brisbane Undefined, 'not stated' and 'did not go to work', but does include 'worked from home'. This is the denominator for the mode shares.

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

The table also shows how active transport commuting trips are distributed across the SEQ region, compared with how trips in all modes are distributed. This reveals that in the Inner sector in 2001, the regional active transport share was proportionate to the regional share of all modes. In other words, about one in five people employed in SEQ who went to work and stated a method of travel were employed in the Inner sector, and about the same proportion of active transport trips were in the Inner sector. But in 2006, only 19.1 per cent of overall commutes were by people employed in the Inner sector, yet the Inner sector accounted for 26.7 per cent of all active transport commutes. Therefore in 2006, active transport was overrepresented in the Inner sector.

Active transport was underrepresented in the Middle sector in 2001, and the under representation increased in 2006, so that it now has a lower share of the active transport commutes than Inner, even though Inner has a lower share of overall commutes.

Similarly, in the Outer sector, the share of all active transport commutes decreased (from 16.5 per cent to 14.8 per cent), while its share of all commutes remained fairly similar from 2001 to 2006.

Among the regions outside Brisbane, the Gold Coast and Sunshine Coast are noteworthy as they increased their share of total SEQ commutes while decreasing their share of active transport commutes. However, the absolute numbers did increase in both cases, but by less than 1200 commuters each, compared with an increase of over 5000 commuters using active transport who were employed in the Inner sector.

Table 6.23 shows the change in mode share by sector of employment as above, but dividing active transport into its cycling and walking components. Similar to the results in the place of enumeration data, the pattern of less (or negative) growth in mode share occurring as distance

from the city centre increases is evident in both the cycling and walking figures, but the growth in the walking share is a lot stronger than that of cycling. The majority of regions experienced decline in their cycling share, resulting in an overall decline of –0.1. Only the Inner sector had any notable growth (0.3 per cent).

Table 6.23 Change in mode share for cycling and walking journey to work by sector of employment, South East Queensland, 2001 to 2006

Region/ Sector	Numbers				Shares				Percentage point change in shares	
	2001	2001	2006	2006	2001	2001	2006	2006	2001–2006	2001–2006
	Cycling	Walking	Cycling	Walking	Cycling	Walking	Cycling	Walking	Cycling	Walking
Inner	2 259	5 191	3 134	9 543	1.3	3.1	1.6	5.0	0.3	1.9
Middle	2 537	7 470	2 872	9 448	0.9	2.8	0.9	3.0	0.0	0.2
Outer	1 482	4 575	1 474	5 546	1.0	3.0	0.8	3.0	–0.2	0.0
Brisbane region	6 278	17 236	7 480	24 537	1.1	2.9	1.1	3.5	0.0	0.6
Gold Coast	1 874	4 459	1 831	5 681	1.5	3.5	1.1	3.5	–0.3	0.0
Sunshine Coast	879	2 776	1 022	3 426	1.3	4.2	1.2	4.0	–0.1	–0.2
Toowoomba	514	1 540	544	1 810	1.4	4.1	1.3	4.3	–0.1	0.1
West Moreton	89	1 103	86	1 142	0.6	7.0	0.5	6.4	–0.1	–0.7
Total SEQ	9 635	27 114	10 963	36 596	1.1	3.2	1.1	3.6	–0.1	0.4

Source: BITRE analysis of ABS 2006 Census DataPacks: Working population profile release 2 (Cat. 2069.0.30.006) and ABS *Census of Population and Housing*, 2001 [data available on request].

Overall assessment

Overall, the census data revealed that between 2001 and 2006, there was growth in the active transport mode share, but it was concentrated in one region (Inner), and driven by walking, rather than cycling. It also indicated that change in the active transport share was slower (or negative) with increasing distance from the city centre.

As the stated rationale for promoting the active and public transport modes is to reduce congestion and encourage more sustainable transport—effectively, to reduce car use—it is worth noting that in the census data, by both place of enumeration and place of work, the 'worked at home' mode fell (by 0.4 and 0.3 percentage points respectively). This is significant, as this means that people who used to work from home are now using other modes, and therefore it can't be assumed that the increase in public and active transport means a decrease in car or other private vehicle use. As discussed earlier in the chapter, some regions experienced growth in their shares of both public transport and car use. The actual decrease in car use was –0.1 percentage points (place of enumeration) and –0.3 percentage points (place of work), while the other private vehicle mode share decreased by –0.2 percentage points (place of enumeration) and –0.1 (place of work).

The SEQ *Household Travel Survey* is less comprehensive than the census, and has a narrower definition of SEQ than used in the census data analysis. However, it does have the benefit

of allowing us to see past the 2006 census and indicates that the growth observed in active transport between 2001 and 2006 has continued through to 2009. As Table 6.18 revealed, the active transport share for journeys to work in Greater Brisbane increased from 4.3 to 5.5 per cent between 2004 and 2007, with a further increase to 5.6 per cent in 2009. For SEQ, the active transport share grew from 4.2 per cent in 2004 to 5.3 per cent in 2009.

Concentrate residential and job growth around frequent public transport

> 'Accommodating future residential and employment growth in areas with access to high-frequency public transport and a mix of land uses promotes social equity and travel choice, and maximises efficient use of existing and planned infrastructure' (Queensland Government and COMSEQ 2009, p.101).

The *SEQ Regional Plan 2009–2031*, in its section on integrated land use and transport planning, emphasises the need to ensure that residential and employment growth occurs close to public transport (primarily rail and busway) and to apply transit oriented development (TOD) principles to precincts 'within a comfortable 10-minute walk of a transit node' (ibid., p.101).

The *SEQ Regional Plan 2005–2026* defines TODs as 'mixed-use residential and employment areas designed to maximise the efficient use of land through high levels of access to public transport. A transit oriented development has a walking and cycle-friendly core with a rail or bus station surrounded by relatively high-density residential development, employment, or a range of mixed uses' (Queensland Government and SEQROC 2005, p.75).

The Queensland Department of Transport and Main Roads (2012b) indicates that a 'transit node generally means a busway, rail or light rail station.'

The TOD transport guidelines in the *SEQ Regional Plan 2009–2031* indicate that the TOD should increase the mode share of walking, cycling and public transport (Queensland Government and COMSEQ 2009). The purpose of a TOD is to maximise access to public transport, and therefore increase public transport's attractiveness (Department of Transport and Main Roads 2012c).

The *SEQ Regional Plan 2009–2031* lists TOD principles that local governments should use for suitable locations in their region, including regional activity centres. Prerequisites for TOD precincts include that the location is (or will be) serviced by high-frequency transport, that it can be developed densely enough to support public transport, and that it can provide a 'vital and active, pedestrian-friendly, walkable catchment' around a transport node or corridor (Queensland Government and COMSEQ 2009, p.101).

The previous 1997 *Integrated Regional Transport Plan for SEQ* discusses providing a 'quality urban experience on a walking scale', and public transport which is accessible by walking and cycling (Queensland Transport 1997, p.xiv). Its vision for the future transport system in SEQ at the time included 'improved urban design along major mass transit routes and around public transport stations so more people live and work within an easy walk of public transport' (ibid., p.15).

It also referred to a holistic approach to include developers and land use authorities to ensure that housing and trip attractors are in walking distance of public transport routes (ibid., p.43).

This section addresses the goal of concentrating residential and job growth around frequent public transport, by examining whether population and employment are growing more in areas within reasonable access to public transport, or outside of these areas. 'Frequent public transport' has been defined as major transport nodes (train stations in the TransLink network, Busway stations and major bus interchanges) that were active in 2006. The access has been defined as 500m and 1000m catchments of transport nodes.

Table 6.24 shows how much of SEQ's population and employment was located within 500m and 1000m of a transport node in 2001 and 2006.

In 2006, just under 1 in 5 SEQ residents (18.9 per cent) lived within a kilometre of a transport node, but only a third of these residents (6.3 per cent) lived within the 500m catchment. These proportions have decreased since 2001, when a slightly higher proportion of people lived in the 500m (6.4 per cent) and 1000m (19.5 per cent) transport node catchments.

For people employed in SEQ in 2006, 39.4 per cent were employed within a kilometre of a transport node. Just over half (21.2 per cent of employment) were within the 500m catchment. While the 500m catchment figure is a slight decrease (0.1 percentage point) from the 2001 proportion, the 1000m catchment figure increased from the 2001 proportion by the same degree (0.1 percentage point).

The areas within 500m of a transport node accounted for 5.9 per cent of total population growth in SEQ between 2001 and 2006, and 20.8 per cent of employment growth. The areas within a kilometre of a transport node accounted for 14.1 per cent of population growth and 39.8 per cent of employment growth.

Table 6.24 Changes in population and employment around transport nodes in South East Queensland, 2001 to 2006

Area around transport nodes	Population 2001	Population 2006	Change in population 2001–2006 (per cent)	Employment 2001	Employment 2006	Change in employment 2001–2006 (per cent)
Within 500 metres	152 774	170 871	11.85	200 015	240 697	20.34
Outside 500 metres	2 243 779	2 533 853	12.93	738 918	894 276	21.03
Percentage within 500 metres	6.4	6.3	–0.06	21.3	21.2	–0.10
Within 1000 metres	468 355	511 660	9.25	368 683	446 647	21.15
Outside 1000 metres	1 928 198	2 193 064	13.74	570 250	688 326	20.71
Percentage within 1000 metres	19.5	18.9	–0.63	39.3	39.4	0.09

Source: BITRE analysis of ABS 2006 *Census of Population and Housing* place of usual residence data for CCDs and place of work data for DZs.

The higher figures for employment compared with population (both absolute proportion and percentage growth) is likely due to the spatial distribution of both, with employment density highest in the Inner sector where the transport links are strongest, and population more dispersed across the whole region (with only 3.1 per cent in Inner Brisbane) (see Table 4.1).

Between 2001 and 2006, the strongest population growth within the 500m catchments occurred in the CBD and on the Caboolture Line towards the Sunshine Coast. Of the 16 stations where population grew by more than 50 per cent within the 500m catchment,

11 were in the CBD or on the central part of the network where the train lines meet (this includes four central Busway stations and the Adelaide Street bus mall). It should be noted that catchments in this area overlap, so that a person living in the CBD would be within 500m of several transport nodes. Another four were stations on the Caboolture line (Beerburrum, and the three consecutive stops of Strathpine, Bald Hills and Carseldine). The 500m around the Robina train station also experienced strong population growth. The pattern was similar for population within 1000m.

More station catchments experienced large employment growth, compared with population growth. There were 31 stations where employment increased by more than 50 per cent within the 500m catchments. However, three of these had very small (less than 10) absolute figures. Of the remaining 28 stations there were:

- The four last train stations on the Gold Coast Line (Coomera to Robina)
- Four train stations on the Sunshine Coast Line (Caboolture and three stations further north)
- Three South East Busway stations
- Seven non-Busway bus stations (including Carindale, Browns Plains)
- Five train stations on the Cleveland Line (including three contiguous: Cannon Hill, Murarrie and Hemmant)
- Two contiguous train stations on the Shorncliffe Line (Banyo and Nudgee)
- Three train stations on the Ipswich Line (Toowong, Oxley and Ipswich).

There was a similar pattern for the 1000m catchment.

The data also indicates that there was no clear connection between employment growth and population growth within these catchment areas. For example, the 500m catchments around Helensvale and Nerang stations, which had high employment growth, had some of the biggest percentage declines in population. More broadly, while the central areas dominated the list of transport node catchments with strong population growth, they did not appear in the list of high employment growth catchments over the period.

Overall assessment

This analysis indicates that the objective of concentrating residential and job growth around frequent transport experienced only isolated success over the 2001 to 2006 period, based on the definition of frequent public transport being train, Busway and major bus stations.

Overall, population and employment growth was broadly similar inside and outside the 500m and 1000m catchments. Population and employment grew at a marginally higher rate outside the 500m buffers, so that the proportion of residents and workers within these buffers declined by 0.1 percentage points or less. There was a slight increase in the percentage of employment within the 1000m buffers (also 0.1 percentage points). The strongest change observed was a decline in the population within the 1000m buffer from 2001 (19.5 per cent) to 2006 (18.9 per cent), which resulted in residential growth within 1km of transport nodes being notably lower than that occurring outside the 1km catchment (9.2 per cent and 13.7 per cent, respectively).

Summary

This chapter has described the spatial variation in transport mode use within SEQ, including the changes between 2001 and 2006.

It has also examined the progress against the transport-related planning objectives of promoting public and active transport, and concentrating residential and jobs growth around frequent public transport.

The data reveals that the public transport mode share has grown between 2001 and 2006, but in a spatially concentrated way. The growth was strongest in the city centre for workers, and for people enumerated in the Middle South. This is likely to be due to new infrastructure (Busways). Active transport growth was more modest, driven by growth in walking. By both place of enumeration and employment, there was actually a small decline in the cycling share (–0.1 percentage points), but growth in the walking share (0.4 percentage points).

The objective of concentrating residential and job growth around frequent transport had only isolated success between 2001 and 2006, with similar rates of growth inside and outside transport node catchments.

CHAPTER 7

Commuting flows

Key points

- In 2006, 1.6 per cent of South East Queensland's (SEQ) workforce lived outside SEQ, mainly in the Tweed region. Commuter flows between Tweed and SEQ grew strongly from 2001 to 2006.
- About 40 per cent of employed Brisbane residents worked in their home subregion. In the rest of SEQ, 75 per cent of employed residents worked in their home region. The overall self-containment rate for SEQ rose marginally, by 0.5 percentage points, between 2001 and 2006.
- The probability of working in Brisbane's Central Business District was 27 per cent for employed residents of the Inner sector, 15 per cent for the Middle sector, 6 per cent for the Outer sector, and 1 per cent in the rest of SEQ.
- Within the Brisbane Statistical Division (SD), 38 per cent of commuting flows occurred in an inward direction and 6 per cent in an outward direction. The remaining 56 per cent of commutes occurred within the home sector, and typically within the home subregion.
- There was an increase of 181 000 commuters with a known SLA of work and residence within SEQ between 2001 and 2006. The largest increases occurred for flows within the home subregion or region. Commuting flows within the Gold Coast increased by 32 800 persons, while there was also strong growth in commuting within the Sunshine Coast (20 700) and Outer North (13 900). The largest change in flows between different subregions was the extra 5263 persons commuting from the Outer North to the Middle North. Commuting from Gold Coast to Brisbane also grew strongly.
- Inward commuting flows declined from 30.2 to 28.6 per cent of all SEQ flows from 2001 to 2006. The proportion of commutes to a different SLA within the same subregion/region rose by 1 percentage point.
- SEQ residents commuted an average of 15.2km to work in 2006. Average commuting distances are low for Inner sector residents (7.2km), and higher for Middle (12.0km) and Outer sector residents (19.6km).
- The average duration of a commuting trip in SEQ was 31 minutes in 2009. The average was 28 minutes for Inner sector residents, 32 minutes for Middle sector residents and 35 minutes for Outer sector residents.
- There is mixed evidence regarding progress in reducing commuting times and distances since 2001. While average commuting distances were stable from 2001 to 2006, and then

declined, the available evidence points to a significant net increase in Brisbane's average commuting times since 2001.

Background

The aims of this chapter are to:

- identify the main commuting flows—i.e. the number of people who travel from a particular place of residence to a particular place of work—for South East Queensland (SEQ) in 2006
- identify the main changes that occurred in commuting patterns in SEQ between 2001 and 2006
- summarise spatial differences in average commuting distances and times, and the trends in commuting distances and times since 2001.

The primary source of data for the study of commuting flows in this chapter are the origin-destination journey to work matrices that are constructed based on the 2001 and 2006 ABS *Census of Population and Housing*. These matrices compare a commuter's place of usual residence to their place of work. Analysis of geographical commuting patterns (from origin to destination) provides information valuable to infrastructure and transport planning.

2006 snapshot

Long distance commuters

On census day 2006, a total of 1.141 million people had a known work address in SEQ (see Table 4.1), of which 1.122 million (or 98.4 per cent) also had a known SLA of residence within SEQ. There were approximately 19 000 people employed in SEQ who lived outside of SEQ, representing 1.6 per cent of SEQ's total workforce.

Table 7.1 summarises the main regions of residence for the long distance commuters to the SEQ region. The main place of origin outside of SEQ itself is Tweed in New South Wales, close to the Gold Coast, which generated more than 6`300 commuters to SEQ on census day. It was followed by 'Rest of Toowoomba'—which corresponds to that part of the Toowoomba working zone[55] which lies outside of SEQ and outside of the Toowoomba Statistical Subdivision (SSD)[56]—which generated around 2700 commuters to SEQ. Other main sources of commuters are Sydney and the regional town of Gympie (160 kilometres north of Brisbane). However, the residents of the more distant places listed in the table (e.g. Melbourne, Sydney, Townsville, Cairns) are not likely to be commuting to SEQ on a daily basis, but rather on a less frequent basis, such as weekly. Alternatively, they may have been temporarily living and working in SEQ at the time of the census, while retaining a usual place of residence in another city.

Employed residents of Tweed and Rest of Toowoomba have the highest propensity to commute to a place of work in SEQ, at 22 and 24 per cent, respectively. Gympie residents also have a

55 For information on BITRE's working zone classification, see BITRE (2009) and the BITRE Industry Structure Database 2009.

56 Includes Clifton, Pittsworth, Crow's Nest Part B, Cambooya Part B, Rosalie Part B and Jondaryan Part B.

relatively high propensity to commute to work in SEQ (7 per cent). While Sydney generates a large volume of commuters to SEQ, this represents a very small proportion of its employed residents (0.06 per cent).

Table 7.1 Main regions of residence for people employed in South East Queensland, 2006

Working zone of residence	Number of residents employed at fixed work address in SEQ	Proportion of SEQ employment (per cent)
South East Queensland Total	1 122 040	97.98
Tweed	6327	0.55
Rest of Toowoomba	2701	0.24
Sydney and surrounds	1068	0.09
Gympie and surrounds	1002	0.09
Melbourne and surrounds	956	0.08
Townsville and surrounds	315	0.03
Lismore, Casino, Ballina and surrounds	278	0.02
Hervey Bay, Maryborough and surrounds	274	0.02
Cairns and surrounds	268	0.02
Warwick	268	0.02

Note: The place of work total is substantially less than the number of employed residents, due to non-response and no fixed work address. Tweed relates to the Tweed LGA. Rest of Toowoomba relates to that part of the Toowoomba working zone that lies outside SEQ (i.e. outside the Toowoomba SSD).

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

Those who commute from Tweed to the SEQ region are most likely to be commuting to the Gold Coast (92 per cent) which is in close proximity. Those who commute from Rest of Toowoomba to the SEQ region are most likely to be commuting to the Toowoomba SSD (93 per cent), which is in close proximity. Similarly, those who commute from Gympie to SEQ are most likely to be commuting to Sunshine Coast (76 per cent).

However, those who commute from Sydney to the SEQ region are most likely to have a place of work in Brisbane's Inner sector (32 per cent), the Gold Coast (24 per cent) or the Middle North (11 per cent). Those who commute from Melbourne to SEQ are also most likely to be commuting to the Inner sector (31 per cent), the Gold Coast (12 per cent) or the Middle North (12 per cent). The Middle North contains Brisbane International Airport.

The ten main non-SEQ places of work for employed residents of SEQ are listed in Table 7.2. On 2006 Census day, there were about 21 000 SEQ residents who commuted to a place of work outside SEQ. This is equivalent to 1.6 per cent of SEQ's employed residents. The number of out-commuters from SEQ slightly outweighed those commuting into SEQ (21 000 vs 19 000). This pattern of outward commuting flows being larger than inward flows is similar to Perth (BITRE 2010), but the opposite pattern was evident for Sydney and Melbourne (BITRE 2012a, BITRE 2011a).

Tweed and Rest of Toowoomba were the most common places of work outside of SEQ for SEQ residents. The Tweed workers were primarily commuting from addresses at the southern end of the Gold Coast (e.g. Coolangatta, Bilinga-Tugun), while those who worked in Rest of Toowoomba were predominantly commuting from residences in Toowoomba.

However, there was also a large number of SEQ residents who reported commuting to locations much further afield, such as Sydney, Melbourne, Townsville, Rockhampton, Perth, Canberra and Mackay. In addition to daily commuters and those who commute to a non-SEQ place of work on a less frequent basis (e.g. weekly or around shifts), the data in Table 7.2 may capture usual residents of SEQ who are living and working in another part of Australia for some of the year.

Table 7.2 Main non-South East Queensland places of work for employed residents of South East Queensland, 2006

Working zone	Number of SEQ residents employed in working zone
Tweed	3745
Rest of Toowoomba	2956
Sydney and surrounds	2248
Melbourne and surrounds	1144
Gympie and surrounds	899
Townsville and surrounds	426
Rockhampton and surrounds	339
Perth and surrounds	327
Canberra and surrounds	325
Mackay and surrounds	283

Note: Tweed relates to the Tweed LGA. Rest of Toowoomba relates to that part of the Toowoomba working zone that lies outside SEQ (i.e. outside the Toowoomba SSD).

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

Overview—sectors, regions and subregions

The focus of this section is to provide an analysis of commuting flows that occurred within SEQ in 2006.

The connection between home and workplace has been, and remains, a central part of theories of urban spatial structure. A key area of interest is the idea of 'self-containment'. Empirically, the self-containment rate is the proportion of trips that are internal to the locality, relative to all trips made by residents (Yigitcanlar et. al. 2005). The larger the spatial unit in population and area, the higher the likely self-containment indicator (Daniels 2007).

In pursuing the goal of sustainability, raising the employment self-containment rate is often viewed as an important strategy with potential benefits in terms of reduced commuting distances and reduced emissions. There is no ideal target for self-containment for particular spatial units—high self-containment is not desirable if it reflects poor access to jobs located outside of the area. Paradoxically, while high self-containment involves relatively short distance commuting, it may potentially be inconsistent with sustainability objectives for reducing car use or increasing use of sustainable modes. Short commuting trips within low population density outer suburbs often involve car use due to convenience and the availability of free parking (Daniels 2007).

Table 7.3 presents self-containment rates for each region of SEQ, as well as the proportion who commute from outside the region. Eighty three per cent of employed residents of SEQ worked in their home region in 2006, with the remaining 17 per cent either working in another region of SEQ, working outside of SEQ, or not identifying a known fixed place of work.[57] At this highly aggregated scale, Brisbane is relatively self-contained, with 87 per cent of employed residents reporting a known place of work within Brisbane. In comparison, West Moreton has relatively low self-containment, with only 57 per cent of employed residents reporting they worked in the home region. For Gold Coast, Sunshine Coast and Toowoomba, regional self-containment lies in-between these extremes.

These regional results are similar to the findings of other self-containment analyses for SEQ. Council of Mayors (SEQ) (2011) estimated employment self-containment rates for all SEQ Local Government Areas (LGAs) using data for 2006 and showed that Toowoomba had the highest self-containment rate, followed by Brisbane, with Logan having the lowest self-containment. An analysis of commuting patterns for the Sunshine Coast and neighbouring LGAs using ABS journey to work data for 2001, found that the proportion of employed persons who work locally in the Sunshine Coast shires of Caloundra, Maroochy and Noosa, ranged between 75 and 80 per cent (Trendle and Siu 2005).

Table 7.4 shows the self-containment rate of each subregion in Brisbane, as well as the proportion who commuted from outside each of these subregions. In 2006, there were 789 470 jobs involving a known place of work in Brisbane. There were 862 343 employed residents, of whom 40 per cent worked in their home subregion. The self-containment rate is highest for the Inner subregion, where 62 per cent of employed residents have a place of work within the Inner subregion. The Outer West subregion also has a relatively high self-containment rate (49 per cent). Self-containment rates are lowest for the Middle East, Outer South and Middle South (32, 34 and 35 per cent, respectively).

Table 7.3 Self-containment and proportion who commute from outside by region, South East Queensland, 2006

Region	Workers	Employed residents	Work in home region	Self-containment rate (per cent)	Proportion who commute from outside region (per cent)
Brisbane	789 470	862 343	747 446	87	5
Gold Coast	184 613	222 918	164 018	74	11
Sunshine Coast	98 053	119 615	94 225	79	4
Toowoomba	48 339	52 136	42 554	82	12
West Moreton	20 290	28 735	16 512	57	19
SEQ Total	1 145 139	1 285 747	1 064 755	83	7

Note: Self-containment rates are calculated at the regional scale as the ratio of 'work in home region' to 'employed residents'. The place of work total is substantially lower than the number of employed residents, due to non-response and no fixed work address.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

57 Due to non-response and no fixed place of work responses, around 10 per cent of employed residents of SEQ do not identify a known place of work in the census.

Table 7.4 Self-containment and proportion who commute from outside by subregion, Brisbane Statistical Division, 2006

Subregion	Workers	Employed residents	Work in home subregion	Self-containment rate (per cent)	Proportion who commute from outside subregion (per cent)
Inner	216 676	46 767	29 025	62	87
Middle East	61 097	82 451	26 722	32	56
Middle North	126 146	151 773	63 067	42	50
Middle South	97 523	110 745	38 397	35	61
Middle West	75 040	96 881	36 293	37	52
Outer East	32 111	61 727	24 667	40	23
Outer North	78 126	148 828	64 211	43	18
Outer South	57 300	100 387	34 064	34	41
Outer West	45 451	62 784	30 890	49	32
Brisbane SD	789 470	862 343	347 336	40	56

Note: Self-containment rates are calculated at the subregion scale as the ratio of 'work in home subregion' to 'employed residents'. The place of work total is substantially lower than the number of employed residents, due to non-response and no fixed work address.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

Table 7.3 also shows that just 7 per cent of SEQ workers commute to their region of work from outside of its boundaries. A relatively high proportion of West Moreton workers commute from outside the region (19 per cent).

Despite the Brisbane Inner subregion's high degree of self-containment, Table 7.4 shows that it had 169 909 (i.e. 216 676 less 46 767) more jobs than employed residents, resulting in 87 per cent of its workforce commuting to the Inner subregion from further afield. Each of Brisbane's Middle subregions attracted at least half of their workforce from outside the subregion. The Outer subregions, and the Outer North in particular, attracted lower proportions of workers from outside their own boundaries.

Table 7.5 summarises commuting flows within SEQ by regions and sectors for 2006. The single most important category is commuter flows within Brisbane's Middle sector, which accounted for 20.4 per cent of all commuters. Commuters within Gold Coast region and Brisbane's Outer sector contributed 14.6 per cent and 14.5 per cent, respectively, of total flows. The most important cross-sector (or cross-region) flow was by residents of the Middle sector commuting to a place of work in the Inner sector (11.5 per cent). Commutes from Brisbane's Outer sector to its Middle sector were also significant (9.2 per cent).

Table 7.5 Summary of commuter flows in South East Queensland by regions and sectors, 2006

Place of residence	Place of work							
	Inner Brisbane	Middle Brisbane	Outer Brisbane	Gold Coast	Sunshine Coast	Too-woomba	West Moreton	SEQ Total
Inner Brisbane	2.54	0.99	0.15	0.04	0.01	0.00	0.00	3.77
Middle Brisbane	11.47	20.37	2.95	0.37	0.05	0.02	0.04	35.48
Outer Brisbane	4.03	9.24	14.54	0.72	0.13	0.02	0.17	28.92
Gold Coast	0.52	0.80	0.65	14.62	0.01	0.01	0.03	16.63
Sunshine Coast	0.15	0.21	0.23	0.01	8.40	0.01	0.01	9.01
Toowoomba	0.02	0.02	0.02	0.00	0.00	3.79	0.06	3.92
West Moreton	0.05	0.17	0.34	0.03	0.00	0.17	1.47	2.24
SEQ Total	18.78	31.81	18.86	15.80	8.60	4.03	1.78	100.00

Note: This is based on the 1.12 million workers who had a known SLA of residence with SEQ and a known SLA of work within SEQ in 2006.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

When considering commuting flows within the Brisbane Statistical Division (SD) only in Table 7.6, commuting flows within each of the broadly defined sectors (i.e. Inner, Middle, and Outer) dominate, accounting for 56.3 per cent of the flows. Commutes within Brisbane's Middle sector and Outer sector contributed 30.6 per cent and 21.8 per cent, respectively. Commuting in an inward direction is also significant, with inward commuting to the Inner sector accounting for 23.7 per cent of all Brisbane SD commutes, and inward commutes to the Middle sector from the Outer sector contributing 13.9 per cent of commutes. In total, these inward cross-sector flows account for 37.6 per cent of all commutes within the Brisbane SD, while 6.2 per cent of all flows are cross-sectoral flows operating in an outward direction.

Table 7.6 Summary of commuter flows in Brisbane by sector, 2006

Place of residence	Place of work			
	Inner	Middle	Outer	Total Brisbane
Inner	3.88	1.51	0.22	5.62
Middle	17.53	30.57	4.42	52.53
Outer	6.16	13.87	21.82	41.85
Total Brisbane	27.57	45.96	26.47	100.00

Note: This is based on the 747 400 workers who had a known SLA of residence with Brisbane and a known SLA of work within Brisbane in 2006.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

Table 7.7 takes a more disaggregated perspective, summarising commuting flows for the SEQ subregions and regions for 2006, while Table 7.8 presents the same information in percentage format, which can be interpreted as the probability[58] that an employed resident of one subregion will work in another subregion.

As expected, the main source of workers in most subregions is those residing within the home subregion or region (i.e. all diagonally highlighted numbers are higher than the other numbers in the same column). Within Brisbane SD, just over 64 000 commuters travelled from a place of residence in the Outer North subregion to a place of work in the same subregion. This is closely followed by the number of commuters from the Middle North to the Middle North (around 63 000 commuters).

Excluding commuter flows within a single subregion or region, the commuter flows which exceeded 20 000 persons all involved a place of work in either Brisbane's Inner sector or its Middle North subregion. Details of these flows are as follows:

- To the Inner sector from all of the Middle subregions and the Outer North subregion.
- To the Middle North subregion from the Outer North subregion.

The most common cross-region flow was the 48 779 residents of the Middle North subregion who commuted to a place of work in Inner Brisbane.

A large number of people travelled to a place of work in the Brisbane SD from other parts of SEQ (35 533), compared with the number of Brisbane SD residents who commuted to a place of work in the rest of SEQ (17 798). The most substantial flows between Brisbane and the rest of SEQ were the 6175 Outer South residents who commuted to a place of work on the Gold Coast and the 5951 Gold Coast residents who commuted in the opposite direction. There were also 5900 Gold Coast residents who commuted to Brisbane's Inner sector for work.

58 For example, the probability that an employed resident of the Middle East subregion will commute to a place of work in the Inner subregion can be estimated by dividing 24 908 in Table 7.7 by 82 451 in Table 7.4. In the discussion, this probability is expressed as a percentage. In this example, this is 30 per cent (refer to Table 7.8).

Table 7.7 Commuting flows between subregions of South East Queensland, 2006

	Place of work													
Place of residence	Inner	Middle East	Middle North	Middle South	Middle West	Outer East	Outer North	Outer South	Outer West	Gold Coast	Sunshine Coast	Too-woomba	West Moreton	SEQ Total
Inner	29 025	1 768	4 234	2 556	2 739	191	508	616	361	456	81	34	36	42 605
Middle East	24 908	26 722	5 110	8 178	2 631	2 588	481	2 006	413	838	68	29	40	74 012
Middle North	48 779	4 157	63 067	4 302	5 814	389	8 071	980	676	639	329	53	75	137 331
Middle South	29 828	6 964	4 809	38 397	6 576	1 194	425	6 835	1 635	1 908	71	77	152	98 871
Middle West	27 509	2 064	4 820	8 627	36 293	286	506	1 696	4 874	815	139	82	179	87 890
Outer East	8 007	8 337	2 747	4 975	1 302	24 667	185	2 433	297	1 117	21	18	47	54 153
Outer North	21 687	3 158	32 404	2 442	2 547	233	64 211	633	276	417	1 340	57	250	129 655
Outer South	10 656	4 635	3 038	17 052	4 893	1 546	283	34 064	1 958	6 175	69	33	937	85 339
Outer West	5 704	788	1 217	5 016	9 127	146	138	1 146	30 890	400	36	116	664	55 388
Gold Coast	5 900	1 529	1 965	4 085	1 387	593	197	5 951	512	164 018	99	86	318	186 640
Sunshine Coast	1 682	289	1 391	352	280	82	2 296	116	59	147	94 225	74	110	101 103
Toowoomba	194	29	84	68	91	3	17	15	144	35	16	42 554	702	43 952
West Moreton	560	144	224	703	784	55	308	434	3010	363	44	1 960	16 512	25 101
SEQ Total	214 439	60 584	125 110	96 753	74 464	31 973	77 626	56 925	45 105	177 328	96 538	45 173	20 022	1 122 040

Note: The SEQ total is less than the workers total in Table 7.3, due to the exclusion of those who live outside the SEQ region, but work in the region, and exclusion of those who work in Brisbane at an unknown address.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

Table 7.8 Probability of employed residents commuting to each subregion of work, South East Queensland, 2006

Place of residence	Place of work														
	Inner	Middle East	Middle North	Middle South	Middle West	Outer East	Outer North	Outer South	Outer West	Gold Coast	Sunshine Coast	Too-woomba	West Moreton	Other/ unknown*	SEQ Total
Inner	62	4	9	5	6	0	1	1	1	1	0	0	0	9	100
Middle East	30	32	6	10	3	3	1	2	1	1	0	0	0	10	100
Middle North	32	3	42	3	4	0	5	1	0	0	0	0	0	10	100
Middle South	27	6	4	35	6	1	0	6	1	2	0	0	0	11	100
Middle West	28	2	5	9	37	0	1	2	5	1	0	0	0	9	100
Outer East	13	14	4	8	2	40	0	4	0	2	0	0	0	12	100
Outer North	15	2	22	2	2	0	43	0	0	0	1	0	0	13	100
Outer South	11	5	3	17	5	2	0	34	2	6	0	0	1	15	100
Outer West	9	1	2	8	15	0	0	2	49	1	0	0	1	12	100
Gold Coast	3	1	1	2	1	0	0	3	0	74	0	0	0	16	100
Sunshine Coast	1	0	1	0	0	0	2	0	0	0	79	0	0	15	100
Toowoomba	0	0	0	0	0	0	0	0	0	0	0	82	1	16	100
West Moreton	2	1	1	2	3	0	1	2	10	1	0	7	57	13	100

Note: * This total includes persons who worked outside SEQ, did not respond, have an undefined place of work or no fixed work addresses.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

In 2006, the probability that employed residents of a region/subregion would commute to a place of work outside the region or subregion of residence exceeded 20 per cent for the following origin-destination pairs:

- to a place of work in Inner Brisbane from any of the Middle subregions, with probabilities ranging between 27 per cent for the Middle South and 32 per cent for the Middle North
- to the Middle North from the Outer North (22 per cent).

The probability of commuting from an Outer subregion to its corresponding Middle subregion ranged between 15 and 22 per cent. For example, 17 per cent of employed residents of the Outer South commuted to a place of work in the Middle South. The probability of commuting from an Outer subregion to Inner Brisbane ranged from 9 per cent for the Outer West to 15 per cent for the Outer North.

Just over 2 per cent of employed residents of Brisbane commute to a place of work in the rest of SEQ, with Gold Coast being the most common destination. Interestingly, while 6 per cent of Outer South residents commuted to a place of work on the Gold Coast, only 3 per cent of Gold Coast residents commuted to a place of work in Brisbane's Outer South.

In the rest of SEQ, West Moreton residents had the highest likelihood of commuting to other parts of SEQ. About 10 per cent of West Moreton employed residents commuted to a place of work in the Outer West (which includes Ipswich), while 7 per cent commuted to a place of work in Toowoomba. The probability of commuting from West Moreton to the Brisbane SD for work was 22 per cent, which was considerably higher than the probability of commuting to Brisbane from Gold Coast (10 per cent), Sunshine Coast (5 per cent) or Toowoomba (1 per cent).

Earlier in Table 7.1, the probabilities of commuting from Tweed to the Gold Coast and from 'Rest of Toowoomba' to Toowoomba, were shown to exceed 20 per cent. Thus, the commuting connections of the non-Brisbane regions with areas outside SEQ are in some cases stronger than their commuting connections with Brisbane.

Commuting flows between Statistical Local Areas

Summary of different types of commuting flows

This section provides information on different types of commuting flows at the Statistical Local Area (SLA) scale. The categorisation of flows is presented separately for SEQ and for the Brisbane SD.

For the Brisbane SD, the flows between SLAs have been identified as occurring either within a 'ring' or across rings, and if the flows involve travel across rings they have been classified as occurring in either an inward direction (e.g. Outer to Middle, Middle to Brisbane CBD) or an outward direction (e.g. Middle to Outer). The Brisbane CBD is the central point of reference for the direction of flow. The geographic entities referred to as rings are the same as the sectors, except that the Inner sector has been split into two rings:

- Brisbane CBD—corresponding to the aggregate of the City Inner and City Remainder SLAs
- Rest of the Inner sector.

Commuting flows that take place within the boundaries of one of the rings—irrespective of whether the direction is oriented towards the inner or outer edge of the ring or is circumferential—are treated as ambiguous in direction and allocated to one of the following categories of commuter flow:

- within the home SLA
- to a different SLA within the home subregion and ring
- to a different subregion within the home ring
  - for those who live in the Outer ring
  - for those who live in the Middle ring.

In undertaking the categorisation for SEQ, an additional ring is introduced corresponding to the 'Rest of SEQ', which consists of the Gold Coast, Sunshine Coast, Toowoomba and West Moreton regions (which in this instance can be thought of as 'subregions'). In other respects, the categorisation is the same.

Different types of commuting flows in South East Queensland

In 2006, there were 1.12 million commuting flows that occurred solely within SEQ from a known place of residence to a known place of work.

Table 7.9 shows that the majority of SEQ's commuter flows are ambiguous in direction (i.e. the majority of flows occur within a ring). Nearly two-thirds (65.7 per cent or 736 875 commuters) of the total commuter flows in SEQ occurred within a ring. There were about 425 000 commutes that occurred between different SLAs within the same subregion/region—representing 38 per cent of all commutes in SEQ. The largest volume flows of this type were commutes from:

- Toowoomba South-East to Toowoomba Central
- Maroochy—Buderim to Maroochy—Maroochydore
- Toowoomba West to Toowoomba Central
- Ipswich East to Ipswich Central.

In addition, commutes within the home SLA were also relatively important, contributing nearly 21 per cent of all commutes (or 234 969 commuters). The largest volume flow of this type was commutes from Ipswich Central to Ipswich Central. However, commuting flows within the Maroochy–Buderim, Ipswich East and Beaudesert Part A SLAs were also substantial.

Less than 6 per cent of commuting flows that occurred in SEQ in 2006 were from one subregion to another within the Middle ring. Only very small commuting flows were identified between different subregions in the Outer ring or between different regions in the rest of SEQ (combined 1.2 per cent).

Table 7.9 also shows that almost 29 per cent of commuting flows were categorised as occurring in an inward direction in SEQ in 2006. The largest volume flows of this type were commutes from:

- Ipswich East and Ipswich Central to Wacol
- Toowong, Hills District and Coorparoo to the City Inner SLA in the Brisbane CBD
- Esk to Ipswich Central.

Less than 6 per cent of commuting flows were classified as occurring in an outward direction. Some of the most important examples were:

- Beaudesert Part A to Beaudesert Part C
- Karana Downs-Lake Manchester to Ipswich Central
- Doolandella-Forest Lake to Ipswich East.

Table 7.9 Total commuting flows within South East Queensland by type of flow, 2006

Type of commuting flows	Number of commuters	Proportion (per cent)
Inwards (across rings)	320 706	28.6
Outwards (across rings)	64 459	5.7
Ambiguous in direction (within a ring)	736 875	65.7
Within home SLA	234 969	20.9
Different SLA, same subregion, same region	424 626	37.8
From one region to another in rest of SEQ	3 954	0.4
From one subregion to another in Outer ring	9 274	0.8
From one subregion to another in Middle ring	64 052	5.7
Total SEQ	1 122 040	100.0

Notes: Based on commutes that have an origin and destination within SEQ. There are five rings underpinning this classification—the CBD (defined as the aggregate of the City Inner and City Remainder SLAs), Rest of Inner, Middle, Outer and Rest of SEQ. Inward commutes include commutes to Brisbane SD workplaces from residences in the rest of SEQ, commutes to workplaces in the Brisbane CBD from elsewhere in SEQ, from outer suburban residences to middle or inner workplaces and from middle suburban residences to inner workplaces. The opposing flows are categorised as outward commutes (e.g. from Middle to Outer).

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

Different types of commuting flows in Brisbane Statistical Division

Table 7.10 presents commuting flows within Brisbane SD by type of flow in 2006. There were more than 747 000 commuting flows within the Brisbane SD from a known place of residence to a known place of work.

In 2006, about 56 per cent of Brisbane's commuter flows occur within a ring and are thus ambiguous in direction. Of these, nearly 215 000 commutes—representing 29 per cent of all commutes in the Brisbane SD—occurred from one SLA to a different SLA within the same subregion. Commutes within the home SLA were also relatively important, contributing 17 per cent of all commutes.

Within the Brisbane SD, 38 per cent of commuting flows were identified as occurring in an inward direction. Only 6 per cent of commuting flows were classified as occurring in an outward direction.

Table 7.10 Total commuting flows within Brisbane Statistical Division by type of flow, 2006

Type of commuting flows	Number of commuters in Brisbane SD	Proportion of Brisbane SD (per cent)	Proportion of total SEQ (per cent)
Inwards (across rings)	285 173	38.2	25.4
Outwards (across rings)	46 661	6.2	4.2
Ambiguous in direction (within a ring)	415 612	55.6	37.0
Within home SLA	127 429	17.0	11.4
Different SLA, same subregion	214 857	28.7	19.1
From one subregion to another in Outer ring	9 274	1.2	0.8
From one subregion to another in Middle ring	64 052	8.6	5.7
Total Brisbane SD	747 446	100.0	66.6

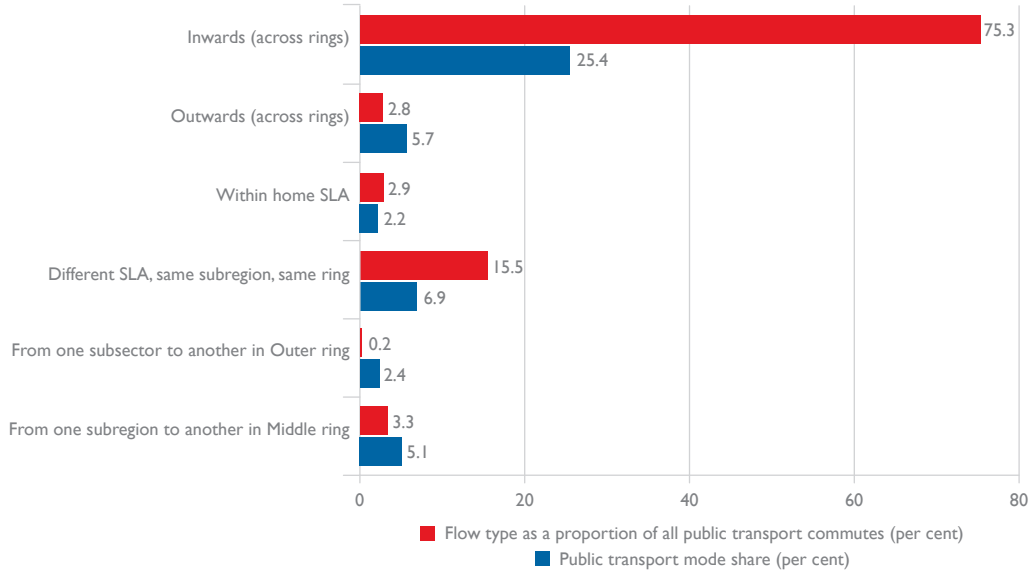
Note: Based on commutes that have an origin and destination within Brisbane SD. Inward commutes include commutes to workplaces in the Brisbane CBD from elsewhere in the SD, from outer suburban residences to middle or inner workplaces and from middle suburban residences to inner workplaces. The opposing flows are categorised as outward commutes (e.g. from Middle to Outer).

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 (unpublished data).

Figure 7.1 shows how commuter use of public transport is heavily oriented towards inward commuting in Brisbane. While 38 per cent of Brisbane SD commutes were in an inward direction (see Table 7.10), about three-quarters of commuter use of public transport in Brisbane was due to inward commuting. A further 15 per cent of public transport use by commuters related to commutes to a different SLA within the home subregion.

About one-quarter of all inward commutes in Brisbane made use of public transport, but all other flow type categories had below-average public transport mode shares. The public transport mode shares were very low for commutes within the home SLA (2 per cent) and for cross-suburban commutes in the Outer sector (2 per cent).

Figure 7.1 Public transport use by type of commuting flow, Brisbane, 2006



Note: Based on commutes that have an origin and destination within Brisbane SD. Inward commutes include commutes to workplaces in the CBD from elsewhere in SD, from outer suburban residences to middle or inner workplaces and from middle suburban residences to inner workplaces. The opposing flows are categorised as outward commutes (e.g. from Middle to Outer).

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 using TableBuilder.

Flows within and between Statistical Local Areas in South East Queensland, 2006

In 2006, about 21 per cent of all employed SEQ residents worked in the same SLA in which they lived (refer Table 7.9). Map 7.1 shows the self-containment rate for all SEQ SLAs in 2006. There is a general pattern of relatively low self-containment throughout much of Brisbane and higher self-containment on the rural periphery of SEQ and on the islands.

Among all SLAs in SEQ, the highest rate of self-containment is for Moreton Island (78 per cent) within the Middle East subregion of the Brisbane SD, reflecting the comparative difficulty and cost of travel to other locations for residents of this island SLA. Other SLAs with high self-containment are predominantly rural and located in the West Moreton region—namely Kilcoy (65 per cent), Beaudesert Part C (64 per cent) and Boonah (60 per cent).

Among Inner sector SLAs, City Inner has the highest self-containment rate (39 per cent), while Highgate Hill and Dutton Park SLAs have the lowest (7 per cent each).

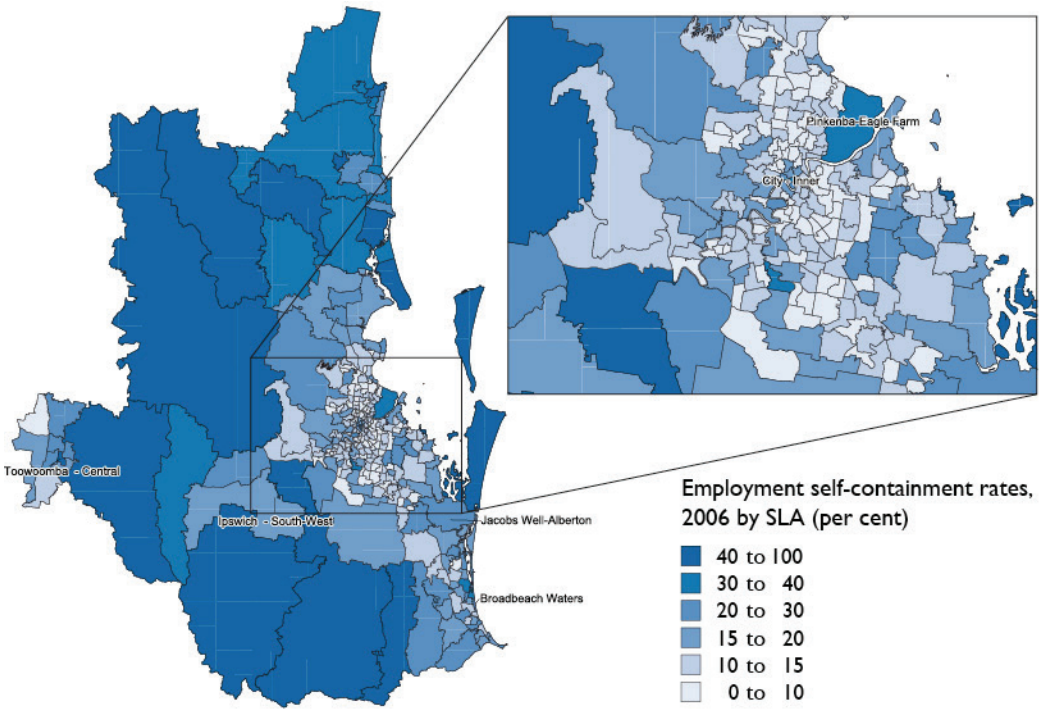
Self-containment rates are at their lowest for the Middle sector SLAs of Holland Park West, Zillmere, Riverhills, Durack and Bald Hills SLAs, with only six per cent of employed residents working in their home SLA.

In the Outer sector, the Ipswich Central and Redland Balance SLAs have the highest self-containment rates (51 and 50 per cent, respectively), followed by Bribie Island (45 per cent). However, self-containment rates are relatively low in Bray Park, Thorneside and Kingston (less than 8 per cent each).

In the Gold Coast region, Beaudesert Part B has the highest self-containment (44 per cent), followed by Southport (32 per cent) and Surfers Paradise (31 per cent), while Edens Landing-Holmview and Coombabah SLAs have the lowest (9 per cent each).

Among SLAs in the Sunshine Coast region, Caloundra-Hinterland and Noosa-Noosaville have the highest self-containment rates, with around 56 per cent each. Toowoomba Central SLA has the highest self-containment rate (40 per cent) in the Toowoomba SSD, while Rosalie Part A has the lowest (7 per cent).

Map 7.1 Self-containment rates in each Statistical Local Area of South East Queensland, 2006



Note: The self-containment rate is derived as the proportion of employed residents of the SLA who have a place of work in their home SLA. The number of employed residents is sourced from the ABS 2006 Basic Community Profile (BCP).

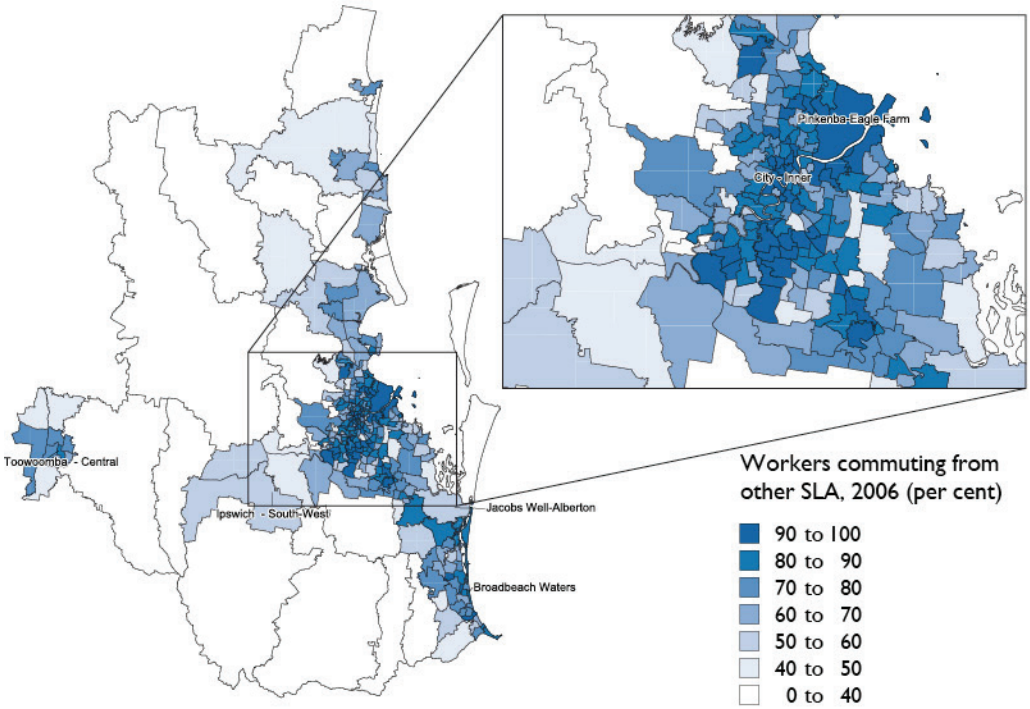
Source: BITRE analysis of ABS *Census of Population and Housing* 2006 BCP and unpublished data.

Map 7.2 shows the number of workers commuting from outside an SLA as a percentage of its total workers. This indicator tends to be high in Inner Brisbane and other key employment hubs, and is at its lowest on the rural periphery of SEQ and on the islands.

