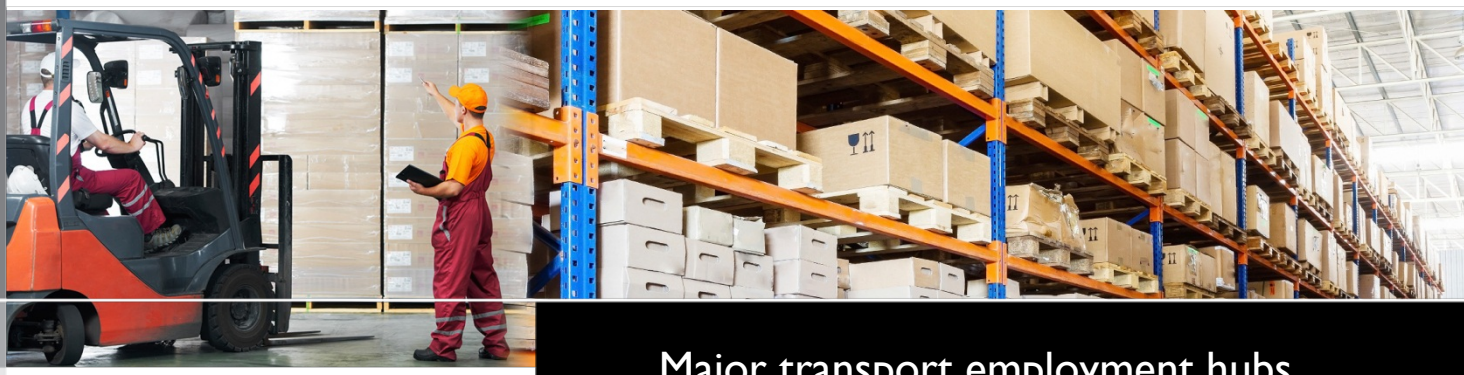
Australian Government
Department of Infrastructure and Regional Development
Bureau of Infrastructure, Transport and Regional Economics



Major transport employment hubs

At a glance

- The Transport, postal and warehousing (TPW) industry is a significant contributor to the national economy, responsible for 5.1 per cent of value added and 582 400 employed persons. TPW contributes a relatively large share of economic activity in Queensland and Tasmania.
- TPW jobs are concentrated in Australia's main population centres and ports. The Significant Urban Areas with the most TPW jobs in 2011 were Sydney (91 489 jobs), Melbourne (79 324), Brisbane (50 371), Perth (31 422), Adelaide (20 265), Newcastle-Maitland (7 269) and Gold Coast-Tweed Heads (6 696). The cities with the highest proportion of TPW jobs were Gladstone-Tannum Sands, Port Hedland, Devonport and Broome, where the TPW industry represented 8–9 per cent of total jobs in each city.
- This study uses Australian Bureau of Statistics (ABS) *Census of Population and Housing* data to identify the 33 largest spatial concentrations of TPW employment within Australia. These major transport employment hubs include airports, ports, industrial areas and Central Business Districts (CBDs). All 33 hubs are located in one of the five major capital cities—Sydney has the most representation with ten hubs, followed by Melbourne with nine, Brisbane with eight, and three each in Perth and Adelaide. The three hubs with the most TPW jobs are Sydney Airport-Mascot (16 617), Altona North-Laverton North-Sunshine West-Derrimut in Melbourne's west (8 514), and Melbourne Airport (8 205).
- The industry mix of the major transport employment hubs provides a useful guide to the different functions they serve. The TPW industry contributes just 3 per cent of jobs in the CBDs, but plays a much more significant role for airports (54 per cent), ports (34 per cent) and 'other' hubs (17 per cent).
- This study focuses on the 'other' hubs—these are predominantly industrial areas that serve important freight and logistics functions. The main industries in these hubs are TPW, Manufacturing, Wholesale trade and Retail trade, which all play an important role in the supply chain involved in moving goods from producer to consumer. The TPW, Manufacturing and Wholesale trade industries, and the distribution centres of major retailers, tend to co-locate, forming logistics hubs in key industrial areas within Australia's major cities. The TPW jobs in these hubs mainly relate to Road freight transport (44 per cent).
- The 19 transport employment hubs based on industrial areas have a largely male workforce (72 per cent) and a very high proportion of full-time workers (85 per cent). Relatively few workers have bachelor degree or higher qualifications (17 per cent), while a high proportion have certificate level III or IV qualifications (23 per cent) or no recognised post-school qualification (48 per cent). People employed full-time in these hubs earn slightly (4 per cent) less than the national average weekly full-time income.
- Between 2006 and 2011, the airports had relatively rapid job growth (22.3 per cent), as did the CBDs (14.7 per cent). The industrial area hubs recorded more modest job growth of 6.6 per cent, compared to national job growth of 10.5 per cent. Melbourne CBD-Southbank-Docklands recorded the largest increase in employment amongst the major transport employment hubs, adding 49 300 jobs. Amongst the industrial areas, substantial job gains occurred in Altona North-Laverton North-Sunshine West-Derrimut (4700 jobs added) and Western Sydney Employment Area-Minchinbury (4200), while Wetherill Park-Smithfield-Yennora recorded significant job losses (–3200).

Introduction

This Information Sheet identifies the largest spatial concentrations of transport industry employment within Australia. The 33 largest transport employment hubs are identified, with each containing at least 1500 jobs in the Transport, postal and warehousing (TPW) industry. The major transport employment hubs include airports, ports, freight and logistics hubs, large industrial areas and Central Business Districts (CBDs).

The Transport, postal and warehousing industry is a significant contributor to the national economy, accounting for 5.1 per cent (or $72.9 billion) of value added in 2012–13 (ABS 2013a) and employing 582 400 persons as of August 2013 (ABS 2013b). This Information Sheet outlines the economic significance of the industry to Australia and its states and territories, and the contribution the industry makes to employment in Australia's cities and regions. It also identifies the most significant small area spatial concentrations of transport employment within Australia, and addresses the following research questions:

- What are the key types of transport employment hub?
- What is the mix between transport and other industries in these hubs?
- What are the characteristics of workers in these transport hubs (e.g. gender, age, employment status, education, occupation, income)?
- What are the trends with respect to growth or decline in employment from 2006 to 2011?

This Information Sheet is part of a set of three BITRE studies which profile employment in and around significant transport infrastructure sites—airports, ports and transport hubs. BITRE Information Sheet 46 examined employment at major Australian airports, while BITRE Information Sheet 56 examined employment located at major Australian ports (BITRE 2013, 2014a).[1] The current study focuses on other spatial concentrations of transport employment, particularly the major freight and logistics hubs. Identification of the major freight hubs within our cities will be valuable for informing infrastructure planning. The study will also improve understanding of the nature of jobs located within these transport employment hubs, and provide insight into the processes of transition that are currently underway.

Data sources

The key data source for this study is the ABS *Census of Population and Housing* for 2011 and 2006. Census employment data provides a count of the total number of employed persons in the relevant geographical area, irrespective of whether they are working on a full-time or part-time basis.

The industry disaggregation of employment is based on the Australian and New Zealand Standard Industrial Classification (ANZSIC) 2006 (ABS 2006a), and the analysis focuses on industry division I—Transport, postal and warehousing. The focus on employment in the TPW industry means that people whose job involves transport-related duties are excluded if they work for a business that is classified to a different industry. Such ancillary transport activity could be particularly significant for businesses operating in the Manufacturing, Construction, Wholesale trade and Mining industries, which each incurred $9–15 billion of transport-related expenses in 2010–11 (ABS 2012a). BITRE (2014b) discusses this issue in greater detail.

The relevant census data is available on a place of work basis and a place of usual residence basis. Place of usual residence data provides more complete coverage of employed persons, because 2.5 per cent of employed usual residents do not respond to the place of work question, 3.8 per cent report no fixed place of work, and 5.8 per cent of responses could not be coded to a Statistical Area Level 2 (SA2) of work (ABS 2012b).[2,3] To maximise coverage of employed persons, the national totals and the analysis of regional summary classifications and capital cities is based on place of usual residence data.[4] However, since the main purpose is to identify the small area locations in which TPW jobs are concentrated, this study largely relies on census place of work data.

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[1] Both studies also explored the relationship between on-site employment and relevant activity measures—see Box 2 for further discussion.

[2] People employed in TPW have a higher incidence of no fixed place of work responses (5.2 per cent) and a higher incidence of undefined location responses (8.7 per cent). Compared to many other industries, TPW employment is inherently difficult to tie down to a small area location, reflecting the mobile nature of many transport jobs (e.g. truck drivers, taxi drivers).

[3] SA2s are a small area geographic unit and key building block within the ABS' Australian Statistical Geography Standard (ASGS). There are 2196 SA2s in Australia, and SA2s typically have a population of between 3 000 and 25 000 (ABS 2010).

[4] The analysis of place of usual residence data was restricted to relatively aggregated geographies which are largely self-contained (i.e. a high proportion of employed usual residents have a place of work within their home city/region).

Counts of employed persons from the ABS census are consistently lower than counts from the ABS *Labour Force Survey*, which provides Australia's official measure of employment.[5] Therefore, the census data presented in this Information Sheet will provide a conservative estimate of employment, which is comparable across Australia's cities and regions.

Other data sources used in this study include the ABS' *Australian System of National Accounts* (ABS 2013a), *State Accounts* (ABS 2013c) and *Labour Force Survey* (ABS 2013b),

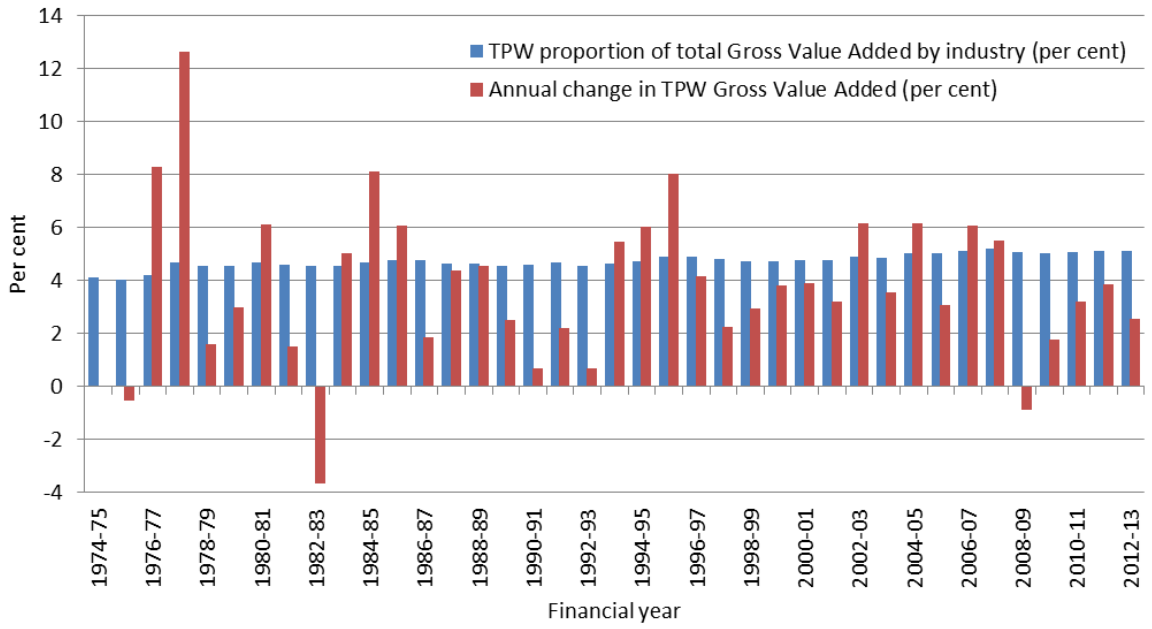
Economic significance of the Transport, postal and warehousing industry

National economic contribution

The TPW industry contributed 5.1 per cent of total industry Gross Value Added (GVA) in 2012–13, up from 4.1 per cent in 1974–75. The national economic contribution of the TPW industry rose significantly in the late 1970s (see Figure 1), and then gradually trended upwards, exceeding 5.0 per cent in every year since 2004–05.

Between 1974–75 and 2012–13, the GVA of the TPW industry grew at an average rate of 3.8 per cent per annum, outpacing growth in total GVA of 3.2 per cent per annum. The TPW industry also recorded above-average GVA growth in the most recent decade, averaging 3.5 per cent growth from 2002–03 to 2012–13, compared to total GVA growth of 3.1 per cent per annum. There was a notable decline in TPW GVA between 2007–08 and 2008–09, reflecting the impact of the Global Financial Crisis (GFC).