Among all SLAs in SEQ, the highest rate of workers commuting from outside the SLA is for City Inner, Pinkenba-Eagle Farm (Middle North subregion) and Archerfield (Middle South subregion), averaging more than 99 per cent each. The latter two locations both contain an airport, but are home to few residents. The lowest rates of workers commuting from outside an SLA were for Upper Kedron in the Middle North subregion (21 per cent), Redland Balance in the Outer East subregion (17 per cent) and Boonah in West Moreton (12 per cent).

Among Inner sector SLAs, the rates of workers commuting from outside the SLA of work exceeded 98 per cent in City Inner, City Remainder, Bowen Hills, Milton and Herston, while the lowest rates were for Highgate Hill (65 per cent), Paddington (76 per cent) and New Farm (79 per cent).

Map 7.2 Proportion of workers who commute from outside the Statistical Local Area of residence, South East Queensland, 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

More than 98 per cent of those who work in the Richlands, Rocklea, Murarrie, Virginia, Pinkenba-Eagle Farm, Archerfield and Wacol SLAs in the Middle sector commute from outside the SLA. In the Outer sector, Underwood, Loganlea, Slacks Creek and Strathpine-Brendale SLAs attract more than 90 per cent of their workers from outside the SLA.

On the Gold Coast, the Molendinar, Bundall and Burleigh Heads SLAs attract more than 90 per cent of their workers from outside the SLA, while Beaudesert Part B and Guanaba-Springbrook attract 30 per cent or less of their workers from other SLAs.

More than 70 per cent of those who work in the Maroochydore, Nambour, Noosaville and Mooloolaba SLAs on the Sunshine Coast commute from outside the SLA, while the Caloundra Hinterland SLA attracts only 26 per cent of its workers from other SLAs.

The Toowoomba Central SLA in the Toowoomba SSD attracts nearly 87 per cent of its workers from outside the SLA, while Rosalie Part A attracts only 41 per cent from outside the SLA. The SLAs in West Moreton SD generally have a relatively low capacity to attract workers from other SLAs (less than 35 per cent of workers commuted from outside the area).

Table 7.11 identifies the largest volume origin-destination commuting flows in SEQ. The single largest commuting flow of 15 412 persons occurred within the SLA of Ipswich Central. Commuting flows of around 5000 persons occurred within Maroochy—Buderim (5259 flows) and Ipswich East (4865 flows). Most of the largest volume flows are same-SLA flows.

The bottom half of Table 7.11 lists the twenty largest volume origin-destination commuting flows which involved an SLA of work different to the SLA of residence. The largest commuting flow that occurred between different SLAs was the 4023 Toowoomba South-East residents who commuted to a place of work within Toowoomba Central. Among the top twenty cross-SLA commuting flows, 18 were commutes within the home subregion and two were inward commutes. Relatively few of these high volume commuting pairs are located within the Brisbane SD.

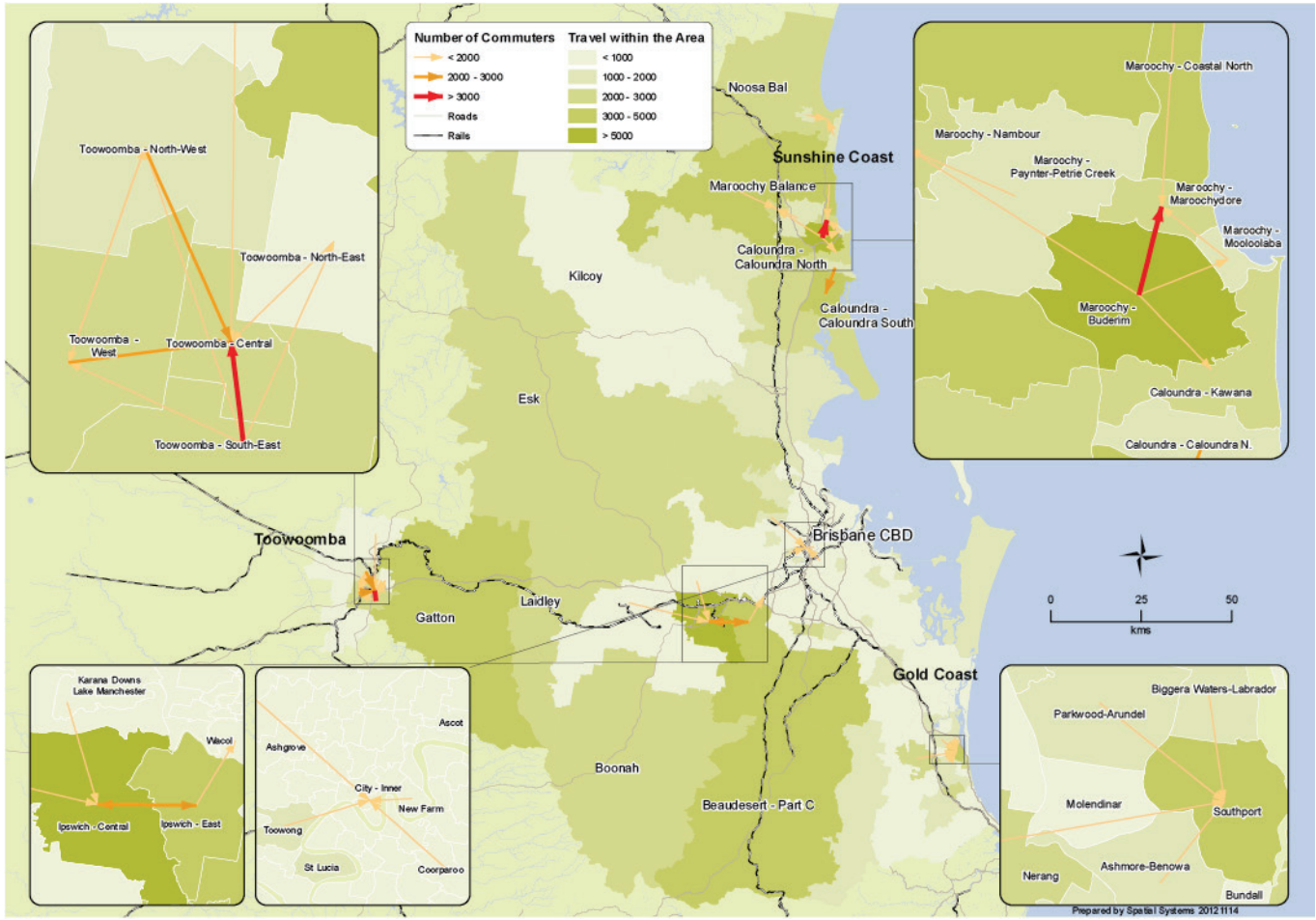
Map 7.3 illustrates the main commuting flows between SLAs of residence and work in SEQ. Essentially, this map depicts the analytical results summarised in Table 7.11. The key employment centres of Brisbane CBD, Ipswich, Toowoomba, Southport and Maroochydore each attract 3000 or more commuters from at least 3 nearby SLAs. There were 10 intra-SLA commuting flows involving more than 3000 people and only two different inter-SLA commuting flows involving more than 3000 people (Toowoomba South-East to Toowoomba Central in Toowoomba and Maroochy—Buderim to Maroochy—Maroochydore in Sunshine Coast). The most dominant intra-SLA commuting flow was in Ipswich Central (Outer West), where more than 15 400 persons commute within the SLA.

Table 7.11 Major commuting flows between Statistical Local Areas in South East Queensland, 2006

SLA of residential	Subregion of residence	SLA of employment	Subregion of employment	No. of people
Top 20 commuting flows within same SLA				
Ipswich Central	Outer West	Ipswich Central	Outer West	15 412
Maroochy—Buderim	Sunshine Coast	Maroochy—Buderim	Sunshine Coast	5259
Ipswich East	Outer West	Ipswich East	Outer West	4865
Beaudesert Part A	Outer South	Beaudesert Part A	Outer South	3960
Gatton	West Moreton	Gatton	West Moreton	3711
Maroochy—Balance	Sunshine Coast	Maroochy—Balance	Sunshine Coast	3632
Southport	Gold Coast	Southport	Gold Coast	3371
Maroochy—Coastal North	Sunshine Coast	Maroochy—Coastal North	Sunshine Coast	3234
Caloundra South	Sunshine Coast	Caloundra South	Sunshine Coast	3215
Beaudesert Part C	West Moreton	Beaudesert Part C	West Moreton	3064
Caloundra Rail Corridor	Sunshine Coast	Caloundra Rail Corridor	Sunshine Coast	2864
Caloundra—Kawana	Sunshine Coast	Caloundra—Kawana	Sunshine Coast	2783
Maroochy—Maroochydore	Sunshine Coast	Maroochy—Maroochydore	Sunshine Coast	2701
Esk	West Moreton	Esk	West Moreton	2635
Noosa—Balance	Sunshine Coast	Noosa—Balance	Sunshine Coast	2527
Nerang	Gold Coast	Nerang	Gold Coast	2524
Surfers Paradise	Gold Coast	Surfers Paradise	Gold Coast	2460
Maroochy—Nambour	Sunshine Coast	Maroochy—Nambour	Sunshine Coast	2418
Toowoomba Central	Toowoomba	Toowoomba Central	Toowoomba	2413
Boonah	West Moreton	Boonah	West Moreton	2323
Top 20 commuting flows between different SLAs				
Toowoomba South-East	Toowoomba	Toowoomba Central	Toowoomba	4023
Maroochy—Buderim	Sunshine Coast	Maroochy—Maroochydore	Sunshine Coast	3087
Toowoomba West	Toowoomba	Toowoomba Central	Toowoomba	2726
Ipswich East	Outer West	Ipswich Central	Outer West	2228
Toowoomba North-West	Toowoomba	Toowoomba Central	Toowoomba	2192
Caloundra North	Sunshine Coast	Caloundra South	Sunshine Coast	2171
Ipswich Central	Outer West	Ipswich East	Outer West	2031
Biggera Waters-Labrador	Gold Coast	Southport	Gold Coast	1594
Maroochy—Balance	Sunshine Coast	Maroochy—Nambour	Sunshine Coast	1545
Toowoomba South-East	Toowoomba	Toowoomba West	Toowoomba	1497
Toowoomba North-East	Toowoomba	Toowoomba Central	Toowoomba	1472
Ipswich East	Outer West	Wacol	Middle West	1446
Parkwood-Arundel	Gold Coast	Southport	Gold Coast	1420
Ashmore-Benowa	Gold Coast	Southport	Gold Coast	1413
Noosa—Tewantin	Sunshine Coast	Noosa—Noosa-Noosaville	Sunshine Coast	1371
Ipswich North	Outer West	Ipswich Central	Outer West	1345
Maroochy—Buderim	Sunshine Coast	Caloundra—Kawana	Sunshine Coast	1329
Toowong	Middle West	City Inner	Inner	1279
Noosa—Sunshine-Peregian	Sunshine Coast	Noosa—Noosa-Noosaville	Sunshine Coast	1243
Maroochy—Coastal North	Sunshine Coast	Maroochy—Maroochydore	Sunshine Coast	1213

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 unpublished data.

Map 7.3 Commuting flows between Statistical Local Areas of residence and work, South East Queensland, 2006



Source: BITRE analysis of ABS *Census of Population and Housing* 2006 unpublished data.

The origin-destination pairs with the highest probabilities are measured simply by taking the number commuting to a given destination as a proportion of the number of employed residents in the origin SLA. Table 7.12 lists the origin-destination pairs in SEQ with the top ten probabilities in 2006. It specifically excludes commutes within the SLA of residence, which have previously been considered in some detail.

The top ten origin-destination pairs involve commutes to just three prominent places of work—Ipswich Central, Toowoomba Central and Noosa-Noosaville. Residents of surrounding SLAs tend to have a relatively high probability of commuting to these local employment hubs. For example the Ipswich Central SLA attracts 38 per cent of employed residents of Ipswich South-West, and similarly high proportions of employed residents of Ipswich West and Ipswich North (35 and 33 per cent, respectively). Toowoomba Central attracts between 26 and 33 per cent of employed residents from five of its surrounding SLAs. Noosa-Noosaville also attracts a high proportion of employed residents of the nearby SLAs of Tewantin and Sunshine-Peregian, which are largely residential in nature.

Table 7.12 Highest probabilities of commuting between different Statistical Local Areas, South East Queensland, 2006

SLA of residence	Selected SLA of work	Total employed residents	Total commuting to selected SLA	Probability of working in this SLA (per cent)
Top ten probabilities of commuting to work for origin-destination pairs in SEQ				
Ipswich South West	Ipswich Central	1998	757	37.9
Ipswich West	Ipswich Central	3393	1183	34.9
Toowoomba South-East	Toowoomba Central	12170	4023	33.1
Toowoomba North-East	Toowoomba Central	4490	1472	32.8
Ipswich North	Ipswich Central	4106	1345	32.8
Noosa—Tewantin	Noosa—Noosa-Noosaville	4416	1371	31.0
Noosa—Sunshine-Peregian	Noosa—Noosa-Noosaville	4299	1243	28.9
Toowoomba West	Toowoomba Central	9547	2726	28.6
Toowoomba North-West	Toowoomba Central	7855	2192	27.9
Cambooya Part A	Toowoomba Central	1920	502	26.1
Top ten probabilities of commuting to work for origin-destination pairs in Brisbane SD				
Ipswich South-West	Ipswich Central	1998	757	37.9
Ipswich West	Ipswich Central	3393	1183	34.9
Ipswich North	Ipswich Central	4106	1345	32.8
City Remainder	City Inner	533	2170	24.6
Spring Hill	City Inner	550	2419	22.7
Fortitude Valley	City Inner	620	3142	19.7
Newstead	City Inner	639	3441	18.6
New Farm	City Inner	1096	5916	18.5
Karana Downs-Lake Manchester	Ipswich Central	554	3126	17.7
Kangaroo Point	City Inner	627	3827	16.4

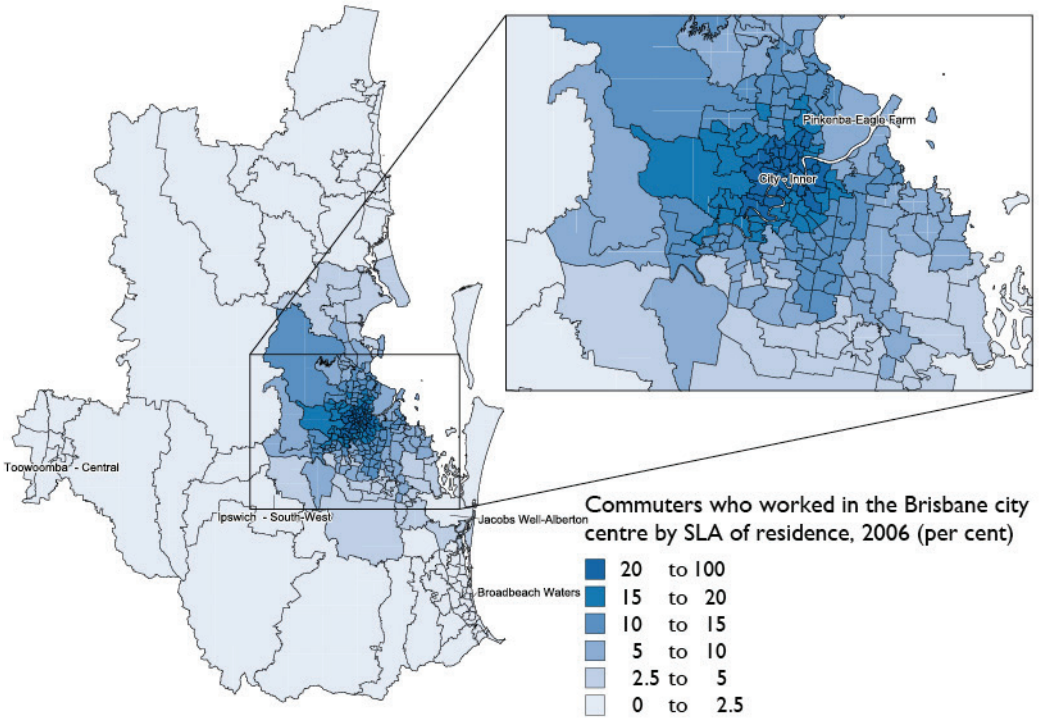
Note: Excludes commutes within the SLA of residence.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 unpublished data.

The second part of Table 7.12 focuses only on origin-destination pairs within the Brisbane SD. The top ten origin-destination pairs involve commutes to just two prominent places of work—Ipswich Central and the City Inner SLA in the Brisbane CBD. Six of the top 10 pairs with the highest probabilities involve commutes to a place of work in the City Inner SLA from a different SLA in the Inner sector. The probabilities for these origin-destination pairs ranged from 16.4 per cent to 24.6 per cent. The probability of commuting to the City Inner SLA exceeds 20 per cent for two adjoining SLAs (City Remainder and Spring Hill).

Map 7.4 shows that the probability of commuting to a place of work in the Brisbane CBD—defined here as the combination of the City Inner and City Remainder SLAs—is highest in the inner city and declines relatively rapidly with distance from the city centre.

Map 7.4 Proportion of employed residents of each Statistical Local Area who commute to a place of work in Brisbane Central Business District, 2006



Note: Brisbane CBD defined as consisting of the City Inner and City Remainder SLAs.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 unpublished data.

In the Inner sector, the SLAs which have the highest proportion of employed residents commuting to a place of work in the Brisbane CBD are City Inner (50 per cent), City Remainder (46 per cent) and Spring Hill (34 per cent).

Among SLAs in the Middle sector, Toowong, Newmarket and Wilston have around 23 per cent of residents who work in the CBD, while the Inala, Wacol and Willawong SLAs have a very low proportion of residents who work in the CBD (3 to 4 per cent).

In the Outer sector, the Hills District stands out with 15 per cent of employed residents commuting to work in the CBD. In the rest of SEQ, the SLA with the highest probability of

commuting to the CBD for work is Edens Landing-Holmview on the Gold Coast (6 per cent). All other locations in the rest of SEQ have less than 5 per cent of employed residents commuting to a place of work in the Brisbane CBD.

To summarise, the probability that an employed resident chooses to work in the Brisbane CBD is at its highest for the Inner sector (27 per cent), and tends to decline with distance from the CBD. The probability of an employed resident commuting to work in the CBD is 15 per cent for Brisbane's Middle sector, 6 per cent for the Outer sector and just 1 per cent in the rest of SEQ.

Commuting distance, speed and time

This section examines the geographic patterns of commuting distance and time in SEQ. As a multi-city region, SEQ provides an interesting case of commuting dynamics, particularly in terms of distance (Li, Corcoran et al. 2012).

A key component of the analysis here is the spatial variation in the average distance travelled to work within SEQ. The analysis is based on SEQ residents who work within SEQ (i.e. it excludes commuting to and from the rest of the Queensland or interstate).

The average distance estimates presented in this chapter represent road network distances, which were derived by BITRE based on data from the Queensland Department of Transport and Main Roads (DTMR) Modelling, Data and Analysis Centre (MDAC) on the shortest road network distance between each SLA pair. The DTMR dataset was derived from the South East Queensland Strategic Transport Multi-Modal Model (SEQSTM-MM) for 2006, using detailed destination zone data. As the model does not include Toowoomba, DTMR derived shortest path road network distance estimates for pairs involving Toowoomba using GIS analysis of 2006 census data at the destination zone scale. The DTMR distance estimates were then weighted by BITRE according to census counts of total commuters for 2006, and aggregated to the sector and subregional scale. BITRE's estimates assume that the road network distance between each origin-destination pair is representative of the distance travelled by all commuters between the origin-destination pair (even though some commuters use rail, cycle or footpath networks). Those who report working from home have been assigned a commuting distance of zero. Using this approach results in an estimated average distance of 15.3 kilometres (km) for commutes within SEQ in 2006.

The BITRE estimates of average commuting distance for SEQ in 2006 are consistent with the 15.3km average for 2006 derived by the Queensland Government (Doonan 2012).

Straight line distance estimates were also calculated by BITRE for SEQ, to enable cross-city comparison of regression results (see Chapter 8). The straight line distance measure was based on the population weighted centroid of the origin SLA and the job weighted centroid of the destination SLA. However, the current chapter focuses on the road network distance figures, which are systematically higher than the straight line distance estimates, although the two sets of estimates by place of residence and place of work align very closely at the subregion scale, with correlation coefficients of 99 and 96 per cent respectively. Appendix C provides further information on the straight line distance estimates.

In addition to analysing spatial variation in commuting distances, this section draws together information from several sources that reveal patterns of spatial variation in travel time and speeds within SEQ.

Overview—sectors and subregions

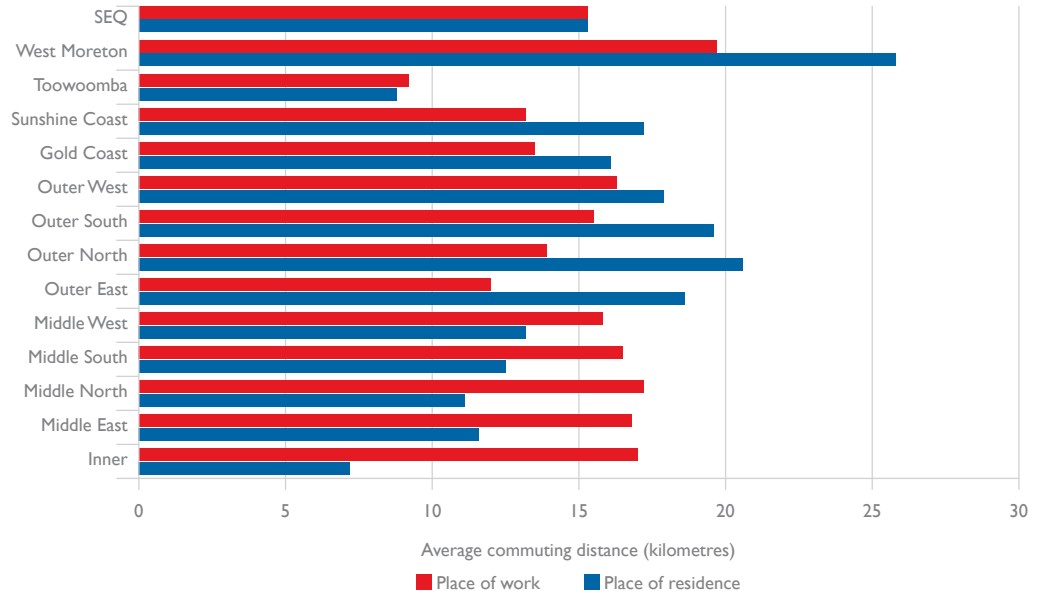
Figure 7.2 shows the average distance of commuter travel within SEQ in 2006 based on the subregion of residence and subregion of work. Table 7.13 presents the same information, alongside averages for the Inner, Middle and Outer sectors of Brisbane.

The average commuting distances by place of residence were low for Inner sector residents (7.2km), somewhat higher for Middle sector residents (12.0km) and higher again for Outer sector (19.6km) and West Moreton residents (25.7km). In the Outer sector, the Outer North has the highest commuting distances (20.6km). On average, residents of the Outer sector travelled well over double the distance that Inner sector residents travelled to get to work.

On a place of work basis, West Moreton and Inner sector workers had the longest average commuting distances, followed by Middle sector workers. Those who worked in the Inner sector had higher commuting distances because the greater number and range of jobs attracted workers from more distant areas. In contrast, West Moreton's high commuting distances reflect relatively low job numbers spread across a vast geographical area. The shorter distance commutes to jobs in Gold Coast, Sunshine Coast, Toowoomba, Outer East and Outer North reflect a localised job market where a high proportion of the jobs are filled by residents of nearby suburban locations.

West Moreton had the highest average commuting distances on both a place of residence and a place of work basis. Toowoomba had a relatively low average commuting distance on both a place of residence and place of work basis. However, while Inner sector residents had the lowest average commuting distance by place of residence, the Inner sector had a much higher average commuting distance by place of work.

Figure 7.2 Average commuting distances by subregion and region, South East Queensland, 2006



Note: Distance calculation based on the road network distance between SLA pairs, sourced from Queensland DTMR MDAC, based on SEQSTM-MM. Based on commutes within SEQ only.

Source: BITRE analysis of customised Queensland DTMR road network distance dataset and origin-destination matrix at SLA scale sourced from the ABS *Census of Population and Housing* 2006.

Table 7.13 Average commuting distances by subregion and sector, South East Queensland, 2006

Regions/Sectors/Subregions	Place of residence (km)	Place of work (km)
Inner	7.2	17.0
Middle Total	12.0	16.6
Middle East	11.6	16.8
Middle North	11.1	17.2
Middle South	12.5	16.5
Middle West	13.2	15.8
Outer Total	19.6	14.6
Outer East	18.6	12.0
Outer North	20.6	13.9
Outer South	19.7	15.5
Outer West	17.9	16.3
Brisbane Total	14.9	16.2
Gold Coast	16.1	13.5
Sunshine Coast	17.2	13.2
Toowoomba	8.8	9.2
West Moreton	25.7	19.6
SEQ Total	15.3	15.3

Note: Distance calculation based on the road network distance between SLA pairs, sourced from Queensland DTMR MDAC, based on SEQSTM-MM. Based on commutes within SEQ only.

Source: BITRE analysis of customised Queensland DTMR road network distance dataset and origin-destination matrix at SLA scale sourced from the ABS *Census of Population and Housing* 2006.

There are two main data sources which provide estimates of average commuting times for SEQ and/or the Brisbane SD:

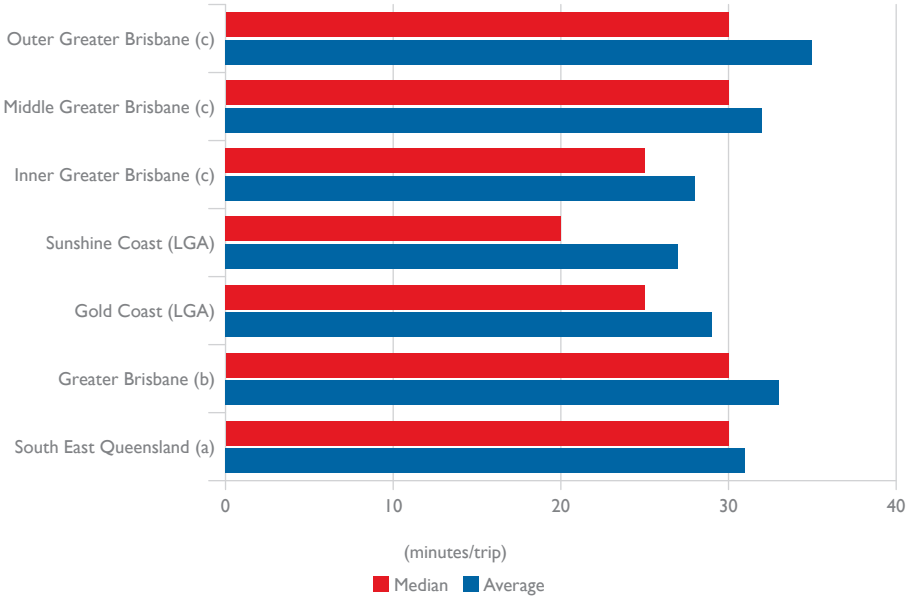
- The Queensland Government's *Household Travel Survey* (HTS) estimate of the average duration of a commuting trip for SEQ is 31 minutes per trip for 2009 (see Figure 7.3) and 33 minutes in 2007, compared to the Brisbane estimates of 33 minutes for 2009 and 35 minutes for 2007.[59] The median duration of a commuting trip was 30 minutes for both SEQ and Brisbane in both 2007 and 2009. Journey time is the cumulative time spent travelling, which excludes time spent engaging in activities at interim stops on the journey to work.
- According to the HILDA survey, for Brisbane residents who were employed full-time, the average was 33 minutes per one-way commute in 2007.[60]

59 Customised HTS data provided by Queensland Transport and Main Roads MDAC.

60 Customised HILDA data provided by National Centre for Social and Economic Modelling (NATSEM). The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported here, however, are those of the authors and should not be attributed to either FaHCSIA or the MIAESR.

The HTS data on the average duration of commuting trips was also provided to us at a more disaggregated scale for 2009. Figure 7.3 shows that the average duration of a commuting trip was lowest for residents of the Inner sector (28 minutes), higher for Middle sector residents (32 minutes) and higher again for Outer sector residents (35 minutes). Average commuting trip durations for Gold Coast and Sunshine Coast residents were similar to those for Inner sector residents, at 29 and 27 minutes, respectively.

Figure 7.3 Average work trip duration by sector and region of work, South East Queensland, 2009



Notes: Based on 2010 LGA boundaries. The sectors and regions were specified by MDAC: a) includes Greater Brisbane, Gold Coast and Sunshine Coast LGAs; b) Includes Moreton Bay, Brisbane, Ipswich, Redland and Logan; c) the Inner, Middle and Outer sector were defined to match the sectoral definitions adopted by BITRE in this report.

Source: Customised data from the SEQ *Household Travel Survey* 2009, provided by Queensland DTMR MDAC.

These spatial differences in commuting times are less pronounced than the spatial differences in commuting distances that were detailed in Table 7.13. The above-average commuting distances of Outer sector, Gold Coast and Sunshine Coast residents do not necessarily translate into longer trip durations, due to a greater speed of travel being possible in these locations, compared to more congested inner city locations.

The HTS data also provides estimates of average commuting distance, which is measured as the cumulative network (road, road/busway, rail or active network) distance taking into account all stops made on the journey to work. Combining the average commuting distance and time figures for SEQ in 2009 gives an average door-to-door speed of around 35 km/hour while commuting to work. For Brisbane, the implied average speed is a little lower at 31 km/hour. The implied average speed is lowest for Inner sector residents (19 km/hour) and highest for Sunshine Coast residents (47 km/hour).[61]

61 Average commuting speeds derived by BITRE from customised HTS 2009 commuting distance and time data provided by Queensland Transport and Main Roads MDAC.

The *SEQ Travel Time Survey* estimates that overall average speeds in SEQ at peak time were 45 km/hour in 2009 (Department of Transport and Main Roads 2010a). As this survey focuses solely on motorised travel it is expected that it will produce higher average speed estimates than the HTS estimates described in the previous paragraph, which capture time spent walking or cycling as part of the commute to work. The *SEQ Travel Time Survey* reveals that average peak period travel speeds in 2009 were considerably faster on the Sunshine Coast (around 60 km/hour) than on the Gold Coast (around 47 km/hour) or in Brisbane (around 40 km/hour) (ibid).

Small area differences

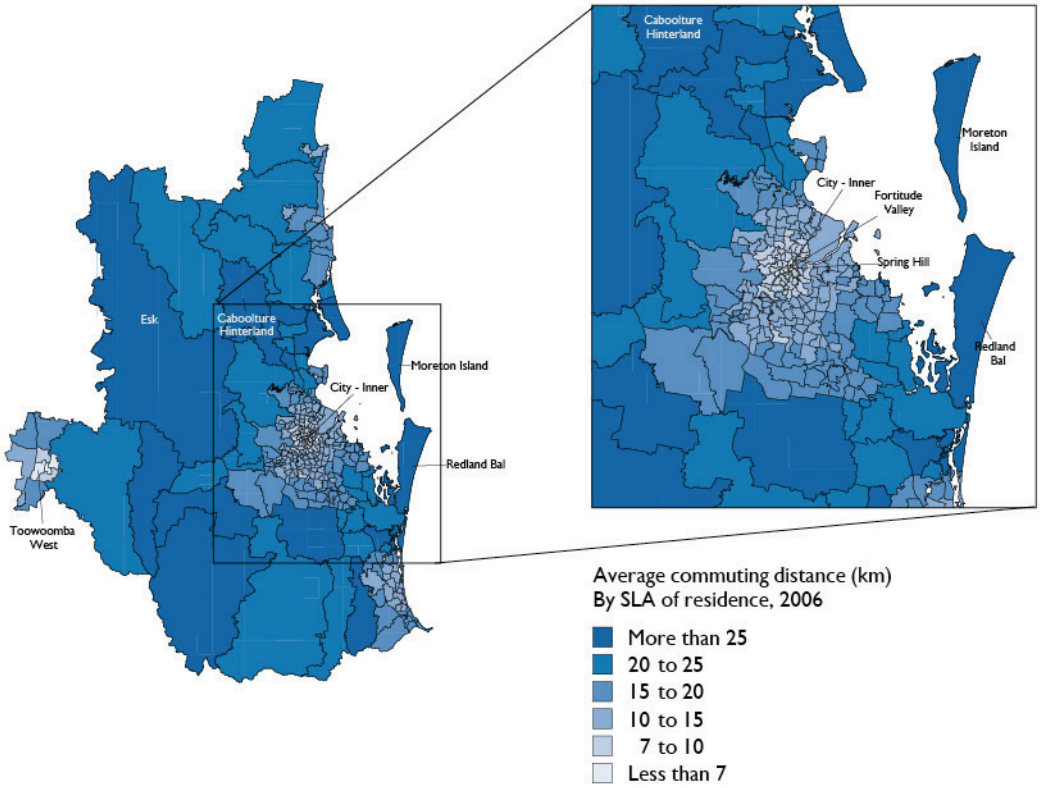
Yates, Randolph et al. (2006) analyses SEQ commuting for selected industries and professions and finds that there is a strong job concentration in Brisbane's CBD for high skilled computer professionals, whilst jobs are more dispersed across the city for nursing, cleaning and hospitality. BITRE's results on Melbourne, Sydney and Perth are also consistent with the finding that highly specialised employment draws workers from further afield (BITRE 2010, BITRE 2011a, BITRE 2012a). Generally high skill and income employees are prepared to commute longer distances (Axisa et. al. 2012, Mao and Tang 2012).

Map 7.5 shows how average commuting distance varies by SLA of residence in 2006. The map shows a pattern of layered rings—residents of the City Inner SLA in the CBD commute the least average distance to work, followed by residents of other Inner sector SLAs (e.g. Spring Hill, City Remainder and Fortitude Valley), then the Middle sector SLAs (e.g. Willawong and Albion).

Within the Middle sector, there is a variation in the commuting distance. On average residents of the Middle West commute 13.2km to work. Residents of the Middle East, Middle South and Middle North subregions travel between 11.1 and 12.5km.

There is a tendency for the outer SLAs to have the longest commuting distances, such as residents of Caboolture Hinterland and Redland Balance, who have average commuting distances of 34 and 31km, respectively. The Toowoomba region is an exception. It is located on the western fringe of SEQ, yet has low commuting distances, averaging just 8.8km. The Toowoomba West, Toowoomba Central and Toowoomba North-East SLAs all had particularly low commuting distances (6.5km or less), reflecting above-average self-containment and/or a high probability of commuting to the neighbouring Toowoomba Central SLA (see Table 7.12).

Map 7.5 Average commuting distances by Statistical Local Area of residence, South East Queensland, 2006



Note: Distance calculation based on the road network distance between SLA pairs, sourced from Queensland DTMR MDAC, based on SEQSTM-MM. Based on commutes within SEQ only.

Source: BITRE analysis of customised Queensland DTMR road network distance dataset and origin-destination matrix at SLA scale sourced from the ABS *Census of Population and Housing* 2006.

Table 7.14 lists the SLAs of residence which have the highest and lowest average commuting distances in 2006. Residents of the Inner SLAs of City Inner, Spring Hill, City Remainder and Fortitude Valley have the lowest commuting distances, averaging between 4 and 6km. The high estimated commuting distances for the island locations of Redland Balance and Moreton Island are unusual given the very high self-containment rates of these two SLAs—the distance estimates reflect the SEQSTM-MM output that assigns a lengthy average road network distance for trips within these two SLAs (21 and 35 km, respectively). Like the other SLAs with very high estimated commuting distances, such as Caboolture Hinterland, Boonah and Esk, the two island SLAs cover a large land area.

Table 7.14 Longest and shortest averages commuting distances by Statistical Local Area of residence, South East Queensland, 2006

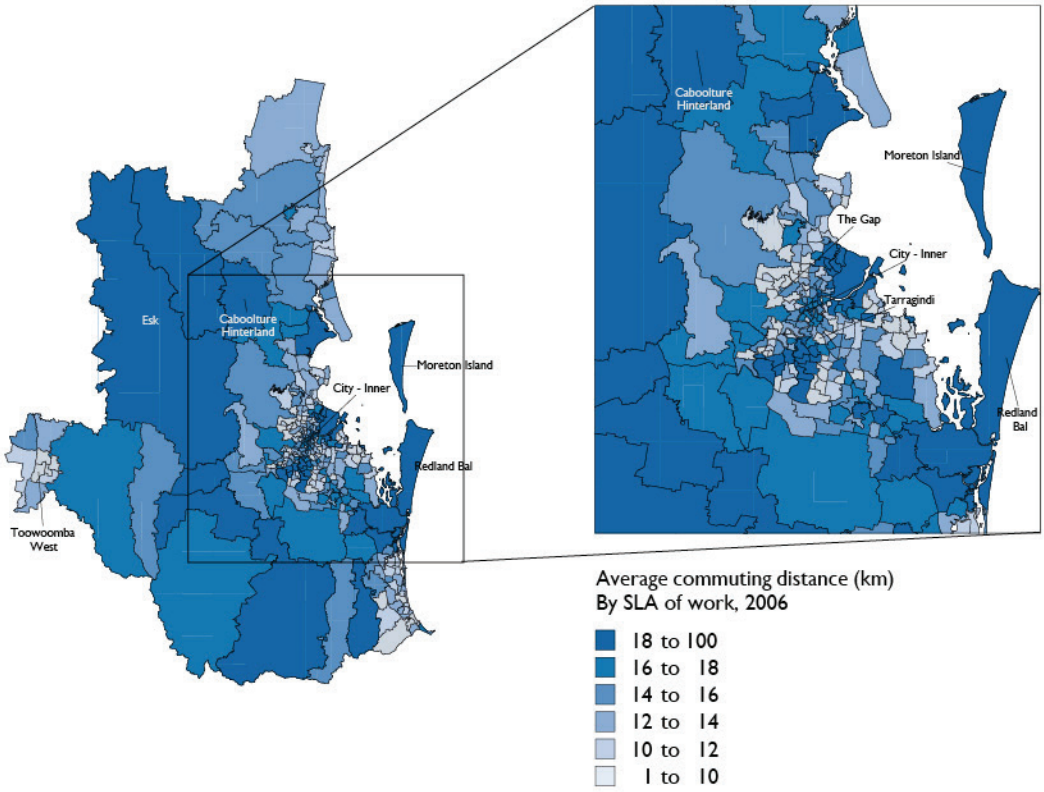
SLA of residence	Subregion/ Region	Longest average distance (km)	SLA of residence	Subregion/ Region	Shortest average distance (km)
Moreton Island	Middle East	35.3	City Inner	Inner	4.3
Caboolture Hinterland	Outer North	34.2	Spring Hill	Inner	5.3
Esk	West Moreton	31.5	City Remainder	Inner	5.5
Redland Balance	Outer East	31.1	Fortitude Valley	Inner	5.9
Boonah	West Moreton	29.6	Toowoomba West	Toowoomba	6.3

Note: Distance calculation based on the road network distance between SLA pairs, sourced from Queensland DTMR MDAC, based on SEQSTM-MM. Based on commutes within SEQ only.

Source: BITRE analysis of customised Queensland DTMR road network distance dataset and origin-destination matrix at SLA scale sourced from the ABS *Census of Population and Housing* 2006.

Map 7.6 shows the average commuting distance to each SLA of work. The spatial pattern is much less obvious than that of the previous map. The Inner sector stands out from the surrounding SLAs as having relatively high commuting distances, as does the area around Brisbane Airport in the Middle North and the area around Mount Gravatt and Acacia Ridge in the Middle South.

Map 7.6 Average commuting distances by Statistical Local Area of work, South East Queensland, 2006



Note: Distance calculation based on the road network distance between SLA pairs, sourced from Queensland DTMR MDAC, based on SEQSTM-MM. Based on commutes within SEQ only.

Source: BITRE analysis of customised Queensland DTMR road network distance dataset and origin-destination matrix at SLA scale sourced from the ABS *Census of Population and Housing* 2006.

Table 7.15 lists the SLAs which have the highest and lowest average commuting distances on a place of work basis for 2006. The geographically large Moreton Island, Redland Balance, Caboolture Hinterland and Kilcoy SLAs have high estimated commuting distances, even though the majority of workers are sourced from within the same SLA. Those who work at Pinkenba-Eagle Farm in the Middle North travel 28.4km on average. This SLA contains the Brisbane Airport and surrounding industrial areas, which draw workers from across the city. On census day in 2006, it had only 352 residents, yet it attracted over 23 100 commuters, including 7 500 commuters working in the *Transport and storage* industry.

The SLAs with the shortest commuting distances were residentially oriented SLAs, in which most of the jobs were focused on serving the local population. The average commuter travels less than 8 kilometres to their workplace in Upper Kedron,[62] Elanora and The Gap.

Table 7.15 Longest and shortest average commuting distances by Statistical Local Area of work, South East Queensland, 2006

SLA of work	Subregion	Longest average distance (km)	SLA of work	Subregion	Shortest average distance (km)
Moreton Island	Middle East	57.0	Upper Kedron	Middle North	3.7
Kilcoy	West Moreton	30.3	Elanora	Gold Coast	7.4
Pinkenba-Eagle Farm	Middle North	28.4	The Gap	Middle North	7.6
Caboolture Hinterland	Outer Northern	26.4	Tarragindi	Middle South	8.0
Redland Balance	Outer Eastern	25.9	Wellington Point	Outer Eastern	8.2

Note: Distance calculation based on the road network distance between SLA pairs, sourced from Queensland DTMR MDAC, based on SEQSTM-MM. Based on commutes within SEQ only.

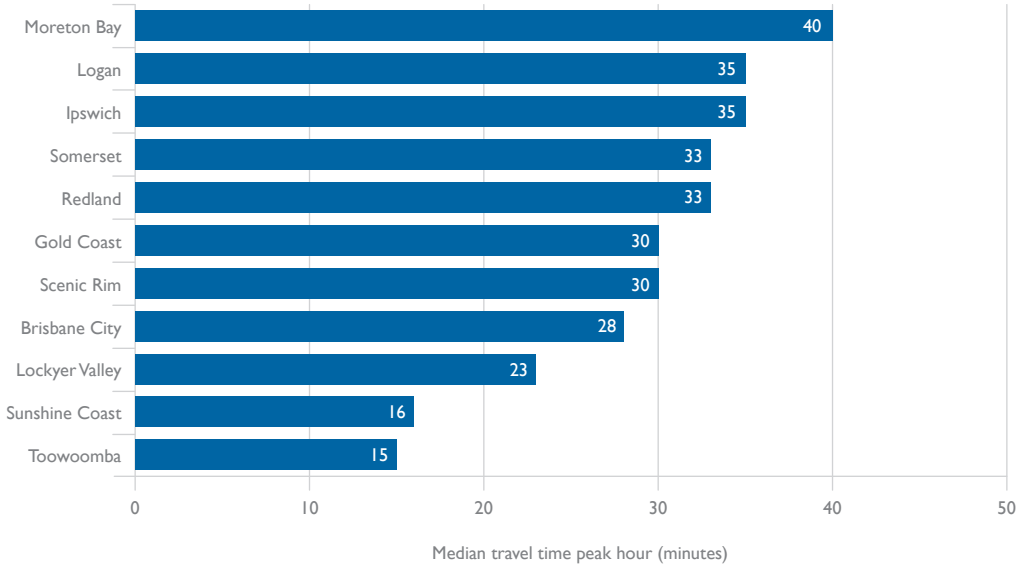
Source: BITRE analysis of customised Queensland DTMR road network distance dataset and origin-destination matrix at SLA scale sourced from the ABS *Census of Population and Housing* 2006.

An area's ability to attract workers from further afield is related to its industry specialisations and the size of the employment agglomeration. The City Inner and City Remainder SLAs represent Brisbane's major employment agglomeration, offering a range of highly skilled and well-renumerated employment opportunities. City Inner has *Property and business services* as the largest employing industry and *Finance and insurance* as its top specialisation industry, attracting relatively high skill and high income workers from throughout the metropolitan area. City Remainder has *Government administration and defence* as both the largest employing and top specialisation industry. On average, workers commute 17.2km to City Inner and 17.8km to City Remainder.

Small area information on spatial differences in commuting times was not readily available. Some limited HTS data on the average duration of work trips for the Inner, Middle and Outer sectors and the Gold Coast and Sunshine Coast LGAs was previously presented in Figure 7.3. A community survey conducted by the Productivity Commission (PC 2011) provides some slightly more detailed information on the median peak period travel time for SEQ LGAs in 2011, as shown in Figure 7.4. PC (2011) provides a median travel time estimate for the Brisbane City Council (which corresponds to the Inner and Middle sectors combined) of 28 minutes. The median travel time estimates for SEQ LGAs range between 15 minutes for Toowoomba and 40 minutes for the Moreton Bay LGA.

62 Upper Kedron has a high proportion of people working from home (40 per cent) and involves a small number of jobs.

Figure 7.4 Travel times to work, South East Queensland Local Government Areas, 2011



Note: The Brisbane City figure refers to the Brisbane City Council area, not the Brisbane region (i.e. Brisbane SD), as used elsewhere in this report.

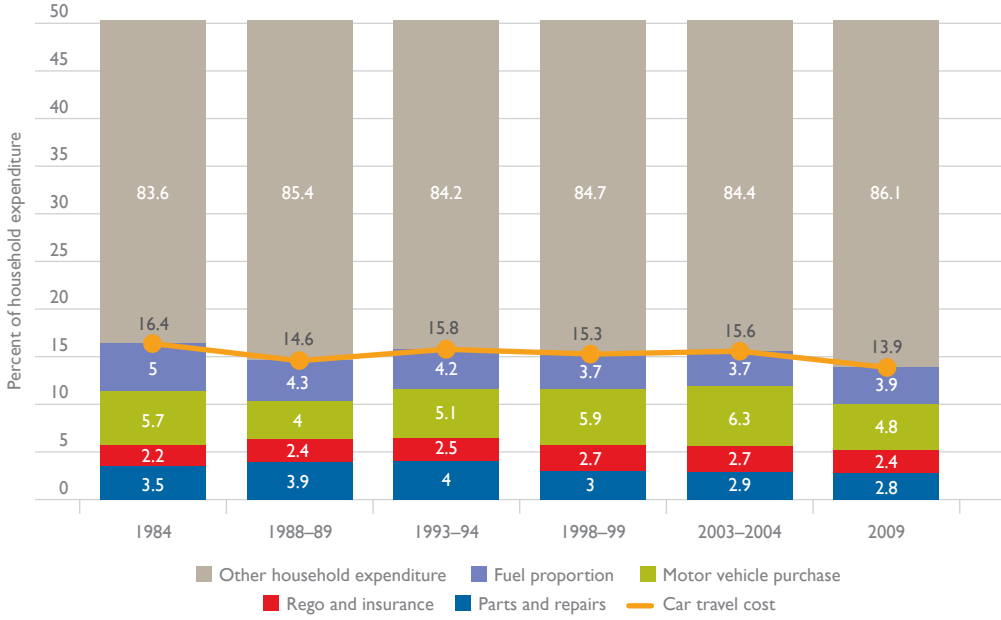
Source: Productivity Commission Community Survey 2011.

Travel costs

This section discusses the price signals reflected in the cost of daily travel for an individual or a household. Ideally, a comprehensive estimate of travel costs should include not only the time and financial costs to an individual, but also a range of indirect costs, such as the external costs of congestion, pollution, crashes, etc. (VCEC 2006). Resource and data constraints often mean that the indirect costs are excluded in calculating travel costs.

In 2009–10 for Brisbane the average weekly car travel cost was $183.25 or 13.9 per cent of the average weekly household expenditure of $1350 (ABS 2011). Doonan (2012) from the Queensland Department of Transport and Main Roads presented estimates of the share of SEQ household expenditure spent on car-related costs from 1984 to 2009, as shown in Figure 7.5. The proportion of car-related costs shows small fluctuations over the years, ranging from a high of 16.4 per cent in 1984 to the 2009 low of 13.9 per cent. The relative stability of vehicle expenditures seems to support car use because once a vehicle is bought and registered (a sunk cost) then there is an incentive to drive a car for practical and economic reasons. The cost of fuel comprises around one quarter of the cost of operating a car, or less than 4 per cent of household expenditure since 1998 (ibid). Doonan linked the dominance of the car mode share—particularly in Brisbane, Moreton Bay, Ipswich, Redland and Logan—to the fact that 80 per cent of residents have similar or better travel time to the CBD by car than by public transport (Doonan 2012).

Figure 7.5 Share of car-related costs in household expenditure, South East Queensland, 1984 to 2009



Note: Data relates to all travel purposes, not just commuter travel. Car-related costs refer to proportion of money outlays as a share of household expenditure of the respective year. This cost does not include monetised travel time.

Source: Reproduced from Doonan (2012).

Changes between 2001 and 2006

This section's main focus is on the changes that have occurred to commuting flows between 2001 and 2006. First an analysis of long distance commuters is presented, followed by an investigation into the changes occurring in commuter flows within SEQ.

The analysis is based on comparing the origin-destination commuter flow matrices from the ABS *Census of Population and Housing* for 2001 and 2006. The ABS' 2001 commuting matrix is subject to some coding problems, as outlined in BITRE (2010, p.75).[63] For commutes between SLAs within SEQ, these issues have been dealt with through the formation of aggregate SLA regions in known problem areas such as Mount Gravatt and Toowoomba (see Table B.1 in Appendix B and related text). However, this quality concern has constrained our analysis of changes in long distance commutes.

Changes in long distance commutes

Table 7.16 lists the main sources of long distance commuters to SEQ workplaces, as of 2006, and identifies the change in commuting for those locations between 2001 and 2006. The main sources of inward commuting to SEQ in both years are the Tweed and 'Rest of Toowoomba' regions.

Commuter flows between Tweed and SEQ grew very strongly between 2001 and 2006. The proportion of employed Tweed residents commuting to a place of work in SEQ rose from 19 per cent in 2001 to 22 per cent in 2006. This growth mainly related to commutes from Tweed to the adjoining Gold Coast region of SEQ, which increased by over 1500 persons from 2001 to 2006. Coolangatta, Bilinga-Tugun and Burleigh Heads were amongst the most common places of work for Tweed commuters.

Table 7.16 Main regions of residence for people employed at a fixed work address in South East Queensland, 2001 and 2006

Working zone of residence	Number of working zone residents employed in SEQ 2001	Number of working zone residents employed in SEQ 2006	Change in number of commuters, 2001 to 2006
Tweed	4577	6327	1750
Rest of Toowoomba	2281	2701	420
Sydney and surrounds	603	1068	465
Gympie and surrounds	633	1002	369
Melbourne and surrounds	487	956	469

Note: Tweed relates to the Tweed LGA. Rest of Toowoomba relates to that part of the Toowoomba working zone that lies outside SEQ (i.e. outside the Toowoomba SSD).

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

63 A number of Queensland specific issues have also been identified by BITRE, such as the 1324 people who apparently commuted from SEQ (largely the Gold Coast) to the Richmond SLA in Queensland's outback in 2001 to work across a wide range of industries (with only 13 employed in Mining). The number commuting between these two locations in 2006 was just 3 persons. The identified quality issues for SEQ seem to largely relate to the place of work data.

There was also strong growth in the number of persons working in SEQ who resided in the adjoining regions of 'Rest of Toowoomba' and Gympie, or in the capital cities of Sydney and Melbourne. The proportion of employed 'Rest of Toowoomba' residents commuting to a place of work in SEQ rose from 22 per cent in 2001 to 24 per cent in 2006, and most of the growth related to commutes to a place of work in the Toowoomba SSD. The proportion of employed Gympie working zone residents commuting to SEQ rose from 5 to 7 per cent, with most of this growth relating to commutes to the Sunshine Coast. While only a tiny fraction of Sydney and Melbourne residents reported a place of work in SEQ, this fraction roughly doubled in both cities between 2001 and 2006. While few Sydney and Melbourne residents would commute to SEQ on a daily basis, residents may be commuting less frequently (e.g. weekly), or be temporarily living and working in SEQ at the time of the census, while retaining a usual place of residence in the other city.

Table 7.17 reveals that, between 2001 and 2006, there was strong growth in the number of people commuting from their SEQ residences to a place of work in Tweed or the 'Rest of Toowoomba'. While the proportion of employed SEQ residents commuting to Tweed rose from 0.25 to 0.29 per cent, the proportion commuting to 'Rest of Toowoomba' declined slightly from 0.24 to 0.23 per cent.

Table 7.17 Main regions of employment for South East Queensland residents employed at a fixed work address outside South East Queensland, 2001 and 2006

Working zone of employment	Number of SEQ residents employed in working zone, 2001	Number of SEQ residents employed in working zone, 2006	Change in number of commuters, 2001 to 2006
Tweed	2689	3745	1056
Rest of Toowoomba	2532	2956	424
Sydney and surrounds	2157	2248	91
Melbourne and surrounds	992	1144	152
Gympie and surrounds	971	899	–72

Note: Tweed relates to the Tweed LGA. Rest of Toowoomba relates to that part of the Toowoomba working zone that lies outside SEQ (i.e. outside the Toowoomba SSD).

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

The growth in commuting to Sydney and Melbourne was relatively modest. The proportion of employed SEQ residents commuting to Sydney declined slightly from 0.20 to 0.17 per cent, while the proportion commuting to Melbourne remained unchanged at 0.09 per cent. Between 2001 and 2006, there was a decline in the number of SEQ residents (and the proportion of SEQ residents) commuting to a place of work in the Gympie working zone.

Overview of change—SEQ's regions and subregions

The focus of this section is to provide an analysis of the changing commuter flows that occurred within SEQ between 2001 and 2006. The subregions and regions are defined based on ABS ASGC boundaries, as of 2006. The figures were produced from the ABS origin-destination commuting flow matrices for SLAs, which were then aggregated to the subregion/region scale. Translating the 2001 data to the 2006 subregion/region boundaries required some estimation, which influences the West Moreton region results, and to a lesser degree the results for the Gold Coast region and the Outer South.[64]

Table 7.18 provides a broad overview of changes in commuting flows between the different SEQ regions. Between 2001 and 2006, the commuting flows within SEQ grew by 3.6 per cent per annum, which resulted in an increase of 181 038 commuters with a known SLA of work and residence within SEQ. Much of the increase was due to increased commutes within the Brisbane SD (108 013 persons or 60 per cent of the total).

In terms of cross-region commutes, the largest changes related to commuting from the Gold Coast to Brisbane (+5218) and from Brisbane to the Gold Coast (+3530). For each of the non-Brisbane regions, the increase in commuting to a Brisbane workplace outweighed the increase in commuting in the reverse direction.

Table 7.18 Change in number of people commuting between regions of South East Queensland, 2001 to 2006

	Place of work					
Place of residence	Brisbane	Gold Coast	Sunshine Coast	Toowoomba	West Moreton	SEQ
Brisbane	108 013	3 530	672	64	427	112 706
Gold Coast	5 218	32 763	–59	47	–50	37 919
Sunshine Coast	1 470	–19	20 737	27	–15	22 200
Toowoomba	182	–7	–2	4 833	108	5 114
West Moreton	1 087	110	6	263	1 633	3 099
SEQ	115 971	36 377	21 354	5 234	2 102	181 038

Note: This is based on workers who had a known SLA of residence within SEQ and a known SLA of work within SEQ. Due to boundary changes, the 2001 flow data for West Moreton, Gold Coast and Brisbane involves a degree of estimation.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

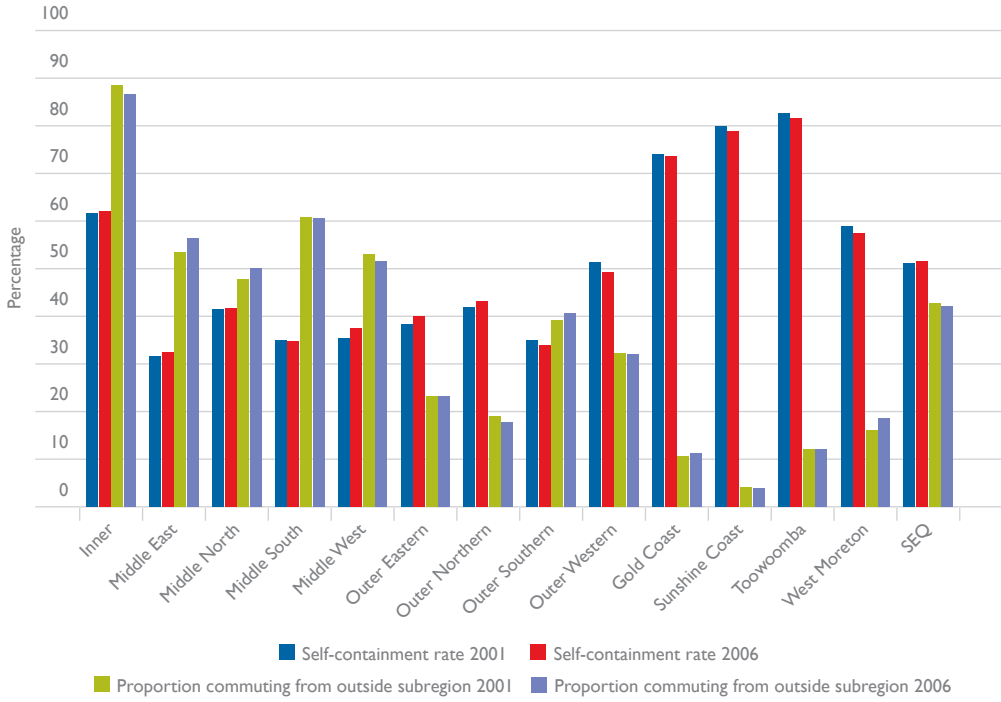
Figure 7.6 summarises the change in each subregion's degree of employment self-containment (i.e. the proportion of employed residents who work in their home subregion) and the change in the extent to which each subregion is able to attract commuters from outside its own boundaries. Neither measure changed substantially for SEQ between 2001 and 2006. The overall self-containment rate for SEQ rose marginally, by 0.5 percentage points. There was a 0.8 percentage point decline in the proportion of SEQ workers commuting to their subregion/ region of work from outside the boundaries of that subregion/region.

64 Specifically, the issue relates the 2001 SLA of Beaudesert Part B, which partially belongs to three different subregions/ regions—West Moreton, Gold Coast and Outer South. Population weighted concordances and the 2006 commuting matrix were used to produce commuting flow estimates for origin-destination pairs involving this SLA for 2001.

The proportion of Brisbane SD residents working in their home subregion rose from 39.7 per cent in 2001 to 40.3 per cent in 2006, but this was partially offset by declines in the self-containment rate of each of the regions in the rest of SEQ. A significant increase in the self-containment rate was evident for the Middle West subregion (+2.1 percentage points), with smaller increases in the Outer East (+1.6 percentage points) and Outer North subregions (+1.2 percentage points). There was a significant decline in the self-containment rate of the Outer West subregion (–2.1 percentage points), with smaller declines in West Moreton (–1.4 percentage points) and the Sunshine Coast (–1.1 percentage points).

The proportion of Inner sector workers who resided outside the Inner sector remained very high, but declined by 2.0 percentage points between 2001 and 2006. The Middle West and Outer North experienced smaller declines in the proportion of workers commuting from outside the subregion. The Middle East, Middle North and West Moreton all experienced 2–3 percentage point increases in the proportion of workers commuting from outside the subregion/region, while the Outer South experienced a more modest increase (1.3 percentage points).

Figure 7.6 Self-containment and proportion commuting from outside by subregion and region, Sydney, 2001 and 2006



Note: Self-containment rate derived at the subregion scale within the Brisbane SD and at the regional scale within the rest of SEQ. Self-containment rate expressed as a proportion of all employed residents of subregion (for Brisbane) or region (for rest of SEQ). Proportion of workers commuting from outside subregion/region boundaries expressed as a proportion of all people who are employed in the subregion/region. Due to boundary changes, the 2001 flow data for West Moreton, Gold Coast and the Outer South subregion involves a degree of estimation.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 data.

Table 7.19 summarises the changes in commuter flows at the subregion scale. The largest absolute increases between 2001 and 2006 occurred for the flows *within* the home subregion or region. Commuting flows within the Gold Coast region increased by 32 763 persons, while commuting flows within the Sunshine Coast region increased by 20 737 persons and commuting flows within the Outer North subregion increased by 13 883 persons.

The largest changes in flows between different subregions were:

- an extra 5263 persons commuting from the Outer North to the Middle North
- the increases in commuting to an Inner sector workplace from the Middle North (+3838), Middle South (+3628), Middle West (+3387), Outer North (+2553) and Middle East (+2543).

While some origin-destination pairs experienced a decline in commuting flows between 2001 and 2006, these declines were small in magnitude (i.e. less than 100 persons).

At the sectoral scale within Brisbane, the largest increases related to commuting within the Middle sector (+ 31 382) and within the Outer sector (+ 28 490), while there were also strong increases in commuting from the Outer sector to the Middle sector (+ 16 267) and from the Middle sector to the Inner sector (+ 13 396).

Table 7.20 presents the percentage point change between 2001 and 2006 in the likelihood of employed residents of the origin subregion commuting to a place of work in the destination subregion. It shows only very minor changes occurred in these probabilities over the five year period, pointing to a high degree of stability in commuter behaviour. The most significant changes in probability between 2001 and 2006 were:

- the 2 percentage point increase in the likelihood that employed residents of the Middle West and Outer East would commute to a place of work in their home subregion (see also Figure 7.6)
- the 2 percentage point decline in the likelihood that employed residents of the Outer West would commute to a place of work in the Outer West
- the 2 percentage point decline in the likelihood that employed residents of the Outer East subregion would commute to a place of work in the Inner sector of Brisbane.

An interesting feature of Table 7.20 is the widespread declines in the likelihood of commuting to a place of work in Inner Brisbane. The probability that Outer sector residents would commute to a place of work in the Inner sector declined by 1.2 percentage points between 2001 and 2006, while for Middle sector residents the probability declined by 0.7 percentage points. Each of the eight contributing subregions experienced a reduction in the probability of commuting to a workplace in the Inner sector, although the decline was marginal for residents of the Outer West subregion. Despite these widespread declines in the likelihood of commuting to a place of work in Inner Brisbane, Table 7.20 shows that there were still increases in the number of people commuting to the Inner sector from each of these subregions and some of those increases were relatively large in magnitude.

Table 7.19 Change in commuting flow by subregion of origin and destination, South East Queensland, 2001 to 2006

	Place of work													
Place of residence	Inner	Middle East	Middle North	Middle South	Middle West	Outer East	Outer North	Outer South	Outer West	Gold Coast	Sunshine Coast	Toowoomba	West Moreton	SEQ
Inner	7 224	626	1 204	456	435	20	139	156	49	186	12	–2	–31	10 474
Middle East	2 543	3 976	579	994	174	438	127	114	15	177	–10	11	–32	9 105
Middle North	3 838	1 074	6 103	245	350	47	963	101	99	107	77	–7	–62	12 936
Middle South	3 628	1 593	648	5 115	1 138	167	77	1 061	265	488	–24	14	14	14 184
Middle West	3 387	521	1 044	1 079	6 749	80	133	171	412	209	14	–18	–78	13 703
Outer East	102	1 603	264	250	81	4 563	21	532	58	435	3	5	14	7 931
Outer North	2 553	1 008	5 263	227	255	48	13 883	176	35	151	565	10	–34	24 141
Outer South	295	1 115	325	1 787	617	264	–39	3 565	478	1 605	30	2	647	10 691
Outer West	949	233	295	1 173	1 771	71	51	345	4 439	172	5	49	–12	9 541
Gold Coast	912	508	652	989	344	191	40	1 496	86	32 763	-59	47	–50	37 919
Sunshine Coast	275	64	351	76	28	19	617	44	–4	–19	20 737	27	–15	22 200
Toowoomba	41	–1	30	–2	44	3	5	–8	70	–7	–2	4 833	108	5 114
West Moreton	74	36	58	140	124	46	115	–46	540	110	6	263	1 633	3 099
SEQ	25 821	12 356	1 6816	12 529	12 110	5 957	16 132	7 708	6 542	36 377	21 354	5 234	2 102	181 038

Note: This is based on workers who had a known SLA of residence within SEQ and a known SLA of work within SEQ. Due to boundary changes, the 2001 flow data for West Moreton, Gold Coast and the Outer South subregion involves a degree of estimation.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

Table 7.20 Change in probability of employed residents of origin subregion commuting to destination subregion, South East Queensland, 2001 to 2006

	Place of work														
Place of residence	Inner	Middle East	Middle North	Middle South	Middle West	Outer East	Outer North	Outer South	Outer West	Gold Coast	Sunshine Coast	Toowoomba	West Moreton	Other/ unknown^	SEQ
Inner	0	1	0	0	–1	0	0	0	0	0	0	0	0	0	0
Middle East	–1	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Middle North	–1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle South	–1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Middle West	0	0	0	0	2	0	0	0	0	0	0	0	0	–2	0
Outer East	–2	1	0	–1	0	2	0	0	0	1	0	0	0	0	0
Outer North	–1	0	–1	0	0	0	1	0	0	0	0	0	0	1	0
Outer South	–1	1	0	0	0	0	0	–1	0	1	0	0	1	0	0
Outer West	0	0	0	1	0	0	0	0	–2	0	0	0	0	1	0
Gold Coast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sunshine Coast	0	0	0	0	0	0	0	0	0	0	–1	0	0	1	0
Toowoomba	0	0	0	0	0	0	0	0	0	0	0	–1	0	1	0
West Moreton	0	0	0	0	0	0	0	0	1	0	0	0	–1	0	0
SEQ	–1	0	0	0	0	0	0	0	0	1	1	0	0	0	0

Note: Table 7.8 presents the probabilities for each subregion pair in 2006. Due to boundary changes, the 2001 flow data for West Moreton, Gold Coast and the Outer South subregion involves a degree of estimation.

^ This includes people who worked outside SEQ and those who did not respond, have an undefined place of work or no fixed work address.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

Change in commuting flows between Statistical Local Areas

Summary of different types of flows

Table 7.21 provides an overview of the main types of commuting flows observed within SEQ in 2001 and 2006, using the classification previously presented in Table 7.9. The figures were produced from the ABS origin-destination commuting flow matrices for SLAs, with each origin-destination pair assigned to a flow type category, and the aggregated results for each flow type category compared between 2001 and 2006.

The number of commutes increased for each of the flow type categories between 2001 and 2006. Most notably, there were 77 914 additional commutes to a different SLA within the same subregion and region—examples of flows in this category include commutes from Ipswich East to Ipswich Central (within the Outer West subregion) and from Nerang to Southport (within the Gold Coast region). There were also 41 526 additional commutes within the home SLA and 36 747 additional commutes that operated across rings[65] in an inward direction.

There have been small shifts in the relative prominence of the different types of flows between 2001 and 2006:

- Commuting flows operating in an inward direction have declined from 30.2 to 28.6 per cent of all commuting flows within SEQ. Inward flows grew at an average annual rate of 2.5 per cent, well below the SEQ growth rate of 3.6 per cent per annum. A similar decline in the relative importance of inward flows was experienced in Perth, Melbourne and Sydney (BITRE 2010, 2011a, 2012a).
- The proportion of commutes within the home SLA rose slightly (from 20.6 to 20.9 per cent) as did the proportion of outward commutes (from 5.5 to 5.7 per cent). Both recorded relatively rapid growth, averaging 4.0 and 4.3 per cent growth per annum, respectively.
- The proportion of commutes to a different SLA within the same subregion/region rose significantly from 36.8 to 37.8 per cent, reflecting relatively rapid growth of 4.1 per cent per annum.
- 'Cross-suburban commutes' refers to the final three flow type categories in Table 7.21. Cross-suburban commutes accounted for 6.9 per cent of all SEQ commutes in both 2001 and 2006, with growth similar to the SEQ average (i.e. 3.6 per cent). Commutes from one subregion to another in the Outer sector were the most rapidly growing component, although this growth occurred off a relatively low base in 2001. Commutes from one region to another in the Rest of SEQ recorded relatively modest growth.

65 Five rings underpin this analysis—the CBD, Inner sector, Middle sector, Outer sector and Rest of SEQ. Any commutes which involve travel from one of these rings to a different ring is classed as either inward in direction (if travel from the place of residence to the place of work brings the commuter closer to the CBD) or outward in direction (in the opposite scenario).

Table 7.21 Proportion of total commuting flows within South East Queensland by type, 2001 and 2006

Type of commuter flow	Proportion of total commutes, 2001 (per cent)	Proportion of total commutes, 2006 (per cent)	Change in number of commuters, 2001 to 2006	Average annual growth rate (per cent)
Inwards (across rings)	30.2	28.6	36 747	2.5
Outwards (across rings)	5.5	5.7	12 359	4.3
Ambiguous in direction (within a ring)	64.3	65.7	131 932	4.0
Within home SLA	20.6	20.9	41 526	4.0
Different SLA, same subregion, same region	36.8	37.8	77 914	4.1
From one subregion to another in Middle sector	5.7	5.7	10 044	3.5
From one subregion to another in Outer sector	0.8	0.8	2 040	5.1
From one region to another in the Rest of SEQ	0.4	0.4	408	2.2
South East Queensland	100.0	100.0	181 038	3.6

Note: Based on commutes that have a known origin and a known destination within SEQ. There are five rings underpinning this classification—the CBD (defined as the aggregate of the City Inner and City Remainder SLAs), Rest of Inner, Middle, Outer and Rest of SEQ rings. Inward commutes include commutes to a workplace in the Brisbane CBD from elsewhere in SEQ, from Middle suburban residences to Inner sector workplaces, from Outer suburban residences to Middle sector workplaces and from the Rest of SEQ to the Brisbane SD. The opposing flows are categorised as outward commutes (e.g. from Inner to Middle).

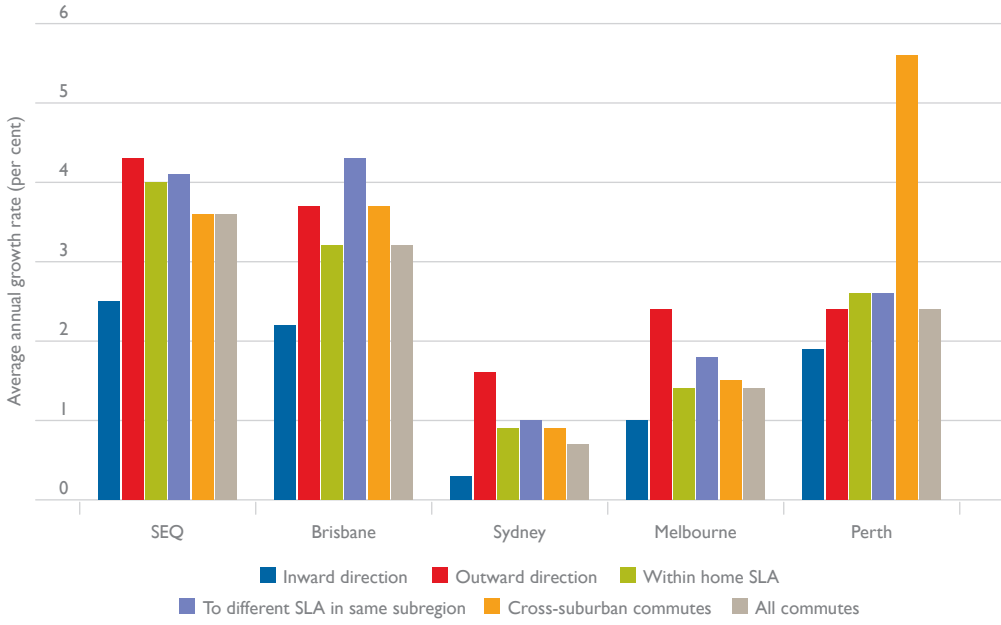
Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

Overall, the mix of commuter flows has changed to having a somewhat lower proportion of inward flows and a greater proportion of outward flows and flows that are ambiguous in direction. More specifically, there has been a significant increase in the proportion of people undertaking commutes to a different SLA in their home subregion and region. Much of this growth relates to short to moderate distance commutes to neighbouring SLAs.

Figure 7.7 compares the flow type mix of commutes within SEQ and Brisbane to previous results for Perth, Melbourne and Sydney. The results for the Brisbane SD have been presented as they are more directly comparable to the results for the other cities, than are the results for all of SEQ.

The average annual rate of growth in total commuting flows in Brisbane and SEQ far exceeded growth in the other cities. In all of the cities, inward flows experienced the lowest rate of growth of the five flow type categories. However, the most rapidly growing type of commuter flow differed across the cities—outward flows grew most rapidly for Sydney, Melbourne and SEQ, cross-suburban commutes grew most rapidly for Perth, while commutes to a different SLA in the home subregion grew most rapidly for Brisbane.

Figure 7.7 Growth by type of commuter flow for South East Queensland and Brisbane, Sydney, Melbourne and Perth Statistical Divisions, 2001 to 2006



Note: Based on commutes that have a known origin and a known destination within the relevant SD/SEQ. Inward commutes include commutes to a workplace in the CBD from elsewhere in the SD, from Middle suburban residences to Inner sector workplaces, and from Outer suburban residences to Middle sector workplaces. The opposing flows are categorised as outward commutes (e.g. from Inner to Middle).

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data and BITRE (2010, 2011a, 2012a).

Detailed analysis of Statistical Local Area change

This section presents a more detailed analysis of changes in commuting flows between individual SLAs in SEQ between 2001 and 2006. A number of SLAs in SEQ experienced significant boundary changes during this period. In order to be able to make valid comparisons between the 2001 and 2006 commuting flow data, the affected SLAs were combined into aggregate SLA regions (as defined in Table B.1, Appendix B) which have a common boundary in 2001 and 2006. These aggregate SLA regions have also been used to overcome apparent coding problems with the 2001 SLA data for Mount Gravatt and Toowoomba.

Due to their increased size, these aggregate SLA regions tend to dominate, with the five largest changes in commuter numbers between 2001 and 2006 all involving these aggregate SLA regions:

- commutes within the Central Gold Coast aggregate region rose by 17 194 persons
- commutes within the North Gold Coast aggregate region rose by 2252 persons
- commutes from the North Gold Coast aggregate region to the Central Gold Coast aggregate region rose by 2114 persons, while commutes in the reverse direction increased by 1741 persons
- commutes within the Beaudesert aggregate region rose by 1798 persons.

For this reason, the aggregate SLA regions have been excluded from the table presented in this section listing the origin-destination pairs with the largest changes in commuting flows. Maps in this section use these aggregate regions where required and 2006 SLA boundaries otherwise.

Table 7.22 presents the origin-destination pairs which experienced the greatest change in the number of commuters between 2001 and 2006 (excluding pairs where either the origin or destination is an aggregate SLA region). The largest increases relate to commutes within the Buderim, Maroochy Coastal North, Caloundra South and Kawana SLAs on the Sunshine Coast and commutes within the Ipswich Central and Ipswich East SLAs in Brisbane's Outer West subregion. Most of the origin-destination pairs listed in Table 7.22 relate to commutes within the home SLA. The largest change in commuting between different SLAs was the 487 person increase in commuting from Buderim to Kawana within the Sunshine Coast region. There were also large increases in commuting from Buderim to Maroochydore, from Ipswich Central to Ipswich East (and vice versa), from Kawana to Buderim, and from City Remainder to City Inner.

The largest decline in commuting flows in SEQ from 2001 to 2006 was a 307 person decline in commuting from the Central Gold Coast aggregate region to Bundall on the Gold Coast. There were no other declines of more than 250 persons.

The remainder of this section focuses on changes in commuting patterns for two key growth locations in SEQ:

- The Ipswich East SLA in the Outer West subregion of Brisbane, which has been the main residential growth area in SEQ and added 29 681 new residents between 2001 and 2011 (see Table 3.5). It includes the master-planned community of Springfield Lakes.
- The Pinkenba-Eagle Farm SLA in Brisbane's Middle North subregion, which recorded the second largest increase in employment in SEQ between 2001 and 2006. It includes the Brisbane International Airport.

Table 7.22 Statistical Local Area origin-destination pairs with greatest change in number of commuters, South East Queensland, 2001 to 2006

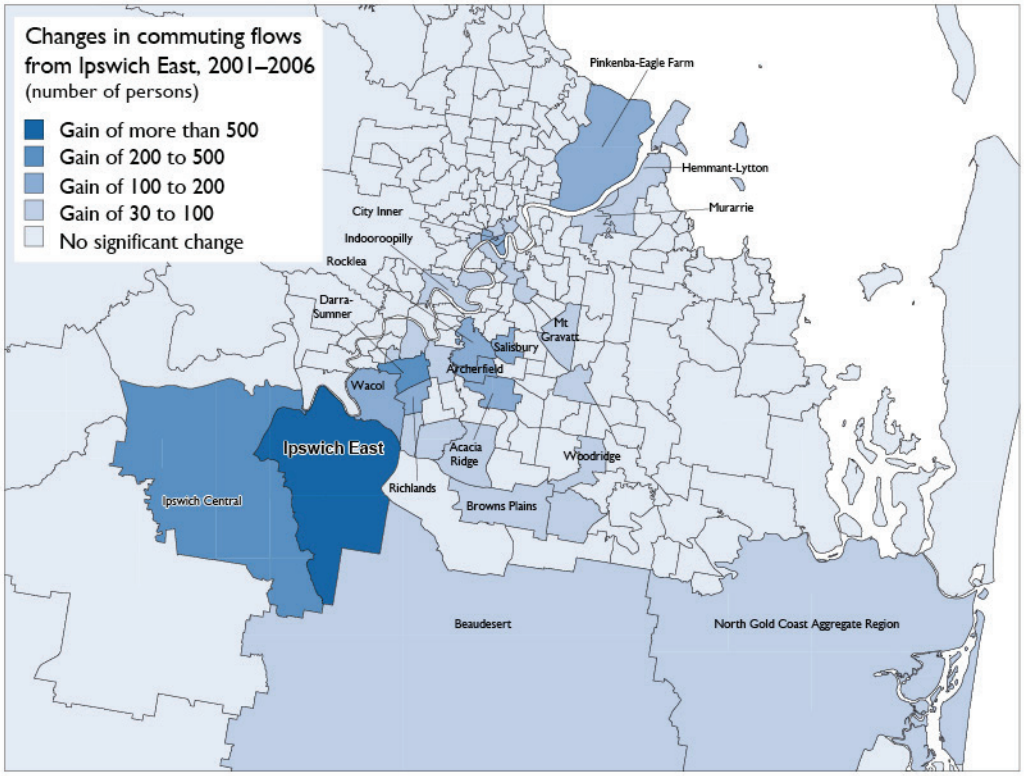
SLA of residence	SLA of work	Change in number of commuters	Average annual growth rate (per cent)
Maroochy—Buderim	Maroochy—Buderim	1646	7.8
Ipswich Central	Ipswich Central	1534	2.1
Ipswich East	Ipswich East	1418	7.1
Maroochy—Coastal North	Maroochy—Coastal North	1161	9.3
Caloundra—Caloundra South	Caloundra—Caloundra South	1057	8.3
Caloundra—Kawana	Caloundra—Kawana	892	8.0
Caloundra—Rail Corridor	Caloundra—Rail Corridor	526	4.1
Noosa Balance	Noosa Balance	525	4.8
Burpengary-Narangba	Burpengary-Narangba	509	7.3
Central Pine West	Central Pine West	505	11.8
Caloundra—Caloundra North	Caloundra—Caloundra North	503	6.6
Maroochy—Buderim	Caloundra—Kawana	487	9.6
Griffin-Mango Hill	Griffin-Mango Hill	462	35.3
Maroochy—Buderim	Maroochy—Maroochydore	452	3.2
Laidley	Laidley	444	4.8
Ipswich Central	Ipswich East	437	5.0
Pine Rivers Balance	Pine Rivers Balance	434	4.8
Victoria Point	Victoria Point	403	9.1
Jondaryan—Part A	Jondaryan—Part A	402	27.8
Boonah	Boonah	397	3.8
Ipswich East	Ipswich Central	378	3.8
Morayfield	Morayfield	371	4.6
Caloundra—Kawana	Maroochy—Buderim	369	12.6
Bribie Island	Bribie Island	357	3.8
City Remainder	City Inner	345	23.2
Ipswich East	Darra-Sumner	335	9.5
Maroochy—Maroochydore	Maroochy—Buderim	331	9.8
Doolandella-Forest Lake	Doolandella-Forest Lake	331	9.1
Caboolture East	Caboolture East	326	6.6
Hope Island	Hope Island	312	11.9
Toowong	Toowong	312	5.4
City Inner	City Inner	307	18.2
Caloundra—Caloundra South	Caloundra—Kawana	307	17.7
Central Pine West	Strathpine-Brendale	306	8.9
Crow's Nest Part A	Crow's Nest Part A	303	8.3
Dakabin-Kallangur-Murrumba Downs	Dakabin-Kallangur-Murrumba Downs	302	4.4

Note: This is based on workers who had a known SLA of residence within SEQ and a known SLA of work within SEQ. Based on 2006 SLA boundaries. Excludes all origin-destination pairs where either the origin or destination was an 'aggregate SLA region' (as defined in Table B.1, Appendix B). The aggregate SLA regions were constructed where significant boundary changes occurred between 2001 and 2006, to ensure change comparison were made on a 'like for like' basis. There were no declines of more than 300 commuters amongst the in-scope origin-destination pairs.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

From 2001 to 2006, the Ipswich East SLA gained 6396 employed residents, representing a 38 per cent increase on its 2001 total. Map 7.7 presents the change in the number of employed residents commuting from Ipswich East to other SLAs in SEQ. There were 1418 additional persons commuting within the Ipswich East SLA in 2006, compared to 2001. There were also substantial increases in the number of employed residents of Ipswich East who commuted to a place of work in the neighbouring Ipswich Central SLA or to the Darra-Sumner SLA in Brisbane's Middle West subregion.

Map 7.7 Change in number of persons commuting from Ipswich East to other Statistical Local Areas in South East Queensland, 2001 to 2006



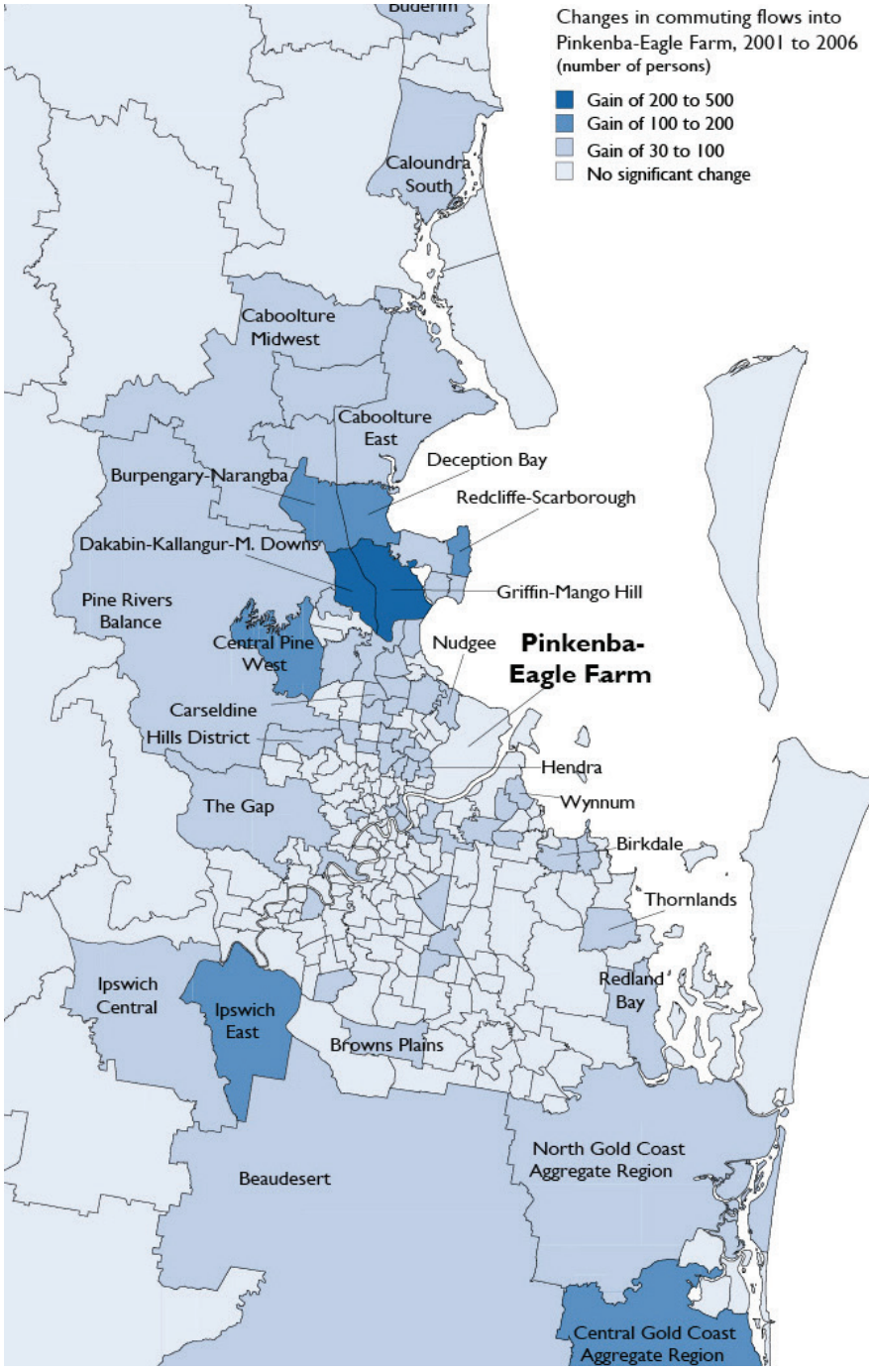
Note: Map uses the aggregate SLA region boundaries (as defined in Table B.1, Appendix B) where required due to boundary change, and 2006 SLA boundaries otherwise. No significant change refers to positive or negative changes of less than 30 persons.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

The locations attracting significant additional numbers of commuters were largely located in the Middle South, Middle West and Outer West subregions of Brisbane. However, there were two key exceptions, with the City Inner SLA attracting 155 additional commuters, and the Pinkenba-Eagle Farm SLA (which is located on the opposite side of Brisbane) attracting 101 additional commuters from Ipswich East between 2001 and 2006.

From 2001 to 2006, the Pinkenba-Eagle Farm SLA added 5700 jobs, second only in SEQ to the City Remainder SLA. Map 7.8 presents the change in the number of workers that are commuting to a place of work in the Pinkenba-Eagle Farm SLA. It shows that the increase in commuters was not heavily concentrated in a single origin location, with the points of origin experiencing significant growth instead rather widely dispersed across SEQ.

Map 7.8 Change in number of persons commuting to Pinkenba-Eagle Farm from other Statistical Local Areas in South East Queensland, 2001 to 2006



Note: Map uses the aggregate SLA region boundaries (as defined in Table B.1, Appendix B) where required due to boundary change, and 2006 SLA boundaries otherwise. No significant change refers to positive or negative changes of less than 30 persons.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 and 2001 unpublished data.

Since Pinkenba-Eagle Farm SLA is largely industrial, it contains few employed residents, and there was minimal change in the number of employed residents commuting within the SLA between 2001 and 2006. The largest increase in commuters to Pinkenba-Eagle Farm was the additional 262 persons who commuted from the residential growth SLA of Griffin-Mango Hill in Brisbane's Outer North. Many of the other main sources of growth in commuter numbers were also located in the Outer North (e.g. Dakabin-Kallangur-Murrumba Downs, Burpengary-Narangba, Deception Bay, Central Pine West). More distant locations with significant growth in commuters to Pinkenba-Eagle Farm include the Central Gold Coast Aggregate Region and Ipswich East.

Changes in commuting distance, speed and time

Overview of change—South East Queensland

Doonan (2012, p.5) reports that the 'average work commute distance has increased slightly over the past 15 years' in SEQ. The largest increase was from 13.7km in 1991 to 15.0km in 1996, which related to the starting of major infrastructure projects. Between 1996 and 2006 the average commuting distance increased by 0.3 kilometres (ibid).

Based on ABS census data, the Queensland DTMR estimates that the average commuting distance was 15.2km in 2001 and 15.3km in 2006 (Doonan 2012). BITRE has produced its own estimates of average commuting distances for 2001 and 2006, based on road network distances provided by DTMR and derived from the SEQSTM-MM for 2006. The DTMR distance dataset contains estimates of distance between SLA origin and destination pairs based on the shortest road distance. Where SLA boundaries did not change significantly between 2001 and 2006, BITRE has assumed that the distance between an origin-destination pair in 2001 is equal to the distance between that pair in 2006. For origin-destination pairs where one or both of the SLAs experienced significant boundary change, and for some of the less travelled origin-destination pairs where there is no available distance estimate, BITRE has imputed the road distance based on the straight line distance and by applying the overall relationship that existed between the straight line and road distance estimates.[66]

Using this approach, BITRE has estimated the average commuting distance for trips within the SEQ at 15.2km in 2001 and 15.3km in 2006, exactly matching the State government's figures. BITRE therefore estimates that the average distance of commutes within SEQ increased by just 0.1km between 2001 and 2006, while the average commuting distance within the Brisbane SD remained stable at 14.1km between 2001 and 2006.

BITRE's 2001 distance estimates need to be treated with some caution, as there were a range of issues affecting the quality of the 2001 ABS commuting matrix (including known miscoding), while the missing road distance values and significant boundary changes required imputation, which will potentially affect the quality of results.

66 Imputed road distance=2.223+1.161*Straight line distance (R-squared = 0.97); See BITRE 2011a, p.233 for explanation and application for Melbourne.

Although not directly comparable with BITRE's distance estimates, the SEQ HTS[67] provides an indication of how commuting distances and times have changed between 2004 and 2009. According to the HTS:

- The median commuting distance in SEQ decreased from 14.0km in 2004 to 12.9km in 2009, while the average commuting distance also declined from 18.5 to 17.9km. These declines were largely concentrated between 2007 and 2009.
- The median commuting distance for Greater Brisbane[68] also decreased from 14.9 kilometres to 13.0 kilometres, while the average distance declined from 18.2km in 2004 to 17.0km in 2009.

While census-based measures of average commuting distance have remained very stable between 1996 and 2006, the SEQ HTS identifies a notable decline of between 0.6 and 1.0km in the average commuting distance for both Brisbane and SEQ between 2007 and 2009.

Table 7.23 presents the results of an ABS survey of the distance travelled to the usual place of work or study in 2006, 2009 and 2012 (ABS 2006b, ABS 2009b, ABS 2012c). Between 2006 and 2009, there was an increase in the relative importance of very short distance trips (of less than 5km) and a modest decline in the relative importance of very long distance trips (of more than 30km). These ABS figures are suggestive of a decline in average commuting distances in Brisbane between 2006 and 2009, which accords with the HTS changes from 2007 to 2009. However, the ABS figures also point to a potential increase in average commuting distances between 2009 and 2012, due to the estimated 7 percentage point decline in the proportion of trips that were less than 5km.

Table 7.23 Distribution of workers by distance of journey to work or study, Brisbane, 2006, 2009 and 2012

	2006	2009	2012
Distance range	Proportion of trips (per cent)		
Less than 5 km	15.9	19.2	12.5
5 km to less than 10 km	19.7	16.9	21.8
10 km to less than 20 km	27.6	27.4	26.2
20 km to less than 30 km	14.7	16.5	14.9
30 km or more	15.7	14.2	16.1
Other (does not travel, unstated)	6.4	5.8	8.5
All trips	100.0	100.0	100.0

Source: BITRE analysis of ABS 2012c and 2009b (Environmental Issues: Waste Management and Transport Use, Cat.4602.0.55.002) and ABS 2006b (Australia's Environmental Issues and Trends 2006, Cat. 4613.0).

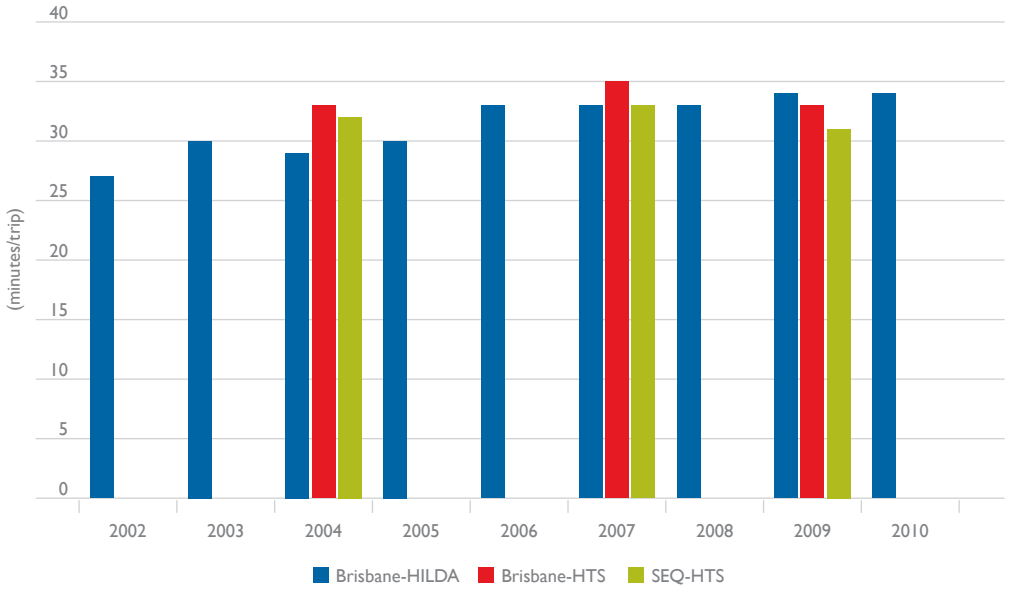
67 The HTS results presented in this section are based on customised data from the SEQ *Household Travel Survey 2004–09*, provided by Queensland DTMR MDAC.

68 Defined based on 2010 LGA boundaries as including the Brisbane City Council, Logan, Redland, Ipswich and Moreton Bay LGAs.

With regard to average commuting times, the HTS identifies a net decline for SEQ from 32 minutes in 2004 to 31 minutes in 2009 (see Figure 7.8), while there was no net change in average commuting times for Greater Brisbane over the same period. Median commuting times were stable at 30 minutes for both Brisbane and SEQ over all three years, reflecting many survey respondents providing responses rounded to the nearest 5 minutes.

Another relevant source of information on commuting times is the HILDA survey, as shown in Figure 7.8. According to this survey, which is conducted on an annual basis and spans most of BITRE's 2001 to 2011 study period, average commuting times for full-time Brisbane workers were 27 minutes in 2002 and 34 minutes in 2010. This is a large increase of 7 minutes, although nearly all of the increase was concentrated between 2002 and 2006, and the HILDA average commuting time estimate has only risen by 1 minute between 2006 and 2010 (see Figure 7.8).

Figure 7.8 Average commuting times for Brisbane and South East Queensland, 2002 to 2009



Note: Brisbane HTS results based on commutes within Moreton Bay, Brisbane, Ipswich, Redland and Logan LGAs. SEQ HTS results reflect Gold Coast and Sunshine Coast LGAs as well as the listed Brisbane LGAs.

The HILDA Project (Melbourne Institute 2010) was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported here, however, are those of the authors and should not be attributed to either FaHCSIA or the MIAESR.

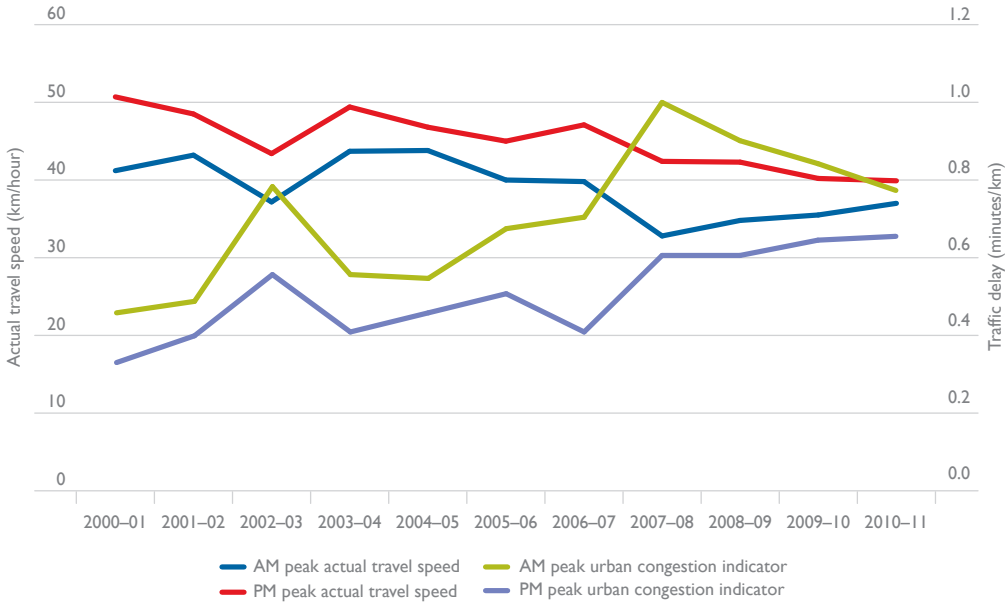
Source: BITRE analysis of SEQ HTS customised data provided by Queensland DTMR MDAC, and HILDA customised data, provided by the National Centre for Social and Economic Modelling (NATSEM).

Figure 7.9 shows how peak period travel speeds and congestion delays have changed for Brisbane between 2000–01 and 2010–11, based on the Austroads National Performance Indicators (AustRoads 2012). While peak period speeds fluctuated considerably over the period, there was a net decline of about 10 km/hour in the afternoon peak speed between 2000–01 and 2010–11, and a smaller net decline in the morning peak speed. Peak period traffic delays have also fluctuated in the past decade, but display an underlying upward trend during both the morning and afternoon peak. Morning peak traffic delays increased from 0.45 to 0.77 minutes/km between 2000–01 and 2010–11, while afternoon peak traffic delays doubled

(from 0.32 to 0.65 minutes/km). Morning peak traffic delays reached a peak in 2007–08, and have since declined, while traffic delays in the afternoon peak have only increased slightly since 2007–08. The average peak period speed in Brisbane increased slightly from 39 km/hour in 2007 and 2008 to 40 km/hour in 2009 (Department of Transport and Main Roads 2010b).

While the AustRoads data in Figure 7.9 relates only to road travel, the increase in traffic delays is qualitatively consistent with the HILDA survey's increase in average commuting times for Brisbane since 2002. The increase in both traffic delays and commuting times was concentrated prior to 2007–08.

Figure 7.9 Morning and afternoon peak period road travel speed and congestion indicators, Brisbane, 2000–01 to 2010–11



Note: This is a weighted speed across a sample of freeways and major arterial roads.

Source: AustRoads National Performance Indicators

Bringing the different data sources together identifies the following recent trends:

- Average commuting distances derived from census data show virtually no change between 2001 and 2006, increasing by just 0.1km for SEQ and unchanged for Brisbane.
- Survey-based evidence points to a decline in average commuting distances during the 2006 to 2009 period. The SEQ HTS identifies declines of between 0.6 and 1.0km in the average commuting distance of Brisbane and SEQ residents between 2007 and 2009. ABS survey data similarly suggest there was a decline in average commuting distances in Brisbane between 2006 and 2009 (ABS 2006a, 2009b), but also point to a subsequent increase from 2009 to 2012 (ABS 2009b, 2012c).
- Peak period urban congestion delays increased considerably in Brisbane between 2000–01 and 2007–08, while peak period travel speeds declined. This trend has since abated, with morning peak traffic delays declining since 2007–08, only a marginal increase in afternoon peak delays, and a small increase in average peak travel speeds (AustRoads 2012, Department of Transport and Main Roads 2010b).

- The HILDA survey identifies a strong upward trend in average commuting times for Brisbane between 2002 and 2007, resulting in a net increase of 6 minutes. The HTS identifies a 2 minute increase in average commuting times for Brisbane between 2004 and 2007 (compared to a 4 minute rise in HILDA).
- HILDA and the HTS provide mixed evidence as to whether Brisbane's commuting times have increased or decreased since 2007, but any such change appears to have been modest in magnitude (i.e. 2 minutes or less).

Thus, the initial period from 2001 through to about 2007 featured stable commuting distances, reduced speeds, and substantial increases in traffic delays and average commuting times in Brisbane. The period since 2007 has involved declining commuting distances (at least through to 2009), a slight increase in peak speeds, and a significant reduction in morning peak traffic delays. The weight of evidence suggests that the upward trend in commuting times has abated, or possibly even reversed, since 2007.

Small area changes

On a place of residence basis, the largest increases in average commuting distances between 2001 and 2006 occurred for residents of the Outer West (+0.4km), Outer North (+0.3km), Gold Coast (+0.3km) and West Moreton (+1.5km[69]). In contrast, residents of the Inner sector recorded a 0.4km decline in the average commuting distance. Other subregions and regions recorded only marginal changes in average commuting distances between 2001 and 2006.

On a place of work basis, there were significant increases in the average distance commuted to work in the Middle East subregion (+1.2km) and the Middle North subregion (+0.9km) between 2001 and 2006. The Middle East subregion attracted more workers from Outer East SLAs such as Thornlands, Wellington Point and Redland Bay. The Middle East also had the second highest average annual growth rate of employment in SEQ (4.6 per cent) during the period. The Middle North sector, which contains Brisbane Airport and some important industrial areas, also attracted additional workers from some distance away. This included an additional 910 commuters from Griffin-Mango Hill and over 830 extra commuters from the Central Pine West SLA in the Outer North subregion. Changes in average commuting distances on a place of work basis were generally modest for the remaining subregions.[70]

Small area information on changes in average commuting times was not available.

Strategic planning objectives

This section assesses recent trends against those strategic planning goals that relate to commuting flows within SEQ. As detailed in Table 2.8, the *SEQ Regional Plan 2009–2031* and its predecessors set out two key policy directions that relate to commuting flows:

- increase self-containment within subregions
- reduce commuting times and distances.

69 This estimate of change needs to be treated with caution as the West Moreton distance estimates for 2001 are likely to have been significantly impacted by boundary changes.

70 All remaining changes were 0.4km or less in magnitude, apart from an estimated 1.9km decrease for West Moreton. However, as noted previously, the 2001 estimates for West Moreton were significantly impacted by boundary change, and so the estimates of change should be treated with caution.

Increase self-containment within subregions

In the recent past, urban policy makers in Australia have been revisiting the notion of high travel self-containment as a key policy concern (Curtis 2005, cited in Yigitcanlar et al. 2007). This is reflected in the *SEQ Regional Plan 2009–2031*, which aims to 'support greater levels of trip self-containment within subregions' and requires 'local governments to demonstrate employment self-containment in planning decisions' (Queensland Government and COMSEQ 2009, pp. 112, 140). Improved self-containment of employment is specifically discussed in the sub-regional narratives for each SEQ council, apart from the Brisbane City Council, the Gold Coast and the Toowoomba LGAs (ibid.,).

This self-containment issue was also highlighted in previous strategic plans. The *SEQ Regional Plan 2005–2026* declares: 'The Regional Plan places a strong emphasis on improving the public transport system in SEQ. Policy directions include more compact forms of urban development and self-containment of travel' (Queensland Government and SEQROC 2005, p. 107). The *SEQ Regional Framework for Growth Management* (RFGM) 2000 also encouraged greater levels of self-containment (RCC 2000, pp. 60, 84).

This section focuses on the change in the self-containment rate between 2001 and 2006. The self-containment rate is calculated here as the proportion of employed residents who actually work in their home subregion (for Brisbane residents) or within their home region (for residents of the rest of SEQ). Self-containment rates for 2006 are presented in Tables 7.3 (regions) and 7.4 (subregions), while Figure 7.6 shows changes in the self-containment rate between 2001 and 2006.

The overall degree of self-containment showed relatively minor changes between 2001 and 2006:

- The proportion working in their home subregion within the Brisbane SD rose from 39.7 per cent in 2001 to 40.3 per cent in 2006
- The proportion working in their home region in the rest of SEQ fell from 75.6 per cent in 2001 to 74.9 per cent in 2006, reflecting declines in self-containment for each of Gold Coast, Sunshine Coast, Toowoomba and West Moreton
- The overall self-containment rate for SEQ nevertheless rose from 51.1 per cent in 2001 to 51.6 per cent in 2006.