Figure 1 Gross Value Added of the Transport, postal and warehousing industry, Australia, 1974–75 to 2012–13



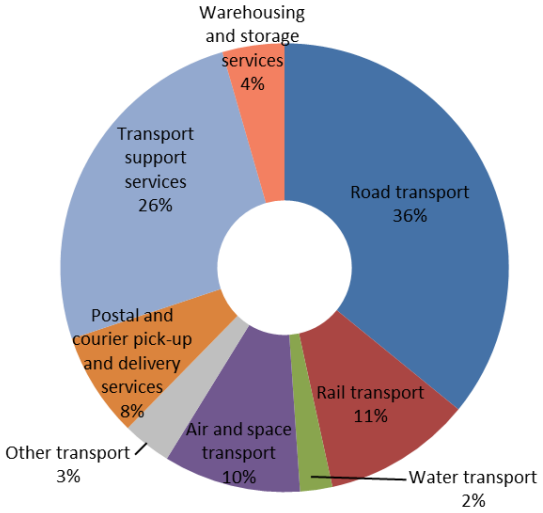
Note: GVA measured on a chain volume basis.
Source: BITRE analysis of ABS (2013a).

The TPW industry contains eight sub-industries, and Figure 2 shows their relative economic significance. The Road transport industry contributes the largest share of TPW Industry Value Added or IVA (36 per cent in 2012–13), followed by Transport support services (26 per cent), Rail transport (11 per cent), Air and space transport (10 per cent) and Postal and courier pick-up and delivery services (8 per cent).[6] Between 2007–08 and 2012–13, the Road transport industry was responsible for 33 per cent of growth in TPW IVA, while

[5] According to the 2011 census, there were 10.058 million employed persons in Australia, which is 11 per cent lower than the *Labour Force Survey* estimate of 11.344 million for August 2011. ABS (2012c) outlines the methodology and scope differences between the two collections.
[6] ABS (2006a) provides details of the activities that are classified to each of these sub-industries.

Transport support services (27 per cent) and Rail transport (18 per cent) also made an important contribution to the industry's recent economic growth (ABS 2014).

Figure 2 Contribution to Transport, postal and warehousing Industry Value Added of sub-industries, Australia, 2012–13

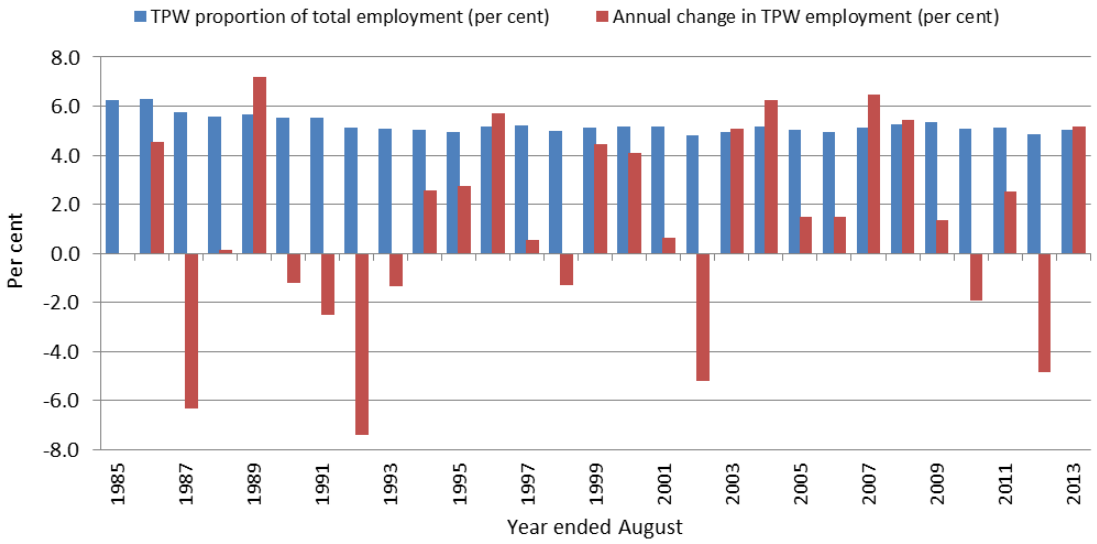


Note: IVA is related to, but different from, the national accounting variable, GVA, which adjusts IVA to include general government units and to account for some other effects.
Source: BITRE analysis of ABS (2014).

According to the ABS *Labour Force Survey*, the TPW industry employed 582 400 persons in the August quarter of 2013, up from 417 200 in the August quarter of 1985. As TPW averaged 1.2 per cent annual growth in employment between 1985 and 2013, compared to all-industry growth of 2.0 per cent, TPW's share of national employment fell from 6.2 to 5.0 per cent. Figure 3 shows that this decline was concentrated between 1985 and 1992, and since then TPW's share has been relatively stable, fluctuating around the 5 per cent mark. Reduced employment in the Rail transport sub-industry, associated with privatisation of government railways, was the key driver of the decline in the TPW job share from 1985 to 1992.

TPW employment did grow strongly from 463 800 persons in the August quarter of 2000 to reach 571 000 persons in the August quarter of 2008, reflecting an average annual growth rate of 2.6 per cent. However, the years following the GFC have been mixed, with a modest net increase of 11 300 TPW employed persons over the last five years.

Figure 3 Employment in Transport, postal and warehousing industry, Australia, 1985 to 2013



Source: BITRE analysis of ABS (2013b).

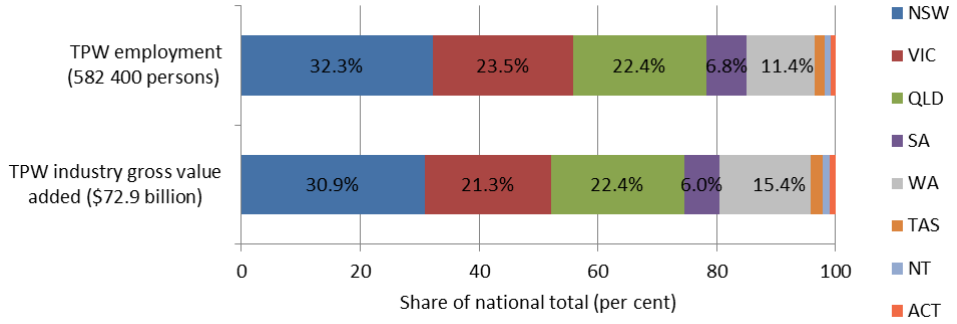
As of August 2013, 80 per cent of TPW employees worked full-time, compared to 70 per cent across all industries. The proportion of full-time TPW employees trended downwards from 91 per cent in 1985 to reach 80 per cent in 2004, and has fluctuated around 80 per cent since then. BITRE (2014b) provides further detail on the characteristics of people employed in Australia's TPW industry—including hours worked, gender, age, skills, income and commuting behaviour— based on 2011 census data.

Productivity is the efficiency of transforming these labour inputs and capital inputs into outputs (goods and services). Multi-factor productivity growth for TPW has slowed since 2002–03. The main reason for this slowing appears to be capital deepening that is associated with large, sustained increases in private gross capital formation (BITRE 2014c).

State and Territory economic contribution

Figure 4 shows the distribution of TPW employment and GVA across the states and territories. New South Wales (NSW) has the largest proportion of TPW GVA and employment, while Victoria ranks second for employment and Queensland ranks second for GVA. NSW and Victoria have a larger proportion of TPW employment than GVA, whereas Western Australia has a smaller proportion of employment than GVA.

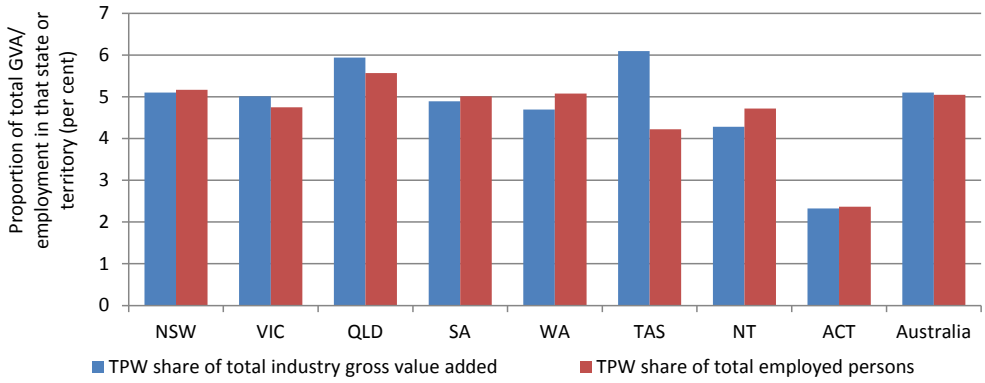
Figure 4 State and territory contributions to Transport, postal and warehousing Gross Value Added and employment, 2013



Note: GVA measured on a chain volume basis and relates to 2012–13 financial year. Employment data relates to August quarter of 2013.
Source: BITRE analysis of ABS (2013b,c).

While the TPW industry contributes 5.1 per cent of national GVA and 5.0 per cent of national employment, there is some variation in its relative economic significance across the different states and territories (see Figure 5). TPW makes a particularly significant contribution to the Queensland economy (with 5.9 per cent of GVA and 5.6 per cent of employment) and to Tasmanian GVA (6.1 per cent). TPW makes a relatively minor contribution to the Australian Capital Territory (ACT) economy, with 2.3 per cent of GVA and 2.4 per cent of employment.

Figure 5 Relative economic significance of Transport, postal and warehousing industry in each State and Territory, 2013



Note: GVA measured on a chain volume basis and relates to 2012–13 financial year. Employment data relates to August quarter of 2013.
Source: BITRE analysis of ABS (2013b,c).

Where are Transport, postal and warehousing jobs concentrated within Australia?

This section uses employment data from the ABS *Census of Population and Housing* to identify the broad types of region, and the individual cities and regions, in which TPW employment is concentrated. The 2011 census identified 479 181 Australians employed in the TPW industry, of which 412 942 had a known and fixed place of work. The census-based employment share of the TPW industry was 4.9 per cent nationally in 2011.

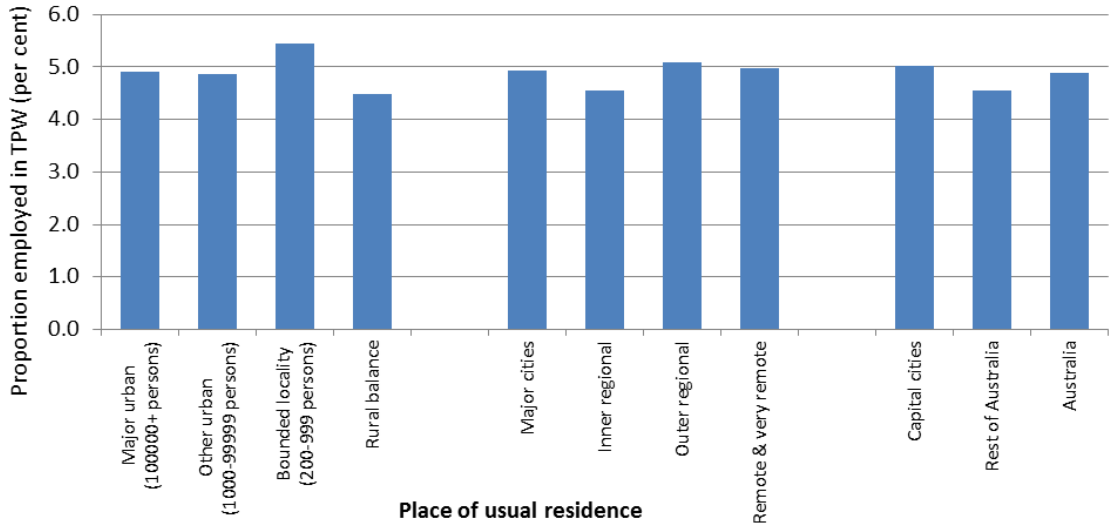
Region type

The proportion of employed residents who work in the TPW industry is reasonably stable across the different types of region that are compared in Figure 6. For example, while Inner regional locations have a below-average share of employed residents working in the TPW industry, there is limited variation in the TPW industry's employment share across the remaining remoteness classes.

Based on the ABS' Section of State classification (ABS 2012e), settlements containing between 200 and 999 persons stand out as having a relatively high share of TPW employment, whereas the rural balance has a relatively low share. The relatively strong presence of TPW employment in small towns reflects a high proportion of employed residents working in the Road transport sub-industry.

In 2011, 70 per cent of people employed in TPW lived in Australia's capital cities. The proportion employed in TPW is a little higher for the capital cities than it is for the rest of Australia (5.0 versus 4.5 per cent). However, the mix of TPW employment differs considerably. The Road transport sub-industry is less prominent in the capital cities than in the rest of Australia (45 versus 56 per cent of TPW employment), while the Air and space transport and Transport support services sub-industries are rather more prominent in the capital cities.

Figure 6 Proportion employed in Transport, postal and warehousing by type of region, 2011



Note: Region type classifications based on ABS' ASGS Section of State classification, Remoteness Structure and Greater Capital City Statistical Areas (ABS 2010, 2012e, 2013d). Proportion employed was calculated after excluding industry not stated and inadequately described from denominator. Analysis based on place of usual residence data.

Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

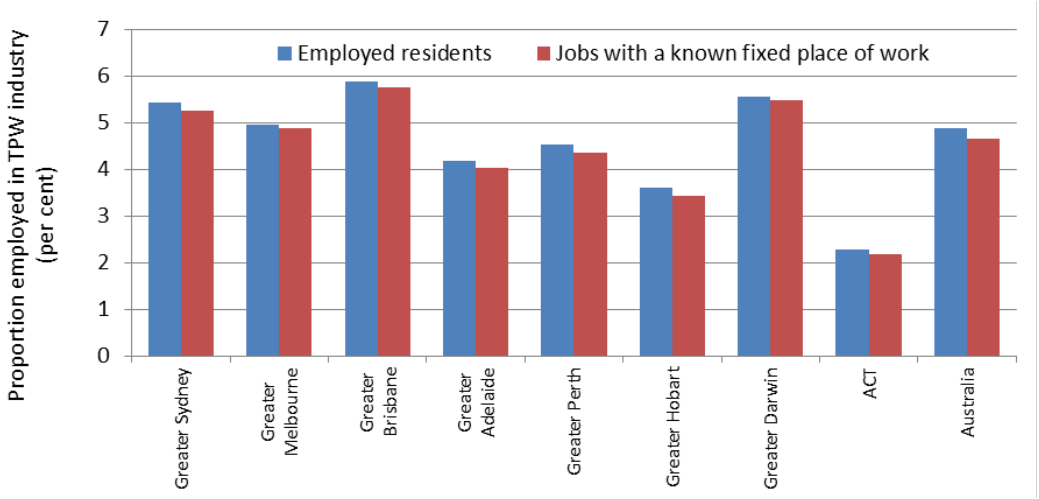
Cities

Of the 479 181 Australians employed in the TPW industry, 109 362 (or 22.8 per cent) live in Greater Sydney, while the other principal cities of residence are Greater Melbourne (19.5 per cent), Greater Brisbane (12.1 per cent), Greater Perth (7.9 per cent) and Greater Adelaide (4.9 per cent).

Figure 7 shows that Greater Brisbane has the highest proportion of its resident workforce employed in TPW (5.9 per cent), followed by Greater Darwin (5.6 per cent) and Greater Sydney (5.4 per cent) The ACT has a much lower proportion (2.3 per cent) employed in TPW than the other Greater Capital City Statistical

Areas, while Greater Hobart (3.6 per cent) and Greater Adelaide (4.2 per cent) also have a relatively low proportion employed in TPW.

Figure 7 Proportion employed in Transport, postal and warehousing industry by Greater Capital City Statistical Area, 2011



Note: Proportion employed was calculated after excluding industry not stated and inadequately described from denominator. Jobs with a known fixed place of work excludes no fixed address, migratory-offshore-shipping and state/territory undefined responses.

Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

The place of usual residence and place of work data in Figure 7 display a broadly similar pattern. However, the TPW industry consistently accounts for a greater share of employed residents than of jobs. This reflects the above-average proportion of TPW employees who did not report an identifiable and fixed place of work address in the census (16 per cent versus 12 per cent of all employed residents). The analysis in the remainder of this Information Sheet is based on place of work data, and specifically on the 412 942 census respondents who were employed in the TPW industry and had a known and fixed place of work.[7]

The ABS has defined a set of 101 Significant Urban Areas (SUAs) which can be used to assess how the economic significance of the TPW industry varies across Australian cities and identify the cities which contain a large number of TPW jobs. SUAs are defined for all concentrations of urban development with a population over 10 000, and can represent a single urban centre or a cluster of urban centres. There can be several SUAs defined within a single Greater Capital City Statistical Area (ABS 2012d).[8]

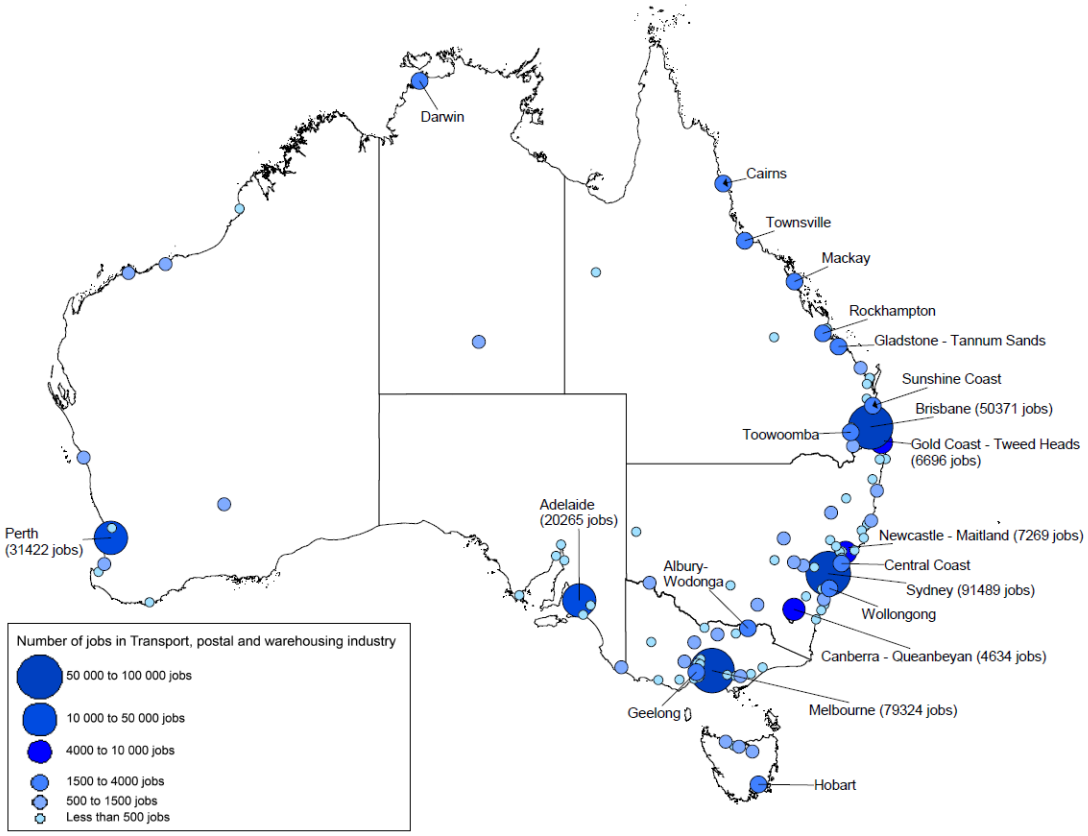
Figure 8 shows that TPW jobs are concentrated in Australia's main population centres and ports, particularly along the eastern seaboard. The SUAs with the most TPW jobs with a fixed place of work within the SUA boundary were Sydney (91 489 jobs), Melbourne (79 324), Brisbane (50 371), Perth (31 422), Adelaide (20 265), Newcastle-Maitland (7 269) and Gold Coast-Tweed Heads (6 696).

Some SUAs are highly specialised in the TPW industry. Figure 9 identifies the SUAs where the TPW industry contributed a particularly high or low share of total jobs in 2011. The Queensland city of Gladstone-Tannum Sands has the highest representation of the TPW industry—there were 1666 TPW jobs, representing 9.0 per cent of jobs with a fixed place of work in that SUA. Other cities and towns with a relatively strong TPW presence (of over 6.0 per cent) include the Western Australian SUAs of Port Hedland, Broome, Karratha, Geraldton and Kalgoorlie-Boulder; the Queensland SUAs of Warwick, Rockhampton and Cairns; Devonport in Tasmania; and Parkes in NSW. Of the capitals, only Brisbane features as having a particularly high proportion of TPW jobs. The Victorian town of Torquay has the lowest TPW representation in 2011 (with just 1.1 per cent of jobs in the TPW industry), followed by Armidale in NSW and Canberra-Queanbeyan.

The 101 SUAs together account for 87 per cent of all TPW jobs with a known and fixed place of work in Australia. The remaining 13 per cent of TPW jobs are located in a mix of smaller towns, rural and remote locations.

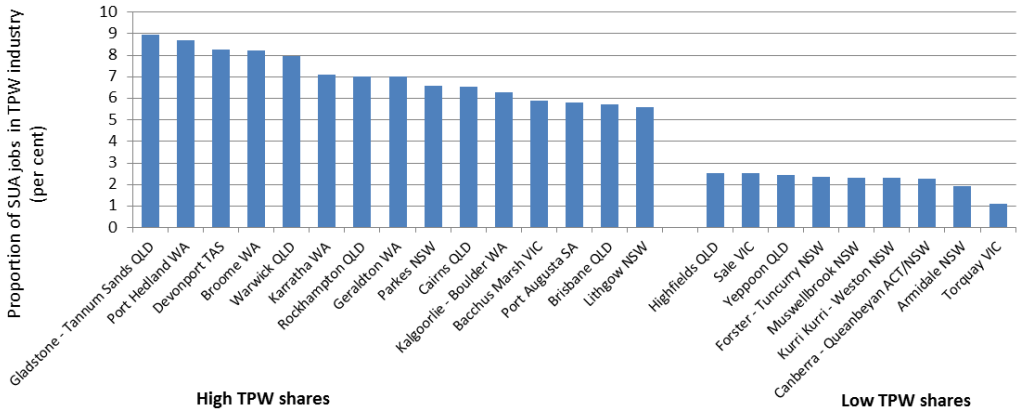
[7] Excludes no fixed address, migratory-offshore-shipping and state/territory undefined responses.
[8] SUAs do not always have high employment self-containment—hence the switch from place of usual residence to place of work data.

Figure 8 Number of Transport, postal and warehousing jobs by Significant Urban Area, 2011



Note: Based on jobs with a known and fixed place of work within the relevant SUA. All SUAs with more than 1500 TPW jobs are labelled with the SUA name, while all SUAs with more than 4000 TPW jobs are labelled with the SUA name and TPW job count.
Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

Figure 9 Proportion employed in Transport, postal and warehousing industry for selected Significant Urban Areas, 2011



Note: Based on jobs with a known fixed place of work within the relevant SUA. SUAs with a TPW share between 2.6 and 5.5 per cent are not shown in the chart. Proportion employed was calculated after excluding industry not stated and inadequately described.
Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

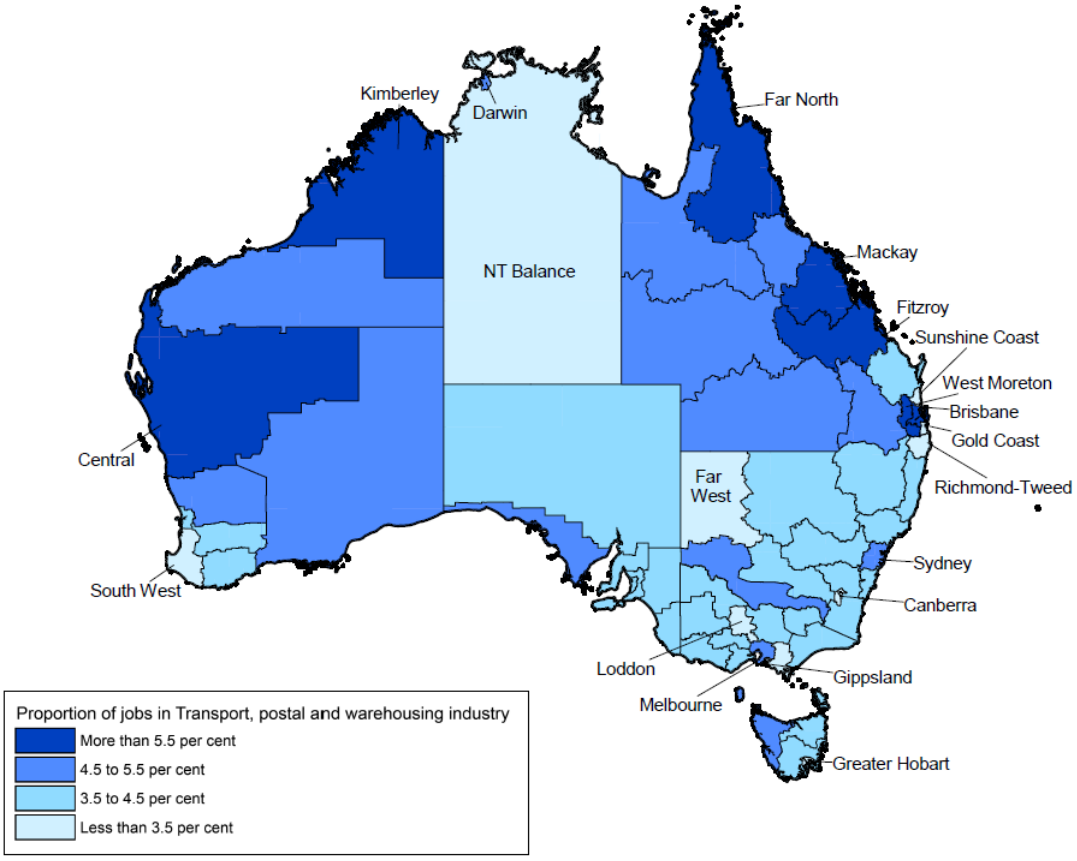
Sub-state regions

Figure 10 summarises how TPW jobs are distributed across Australia's regions, using the Statistical Division (SD) classification (ABS 2006b).[9] The SDs with the highest proportion of TPW jobs were all located in Queensland and Western Australia, with Mackay (6.1 per cent), Fitzroy (5.8 per cent) and Brisbane (5.8 per

[9] Data for ASGS Statistical Area Level 4 (SA4) boundaries was also analysed. However, the SD data was better suited to the purpose of highlighting variation across non-metropolitan areas.

cent) having a particularly high TPW representation. Apart from Mackay and the two ACT-based SDs, all of the SDs had a TPW share in the 3 to 6 per cent range.