While the overall degree of self-containment in SEQ rose marginally (by 0.5 percentage points), there were larger positive and negative changes in individual subregions and regions. For example, a significant increase in the self-containment rate was evident for the Middle West subregion (+2.1 percentage points), with smaller increases in the Outer East (+1.6 percentage points) and Outer North subregions (+1.2 percentage points). The *SEQ Regional Plan 2009–2031* specifically discusses improved self-containment for the Moreton Bay LGA (i.e the Outer North subregion) and the Redland LGA (i.e. the Outer East subregion). On the other hand, there was a significant decline in the self-containment rate of the Outer West subregion (–2.1 percentage points), with smaller declines in West Moreton (–1.4 percentage points) and the Sunshine Coast (–1.1 percentage points). The *SEQ Regional Plan 2009–2031* envisaged improved self-containment in the Ipswich LGA (i.e. the Outer West subregion), the Sunshine Coast LGA and the western councils (i.e. the West Moreton region) over the life of the plan.

In conclusion, the evidence points to a small increase in the overall degree of self-containment in SEQ from 2001 to 2006. This reflects mixed results across SEQ. Some of the targeted subregions increased their rate of employment self-containment (e.g. Moreton Bay, Redland), while others experienced a significant decline in self-containment (e.g. Ipswich, Sunshine Coast).

Reduce commuting times and distances

Compared to the previous strategic plan, the *SEQ Regional Plan 2009–2031* has a greater focus on reducing travel times and distances, as a means of reducing greenhouse gas emissions and responding to oil supply vulnerability. It argues that '[b]y consolidating urban growth into an identified area, travel times and distances can be greatly reduced' (Queensland Government and COMSEQ 2009, p.12). It aims to '[r]educe the length of trips and dependence on oil by localising access to goods, services and employment opportunities' and to develop a high quality public transport network that will 'reduce commuter travel time' (ibid., pp. 46, 145).

The *SEQ Regional Plan 2005–2026* contained only a single brief mention of reduced commuter travel times (Queensland Government and SEQROC 2005, p.108). The issue received a little more attention in the SEQ RFGM 2000 which envisaged that employment would be close to where people lived to reduce the need for residents to travel long distances in private vehicles (RCC 2000, p.15). There was also a more specific aim to reduce the extent of long distance commuting from rural areas (ibid., p.60), which is not investigated here.

A number of different data sources that shed light on recent movements in commuting times and distances in SEQ were discussed earlier in the chapter, and are revisited in this section.

Average commuting distances derived from census data show virtually no change between 2001 and 2006, increasing by just 0.1km for SEQ and unchanged for Brisbane. Survey-based evidence points to a decline in average commuting distances during the 2006 to 2009 period. The SEQ HTS[71] identifies declines of between 0.6 and 1.0km in the average commuting distance of Brisbane and SEQ residents between 2007 and 2009, while ABS survey data suggest there was a decline in average commuting distances in Brisbane between 2006 and 2009 (ABS 2006b, 2009b). Thus, the available data on changes between 2001 and 2009 appears to be consistent with the objective of reducing commuting distances in Brisbane and SEQ.

There are two annual time series that shed light on changes in average commuting times over the study period (2001 to 2011), and both point to a net rise in Brisbane commuting times since 2001:

- The HILDA survey identifies a net rise of 7 minutes in the average commuting times of full-time workers between 2002 and 2010, although nearly all of the increase was concentrated between 2002 and 2006[72]
- The AustRoads congestion indicators identify a significant net increase in peak period traffic delays (of about 0.3 minutes per kilometre) between 2000–01 and 2010–11. The increase in peak traffic delays was concentrated prior to 2007–08 (AustRoads 2012).

Time series information is not available to assess post-2001 changes in commuting times for SEQ as a whole, but the available evidence for Brisbane indicates that commuting times have not been heading in the desired direction, and have instead increased significantly over the study period. However, there is some evidence that the upward trend in commuting times may have abated, or possibly even reversed, since 2007:

71 The HTS data referred to in this section is based on customised data from the SEQ *Household Travel Survey 2004–09*, provided by Queensland DTMR MDAC.

72 The HILDA data referred to in this section was provided by the National Centre for Social and Economic Modelling (NATSEM). The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported here, however, are those of the authors and should not be attributed to either FaHCSIA or the MIAESR.

- The SEQ HTS identifies a 2 minute decline in average commuting times for Brisbane and SEQ between 2007 and 2009
- The HILDA survey estimates that average commuting times for Brisbane rose by only 1 minute between 2007 and 2010
- The AustRoads indicators show that morning peak traffic delays have declined since 2007–08, with only a marginal increase in afternoon peak delays (AustRoads 2012).

Overall, there is mixed evidence as to whether progress has been made in reducing commuting times and distances since 2001. For both Brisbane and SEQ, average commuting distances remained stable from 2001 to 2006, but seem to have declined in the 2006 to 2009 period, which is consistent with the stated objective. However, the available evidence points to a significant net increase in average commuting times for Brisbane since 2001.

Summary

This chapter has provided a detailed picture of spatial commuting flows in SEQ in 2006 and the changes in commuting flows between 2001 and 2006. It has also explored how average commuting distances and times vary across different part of SEQ.

Between 2001 and 2006, commuting flows within SEQ grew by 3.6 per cent per annum, or a total of around 181 000 commuters. Much of the increase was due to increased commutes within the Brisbane SD (60 per cent). Some of the key features of this growth include:

- Commuter flows between Tweed and SEQ grew very strongly.
- In terms of cross-region commutes, the largest changes related to commuting from the Gold Coast to Brisbane (+5218) and from Brisbane to the Gold Coast (+3530). For each of the non-Brisbane regions, the increase in commuting to a Brisbane workplace outweighed the increase in commuting in the reverse direction.
- The overall self-containment rate for SEQ rose marginally, by 0.5 percentage points.
- Commuting flows within the Gold Coast region increased by 32 763 persons, while flows within the Sunshine Coast increased by 20 737 persons and flows within the Outer North increased by 13 883 persons.
- The largest change in commuter flows between different subregions was the extra 5263 persons commuting from the Outer North to the Middle North.
- Inward commuting flows declined from 30.2 to 28.6 per cent of all flows within SEQ from 2001 to 2006. The proportion of commutes to a different SLA within the same subregion/region rose by 1 percentage point.
- There were widespread declines in the likelihood of commuting to a place of work in Inner Brisbane between 2001 and 2010.
- Average commuting distances were stable from 2001 to 2006, and then declined in the 2006 to 2009 period. The available evidence points to a significant net increase in Brisbane's average commuting times since 2001.

CHAPTER 8

Drivers of change in commuting patterns

Key points

- Residents of areas experiencing rapid population growth predominantly find work within the home area and neighbouring areas, and in some cases the Central Business District (CBD). Areas experiencing rapid jobs growth are predominantly drawing their additional workers from amongst residents of the local area and neighbouring areas.
- A simple gravity model of commuter flows for 2006 can explain 63 per cent of all variation in origin-destination flows within South East Queensland (SEQ).
- The amount of people commuting between an origin-destination pair tends to increase with the number of employed residents of the origin Statistical Local Area (SLA) and with the number of jobs in the destination SLA, but declines as the distance between the two SLAs widens. Distance is less of an impediment to travel for origin-destination pairs that have a direct rail connection or a direct freeway connection.
- Distance was a greater impediment to travel in 2006 than in 2001, reflecting the 55 per cent increase in nominal automotive fuel prices in Australia over the period.
- Distance was less of an impediment to travel in Brisbane, than it was for Sydney, Melbourne or Perth.
- The greater the alignment between the skills available in the origin SLA and the skills demanded in the destination SLA, the greater the predicted commuting flows between those two locations.
- Growth in employed residents and jobs played an important role in explaining *changes* in commuting flows in SEQ between 2001 and 2006. These factors alone explained just over half of the variation in commuting growth rates for origin-destination pairs with non-trivial commuter flows.
- More distant origin-destination pairs tended to experience lower growth in commuting flows between 2001 and 2006.
- Major infrastructure projects completed between 2000 and 2006 included the Inner City Bypass, Port of Brisbane Motorway (stage one), Inner Northern Busway, South East Busway, Airtrain and the Pacific Motorway upgrade. Commuting flows between areas impacted by these major infrastructure projects increased more than otherwise would have been expected given residential and job growth in those areas.

Background

This chapter explores how the recent changes in commuting flows relate to the observed spatial patterns of residential and job growth within South East Queensland (SEQ). The role of other potential drivers of commuting flows, such as distance, transport infrastructure and skills are also investigated.

Overall patterns of residential and job growth are shaped by planning policy. Within this context, commuting patterns are determined by individual's choices about where to live and work. Distance between home and work is one of many considerations taken into account when these decisions are made (ABS 2009b). The role that distance plays in influencing commuting decisions varies between individuals and between industries, and will also be influenced by the quality of transport infrastructure. The complexity and variety of individual decisions is reflected in the complex relationship between overall residential and job patterns and commuting patterns.

The chapter commences with a descriptive analysis of the relationships between changes in commuter flows and these potential drivers in SEQ and the Brisbane Statistical Division (SD). In the second part of the chapter, gravity models are used to explain variation in origin-destination (O-D) commuter flows within SEQ, and the drivers of recent changes in these commuter flows.

Residential and jobs growth

This section explores how changes in commuting depend on spatial patterns of population and job growth. Spatial patterns of residential and job growth reflect the accumulated effect of numerous business and household decisions about location. Job access is one of several key factors—alongside proximity to family and friends, lifestyle and housing cost—that underpin people's choice of where to live (BITRE 2012, p. 346).

It is expected that the change in the number of people commuting between an origin location and a destination location will be related to the growth that is occurring in those two locations. At the origin location, growth in the number of employed residents is the primary variable of interest—it will be influenced by population growth, as well as changes in age structure, labour force participation and unemployment rates. At the destination location, growth in the number of available jobs is the relevant measure.

Within SEQ, there were 84 681 possible origin-destination combinations based on 2006 ASGC boundaries (i.e. 291 X 291, where 291 is the number of SLAs). However, some boundary changes occurred in SEQ between 2001 and 2006. For analysis of changes in commuting flows, BITRE has constructed a dataset that makes use of aggregate SLA regions (where boundary change has occurred) which share a common boundary in 2001 and 2006.[73] The change dataset contains 65 025 O-D pairs (255 X 255). Correlation analysis of this dataset and also for Brisbane SD is presented in Table 8.1.

73 Further detail on aggregate SLA regions is provided in Appendix B.

Table 8.1 shows that the change in commuting flows between any two SLAs in SEQ from 2001 to 2006 was:

- significantly positively associated with the change in the number of employed residents in the origin SLA (correlation = 0.09)
- significantly positively associated with the change in the number of jobs in the destination SLA (correlation = 0.10).

The correlations were notably higher for the Brisbane SD than they were for SEQ.

Table 8.1 Correlation coefficients of change in commuting flows with change in number of employed residents and change in number of jobs, South East Queensland and Brisbane, 2001 to 2006

	SEQ	Brisbane
Change in number of employed residents	0.09	0.16
Change in number of jobs	0.10	0.24

Note: Levels of significance are all $p<0.001$.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* commuting flow matrix.

These correlations mean that strong growth in the origin and destination SLAs tends to translate into strong growth in commuting flows between the two locations. The correlations in SEQ are of roughly equal magnitude and are not overly strong, suggesting other factors may also play an important role in driving growth in commuter flows. However, for the Brisbane SD, the correlation with jobs was of larger magnitude than the correlation with employment residents.

These relationships are explored further below by investigating the changes in commuting behaviour that occurred in those SLAs that experienced the most substantial growth or decline in employed residents and jobs between 2001 and 2006.

Changes in commuting from substantial residential growth areas

Table 8.2 shows areas with substantial growth in employed residents between 2001 and 2006, and lists the main areas to which additional commuting flows from these SLAs are occurring. The table contains four Inner sector SLAs, two Middle sector SLAs, two Outer sector SLAs and the 'North Gold Coast Aggregate Region', which includes Jacobs Well-Alberton, Ormeau-Yatala, Wolffdene-Bahrs Scrub, Kingsholme-Upper Coomera and Pimpama-Coomera.

Table 8.2 Areas in which employed residents of substantial growth Statistical Local Areas are increasingly finding work, South East Queensland, 2001 to 2006

SLAs with substantial growth in employed residents	Subregion	Change in number of employed residents	Average annual growth rate (per cent)	More than 100 additional residents commuted to a place of work in the following SLAs (in descending order of importance)
Griffin-Mango Hill	Outer North	3574	27.1	Griffin-Mango Hill, Pinkenba-Eagle Farm, City Inner, Strathpine-Brendale, City Remainder, Chermside
Wakerley	Middle East	1278	20.7	City Inner
City Inner	Inner	816	19.2	City Inner, City Remainder
City Remainder	Inner	1268	19.2	City Inner, City Remainder
Fortitude Valley	Inner	1661	16.2	City Inner, Fortitude Valley, City Remainder
Parkinson-Drewvale	Middle South	3035	14.2	Parkinson-Drewvale, City Inner, Rocklea, Acacia Ridge, Browns Plains
Newstead	Inner	1542	12.6	City Inner, Newstead, City Remainder, Fortitude Valley
North Gold Coast Aggregate Region[a]	Gold Coast	7983	11.5	North Gold Coast Aggregate Region, Central Gold Coast Aggregate Region, Shailer Park, Surfers Paradise, South Stradbroke-Runaway Bay, Hope Island
Redland Bay	Outer East	2181	11.5	Victoria Point, Redland Bay, Cleveland, Capalaba

Note: Cut-off of increase in number of employed residents is 800.

[a] North Gold Coast Aggregate Region is a BITRE-defined 'Aggregate SLA' on the Gold Coast, which consists of Jacobs Well-Alberton, Ormeau-Yatala, Wolffdene-Bahrs Scrub, Kingsholme-Upper Coomera and Pimpama-Coomera (see Appendix B).

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* commuting flow matrix.

The residential growth areas tend to generate increased commuting flows to destinations within the home SLA and neighbouring SLAs, and in many instances to the Inner sector of Brisbane. In terms of individual SLAs, the Griffin-Mango Hill SLA in the Outer sector and Parkinson-Drewvale in the Middle South sector experienced the largest increase in the number of employed residents between 2001 and 2006, and consequently provided more than 100 additional workers to several SLAS. Amongst Griffin-Mango Hill residents, there was substantial growth in commuting flows within the home SLA and home subregion (Strathpine-Brendale SLA), to the Central Business District (CBD) and to the Chermside SLA in Middle North subregion. Amongst Parkinson-Drewvale residents, the growth was primarily within the home SLA, to the City Inner SLA, to other locations in the Middle South and to Browns Plains in the Outer South. The rapid growth inner city SLAs tended to provide significant additional numbers of commuters within the home SLA and to other inner city SLAs.

Changes in commuting from areas of substantial job growth

Table 8.3 shifts the focus to the places in SEQ which experienced the most rapid job growth between 2001 and 2006. It identifies the principal industry driver of job growth in each SLA and the locations from which the strong job growth SLAs drew their additional workers from. Four of the nine rapid job growth areas belong to the Middle sector, three to the Outer sector and one to each of Toowoomba and Gold Coast.

Between 2001 and 2006, there were three SLAs which added more than 1000 jobs and had an average annual employment growth rate of more than 25 per cent:

- Griffin-Mango Hill in the Outer North subregion of Brisbane SD attracted significant numbers of additional workers from within its own boundaries and from the neighbouring SLA of Dakabin-Kallangur-Murrumba Downs.
- Jondaryan Part A (containing the growing suburbs of Westbrook and Glenvale) in the Toowoomba SSD attracted significant numbers of additional workers from within its own boundaries and from the Toowoomba aggregate region.
- For Pallara-Heathwood-Larapinta in the Middle South subregion of the Brisbane SD, there was no single SLA (or aggregate SLA region) that provided more than 100 additional workers, although Ipswich East did provide 96 additional workers.

For most of the job growth areas in Table 8.3, the employment growth is being driven by the *Retail trade* (Griffin-Mango Hill, Robertson, Victoria Point and Central Pine West) or by *Manufacturing* (Jondaryan Part A, North Gold Coast Aggregate Region and Murarrie). The exceptions were Pallara-Heathwood-Larapinta (where *Transport and storage* was predominant) and Eight Mile Plains (where *Property and business services* was predominant).

There were two SLAs in SEQ that experienced a loss of more than 800 jobs between 2001 and 2006. These SLAs are Sunnybank (–1242 jobs) and Coopers Plains (–833 jobs) which are located in the Middle sector of Brisbane SD. The job loss in the Sunnybank SLA between 2001 and 2006 was mainly reflected in reduced commuting within the SLA and from other neighbouring Middle South SLAs, including Sunnybank Hills, Runcorn, Eight Mile Plains and Calamvale. The job loss in the Coopers Plains SLA was principally reflected in reduced commuting from Outer South SLAs (e.g. Marsden, Browns Plains).

Table 8.3 Areas which rapid jobs growth Statistical Local Areas are drawing their additional workers from, South East Queensland, 2001 to 2006

SLA/Area name	Subregion	Change in number of jobs	Average annual growth rate (per cent)	Main industry contributor to jobs growth	Origin SLAs which increased commuting to this place of work SLA by more than 100 persons (in descending order)
Griffin-Mango Hill	Outer North	1418	41.1	Retail trade	Griffin-Mango Hill, Dakabin-Kallangur-Murrumba Downs
Jondaryan Part A	Toowoomba	1481	33.4	Manufacturing	Toowoomba, Jondaryan Part A
Pallara-Heathwood-Larapinta	Middle South	1027	26.1	Transport and storage	None
North Gold Coast Aggregate Region[a]	Gold Coast	7315	14.0	Manufacturing	North Gold Coast Aggregate Region, Central Gold Coast Aggregate Region, Beaudesert, Eagleby, South Stradbroke-Runaway Bay, Loganholme, Beenleigh, Mt Warren Park, Marsden
Murarrie	Middle East	4003	13.6	Manufacturing	None
Robertson	Middle South	886	13.6	Retail trade	None
Victoria Point	Outer East	1320	12.6	Retail trade	Victoria Point, Redland Bay, Thornlands
Central Pine West	Outer North	854	11.8	Retail trade	Central Pine West
Eight Mile Plains	Middle South	1995	11.2	Property and business services	Eight Mile Plains

Note: Cut-off of increase in number jobs is 800. Note that there were several SLAs which experienced a gain of more than 800 jobs between 2001 and 2006, but the average annual growth rates were much slower (<2 per cent per annum) than those listed in Table 8.3.

[a] North Gold Coast Aggregate Region is a BITRE-defined 'Aggregate SLA' on the Gold Coast, which consists of Jacobs Well-Alberton, Ormeau-Yatala, Wolffdene-Bahrs Scrub, Kingsholme-Upper Coomera and Pimpama-Coomera (see Appendix B).

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* commuting flow matrix.

Travel cost

The cost of travel between any two locations is another potentially important driver of commuting flows. The cost of travel between two areas depends on the opportunity cost of the time spent undertaking the journey as well as direct costs such as petrol, tolls, public transport fares and parking fees. The journey time depends on the distance between the two areas and average speed, which in turn depends on transport infrastructure and the level of congestion.

No direct measure of the travel time between each origin-destination pair was available for SEQ. However, BITRE was able to experiment with road network distance, straight line distance and travel time measures for Sydney, and the road network distance was found to be the most appropriate representation of generalised travel cost amongst these alternatives (BITRE 2012a).

The Queensland Department of Transport and Main Roads model-based estimates of the road network distance between any origin-destination pair[74] should serve as a useful proxy for travel time and for some of the direct costs, such as petrol. BITRE has also derived a straight line distance measure for each origin-destination pair, as the distance between the population-weighted centroid of the origin SLA (using Collection District level populations) and the job-weighted centroid of the destination SLA (using job numbers for destination zones). The expected relationship is that a greater distance between any origin-destination pair will generally be associated with a greater travel cost and a greater impediment to travel between those two regions.

Table 8.4 presents the results of a simple correlation analysis across all of the origin-destination pairs in SEQ, as well as for the origin-destination pairs within the Brisbane SD. The results show that the distance between an origin-destination pair is significantly negatively correlated with the number of people commuting between those SLAs and with the change in commuter flows between those SLAs. The correlation statistics are similar irrespective of whether a straight line or road network based measure of distance is used. The 2001 correlations tend to be a little lower than the 2006 correlations. The correlations are also similar for Brisbane and for SEQ as a whole, except that the correlation between commuting change and distance is much stronger for Brisbane than it is for SEQ as a whole.

Table 8.4 Correlation analysis of relationships between commuting flows and distance, 2001 and 2006

Commuting flow variable	Correlation with road distance		Correlation with straight line distance	
	Brisbane	SEQ	Brisbane	SEQ
Number of persons commuting between origin-destination pair in 2006	–0.13	–0.13	–0.13	–0.12
Number of persons commuting between origin-destination pair in 2001	–0.12	–0.12	–0.12	–0.12
Change in number of persons commuting between origin-destination pair, 2001 to 2006	–0.11	–0.03	–0.11	–0.03

Note: Correlation calculated across all SLA pairs, including those with zero commuter flows. Levels of significance are all $p<0.001$.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* commuting flows matrix, DTMR model-based estimates of the road distance between each origin-destination pair, and BITRE estimates of the straight line distance between each origin-destination pair.

The negative correlation between distance and the change in the number of people commuting between any two SLAs suggests that the extent to which distance impedes travel may have increased over the period. This would be consistent with the 55 per cent increase in nominal automotive fuel prices between the September quarters of 2001 and 2006, as revealed by the ABS Consumer Price Index, based on the weighted average of the eight capital cities (ABS 2009).

74 The Department of Transport and Main Roads (DTMR) dataset is described in Chapter 7 and was derived from the South East Queensland Strategic Transport Multi-Modal Model (SEQSTM-MM) for 2006. BITRE has imputed the road distance for some origin-destination pairs (i.e. those which have undergone significant boundary change between 2001 and 2006 or for which no distance value was provided in the DTMR dataset) based on the straight line distance for that origin-destination pair, by applying the overall relationship that existed between the straight line and road distance estimates, i.e. for 2006

Imputed road distance = 2.72 + 1.17 * Straight line distance (R-squared = 0.975).

Transport infrastructure

The extent to which distance acts as an impediment to travel is likely to depend on the choice of transport mode and the capacity of the transport network.

For example, commuting times by rail can be quicker than by car, with Department of Transport and Main Roads (2010a) reporting that on five of the seven routes considered for the 2007 to 2009 period, average train speeds were higher than average car speeds during the morning peak.[75] Thus, the impact of distance may be less pronounced for origin-destination pairs that have a direct rail connection than for those that are reliant on the road network. This relationship will be investigated through estimation of a gravity model of commuting flows, to be presented later in the chapter.

While average peak period bus speeds in SEQ are typically less than average car speeds (Department of Transport and Main Roads 2010a), there is some evidence that travel time savings may be available on SEQ's dedicated busways. For example, a survey of South East Busway users from 2004 found that 80 per cent identified a 'reduction in travel time' as an advantage of the busway (Parsons Brinckerhoff 2010), while the economic impact analysis of the Northern Busway extension from the Royal Children's Hospital to Kedron identified $224 million of travel time savings from construction of the Busway (ibid). The question of whether the impediment effect of distance is less pronounced for origin-destination pairs that are directly connected by one of SEQ's dedicated busways will be investigated through estimation of a gravity model of commuting flows.

Peak period travel speeds can also be quicker on freeways than on arterial roads, with AustRoads (2012) reporting that in Brisbane in 2009–10 the average morning peak travel time per 10 kilometres was 8.4 minutes on the freeway and motorway network, compared to 15.6 minutes on the arterial road network. This suggests that the impact of road distance may be rather less pronounced for origin-destination pairs that are connected by SEQ's freeway and motorway network, than for those that are not. These relationships will be explored through the gravity model, with results presented later in the chapter.

Changes in commuting patterns will also be shaped to some extent by development of new transport infrastructure, which changes the relative costs of commuting to different areas. The remainder of this section considers the relationship between changes in commuter flows and major new transport infrastructure investments,[76] focusing on the 2001 to 2006 period.

Between the 2001 and 2006 censuses, the main expansion of SEQ's public transport network related to the Inner Northern Busway. The busway from Roma Street to the Kelvin Grove campus of the Queensland University of Technology was completed in February 2004, while stops at Normanby and the Royal Children's Hospital at Herston were opened in December 2005 (Beattie 2004, 2005). The (Inner) Northern Busway has been extended several times since the 2006 census was conducted (see Table 6.1).

75 Higher speeds do not necessarily translate into shorter travel times, if rail routes are much less direct than the car route (as is the case for the Cleveland to South Brisbane route).

76 Major transport infrastructure investments were selected based on their potential to have significantly altered spatial commuting flows and their total cost. A threshold of $150 million was used to identify major road infrastructure projects, The sole public transport project included for the 2001 to 2006 period was the $135 million Inner Northern Busway, while two larger scale projects completed just prior to the 2001 census (i.e. the $660m South Eastern Busway and the $220m Airtrain) were also considered (costings sourced from Martin 2011). A list of infrastructure projects completed since 2000 is provided in Table 6.1.

Important road infrastructure investment projects costing more than $150 million and completed between the 2001 and 2006 censuses include:

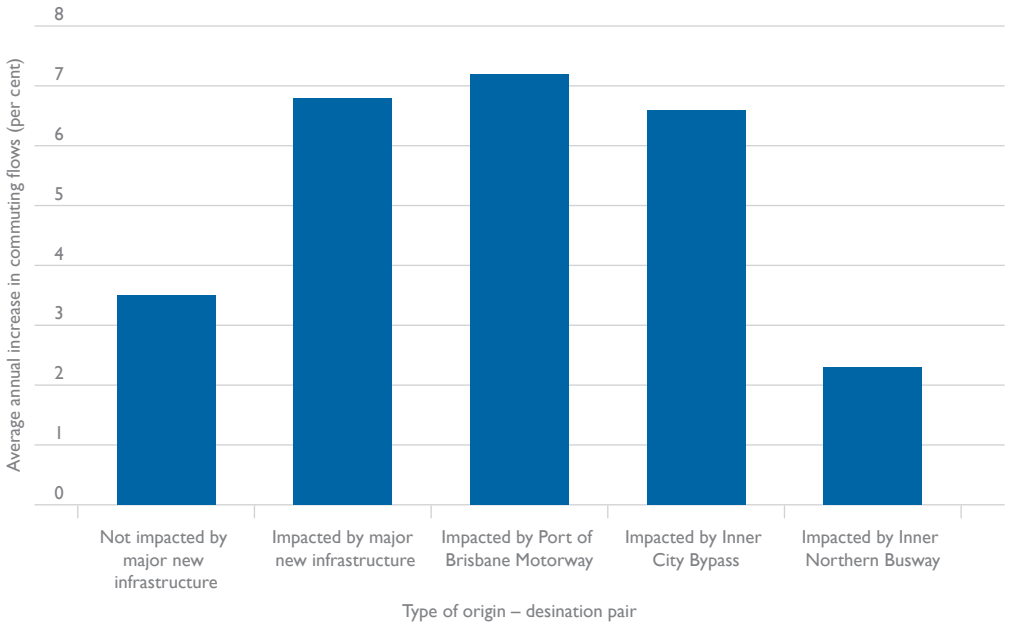
- The 4 kilometre long Port of Brisbane Motorway Stage One project was completed in December 2002 (Beattie 2002). The project motivation was largely about improving port efficiency. In the context of SEQ commuter travel, this project would be expected to improve connectivity to and from the Hemmant-Lytton SLA (which includes the Port of Brisbane), while also potentially reducing congestion, and thus travel costs, for commuters travelling within the local area by separating freight vehicles and local traffic.
- The 4.5 kilometre Inner City Bypass (ICB) provided a new east-west link along the CBD's northern fringe, and was opened in three stages between November 2001 and July 2002. The project motivation was to divert up to 25 per cent of traffic away from the CBD and inner northern areas and significantly reduce local congestion, while also improving east-west connectivity (Leighton Contractors n.d.). In the context of SEQ commuter travel, this project would be expected to improve connectivity within the CBD and inner north (e.g. the Milton, Spring Hill, Kelvin Grove and Newstead SLAs, amongst others), by reducing congestion and travel costs in the area. It would also be expected to improve connectivity between locations on the east side of the ICB and locations that are now more accessible to the west (e.g. via the Western Motorway), and between locations on the west side of the ICB and locations that are now more accessible to the east (e.g. the airport).

For the purposes of exploring drivers of change in commuter flows, dummy variables have been constructed for the major infrastructure projects that were completed between 2001 and 2006.[77] The three infrastructure projects considered are the Inner Northern Busway, the Port of Brisbane Motorway (stage one) and the Inner City Bypass.

77 In constructing the dummy variables, each SLA pair in SEQ was categorised by BITRE as either having been directly impacted by the relevant infrastructure project or not impacted. The previous set of dot points provides information about which SLA pairs were judged to have been impacted by each road infrastructure project. For the busway, commuting flows between the Herston, Kelvin Grove, City Inner and City Remainder SLAs (which each contain one or more stops) were judged to have been impacted.

Figure 8.1 shows that the origin-destination pairs that were impacted by at least one of these major infrastructure projects experienced more rapid growth in commuting flows between 2001 and 2006 than those that were not. While the origin-destination pairs impacted by new road infrastructure experienced rapid growth, those impacted by the Inner Northern Busway experienced more modest growth. The regression analysis later in the chapter will attempt to assess whether these infrastructure extensions had a statistically significant impact on spatial change in commuting flows, after controlling for the effects of population and jobs growth.

Figure 8.1 Growth in commuting flows and transport infrastructure investment, South East Queensland, 2001 to 2006



Note: Three major new infrastructure projects completed between the 2001 and 2006 censuses are analysed—the Port of Brisbane Motorway (stage one), the Inner City Bypass and the Inner Northern Busway (City to RCH Herston). Infrastructure projects completed prior to the 2001 census (e.g. Airtrain, Pacific Highway upgrade) are not considered.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* commuting flows matrix.

Three large scale infrastructure projects were completed in SEQ in the months leading up to the August 2001 census:

- The 16 kilometre South East Busway was opened in two stages—the section from the city to Woolloongabba was opened in October 2000, and the section from Woolloongabba to Eight Mile Plains opened in April 2001 (Brehauer 2001). This project would be expected to have improved connectivity between the SLAs that contain stations along this busway (e.g. from Holland Park West to South Brisbane). A 2004 customer satisfaction survey found that 80 per cent of South East Busway users reported a 'reduction in travel time' as a perceived advantage, and 59 per cent of users reported that travel time savings were the main reason they used the bus (Parsons Brinckerhoff 2010).
- Airtrain was completed in May 2001 (Airtrain 2011)—it is a rail link connecting the Brisbane Airport international and domestic terminals to the Brisbane CBD and the Gold Coast. While primarily catering to air travellers, this project would be expected to have

improved connectivity to and from the Pinkenba-Eagle Farm SLA that contains the two new airport stations.

- The upgrade of the Pacific Highway to motorway status between the Logan Motorway and Worongary was completed in October 2000. The new Pacific Motorway involved an 8 lane dual carriageway over 35 kilometre of its length and a 6 lane dual carriageway over 8 kilometres (Queensland Ombudsman 2007). In the context of SEQ commuter travel, this project would be expected to improve connectivity between the Gold Coast SLAs that are located along this motorway. Given the length of the upgraded motorway, it would also be expected to have improved connectivity and reduced travel times between many Gold Coast and Brisbane SLAs.

In the regression analysis for the 2001 to 2006 period, dummy variables have been constructed[78] to control for the impact of any delayed impacts flowing from the Airtrain, South East Busway and Pacific Motorway upgrade projects. The latter two projects are of much larger scale (each costing more than $600 million) than any of the infrastructure projects completed between 2001 and 2006, and it is certainly possible that the impacts of these projects on commuting times and costs were not fully realised by the time of the 2001 census.

Other significant transport infrastructure investments were completed after the 2006 census, as detailed in Table 6.1. Major infrastructure expansions included the extension of the Gold Coast rail line to Varsity Lakes, construction of the Eastern Busway and the Northern Busway, the Gateway Motorway upgrade and Airport Link. The primary economic justification for the Royal Children's Hospital to Kedron section of the Northern Busway was travel time savings along the route (SKM Connell Wagner Joint Venture 2007, p. 11–63). The Airport Link project was similarly justified on the basis that it would 'greatly improve access between Brisbane's CBD and the northern suburbs' and on the basis of anticipated savings in travel time, including 'reduced travel time between Hendra and Fortitude Valley by up to 40%' (SKM Connell Wagner Joint Venture 2006, p. 4–6). Note that the commuting impacts of these post-2006 infrastructure investments lie outside the scope of this chapter's regression analysis, which is focused on the 2001 to 2006 period, and so are not considered further here.

Industry and skills

Industry and skills related factors play an important role in shaping commuting flows between different parts of the city and how they change over time. In the context of the Sunshine Coast, Trendle and Siu (2005) show that distance has less of a deterrent effect in the commuting decision for more educated workers. BITRE's recent commuting study for Sydney finds that the deterrent effect of distance also varies across industries, being greater for spatially dispersed industries, such as *Retail trade* and *Health care and social assistance*, than for spatially concentrated industries, such as *Information, media and telecommunications* and *Finance and insurance* (BITRE 2012a).

As discussed in chapter 5, some significant industry-specific employment changes occurred between 2001 and 2006. Changes in industry structure are likely to impact changes in commuting flows beyond their impact on where jobs are located. The role distance plays in determining

78 In constructing these infrastructure dummy variables, each SLA pair in SEQ was categorised by BITRE as either having been directly impacted by the relevant infrastructure project or not impacted. The previous set of dot points provides information about which SLA pairs were judged to have been impacted by each project.

commuting flows differs between industries. Distance appears to be less important a factor at explaining commuting flows for industries where jobs are more concentrated relative to the overall population (BITRE 2012a).

Other things equal, commuting flows are likely to be greater for origin-destination pairs which have good alignment between the industry (skills) mix of employed residents in the origin SLA and the industry (skills) mix of jobs in the destination SLA. To investigate the influence of skills and industry on commuting flows, BITRE has developed a measure of industry mismatch for 2001 and 2006 as well as a measure of skills mismatch for 2001 and 2006.[79] These measures identify the proportion of employed residents of the origin SLA who would need to change industries (skill categories) to match the industry (skill) mix of the destination SLA.

The skills mismatch index was calculated based on three qualifications categories: no post school qualification, certificate level qualification and higher qualification.[80] While the skills mismatch index can theoretically take values between 0 and 1, in practice no SEQ origin-destination pair has a skills mismatch index over 0.6 for 2006 and the median index value is 0.12. In 2006, skills mismatch was lowest for the origin-destination pair of Coorparoo in the Middle East subregion and Woolloongabba in the Inner sector, while skills mismatch indices were greatest for the pairing of Willawong in Middle South subsector and Herston in the Inner sector. Other things equal, it is expected that SLA pairs with a high score on the skills mismatch index will have lower commuting flows.

The industry mismatch index was calculated based on the single digit ANZSIC 1993 industry classification for both 2001 and 2006. The industry mismatch index can theoretically take values between 0 and 1, and the median index value is 0.26 in both years. In 2006, the greatest industry mismatch related to the SLA pair of Moreton Island in the Middle East subregion and Herston in the Inner sector, while industry mismatch was lowest for commutes from Springwood in the Outer South subregion to Nerang on the Gold Coast.

Table 8.5 presents the results of correlation analysis of commuting flows with skills and industry mismatch for SEQ and Brisbane for 2001 and 2006. As expected, the greater the extent of the industry or skills mismatches, the lower the observed commuting flow. The results also suggest that a high degree of skills mismatch may negatively affect the change in commuting flows. As was the case for Sydney, Melbourne and Perth (see BITRE 2012a, 2011a, 2010), the skills mismatch index is more closely connected to commuting patterns than the industry mismatch variable.

79 An alternate method for investigating the influence of skills and industry is to estimate gravity models of commuting flows which are disaggregated by skills (as per Trendle and Siu 2005) or industry (as per BITRE 2012a). BITRE does not have access to commuting matrices disaggregated by industry or education for SEQ, which would be needed to undertake disaggregated regression analysis of this type

80 Constraints on data availability meant a slightly different classification was used to construct the 2001 index: no post school qualifications above Certificate Level II; Certificate III or IV qualification; higher qualification.

Table 8.5 Correlation analyses of relationships between commuting flows and industry and skills mismatch, South East Queensland and Brisbane, 2001 and 2006

Commuting flow variable	Skills mismatch index	Industry mismatch index	Number of observations
South East Queensland			
Number of persons commuting between origindestination pair in 2006	–0.05	–0.04	84 681
Number of persons commuting between origindestination pair in 2001	–0.04	–0.04	86 841
Change in number of persons commuting between origin-destination pair, 2001 to 2006	–0.02	–0.02	65 025
Brisbane SD			
Number of persons commuting between origindestination pair in 2006	–0.05	–0.02	46 225
Number of persons commuting between origindestination pair in 2001	–0.04	–0.03	47 381
Change in number of persons commuting between origin-destination pair, 2001 to 2006	–0.04	0.01^	44 732

Notes: Correlations for 2001 and 2006 based on complete sample of origin-destination commuter flows. Change correlations based on 2001 version of skills and industry mismatch indices.

^ This correlation is only borderline statistically significant, at the 10 per cent probability level (but not the 5 per cent level). All remaining correlations are statistically significant at the 1 per cent level.

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* commuting flows matrix, industry and educational qualifications data.

Table 8.6 provides an illustration of the role that skills mismatch could potentially play. It shows six origin-destination pairs that have been selected because they are very much equivalent in terms of having a commuting distance of about 10 kilometres, between 3500 and 4300 employed residents in the origin SLA and about 2800 jobs in the destination SLA (the three shaded columns). However, while the first three listed pairs are very well aligned in terms of their skills mix, the latter three pairs have greater skills mismatch. The initial three origin-destination pairs also have greater commuting flows (on average) than the latter three pairs, which is consistent with the hypothesis that, other things equal, commuting flows are likely to be greater for origin-destination pairs which have a high degree of skills and industry alignment. It is of course possible that other factors lie behind these differences, such as transport connections. The gravity model analysis in the following section will assess whether industry and skills mismatch have a statistically significant influence on commuting flows in SEQ and Brisbane SD.

Table 8.6 Exploring the link between commuter flows and skills mismatch for selected origin-destination pairs, South East Queensland, 2006

Origin SLA	Origin subsector	Destination SLA	Destination subsector	Employed residents of origin SLA	Jobs in destination SLA	Average road distance (km)	Skill mismatch index	Number of commuters
Coombabah	Gold Coast	Oxenford-Maudsland	Gold Coast	3781	2957	11.0	0.05	48
Taigum-Fitzgibbon	Middle North	Hendra	Middle North	3784	2541	10.2	0.06	23
Enoggera	Middle North	Albany Creek	Outer North	3502	2752	9.5	0.07	11
Inala	Middle West	Sunnybank Hills	Middle South	3823	2743	10.2	0.20	16
Kangaroo Point	Inner	Mount Gravatt East	Middle South	3827	2936	10.9	0.21	5
Taringa	Middle West	East Brisbane	Middle East	4285	2727	10.0	0.26	13

Source: BITRE analysis of ABS 2001 and 2006 *Census of Population and Housing* commuting flows matrix, industry and educational qualifications data.

A gravity model of commuting

This chapter has identified several factors which are likely to be important drivers of spatial commuting flows in SEQ. A wide range of other factors are also likely to have an influence, such as age, occupation, home ownership, income and gender (Trendle and Siu 2005).

This section estimates gravity models for origin-destination commuting flows that occur within the Brisbane SD and for flows that occur within SEQ. The regression analysis is not intended to be comprehensive. The purpose of the model is:

- to quantify the influence that residential growth, jobs growth and distance have on spatial patterns of commuting in SEQ
- to explore the effect of transport infrastructure on spatial patterns of commuting in SEQ
- to enable comparisons across Australia's largest capital cities through adoption of a common model specification across all cities.

Explaining origin-destination commuter flows

Gravity models are often used to explain spatial variation in commuter flows. Gravity models relate passenger flows between origin and destination zones to the relevant population total in the origin and destination zones and to distance. The basic structure of a gravity model of commuting flows is:

$$C_{ij} = \alpha R_i^{\ \beta} W_j^{\gamma} / D_{ij}^{\delta}$$

C_{ij} = commuting flow from zone i to zone j

R_i = the number of employed residents of zone i

W_j = the number of people working in zone j

D_{ij} = the travel cost between zones i and j
(typically proxied by measures of either distance or time)

α, β, γ and δ are the model parameters to be estimated.

The state transport departments have typically developed far more sophisticated models of spatial commuting flows (e.g. the SEQ Strategic Transport Multi-Modal Model), which reflect more disaggregated flow data and more detailed information on transport infrastructure and mode usage. Such models have been progressively improved over many years and have the capability of addressing a much broader set of questions (see, for example Alford and Whiteman 2009). The relatively simple gravity model presented in this paper nevertheless provides a useful introduction to some of the principal drivers of spatial differences in commuter flows within SEQ.

Regression analysis for 2001 and 2006—base model

The gravity model is traditionally estimated in logarithmic form using ordinary least squares (OLS) estimation. The following model was estimated for each time period (t).

$$ln\,C_{ijt} = \alpha + \beta\,ln\,R_{it} + \gamma\,ln\,W_{jt} - \delta\,ln\,D_{ijt}$$

As travel time information was not available, two different measures of the distance between origin-destination pairs were experimented with:

- BITRE derived a straight line measure of the distance between the population-weighted centroid of the origin SLA (using collection district level populations) and the job-weighted centroid of the destination SLA (using job numbers for destination zones) using ArcGIS. People who worked at home were assigned a zero commuting distance. The straight line distance measure was comparable to that used in other reports in this series (i.e. BITRE 2010, 2011a, 2012a).
- The Queensland Department of Transport and Main Roads model-based estimates of the road network distance between any origin-destination pair, derived from the South East Queensland Strategic Transport Multi-Modal Model (SEQSTM-MM) for 2006.

For the main results presented here, the variable D_{ij} is represented by the estimated straight line distance between SLAs, which was considered the most suitable measure of travel costs available, as it had better explanatory power and produced more robust results across alternate model specifications. Appendix D presents model results which instead use the road network distance measure.[81]

The regression analysis is undertaken for two geographic areas:

- for the 291 SLAs in SEQ
- for the 215 SLAs that make up the Brisbane SD.

81 For the other cities where both straight line and road network distance measures were available (i.e. Sydney and Melbourne), the road network distance measure was preferred because it performed considerably better in the regression analysis (BITRE 2011, 2012a).

With 291 SLAs, there is a potential sample of 84 681 origin-destination pairs in 2006 (i.e. 291 X 291), but all sample observations which took a value of either zero or three were excluded from the analysis.[82] [83] This resulted in a sample of 23 950 observations for 2006 and 21 314 for 2001. For the Brisbane SD regressions, the sample is about 25 per cent smaller.

Initial testing of the model identified some issues with heteroskedasticity and non-normality of errors. Following Chen et. al. (2003), robust standard errors were derived and the resulting robust t-values have been presented throughout this chapter. As a rule of thumb, robust t-values which have an absolute value of more than two should be considered statistically significant. Using robust standard errors had minimal impact as all of the explanatory variables in the base model remained highly significant and the robust standard errors remained low.

Table 8.7 summarises the base gravity model results for 2001 and 2006. Some key points to note include:

- The gravity model has reasonably high explanatory power, with the three independent variables explaining between 57.8 and 65.3 per cent of all variation in origin-destination commuter flows.
- The model has higher explanatory power when the focus is restricted to SLAs within the Brisbane SD.[84] The results suggest that the relationship between commuter flows and the three drivers is a little different for locations in the rest of SEQ than it is within the Brisbane SD.
- All three explanatory variables are highly significant and have the expected signs. The amount of people commuting between an origin-destination pair tends to increase with the number of employed residents in the origin SLA and the number of jobs in the destination SLA. Greater distance between an origin-destination pair is associated with smaller commuting flows.
- The 2001 model has considerably (i.e. more than 4 percentage points) lower explanatory power than the 2006 model perhaps reflecting the greater data quality problems with the 2001 data.

82 Values of three and zero are generated by randomisation techniques applied by ABS to protect confidentiality, and should not be relied upon.

83 Values of zero create estimation problems when using a logarithmic formulation. Using a poisson model allows the retention of observations with a zero value—a poisson model was estimated in BITRE's Sydney study, and while some of the specific estimates differ between the poisson and logarithmic models for Sydney, the conclusions proved to be generally robust to the alternate model specification. The key difference was that the distance penalty was of a smaller magnitude in the poisson model (BITRE 2012a).

84 Similarly, the regression analysis for Sydney SD had higher explanatory power than that for the Sydney Greater Metropolitan Area (BITRE 2012a), while the regression analysis Melbourne SD had higher explanatory power than that for the more encompassing Melbourne working zone (BITRE 2011a).

Table 8.7 Estimation of base gravity model of origin-destination commuter flows, Brisbane and South East Queensland, 2001 and 2006

	2001		2006	
	SEQ	Brisbane SD	SEQ	Brisbane SD
Sample	21 314	17 138	23 950	18 531
Adjusted R-squared (per cent)	57.8	61.2	63.2	65.3
Parameter estimates				
Constant	–7.58	–7.99	–7.65	–8.07
Log of number of employed residents in origin SLA	0.82	0.82	0.82	0.82
Log of number of jobs in destination SLA	0.72	0.75	0.73	0.76
Log of straight line distance between origin and destination SLA	–0.89	–0.87	–0.93	–0.90
Robust t-value				
Constant	–74.5	–72.0	–84.8	–81.6
Log of number of employed residents in origin SLA	88.5	84.8	97.2	90.5
Log of number of jobs in destination SLA	113.8	109.8	134.5	132.2
Log of straight line distance between origin and destination SLA	–136.9	–118.2	–155.5	–127.8

Note: The dependent variable is the log of the number of persons commuting from the origin SLA to the destination SLA in the given year.

Sources: Estimated by BITRE using SAS OLS estimation and robust standard errors. Based on ABS *Census of Population and Housing* data 2001 and 2006 commuting matrices and BITRE-derived estimates of the straight line distance between SLAs.

In addition to the straight line distance estimates used in Table 8.6, a measure of road network distance was also available from DTMR SEQSTM-MM outputs for 2006 (but not separately for 2001). A comparison of the regression results based on the road network and straight line distances (Table 8.7 and Table D.1) reveals that using the straight line distance measure results in a model with slightly greater explanatory power for 2006. While the parameter estimates on the distance variable obviously differed depending on which distance measure was used, the base gravity model results were otherwise robust to measurement of distance.

The sum of the coefficients on the jobs and employed residents variables exceeds one in each of the unconstrained model specifications in Table 8.7. If the coefficients sum to more than one, an equi-proportional increase in workers and jobs in all SLAs would be predicted to result in a greater increase in the number of commutes. For the gravity model to be useful for predicting future commuting flows, the parameters should sum to one.[85] To better grasp the influence of these coefficients, a restricted model was estimated for the Brisbane SD with the jobs and employed residents parameters constrained to sum to one. This reduced the 2006 model's explanatory power from 65.3 per cent to 59.2 per cent, with the distance coefficient declining to –0.77.[86] Thus, even in this restricted model, the majority of the variation in origin-destination commuter flows can be explained by reference to just three key factors—distance plus the spatial distribution of employed residents and jobs.

From Table 8.7 it can be seen that the parameter estimate for the straight line distance variable became increasingly negative between 2001 and 2006—this change was statistically significant

85 Note that the unconstrained models presented in Table 8.7 are not intended to be used to predict future commuting flows.

86 In this constrained model, the employed residents parameter was estimated at 0.19 and the jobs parameter at 0.81.

at the 1 per cent probability level for both SEQ and the Brisbane SD. As was the case for Melbourne (BITRE 2011a), there is evidence for Brisbane and SEQ that the extent to which distance impedes travel has increased over the period, a result which presumably reflects the sharp increase of 55 per cent nationally in nominal automotive fuel prices between the September quarters of 2001 and 2006 (ABS 2009a). However, in the road network distance specifications presented in Appendix D, while the change in the distance parameter between 2001 and 2006 was in the same direction, it was not statistically significant.

The coefficients on the jobs and employed residents variables were relatively robust over time (i.e. the parameter estimates did not change significantly between 2001 and 2006).

The largest commuting flows are predicted to occur for origin-destination pairs which have a very large number of employed residents in the origin SLA, a very large number of jobs in the destination SLA and a very short distance between the two SLAs. To see how the model works in practice, some examples are provided below based on the 2006 parameter estimates for the SD model: [87]

- For an origin-destination pair which is located 5 kilometres apart, where each has 3000 employed residents and jobs, commuting flows are predicted to be 32 persons.
- A doubling of the size of the two SLAs to 6000 employed residents and jobs (leaving distance unchanged) results in predicted commuting flows of 96 persons.
- If the two SLAs with 6000 employed residents and jobs are located 10 kilometres apart, the predicted commuting flow is 49 persons. It is 24 persons if they are located 20 kilometres apart and 13 persons if they are located 40 kilometres apart.

Regression analysis for 2001 and 2006—extended model

This basic gravity model formulation assumes that employees are homogenous (Trendle and Siu 2005). In practice, employees have different skills and educational attainment and vary in their suitability for employment in different industries. BITRE has attempted to capture this heterogeneity through inclusion of the skill mismatch variable, which was described in the previous section. An industry mismatch variable was also trialled, but it was omitted as it was sufficiently closely correlated with the skill mismatch variable to pose multicollinearity risks,[88] but had lower explanatory power.

One of the aims of this modelling exercise is to explore the effect of transport infrastructure on spatial patterns of commuting in SEQ. This has been investigated through inclusion of three variables which identify the impact of SEQ's rail network, busway network and freeway network on commuting patterns:

- A rail-distance interactive term has been included to identify whether the distance penalty is reduced for origin-destination pairs which have a direct rail connection, compared to those that do not. Only stations on the same train line are considered to have a direct rail connection. An exception was made for the Gold Coast-Airport service, which was treated as a single continuing line since nearly all peak hour services from the Gold Coast

87 Calculated as $exp\,[-8.07+0.82*lnR_i+0.76*\ln W_j-0.90*\ln D_{ij}]$

88 The correlation between the two variables was 0.54 in 2006 for the SEQ sample and 0.55 for the Brisbane sample.

continue through the city to the Airport.[89] Stations north of Nambour were excluded from the analysis due to their very limited service frequency. This variable takes a value of zero if the origin-destination pair does not have a direct rail connection, and is set equal to the log of the distance between the origin-destination pair if there is a direct rail connection.

- A busway-distance interactive term has been included to identify whether the distance penalty is reduced for origin-destination pairs which have a direct busway connection, compared to those that do not. Only the South East Busway contributes to the 2001 variable, while the 2006 variable reflects both the South East Busway and the Inner Northern Busway (City to Herston). Only busway stations on the same route are considered to have a direct busway connection, with both busways considered to be directly connected to the City Remainder and City Inner SLAs. The variable takes a value of zero if the origin-destination pair does not have a direct busway connection, and is set equal to the log of the distance between the origin-destination pair if there is a direct busway connection.
- A freeway-distance interactive term has been included to identify whether the distance penalty is reduced for origin-destination pairs which would be travelled between without leaving the freeway system, compared to origin-destination pairs that would require travel on arterial or local roads. This variable is set equal to the log of the distance between the origin-destination pair if the two SLAs would be travelled between without leaving SEQ's freeway network, and to zero otherwise. The variable differs for 2001 and 2006 due to changes made to the freeway network, such as the Inner City Bypass and the Port of Brisbane Motorway.

Table 8.8 presents an extended gravity model, which allows for skills heterogeneity of workers, and the rail, busway and freeway networks, to impact on origin-destination commuter flows within SEQ. The inclusion of these three variables leads to a 2 to 3 percentage point increase in the model's explanatory power, compared to the base model specifications in Table 8.7. The parameter estimates for the employed residents, jobs and distance variables undergo little change in response to the inclusion of additional variables in the regression.

The three additional variables that have previously been trialled for other Australian cities—skill mismatch, rail-distance and freeway-distance—are all statistically significant ($p<0.001$) in both the 2001 and 2006 regressions and signs are in accordance with expectations.

The skills mismatch variable is a highly significant addition to the gravity model of commuter flows. When an origin-destination pair has a large degree of skill mismatch, commuter flows are predicted to be significantly lower than if the supply and demand for skills is well aligned between the two SLAs. If we consider a hypothetical origin-destination pair with 4000 employed residents and jobs located 5km apart, the predicted 2006 commuter flow falls from 42 persons with no skills mismatch (i.e. perfect alignment) to just 17 persons when the maximum level of skills mismatch is observed.[90] The skills mismatch variable has a more pronounced effect in the SEQ model than in the Brisbane SD model, but is highly significant in both. The skills mismatch parameter did not change significantly between 2001 and 2006.

As expected, the existence of a direct rail connection between an origin-destination pair has the effect of offsetting the distance penalty and boosting commuter flows. The hypothetical origin-destination pair described in the previous paragraph is predicted to have 42 commuters if there is no skills mismatch and no direct rail, busway or freeway connections. The 2006 SD

89 While other inbound lines often continue through the city and become the outbound service of another line, they do not do this consistently enough in peak time to be considered one continuing line overall.

90 In 2006, the maximum level of the skills mismatch index was 0.59.

model predicts that the commuter flow will be somewhat higher (55 persons) if these SLAs are directly connected by the rail system. Between 2001 and 2006, there was a small decline in the magnitude of the rail parameter, but this was only borderline significant (i.e. at the 10 per cent probability level) in the Brisbane model, and insignificant for the SEQ model.

Table 8.8 Estimation of extended gravity model of origin-destination commuter flows, South East Queensland and Brisbane, 2001 and 2006

	2001		2006	
	SEQ	Brisbane SD	SEQ	Brisbane SD
Sample	21 314	17 138	23 950	18 531
Adjusted R-squared (per cent)	60.9	64.1	65.9	67.8
Parameter estimates				
Constant	–7.42	–7.90	–7.37	–7.91
Log of number of employed residents in origin SLA	0.80	0.82	0.79	0.81
Log of number of jobs in destination SLA	0.74	0.76	0.74	0.77
Log of straight line distance between origin and destination SLA	–0.89	–0.86	–0.92	–0.89
Direct rail connection X Log of distance	0.15	0.19	0.14	0.17
Direct busway connection X Log of distance	–0.06	–0.02	–0.07	–0.03
Freeway connection X Log of distance	0.07	0.08	0.05	0.05
Skills mismatch index for origin-destination pair	–1.91	–1.52	–1.78	–1.48
Robust t-value				
Constant	–73.9	–71.8	–82.3	–80.5
Log of number of employed residents in origin SLA	89.4	85.9	96.7	91.3
Log of number of jobs in destination SLA	113.2	109.4	131.9	129.8
Log of straight line distance between origin and destination SLA	–136.4	–118.0	–152.6	–125.5
Direct rail connection X Log of distance	19.3	24.2	17.3	20.8
Direct busway connection X Log of distance	–1.4	–0.6	–1.4	–0.8
Freeway connection X Log of distance	12.8	11.3	11.0	9.8
Skills mismatch index for origin-destination pair	–35.3	–27.4	–39.0	–30.5

Note: The dependent variable is the log of the number of persons commuting from the origin SLA to the destination SLA in the given year. The skills mismatch index was calculated using slightly different categories for 2001 and 2006 so the parameter estimate is not directly comparable across the two models.

Sources: Estimated by BITRE using SAS OLS estimation and robust standard errors. Based on ABS *Census of Population and Housing* data 2001 and 2006 commuting matrices and qualifications data and BITRE-derived estimates of the straight line distance between SLAs.

Similarly, the existence of a freeway connection between an origin-destination pair also has the effect of offsetting the distance penalty and boosting commuting flows, reflecting the greater average travel speeds on the freeway network. The magnitude of this effect is, however, smaller than that of the rail variable. Consider the previously described origin-destination pair—the 2006 SD model predicts that if they are not fully connected by the freeway network (or the rail or busway network) there will be a commuter flow of 42 persons, compared to 45 persons if it were feasible to travel between the two SLAs using only the freeway network. There was a statistically significant (at the 1 per cent level) decline in the magnitude of the

freeway parameter between 2001 and 2006 for both Brisbane and SEQ, suggesting that any travel time (or cost) advantage over the rest of the road network has diminished.

The direct busway connection variable is being trialled for the first time for SEQ—it was not included in BITRE's gravity models for Sydney, Melbourne or Perth. In the results presented in Table 8.8, the busway variable is not statistically significant.[91] This implies that the existence of a direct busway connection between an origin-destination pair had no significant effect on commuter flows between those locations (and no significant effect on the distance penalty between those locations). This finding is broadly in line with Department of Transport and Main Roads (2010) which reports that the bus route between Eight Mile Plains and the city (i.e. the South East Busway) was the only bus route, out of the 19 considered, that had a faster average speed in the morning peak period than the equivalent car route—but the average bus speed on this route was just 0.5 kilometres per hour (or 1 per cent) faster than the car speed. The lack of significance of this variable may reflect the fairly limited busway system in operation at the time of the 2001 and 2006 censuses, with Brisbane's busway network undergoing multiple extensions since that time.

Comparison to results for Sydney, Melbourne and Perth

The regression analysis has been designed to enable comparisons across Australia's largest capital cities through adoption of a common model specification across the cities. Results are available for four cities—Brisbane, Sydney, Melbourne and Perth.

Table 8.9 compares the results of a common gravity model specification for 2006. To ensure comparability, a straight line measure of distance is used for all four cities. The freeway variable has been excluded as it was not part of the Perth study (BITRE 2010) and the busway variable was excluded as it was only included in the Brisbane study. Note that the Brisbane sample is much larger than that for the other cities, reflecting the greater disaggregation of SLAs within the Brisbane Statistical Division.

The core gravity model explanatory variables are highly significant and have the expected signs in all four city regressions. The Perth model had a higher explanatory power (82 per cent) than the Sydney and Melbourne models (77 per cent), which in turn had better explanatory power than the Brisbane model (68 per cent).

91 Note that the variable was statistically significant in the road distance specifications (see Appendix D). The parameter estimates for this variable proved to be very sensitive to minor changes in model specification (e.g. replacing the skills mismatch variable with an industry mismatch variable), and should be treated with caution.

Table 8.9 Comparison of extended gravity model of origin-destination commuter flows between Brisbane, Sydney, Melbourne and Perth, 2006

	Brisbane Statistical Division	Perth Working Zone	Sydney Statistical Division	Melbourne Statistical Division
Sample	18 531	1359	3788	5152
Adjusted R-squared (per cent)	67.7	82.4	76.8	76.5
Parameter estimates				
Constant	–7.96	–11.17	–13.90	–6.64
Log of number of employed residents in origin SLA	0.81	1.02	1.13	0.59
Log of number of jobs in destination SLA	0.77	0.99	1.11	0.96
Log of straight line distance between origin and destination SLA	–0.88	–1.07	–1.30	–1.33
Direct rail connection X Log of straight line distance	0.17	0.11	0.15	0.21
Skills mismatch index for origin-destination pair	–1.51	–1.26	–1.94	–2.00
Robust t-value				
Constant	–81.0	–37.5	–44.4	–17.6
Log of number of employed residents in origin SLA	91.6	45.4	43.7	19.5
Log of number of jobs in destination SLA	130.8	49.6	62.4	60.0
Log of straight line distance between origin and destination SLA	–125.9	–31.9	–63.2	–58.5
Direct rail connection X Log of straight line distance	20.9	5.2	14.7	16.2
Skills mismatch index for origin-destination pair	–31.3	–6.8	–13.8	–19.8

Notes: The dependent variable is the log of the number of persons commuting from the origin SLA to the destination SLA in the given year. The skills mismatch index was calculated using slightly different categories for 2001 and 2006 so the parameter estimate is not directly comparable across the two models.

Sources: Perth results sourced from BITRE (2010) T8.6. Sydney and Melbourne results sourced from BITRE (2012a) T8.9. Brisbane results estimated by BITRE using SAS OLS estimation and robust standard errors based on ABS *Census of Population and Housing* data 2001 and 2006 commuting matrices and qualifications data and straight line distance estimates.

The parameter estimate for Brisbane's straight line distance variable is of a smaller magnitude than that obtained for Perth, Melbourne or Sydney. This implies that distance is much less of an impediment to commuter travel in Brisbane than it is in Sydney and Melbourne, a result which is consistent with the greater density and congestion of Sydney and Melbourne. It also implies that distance is less of an impediment to commuter travel in Brisbane than it is in Perth. This is reasonably consistent with the AustRoads National Performance Indicators for 2005–06 which report that average morning peak travel speeds were a little faster on Brisbane's arterial roads and freeways than on Perth's (40 vs 39 kilometres per hour), while afternoon peak speeds were considerably faster on Brisbane's roads (45 vs 41 kilometres per hour) (AustRoads 2012).

The additional variables—capturing rail connections and skills mismatch—were both statistically significant and had signs in accordance with expectations. For both variables, the Brisbane parameter estimates were within the range established by the other three cities.

For all cities, the 2006 regressions had consistently higher explanatory power than the comparable 2001 regressions. This probably reflects improvements in journey-to-work data quality over time.

Explaining changes in origin-destination commuter flows

Regression analysis of change between 2001 and 2006

The main drivers of change in commuter flows can be explored by transforming the gravity model into log difference form:

$$[\ \ln C_{ij2006} - \ln C_{ij2001}\ ] = \theta + \mu\,[\ln R_{i2006} - \ln R_{i2001}\ ] + \varrho\,[\ln W_{j2006} - \ln W_{j2001}\ ]$$
$$- \phi\,[\ln D_{ij2006} - \ln D_{ij2001}\ ]$$

where θ, μ, ϱ and ϕ are the model parameters to be estimated.

The dependent variable in this specification closely approximates the percentage change in commuter flows from zone i to zone j between 2001 and 2006. Thus, the percentage change in commuter flows between zone i and j is expressed as a function of the percentage change in employed residents in zone i, the percentage change in jobs in zone j, and the percentage change in distance between zones i and j.

A number of SLAs in SEQ experienced significant boundary changes during this period. In order to be able to make valid comparisons between the 2001 and 2006 commuting flow data, the affected SLAs were combined into aggregate SLA regions (as defined in Appendix B) which have a common boundary in 2001 and 2006. This resulted in a reduced set of 65 025 origin-destination pairs, covering all commuting flows within SEQ.

In practice, most of the apparent changes in the distance measure for origin-destination pairs are likely to be driven by differences in the quality and comparability of the 2001 and 2006 data, such as the greater spatial disaggregation of 2006 travel zones. As it seems likely that the apparent changes in the distance measure for individual O-D pairs between 2001 and 2006 will generally not be meaningful, we have chosen to assume that $D_{ij2006} = D_{ij2001}$, which causes the distance term to drop out of the base model of changes in origin-destination commuter flows.

A practical issue with this specification is that the dependent variable tends to take very extreme values for origin-destination pairs which have zero or low commuter flows in one of the two periods. Such observations were highly influential in the regression analysis and detracted from its usefulness. BITRE has dealt with this issue by focusing the analysis on those origin-destination pairs which had non-trivial commuter flows in both periods. For the results presented in this section, origin-destination pairs with less than 50 commuters in either period were excluded from the analysis.[92] This resulted in a sample of 2416 observations for the Brisbane SD and 2810 for SEQ. When the results are compared to the other cities, a higher cutoff of 100 commuters is used to preserve comparability with the Perth, Melbourne and Sydney results. The greater spatial disaggregation of SLAs in SEQ meant that a relatively small proportion of origin-destination pairs met the 100 commuter cutoff. By adopting the lower cutoff of 50 commuters, a more representative selection of pairs is retained in the analysis, capturing about 73 per cent of total flows in SEQ.

92 The analysis was repeated using a cutoff of 100 commuters, which gave a sample of 1394 observations for SEQ and 1142 for Brisbane. The explanatory power was 9 percentage points higher than for the model with a cutoff of 50, but in qualitative terms the model results were very similar. The model results using the cutoff of 100 commuters are shown in Table 8.12.

Table 8.10 presents the base model regression results for the percentage growth in commuter flows between 2001 and 2006. Initial testing of the model identified some issues with heteroskedasticity and non-normality of errors. Following Chen et al (2003), robust standard errors were derived and the resulting robust t-values have been presented.

The regressions explain a little over half of the variation in the dependent variable. While the Brisbane SD model has slightly lower explanatory power than the SEQ model, the two sets of regression results are broadly consistent with one another. The higher the growth rate of employed residents in the origin SLA and the higher the growth rate of jobs in the destination SLA, the greater is the predicted rate of growth in commuter flows between those two SLAs. Both of these explanatory variables are highly significant and their parameter estimates are of similar magnitude.

Table 8.10 Estimation of base regression model of growth in origin-destination commuter flows from 2001 to 2006, South East Queensland and Brisbane

	SEQ	Brisbane SD
Sample	2810	2416
Adjusted R-squared (per cent)	54.0	50.6
Parameter estimates		
Constant	–0.119	–0.113
Growth rate of employed residents in origin SLA	0.809	0.832
Growth rate of jobs in destination SLA	0.806	0.757
Robust t-value		
Constant	–14.3	–12.3
Growth rate of employed residents in origin SLA	23.3	21.0
Growth rate of jobs in destination SLA	24.7	20.9

Note: The dependent variable is essentially the percentage change in the number of persons commuting from the origin SLA to the destination SLA between 2001 and 2006. Based on origin-destination pairs that have a commuter flow of at least 50 persons in both 2001 and 2006.

Sources: Estimated by BITRE using SAS OLS estimation and robust standard errors. Based on ABS *Census of Population and Housing* commuting data for 2001 and 2006.

This base regression model of change has been extended in four ways:

- In recognition of the earlier result that the deterrent effect of distance on commuting flows was significantly larger in 2006 than in 2001 (see Table 8.7), a distance term has been included to specifically test for its impact on the observed change in commuting flows. This is a straight line distance estimate for 2001, derived by BITRE using GIS methods, as described previously. The variable is expected to be negatively signed, with more distant origin-destination pairs expected to experience lesser growth in commuter flows, (controlling for other influences), reflecting rising travel costs over the period (and specifically fuel costs).
- The skills mismatch variable for 2001 is added to the regression analysis to test for whether origin-destination pairs with a high degree of skills mismatch tend to experience lesser growth in commuting flows.

- An 'infrastructure investment between 2001 and 2006' variable is added to capture any impact that major road and public transport infrastructure investments have had on growth in commuter flows during the period. Three major infrastructure projects are considered—the Port of Brisbane Motorway (stage one), the Inner City Bypass and the Inner Northern Busway (City to RCH Herston). The variable is set equal to one for origin-destination pairs impacted by one of the three major road and public transport infrastructure and zero for all other origin-destination pairs.
- An additional variable relating to 'infrastructure investment completed before 2001 census' is included to control for any potential lagged effect of major infrastructure projects completed in SEQ in the 12 month period leading up to the August 2001 census. Three large scale infrastructure projects are considered—Airtrain, South East Busway and Pacific Motorway upgrade. Origin-destination pairs that became better connected due to road or public transport infrastructure investment would be expected to have more rapid growth in commuting flows.

Table 8.11 summarises the regression results. The inclusion of the four additional variables has only marginally boosted explanatory power. The parameter estimates on the employed residents and jobs growth variables are robust to the inclusion of the additional variables.

The skills mismatch variable was not statistically significant in either the SEQ or Brisbane regressions, but the other three added variables proved to be significant in explaining changes in commuting flows.

The distance variable is negatively signed (as expected) and statistically significant at the 5 per cent probability level for SEQ and at the 1 per cent level for Brisbane. Holding other factors constant, the further apart an origin-destination pair was, the lower the growth in commuting flows. As previously noted, this most probably reflects the effect of the rapid growth in petrol prices over the period, which would favour short distance commutes over long distance commutes. The effect of distance on commuting growth was more pronounced within the Brisbane SD.

Table 8.11 Estimation of extended regression model of growth in origin-destination commuter flows from 2001 to 2006, South East Queensland and Brisbane

	SEQ	Brisbane SD
Sample	2810	2416
Adjusted R-squared (per cent)	54.3	50.9
Parameter estimates		
Constant	–0.112	–0.104
Growth rate of employed residents in origin SLA	0.801	0.830
Growth rate of jobs in destination SLA	0.800	0.753
Log of straight line distance between origin and destination SLA in 2001	–0.006	–0.008
Skills mismatch index in 2001	0.022	0.042
Infrastructure investment between 2001 and 2006	0.034	0.032
Infrastructure investment completed before 2001 census	0.051	0.035
Robust t-value		
Constant	–12.3	–10.7
Growth rate of employed residents in origin SLA	22.2	20.6
Growth rate of jobs in destination SLA	23.9	20.0
Log of straight line distance between origin and destination SLA in 2001	–2.1	–2.6
Skills mismatch index in 2001	0.6	1.1
Infrastructure investment between 2001 and 2006	2.0	1.9
Infrastructure investment completed before 2001 census	3.0	1.9

Note: The dependent variable is essentially the percentage change in the number of persons commuting from the origin SLA to the destination SLA between 2001 and 2006. Based on origin-destination pairs that have a commuter flow of at least 50 persons in both 2001 and 2006.

For the 2001 to 2006 period, the following major infrastructure investments were captured: the Port of Brisbane Motorway (stage one), the Inner City Bypass and the Inner Northern Busway (City to RCH Herston). The pre-2001 census infrastructure investment variable captures Airtrain, the South East Busway and the Pacific Motorway upgrade.

Sources: Estimated by BITRE using SAS OLS estimation and robust standard errors. Based on ABS *Census of Population and Housing* data 2001 and 2006 commuting matrices and qualifications data and BITRE-derived estimates of the straight line distance between SLAs.

It is expected that major infrastructure investments would have a positive impact on commuter flows by improving connectivity and reducing travel times. In the SEQ model, both the lagged and contemporaneous infrastructure terms are positively signed, with the lagged variable being statistically significant at the 1 per cent level and the contemporaneous variable being statistically significant at the 5 per cent level.[93] These results suggest that commuting flows between areas connected by this new infrastructure increased more than would otherwise have been expected given residential and job growth in those areas.

The effects are a little less pronounced in the Brisbane SD model, where both the lagged and contemporaneous infrastructure terms are positively signed and borderline significant (i.e. at the 10 per cent probability level, but not the 5 per cent level).

93 More detailed regressions (not presented here) revealed that the significance of the contemporaneous infrastructure variable was primarily due to the Inner City Bypass having a significant positive effect on commuting change, while the significance of the lagged infrastructure variable did not arise from a single project but from the three projects considered jointly.

The significance of the rail and freeway connection variables in the 2001 and 2006 snapshot regressions shows that the current rail and freeway network, built over many decades, plays an important role in shaping current commuting flows. The significance of the transport infrastructure investment variables in the change regression analysis further suggests that the expansions to the existing transport infrastructure network between 2001 and 2006, and those that occurred just prior to the 2001 census, significantly altered the spatial pattern of commuting in SEQ during the period.

Comparison to results for Sydney, Melbourne and Perth

Table 8.12 compares results from the base regression model of growth in commuter flows for four cities—Brisbane, Sydney, Melbourne and Perth. A consistent model specification has been adopted for all three cities, which assumes that the distance between origin-destination pairs was stable between 2001 and 2006. For all three cities, the analysis is focused on origin-destination pairs with at least 100 commuters in both years, and so the Brisbane results differ from those presented previously in Table 8.10 which focused on pairs with at least 50 commuters in both years.

Table 8.12 Comparison of base regression model of growth in origin-destination commuter flows between 2001 and 2006 for Brisbane, Sydney, Melbourne and Perth

	Brisbane Statistical Division	Sydney Statistical Division	Melbourne Statistical Division	Perth Working Zone
Sample	1142	1734	1790	621
Adjusted R-squared (per cent)	59.5	39.8	68.7	51.8
Parameter estimates				
Constant	–0.09	–0.03	–0.06	–0.06
Growth rate of employed residents in origin SLA	0.85	0.82	0.88	0.55
Growth rate of jobs in destination SLA	0.64	1.03	0.90	1.04
Robust t-value				
Constant	–8.2	–7.6	–11.9	–6.3
Growth rate of employed residents in origin SLA	17.0	15.9	19.7	7.9
Growth rate of jobs in destination SLA	14.6	25.2	21.5	23.0

Note: The dependent variable is essentially the percentage change in the number of persons commuting from the origin SLA to the destination SLA between 2001 and 2006. Based on origin-destination pairs that have a commuter flow of at least 100 persons in both 2001 and 2006.

Sources: Perth results sourced from BITRE (2010, Table 8.7). Melbourne and Sydney results sourced from BITRE (2011a, Table 8.12). Brisbane results estimated by BITRE using SAS OLS estimation and robust standard errors based on ABS *Census of Population and Housing* data for 2001 and 2006.

A distance term was trialled in the Sydney, Melbourne and Brisbane change regressions, and proved to be statistically significant and negatively signed for all three cities (see Table 8.11, BITRE 2011a, p.301 and BITRE 2012a, p.309). Origin-destination pairs that were further apart tended to experience lower growth in commuter flows—this most likely reflected the rapid growth that occurred in petrol prices over the period, which would favour short distance commutes over longer distance commutes.

A variable capturing major transport infrastructure investments between 2001 and 2006 was included in the change regression for all four cities. A lagged transport infrastructure investment variable was included only for Brisbane and Melbourne, as in these cities some particularly large-scale projects were completed just prior to the period of interest. The infrastructure variable(s) proved insignificant in the Perth and Melbourne regressions (see BITRE 2010, p.212 and BITRE 2011a, p.301). However, the transport infrastructure variable was statistically significant at the 5 per cent probability level and positively signed in the Sydney change regression (see BITRE 2012a, p.309). For Brisbane, the transport infrastructure variables were positively signed, with the lagged variable statistically significant at the 5 per cent probability level and the contemporaneous variable statistically significant at the 10 per cent probability level (but not the 5 per cent level).[94]

The cross-city differences in the significance of infrastructure investment as a driver of changes in commuting flows between 2001 and 2006 will relate to the scale of projects that were completed in each city during the time period, not just in terms of project cost, but also in terms of the project's potential to transform the overall pattern of commuting within the city. The projects that were completed in Perth,[95] Melbourne[96] and Brisbane between 2001 and 2006 were of relatively small scale, although some had greater potential to reshape city-wide commuting patterns than others. The major transport infrastructure investments captured for Sydney (i.e. the Westlink M7, the M5 East Freeway and the Cross City Tunnel) were much larger in scale, costing around $3 billion altogether, and the completion of the orbital motorway network represented a fairly fundamental transformation to the freeway network that supports commuter flows in Sydney.

This set of regression results indicates that some major transport infrastructure investments—such as the series of freeway and tunnel investments that occurred in Sydney between 2001 and 2006 or the series of motorway and public transport investments that were completed in SEQ between 2000 and 2006—can significantly reshape commuting flows within a city.

94 These Brisbane results are based on the sample of 1142 persons, obtained by applying a cut-off that origin-destination pairs must have at least 100 commuters in both 2001 and 2006. The significance levels differ somewhat from those based on a larger sample (i.e. Table 8.11).

95 The specific transport infrastructure investments reflected in the 2001 to 2006 change regression for Perth were the opening of the Thornlie spur line, the extension of the northern rail line to Clarkson, and the extensions of the Roe, Tonkin and Kwinana freeways. The Mandurah rail line was opened in December 2007.

96 The most substantial project completed in Melbourne between 2001 and 2006 was the Craigieburn bypass. CityLink and the Western Ring Road were much larger scale projects, with greater potential to substantially alter the spatial patterns of commuting in Melbourne, but any such impacts would be expected to be concentrated in the pre-2001 period. Allen Consulting Group (2003) and Thakur (2009) present evidence that these projects did substantially boost connectivity in relevant parts of Melbourne during the 1996 to 2001 period. The other relevant larger scale project—Eastlink—was completed in 2008, so any impacts would need to be assessed using more recent data.

Summary

This chapter uses gravity models to explain variation in origin-destination commuter flows within SEQ, and to identify some of the key drivers of recent change in these commuter flows.

About two-thirds of the spatial variation in SEQ's commuting flows in 2006 can be explained by reference to just a few key factors, namely:

- the number of employed residents in the origin SLA
- the number of jobs in the destination SLA
- the distance between the two SLAs
- whether there is a direct rail or freeway connection between the SLAs
- the degree of alignment between the skills available in the origin SLA and the skills demanded in the destination SLA.

There are two fundamental drivers—namely growth in employed residents in the origin SLA and growth in jobs in the destination SLA—that together are capable of explaining just over half of the observed variation in the growth rate of commuting flows throughout SEQ. Factors such as the distance between an origin-destination pair and transport infrastructure investments also made a minor contribution to explaining the rate of growth in commuting flows between 2001 and 2006.

CHAPTER 9
Outlook

Key points

- The Queensland Government's population projections suggest that South East Queensland (SEQ) will grow at an average annual growth rate of 2.0 per cent to reach 4.6 million by 2031. The population of the Brisbane Statistical Division (SD) is projected to grow at 1.8 per cent per annum, reaching 2.8 million people by 2031. Of the projected 1.8 million population increase in SEQ, 1.0 million is expected to occur in the Brisbane SD.
- These population projections also suggest that the Outer West subregion will grow at the fastest pace (4.8 per cent annually) in SEQ between 2006 and 2031. In terms of the size of the population increase, Gold Coast is expected to increase the most (371 400), followed by the Outer West (320 600). At the SLA level, Ipswich Central and Ipswich East in the Outer West are projected to add the largest number of people (141 000 and 124 000 people respectively).
- To match the population growth of 1.8 million, about 810 000 new dwellings will be required in SEQ between 2006 and 2031. Most are likely to be built in the Brisbane SD (58 per cent), with Gold Coast (19 per cent) and Sunshine Coast (13 per cent) also expected to accommodate many new dwellings.
- SEQ is forecast to add 783 000 jobs from 2006 to 2026. About 70 per cent of the jobs growth is expected to occur in the Brisbane region—23 per cent in the Outer sector, 24 per cent in the Middle sector and 23 per cent in the Inner sector. The Gold Coast is forecast to contribute 16 per cent of SEQ's employment growth. At the SLA scale, the largest job creation is expected in Ipswich Central (56 300), City Inner (47 300) and Pinkenba-Eagle Farm (47 000).
- The *Health and community services* industry is expected to contribute 16 per cent of SEQ's employment growth between 2006 and 2026, adding 128 200 jobs. *Property and business services* (with a 15 per cent share of SEQ's job growth), *Retail trade* (11 per cent) and *Education* (10 per cent) are also expected to be significant contributors.
- Should the spatial projections of population and employment growth be realised, BITRE's scenario modelling suggests that a large proportion of the increase in commuting in SEQ between 2006 and 2031 will be increased commutes within Outer Brisbane (17–24 per cent of growth) and within the Gold Coast (15–17 per cent of growth). The relative importance of same SLA commutes rises significantly under all three scenarios, and combined with the modelled reduction in the relative importance of inward commutes, is likely to pose a challenge to growing the public transport mode share. The projected pattern of growth is also expected to involve a small rise in average commuting distances.

Context

This chapter considers the future population, employment and commuting patterns of South East Queensland (SEQ). The chapter begins with an analysis of population projections from both the Australian Government and the Queensland Government. It then proceeds to investigate the spatial dwellings forecasts for SEQ. Information is also presented about projected employment growth in SEQ, and the industries which are expected to experience the most jobs growth. Finally, the implications of these population and employment projections for future spatial patterns of commuting within SEQ are considered.

Projected population growth

Using results of ABS Projection Series B,[97] Brisbane is forecast to be one of the highest growth cities in the nation (ABS 2008). Table 9.1 compares the expected average annual growth in population for the five most populous capitals in Australia. According to the projections (see Table 9.1), between 2006 and 2056 the population of Brisbane will grow at the same pace as Perth (1.6 per cent per annum), and at a considerably faster pace than the other capital cities. In absolute terms, this represents an increase of about 2.2 million over the 50 year period. These projections also indicate that by 2056, the five capital cities will continue to retain their current population rankings with Sydney on the top, followed by Melbourne and Brisbane.

Table 9.1 Australian Government population projections for Australia's largest capital cities, 2006 to 2056

	Population ('000)					
	Brisbane	Sydney	Melbourne	Perth	Adelaide	All capital cities
2006	1 819.8	4 282.0	3 743.0	1 518.7	1 145.8	13 163.3
2010	1 980.7	4 496.6	3 998.2	1 661.8	1 194.2	14 023.4
2026	2 681.1	5 426.3	5 038.1	2 267.6	1 384.5	17 624.7
2056	3 979.3	6 976.8	6 789.2	3 358.4	1 651.8	23 787.5
Average annual growth rate (per cent)	1.6	1.0	1.2	1.6	0.7	1.2

Note: Figures in the last column are the totals for the 5 largest cities and for Hobart, Canberra and Darwin.
Source: ABS Cat. 3222.0 Population Projections Australia, 2006 to 2101 (Series B projections) (2008).

Long term population projections are mostly based on key predictors of population, such as fertility, mortality and migration. Therefore it is implicit that the population projections do not reflect policy positions and hence are likely to differ from policy targets.

97 Projection Series B 'largely reflects current trends in fertility, life expectancy at birth, net overseas migration and net interstate migration' (ABS 2008, p.3). The three elements of the projection—births, deaths and migration—are assumed relatively stable over the longer term.

Table 9.2 shows the Australian Government projections for SEQ for five future years from the base year of 2007 to 2027 and the expected rates of average annual growth. The projections are based on the Department of Health and Ageing's (DHA) estimates for Statistical Local Areas (SLAs) and are presented here for the SEQ subregions and regions. The DHA (2009) spatial projections of population are consistent with the aggregate capital city projections shown previously in Table 9.1 from ABS (2008).

Table 9.2 Australian Government population projections for South East Queensland by subregions and regions, 2007 to 2027

	Population ('000)							Average annual growth (per cent)
	2007	2011	2016	2021	2026	2027	Projected change	
Inner	91	101	112	124	135	138	47	2.1
Middle	916	965	1022	1081	1139	1150	234	1.1
Middle East	166	177	190	203	216	219	53	1.4
Middle North	309	322	338	353	368	371	62	0.9
Middle South	235	249	266	284	301	305	70	1.3
Middle West	206	216	229	241	253	255	49	1.1
Outer	850	958	1105	1255	1407	1438	588	2.7
Outer East	134	145	158	172	185	188	54	1.7
Outer North	344	386	438	491	543	553	210	2.4
Outer South	224	246	277	309	341	348	124	2.2
Outer West	149	182	231	283	338	349	200	4.4
Brisbane SD	1857	2023	2239	2459	2681	2726	869	1.9
Gold Coast	536	602	686	771	856	873	338	2.5
Sunshine Coast	303	339	385	431	477	485	182	2.4
Toowoomba	123	131	142	153	164	166	43	1.5
West Moreton	74	81	89	96	103	105	30	1.7
SEQ Total	2893	3175	3541	3911	4281	4355	1462	2.1

Notes: Aggregation of population of SLAs to subregion and region population (2007) and projections (2011–2027) in SEQ.
Source: Department of Health and Ageing (medium series), 2009.

Compared to its 2007 population of 2.9 million, the population of SEQ is expected to grow by an estimated 1.5 million people to bring it up to a population of 4.4 million persons by 2027. This is an average growth of 73 100 persons per year.

Much of this growth will occur in the Brisbane region. By 2026 Brisbane is expected to grow to 2.7 million people (ABS 2008). The long term average annual growth rate up to 2027 for the Brisbane region is expected to reach 1.9 per cent, and after that, will slow down to average 1.6 per cent per annum between 2006 and 2056.

Table 9.2 reveals that the Gold Coast is expected to add 338 000 people between 2007 and 2027, with large increases also projected for the Outer North (210 000), Outer West (200 000) and Sunshine Coast (182 000). The Outer West subregion is expected to grow at

the fastest pace (4.4 per cent per annum), followed by Gold Coast (2.5 per cent). In contrast, the Middle North and Middle West are expected to grow at the slowest pace (0.9 per cent and 1.1 per cent per annum respectively).

The most recent Queensland Government population projections were produced in 2011. Because Queensland's population has been growing faster than predicted by the previous set of projections, the projected population has been revised upwards. The state is anticipated to grow substantially from overseas and interstate migration (Office of Economics and Statistical Research 2011a).

Based on these projections,[98] the population of SEQ is projected to grow to 4.6 million by 2031, as shown in Table 9.3. This is an increase of 1.8 million on the 2006 population of 2.8 million, or an additional 70 600 persons per year. This produces an anticipated average annual growth rate for SEQ of 2.0 per cent, which is very close to that of the Australian Government projections (2.1 per cent, in Table 9.2).[99] As in the Australian Government projections, Queensland Government's forecasts also show that the Brisbane Statistical Division (SD) is expected to grow slightly slower than SEQ at an average annual growth rate of 1.8 per cent.

The anticipated population increase by subregion and region in SEQ is shown in Table 9.3. In terms of the size of the population increase between 2006 and 2031, Gold Coast is expected to increase the most (371 400), followed by the Outer West (320 600), Sunshine Coast (213 000) and Outer North (200 300). The expected rate of population growth is fastest for the Outer West, at an average annual growth rate of 4.8 per cent. The second fastest growing subregion is West Moreton (3.3 per cent per annum), followed by the Inner sector (2.3 per cent per annum).

The Outer West's population is expected to triple from 143 800 in 2006 to 464 400 by 2031. Within this fastest growing subregion, two SLAs—Ipswich Central and Ipswich East—are expected to contribute over 83 per cent of the subregion's population growth. This remarkably high projected growth is based on the current and expected thriving housing development activities in the area. In turn, this will have significant consequences for local infrastructure in the Ipswich area (Office of Economics and Statistical Research 2011a). In contrast, the Middle sector—Middle East, Middle West, Middle North and Middle South subregions—are expected to grow at the slowest pace, averaging just under 1.0 per cent per annum.

98 Queensland Government population projections, 2011 edition (medium series)—aggregated and concorded to subregion and region from SLA 2011 ASGC boundaries to 2006 ASGC boundaries, to match geographic boundaries adopted throughout this BITRE study.

99 The differences in the national population growth projections (DHA 2009) and the state government's projections arise from the assumptions used, including the Total Fertility Rate (TFR), lower life expectancy and net overseas migration.

The assumptions for fertility, mortality and migration of the Queensland Government's projections represent the likely growth scenario (the medium series). This reflects a TFR of approximately 1.9 children per woman by 2013–14, which remains constant thereafter. The mortality assumptions imply life expectancy to reach 89 years for males and 92 years for females. Net overseas migration was assumed to decline to 180 000 within three years, remaining constant thereafter (Office of Economics and Statistical Research 2011). Net overseas migration has been the main driver of Queensland's population growth. By 2010–2011, it accounted for 81.4 per cent of all net migration into Queensland (Brisbane City Council 2012b).

Table 9.3 Queensland Government population projections for South East Queensland by subregions and regions, 2006 to 2031

	Population ('000)						Average annual growth (per cent)	Share (per cent)	
	2006[a]	2011[b]	2016[b]	2021[b]	2026[b]	2031[b]		2006[a]	2031[b]
Inner	88	99	107	124	140	155	2.3	3.1	3.4
Middle	903	987	1047	1086	1109	1117	0.9	31.9	24.3
Middle East	162	181	188	193	196	197	0.8	5.7	4.3
Middle North	306	333	350	365	375	380	0.9	10.8	8.3
Middle South	232	253	273	285	292	293	0.9	8.2	6.4
Middle West	203	221	235	243	246	247	0.8	7.2	5.4
Outer	829	956	1083	1227	1388	1562	2.6	29.3	34.0
Outer East	131	146	158	170	180	188	1.5	4.6	4.1
Outer North	333	390	431	468	501	533	1.9	11.8	11.6
Outer South	221	243	270	301	336	376	2.1	7.8	8.2
Outer West	144	177	223	288	371	464	4.8	5.1	10.1
Brisbane SD	1820	2041	2236	2437	2638	2834	1.8	64.4	61.7
Gold Coast	518	604	684	757	825	889	2.2	18.3	19.4
Sunshine Coast	295	338	377	420	465	508	2.2	10.4	11.1
Toowoomba	122	133	146	161	179	199	2.0	4.3	4.3
West Moreton	73	84	97	116	138	162	3.3	2.6	3.5
SEQ Total	2828	3201	3540	3891	4244	4593	2.0	100.0	100.0

Notes: BITRE uses the 2011 version of the projections and they have been concorded from the 2011 Australian Standard Geographical Classification (ASGC) geography to the 2006 ASGC to match the geographic boundaries used throughout this study.

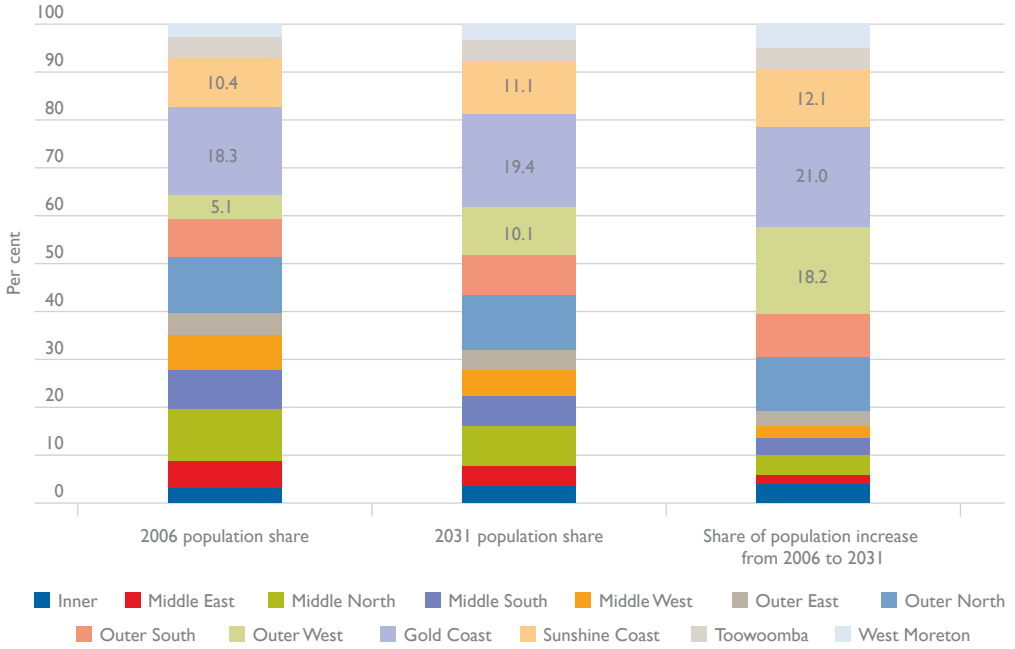
[a] Final estimated resident population (ERP) at 30 June.

[b] Projected resident population at 30 June.

Source: Queensland Government population projections (medium series), Office of Economic and Statistical Research (OESR) 2011 edition.

In 2006, as shown in Figure 9.1, Gold Coast had the largest share of population (18.3 per cent), followed by the Outer North (11.8 per cent), Middle North (10.8 per cent) and Sunshine Coast (10.4 per cent). By 2031, the ranking of the top four subregions is expected to change, due to the rapid growth of the Outer West subregion increasing its share from 5.1 per cent in 2006 to 10.1 per cent in 2031. Between 2006 and 2031, 21.0 per cent of SEQ's population increase is expected to occur in the Gold Coast region, with 18.2 per cent attributable to the Outer West subregion. The Gold Coast and the Outer North are expected to remain in the top two rankings in 2031, although Gold Coast's share is expected to increase (to 19.4 per cent), whilst the Outer North's share is expected to decrease marginally (to 11.6 per cent).

Figure 9.1 Projected shares of population in South East Queensland by subregions and regions, 2006[a] and 2031[b]



Notes: BITRE uses the 2011 version of the projections and they have been concorded from the 2011 ASGC geography to 2006 ASGC boundaries, as used in the remainder of this report.

[a] Final estimated resident population (ERP) at 30 June.

[b] Projected resident population at 30 June.

Source: Queensland Government population projections (medium series), Office of Economic and Statistical Research (OESR) 2011 edition.

The two sets of projections in Table 9.2 and Table 9.3 bear some similarities as well as differences:

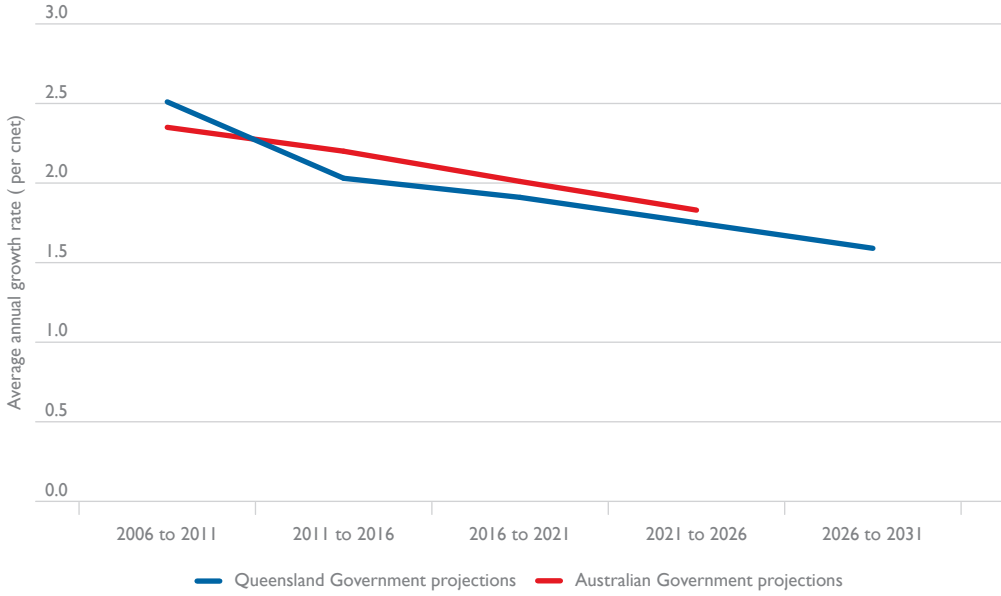
Both sets of projections display an above average growth rate in the population of the Outer West and Outer South subregions and the Gold Coast and Sunshine Coast regions. The common subregions that are expected to have a below average population growth are the Middle East, Middle North, Middle South, Middle West and Outer East.

Both sets of projections anticipate that around 40 per cent of the population increase will occur in the Outer sector, particularly in the Outer West and Outer North subregions. Around 20 per cent of SEQ's growth is expected to occur in Gold Coast. In contrast, the Inner sector is expected to have only around a 3 per cent share of the anticipated population growth.

While both forecasts expect a similar growth of population in Brisbane (1.9 per cent and 1.8 per cent respectively), the Australian Government's projected average annual growth for Gold Coast (2.5 per cent) and Sunshine Coast (2.4 per cent) are higher than the state's projections (2.2 per cent each).

Figure 9.2 shows a progressive decline in the five-yearly rates of average annual growth of population for SEQ in both sets of projections. The Queensland Government's growth projections are consistently lower than the Australian Government's projections beyond 2011.

Figure 9.2 Trends in population growth projections by the Queensland Government and the Australian Government for South East Queensland

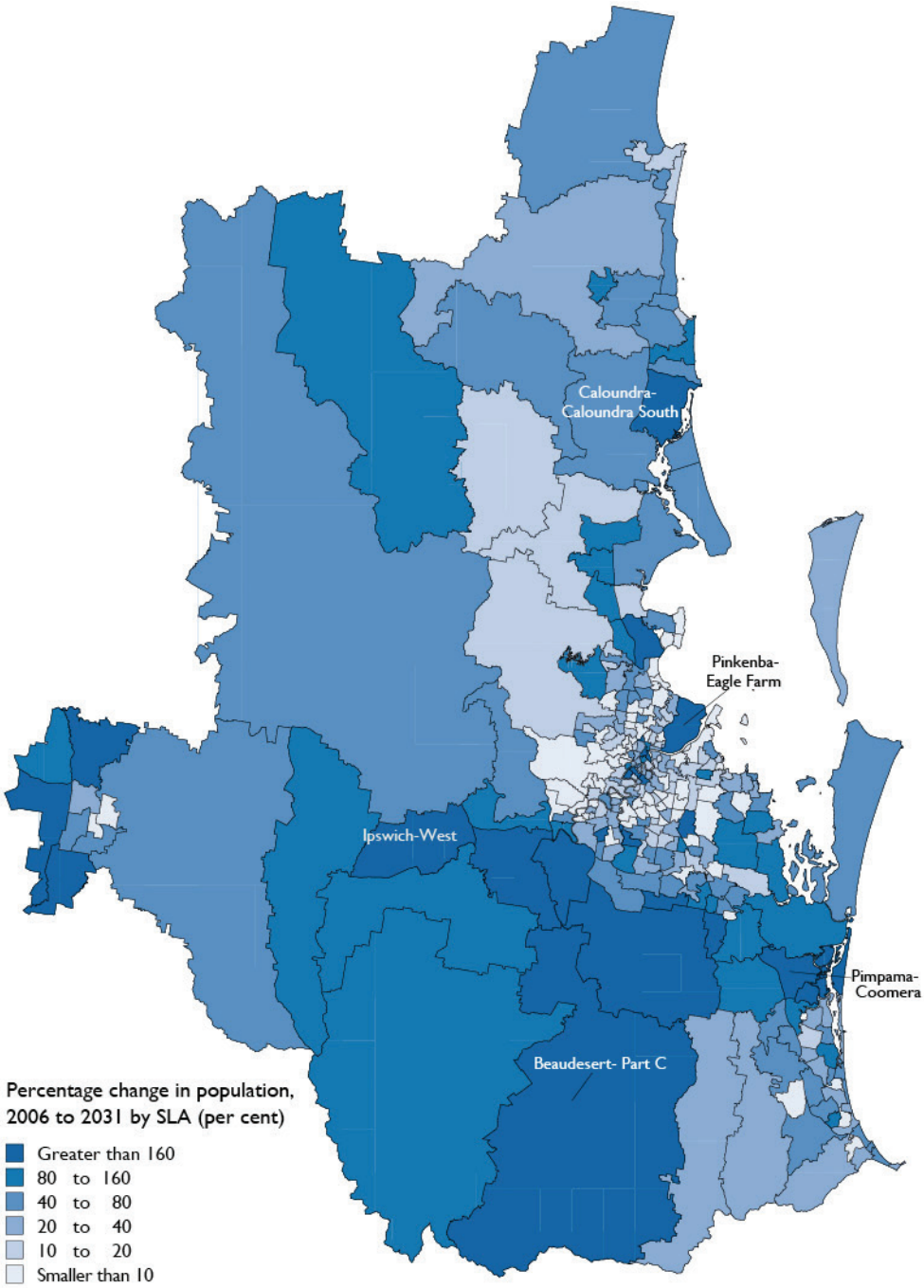


Source: BITRE analysis of Queensland Government population projections (OESR 2011a) and DHA (2009) population projections.

Maps 9.1 and 9.2 present the percentage change and the change in the population count by SLA, from 2006 to 2031.[100] The SLAs of Ipswich Central and Ipswich East are projected to add the largest number of people (141 000 and 124 000 people respectively), whilst Beaudesert Part A and Pimpama-Coomera are expected to add around 70 000 people each by 2031. In contrast, of the 291 SLAs, 14 are expected to have insignificant change (of less than 100 persons) in population, with all of them located in the Middle sector. Stafford Heights is the only SLA which is projected to reduce its population by more than 100 persons.

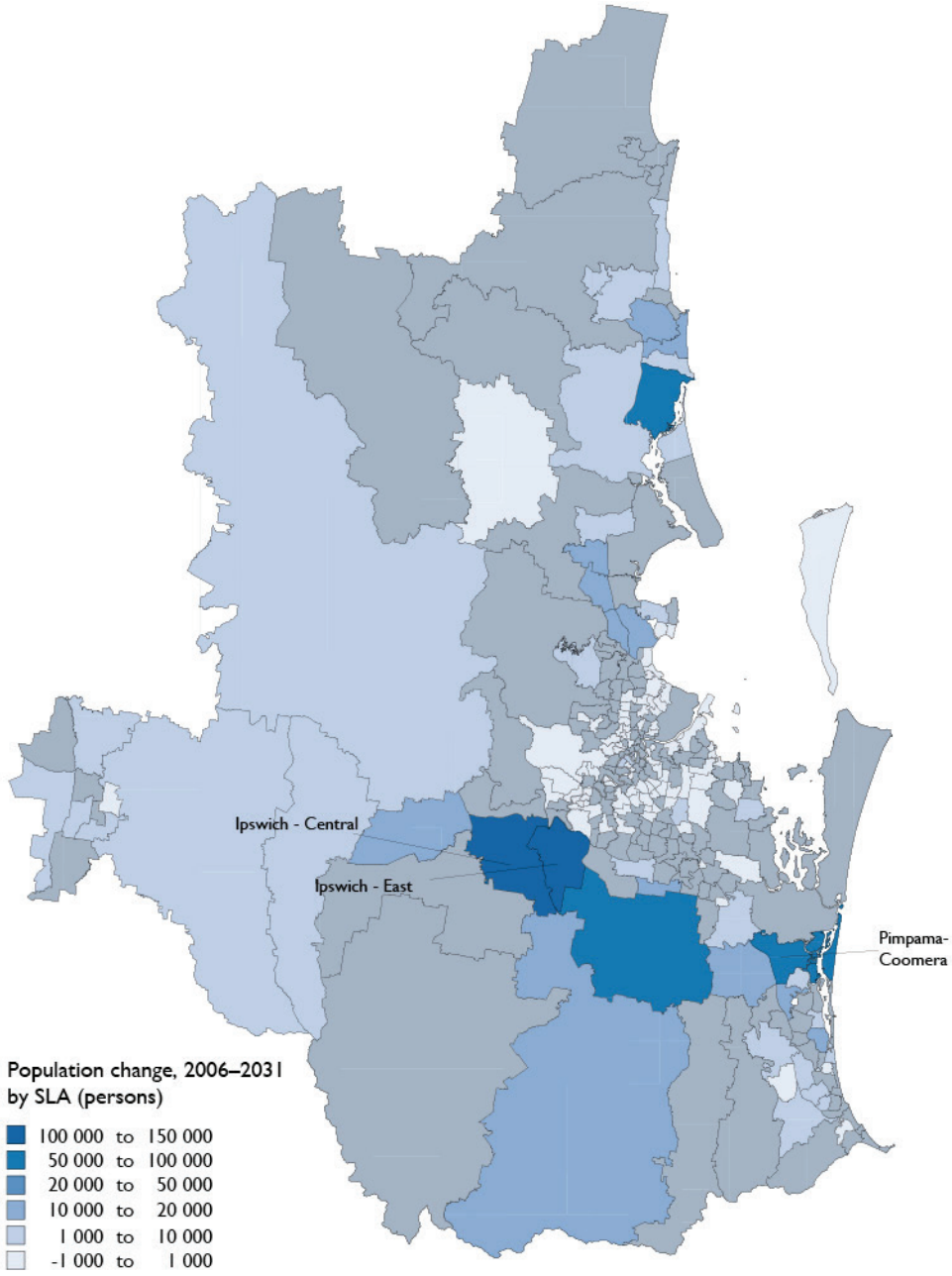
100 BITRE analysis of Queensland Government population projections by SLA (OESR 2011a) is based on 2006 ASGC boundaries for SEQ to allow consistent comparisons to be made across time and place.

Map 9.1 Percentage change in Queensland Government's projected population by Statistical Local Area, South East Queensland, 2006 to 2031



Source: BITRE analysis of Queensland Government population projections (OESR 2011a).

Map 9.2 Change in Queensland Government's projected population count by Statistical Local Area, South East Queensland, 2006 to 2031



Source: BITRE analysis of Queensland Government population projections (OESR 2011a).