Figure 10 Proportion employed in Transport, postal and warehousing industry by Statistical Division, 2011



Note: Based on jobs with a known and fixed place of work within the relevant SD, defined based on ABS (2006b). Proportion employed was calculated after excluding industry not stated and inadequately described from denominator.
Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

Identifying the major transport employment hubs

Methodology

Identification of the major transport employment hubs was data-driven, in that census data was used to identify the small area locations which have the most employment in the TPW industry. The boundaries of the ports and airports reflect the boundaries used in the previous Information Sheets in this series (BITRE 2013, 2014a). Spatial analysis of place of work counts at the SA2[10] and Destination Zone (DZ)[11] scales was then used to identify additional geographic clusters of TPW employment and develop customised boundaries for each of these transport employment hubs.

The requirements were that these additional clusters be formed from adjoining DZs/SA2s that contained more than 1500 TPW jobs[12] in aggregate and met a minimum job density threshold of at least 100 TPW jobs per square kilometre.[13] The density threshold ensured the TPW jobs were concentrated within a reasonably

[10] The ABS defined SA2s based on population criteria, and (apart from in the CBDs) they generally do not provide a useful basis for defining small area concentrations of TPW jobs. Key transport infrastructure sites (e.g. ports) and industrial areas are often spread across several SA2s. Where an infrastructure site or industrial area is confined to a single SA2, the SA2 will often include neighbouring residential areas with a significant population base.
[11] DZs are defined by the states and territories and represent the smallest scale geography at which employment data is available from the census. DZ boundaries for 2011 are available from the ABS website (ABS 2012d).
[12] The preliminary analysis identified 46 clusters containing more than 1000 TPW jobs. Further refinement led to a cutoff of 1500 TPW jobs as the basis for the analysis presented in this Information Sheet.
[13] Note that the definitions of the boundaries of the ports and airports, as detailed in BITRE (2013, 2014a), did not involve a density threshold.

compact geographic area, and was set at a relatively low level so that most established industrial areas would potentially be within scope. In forming these clusters, it was desirable that the contributing DZs were broadly similar in terms of land use, industry mix and key transport functions.

For clusters of TPW jobs within industrial (or commercial) precincts, the approach was to capture the whole of the industrial (or commercial) area, and to group together neighbouring areas which served a similar transport function, were well connected by road, and separated by less than 500 metres of parkland or residential area. For example, the Wetherill Park, Smithfield and Yennora industrial areas in Sydney were combined to form a single contiguous transport employment hub (consisting of 11 DZs).

For the CBD-based employment hubs, the starting point was the relevant SA2 boundary (e.g. the Sydney-Haymarket-The Rocks SA2 for the Sydney CBD). Where adjoining DZs contained a significant number of TPW jobs and were functionally similar to the CBD then the boundary of the CBD-based hub was extended to include these additional DZs. For example, parts of the Southbank and Docklands SA2s were included within the customised Melbourne CBD-based hub, while parts of the Spring Hill SA2 were included within the customised Brisbane CBD-based hub.

Appendix A details the DZs that form each of the 33 major transport employment hubs. Census data has been used to build a profile of jobs located within the boundaries of each of these hubs. The study examines the composition of all jobs located within these hubs, not just jobs in the TPW industry.

Results

Table 1 identifies 33 small area concentrations of TPW industry employment within Australia, each involving at least 1500 TPW jobs. The 33 transport employment hubs together account for 32 per cent of all TPW jobs in Australia and 15 per cent of total national employment. Sydney Airport-Mascot is the largest TPW job hub in Australia, containing 16 617 TPW jobs and a total of 28 821 jobs across all industries. Five of the transport employment hubs in Table 1 contain between 7200 and 8600 TPW jobs. These are Altona North-Laverton North-Sunshine West-Derrimut (in Melbourne's western suburbs), Melbourne Airport, Melbourne CBD-Southbank-Docklands, the Sydney CBD and the Brisbane Airport. There are a further three hubs that contain more than 5000 TPW jobs—Welshpool-Kewdale-Forrestfield in Perth, Brisbane CBD-Spring Hill and the Perth Airport.

Figure 11 maps the locations of these transport employment hubs, all 33 of which are located in one of the five major capital cities. Sydney has the highest representation with ten hubs identified, followed by Melbourne with nine, Brisbane with eight, and three each in Perth and Adelaide. If the threshold is relaxed to 1000 TPW jobs, several additional cities are found to have significant TPW job concentrations, namely Newcastle (Newcastle Port; Sandgate-Warrabrook-Mayfield-Tighes Hill), Cairns (Portsmith-Bungalow) and Hobart (Moonah-Derwent Park-Lutana).[14]

Five of the transport employment hubs in Table 1 are capital city airports, while three are capital city ports.[15] There are also five hubs focused on capital city CBDs. The remaining 20 small area concentrations of TPW employment (labelled 'other' in Table 1) largely relate to suburban industrial areas within our major cities. The inner Brisbane location of Bowen Hills is an exception in that employment is largely office-based (including the Virgin Australia headquarters).

Airports tend to have a very high proportion of total employment in the TPW industry (43–59 per cent). For Sydney and Brisbane, the airport represents the largest TPW job concentration in the city, while for Melbourne, Perth and Adelaide it is the second largest TPW job concentration. The port-based hubs are smaller, containing between 2000 and 2400 TPW jobs in each of Sydney, Melbourne and Brisbane. The ports also have a relatively strong concentration of TPW jobs, which represent between 25 and 54 per cent of total jobs in the port precinct. While the CBDs contain a very large number of TPW jobs, only a very small fraction of their total employment is due to the TPW industry (between 1 and 5 per cent).

The principal focus of this study is the 'other' transport employment hubs (i.e. those that are not airports, ports or CBDs). The standout is the physically large and TPW-oriented industrial area of Altona North-

[14] If SA2s are instead used to identify small area concentrations of TPW jobs, the top-ranked SA2s outside of the five major capital cities are Westcourt-Bungalow in Cairns and Newcastle Port-Kooragang, which are ranked 50th and 51st, respectively, in terms of TPW jobs.
[15] BITRE (2013) profiles employment at these airports, while BITRE (2014a) profiles employment at these ports.

Laverton North-Sunshine West-Derrimut, which is located in Melbourne's western suburbs. It contains about 8500 TPW jobs, with 26 per cent of all jobs being in the TPW industry.

Some of the 'other' transport employment hubs are heavily transport-oriented, with TPW accounting for over a third of all jobs (e.g. Larapinta-Heathwood-Parkinson, West Melbourne (Dynon)). However, some have a relatively modest TPW job share, with the TPW industry accounting for only 9–11 per cent of total jobs in each of Dandenong South-Hallam, Murarrie-Hemmant and Somerton-Campbellfield.

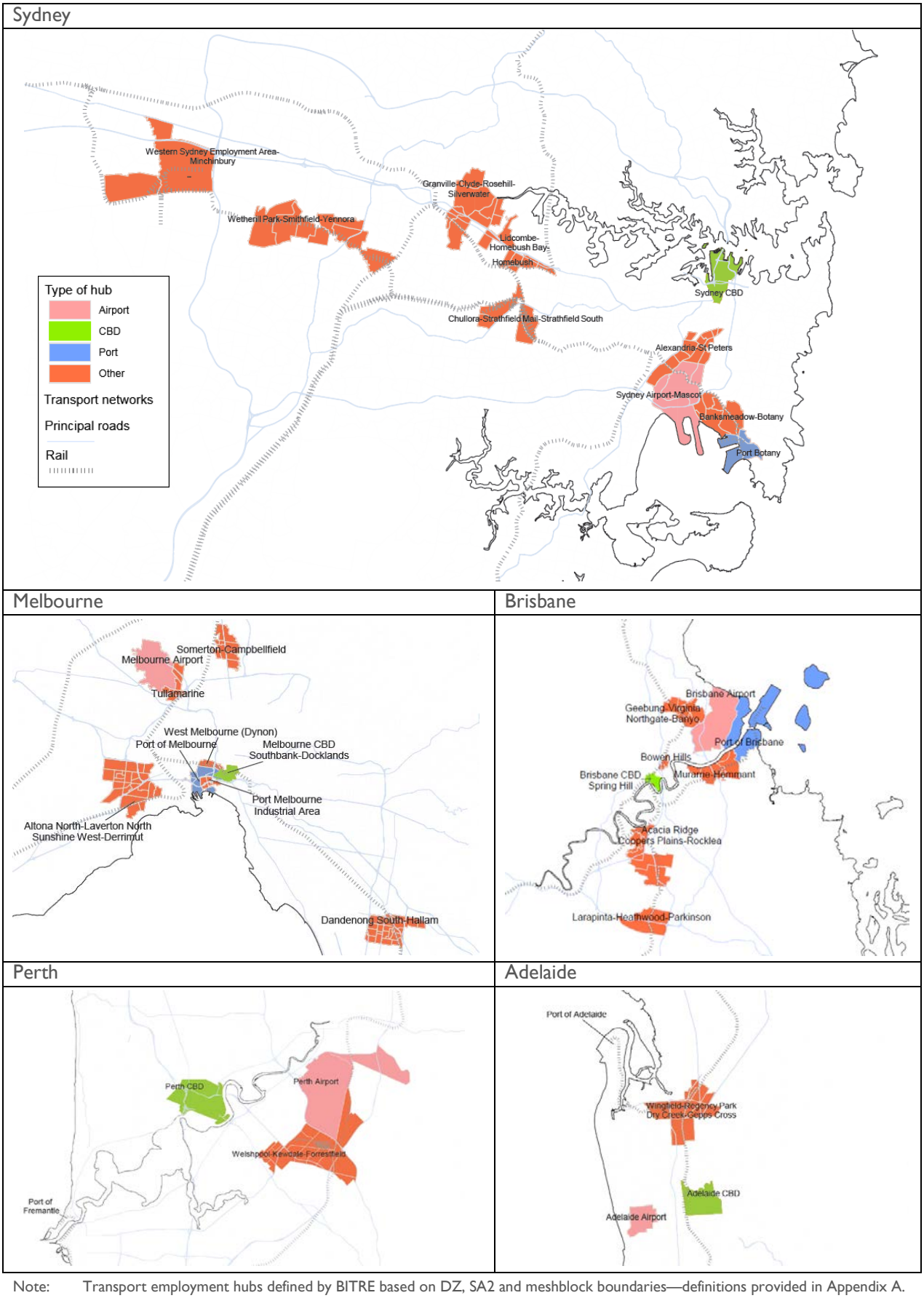
Sydney Airport-Mascot, Bowen Hills and the Sydney, Melbourne and Brisbane CBDs stand out in Table 1 as having a particularly high TPW job density (1400–1900 TPW jobs per square kilometre). The remaining hubs have much lower TPW job densities. Densities tend to be higher in well-established inner suburban industrial areas (e.g. Alexandria-St Peters, Port Melbourne Industrial Area) than in the newly developing outer suburban industrial areas (e.g. Somerton-Campbellfield, Western Sydney Employment Area-Minchinbury).