Projected growth in dwellings

The *SEQ Regional Plan 2009–2031* states that '[f]rom 2006 to 2031, 754 000 additional dwellings will be required to cater for population growth in SEQ and provide housing choices for a more diverse population' (Queensland Government and COMSEQ 2009, p.9). A review of the SEQ Urban Footprint found that it had the capacity to accommodate at least 754 000 additional dwellings (ibid.,). The *SEQ Regional Plan 2009–2031* allocated the projected requirement of 754 000 additional dwellings to local government areas (LGAs) based on the preferred settlement pattern principles of:

- relieving pressures on the coast
- redistributing growth to the Western Corridor
- promoting infill in existing centres
- redeveloping 'infrastructure rich' areas
- maximising residential yield in major new residential developments (ibid., p.9).

In particular, the *SEQ Regional Plan 2009–2031* notes that an 'increased proportion of the region's future population will be accommodated in the Western Corridor and South Western Corridor, making use of significant areas of available land and reducing pressure on the coast' (Queensland Government and COMSEQ 2009, p.11).

The Queensland Government's latest household and dwelling projections (OESR 2012b) show that an additional 810 000 dwellings are likely to be required to house the SEQ population between 2006 and 2031. Because Queensland's population has been growing faster than previously predicted, the projected dwelling requirements have been revised upwards since the release of the *SEQ Regional Plan 2009–2031*. Table 9.4 shows projected dwelling requirements for SEQ by region in five yearly intervals.[101] The Brisbane SD is anticipated to have the largest share of additional dwellings in SEQ between 2006 and 2031 (58 per cent), followed by the Gold Coast (19 per cent) and Sunshine Coast regions (13 per cent).

For SEQ as a whole, the projection of average annual growth in dwellings (2.2 per cent) is slightly higher than the projection of average annual population growth (2.0 per cent) between 2006 and 2031.

Between 2006 and 2031, Brisbane's dwelling requirements are expected to grow at 2.0 per cent per annum, which is the slowest rate and the only region anticipated to be below the SEQ average rate of growth (2.2 per cent). West Moreton's average annual growth rate is expected to be high (3.0 per cent), although it translates into the smallest number of additional dwellings (71 500) in SEQ, given the small base of population.

Gold Coast accounted for around 18 per cent of SEQ's population in 2006 and is expected to increase its share to 19 per cent by 2031, implying an expected average annual growth of 2.2 per cent during the period (see Table 9.3). With regard to dwelling requirements, the Gold Coast's projected average annual growth rate of 2.3 per cent in effect reflects the projected population growth rate. Similarly, Sunshine Coast is anticipated to have the same average annual growth rates of population and dwelling requirements as the Gold Coast. Toowoomba is anticipated to have slightly lower rates of growth of population growth (2.0 per cent) and dwelling requirements (2.2 per cent) through to 2031.

101 Using the 2011 ASGC. The total of the five regions are consistent with the SEQ region used in this report.

SEQ's Western Corridor corresponds to the Ipswich LGA[102] and lies within the Brisbane SD. It has the highest average annual projected dwellings growth (4.9 per cent). The number of dwellings is expected to rise from 52 600 in 2006 to reach 175 000 dwellings by 2031.

The South Western Corridor is expected to emerge as a key location for residential growth in the medium to long term (Queensland Government and COMSEQ 2009). It includes the southern part of the Logan LGA (e.g. Yarrabilba, Greater Flagstone) and the north-eastern section of the Scenic Rim LGA. The Logan LGA is projected to add 83 500 dwellings between 2006 and 2031 while the Scenic Rim LGA is projected to add 17 400 dwellings. The average annual growth rates of dwellings through to 2031 are 2.5 per cent for Logan and 3.3 per cent for the Scenic Rim, which both exceed the SEQ average of 2.2 per cent.

Table 9.4 Projected dwelling requirements by region, South East Queensland, 2006 to 2031

	Total dwellings ('000)						Change to dwellings ('000) 2006–2031	Share of growth (per cent)	Average annual growth (per cent)
	2006	2011	2016	2021	2026	2031			
Brisbane SD	722.5	817.0	910.3	1005.6	1099.7	1193.6	471.1	57.9	2.0
Gold Coast	203.6	237.6	270.3	301.5	331.4	361.0	157.5	19.0	2.3
Sunshine Coast	133.9	153.7	172.3	193.2	214.4	235.9	102.0	12.6	2.3
West Moreton	33.9	39.1	44.7	52.3	61.4	71.5	37.6	5.0	3.0
Toowoomba[1]	58.6	65.0	72.4	80.6	90.1	100.6	41.9	5.5	2.2
SEQ Total	1152.5	1312.4	1469.9	1633.2	1797.0	1962.5	810.0	100.0	2.2

Note: The projected dwelling requirements data are available for SDs and LGAs, based on 2011 ASGC boundaries. Without access to data at a more disaggregated scale (equivalent to SLA scale), it is not possible to create a consistent SEQ region based on 2006 ASGC boundaries. [1]Toowoomba LGA.

Source: OESR (2012b) Household and dwelling projections, Queensland.

Forecast growth in employment

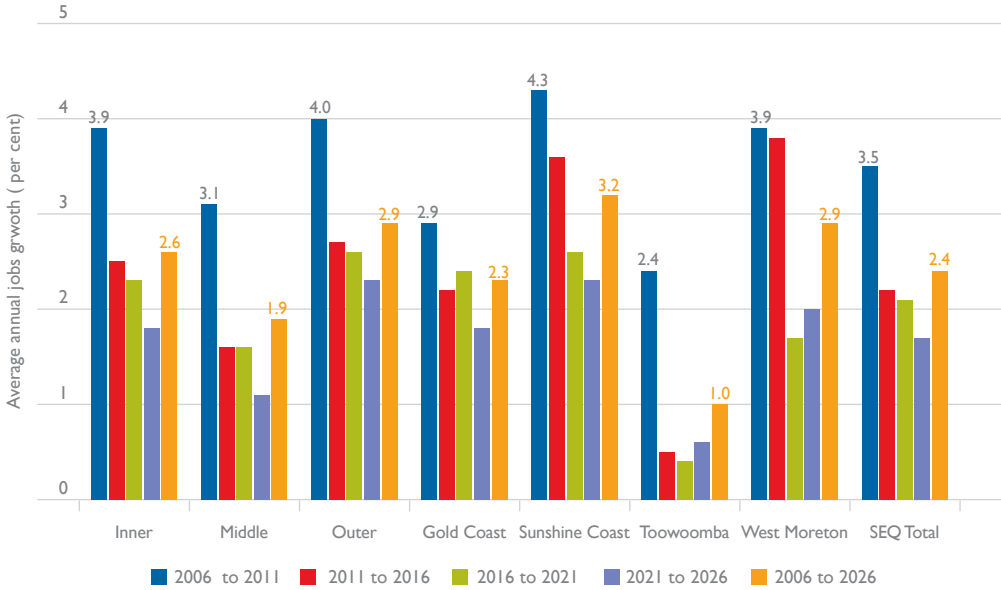
Small area employment forecasts were produced by the National Institute of Economic and Industry Research (NIEIR) in 2007 as commissioned by the Queensland Government (Office of Urban Management) and the Council of Mayors (SEQ).[103] The employment forecasts originally were provided on 2001 ASGC boundaries. BITRE has concorded the data to 2006 ASGC boundaries, in line with the approach used throughout this report.

The NIEIR employment forecasts predict that SEQ will add 783 000 jobs to reach a total of 2.1 million jobs by 2026. Figure 9.3 presents the forecast average annual growth of employment for the Inner, Middle and Outer sectors, as well as the Gold Coast, Sunshine Coast, Toowoomba and West Moreton regions in SEQ from 2006 to 2026. Forecastates of employment growth were highest between 2006 and 2011 for all sectors and regions, but forecast rates of growth gradually slow down thereafter.

102 This is in line with BITRE's approach in Chapter 3 and 4, that the Western Corridor has been defined as equivalent to the Ipswich LGA.

103 Employment and economic projections have been developed at the small area level incorporating land use and valuation data supplied by local governments. These projections remain the property of Office of Urban Management, Queensland Government; however they do not represent government policy.

Figure 9.3 Growth of employment forecasts for five yearly intervals by sector and region, South East Queensland, 2006 to 2026



Note: In 2007 the Office of Urban Management (Queensland Government) and the Council of Mayors (SEQ) commissioned the National Institute of Economic and Industry Research (NIEIR) to develop employment and economic projections for South East Queensland. The projections developed by NIEIR as part of the SEQ Forecasting Study do not represent Government policy. Forecasts are for a 20 year period, from 2006 to 2026, available at five year intervals. Toowoomba in this case excludes Cambooya Part A, Crow's Nest Part A, Jondaryan Part A and Rosalie Part A, which were all excluded from the NIEIR (2007) forecasts.

Source: BITRE analysis of employment projections data for 2006 to 2026 produced by NIEIR (2007).

These job forecasts anticipate that, between 2006 and 2031, the Sunshine Coast (3.2 per cent), the Outer sector (2.9 per cent) and West Moreton (2.9 per cent) will grow well above the average annual growth of SEQ (2.4 per cent). Jobs in the Inner sector are also expected to grow at an above-average annual rate of 2.6 per cent during the 20 year period. The slowest growth has been predicted to occur in the Middle sector (1.9 per cent) and Toowoomba (1.0 per cent).[104]

104 Toowoomba in this case excludes Cambooya Part A, Crow's Nest Part A, Jondaryan Part A and Rosalie Part A, which were all excluded from the NIEIR (2007) forecasts.

Table 9.5 provides the employment forecast, expected change in employment, forecast average annual growth rates and forecast shares of growth for subregions in SEQ to 2026. These forecasts anticipate that the Outer West subregion will grow substantially faster than the other subregions, at an average growth rate of 5.0 per cent per annum. The slowest growth has been predicted to occur in the Middle East subregion and the Toowoomba region (1.0 per cent each), which is well below SEQ's average annual growth rate.

Table 9.5 Employment forecasts by subregion and region, South East Queensland, 2006 to 2026

	2006	2026	Change in employment	Percentage change in employment	Share of growth	Average annual growth	Share of employment 2026
	('000)			(per cent)			
Inner	268	449	180	67	23	2.6	22
Middle	416	601	185	44	24	1.9	29
Middle East	75	92	17	22	2	1.0	4
Middle North	144	232	88	61	11	2.4	11
Middle South	112	152	39	35	5	1.5	7
Middle West	85	126	41	48	5	2.0	6
Outer	232	410	178	77	23	2.9	20
Outer East	34	49	14	42	2	1.8	2
Outer North	82	128	45	55	6	2.2	6
Outer South	65	102	37	56	5	2.3	5
Outer West	49	131	81	164	10	5.0	6
Brisbane SD	916	1460	544	59	69	2.4	70
Gold Coast	210	334	124	59	16	2.3	16
Sunshine Coast	102	192	89	87	11	3.2	9
Toowoomba	51	62	11	22	1	1.0	3
West Moreton	20	36	15	76	2	2.9	2
SEQ Total	1299	2083	783	60	100	2.4	100

Note: In 2007 the Office of Urban Management (Queensland Government) and the Council of Mayors (SEQ) commissioned the National Institute of Economic and Industry Research (NIEIR) to develop employment and economic projections for South East Queensland. The projections developed by NIEIR as part of the SEQ Forecasting Study do not represent Government policy. Note that the NIEIR forecasts appear to have been produced prior to the release of 2006 census employment totals, and so the 2006 data differs from that presented in Chapter 4. Toowoomba results exclude Cambooya Part A, Crow's Nest Part A, Jondaryan Part A and Rosalie Part A, which were all excluded from the NIEIR (2007) forecasts.

Source: BITRE analysis of employment projections data for 2006 to 2026 (5 yearly intervals) produced by NIEIR (2007).

About 70 per cent of the jobs growth to 2026 is expected to occur in the Brisbane region—23 per cent in the Outer sector, 24 per cent in the Middle sector and 23 per cent in the Inner sector. The Inner sector contains significant economic activities and is expected to reach 448 700 jobs and increase its share of SEQ employment by 2026 (to 22 per cent of SEQ jobs).[105] According to these forecasts, SEQ will have an extra 783 000 jobs in 2026 with almost half of the new jobs expected to be in the Inner and Middle sectors of Brisbane.

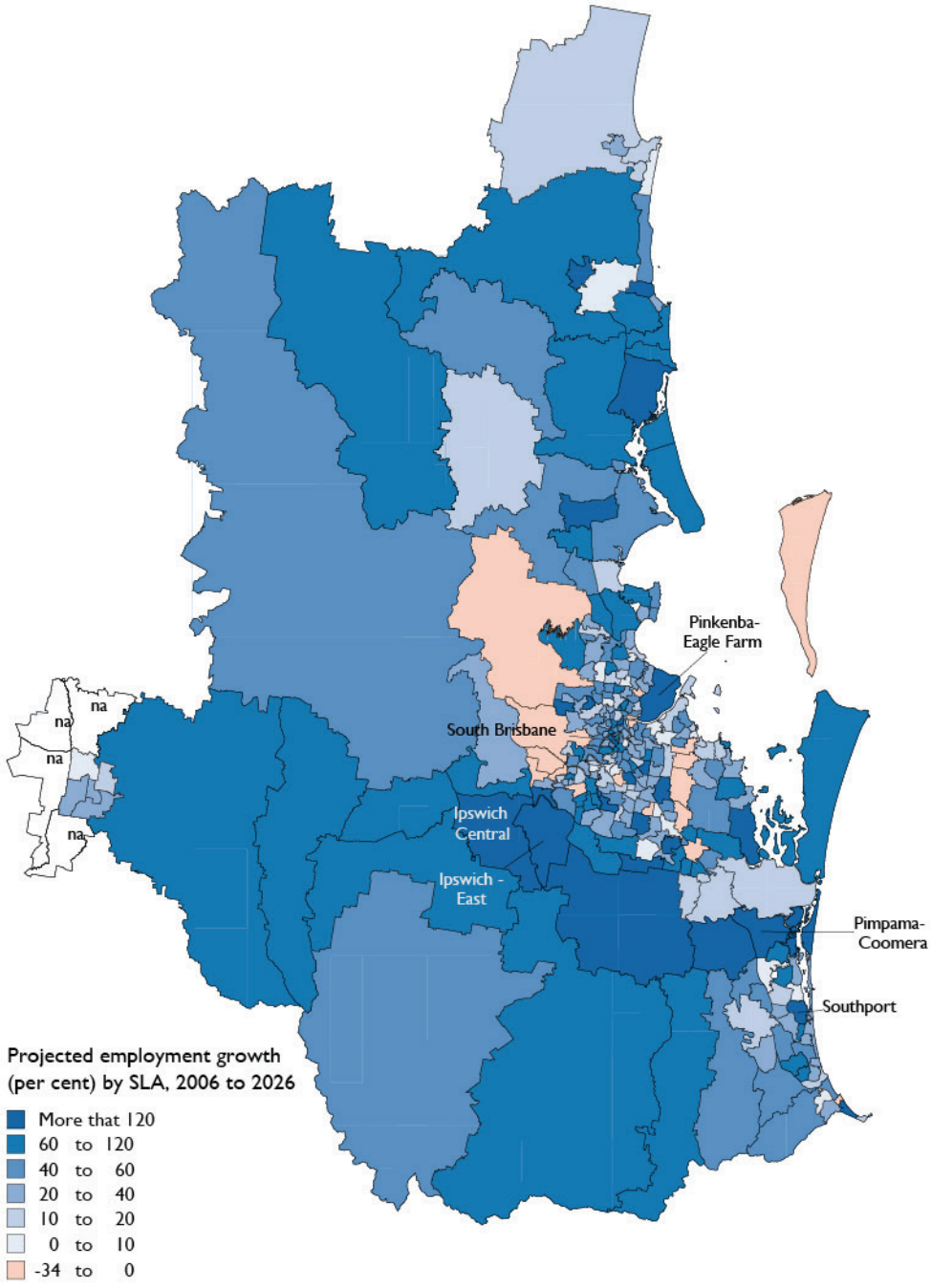
The Gold Coast is forecast to add 124 000 new jobs between 2006 and 2026, representing 16 per cent of SEQ's employment growth. The forecast of 89 000 new jobs for the Sunshine Coast is slightly higher than the forecast job growth in the Middle North (88 000 new jobs) and the Outer West (81 000 new jobs) by 2026. Although West Moreton is expected to grow relatively fast (2.9 per cent per annum), it is anticipated to contribute only around 15 000 new jobs by 2026, as it has relatively small employment and population bases.

Maps 9.3 and 9.4 present the forecast employment growth by Statistical Local Area from 2006 to 2026, in terms of both the number of employees and percentage change.

A key feature of Map 9.3 is the pattern of strong employment growth for a number of SLAs in the Western and South-Western Corridors. The Ipswich Central and Ipswich East SLAs are expected to be the main drivers of employment growth in the Western Corridor with a forecast average annual job growth of over 5 per cent. Five SLAs—Pimpama-Coomera, Kingsholme-Upper Coomera, Bowen Hills, Rochedale and Logan Balance—are expected to grow at more than 6.8 per cent per annum, on average, between 2006 and 2026. For SEQ as a whole, the average annual growth of employment is forecast to be 2.4 per cent.

105 This compares to the Inner sector's 216 700 jobs in 2006, accounting for 19 per cent of SEQ employment (Table 4.1). Note that the NIEIR forecasts appear to have been produced prior to the release of 2006 census employment totals.

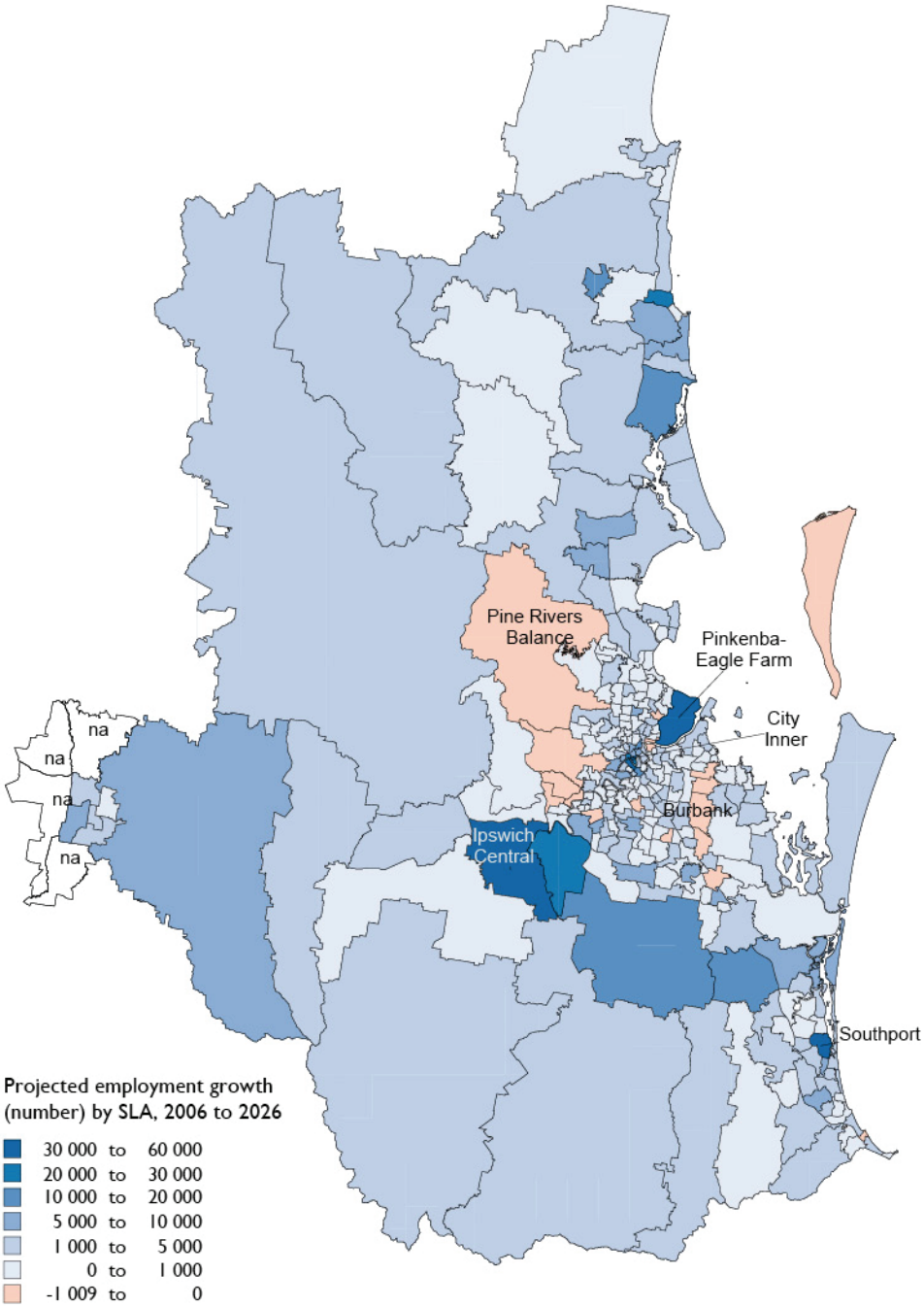
Map 9.3 Percentage change in forecast employment by Statistical Local Area, South East Queensland, 2006 to 2026



Note: The projections were developed by NIEIR as part of the SEQ Forecasting Study and do not represent Government policy. Na=not available.

Source: BITRE analysis of employment projections data for 2006 to 2026 (5 yearly intervals) produced by NIEIR (2007).

Map 9.4 Forecast change in number of persons employed by Statistical Local Area, South East Queensland, 2006 to 2026



Note: The projections were developed by NIEIR as part of the SEQ Forecasting Study and do not represent Government policy. Na=not avail able.

Source: BITRE analysis of employment projections data for 2006 to 2026 (5 yearly intervals) produced by NIEIR (2007).

Industry employment

The *SEQ Regional Plan 2009–2031* presents industry diversity as an important goal to increase the resilience of the SEQ economy. However, it does not include any specific targets or forecasts for employment growth within SEQ. This section outlines the main industries that are expected to grow in the future. The analysis is based on NIEIR (2007) forecasts of SEQ employment by industry and adopts the ANZSIC 1993 industry classification.

The employment forecasts in Table 9.6 show that the *Health and community services* industry is expected to contribute the most to SEQ's forecast employment growth between 2006 and 2026, adding 128 200 jobs, which is about 16 per cent of SEQ's forecast employment growth. The *Health and community services* industry is forecast to reach 258 000 jobs by 2026, almost doubling from 130 000 jobs in 2006. *Property and business services* (with a 15 per cent share of SEQ's job growth), *Retail trade* (11 per cent) and *Education* (10 per cent) are also expected to be significant contributors to SEQ's employment growth between 2006 and 2026.

In terms of the forecast average annual rate of jobs growth, the *Cultural and recreational* services industry is expected to grow the fastest (4.3 per cent) followed by *Health and community services* and *Education* (3.5 per cent and 3.2 per cent respectively). In contrast, *Mining* jobs are expected to decline by an average annual growth rate of –0.2 per cent. The *Manufacturing, Communication services*, *Electricity, gas and water* and *Agriculture, forestry and fishing* industries are anticipated to grow at relatively slow rates (between 0.7 to 1.3 per cent), which are well below the forecast average annual growth rate of total employment in SEQ (2.4 per cent).

The NIEIR (2007) forecasts of employment by industry convey similar messages to other available industry forecasts (e.g. Access Economics 2009 forecasts for Australia and SGS 2008 forecasts for Melbourne).[106] These forecasts show a relatively rapid growth in employment in the *Health and community services* and *Education* industries, which are population serving industries. The rapid growth in the *Health and community services* industry accords with the noticeably higher growth expected in the 'over 65 year cohort' in Australia's capital cities.

106 As discussed in Chapter 9 of BITRE (2011a) and BITRE (2012a).

Table 9.6 Employment forecasts for South East Queensland by industry, 2006 to 2026

	2006	2026	Change 2006–2026	Average Annual Growth	Share of jobs in 2006	Share of jobs in 2036
	('000)			(per cent)		
Agriculture, forestry and fishing	17.4	20.0	2.6	0.7	1.3	1.0
Mining	17.8	22.8	5.1	1.3	1.4	1.1
Manufacturing	136.8	179.8	42.9	1.4	10.5	8.6
Electricity, gas and water supply	38.8	90.1	51.3	4.3	3.0	4.3
Construction	92.9	173.9	81.0	3.2	7.1	8.3
Wholesale trade	42.2	68.6	26.4	2.5	3.2	3.3
Retail trade	58.2	107.4	49.2	3.1	4.5	5.2
Accommodation, cafes and restaurants	129.9	257.7	127.8	3.5	10.0	12.4
Transport and storage	65.5	99.1	33.6	2.1	5.0	4.8
Communication services	128.2	166.6	38.3	1.3	9.9	8.0
Finance and insurance	9.6	9.2	–0.3	–0.2	0.7	0.4
Property and business services	57.9	106.3	48.4	3.1	4.5	5.1
Government administration and defence	172.4	291.7	119.3	2.7	13.3	14.0
Education	205.0	293.2	88.3	1.8	15.8	14.1
Health and community services	63.9	104.3	40.4	2.5	4.9	5.0
Cultural and recreational services	10.4	12.7	2.3	1.0	0.8	0.6
Personal services	52.7	79.5	26.9	2.1	4.1	3.8
SEQ	1 299.5	2 082.9	783.4	2.4	100.0	100.0

Note: The projections were developed by NIEIR as part of the SEQ Forecasting Study and do not represent Government policy. SEQ results exclude Cambooya Part A, Crow's Nest Part A, Jondaryan Part A and Rosalie Part A, which were all excluded from the NIEIR (2007) forecasts.

Source: BITRE analysis of employment projections data for 2006 to 2026 (5 yearly intervals) produced by NIEIR (2007).

Commuting implications of population and employment growth—a scenario analysis

Connecting SEQ 2031 expects that by 2031 there will be a total of 15 million trips a day in SEQ (across all trip purposes), an increase from 9.2 million trips a day in 2006 (Department of Transport and Main Roads 2011a, p.5). What will be the spatial composition of the expected increase in commuter travel within SEQ?

The spatial projections of population and employment growth discussed in this chapter have implications for spatial patterns of commuting through to 2031. This section explores the implications for future commuting flows using the change model of SEQ (Table 8.9) as a device for translating the available population and employment projections into the potential impacts on commuter flows. It considers the commuting implications of three different growth

scenarios. This exercise is undertaken for exploratory purposes and is not intended to be predictive.

This section first outlines the methodology used for exploring potential spatial patterns in commuting in 2031. It then presents the results of three different growth scenarios, which have been constructed based on the key determinants of commuting patterns—namely the spatial distribution of the working age population and jobs in SEQ.

Methodology

The available projections of residential and job growth between 2006 and 2031 are inputted into the change in commuting flow model for SEQ to elicit likely outcomes in spatial commuter flows *if the population growth projections and employment forecasts are realised.* BITRE's change model and the population and employment projections are all available at the SLA scale, so this scale of geography has been used—following the approach used in the previous BITRE reports in this series (BITRE 2010, 2011a, 2012a).

The change model of commuting flows (Table 8.10) uses population growth and employment growth as the key variables to explain changes in commuting behaviour between 2001 and 2006. The result shows that the rate of growth of employed residents in the origin SLA and the rate of growth of jobs in the destination SLA explained 54 per cent of the variability in commuting changes for origin-destination pairs with non-trivial commuting flows in SEQ. Although the explanatory power of the model is not as high as the corresponding values for Melbourne, it is better than the results for Sydney and Perth (see Table 8.12). The acceptable explanatory power, the high level of statistical significance of the explanatory variables, and the correct signs of variable coefficients, lead us to use the model to investigate future patterns of commuting flows in SEQ.

BITRE's scenario modelling approach involves several assumptions:

- The change model for the 2001 to 2006 period explains the observed variation in the growth of commuting flows by reference to just two factors—growth in employed residents in the origin SLA and growth in jobs in the destination SLA. All other variables that may influence origin-destination commuter flows—apart from residential and jobs growth—are assumed constant.
- The future growth rate of employed residents for each SLA is assumed to equal the future growth rate of its working age population (15 to 64 year olds).
- The parameters in the change model are assumed to remain stable over time. The model was estimated for a shorter time horizon (2001 to 2006), but is being applied to a much longer time period (2006 to 2031), over which fundamental changes in the nature of the relationship are likely.
- In calculating average commuting distance, the road distance between each origin-destination pair is assumed to remain unchanged over time.

Three different scenarios are analysed and compared to the 2006 baseline. Each of the scenarios involves a different spatial allocation of population in 2031:

- **"Queensland Government population projections scenario"** reflects the Queensland Government's latest population projections (OESR 2011a) and the NIEIR (2007) employment forecasts.
- **"Australian Government population projections scenario"** reflects the alternate set of small area population projections produced by the Australian Government Department of Health and Ageing (2009), while retaining the NIEIR (2007) employment forecasts. As the DHA (2009) data spans the period from 2007 to 2027, the average annual growth for the full period was used to backcast 2007 to 2006, while average annual growth for the five year period ending in 2027 was used to extend the projections from 2027 to 2031.
- **"Li and Corcoran population projections scenario"** reflects an alternate set of small area population projections produced by the Queensland-based academics, Li and Corcoran (2010), while retaining the NIEIR (2007) employment forecasts. Li and Corcoran have produced spatial projections of the total population of SLAs between 2006 and 2026. The average annual growth for the five year period ending in 2026 was used to extend the projections from 2026 to 2031. As the Li and Corcoran (2010) projections were not decomposed by age group, the pattern of growth in the working age population was assumed to mirror the spatial pattern of growth in the total population of each SLA. As population projections were not available for the Toowoomba region, OESR (2011a) projections were used to impute for this region.

Note that all three scenarios adopt the NIEIR (2007) employment forecasts, as no alternative set of employment forecasts was able to be accessed for SEQ. Since the NIEIR (2007) forecasts relate to the 2006 to 2026 period, BITRE has extended the employment forecasts to 2031, using the average annual growth rate for the 2021 to 2026 period.

Relative to the "Queensland Government population projections scenario", the spatial projections underlying the "Li and Corcoran population projections scenario" allocate a much larger share of future population growth to Brisbane's Middle sector, and much smaller shares of population growth to Brisbane's Outer sector and the West Moreton region. The "Australian Government population projections scenario" is broadly similar to the "Queensland Government population projections scenario", except that it involves a somewhat greater share of population growth being concentrated within Brisbane's Middle and Outer sectors, and considerably lower population growth for the outlying Toowoomba and West Moreton regions. Based on the state government's population projections (see Table 9.3), average annual growth rates differ considerably across SEQ's sectors and regions. By comparison, the Li and Corcoran (2010) projections display relatively modest sectoral differences in average annual population growth rates.

Due to benchmarking, in all three scenarios the aggregate population of SEQ is set to reach 4.59 million in 2031, with a working age population of 2.87 million and around 2.28 million people employed—this is consistent with OESR (2011a) and NIEIR (2007). Thus, while the scenario analysis explores the commuting impacts of different spatial allocations of population and jobs, it does not explore the impacts of different aggregate rates of growth.

The scenario modelling only investigates the influence of spatial projections of population and job growth on commuting patterns—the potential impacts of changes to the transport network

are not explored. Note that the 20 year regional transport plan—*Connecting SEQ 2031*—contains 'ambitious targets to change the way the region moves during the next 20 years' (Department of Transport and Main Roads 2011a). It identifies a range of transport initiatives to achieve this vision, stating that '[t]he rail network will be expanded with new rail lines, including Cross River Rail and extensions to north-west Brisbane, Kippa-Ring, Maroochydore, Redbank Plains, Ripley, Flagstone and Gold Coast airport' (ibid., p.1). *Connecting SEQ 2031* also aims to dramatically increase the mode shares of public and active transport.

Scenario modelling results

Figure 9.4 summarises the spatial patterns of commuting flows in 2031 under the three scenarios and compares them with the actual pattern of commuting flows in 2006. The three scenarios typically involve the same direction of change, relative to the baseline results for 2006. Compared to 2006, all three scenarios involve:

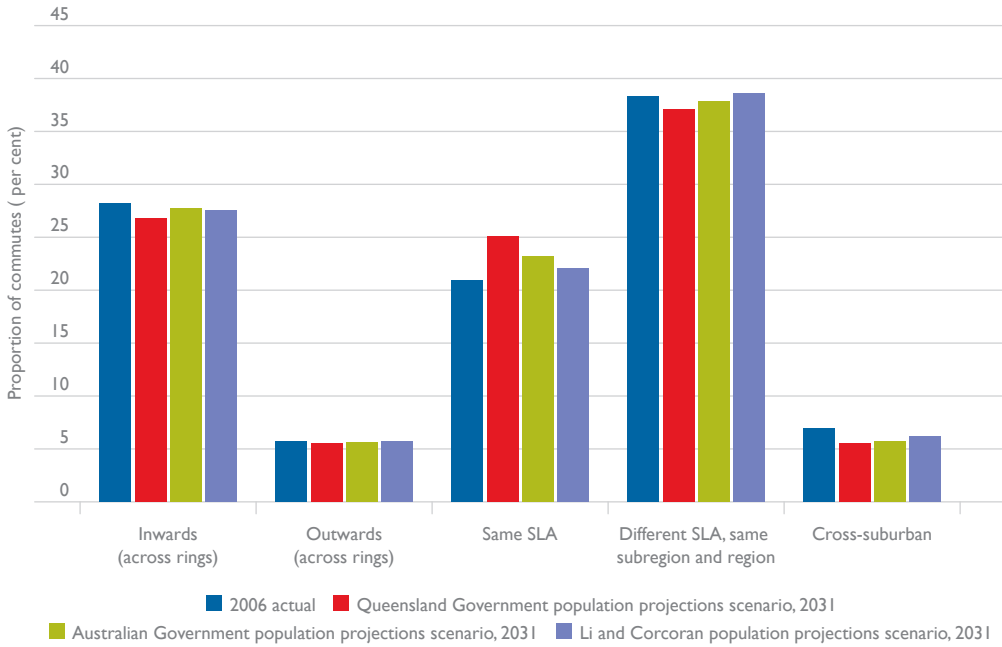
- a reduction in inward commutes as a proportion of total commutes (of between 0.5 and 1.4 percentage points)
- minimal change in outward commutes as a proportion of total commutes
- an increase in the proportion of commutes that occur in the home SLA (of between 1.1 and 4.1 percentage points)
- a reduction in the proportion of cross-suburban commutes to a different subregion or region within the same ring (of between 0.7 and 1.4 percentage points).

However, for commutes to a different SLA in the same subregion and region, the direction of change differed across the scenarios. A small increase of 0.3 percentage points is predicted in this type of commuter flow under the Li and Corcoran population projections scenario, while declines (of 0.5 and 1.2 percentage points) are predicted under the remaining two scenarios.

The most substantial change emerging from this scenario modelling for the 2006 to 2031 period relates to the increase in the relative importance of commuting within the home SLA. The Queensland Government population projections scenario involves a larger modelled increase in same SLA commuting (4.1 percentage points) than the remaining two scenarios. The Li and Corcoran population projections scenario involves the most modest increase in same SLA commuting (1.1 percentage points).

These patterns bear some similarities to those observed for Perth and Sydney (see BITRE 2010, 2012a). Scenario modelling for Perth and Sydney also pointed to a significant reduction in the relative importance of inward commuting and a significant increase in the relative importance of same SLA commutes across all scenarios.

Figure 9.4 A comparison of the spatial patterns of commuting in 2006 and 2031 under different scenarios, South East Queensland



Note: Relates to commuting flows within SEQ. The spatial distribution of commuting flows in 2031 assumes that population and employment projections to 2031 are realised. There are five rings underpinning this classification—the CBD (defined as the aggregate of the City Inner and City Remainder SLAs), Rest of Inner, Middle, Outer and Rest of SEQ rings. Inward commutes include commutes to a workplace in the Brisbane CBD from elsewhere in SEQ, from Middle suburban residences to Inner sector workplaces, from Outer suburban residences to Middle sector workplaces and from the Rest of SEQ to the Brisbane SD. The opposing flows are categorised as outward commutes (e.g. from Inner to Middle). Cross-suburban commutes refer to commutes to a different subregion or region within the same ring.

Sources: BITRE analysis of ABS *Census of Population and Housing* 2006 unpublished data, NIEIR (2007) employment forecasts, OESR (2011a) population projections, DHA (2009) population projections and Li and Corcoran (2010) population projections, using Table 8.10 regression results for SEQ.

The remaining spatial analysis of commuting growth between 2006 and 2031 focuses on the "Queensland Government population projections scenario" and how it compares to census-based commuting patterns in 2006. Box 9.1 summarises results of the sensitivity analysis, highlighting the key differences in results across the three scenarios.

Table 9.7 shows the share of expected growth in commuting by origin-destination combinations, should the Queensland Government's spatial population projections and NIEIR employment forecasts be realised. The top four origin-destination pairs which are anticipated to generate most growth involve the same sector of home and work—Outer (23.8 per cent), Gold Coast (15.5 per cent), Sunshine Coast (12.2 per cent) and Middle (9.2 per cent). Together they account for about 61 per cent of the expected increase in commuter flows between 2006 and 2031 under this scenario.

Table 9.7 Share of the expected growth in commuting flows by sector of home and work under the "Queensland Government population projections scenario", South East Queensland, 2006 to 2031

	Sector of work (per cent)							
Sector of residence	Inner	Middle	Outer	Gold Coast	Sunshine Coast	Toowoomba	West Moreton	SEQ
Inner	3.2	1.0	0.2	0.1	0.0	0.0	0.0	4.4
Middle	8.0	9.2	2.3	0.3	0.1	0.0	0.0	19.8
Outer	4.6	7.9	23.8	0.8	0.2	0.0	0.4	37.7
Gold Coast	0.8	0.9	0.9	15.5	0.0	0.0	0.1	18.3
Sunshine Coast	0.2	0.2	0.3	0.0	12.2	0.0	0.0	13.0
Toowoomba	0.0	0.0	0.0	0.0	0.0	2.0	0.1	2.2
West Moreton	0.1	0.2	1.0	0.1	0.0	0.1	3.1	4.6
SEQ	16.9	19.5	28.5	16.8	12.5	2.2	3.7	100.0

Sources: BITRE analysis of ABS *Census of Population and Housing* 2006 unpublished data, NIEIR (2007) employment forecasts and OESR (2011a) population projections, using Table 8.10 regression results for SEQ.

Commuting flows within the Outer sector are expected to experience the largest increase (involving around 250 000 additional daily commutes). This reflects the large projected increases in the number of residents and jobs in this sector through to 2031. Under the "Queensland Government population projections scenario", the Outer sector is expected to account for 42 per cent of SEQ's population increase and 22 per cent of SEQ's employment increase between 2006 and 2031. Under this scenario, roughly half of the expected increase in commuting within Brisbane's Outer sector is expected to relate to commutes within the Outer West subregion.

While within-sector flows dominate growth, commuting from the Outer to the Middle sector and from the Middle to Inner sector are also expected to make a notable contribution to growth in commuting flows under this scenario.

The results of the scenario modelling were compared to urban car traffic projections for Brisbane to 2031 (BITRE forthcoming). The spatial distributions were broadly comparable, with both predicting a concentration of growth in the Ipswich area and in Brisbane's north western suburbs.

Box 9.1 Sensitivity of results across scenarios

There are some differences in the spatial commuting implications of the different scenarios. Relative to the "Queensland Government population projections scenario", the "Australian Government population projections scenario" implies that by 2031:

- Commuting flows within the Outer West subregion will account for a lower proportion of the overall increase in commuting flows (11 per cent, compared to 13 per cent).
- Commuting from the Middle to the Inner sector will make a somewhat larger contribution to overall growth.
- Commuting flows within West Moreton will make a notably smaller contribution to overall growth in commuter flows.

Relative to the "Queensland Government population projections scenario", the "Li and Corcoran population projections scenario" implies that by 2031:

- Commuting flows within the Outer sector will account for just 17 per cent of the overall increase in commuting flows (compared to 24 per cent, see Table 9.7).
- Commuting flows within the Outer West subregion will account for a much lower proportion of the overall increase in commuting flows (6 per cent, compared to 13 per cent).
- Commuting flows within the Middle sector will make a much larger contribution (14 per cent, compared to 9 per cent).
- Commuting from the Middle to the Inner sector will also make a much larger contribution to overall growth in commuter flows in SEQ (12 per cent, compared to 8 per cent).

These sensitivity results, and Figure 9.4, highlight how future commuting patterns in SEQ will depend on the spatial distribution of population growth between 2006 and 2031. While there are some important differences in the commuting implications of the three scenarios, many of the implications are applicable across all three scenarios. For example, all three scenarios involve a decline in inward commuting and cross-suburban commuting, together with substantial growth in the importance of same SLA commutes. All three scenarios also predict that, at the SLA scale, the increase in commuter flows will be concentrated within Western and South Western corridor SLAs, as well as a few selected Gold Coast and Sunshine Coast SLAs.

At the more detailed SLA scale, the implications of the available spatial projections of population and employment are for growth in commuter numbers to be concentrated amongst the following origin-destination pairs:[107]

- Within the SLAs of Ipswich Central and Ipswich East, and from Ipswich East and Ipswich West to Ipswich Central (with all of these commuter flows located in the Outer West subregion and hence, the Western Corridor)
- Within the Caloundra South SLA on the Sunshine Coast

107 Each of the listed pairs are expected to contribute at least 1 per cent of total growth in commuter flows between 2006 and 2031 under the "Queensland Government population projections scenario".

- Within the Pimpama-Coomera SLA on the Gold Coast
- Within the Beaudesert Part A SLA in the Outer South subregion and the neighbouring Beaudesert Part C SLA in West Moreton (i.e. within the South Western corridor).

The "Queensland Government population projections scenario" involves substantial growth in commuter travel for this set of origin-destination pairs, which will involve increased demand for public transport and road infrastructure that facilitates these local area commutes. For example, the greatly expanded volume of commuting within the Ipswich LGA will require investment in road infrastructure and expanded bus services.

What are the implications of these spatial projections of population and employment for the use of different transport modes? Any significant shift away from inward commutes is likely to be unfavourable to public transport use because inward commutes dominate public transport use, accounting for three-quarters of public transport use by Brisbane commuters in 2006 (see Figure 7.1). While commutes within the home SLA are expected to become increasingly important, only 2 per cent of same SLA commutes within Brisbane were by public transport in 2006.

The changes in commuting patterns that flow from the available spatial projections of population and job growth to 2031 pose challenges for maintaining or increasing the public transport mode share. The forecasts of rapid job growth in the Outer West, Sunshine Coast and West Moreton pose a particular challenge, as the existing public transport system is not well suited to accessing outer suburban and regional workplaces. A reorientation of the public transport system, to better service those making short-distance trips in the home SLA and those accessing workplaces in Outer Brisbane and the rest of SEQ, may be needed to encourage a substantial shift towards public transport.

The spatial projections also have implications for commuting distances. Table 9.8 presents estimates of the average commuting distance in 2031 under the three scenarios. All three scenarios involve a small increase in the average commuting distance between 2006 and 2031. The "Li and Corcoran population projections scenario" involves a minimal increase in the average commuting distance, while the "Australian Government population projections scenario" involves a larger increase.

Table 9.8 A comparison of the average commuting distance under different scenarios, South East Queensland, 2006 and 2031

Scenario	Average road commuting distance (km)	Average straight line commuting distance (km)
2006 actual commuting patterns	15.3	11.7
2031 Queensland Government population projections scenario	15.9	12.0
2031 Australian Government population projections scenario	16.2	12.2
2031 Li and Corcoran population projections scenario	15.7	11.8

Note: The estimated increases to 2031 are conservative as we have not factored in the effect that expanding urban sprawl could have on increasing the average road distance involved in travelling from a specific outer suburban SLA to an inner or middle SLA over this period of time. Instead, in calculating average commuting distances, the road (or straight line) distance between each origin-destination pair is assumed to remain unchanged from 2006 to 2036.

Sources: BITRE analysis of ABS *Census of Population and Housing* 2006 unpublished data, customised Queensland DTMR road network distance dataset, NIEIR (2007) employment forecasts, OESR (2011a) population projections, DHA (2009) population projections and Li and Corcoran (2010) population projections, using Table 8.10 regression results for SEQ.

Summary

This chapter summarises the outlook for SEQ in terms of spatial projections of population, dwellings, employment and commuting by 2031.

The population of SEQ is projected to grow annually by 2.0 per cent and is expected to reach 4.6 million people by 2031. Gold Coast is expected to increase its population the most (371 400), followed by the Outer West (320 600). To match the population growth of 1.8 million, about 810 000 new dwellings will be required in SEQ between 2006 and 2031.

SEQ is forecast to add 783 000 jobs from 2006 to 2026. About 70 per cent of the job growth is expected to occur in the Brisbane region—23 per cent in the Outer sector, 24 per cent in the Middle sector and 23 per cent in the Inner sector. The Gold Coast is forecast to contribute 16 per cent of SEQ's employment growth.

Should the population and employment projections be realised, a large proportion of the increase in commuting in SEQ between 2006 and 2031 will likely be increased commutes within Outer Brisbane (17–24 per cent of growth) and within the Gold Coast (15–17 per cent of growth). This reflects the large projected increases in the number of residents and jobs in those two locations through to 2031.

CHAPTER 10
Reviewing the evidence

The aim of this report is to provide key stakeholders with evidence on spatial changes in population, jobs and commuting flows in the South East Queensland (SEQ) region, and also in the Brisbane Statistical Division (SD), for the 2001 to 2011 period. The SEQ region includes land covered by 11 local government areas, as defined by the *South East Queensland Regional Plan 2009–2031* (Queensland Government and COMSEQ 2009). The analysis covers a range of geographic scales, including SEQ as a whole, the Brisbane SD and its surrounding regions, sectors (e.g. Inner, Middle and Outer), subregions, Statistical Local Areas (SLAs) and Destination Zones (DZs).

This chapter presents an overview of the main findings of the analysis. The chapter begins with a summary of shifts in the spatial distribution of population and employment and a description of commuter use of different transport modes in SEQ. This is followed by analysis of the spatial patterns of commuting in SEQ and a discussion of how commuting behaviour has responded to the observed changes in employment and population.[108] Finally, some observations are made about the extent to which there has been progress against key urban policy goals that relate to shaping the spatial distribution of population, employment and commuting in SEQ.

Population and job growth

Historical overview of population and job growth

The population of Brisbane stood at around 120 000 in 1901 (Spearritt 2010). By 1971, Brisbane had a population of 870 100 and the SEQ region had a population of 1.11 million (ABS 1983). In 2011, the Brisbane region had an Estimated Resident Population (ERP) of 2.03 million and the SEQ region had an ERP of 3.18 million (ABS 2012a). The average annual rate of population growth in SEQ was more than 2.5 per cent in each decade from 1971 to 2011. Brisbane's rate of growth tended to be a little lower, with its share of the total SEQ population declining from 78.1 per cent in 1971 to 63.9 per cent in 2011, reflecting a significant rise in the population shares of the Gold Coast and Sunshine Coast.

Brisbane's Outer sector gained nearly 780 000 residents between 1971 and 2011, compared to 364 000 for the Middle sector and 16 000 for the Inner sector. The Gold Coast added

108 The evidence presented about spatial changes in population, employment, transport and commuting is based on BITRE's analysis of the Australian Bureau of Statistics (ABS) *Census of Population and Housing*, Estimated Resident Population data and Queensland Government datasets (e.g. Household Travel Survey, DTMR modelled distance estimates), unless another source is specified. Details of sources, definitions and methods are provided in the body of the report.

509 000 residents and the Sunshine Coast added 285 000. The Toowoomba and West Moreton regions gained 58 200 and 52 200 residents, respectively.

The Inner sector experienced population decline in the 1970s and 1980s, but recorded a relatively high annual average growth of 3.7 per cent between 2001 and 2011. In the 1971 to 1981 period, the Outer sector, Gold Coast and Sunshine Coast all recorded average annual growth rates of over 7 per cent. Since then growth has moderated (particularly in Brisbane's Outer sector), but has continued to exceed the SEQ average growth rate for each decade.

Employment in SEQ decentralised during the 20 years to 1999, with industrial areas moving from the inner city to greenfield sites in the outer suburbs and office-based employment expanding beyond the CBD into other inner suburbs (Stimson and Taylor 1999). Based on census data, Robson (2008) calculated that the number of jobs in SEQ[109] grew by 268 900 between 1991 and 2001, representing average annual growth of 3.1 per cent per annum. The main industry contributor to job growth between 1991 and 2001 was the *Property and business services* industry, which added 53 600 jobs (ibid).

Residential growth, 2001 to 2011

As of 2011, 31 per cent of SEQ's population lives in the Middle sector of Brisbane, 30 per cent in the Outer sector and 3 per cent in the Inner sector. The remainder of SEQ's population is distributed between the Gold Coast (19 per cent), Sunshine Coast (14 per cent), Toowoomba (3 per cent) and West Moreton (3 per cent).

The SEQ region is one of the fastest growing regions in Australia, with an average annual population growth rate of 2.5 per cent between 2001 and 2011. The population of the SEQ region increased by nearly 694 000 persons from 2001 to 2011 to reach 3.18 million. Brisbane grew by around 400 000 persons during this period, while the Gold Coast added 164 000 persons and the Sunshine Coast gained 88 000. Within Brisbane, growth was concentrated in the Outer North subregion, which gained 103 000 new residents.

The average annual growth rate of population in Brisbane was 2.2 per cent between 2001 and 2011. Gold Coast experienced a higher average annual growth rate (3.3 per cent), as did the Sunshine Coast (3.1 per cent). Within Brisbane, the annual rate of population growth was greatest for the Inner sector (3.7 per cent), while the Outer West and Outer North subregions grew faster than the other Outer subregions (at 3.2 and 3.1 per cent, respectively). Population growth was lowest for the Middle sector (1.7 per cent), and particularly low for the Middle North subregion (1.3 per cent). The limited growth within the middle suburbs meant that the proportion of Brisbane's population living between 5 and 15 kilometres from the Central Business District (CBD) declined from 36.5 to 33.6 per cent between 2001 and 2011, while the proportion living 15 to 45 kilometres away increased.

At the SLA scale, the most substantial population increases in Brisbane were in Ipswich East (29 681 persons), Griffin-Mango Hill (17 035) and Ipswich Central (14 478). The Gold Coast and Sunshine Coast regions also saw significant population increases, particularly the SLAs of Kingsholme-Upper Coomera (18 060) and Buderim (15 858).

109 Toowoomba City Council was excluded (see Robson 2008).

The population growth that occurred in Brisbane between 2001 and 2011 led to increases in Brisbane's population density. The established inner and middle suburbs of Brisbane averaged 814 persons per square kilometre in 2011, up from 676 persons per square kilometre in 2001. The largest increases in population density were in inner city SLAs, such as Brisbane City Inner and Fortitude Valley.

In terms of housing development, there were 275 600 dwelling approvals between July 2001 and June 2011 in SEQ (OESR 2011b). Dwelling approvals have fluctuated, and both separate house approvals and other dwelling approvals dropped significantly after June 2008. While 63 per cent of SEQ dwelling approvals related to separate houses, the proportion declined from 70 per cent in 2000–01 to 58 per cent in 2010–11. This reflects a shift towards higher density forms of housing being built in SEQ since 2001. In particular, the stock of high rise flats, units and apartments in SEQ's centres expanded by 76 per cent from 2001 to 2006.

Employment growth since 2001

SEQ's employment is currently concentrated in the inner and middle suburbs of Brisbane, and is not well matched to the population distribution. The Inner sector contained 19 per cent of SEQ's employment in 2006, but only 3 per cent of its population. The Outer sector also contained 19 per cent of the region's employment, but was home to 29 per cent of the population. The Middle sector accounted for 31 per cent of jobs and 32 per cent of population, while the rest of SEQ contained 31 per cent of jobs and 36 per cent of SEQ's population.

While the Inner sector of Brisbane contains 4.6 jobs for every employed resident, the Outer sector of Brisbane offers relatively limited job opportunities to local residents, with less than 0.6 jobs per employed resident. The Outer West subregion is a little more self-sufficient than the other Outer subregions.

At the SLA scale, the City Inner SLA was the top employer with 66 300 jobs in 2006. Other major employers included the City Remainder SLA in Inner Brisbane (40 200 jobs), Ipswich Central in the Outer West (29 300), Pinkenba-Eagle Farm in the Middle North (23 300), and Southport on the Gold Coast (22 400).

The major employing industries in SEQ in 2006 were *Retail trade* (16 per cent), *Property and business services* (12 per cent) and *Health and community services* (12 per cent). The *Property and business services* industry was the major employer in the Inner sector, with *Retail trade* being the dominant industry in all remaining sectors and regions, apart from West Moreton, which featured *Agriculture, forestry and fishing* as the major employing industry.

According to the ABS *Labour Force Survey,* SEQ had very strong job growth of 3.6 per cent per annum between 2001 and 2011, with Brisbane also recording strong job growth (3.1 per cent). Both growth rates were well above the national rate of job growth (2.3 per cent). However, SEQ's growth rate declined from 4.1 per cent per annum between 2001 and 2006 to 3.0 per cent per annum between 2006 and 2011. Of the 270 000 jobs added in Brisbane between 2001 and 2011, 19 per cent were in the *Health care and social assistance* industry and 14 per cent in the *Construction* industry.[110]

110 The *Labour Force Survey* results are based on the ANZSIC 2006 industry classification, whereas the remaining industry analysis—which focuses on the 2001 to 2006 period—adopts the ANZSIC 1993 classification.

ABS census data identifies an increase of 187 000 jobs with a fixed place of work in SEQ from 2001 to 2006, with 115 300 of the new jobs located in Brisbane. The primary industry contributors to SEQ's job growth were *Health and community services* (which added 29 000 jobs), *Construction* (25 300) and *Property and business services* (23 500), while the *Agriculture, forestry and fishing* industry lost 2700 jobs.

Brisbane's Middle sector added 54 000 jobs between 2001 and 2006 (29 per cent of the SEQ total), while the Outer sector added 35 500 jobs (20 per cent) and the Gold Coast added 37 800 jobs (20 per cent). The rate of job growth was strongest in the Sunshine Coast (5.1 per cent per annum), with the strongest growing subregion in Brisbane being the Outer North (4.7 per cent per annum). The slowest job growth was in Toowoomba (2.4 per cent per annum) and the Inner sector (2.6 per cent per annum).

The Inner sector added 25 800 jobs between 2001 and 2006, but its share of SEQ employment declined from 19.9 to 18.9 per cent. About 9200 jobs were added in the Brisbane CBD[11] from 2001 to 2006, which represented a decline from 14.5 to 13.5 per cent of Brisbane employment and from 10.2 to 9.3 per cent of SEQ employment. This reflects a clear reduction in the centralisation of SEQ's employment, continuing the trend of preceding decades.

Important locations for job growth between 2001 and 2006 included the City Remainder SLA in Inner Brisbane (which added 6800 jobs), Pinkenba-Eagle Farm in the Middle North (5700), Buderim on the Sunshine Coast (4100), and Murarrie in the Middle East subregion (4000). The proportion of SEQ jobs that involved working from home fell from 5.3 per cent in 2001 to 5.0 per cent in 2006.

The industry drivers of employment growth varied greatly across SEQ. Growth in the Inner sector was primarily due to the *Government administration and defence* industry, while job growth in the Middle and Outer sectors was driven by *Health and community services* and *Retail trade*, respectively. The Gold Coast featured *Construction* as the primary contributor to employment growth. *Retail trade* was the largest growth industry for both the Sunshine Coast and West Moreton, while *Health and community services* was the primary growth industry for Toowoomba.

Future growth projections

The Queensland Government's latest population projections (OESR 2011a) suggest that SEQ will grow at an average annual rate of 2.0 per cent to reach 4.6 million by 2031. The population of the Brisbane SD is projected to grow at 1.8 per cent per annum, reaching 2.8 million people by 2031. Of the projected 1.8 million population increase in SEQ, 1.0 million is expected to occur in Brisbane.

These population projections also suggest that the Outer West subregion will grow at the fastest pace (4.8 per cent annually) in SEQ between 2006 and 2031. In contrast, the Middle subregions are expected to grow at the slowest pace, averaging slightly less than 1.0 per cent per annum. In terms of the size of the population increase, Gold Coast is expected to increase the most (371 400), followed by the Outer West (320 600). At the SLA level, Ipswich Central and Ipswich East in the Outer West are projected to add the largest number of new residents (141 000 and 124 000 people respectively) (ibid).

11 Defined here as the combination of the City Inner and City Remainder SLAs.

To house the population increase of 1.8 million, about 810 000 new dwellings will be required in SEQ between 2006 and 2031 (OESR 2012b). Most are likely to be built in the Brisbane SD (58 per cent), with Gold Coast (19 per cent) and Sunshine Coast (13 per cent) also expected to accommodate many new dwellings (ibid).

SEQ is forecast to add 783 000 jobs from 2006 to 2026 (NIEIR 2007),[112] with the *Health and community services* industry expected to make the largest contribution to job growth (16 per cent). About 70 per cent of SEQ's job growth is expected to occur in Brisbane—23 per cent in the Outer sector, 24 per cent in the Middle sector and 23 per cent in the Inner sector. The Gold Coast is forecast to contribute 16 per cent of SEQ's job growth. At the SLA scale, the largest job creation is expected in Ipswich Central (56 300), City Inner (47 300) and Pinkenba-Eagle Farm (47 000).

Relatively rapid job growth is forecast for the Outer West (5.0 per cent per annum), Sunshine Coast (3.2 per cent) and West Moreton (2.9 per cent), with the slowest job growth forecast to occur in the Middle East and Toowoomba (averaging 1.0 per cent per annum, each) (ibid).

Transport use

In the SEQ region, private vehicle was the dominant mode of travel to work on census day 2006, with a 79 per cent mode share. Only 10 per cent used public transport to get to work, comprised mostly of train (5.0 per cent) and bus (4.5 per cent). In addition, 4.6 per cent either cycled or walked to work (known collectively as active transport) and 5.3 per cent worked from home. Toowoomba is the most car dependent region in SEQ, with 88 per cent of Toowoomba residents and workers commuting by private vehicle.

Residents of Inner Brisbane are more likely to use public transport to get to work (20.6 per cent) than residents of other parts of SEQ. Only 1.4 per cent of Toowoomba and West Moreton residents used public transport to get to work in 2006. Those who work in Inner Brisbane are particularly likely to use public transport for the journey to work (39.6 per cent), but only 2.7 per cent of Outer sector jobs and 2.1 per cent of jobs in the rest of SEQ are accessed by public transport. The majority (73 per cent) of SEQ's commutes by public transport are to a place of work in the Inner sector.

While walking accounted for only 3.5 per cent of SEQ commutes, walking was a common commuting mode for inner city residents, with 19.4 per cent of Inner Brisbane residents walking to work in 2006. Cycling represents just 1.1 per cent of commutes, with a higher proportion of Inner sector residents cycling to work (3.1 per cent).

Between 2001 and 2006, the proportion of SEQ residents commuting by private vehicle fell by 0.3 percentage points. The decline in the private vehicle mode share was due to the reduced car use of Inner and Middle Brisbane residents.

Between 2001 and 2006, the proportion of SEQ residents commuting by public transport rose by 0.5 percentage points and the active transport mode share rose by 0.3 percentage points. The mode share increases were more pronounced for Brisbane, at 0.9 and 0.6 percentage points, respectively. Growth in the public transport mode share was concentrated in Inner

112 These projections were commissioned by the Queensland Government (Office of Urban Management) and the Council of Mayors (SEQ). They remain the property of Office of Urban Management, Queensland Government; however they do not represent government policy.

Brisbane (by place of work) and the Middle South (by place of enumeration), and was driven by growth in bus use, reflecting the new Busway routes. The growth in the active transport mode share was driven by strong increases in the Inner sector, and by growth in walking, rather than cycling. The active transport mode share decreased in a number of regions (i.e. the Gold Coast, Sunshine Coast, West Moreton, Outer South and Outer West).

Commuting flows

Overview of South East Queensland commuting flows in 2006

About 40 per cent of employed Brisbane residents worked in their home subregion in 2006. In the rest of SEQ, 75 per cent of employed residents worked in their home region. The majority of SEQ's commuter flows occurred within the home subregion/region. For example, over 164 000 Gold Coast residents commuted to a place of work on the Gold Coast, while 64 200 Outer North residents commuted to a place of work in the Outer North.

The most common cross-region flow related to the 48 800 residents of the Middle North subregion who commuted to a place of work in Inner Brisbane. About 32 per cent of Middle North employed residents commuted to work in the Inner sector, and the probability of commuting to the Inner sector was 27 per cent or higher for each of the Middle subregions. The probability of working in the more narrowly-defined Brisbane Central Business District was 27 per cent for employed residents of the Inner sector, 15 per cent for the Middle sector, 6 per cent for the Outer sector and 1 per cent in the rest of SEQ. Outer North residents had a relatively high probability of commuting to a place of work in the Middle North (22 per cent).

In 2006, 1.6 per cent of the SEQ workforce lived outside of SEQ, mainly in the Tweed region, and in Toowoomba's hinterland. A large number of people travelled to a place of work in the Brisbane SD from other parts of SEQ (35 533), compared with the number of Brisbane SD residents who commuted to a place of work in the rest of SEQ (17 798). The most substantial flows between Brisbane and the rest of SEQ were the Outer South residents who commuted to a place of work on the Gold Coast (a total of 6175 people) and the Gold Coast residents who commuted in the opposite direction (a total of 5951 people). There were also a total of 5900 residents from Gold Coast who commuted to Brisbane's Inner sector for work.

Focusing on commuting flows *within* the Brisbane SD in 2006, trips to work in an inward direction (38 per cent) dominated those in an outward direction (6 per cent). The remaining 56 per cent of commutes occurred within the home sector, and typically within the home subregion. Of these, nearly 215 000 commutes—representing 29 per cent of all commutes in the Brisbane SD—occurred from one SLA to a different SLA within the same subregion. Commutes within the home SLA were also relatively important, contributing 17 per cent of all commutes.

At the SLA scale, most of the largest volume origin-destination flows in SEQ are commutes within the home SLA, such as the 15 412 residents of Ipswich Central who commuted to a place of work in Ipswich Central. The largest volume flow that occurred between different SLAs was the 4023 Toowoomba South-East residents who commuted to a place of work within Toowoomba Central.

SEQ residents commuted an average of 15.2km to work in 2006, based on Queensland Department of Transport and Main Roads (DTMR) modelled distance estimates and ABS census data. Average commuting distances are low for Inner sector residents (7.2km) and higher for Middle (12.0km) and Outer sector residents (19.6km). Commuting distances were particularly high for West Moreton (25.7km) and Outer North residents (20.6km). While Inner Brisbane residents had the lowest average commuting distance (7.2km), those who worked in Inner Brisbane travelled an average of 17.0km to work.

The average duration of a commuting trip in SEQ was 31 minutes in 2009, according to the *SEQ Household Travel Survey*. The average duration of a commuting trip rises more gradually across the sectors of residence, standing at 28 minutes for the Inner sector, 32 minutes for the Middle sector and 35 minutes for the Outer sector. Average commuting trip durations for Gold Coast and Sunshine Coast residents were similar to those of Inner sector residents, at 29 and 27 minutes, respectively.

Changes since 2001

Between 2001 and 2006, commuting flows *within* SEQ grew by 3.6 per cent per annum, which resulted in an increase of just over 181 000 commuters with a known SLA of work and residence within SEQ. Much of the increase in commuting flows within SEQ was due to increased commutes *within* the Brisbane SD (108 013 persons or 60 per cent of the total). In terms of cross-region commutes, the largest changes related to commuting from the Gold Coast to Brisbane (+5218) and from Brisbane to the Gold Coast (+3530). For each of the non-Brisbane regions, the increase in commuting to a Brisbane workplace outweighed the increase in commuting in the reverse direction. Commuter flows between Tweed and SEQ also grew strongly from 2001 to 2006.

Inward commuting flows declined from 30.2 to 28.6 per cent of all SEQ flows from 2001 to 2006. The proportion of commutes to a different SLA within the same subregion/region rose by 1 percentage point from 36.8 to 37.8 per cent, which amounted to an additional 77 900 commutes of this type. The proportion of commutes within the home SLA also rose slightly (from 20.6 to 20.9 per cent), representing an additional 41 500 commutes.

The largest increases occurred for flows *within* the home subregion or region. As a result, the overall self-containment rate for SEQ rose marginally, by 0.5 percentage points, between 2001 and 2006. Commuting flows within the Gold Coast increased by 32 800 persons, while there was also strong growth within the Sunshine Coast (20 700 persons) and Outer North (13 900 persons).

The largest change in flows between different subregions was the extra 5263 persons commuting from the Outer North to the Middle North. There was also a notable 1.2 percentage point decline in the probability of commuting to a place of work in the Inner sector for employed residents of the Outer sector.

Average commuting distances, derived from ABS census data and DTMR modelled distance data, show virtually no change between 2001 and 2006, increasing by just 0.1km for SEQ and unchanged for Brisbane. However, the SEQ *Household Travel Survey* identifies a decline of between 0.6 and 1.0km in the average commuting distance of Brisbane and SEQ residents between 2007 and 2009.

The HILDA survey identifies a 7 minute net increase in average commuting times for Brisbane from 2002 to 2010, most of which occurred between 2002 and 2006. The upward trend in commuting times seems to have either abated, or reversed, since 2007.

Some drivers of commuting flows

In addition to describing spatial patterns and trends in commuting, this project set out to explore how commuting behaviour has responded to recent spatial changes in population and employment. Regression analysis was used to investigate this issue. Simple gravity models of commuter flows explained 63–66 per cent of all variation in origin-destination flows within SEQ in 2006. The following key drivers of commuting flows were identified:

- The amount of people commuting between an origin-destination pair tends to increase with the number of employed residents of the origin SLA and with the number of jobs in the destination SLA.
- The number of people commuting between an origin-destination pair tends to decline as the distance between the two SLAs widens. Distance is less of an impediment to travel for origin-destination pairs that have a direct rail connection or a direct freeway connection. Distance was a greater impediment to travel in 2006 than in 2001, reflecting the 55 per cent increase in automotive fuel prices in Australia over the period (ABS 2009a). Distance was also less of an impediment to travel in Brisbane, than it was for Sydney, Melbourne or Perth.
- The spatial concentration of industries also has implications for commuting, particularly where workers have specialised skills that tie them closely to specific industries. The greater the alignment between the skills available in the origin SLA and the skills demanded in the destination SLA, the greater the predicted commuting flows between those two locations.

Spatial patterns of growth in employed residents and jobs also played an important role in explaining changes in commuting flows in SEQ between 2001 and 2006. These two factors alone explained just over half of the variation in commuting growth rates for origin-destination pairs with non-trivial commuter flows. Factors such as the distance between an origin-destination pair and transport infrastructure investments also made a minor contribution to explaining the rate of growth in commuting flows between 2001 and 2006:

- More distant origin-destination pairs tended to experience lower growth in commuting flows over this period.
- Major infrastructure projects completed between 2000 and 2006 included the Inner City Bypass, Port of Brisbane Motorway (stage one), Inner Northern Busway, South East Busway, Airtrain and the Pacific Motorway upgrade. Commuting flows between areas impacted by these major infrastructure projects increased more than otherwise would have been expected given residential and job growth in those areas.

Outlook for commuting flows

SEQ's future spatial distribution of population and employment will shape future spatial patterns of commuting in the region, which will in turn have ramifications for congestion and infrastructure investment.

If the available spatial projections of population and employment are realised, BITRE's scenario modelling[113] suggests that a large proportion of the increase in commuting in SEQ between 2006 and 2031 will be increased commutes within Outer Brisbane (17–24 per cent of growth) and within the Gold Coast (15–17 per cent of growth). The relative importance of same SLA commutes rises significantly under all three scenarios, and combined with the modelled reduction in the relative importance of inward commutes, is likely to pose a challenge to growing the public transport mode share. The projected pattern of growth is also expected to involve a small rise in average commuting distances.

Shaping the spatial pattern of population, employment and commuting in South East Queensland

Commuting flows within SEQ are driven by the spatial distribution of the residential population and jobs throughout the region. The current spatial distribution of population and jobs reflects the accumulated pattern of development over many decades, but continues to be shaped and influenced by demographic trends, cultural preferences, economic forces and government interventions.

There are a range of mechanisms through which governments attempt to directly influence the spatial allocation of population, jobs and commuting within our cities, including through the development of strategic metropolitan plans, provision of urban infrastructure, management of land release and zoning of land use. Many other social, economic and environmental policy domains also play an important role in shaping our cities, even where that is not the primary aim.

The primary focus of this study has been identifying spatial changes in population, employment and commuting, with a view to providing a solid evidence base about the trends that have been shaping SEQ in recent years. A secondary focus has been to provide some contextual information about urban policy directions for SEQ and to investigate the extent to which recent spatial changes have been in line with the stated policy goals.

This BITRE study focuses on the 2001 to 2011 period, in which the *SEQ Regional Plan* 2009–2031 (released in 2009), the *SEQ Regional Plan 2005–2026* (from 2005) and the *SEQ Regional Framework for Growth Management* (RFGM) (from 2000) were the operational strategic plans. Following the change of government in March 2012, a range of changes are being made to the Queensland planning system.[114]

The *SEQ Regional Plan 2009–2031* is designed to guide regional growth and development in SEQ, and to protect the region from 'inappropriate urban development' (Queensland Government and COMSEQ 2009, p.1). It aims to balance population growth with the need to protect the lifestyle that residents of SEQ value and enjoy (Hinchcliffe 2009). The *SEQ Regional Plan 2009–2031* is supported by several other initiatives, most notably *Connecting SEQ 2031—An Integrated Regional Transport Plan for South East Queensland* (2011) and the *Queensland*

113 Three scenarios were considered, based on three different sets of spatial population projections, derived from OESR (2011a), DHA (2009) and Li and Corcoran (2010). All three scenarios used spatial employment projections based on NIEIR (2007).

114 For example, in November 2012, amendments were made to the *Sustainable Planning Act 2009* aimed at 'restoring efficiency and consistency to the planning and development system'. The government has also commenced transferring state planning powers back to councils from the Urban Land Development Authority.

Infrastructure Plan (2011). It also contributes to the broader strategic vision for the State, as articulated in *Towards Q2—Tomorrow's Queensland* (2008).

The three most recent strategic plans have a number of common goals that relate to the spatial distribution of population and employment, or to commuting patterns and transport use. These include limiting urban sprawl, locating infill development and job growth in centres, promoting public transport and active transport use, and increasing employment self-containment. However, there were also some significant changes to strategic planning in SEQ over the period. These include the introduction of a statutory basis for regional planning in 2004, the introduction of the SEQ urban footprint in the 2005 plan, and an increased focus on concentrating growth in the west, reducing the length of commuting trips, and decentralisation of employment in particular industries.

BITRE has analysed the extent to which progress has been achieved since 2001 against those metropolitan strategy goals that relate to the spatial distribution of population and employment or to commuting patterns—the remainder of this chapter summarises the results. Outcome measures on their own do *not* provide a reliable indication of how effectively government planning systems are working, due to the many other influences that can impact on outcomes (Productivity Commission 2011). The purpose of this exercise is not to evaluate the success of the strategic planning system or any specific planning document, but rather to provide evidence about the actual 'on-the-ground' changes that have been occurring with respect to these strategic planning goals, whether such developments are in the desired direction and whether they are progressing at the intended pace of change. This evidence about the reality of the trends that have been shaping SEQ's population, employment and commuting flows can then be used to inform future planning initiatives.

Spatial patterns of residential development

Redistribute residential growth to west and away from coast

According to the *SEQ Regional Plan 2009–2031*, an 'increased proportion of the region's future population will be accommodated in the Western Corridor and South Western Corridor, making use of significant areas of available land and reducing pressure on the coast' (Queensland Government and COMSEQ 2009, p.11). This was also a key strategic direction of the *SEQ Regional Plan 2005–2026*, except that the focus was restricted to the Western Corridor, with no mention of the South Western Corridor. Achieving residential growth in the west was a lower level priority in the SEQ RFGM 2000.

Since 2001, there has been a partial redirection of SEQ's population growth away from the coast and towards the Western Corridor, as well as to other parts of SEQ (but not as yet to the South Western corridor). This resulted in the Western Corridor increasing its share of SEQ population growth from just 1 per cent between 1991 and 2001, to 5 per cent for 2001 to 2006, and then to 9 per cent for 2006 to 2011. Growth averaged 3.2 per cent per annum for the Western Corridor from 2001 to 2011, compared to 2.7 per cent for coastal areas. Despite this partial redirection, about 45 per cent of SEQ's recent population growth continues to occur within 10km of the coastline.

Limit urban sprawl

The *SEQ Regional Plan 2009–2031* aims to control urban sprawl in SEQ by increasing housing density in new and existing suburbs and by restricting development in areas beyond the Urban Footprint. The aim is for at least 50 per cent of the additional 754 000 dwellings required in SEQ between 2006 and 2031 to be accommodated within the existing urban area, through infill and redevelopment (Queensland Government and COMSEQ 2009, p.91). The *SEQ Regional Plan 2005–2026* pursued a similar objective, but involved a less ambitious infill target in the short to medium term—targeting 40 per cent between 2004 and 2016, rising to 50 per cent between 2016 and 2026. While the SEQ RFGM 2000 preceded the introduction of the Urban Footprint, the intent was similar—that the pattern of development in SEQ should reduce encroachment on the natural environment (RCC 2000, p.25).

Multiple sources point to progress being made in controlling urban sprawl in SEQ between 2001 and 2011. There was considerable progress in increasing the density of new detached housing developments, with median lot size trending downwards between 2004 and 2012 (OESR 2012a). SEQ's urban development was largely concentrated within the Urban Footprint, with BITRE estimating that about 88 per cent of population growth between July 2001 and June 2011 and 89 per cent of dwelling approvals occurred within the Urban Footprint boundary.

From 2001 to 2006, the proportion of Brisbane's (and SEQ's) additional dwellings built in newly developed suburbs on the urban fringe was smaller than that of Perth or Melbourne. It was, however, appreciably higher than that of Sydney.

For the 2001 to 2011 period, the available evidence indicates that SEQ has accommodated 60–70 per cent of residential growth within existing urban areas,[115] which exceeds the 50 per cent target (and the previous target of 40 per cent). However, of the 60–70 per cent of SEQ's residential growth which is classified as 'infill' development, only 25–30 per cent relates to Inner and Middle Brisbane. Much of the remaining 'infill' relates to new houses being built on recently subdivided land near the urban fringe, rather than to redevelopment of established suburbs. The sheer magnitude of SEQ's recent growth meant that the non-infill development still represents a rather significant addition (of at least 82 000 dwellings) beyond the Existing Urban Area (EUA) boundary since 2001.

Consolidate rural population growth in existing towns/villages

The *SEQ Regional Plan 2009–2031* aims to 'consolidate future rural population growth within existing towns and villages' and to 'contain and limit areas allocated for rural residential development' (Queensland Government and COMSEQ 2009, pp. 74, 110). The *SEQ Regional Plan 2005–2026* and the SEQ RFGM 2000 pursued very similar principles.

Between 2001 and 2006, about 94 per cent of population and dwellings growth in SEQ was in urban centres, principally in the three largest urban centres of Brisbane, Gold Coast and Sunshine Coast. Of the 6.5 per cent of SEQ's population growth that related to rural areas, 87 per cent occurred in the rural balance, with only a small proportion of population growth

115 For the five year period ended July 2011, 69 per cent of all dwelling approvals in SEQ occurred within the 'Existing Urban Area' (EUA) boundary (as defined in December 2008) and were classified as infill (Growth Management Queensland 2011, OESR 2011c). Earlier performance reporting for the three years ended September 2007, based on the previous EUA boundary, found that 60 per cent of new dwellings were infill dwellings (Queensland Government 2008b). For the 2001 to 2006 period, BITRE's analysis found that 62 per cent of population growth and 68 per cent of dwellings growth in SEQ occurred in established suburbs, rather than newly developed suburbs on the urban fringe.

being consolidated within existing localities of 200 to 999 persons (i.e. villages). Population growth in rural areas outside of SEQ's existing towns and villages amounted to an additional 17 000 persons, or 5.7 per cent of SEQ's population growth. Around one-quarter of this increase in the 'rural balance' population occurred in the Beaudesert Part A SLA, which contains a great deal of low density rural residential development.

The 9 per cent increase in the 'rural balance' population was less than SEQ's total population increase of 12 per cent between 2001 and 2006. With significant declines in rural residential lot approvals and low density lot registrations since 2004, there are indications that rural residential development is starting to be curtailed in SEQ.

Promote infill housing and higher densities in centres

One of the key policy objectives of compact settlement highlighted in both SEQ regional plans is to '[f]ocus higher density residential development in and around regional activity centres' (Queensland Government and SEQROC 2005, p.65; Queensland Government and COMSEQ 2009, p.91). A similar policy objective was set out in the earlier SEQ RFGM 2000, which states that '[r]esidential densities should be increased in existing and new areas, particularly around major centres' (RCC 2000, p.51).

Between 2001 and 2006, the population of SEQ's primary and regional activity centres rose by 56 600, representing an increase from 11.9 per cent of the SEQ population in 2001 to 12.7 per cent in 2006. The population density of SEQ's centres increased at a more rapid pace than SEQ's overall population density, although much of the density gain of centres was due to the primary centre, based around the Brisbane CBD.

From 2001 to 2006, the number of high rise flats, units and apartments in SEQ rose by 9.4 per cent per annum, compared to 2.1 per cent for separate houses. Two-thirds of the increase in high rise dwellings occurred in the primary and regional activity centres, amounting to 10 500 additional dwellings, and expanding the stock of high rise dwellings in centres by 76 per cent in just five years. Dwelling approvals data shows that the shift towards higher density forms of housing continued over the 2006 to 2010 period.

Spatial patterns of job growth

Achieve significant employment growth in the Western Corridor

The *SEQ Regional Plan 2009–2031* calls for 'significant employment growth in the Western Corridor' (Queensland Government and COMSEQ 2009, p.122). While the *SEQ Regional Plan 2005–2026* pursued a similar objective, this employment goal did not feature within the SEQ RFGM 2000.

The Western Corridor (i.e. the Ipswich Local Government Area) gained about 6500 jobs from 2001 to 2006, reaching 45 500 jobs in 2006. However, the average annual rate of job growth in the Western Corridor (3.1 per cent) was not as strong as the SEQ rate (3.6 per cent), indicating that employment growth in the Western Corridor is not quite keeping pace with the rest of the region. Furthermore, job growth did not keep pace with growth in employed

residents in the Western Corridor between 2001 and 2006, with self-sufficiency declining from 76 to 72 jobs per 100 employed residents.

Locate employment in activity centres

The *SEQ Regional Plan 2009–2031* aims to '[l]ocate major employment and trip-generating activities in regional activity centres', and specifically discourages out-of-centre development (Queensland Government and COMSEQ 2009, p.96). The two preceding strategic plans also aimed to focus job growth in centres, although the SEQ RFGM 2000 was based on a different activity centres hierarchy to the two more recent plans.

From 2001 to 2006, about 56 per cent of all job growth in SEQ occurred in the primary, regional and specialist activity centres. The proportion of jobs located in centres rose from 36.3 to 39.5 per cent. This involved an additional 104 000 jobs in centres, with growth averaging 5.4 per cent per annum. While the Central Brisbane activity centre was responsible for 28 per cent of employment growth in centres, nearly all of SEQ's centres experienced job growth.

Develop diversified subregional economies

The *SEQ Regional Plan 2009–2031* aims to '[d]evelop a diversified regional economy within each subregion that retains local jobs and builds on regional and sub-regional competitive advantages and specialisations' (Queensland Government and COMSEQ 2009, p.112). This goal was also present in earlier planning documents, with both the SEQ RFGM 2000 and the *SEQ Regional Plan 2005–2026* expressing a desire to develop a diverse SEQ economy.

SEQ's level of industry diversity remained stable from 2001 to 2006, which combined with the high base level of diversity, indicates SEQ is continuing to develop in a diverse fashion. The level of industry diversity either remained stable or increased for most subregions/regions. West Moreton improved its industry diversity and reduced reliance on agricultural employment. The Inner sector reduced its industry diversity, instead building further on its existing specialisations in *Government administration* and *Property and business* services.

Locate government and office-based business employment outside the Brisbane Central Business District

The *SEQ Regional Plan 2009–2031* identifies a need for 'office-based businesses and government and community services in centres outside the Brisbane CBD, particularly in high growth areas such as the Sunshine Coast, Moreton Bay, Gold Coast, Ipswich, Toowoomba and Logan' (Queensland Government and COMSEQ 2009, p.112). The *SEQ Regional Plan 2005–2026* and the SEQ RFGM 2000 also aimed to locate government employment in key regional centres, but did not specify goals relating to the location of employment in office-based businesses.

The Brisbane CBD activity centre added about 7 700 jobs in *Finance and insurance* and *Property and business services* and 12 600 jobs in *Government administration and defence* and *Health and community services* from 2001 to 2006. While job growth in government and office-based businesses was greatest in the CBD, jobs were also created in other centres.

Toowoomba gained about 2800 jobs in these industries, while Ipswich, Caboolture-Morayfield, Maroochydore, Sippy Downs and Kawana each added between 1000 and 1600 jobs.

Relocate manufacturing and logistics employment from Inner Brisbane

The *SEQ Regional Plan 2009–2031* aims to '[e]ncourage the relocation of large-scale industrial, warehousing, transport and storage businesses from inner suburbs to release these sites for higher and better use' (Queensland Government and COMSEQ 2009, p.122). The strategic plan identifies a need for additional manufacturing and logistics jobs in the outlying regions of Sunshine Coast, Ipswich, Moreton Bay, Gold Coast, Scenic Rim, Toowoomba, Lockyer Valley, Somerset and Logan (ibid., p.112). The earlier strategic plans do not discuss this goal.

From 2001 to 2006, SEQ added 14 600 jobs in the *Manufacturing industry* and 8 700 jobs in the *Transport and storage* industry. There was some redistribution of manufacturing and logistics employment away from Inner Brisbane towards other parts of SEQ. Employment in the *Manufacturing* and *Transport and storage* industries declined by about 400 jobs in Brisbane's Inner sector, while many of the regions targeted for growth showed strong gains, with the Gold Coast adding 4800 jobs. However, Toowoomba reduced its manufacturing and logistics employment from 2001 to 2006.

Commuting patterns and transport use

Promote public transport

The recent SEQ regional and transport plans all have the clear objective of promoting public transport use, in order to increase its mode share. The *Connecting SEQ 2031* plan (from 2011) sets a target of increasing the public transport mode share from 7 per cent in 2006 to 14 per cent in 2031 (Department of Transport and Main Roads 2011a). This target is for all trips, not just commuting trips.

Public transport's share of Brisbane's total motorised urban passenger transport (expressed in passenger kilometres) rose by 1.2 percentage points between 2001 and 2011 to reach 8.9 per cent (BITRE 2012b). This represents an average annual growth rate of 4.3 per cent. Rail patronage growth averaged 1.7 per cent per annum, lower than that for bus (6.2 per cent) and ferry (1.9 per cent) (ibid). The public transport mode share of all SEQ trips rose from 7.0 per cent in 2004 to 7.9 per cent in 2009 (Department of Transport and Main Roads 2011a).

According to ABS census data, public transport's share of commuter travel rose by 0.5 percentage points between 2001 and 2006 to reach 10.0 per cent in SEQ and by 0.9 percentage points to reach 13.5 per cent in Brisbane. The increase in the public transport mode share was primarily due to increased bus use. The increase was largest amongst those who worked in Inner Brisbane and those who resided in the Middle South subregion.

Promote walking and cycling

The three most recent SEQ strategic plans strongly support the promotion of walking and cycling (i.e. active transport). *Connecting SEQ 2031* specifies a target to increase the active

transport mode share from 10 per cent in 2006 to 20 per cent by 2031. This target relates to all trips, not just commuting trips (Department of Transport and Main Roads 2011a, p.4).

Based on ABS census data, the active transport mode share of SEQ commuter travel rose from 4.3 per cent in 2001 to 4.6 per cent in 2006. The increase was concentrated amongst inner city residents and driven by walking, not cycling. The active transport mode share decreased in a number of regions between 2001 and 2006 (i.e. the Gold Coast, Sunshine Coast, West Moreton, Outer South and Outer West).

The *Household Travel Survey* finds that active transport's share of SEQ commuter travel grew by 1.1 percentage points from 2004 to 2009, reaching 5.3 per cent. For Greater Brisbane, the active transport share of commuter travel increased from 4.3 to 5.5 per cent between 2004 and 2007, with a further increase to 5.6 per cent in 2009.

Concentrate residential and job growth around frequent public transport

The *SEQ Regional Plan 2009–2031* emphasises the need to ensure that residential and job growth occurs close to public transport (primarily rail and busway) and that development supports the transport system. This goal was also pursued in the two previous strategic plans, with the SEQ RFGM 2000 stating that the 'pattern of development in South East Queensland should, taking into account other principles, maximise the efficient use of public transport' (RCC 2000, p.84).

From 2001 to 2006, population growth within 1km of SEQ's transport nodes was notably lower than that occurring outside the 1km catchment (9.2 per cent and 13.7 per cent, respectively), so that the population living within 1km of public transport nodes fell from 19.5 to 18.9 per cent. Population also grew at a marginally slower rate within 500m of transport nodes, although strong growth occurred around Inner Brisbane nodes.

Job growth rates were very similar inside and outside the 500m and 1km catchments between 2001 and 2006. However, some suburban bus and rail station catchments experienced large job growth.

Increase self-containment within subregions

The *SEQ Regional Plan 2009–2031* aims to 'support greater levels of trip self-containment within subregions' and requires 'local governments to demonstrate employment self-containment in planning decisions' (Queensland Government and COMSEQ 2009, pp. 112, 140). Similar objectives were pursued in the two preceding strategic plans.

The proportion of employed residents working in their home subregion within the Brisbane SD rose from 39.7 per cent in 2001 to 40.3 per cent in 2006. The proportion working in their home region in the rest of SEQ fell from 75.6 per cent in 2001 to 74.9 per cent in 2006, reflecting declines in self-containment for each of Gold Coast, Sunshine Coast, Toowoomba and West Moreton. Overall, there was a small increase in SEQ's rate of employment self-containment from 51.1 per cent in 2001 to 51.6 per cent in 2006. This reflects mixed results across SEQ, as some of the targeted subregions increased their rate of self-containment (e.g. Moreton Bay, Redland), while others experienced a significant decline (e.g. Ipswich, Sunshine Coast).

Reduce commuting times and distances

The *SEQ Regional Plan 2009–2031* aims to '[r]educe the length of trips and dependence on oil by localising access to goods, services and employment opportunities' and to develop a high quality public transport network that will 'reduce commuter travel time' (Queensland Government and COMSEQ 2009, pp. 46, 145). There is greater focus on reducing commuting times and distances in the current regional plan than in its two predecessors.

Average commuting distances derived from ABS census data show virtually no change between 2001 and 2006, increasing by just 0.1km for SEQ and unchanged for Brisbane. The *Household Travel Survey* identifies declines of between 0.6 and 1.0km in the average commuting distance of Brisbane and SEQ residents between 2007 and 2009, while ABS survey data also points to a decline in average commuting distances in Brisbane between 2006 and 2009 (ABS 2006b, 2009b).

The HILDA survey identifies a 7 minute net increase in the average commuting times of full-time workers in Brisbane from 2002 to 2010, although nearly all of the increase occurred between 2002 and 2006. Morning peak traffic delays increased from 0.45 to 0.77 minutes/km between 2000–01 and 2010–11, while afternoon peak traffic delays doubled (from 0.32 to 0.65 minutes/km) (AustRoads 2012).

The study period features two distinct subperiods. The initial period featured stable commuting distances, reduced speeds, and increased traffic delays and commuting times. The period since 2007 involved declining commuting distances (at least through to 2009), a slight increase in peak speeds, a significant reduction in morning peak traffic delays, and either an abatement or reversal of the upward trend in commuting times.

Overall assessment of metropolitan strategy goals

The purpose of this assessment has been to provide evidence about the 'on the ground' changes that have been occurring with respect to these strategic planning goals, identifying whether such movements were in the desired direction and progressing at the required pace of change.

The available evidence suggests that there has been some movement in the desired direction for most of these planning objectives since 2001. The principal exception is that SEQ's average commuting time has not moved in the desired direction. A further exception is that residential and job growth has not been concentrated around frequent public transport for SEQ as a whole, even though there was progress in some specific locations. Good progress was achieved against several of these objectives, such as increasing residential densities and locating employment in centres, and redistributing residential growth to the Western Corridor. More often, evidence is mixed. For example, some of the targeted subregions increased their rate of employment self-containment (e.g. Moreton Bay, Redland), while others experienced a significant decline (e.g. Ipswich, Sunshine Coast).

While some progress has been made against most of the planning goals set out in the SEQ regional plans, it has been incremental in nature as the accumulated effects of decades of residential and industry development do not reverse in just five to ten years.

The various objectives are highly inter-related and progress against one objective may aid or hinder progress in other areas. For example, in line with regional planning objectives, the Western Corridor experienced rapid residential growth between 2001 and 2011, averaging 3.2 per cent per annum compared to 2.5 per cent for SEQ as a whole. However, job growth in the Western Corridor did not keep pace with local growth in employed residents between 2001 and 2006, resulting in a decline in self-sufficiency, reduced self-containment of employment and increased commuting distances for local residents.

Strategic planning is one of several mechanisms through which governments attempt to influence the spatial allocation of population, jobs and commuting within cities. State and territory governments believe that the management of greenfield development, accommodation of population growth, and the transition to higher densities, are most able to be influenced by planning (Productivity Commission 2011). For these population-related strategic planning goals, the spatial changes that occurred in SEQ between 2001 and 2011 were consistently in line with the stated policy goals. There was particularly good progress in achieving higher densities in centres and in redistributing residential growth to the Western Corridor. Since 2001, some progress has also been made in limiting SEQ's urban sprawl (by exceeding infill targets) and in containing rural residential development.

Future directions

This study represents the final case study in a broader research project which aims to identify recent spatial changes in employment and residential patterns in Australia's largest cities, and investigate how commuting behaviour has responded to those changes. The Perth, Melbourne and Sydney reports have already been released (BITRE 2010, 2011a, 2012a). The final stage of the project will involve the preparation of a comparative report, which provides an overview of relevant statistics for the four cities, extracts some common themes and differences, and discusses the implications for infrastructure and urban development.

While the SEQ report does not incorporate any information from the 2011 ABS *Census of Population and Housing*, the comparative report will include some high-level results from the 2011 census. BITRE also intends to produce a series of short information sheets during 2013 which will use 2011 census data to shed light on recent patterns of growth in Australia's major cities, by investigating recent trends in employment, industry, housing and active travel in Australia's major cities.

APPENDIX A
Geographical classification

Appendix A provides the complete geographical classification of Statistical Local Areas (SLAs) for South East Queensland (SEQ) and its component regions, sectors and subregions. It also shows maps of SLAs for SEQ and the Brisbane Statistical Division.

Table A.1 Classification of Statistical Local Area areas, South East Queensland, 2006

SLA[a]	SLA code[b]	SLA name	Sector	Subregion
1	305011143	City—Inner	Inner	Inner
2	305011067	Bowen Hills	Inner	Inner
3	305011146	City—Remainder	Inner	Inner
4	305011187	Dutton Park	Inner	Inner
5	305011227	Fortitude Valley	Inner	Inner
6	305011274	Herston	Inner	Inner
7	305011277	Highgate Hill	Inner	Inner
8	305011304	Kangaroo Point	Inner	Inner
9	305011315	Kelvin Grove	Inner	Inner
10	305011378	Milton	Inner	Inner
11	305011421	New Farm	Inner	Inner
12	305011427	Newstead	Inner	Inner
13	305011454	Paddington	Inner	Inner
14	305011481	Red Hill	Inner	Inner
15	305011525	South Brisbane	Inner	Inner
16	305011528	Spring Hill	Inner	Inner
17	305011607	West End	Inner	Inner
18	305011631	Woolloongabba	Inner	Inner
19	305091042	Balmoral	Middle	Middle East
20	305091086	Bulimba	Middle	Middle East
21	305091097	Camp Hill	Middle	Middle East
22	305091102	Cannon Hill	Middle	Middle East
23	305091108	Carindale	Middle	Middle East
24	305091113	Carina	Middle	Middle East
25	305091116	Carina Heights	Middle	Middle East
26	305091157	Coorparoo	Middle	Middle East
27	305091195	East Brisbane	Middle	Middle East
28	305091258	Hawthorne	Middle	Middle East
29	305091397	Morningside	Middle	Middle East
30	305091432	Norman Park	Middle	Middle East
31	305111057	Belmont-Mackenzie	Middle	Middle East
32	305111091	Burbank	Middle	Middle East

(continued)

Table A.1 Classification of Statistical Local Area areas, South East Queensland, 2006 *(continued)*

SLA[a]	SLA code[b]	SLA name	Sector	Subregion
33	305111123	Chandler-Capalaba West	Middle	Middle East
34	305111251	Gumdale-Ransome	Middle	Middle East
35	305111265	Hemmant-Lytton	Middle	Middle East
36	305111337	Lota	Middle	Middle East
37	305111364	Manly	Middle	Middle East
38	305111367	Manly West	Middle	Middle East
39	305111394	Moreton Island	Middle	Middle East
40	305111413	Murarrie	Middle	Middle East
41	305111571	Tingalpa	Middle	Middle East
42	305111601	Wakerley	Middle	Middle East
43	305111637	Wynnum	Middle	Middle East
44	305111642	Wynnum West	Middle	Middle East
45	305031004	Albion	Middle	Middle North
46	305031007	Alderley	Middle	Middle North
47	305031026	Ascot	Middle	Middle North
48	305031031	Ashgrove	Middle	Middle North
49	305031048	Bardon	Middle	Middle North
50	305031151	Clayfield	Middle	Middle North
51	305031206	Enoggera	Middle	Middle North
52	305031244	Grange	Middle	Middle North
53	305031255	Hamilton	Middle	Middle North
54	305031271	Hendra	Middle	Middle North
55	305031312	Kedron	Middle	Middle North
56	305031345	Lutwyche	Middle	Middle North
57	305031424	Newmarket	Middle	Middle North
58	305031446	Nundah	Middle	Middle North
59	305031533	Stafford	Middle	Middle North
60	305031536	Stafford Heights	Middle	Middle North
61	305031618	Wilston	Middle	Middle North
62	305031623	Windsor	Middle	Middle North
63	305031634	Wooloowin	Middle	Middle North
64	305071034	Aspley	Middle	Middle North
65	305071037	Bald Hills	Middle	Middle North
66	305071045	Banyo	Middle	Middle North
67	305071064	Boondall	Middle	Middle North
68	305071072	Bracken Ridge	Middle	Middle North
69	305071075	Bridgeman Downs	Middle	Middle North
70	305071078	Brighton	Middle	Middle North
71	305071121	Carseldine	Middle	Middle North
72	305071135	Chermside	Middle	Middle North
73	305071138	Chermside West	Middle	Middle North
74	305071173	Deagon	Middle	Middle North
75	305071211	Everton Park	Middle	Middle North
76	305071217	Ferny Grove	Middle	Middle North
77	305071236	Geebung	Middle	Middle North

(continued)

Table A.1 Classification of Statistical Local Area areas, South East Queensland, 2006 *(continued)*

SLA[a]	SLA code[b]	SLA name	Sector	Subregion
78	305071326	Keperra	Middle	Middle North
79	305071353	McDowall	Middle	Middle North
80	305071383	Mitchelton	Middle	Middle North
81	305071435	Northgate	Middle	Middle North
82	305071442	Nudgee	Middle	Middle North
83	305071467	Pinkenba-Eagle Farm	Middle	Middle North
84	305071514	Sandgate	Middle	Middle North
85	305071556	Taigum-Fitzgibbon	Middle	Middle North
86	305071567	The Gap	Middle	Middle North
87	305071585	Upper Kedron	Middle	Middle North
88	305071593	Virginia	Middle	Middle North
89	305071604	Wavell Heights	Middle	Middle North
90	305071653	Zillmere	Middle	Middle North
91	305091015	Annerley	Middle	Middle South
92	305091214	Fairfield	Middle	Middle South
93	305091247	Greenslopes	Middle	Middle South
94	305091282	Holland Park	Middle	Middle South
95	305091285	Holland Park West	Middle	Middle South
96	305091391	Moorooka	Middle	Middle South
97	305091563	Tarragindi	Middle	Middle South
98	305091645	Yeerongpilly	Middle	Middle South
99	305091648	Yeronga	Middle	Middle South
100	305111001	Acacia Ridge	Middle	Middle South
101	305111012	Algester	Middle	Middle South
102	305111023	Archerfield	Middle	Middle South
103	305111094	Calamvale	Middle	Middle South
104	305111154	Coopers Plains	Middle	Middle South
105	305111198	Eight Mile Plains	Middle	Middle South
106	305111331	Kuraby	Middle	Middle South
107	305111356	MacGregor	Middle	Middle South
108	305111372	Mansfield	Middle	Middle South
109	305111402	Mount Gravatt	Middle	Middle South
110	305111405	Mount Gravatt East	Middle	Middle South
111	305111416	Nathan	Middle	Middle South
112	305111456	Pallara-Heathwood-Larapinta	Middle	Middle South
113	305111463	Parkinson-Drewvale	Middle	Middle South
114	305111492	Robertson	Middle	Middle South
115	305111495	Rochedale	Middle	Middle South
116	305111498	Rocklea	Middle	Middle South
117	305111503	Runcorn	Middle	Middle South
118	305111511	Salisbury	Middle	Middle South
119	305111541	Stretton-Karawatha	Middle	Middle South
120	305111547	Sunnybank	Middle	Middle South
121	305111552	Sunnybank Hills	Middle	Middle South
122	305111588	Upper Mount Gravatt	Middle	Middle South

(continued)

Table A.1 Classification of Statistical Local Area areas, South East Queensland, 2006 *(continued)*

SLA[a]	SLA code[b]	SLA name	Sector	Subregion
123	305111615	Willawong	Middle	Middle South
124	305111626	Wishart	Middle	Middle South
125	305031132	Chelmer	Middle	Middle West
126	305031162	Corinda	Middle	Middle West
127	305031241	Graceville	Middle	Middle West
128	305031293	Indooroopilly	Middle	Middle West
129	305031506	St Lucia	Middle	Middle West
130	305031522	Sherwood	Middle	Middle West
131	305031558	Taringa	Middle	Middle West
132	305031574	Toowong	Middle	Middle West
133	305071018	Anstead	Middle	Middle West
134	305071053	Bellbowrie	Middle	Middle West
135	305071084	Brookfield (includes Brisbane Forest Park)	Middle	Middle West
136	305071127	Chapel Hill	Middle	Middle West
137	305071167	Darra-Sumner	Middle	Middle West
138	305071176	Doolandella-Forest Lake	Middle	Middle West
139	305071184	Durack	Middle	Middle West
140	305071203	Ellen Grove	Middle	Middle West
141	305071222	Fig Tree Pocket	Middle	Middle West
142	305071288	Inala	Middle	Middle West
143	305071296	Jamboree Heights	Middle	Middle West
144	305071301	Jindalee	Middle	Middle West
145	305071306	Karana Downs-Lake Manchester	Middle	Middle West
146	305071318	Kenmore	Middle	Middle West
147	305071323	Kenmore Hills	Middle	Middle West
148	305071375	Middle Park	Middle	Middle West
149	305071386	Moggill	Middle	Middle West
150	305071408	Mount Ommaney	Middle	Middle West
151	305071451	Oxley	Middle	Middle West
152	305071465	Pinjarra Hills	Middle	Middle West
153	305071473	Pullenvale	Middle	Middle West
154	305071484	Richlands	Middle	Middle West
155	305071487	Riverhills	Middle	Middle West
156	305071517	Seventeen Mile Rocks	Middle	Middle West
157	305071596	Wacol	Middle	Middle West
158	305071612	Westlake	Middle	Middle West
159	305506251	Alexandra Hills	Outer	Outer East
160	305506254	Birkdale	Outer	Outer East
161	305506257	Capalaba	Outer	Outer East
162	305506262	Cleveland	Outer	Outer East
163	305506264	Ormiston	Outer	Outer East
164	305506265	Redland Bay	Outer	Outer East
165	305506267	Sheldon-Mt Cotton	Outer	Outer East
166	305506268	Thorneside	Outer	Outer East
167	305506271	Thornlands	Outer	Outer East

(continued)

Table A.1 Classification of Statistical Local Area areas, South East Queensland, 2006 *(continued)*

SLA[a]	SLA code[b]	SLA name	Sector	Subregion
168	305506273	Victoria Point	Outer	Outer East
169	305506276	Wellington Point	Outer	Outer East
170	305506283	Redland (S) Balance	Outer	Outer East
171	305202002	Bribie Island	Outer	Outer North
172	305202005	Burpengary-Narangba	Outer	Outer North
173	305202008	Caboolture (S)—Central	Outer	Outer North
174	305202013	Caboolture (S)—East	Outer	Outer North
175	305202014	Caboolture (S)—Hinterland	Outer	Outer North
176	305202015	Caboolture (S)—Midwest	Outer	Outer North
177	305202016	Deception Bay	Outer	Outer North
178	305202018	Morayfield	Outer	Outer North
179	305405951	Albany Creek	Outer	Outer North
180	305405957	Bray Park	Outer	Outer North
181	305405958	Central Pine West	Outer	Outer North
182	305405961	Dakabin-Kallangur-Murrumba Downs	Outer	Outer North
183	305405963	Griffin-Mango Hill	Outer	Outer North
184	305405971	Hills District	Outer	Outer North
185	305405973	Lawnton	Outer	Outer North
186	305405974	Petrie	Outer	Outer North
187	305405978	Strathpine-Brendale	Outer	Outer North
188	305405988	Pine Rivers (S) Balance	Outer	Outer North
189	305456201	Clontarf	Outer	Outer North
190	305456204	Margate-Woody Point	Outer	Outer North
191	305456206	Redcliffe-Scarborough	Outer	Outer North
192	305456208	Rothwell-Kippa-Ring	Outer	Outer North
193	305150552	Beaudesert (S)—Part A	Outer	Outer South
194	305304601	Browns Plains	Outer	Outer South
195	305304603	Carbrook-Cornubia	Outer	Outer South
196	305304605	Daisy Hill-Priestdale	Outer	Outer South
197	305304608	Greenbank-Boronia Heights	Outer	Outer South
198	305304612	Kingston	Outer	Outer South
199	305304615	Loganholme	Outer	Outer South
200	305304618	Loganlea	Outer	Outer South
201	305304623	Marsden	Outer	Outer South
202	305304631	Rochedale South	Outer	Outer South
203	305304634	Shailer Park	Outer	Outer South
204	305304637	Slacks Creek	Outer	Outer South
205	305304642	Springwood	Outer	Outer South
206	305304645	Tanah Merah	Outer	Outer South
207	305304651	Underwood	Outer	Outer South
208	305304654	Waterford West	Outer	Outer South
209	305304656	Woodridge	Outer	Outer South
210	305304663	Logan (C) Balance	Outer	Outer South

(continued)

Table A.1 Classification of Statistical Local Area areas, South East Queensland, 2006 *(continued)*