Table 1 List of major transport employment hubs and their characteristics, 2011

Rank	Transport employment hub	Location	Type	TPW job count	Total job count	Proportion employed in TPW (per cent)[a]	TPW jobs per square kilometre
1	Sydney Airport-Mascot	Sydney	Airport	16 617	28 821	58.0	1 545
2	Altona North-Laverton North-Sunshine West-Derrimut	Melbourne	Other	8 504	32 963	26.2	188
3	Melbourne Airport	Melbourne	Airport	8 205	13 910	59.3	270
4	Melbourne CBD-Southbank-Docklands	Melbourne	CBD	7 420	241 824	3.1	1 464
5	Sydney CBD	Sydney	CBD	7 350	251 423	2.9	1 718
6	Brisbane Airport	Brisbane	Airport	7 255	14 731	49.5	207
7	Welshpool-Kewdale-Forrestfield	Perth	Other	5 896	31 668	18.9	259
8	Brisbane CBD-Spring Hill	Brisbane	CBD	5 328	128 294	4.2	1 827
9	Perth Airport	Perth	Airport	5 029	11 023	46.0	183
10	Acacia Ridge-Coopers Plains-Rocklea	Brisbane	Other	3 724	29 681	12.7	132
11	Alexandria-St Peters	Sydney	Other	3 709	18 938	19.9	672
12	Wingfield-Regency Park-Dry Creek-Gepps Cross	Adelaide	Other	3 533	26 037	13.7	147
13	Tullamarine	Melbourne	Other	3 394	13 141	26.2	399
14	Dandenong South-Hallam	Melbourne	Other	3 274	35 192	9.5	126
15	Wetherill Park-Smithfield-Yennora	Sydney	Other	3 242	27 294	12.1	202
16	Bowen Hills	Brisbane	Other	2 929	8 596	34.4	1 633
17	Banksmeadow-Botany	Sydney	Other	2 895	11 690	25.2	483
18	Chullora-Strathfield Mail-Strathfield South	Sydney	Other	2 837	8 761	32.7	499
19	Granville-Clyde-Rosehill-Silverwater	Sydney	Other	2 695	24 421	11.2	254
20	Western Sydney Employment Area-Minchinbury	Sydney	Other	2 654	9 269	28.9	145
21	Geebung-Virginia-Northgate-Banyo	Brisbane	Other	2 572	21 434	12.1	168
22	Perth CBD	Perth	CBD	2 396	134 273	1.8	219
23	Port of Melbourne	Melbourne	Port	2 321	9 214	25.5	230
24	Port of Brisbane	Brisbane	Port	2 293	6 764	34.4	53[b]
25	Port Botany	Sydney	Port	2 090	3 927	53.8	579
26	Larapinta-Heathwood-Parkinson	Brisbane	Other	2 006	4 915	41.0	116
27	Adelaide Airport	Adelaide	Airport	1 944	4 446	43.9	266
28	Murarrie-Hemmant	Brisbane	Other	1 903	17 919	10.8	113
29	Somerton-Campbellfield	Melbourne	Other	1 802	17 874	10.2	114
30	Adelaide CBD	Adelaide	CBD	1 793	100 230	1.8	171
31	West Melbourne (Dynon)	Melbourne	Other	1 639	4 696	35.3	544
32	Port Melbourne Industrial Area	Melbourne	Other	1 620	12 667	13.0	514
33	Lidcombe-Homebush Bay-Homebush	Sydney	Other	1 598	12 521	12.9	359

Note: Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Based on jobs with a known fixed place of work within the relevant transport employment hub.
[a] Proportion employed was calculated after excluding industry not stated and inadequately described from total job count.
[b] Port boundaries were defined based on BITRE (2014a), and so the TPW job density threshold of 100 was not relevant to ports.
Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

Figure 11 Mapping the transport employment hubs



Note: Transport employment hubs defined by BITRE based on DZ, SA2 and meshblock boundaries—definitions provided in Appendix A. The Ports of Adelaide and Fremantle are shown for illustrative purposes only, as they do not meet the threshold of 1500 TPW jobs. The roads shown comprise a selection of the principal roads in each city, provided for illustrative purposes only.

Source: BITRE.

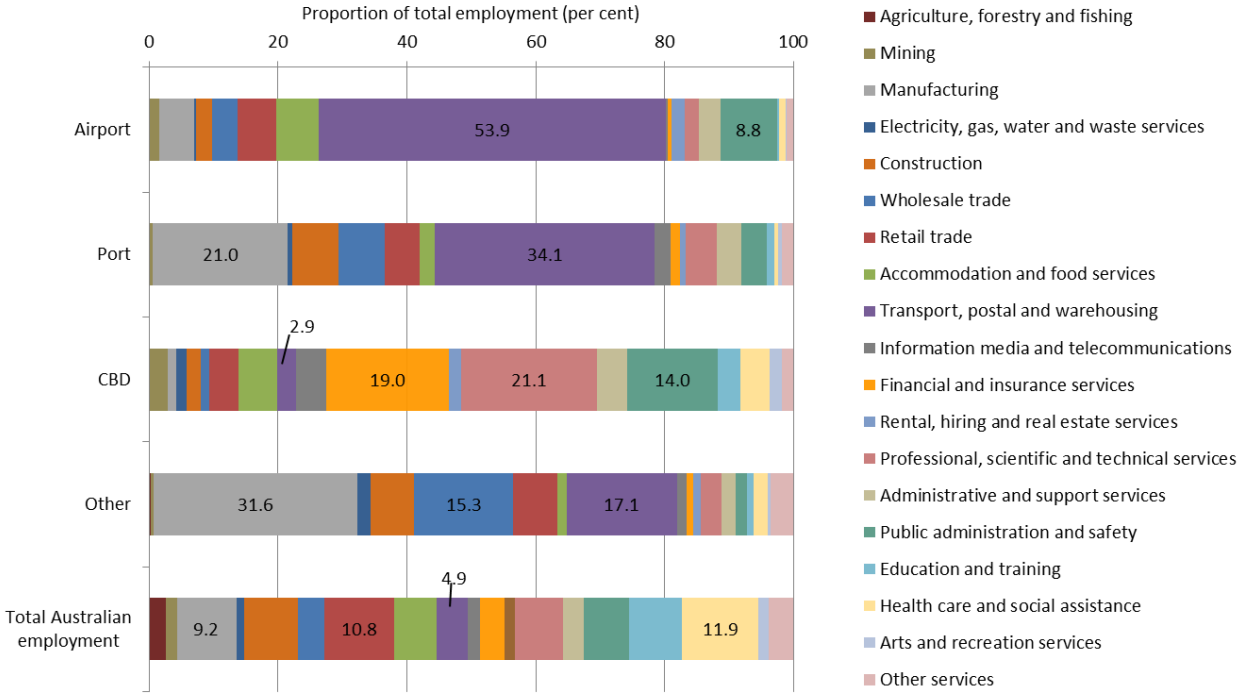
Functions of the major transport employment hubs

Industry mix

This section investigates the industry mix of employment in the major transport employment hubs, which provides a useful guide to the different functions of these employment hubs.

Figure 12 shows the proportion of employment in each ANZSIC 1-digit industry, and how that differs across the airport, port, CBD and other transport employment hubs. Nationally, the TPW industry represented 4.9 per cent of all jobs in 2011. The TPW industry contributes just 2.9 per cent of jobs in the CBDs, where employment is principally in Professional, scientific and technical services (21 per cent), Financial and insurance services (19 per cent) and Public administration and safety (14 per cent). The TPW industry accounts for a much higher proportion of jobs for the remaining three types of transport employment hub. It contributes 54 per cent of jobs in the airports, 34 per cent in the ports, and 17 per cent for the 'other' hubs. TPW is the top employing industry in the airport and port-based hubs. Public administration and safety is the second main source of jobs for the airports, while Manufacturing is an important secondary source of employment at the ports. For the 'other' category, which mainly comprises suburban industrial areas, Manufacturing is the top source of employment (32 per cent), followed by TPW (17 per cent) and Wholesale trade (15 per cent).

Figure 12 Industry mix of employment by type of transport employment hub, 2011



Note: Industry mix of each hub type based on place of work data by ANZSIC 2006 1-digit industry. Proportion employed was calculated after excluding industry not stated and inadequately described. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 details which hubs are classified to each type.
Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

In Figure 13, the 'other' transport-based employment hubs have been divided into three subcategories—transport-oriented industrial areas, other industrial areas, and office headquarters.

Bowen Hills is the only member of the office headquarters subcategory.[16] It has a distinctively different industry mix to the other hubs in Figure 13. While TPW is the principal source of employment, there is limited Manufacturing and Wholesale trade employment. Instead, the major secondary sources of employment are Professional, scientific and technical services, Information media and telecommunications, and Health care and social assistance.

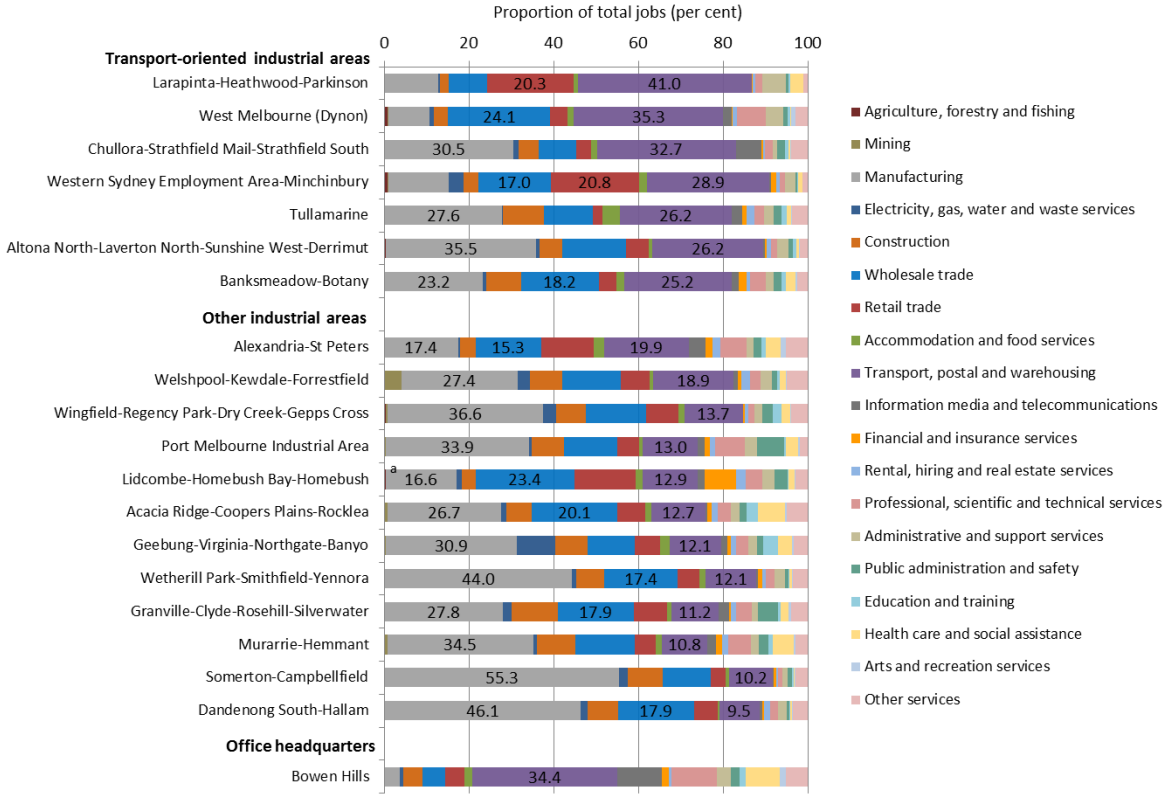
[16] If the threshold was relaxed to 1000 TPW jobs, the VicRoads head office in the Melbourne suburb of Kew would also qualify.

The transport-oriented industrial areas all have at least one-quarter of jobs in the TPW industry, while the remaining industrial areas have between 9 and 20 per cent of jobs in TPW. A common feature of all of these industrial areas is that the Manufacturing and Wholesale trade industries are also well represented. The Manufacturing and Wholesale trade industries have a strong tendency to co-locate—across all Australian DZs, the correlation of employment in these two industries is 79 per cent. The TPW industry also has a significant (but weaker) tendency to co-locate with both Manufacturing and Wholesale trade jobs. Manufacturing is the main source of employment in many of these industrial areas, particularly in Somerton-Campbellfield, Dandenong South-Hallam and Wetherill Park-Smithfield-Yennora, where it accounts for more than 40 per cent of jobs. The Wholesale trade industry tends to be the second or third top source of jobs, except in Lidcombe-Homebush Bay-Homebush, where it is the top employing industry.

The Retail trade industry is also an important additional source of jobs in many of these industrial areas. It is most important to Western Sydney Employment Area (WSEA)-Minchinbury and Larapinta-Heathwood-Parkinson. The strong contribution of Retail trade reflects the presence of distribution centres for several major retailers within both hubs. It is important to note that jobs classified to the Manufacturing and Retail trade industries will sometimes relate to distribution centres of major manufacturers and retailers, and therefore reflect a logistics function.

More generally, the Manufacturing, TPW, Wholesale trade and Retail trade industries all play key roles in the supply chain involved in moving goods from producer to consumer. The Manufacturing, TPW and Wholesale trade industries, and the distribution centres of major retailers, tend to co-locate, forming logistics hubs in key industrial areas within Australia's major population centres. Logistics hubs are strategically located to provide efficient transportation services to large populations (Sheffi 2012). While some are more manufacturing-oriented, and others are more transport-oriented, the transport job hubs in Figure 13 (apart from Bowen Hills) share a common set of core industries and serve an important logistics function.

Figure 13 Industry mix of employment for selected transport employment hubs, 2011



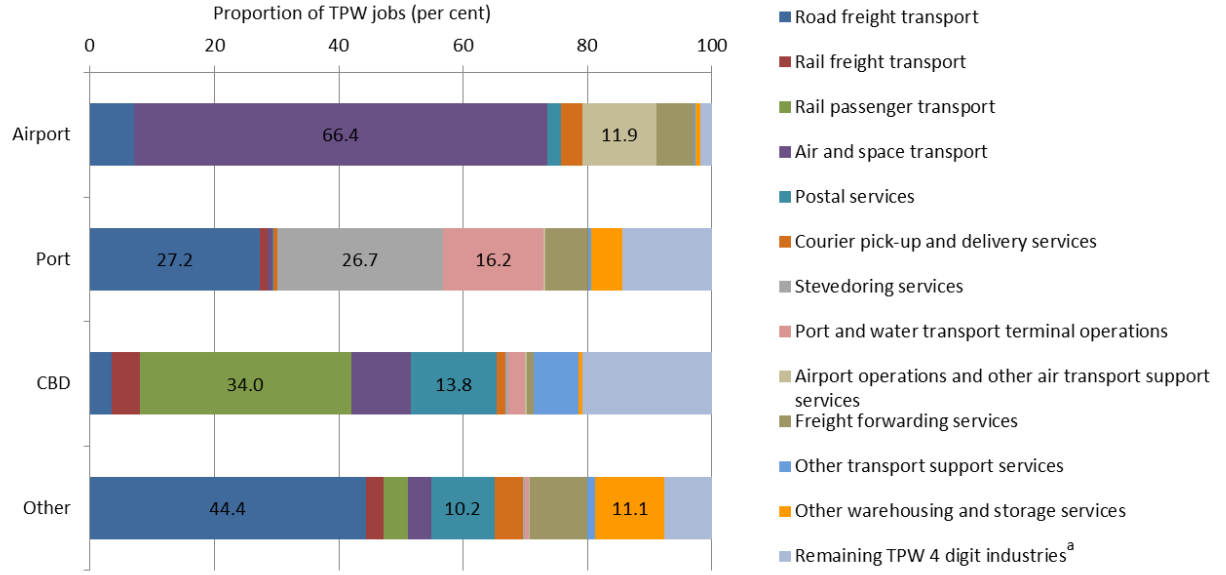
Note: Based on place of work data by ANZSIC 2006 1-digit industry. Proportion employed was calculated after excluding industry not stated and inadequately described. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Only hubs classified as 'other' in Table 1 (i.e. not a port, airport or CBD) are included in chart.
[a] Lidcombe-Homebush Bay-Homebush contains substantial office-based employment alongside traditional industrial area functions.
Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

Transport specialisations

The different types of transport employment hubs are each characterised by a distinctive mix of TPW jobs. Figure 14 shows how TPW jobs are distributed across key ANZSIC 4-digit industries. Airports are dominated by Air and space transport jobs, with the Airport operations and other air transport support services sub-industry also making a significant contribution. Airports also contain notable employment in Road freight transport and Freight forwarding. TPW jobs located at the ports are concentrated in three principal sub-industries—Road freight transport, Stevedoring services, and Port and water transport terminal operations. The ports also contain notable employment in Freight forwarding and Other warehousing and storage services. For the CBDs, the TPW jobs are concentrated in Rail passenger transport, while Postal services, Air and space transport and Other transport support services also make notable contributions. For the 'other' transport employment hubs, Road freight transport is the main contributor, accounting for 44 per cent of TPW jobs. The 'other' hubs also contain significant employment in Other warehousing and storage services, Postal services and Freight forwarding.

Road freight transport has a presence in all four types of hub, but is much more prominent for the ports and 'other' hubs than it is for airports and CBDs. Freight forwarding has a consistent 5–10 per cent share of TPW jobs in the port, airport and 'other' hubs. However, most TPW sub-industries are concentrated in just one or two of the different types of hub, with limited presence in the remaining hub types.

Figure 14 Industry mix of Transport, postal and warehousing jobs by type of transport employment hub, 2011



Note: Industry mix of each hub type based on place of work data by ANZSIC 2006 4-digit industry. Proportion employed was calculated after excluding industry not stated and inadequately described. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 details which hubs are classified to each type.
[a] Comprises 23 4-digit industry categories, none of which individually contribute more than 3 per cent of TPW jobs to any hub type.
Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

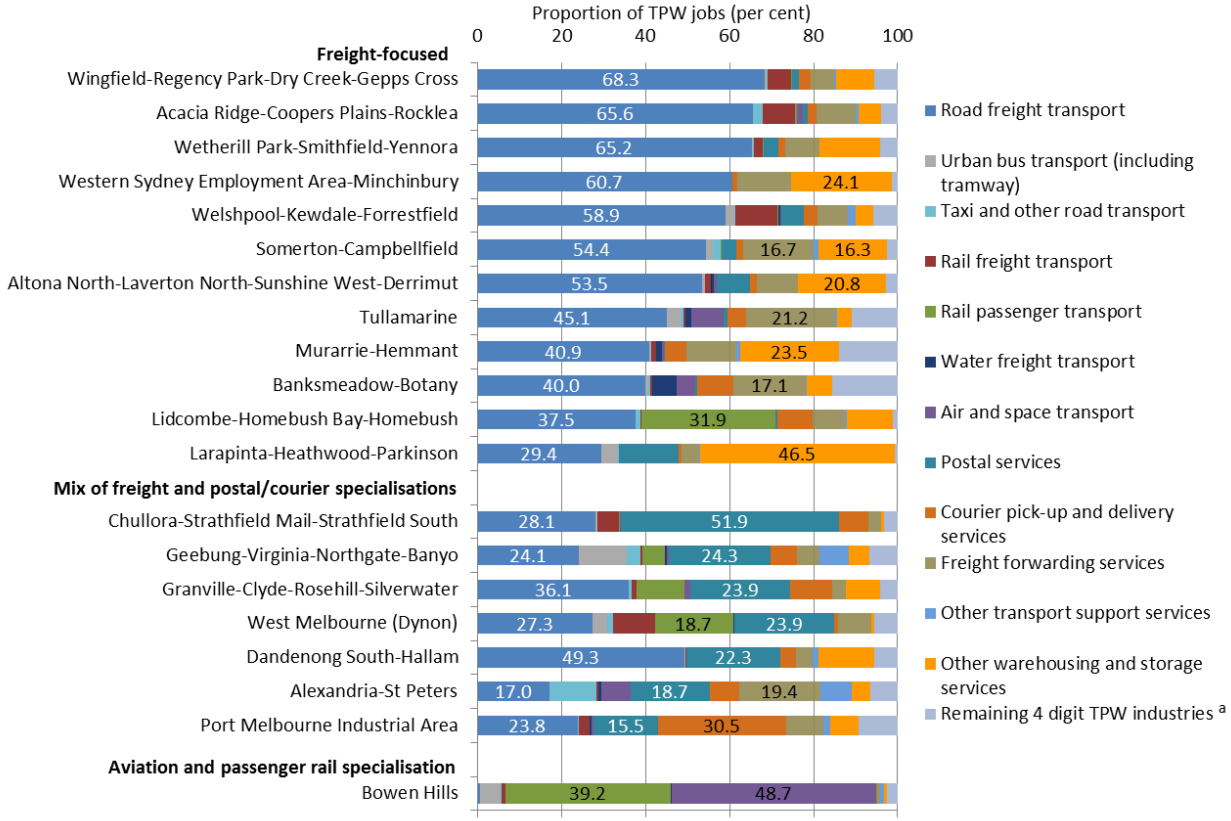
Figure 15 presents the TPW job mix for the 20 transport employment hubs that comprise the 'other' category and represent the main focus of this study. These hubs have been divided into three groups based on the principal TPW sub-industries—freight focused; mix of freight and postal/courier specialisations; and aviation and passenger rail specialisation. Bowen Hills again stands alone with TPW specialisations in aviation (due to the presence of Virgin Australia headquarters) and passenger rail (due to the Mayne rail yards and the Bowen Hills railway station).

For the 12 freight-focused hubs, TPW jobs are concentrated in Road freight transport and the three sub-industries with which it tends to co-locate—Rail freight transport, Freight forwarding services, and Other warehousing and storage services. In each of the 12 freight-focused hubs, these four industries together contribute at least 55 per cent of TPW jobs. Larapinta-Heathwood-Parkinson is somewhat unusual in that the dominant TPW sub-industry is Other warehousing and storage services, rather than Road freight transport.

Lidcombe-Homebush Bay-Homebush differs from the other hubs in having a strong secondary specialisation in Rail passenger transport, sitting alongside the freight-focused job profile.

The remaining seven hubs all have dual specialisations in both postal/courier services and freight, rather than being narrowly focused on the provision of freight services. Postal and courier services together comprise 24–59 per cent of TPW jobs in each hub, while Road freight transport comprises 17–50 per cent of TPW jobs. The Postal services sub-industry is particularly dominant in Chullora-Strathfield Mail-Strathfield South, while the Port Melbourne Industrial Area has the highest representation of Courier pick-up and delivery services. Alexandria-St Peters has a particularly diverse TPW job mix, with the Freight forwarding services, Postal services, Road freight transport, and Taxi and other road transport industries, each contributing 10–20 per cent of TPW jobs.

Figure 15 Industry mix of Transport, postal and warehousing jobs for selected transport employment hubs, 2011



Note: Industry mix of each hub type based on place of work data by ANZSIC 2006 4-digit industry. Proportion employed calculated after excluding industry not stated and inadequately described. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Only hubs classified as 'other' in Table 1 (i.e. not a port, airport or CBD) are included in chart.

[a] This category comprises 23 4-digit industry categories and is relatively prominent for clusters that adjoin airports and ports (e.g. Tullamarine, Banksmeadow-Botany), as key port and aviation-related industries are not shown separately in the chart.

Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

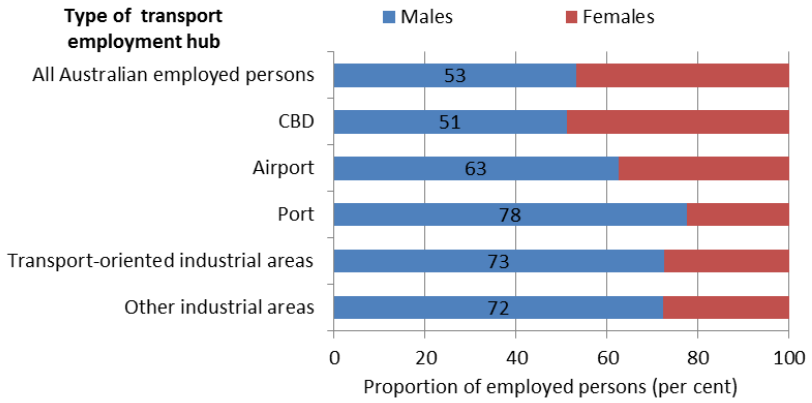
Profile of workers at the major transport employment hubs

This section profiles employment in the major transport employment hubs, considering gender, age, skills, hours worked, income and commuting behaviour. This represents a profile of all jobs located in these hubs, irrespective of whether jobs are in the TPW industry or another industry. BITRE (2014b) provides a national profile of the characteristics of those employed specifically in the TPW industry, and serves as a useful point of reference when interpreting the characteristics of people employed within the 33 major transport employment hubs.

Gender

Figure 16 shows how the proportion of males and females varies across the different types of transport employment hub. In the CBDs, there are roughly equal numbers of male and female workers. However, males account for the clear majority of workers in the four remaining hub types. The great majority of workers in the port-based hubs are males (78 per cent). The transport-oriented and other industrial areas also have a very high representation of male workers (73 and 72 per cent, respectively), but the male employment share is somewhat lower for the airports (63 per cent).

Figure 16 Gender split of workers by type of transport employment hub, 2011



Note: Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the chart.
Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

Males account for more than two-thirds of jobs in 22 out of the 33 transport employment hubs. The most male-dominated hubs are the Port of Brisbane and Port Botany, where over 80 per cent of the workforce is male. All five CBD-based hubs have a roughly even number of males and females in their workforce.

Age

The ageing of the workforce is regarded as one of the major challenges facing the transport and logistics industry (Transport and Logistics Industry Skills Council 2012, 2014). As of 2011, 22.9 per cent of TPW workers nationally were aged 55 and over, which is considerably higher than the all-industry figure of 17.6 per cent. The TPW workforce has been ageing more rapidly than the overall workforce—from 2006 to 2011, the proportion aged 55 and over rose by 3.5 percentage points in TPW, compared to a 2.5 percentage point rise for total employment (BITRE 2014b).

Figure 17 shows the age structure of all jobs located in the different types of transport employment hub and the age structure of all employed persons nationally. The CBDs have a relatively youthful age structure, with a high proportion of their workforce aged under 35 (43 per cent, compared to 37 per cent of the national workforce) and a relatively small proportion of workers aged over 55 (12 per cent, compared to 18 per cent nationally). All of the different types of transport employment hub have less than the national average proportion of workers aged 55 and over.[17] All hub types do, however, have a relatively low proportion of workers aged 15–24 and (apart from the CBDs) a relatively low proportion aged under 35. Instead, workers in the four non-CBD hub types tend to be reasonably concentrated in the 35–54 age group.