SLA[a]	SLA code[b]	SLA name	Sector	Subregion
211	305253962	Ipswich (C)—Central	Outer	Outer West
212	305253965	Ipswich (C)—East	Outer	Outer West
213	305253966	Ipswich (C)—North	Outer	Outer West
214	305253974	Ipswich (C)—South-West	Outer	Outer West
215	305253976	Ipswich (C)—West	Outer	Outer West
216	307053461	Beenleigh	Gold Coast	Gold Coast
217	307053463	Bethania-Waterford	Gold Coast	Gold Coast
218	307053466	Eagleby	Gold Coast	Gold Coast
219	307053471	Edens Landing-Holmview	Gold Coast	Gold Coast
220	307053473	Jacobs Well-Alberton	Gold Coast	Gold Coast
221	307053476	Mt Warren Park	Gold Coast	Gold Coast
222	307053481	Ormeau-Yatala	Gold Coast	Gold Coast
223	307053493	Wolffdene-Bahrs Scrub	Gold Coast	Gold Coast
224	307103508	Biggera Waters-Labrador	Gold Coast	Gold Coast
225	307103511	Bilinga-Tugun	Gold Coast	Gold Coast
226	307103514	Broadbeach-Mermaid Beach	Gold Coast	Gold Coast
227	307103515	Broadbeach Waters	Gold Coast	Gold Coast
228	307103517	Bundall	Gold Coast	Gold Coast
229	307103521	Burleigh Heads	Gold Coast	Gold Coast
230	307103523	Burleigh Waters	Gold Coast	Gold Coast
231	307103527	Coolangatta	Gold Coast	Gold Coast
232	307103533	Currumbin	Gold Coast	Gold Coast
233	307103555	Main Beach-South Stradbroke	Gold Coast	Gold Coast
234	307103562	Mermaid Waters-Clear Island Waters	Gold Coast	Gold Coast
235	307103563	Miami	Gold Coast	Gold Coast
236	307103573	Palm Beach	Gold Coast	Gold Coast
237	307103576	Paradise Point-Runaway Bay	Gold Coast	Gold Coast
238	307103585	Southport	Gold Coast	Gold Coast
239	307103587	Surfers Paradise	Gold Coast	Gold Coast
240	307153502	Ashmore-Benowa	Gold Coast	Gold Coast
241	307153525	Carrara-Merrimac	Gold Coast	Gold Coast
242	307153531	Coombabah	Gold Coast	Gold Coast
243	307153534	Currumbin Valley-Tallebudgera	Gold Coast	Gold Coast
244	307153535	Currumbin Waters	Gold Coast	Gold Coast
245	307153537	Elanora	Gold Coast	Gold Coast
246	307153543	Helensvale	Gold Coast	Gold Coast
247	307153547	Hope Island	Gold Coast	Gold Coast
248	307153551	Kingsholme-Upper Coomera	Gold Coast	Gold Coast
249	307153564	Molendinar	Gold Coast	Gold Coast
250	307153566	Mudgeeraba-Reedy Creek	Gold Coast	Gold Coast
251	307153567	Nerang	Gold Coast	Gold Coast
252	307153568	Oxenford-Maudsland	Gold Coast	Gold Coast
253	307153572	Pacific Pines-Gaven	Gold Coast	Gold Coast
254	307153578	Parkwood-Arundel	Gold Coast	Gold Coast
255	307153581	Pimpama-Coomera	Gold Coast	Gold Coast

(continued)

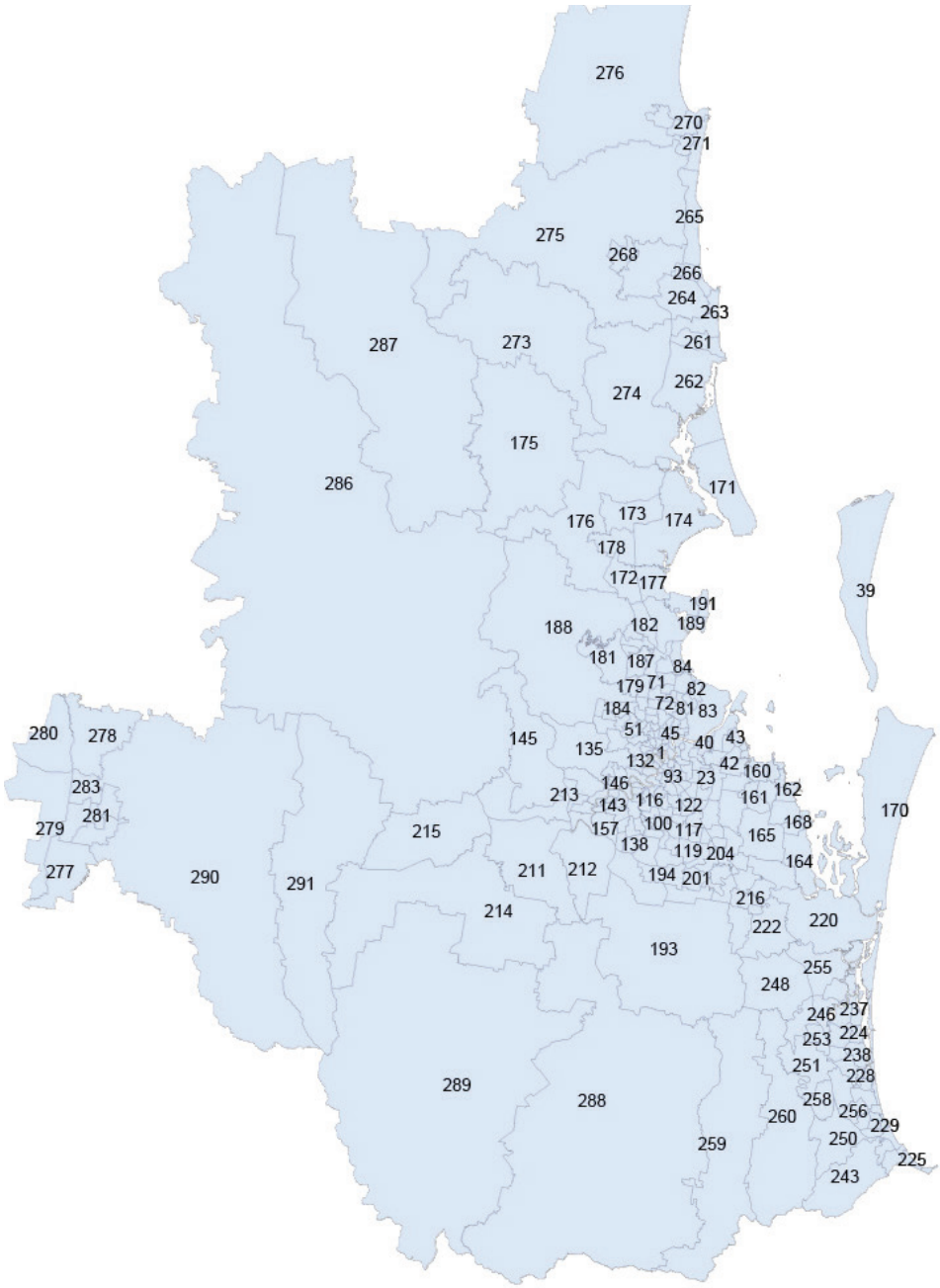
Table A.1 Classification of Statistical Local Area areas, South East Queensland, 2006 *(continued)*

SLA[a]	SLA code[b]	SLA name	Sector	Subregion
256	307153582	Robina	Gold Coast	Gold Coast
257	307153592	Varsity Lakes	Gold Coast	Gold Coast
258	307153593	Worongary-Tallai	Gold Coast	Gold Coast
259	307200553	Beaudesert (S)—Part B	Gold Coast	Gold Coast
260	307203538	Guanaba-Springbrook	Gold Coast	Gold Coast
261	309052132	Caloundra (C)—Caloundra North	Sunshine Coast	Sunshine Coast
262	309052133	Caloundra (C)—Caloundra South	Sunshine Coast	Sunshine Coast
263	309052135	Caloundra (C)—Kawana	Sunshine Coast	Sunshine Coast
264	309054902	Maroochy (S)—Buderim	Sunshine Coast	Sunshine Coast
265	309054905	Maroochy (S)—Coastal North	Sunshine Coast	Sunshine Coast
266	309054907	Maroochy (S)—Maroochydore	Sunshine Coast	Sunshine Coast
267	309054911	Maroochy (S)—Mooloolaba	Sunshine Coast	Sunshine Coast
268	309054914	Maroochy (S)—Nambour	Sunshine Coast	Sunshine Coast
269	309054917	Maroochy (S)—Paynter-Petrie Creek	Sunshine Coast	Sunshine Coast
270	309055752	Noosa (S)—Noosa-Noosaville	Sunshine Coast	Sunshine Coast
271	309055755	Noosa (S)—Sunshine-Peregian	Sunshine Coast	Sunshine Coast
272	309055756	Noosa (S)—Tewantin	Sunshine Coast	Sunshine Coast
273	309102136	Caloundra (C)—Hinterland	Sunshine Coast	Sunshine Coast
274	309102138	Caloundra (C)—Rail Corridor	Sunshine Coast	Sunshine Coast
275	309104918	Maroochy (S) Balance	Sunshine Coast	Sunshine Coast
276	309105758	Noosa (S) Balance	Sunshine Coast	Sunshine Coast
277	320012151	Cambooya (S)—Part A	Toowoomba	Toowoomba
278	320012551	Crow's Nest (S)—Part A	Toowoomba	Toowoomba
279	320014201	Jondaryan (S)—Part A	Toowoomba	Toowoomba
280	320016451	Rosalie (S)—Part A	Toowoomba	Toowoomba
281	320016901	Toowoomba (C)—Central	Toowoomba	Toowoomba
282	320016903	Toowoomba (C)—North-East	Toowoomba	Toowoomba
283	320016905	Toowoomba (C)—North-West	Toowoomba	Toowoomba
284	320016906	Toowoomba (C)—South-East	Toowoomba	Toowoomba
285	320016908	Toowoomba (C)—West	Toowoomba	Toowoomba
286	312053050	Esk (S)	West Moreton	West Moreton
287	312054250	Kilcoy (S)	West Moreton	West Moreton
288	312100555	Beaudesert (S)—Part C	West Moreton	West Moreton
289	312100800	Boonah (S)	West Moreton	West Moreton
290	312103250	Gatton (S)	West Moreton	West Moreton
291	312104450	Laidley (S)	West Moreton	West Moreton

Note: [a] SLA reference in Map A.1.
[b] SLA code 2006 ASGC.

Source: BITRE analysis based on ABS 2006 Australian Standard Geographical Classification.

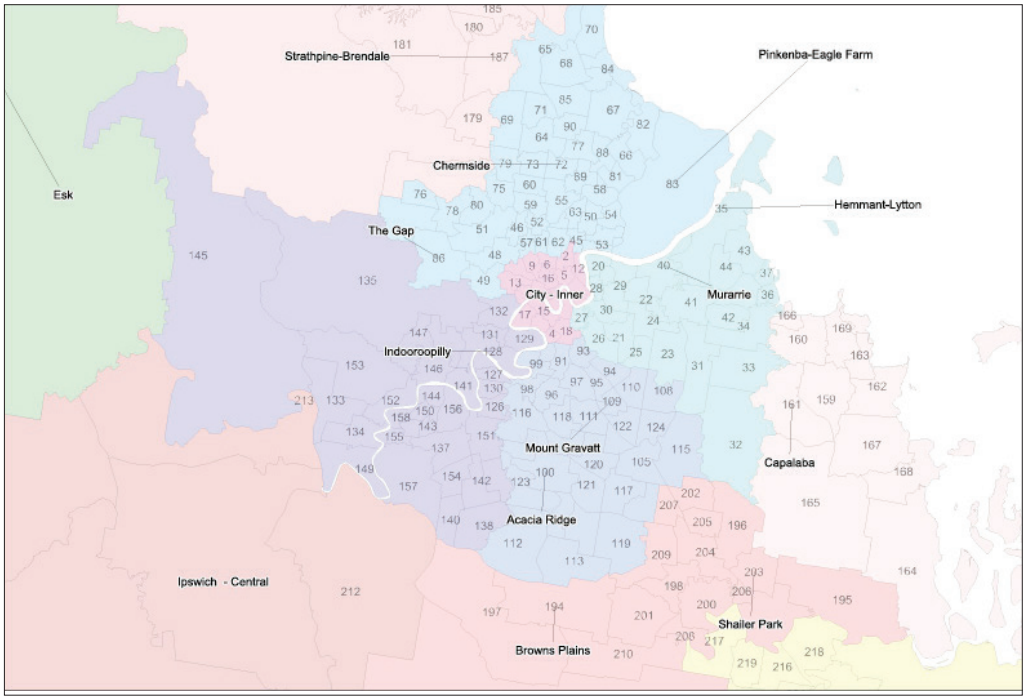
Figure A.1 Statistical Local Area areas, South East Queensland, 2006



Note: Details of the numbers can be found in Table A.1.

Source: BITRE analysis based on ABS2006 Australian Standard Geographical Classification.

Figure A.2 Statistical Local Area areas, Brisbane Statistical Division, 2006



Note: Details of the numbers can be found in Table A.1.

Source: BITRE analysis based on ABS 2006 Australian Standard Geographical Classification.

APPENDIX B

Aggregate Statistical Local Area regions

Chapter 4 (see Table 4.7) presented the change in employment and average annual employment growth rate for a set of BITRE-derived aggregate Statistical Local Area (SLA) regions between 2001 and 2006. This appendix presents BITRE's method of aggregation of several SLAs in South East Queensland (SEQ), as a means of dealing with significant boundary changes between 2001 and 2006.

In SEQ, a large number of SLAs underwent significant boundary changes between 2001 and 2006. These changes took many different forms, from simple splitting of a single 2001 SLA into two or more SLAs in 2006, merging of two or more 2001 SLAs into a single SLA in 2006, and more complex changes involving several SLAs. The complexity of these changes makes it impossible to use either 2001 or 2006 boundaries directly as a geographical basis for comparison of change. The unavailability of employment weighted concordance at the SLA scale for SEQ adds to the difficulty of analysing change during the 2001 to 2006 period.

To allow for direct comparison, SLAs with changed boundaries were extracted, and the smallest aggregate regions which share a common boundary in both 2001 and 2006 were identified. These aggregate SLAs were then treated as a single region for further change analysis. Figure B.1 shows an example of the way an aggregate SLA has been constructed for the Beaudesert area, with two SLAs in 2001 becoming three in 2006.

In addition to boundary changes, there was some apparent reclassification of employment location between 2001 and 2006. This was seen in SLAs with unusually high employment growth in one area being located adjacent to SLAs with unusually high employment loss, with no boundary change or apparent underlying infrastructure change to account for such high numbers of employment increase or decrease. To avoid tainting other results in the chapter, SLAs which evidenced this sort of employment shifting were also aggregated together.

Figure B.1 Example Statistical Local Area aggregation process—Beaudesert

Note: The Beaudesert aggregate SLA consists of Beaudesert—Part A and Beaudesert—Part B in 2001 and Beaudesert—Part A, Beaudesert—Part B and Beaudesert—Part C in 2006. The boundary of the Beaudesert aggregate region is constant in both 2001 and 2006

Source: BITRE analysis of ASGC SLA boundaries 2001 and 2006.

Table B.1 describes the SLAs from each time period that have been assigned to each aggregate SLA cluster. Map B.1 shows the aggregate SLA regions in SEQ, while map B.2 shows the aggregate SLAs in the Brisbane Statistical Division (SD).

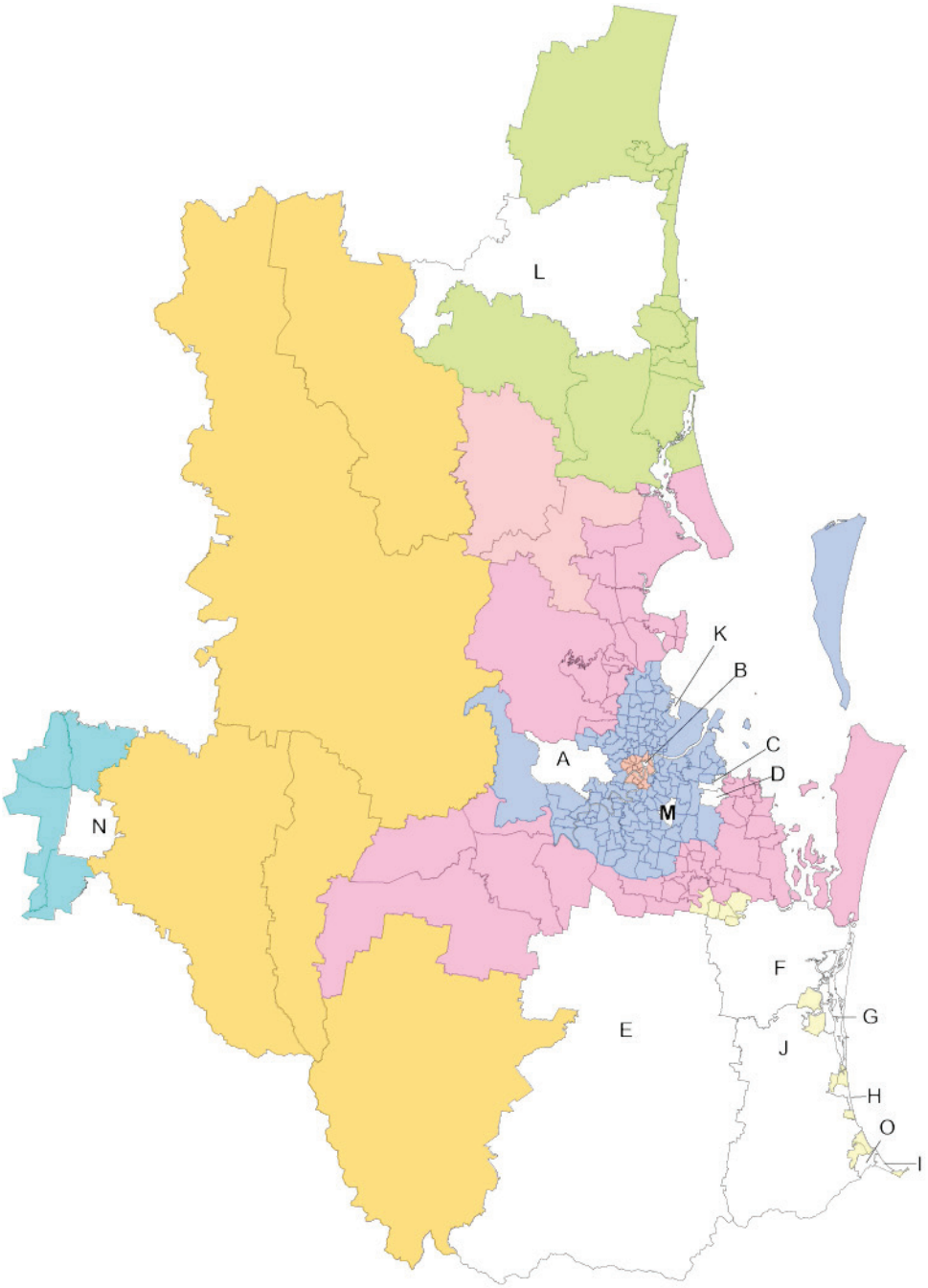
Table B.1 Aggregate Statistical Local Area regions, South East Queensland, 2001 and 2006

SLA[a]	Aggregate SLA region	2001 SLAs	2006 SLAs
A	The Gap	The Gap (including Enoggera Reserve), Upper Brookfield, Brookfield (including Mt Coot-tha)	Brookfield (including Brisbane Forest Park), The Gap
B	Fortitude Valley	Fortitude Valley—Inner, Fortitude Valley—Remainder	Fortitude Valley
C	Gumdale-Ransome	Gumdale, Ransome	Gumdale-Ransome
D	Chandler-Capalaba West	Chandler, Capalaba West	Chandler-Capalaba West
E	Beaudesert	Beaudesert—Part A, Beaudesert—Part B	Beaudesert—Part A, Beaudesert—Part B, Beaudesert—Part C
F	North Gold Coast aggregate region	Windaroo-Bannockburn, Gold Coast Balance in Brisbane SD, Coomera-Cedar Creek	Kingsholme-Upper Coomera, Pimpama-Coomera, Jacobs Well-Alberton, Ormeau-Yatala, Wolffdene-Bahrs Scrub
G	South Stradbroke-Runaway Bay	Runaway Bay, Hollywell, Paradise Point, Main Beach-Broadwater	Paradise Point-Runaway Bay, Main Beach-South Stradbroke
H	Broadbeach-Mermaid Beach	Broadbeach, Mermaid Beach, Broadbeach Waters	Broadbeach-Mermaid Beach, Broadbeach Waters
I	Bilinga-Tugun	Tugun, Bilinga	Bilinga-Tugun
J	Central Gold Coast aggregate region	Arundel, Ashmore, Benowa, Biggera Waters, Burleigh Heads, Burleigh Waters, Carrara-Merrimac, Guanaba-Currumbin Valley, Helensvale, Labrador, Mermaid Waters-Clear Island Waters, Mudgeeraba, Nerang, Oxenford, Parkwood, Robina, Southport, Stephens, Worongary-Tallai, Ernest-Molendinar	Biggera Waters-Labrador, Burleigh Heads, Burleigh Waters, Mermaid Waters-Clear Island Waters, Southport, Ashmore-Benowa, Carrara-Merrimac, Currumbin Valley-Tallebudgera, Helensvale, Molendinar, Mudgeeraba-Reedy Creek, Nerang, Oxenford-Maudsland, Pacific Pines-Gaven, Parkwood-Arundel, Robina, Varsity Lakes, Worongary-Tallai, Guanaba-Springbrook
K	Nudgee	Nudgee, Nudgee Beach	Nudgee
L	Nambour	Maroochy Balance, Maroochy—Nambour, Maroochy Balance in Sunshine Coast SSD	Maroochy Balance, Maroochy—Nambour, Maroochy—Paynter-Petrie Creek
M	Mount Gravatt	Mount Gravatt, Mount Gravatt East, Upper Mount Gravatt	Mount Gravatt, Mount Gravatt East, Upper Mount Gravatt
N	Toowoomba	Toowoomba—South-East, Toowoomba—West, Toowoomba—North-West, Toowoomba—North-East, Toowoomba—Central	Toowoomba—South-East, Toowoomba—West, Toowoomba—North-West, Toowoomba—North-East, Toowoomba—Central
O	Currumbin	Currumbin, Currumbin Waters	Currumbin, Currumbin Waters

Note: [a] Aggregate SLA region index.

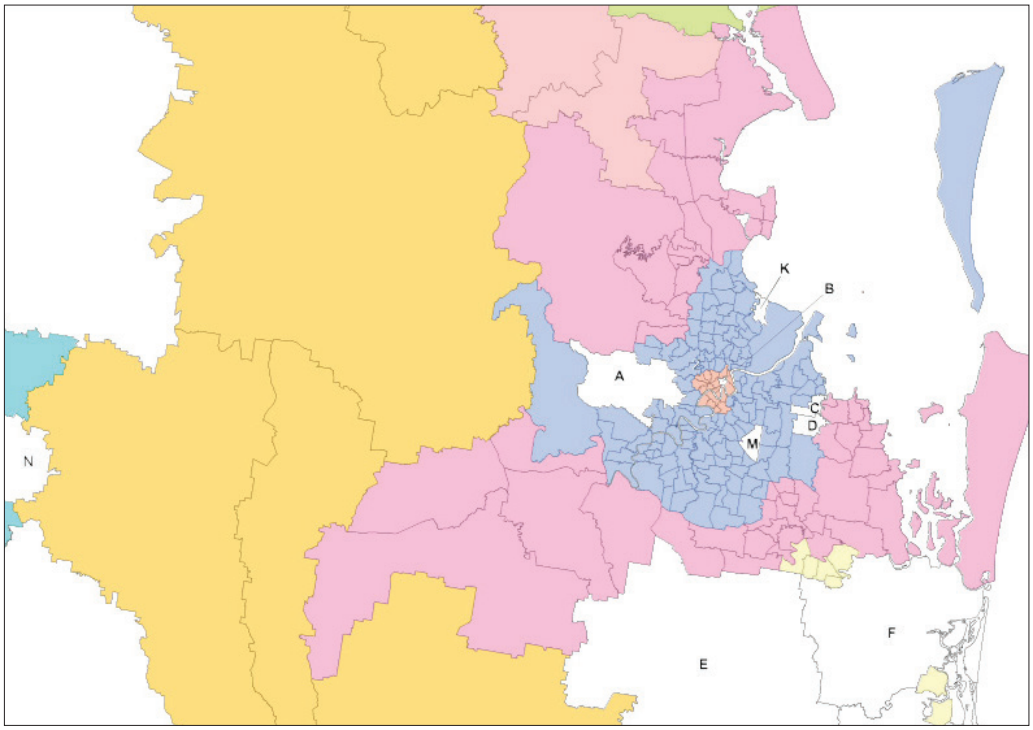
Source: BITRE analysis of ASGC SLA boundaries 2001 and 2006.

Map B.1 Aggregate Statistical Local Area regions, South East Queensland



Note: SLA boundaries as at 2006 ASGC.
The aggregate SLA region names and component SLAs can be found in Table B.1.
Source: BITRE analysis of ASGC SLA boundaries 2001 and 2006.

Map B.2 Aggregate Statistical Local Area regions, Brisbane



Note: SLA boundaries as at 2006 ASGC.
The aggregate SLA region names and component SLAs can be found in Table B.1.
Source: BITRE analysis of ASGC SLA boundaries 2001 and 2006.

APPENDIX C
Straight line distance estimates

Chapter 7 presented information on the average road network distance travelled by South East Queensland (SEQ) residents in their journey to work. The road network distance estimates were based on model outputs of the shortest road distance between Statistical Local Areas (SLAs) in 2006 from the Queensland Department of Transport and Main Roads (DTMR) SEQ Strategic Transport Multi-Modal Model (SEQSTM-MM), together with the origin-destination matrix of commuting flows between SLAs from the Australian Bureau of Statistics (ABS) *Census of Population and Housing* for 2006.

This appendix presents BITRE's estimates of average commuting distances using the straight line distance between origin SLAs and destination SLAs. These estimates will be less accurate than calculations based on more spatially disaggregated data such as destination zones or address information. Moreover, the estimated straight line distances are likely to be systematically lower than average distance calculations that reflect actual or simulated travel routes. The straight line distance estimates nevertheless have the advantage of being fully consistent with the straight line estimates of average commuting distance that have previously been derived for Perth, Melbourne and Sydney (BITRE 2010, 2011a, 2012a), thus enabling comparisons to be made across the four cities.

Estimates of average straight line commuting distance

Distance for each origin-destination pair was calculated using Mapinfo as the straight line distance between the population-weighted centroid of the origin SLA (using 2006 data for Census Collection Districts) and the job-weighted centroid of the destination SLA (calculated using 2006 data for destination zones). In these calculations, people who work from home were assigned a distance of zero, while people who work elsewhere in their home SLA were assigned the straight line distance between the population-weighted centroid and the job-weighted centroid of the home SLA. The distance between each origin-destination pair was estimated separately for 2001 and 2006.

The average straight line commuting distance within SEQ was estimated by BITRE to be 11.7km in 2006. This is considerably lower than the average road network distance estimate, based on SEQSTM-MM outputs, of 15.3km (see Chapter 7). It is expected that straight line distances will inevitably underestimate actual road distances travelled by commuters.

Table C.1 shows the average straight line commuting distance:

- from an origin region/sector/subregion to a workplace in any destination within SEQ (column 2)
- to a workplace in a destination region/sector/subregion from any origin in SEQ (column 3).

The average commuting distances for Inner and Middle sector residents are relatively low, as are those for Toowoomba residents. Residents of the Outer sector (particularly the Outer North) and West Moreton have comparatively high average commuting distances.

The average commuting distances display less variation on a place of work basis than on a place of residence basis. The average commuting distance to a place of work in the Inner sector is higher than any of the other sectors, regions or subregions. Average commuting distances are also relatively high for those who work in West Moreton, and are lowest for those who work in the Outer East and Toowoomba.

Table C.1 Average straight line commuting distance for the journey to work by sector, region and subregion, South East Queensland, 2006

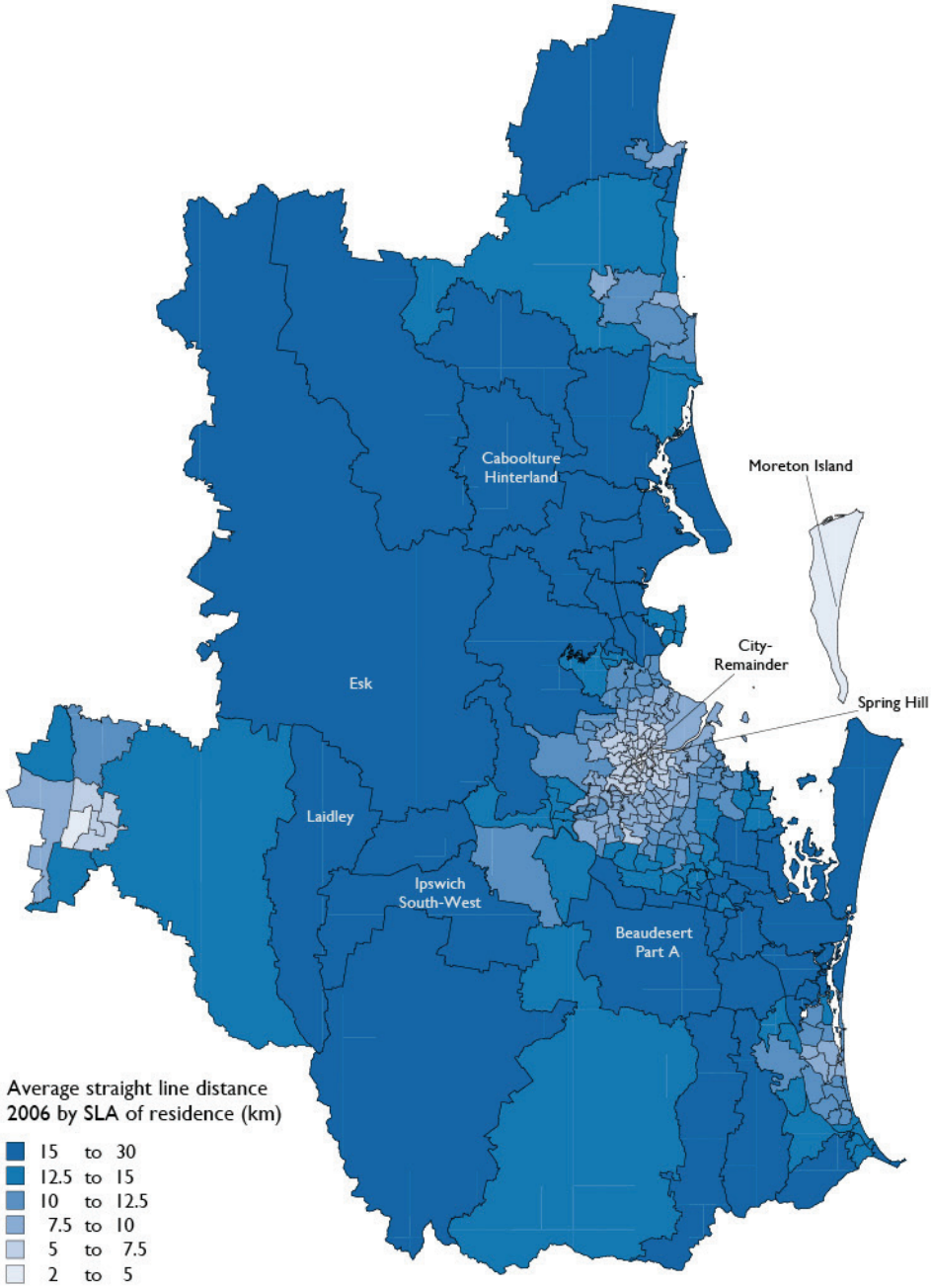
Sector/region/subregion	Place of residence (km)	Place of work (km)
Inner	5.4	13.4
Middle	9.1	12.7
Middle East	8.4	12.6
Middle North	8.6	13.1
Middle South	9.7	12.9
Middle West	9.8	11.8
Outer	14.8	11.0
Outer East	13.8	8.7
Outer North	15.7	10.7
Outer South	15.3	11.7
Outer West	12.9	12.1
Brisbane SD	11.3	12.4
Gold Coast	12.7	10.4
Sunshine Coast	13.2	9.8
Toowoomba	6.8	7.4
West Moreton	20.2	13.3
South East Queensland	11.7	11.7

Note: This is the average straight line distance between population and employment weighted centroids of SLAs.
Source: BITRE analysis of ABS *Census of Population and Housing* data for 2006.

The SLA data in Map C.1 shows a similar pattern to that shown in Map 7.5. The map shows a clear pattern of concentric rings within the Brisbane Statistical Division (SD), with the average commuting distance relatively low for inner city residents, but tending to rise with distance from the Central Business District (CBD). For example, residents of the City Inner SLA have an average straight line commuting distance of just 3.3km, compared to 22.4km for residents of the Ipswich South-West SLA in the Outer West subregion. Some town centre locations in the rest of SEQ also have relatively low commuting distances. For example, Toowoomba Central residents travel an average of 5.2km to work, Southport residents travel 8.1km and Nambour

residents travel 9.4km, on average. Commuting distances are highest for residents of peri-urban areas such as Esk (27.3km), Caboolture Hinterland (25.6) and Laidley (24.1km)

Map C.1 Straight line distance by Statistical Local Area of residence, South East Queensland, 2006

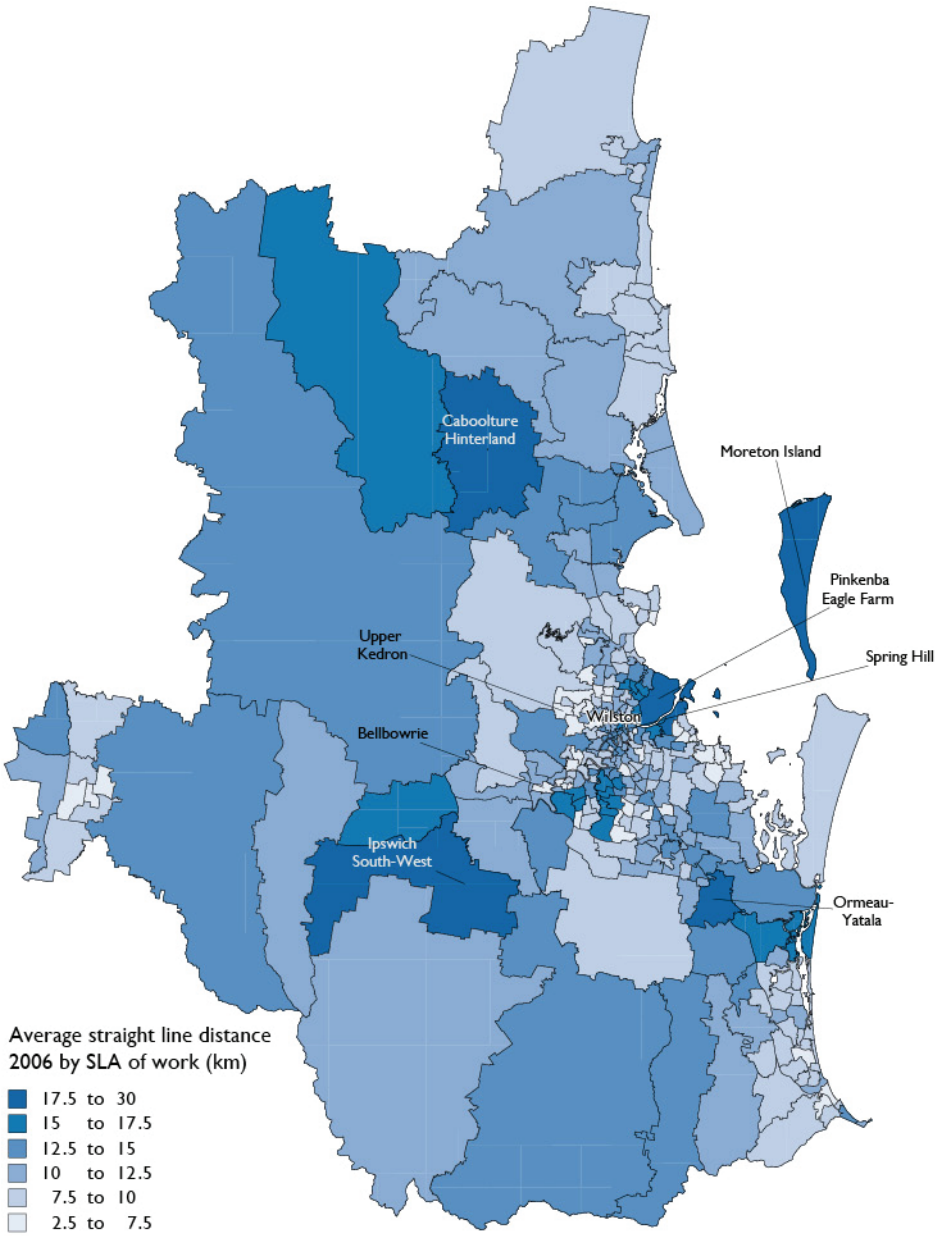


Note: This is the average straight line distance between population and employment weighted centroids of SLAs.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 data.

Map C.2 depicts the average commuting distance for each SLA of work. Unlike in Map C.1, this map does not show a clear pattern of concentric circles spanning out from the CBD. Similar to Map 7.6, it reveals many Inner sector SLAs have relatively high commuting distances, as does the area around Brisbane Airport in the Middle North and the area around Acacia Ridge in the Middle South. The Pinkenba-Eagle Farm SLA, which is home to Brisbane Airport, has the highest average commuting distance (19.9km) on a place of work basis.

Map C.2 Straight line distance by Statistical Local Area of work, South East Queensland, 2006



Note: This is the average straight line distance between population and employment weighted centroids of SLAs.

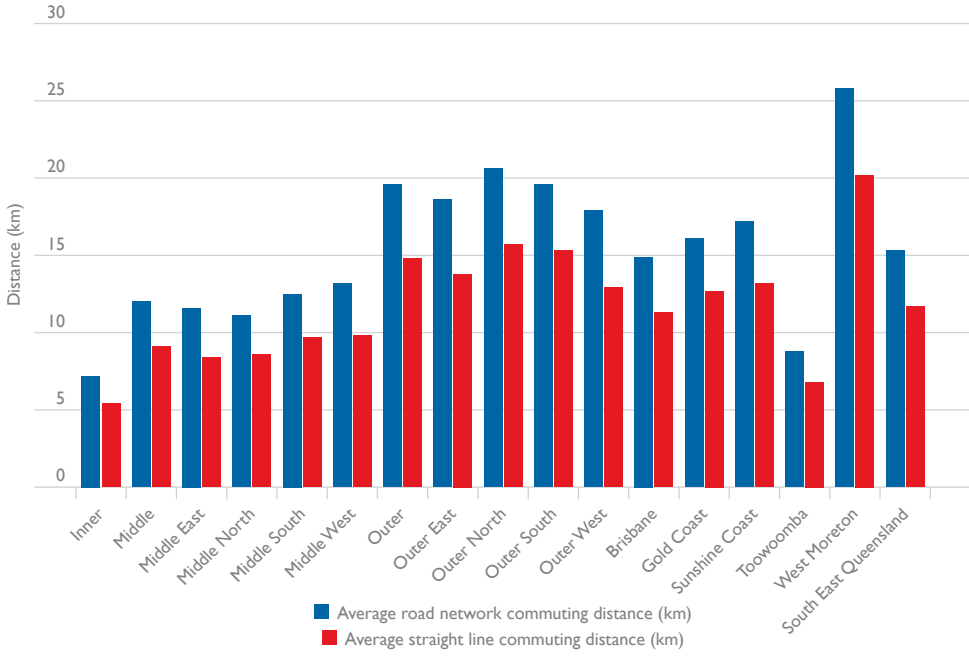
Source: BITRE analysis of ABS *Census of Population and Housing* 2006 data.

Comparison of straight line and road network distance estimates

Figure C.1 compares the straight line and road network based measures of average commuting distance for SEQ's regions, sectors and subregions on a place of residence basis. While the straight line distance estimates are systematically lower than the road network based estimates, the two sets of estimates show a very similar pattern of spatial variation.

At the SLA scale, the correlation coefficients between the straight line and road network distance estimates are 0.92 on a place of residence basis and 0.86 on a place of work basis. The rank correlation coefficients are 0.97 on a place of residence basis and 0.95 on a place of work basis. The two methods therefore compare favourably in that they present a very consistent picture of spatial variation in average commuting distances.

Figure C.1 **Relationship between straight line and road network based measures of average commuting distance in South East Queensland, 2006**



Note: The average commuting distances are calculated on a place of residence basis. This is the average straight line distance between population and employment weighted centroids of SLAs.

Source: BITRE analysis of ABS *Census of Population and Housing* 2006 data.

While the spatial analysis of commuting distances in Chapter 7 is based on the road network distance measure, the regression analysis presented in Chapter 8 is based on the straight line distance measure, which had slightly higher explanatory power in the gravity model regressions than did the road network measure. Appendix D presents an alternate set of regression results, based on the road network distance measure, rather than the straight line distance measure.

APPENDIX D

Gravity model regression results using road network distance measure

This appendix presents a set of gravity model regression results which differ from those presented in Chapter 8 due only to the use of a different measure of distance for each origin-destination pair.

Gravity model of origin-destination commuter flows

The results presented in Table 8.7 were based on the straight line distance between each origin-destination pair, as derived by BITRE. The results presented in Table D.1 below instead use a road network distance measure provided by the Queensland Department of Transport and Main Road from their SEQ Strategic Transport Multi-Modal Model for 2006. The results presented in Table D.1 are more directly comparable to those presented for Melbourne in BITRE (2011a) and Sydney in BITRE (2012a), which used a road network distance measure.

The gravity model regression has somewhat lower explanatory power when the road network distance measure is used (Table D.1) rather than the straight line distance measure (Table 8.6)—the difference is 0.5 percentage points for SEQ in 2006. The difference in explanatory power is a little more pronounced in the 2006 model than in the 2001 model. The coefficient on the road network distance variable lies in the –0.97 to –1.01 range (Table D.1), while the coefficient on the straight line distance variable lies in the –0.87 to –0.93 range (see Table 8.7).

The parameter estimates in Table D.1 did not change significantly between 2001 and 2006.

The road distance penalty estimates for SEQ and the Brisbane Statistical Division (SD) are of a consistently smaller magnitude than that estimated for Melbourne and Sydney (see BITRE 2011, 2012a). This may reflect higher levels of congestion in Melbourne and Sydney.

The model specification based on the road network distance measure proved to be less robust than the straight line distance specification, with greater sensitivity to changed treatment of outliers, inclusion of additional explanatory variables and use of alternate regression methods.

Table D.1 Estimation of base gravity model of origin-destination commuter flows using road network distance measure, South East Queensland, 2001 and 2006

	2001		2006	
	SEQ	Brisbane SD	SEQ	Brisbane SD
Sample	21 314	17 138	23 950	18 531
Adjusted R-squared (per cent)	58.7	61.8	62.7	64.8
Parameter estimates				
Constant	–7.21	–7.60	–7.21	–7.63
Log of number of employed residents in origin SLA	0.83	0.83	0.82	0.82
Log of number of jobs in destination SLA	0.73	0.75	0.73	0.76
Log of road network distance between origin and destination SLA	–1.01	–0.97	–1.01	–0.98
Robust t-value				
Constant	–65.5	–61.4	–74.3	–70.0
Log of number of employed residents in origin SLA	83.6	77.3	91.3	82.7
Log of number of jobs in destination SLA	109.1	101.9	128.3	123.6
Log of road network distance between origin and destination SLA	–131.5	–107.3	–149.8	–117.9

Note: The dependent variable is the log of the number of persons commuting from the origin SLA to the destination SLA in the given year.

Sources: Estimated by BITRE using SAS OLS estimation and robust standard errors. Based on ABS *Census of Population and Housing* data 2001 and 2006 commuting matrices and Queensland Department of Transport and Main Roads road distance measures derived from the South East Queensland Strategic Transport Multi-Modal Model (SEQSTM-MM) for 2006.

Table D.2 presents the results for the extended gravity model, using the road network distance measure. The extended gravity model regression has somewhat lower explanatory power when the road network distance measure is used (Table D.2) rather than the straight line distance measure (Table 8.8). The parameter estimates on the employed residents, jobs and distance variables are all quite robust to the inclusion of additional variables in the model.

The skills mismatch, direct rail connection and direct freeway connection variables are all highly significant and signed in accordance with expectations. The model estimates imply that:

- when an origin-destination pair has a large degree of skill mismatch, commuter flows are predicted to be significantly lower than if the supply and demand for skills is well aligned between the two SLAs
- the existence of a direct rail connection or freeway connection between an origin-destination pair has the effect of offsetting the distance penalty and boosting commuter flows between those locations.

Table D.2 Estimation of extended gravity model of origin-destination commuter flows using road network distance measure, Brisbane and South East Queensland, 2001 and 2006

	2001		2006	
	SEQ	Brisbane SD	SEQ	Brisbane SD
Sample	21 314	17 138	23 950	18 531
Adjusted R-squared (per cent)	61.7	64.3	65.3	67.1
Parameter estimates				
Constant	–7.04	–7.51	–6.95	–7.50
Log of number of employed residents in origin SLA	0.82	0.83	0.80	0.81
Log of number of jobs in destination SLA	0.75	0.76	0.75	0.77
Log of road distance between origin and destination SLA	–1.01	–0.95	–1.00	–0.96
Direct rail connection X Log of distance	0.12	0.15	0.10	0.13
Direct busway connection X Log of distance	–0.15	–0.10	–0.16	–0.12
Freeway connection X Log of distance	0.07	0.07	0.04	0.05
Skills mismatch index for origin-destination pair	–1.88	–1.46	–1.80	–1.46
Robust t-value				
Constant	–64.6	–61.1	–72.1	–69.1
Log of number of employed residents in origin SLA	83.8	77.7	90.5	82.9
Log of number of jobs in destination SLA	109.2	101.8	127.1	122.3
Log of road distance between origin and destination SLA	–131.6	–106.0	–147.6	–114.1
Direct rail connection X Log of distance	16.7	21.2	14.4	17.5
Direct busway connection X Log of distance	–4.2	–3.0	–4.1	–3.2
Freeway connection X Log of distance	14.2	11.9	9.8	9.1
Skills mismatch index for origin-destination pair	–35.3	–26.5	–39.4	–30.2

Note: The dependent variable is the log of the number of persons commuting from the origin SLA to the destination SLA in the given year. The skills mismatch index was calculated using slightly different categories for 2001 and 2006 so the parameter estimate is not directly comparable across the two models.

Sources: Estimated by BITRE using SAS OLS estimation and robust standard errors. Based on ABS *Census of Population and Housing* data 2001 and 2006 commuting matrices and qualifications data, and Queensland Department of Transport and Main Roads road distance measures derived from the South East Queensland Strategic Transport Multi-Modal Model (SEQSTM-MM) for 2006.

The direct busway connection variable is statistically significant in Table D.2 (but not Table 8.8). The variable is negatively signed implying that the existence of a direct busway connection between an origin-destination pair has the effect of increasing the distance penalty and reducing commuter flows between those locations. However, the parameter estimates for this variable proved to be very sensitive to minor changes in model specification, such as replacing the skills mismatch variable with an industry mismatch variable, and should be treated with caution. The results may also reflect the limited nature of the busway system in operation in 2001 and 2006, and so may not translate to the current busway network.

There was a statistically significant decline in the magnitude of the freeway parameter between 2001 and 2006, which matches the results from Table 8.8. All other parameter estimate changes were statistically insignificant at the 5 per cent probability level (although there was a significant decline in the magnitude of the Brisbane model's rail parameter at the 10 per cent probability level).

Model of growth in commuter flows from 2001 to 2006

Table D.3 presents the extended model of changes in origin-destination commuter flows from 2001 to 2006, using a road network distance measure in place of the straight line distance measure used in Table 8.11. The road network distance measure is marginally less significant than the straight line distance measure. However, the conclusion that more distant origin-destination pairs tended to experience lower growth in commuting flows between 2001 and 2006 remains unchanged. The remaining parameters are robust to this change in model specification.

Table D.3 Estimation of extended regression model of growth in origin-destination commuter flows from 2001 to 2006, South East Queensland and Brisbane

	SEQ	Brisbane SD
Sample	2810	2416
Adjusted R-squared (per cent)	54.3	50.9
Parameter estimates		
Constant	–0.107	–0.098
Growth rate of employed residents in origin SLA	0.802	0.832
Growth rate of jobs in destination SLA	0.801	0.754
Log of road network distance between origin and destination SLA in 2001	–0.007	–0.009
Skills mismatch index in 2001	0.022	0.042
Infrastructure investment between 2001 and 2006	0.033	0.032
Infrastructure investment completed before 2001 census	0.052	0.035
Robust t-value		
Constant	–11.0	–9.4
Growth rate of employed residents in origin SLA	22.1	20.6
Growth rate of jobs in destination SLA	23.8	20.0
Log of road network distance between origin and destination SLA in 2001	–2.0	–2.5
Skills mismatch index in 2001	0.6	1.1
Infrastructure investment between 2001 and 2006	2.0	1.8
Infrastructure investment completed before 2001 census	3.1	1.9

Note: The dependent variable is essentially the percentage change in the number of persons commuting from the origin SLA to the destination SLA between 2001 and 2006. Based on origin-destination pairs that have a commuter flow of at least 50 persons in both 2001 and 2006.

For the 2001 to 2006 period, the following major infrastructure investments were captured: the Port of Brisbane Motorway (stage one), the Inner City Bypass and the Inner Northern Busway (City to RCH Herston). The pre-2001 census infrastructure investment variable captures Airtrain, the South East Busway and the Pacific Motorway upgrade.

Sources: Estimated by BITRE using SAS OLS estimation and robust standard errors. Based on ABS *Census of Population and Housing* data 2001 and 2006 commuting matrices and qualifications data and BITRE-derived estimates of the straight line distance between SLAs.

APPENDIX E
List of Tables, Figures and Maps

Appendix E provides list of Tables, Figures and Maps which are included in the report.

List of Tables

List of Figures

List of Maps

Abbreviations and acronyms

ABS	Australian Bureau of Statistics
ACELG	Australian Centre for Excellence in Local Government
ANZSIC	Australian and New Zealand Standard Industry Classification
ASGC	Australian Standard Geographical Classification
BITRE	Bureau of Infrastructure, Transport and Regional Economics
Cat.	Catalogue
CBD	Central Business District
CCD	Census Collection District
CD	Collection District
CDATA	ABS Census data analytical software
COAG	Council of Australian Governments
COMSEQ	Council of Mayors South East Queensland
DHA	Australian Government Department of Health and Ageing
DSDIP	Queensland Department of State Development, Infrastructure and Planning
DTMR	Queensland Department of Transport and Main Roads
DZ	Destination Zone
e.g.	Latin, short for exempli gratia, meaning 'for example'
ERP	Estimated Resident Population
et al.	Latin, short for et alia, meaning 'and others'
EUA	Existing Urban Area
FaHCSIA	Australian Government Department of Families, Housing, Community Services and Indigenous Affairs
GPO	General Post Office
HILDA	Household Income and Labour Dynamics in Australia
HTS	Household Travel Survey
i.e.	Latin, short for id est, meaning 'that is'
ibid.	Latin, short for ibidem, meaning 'in the same place'
ICB	Inner City Bypass
IPA	Integrated Planning Act

Km	Kilometre
Km/hour	Kilometre per hour
Km^2	Square kilometre
LFS	Labour Force Survey
LGA	Local Government Area
LNP	Liberal National Party
MDAC	Modelling Data and Analysis Centre (of DTMR)
MIAESR	Melbourne Institute of Applied Economic and Social Research
NATSEM	National Centre for Social and Economic Modelling
NIEIR	National Institute of Economic and Industry Research
No.	Number
NORSROC	Northern Sub-regional Organisation of Councils
NSW	New South Wales
O-D	Origin-Destination
OESR	Office of Economic and Statistical Research
OLS	Ordinary Least Squares
OUM	Office of Urban Management
PC	Productivity Commission
RCC	Regional Coordination Committee
RFGM	Regional Framework for Growth Management
RPAG	Regional Planning Advisory Group
RPC	Regional Planning Committee
SD	Statistical Division
SEQ	South East Queensland
SEQIPP	South East Queensland Infrastructure Plan and Program
SEQROC	South East Queensland Regional Organisation of Councils
SEQSTM-MM	South East Queensland Strategic Transport Multi-Modal Model
SLA	Statistical Local Area
SouthROC	Southern Regional Organisation of Councils
SPA	Sustainable Planning Act
SPOLAA	Sustainable Planning and Other Legislation Amendment Act
SSD	Statistical Subdivision
TOD	Transit Oriented Development
ULDA	Urban Land Development Authority
WESROC	Western Sub-regional Organisation of Councils

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