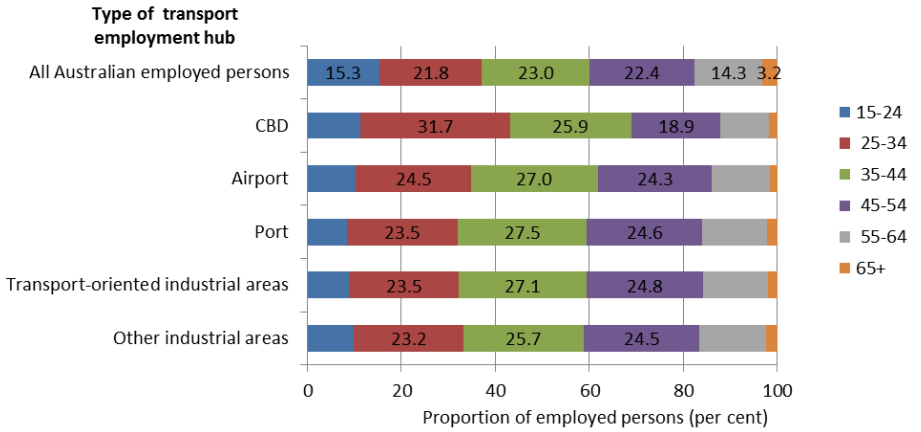
CBD workers have a lower median age (37 years) than the average for Australian workers (40 years). The median age is slightly lower for airport workers (40 years) than for the remaining three hub types (which each have a median age of 41).

Turning to the individual transport employment hubs, the proportion of workers aged over 55 is at its lowest in the Sydney CBD and Melbourne CBD-Southbank-Docklands (11 per cent each) and at its highest for the Sydney hubs of Chullora-Strathfield Mail-Strathfield South, Granville-Clyde-Rosehill-Silverwater, and

[17] This may surprise, since the TPW industry has a relatively old workforce (BITRE 2014b). The more youthful age structure of the major transport employment hubs reflects TPW being just one of many industries operating within each hub, and also reflects the clusters being in the capital cities, which have a much lower proportion of TPW workers aged over 55 (21 per cent) than the rest of Australia (28 per cent).

Wetherill Park-Smithfield-Yennora (18–19 per cent each). The median age is lowest for the Sydney CBD and Melbourne CBD-Southbank-Docklands (both 36 years), and highest for Chullora-Strathfield Mail-Strathfield South (44) and Port Botany (43). Thus, the ageing TPW workforce seems to be most evident in several of suburban Sydney's transport employment hubs.

Figure 17 Age mix of workers by type of transport employment hub, 2011



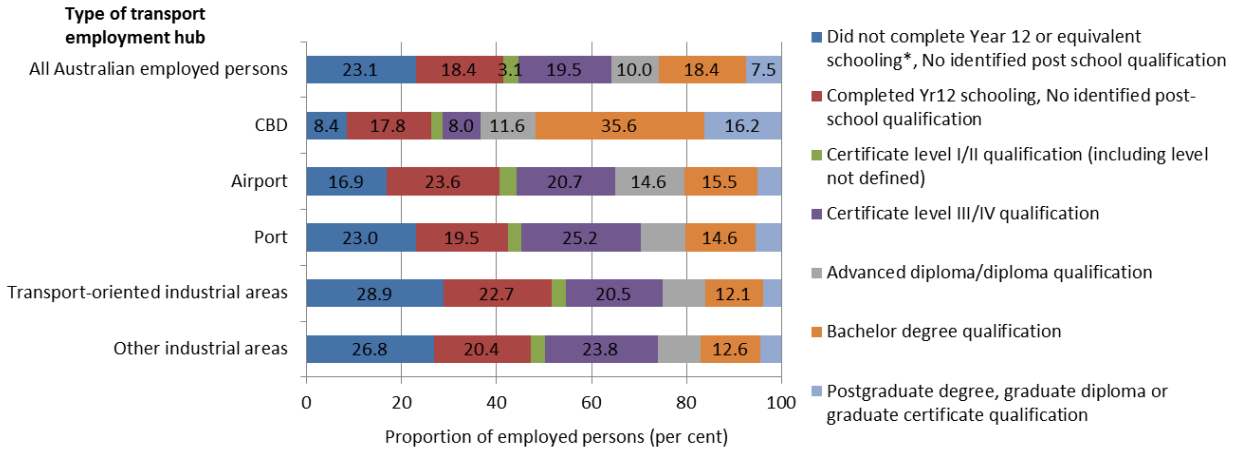
Note: Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the chart.

Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

Education

Figure 18 illustrates the educational qualifications of workers in the different types of transport employment hub. The CBDs have a more highly skilled workforce than the other hub types or the national workforce—52 per cent of workers have a bachelor degree or higher qualification, compared to 26 per cent nationally. Apart from the CBDs, the transport employment hubs tend to have a relatively high proportion of workers with certificate III and IV qualifications (20–26 per cent) and a relatively low proportion with bachelor degree or higher qualifications (16–21 per cent). The transport-oriented industrial areas and the other industrial areas both have a particularly low proportion of workers with bachelor degree or higher qualifications (16 and 17 per cent, respectively), and a particularly high proportion without any identified post-school qualification (52 and 47 per cent, respectively). The educational mix of workers is somewhat more skilled for the ports and airports than for the two types of industrial areas, while the transport-oriented industrial areas have a slightly less skilled profile than the other industrial areas.

Figure 18 Qualifications of workers by type of transport employment hub, 2011

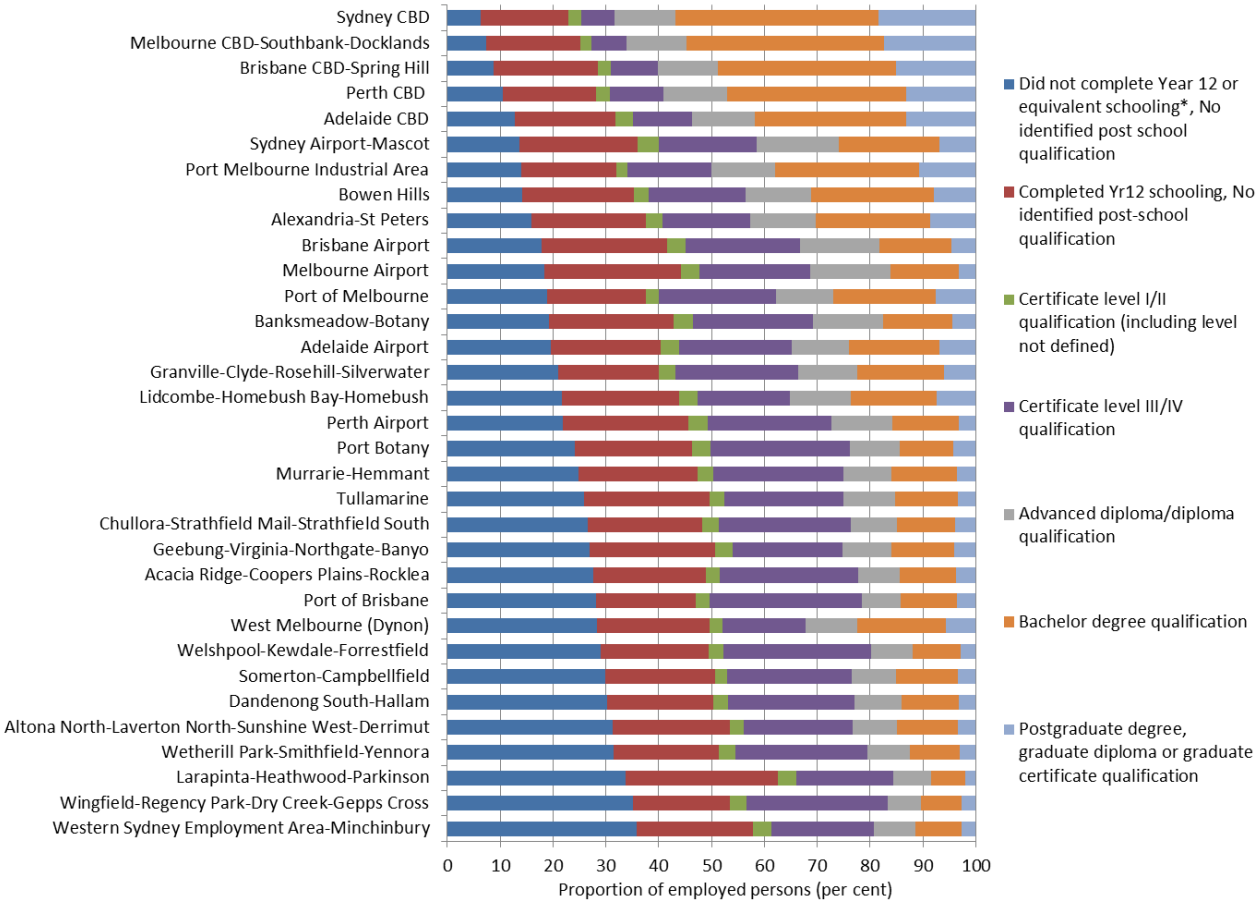


Note: Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the chart.
* Includes not stated level of schooling.

Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

Figure 19 shows the educational qualifications of workers in the 33 transport employment hubs, sorted in terms of the proportion of workers who have no Year 12 or post-school qualifications. There is considerable variation across the 33 hubs, with the five CBD-based hubs having the most highly skilled workers. The airports are concentrated at the middle to upper end of the skill spectrum. Other relatively highly skilled hubs include Bowen Hills, and the established inner suburban industrial areas of Alexandria-St Peters and Port Melbourne Industrial Area. The hubs with the least skilled employment profiles tend to be middle and outer suburban freight-focused industrial areas, such as Larapinta-Heathwood-Parkinson (in Brisbane's south), Wingfield-Regency Park-Dry Creek-Gepps Cross (in Adelaide's north) and WSEA-Minchinbury (in Sydney's outer west). West Melbourne (Dynon) has a somewhat unusual skill profile—compared to other industrial areas it has a relatively high concentration of workers with bachelor degree qualifications, while also having a high proportion of workers without Year 12 or post-school qualifications.

Figure 19 Qualifications of workers in the major transport employment hubs, 2011



Note: Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A.
* Includes not stated level of schooling.
Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

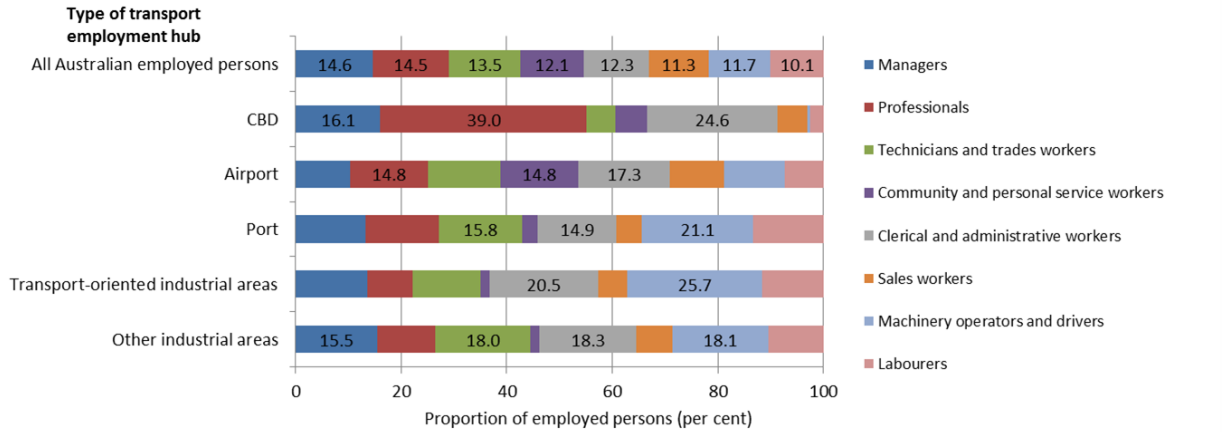
Occupation

Figure 20 shows the occupational mix of jobs in the different types of transport employment hub, based on the Australian and New Zealand Standard Classification of Occupations (ANZSCO) 1-digit occupations (ABS 2009). The national workforce is split very evenly across the eight occupational categories, each of which represents 10–15 per cent of employment. Managers and Professionals are the two most highly skilled occupations and together contribute 29 per cent of national employment.

The CBDs have a very highly skilled workforce with 55 per cent of jobs due to Managers and Professionals. Employment at the airports is fairly evenly spread across the occupational categories, with Community and personal service workers being much more prominent for airports than the other hub types. The ports, transport-oriented industrial areas and other industrial areas all have a significant over-representation of Machinery operators and drivers, which contribute 18–26 per cent of jobs in these hub types, compared to 12 per cent of jobs nationally. The occupational profiles of the transport-oriented and other industrial areas

differ, with the transport-oriented industrial areas having a smaller proportion of Managers, Professionals and Technicians and trades workers, and a larger proportion of Machinery operators and drivers and Clerical and administrative workers.

Figure 20 Occupational mix of workers by type of transport employment hub, 2011



Note: Occupational mix based on ANZSCO 1-digit occupations (ABS 2009). Proportions calculated after deducting 'not stated' and 'inadequately described' responses from total. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the chart.

Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

The share of employment due to Managers and Professionals is highest for the Sydney CBD (60 per cent), and is also above 40 per cent for the other four CBD-based hubs, and for Bowen Hills and the Port Melbourne Industrial Area. The lowest shares occur in the transport-oriented industrial areas of Larapinta-Heathwood-Parkinson (13 per cent), WSEA-Minchinbury (17 per cent) and Chullora-Strathfield Mail-Strathfield South (18 per cent). The first two have a very high proportion of Machinery operators and drivers (45 and 41 per cent, respectively), reflecting their road freight and warehousing functions and the presence of major distribution centres. Chullora-Strathfield Mail-Strathfield South has a high proportion of Clerical and administrative workers (28 per cent), due to Australia Post's Strathfield Letter Facility.

ANZSCO defines the skill level of an occupation based on the range and complexity of the set of tasks performed in the occupation. It assigns occupations to one of five skill levels, with one being the highest skill level and five the lowest. Occupations at skill level one have a level of skill commensurate with a bachelor degree or higher qualification, while at least five years of relevant experience may substitute for the formal qualification. Skill level five occupations have a level of skill commensurate with a Certificate Level I qualification or compulsory secondary education, although in some instances no formal qualification or on-the-job training may be required (ABS 2009).

Table 2 provides some further detail on the five main (3-digit) occupations in each type of transport employment hub, and the skill level of each of those occupations. For the CBDs, the principal occupations are several different types of professionals (i.e. skill level one occupations). The main occupations at airports cover a mix of skill categories, including Air and marine transport professionals (skill level one) and Personal service and travel workers (skill levels three and four).

There is considerable overlap in the top five occupations at ports, transport-oriented industrial areas and other industrial areas. However, the main occupation at ports is Freight handlers and shelf fillers (skill level five), which is not amongst the top five occupations in either type of industrial area. Skill level four occupations[18]— such as Storepersons, Truck drivers and Logistics clerks— are prevalent in both types of industrial area. The key difference is that while Storepersons (skill level four) are the most common occupation in the transport-oriented industrial areas, in the other industrial areas the most common occupation is Construction, distribution and production managers (skill level one).

[18] Skill level four occupations have a level of skill commensurate with a Certificate Level II or III qualification (ABS 2009).

Table 2 List of major occupations in each type of transport employment hub, 2011

Type of hub	Main 3-digit occupations (from most to least prevalent)	Predominant skill levels
CBDs	Accountants, auditors and company secretaries	1
	Information and organisation professionals	1
	Legal professionals	1
	Financial and insurance clerks	4
	Business and systems analysts, and programmers	1
Airports	Personal service and travel workers	3,4
	Air and marine transport professionals	1
	Mechanical engineering trades workers	3
	Mobile plant operators	4
	Miscellaneous sales support workers	3,4,5
Ports	Freight handlers and shelf fillers	5
	Truck drivers	4
	Logistics clerks	4
	Construction, distribution and production managers	1
	Mobile plant operators	4
Transport-oriented industrial areas	Storepersons	4
	Truck drivers	4
	Logistics clerks	4
	Mobile plant operators	4
	Construction, distribution and production managers	1
Other industrial areas	Construction, distribution and production managers	1
	Storepersons	4
	Truck drivers	4
	Logistics clerks	4
	Accounting clerks and bookkeepers	4

Note: Occupations and predominant skill levels based on ANZSCO 3-digit occupations (ABS 2009). ANZSCO assigns occupations to one of five skill levels, with one being the highest skill level and five the lowest (more detail is provided in the text on the previous page). Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the table.

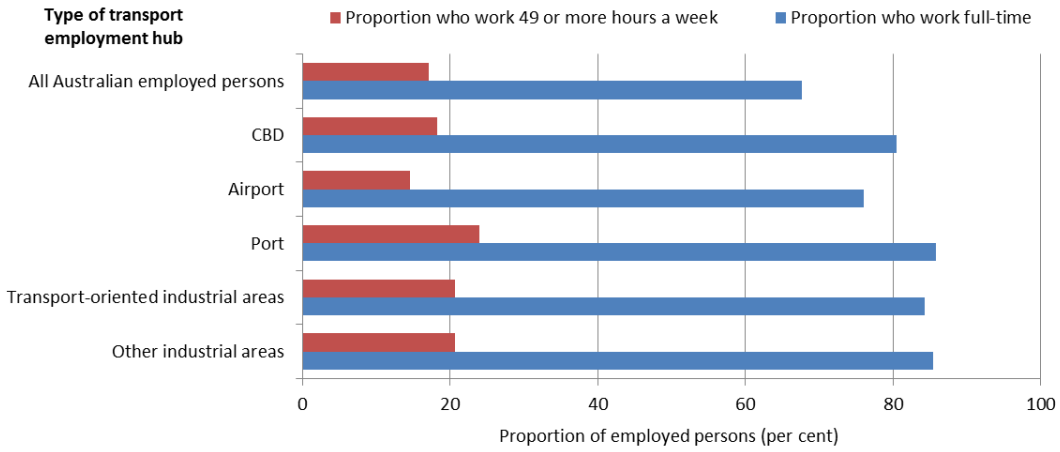
Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

Hours worked

Nationally, 68 per cent of employed persons worked full-time (i.e. 35 or more hours per week), according to the 2011 census. Figure 21 shows that each of the different types of transport employment hub exceed this national average. The proportion of full-time workers ranges from 76 per cent at the airports to 86 per cent at the ports.

Nationally, 17 per cent of workers report working 49 or more hours per week. Apart from the airports, each of the different hub types exceed this national average. Workers in the port-based hubs are particularly likely to work long hours, with 24 per cent working 49 or more hours per week.

Figure 21 Proportion who work full-time or long hours by type of transport employment hub, 2011



Note: Proportions calculated after deducting hours of work not stated. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the chart.

Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

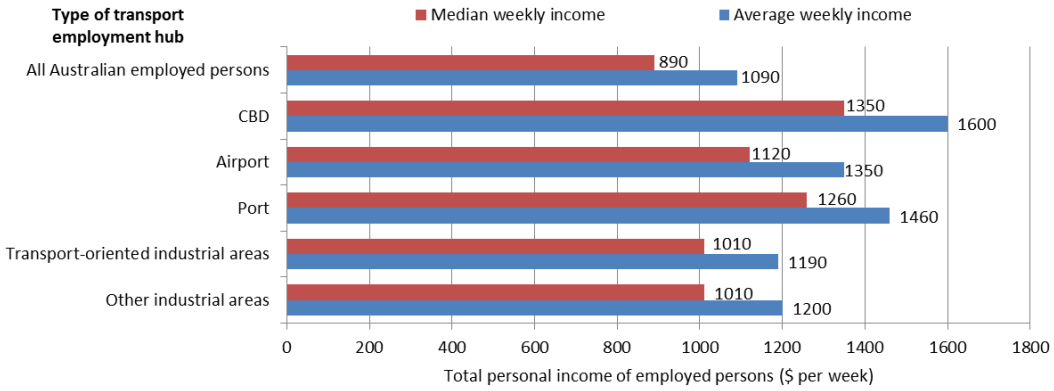
All 33 of the transport employment hubs exceed the national average of 68 per cent of workers in full-time employment. The reliance on full-time workers is particularly high for Port Botany (91 per cent), Port of Brisbane (89 per cent), Port Melbourne Industrial Area (88 per cent) and Welshpool-Kewdale-Forrestfield (87 per cent). Some hubs have a relatively small proportion of employed persons working over 49 hours a week, including Melbourne Airport (11 per cent), the Adelaide CBD (12 per cent) and Sydney Airport-Mascot (14 per cent). The Port of Brisbane has a particularly high share of employed persons working more than 49 hours per week (28 per cent), as do the freight-focused industrial areas of Welshpool-Kewdale-Forrestfield (25 per cent), Murarrie-Hemmant (23 per cent) and Banksmeadow-Botany (23 per cent).

Income

Figure 22a presents estimates of the average and median weekly total personal income of workers in each type of transport employment hub and for Australia as a whole. The median income estimate is consistently lower than the average income estimate for each hub type, but both the median and average incomes display a very similar pattern of variation. All five types of transport employment hub exceed the national median and average weekly income. Average (median) incomes are at their highest in the CBDs, where they exceed the national figures by roughly 50 per cent. Average (median) incomes are also relatively high in the port-based hubs and (to a lesser extent) in the airport-based hubs. The transport-oriented and other industrial areas have very similar averages (medians), which are about 10 per cent higher than the national figures.

Figure 22 Weekly income of workers by type of transport employment hub, 2011

a) All employed persons



b) Full-time employed persons

Notes: 1. Total personal income includes income from sources other than employment (e.g. family benefits, investment income). Given the very high proportion of full-time employment in these hubs, wage income will generally make up a large proportion of the total income of workers, and so the personal income figures should provide a useful indication of how wage income varies across the different hub types. BITRE has estimated median and average weekly income based on the categorical income responses in the census. For median income, a specific point estimate within the median income category is derived using a simple pro-rata approach. The approach to estimating average income involved excluding negative income responses and assigning an average value to each income category. The average value was set as the midpoint of the income range for all categories, apart from the top income category, where the average was set at $3000, based on results from the ABS' *Survey of Income and Housing 2009–10* (which show that $3000 is a conservative midpoint for the top income category).
2. Full-time employed persons are defined as those who work 35 or more hours per week.
3. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the charts.

Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

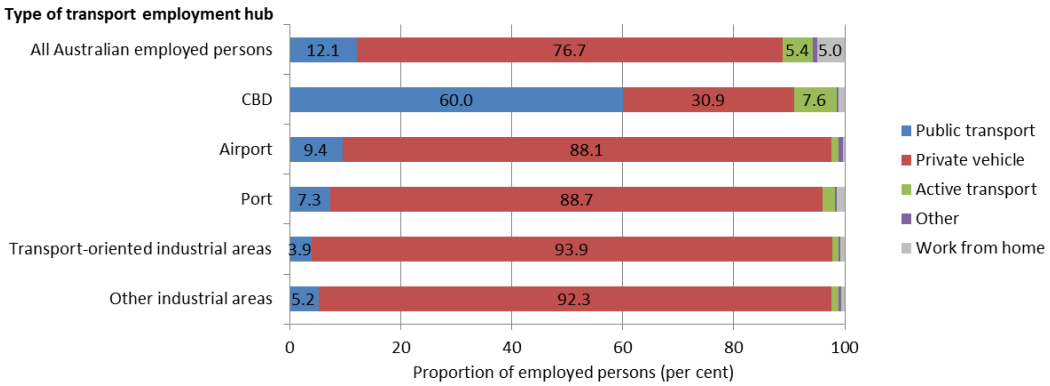
A possible reason why the average (and median) incomes are relatively high in the transport employment hubs is that the higher incomes could reflect the greater number of hours being worked (see Figure 21), rather than reflecting above-average hourly rates of remuneration. This is confirmed by Figure 22b, which focuses on full-time employed persons, to enable a more like-for-like comparison of workers to be undertaken. When the focus is restricted to full-time workers, the CBD, airport and port-based hubs continue to exceed the national average (median) weekly income. Full-time CBD workers earn approximately one-third more than the national average (median), while the income premium is about 20 per cent for the port-based hubs and about 10 per cent for the airport-based hubs. However, the average (median) incomes of full-time employed workers in the transport-oriented and other industrial areas lie slightly below the national average (median). Full-time employed workers in these two types of industrial area earn 2–4 per cent less than the national average (median) weekly income.

The average (median) weekly incomes of full-time employed workers exceed the national average (median) in 22 of the 33 major transport employment hubs, including all of the CBD, port and airport-based hubs. Incomes are at their highest in the Sydney and Perth CBDs, at roughly 40 per cent above the national average (median) for a full-time employed person. Incomes are also relatively high for Melbourne CBD-Southbank-Docklands, Brisbane CBD-Spring Hill, Bowen Hills, Port Melbourne Industrial Area, and the three port-based hubs. Incomes are at their lowest in a range of middle and outer suburban industrial areas, such as Brisbane's Larapinta-Heathwood-Parkinson and Geebung-Virginia-Northgate-Banyo, Adelaide's Wingfield-Regency Park-Dry Creek-Gepps Cross, Sydney's Wetherill Park-Smithfield-Yennora and Melbourne's Tullamarine, Somerton-Campbellfield and Dandenong South-Hallam. Incomes in each of these industrial areas are 6–14 per cent below the national average (median) for full-time workers.

Transport mode for journey to work

Across all Australian employed persons, private vehicle was the main transport mode used to journey to work on census day 2011, accounting for 77 per cent of employed persons. About 12 per cent used public transport, while 5 per cent used active transport, and 5 per cent worked from home. Figure 23 shows that workers in the CBD-based hubs have a very different use of transport modes for the journey to work—60 per cent travel by public transport, with 8 per cent using active transport, and only 31 per cent travelling by private vehicle. For the remaining hub types, the private vehicle mode share is well above the national share of 77 per cent, while the proportions using public transport, active transport and working from home are well below the national shares. The transport-oriented industrial areas are most reliant on private vehicles, with 94 per cent of workers travelling to work by private vehicle, and only 4 per cent using public transport.

Figure 23 Journey to work transport mode by type of transport employment hub, 2011



Note: Proportions calculated after deducting did not go to work and mode not stated from total. Public transport includes train, bus, tram, ferry and taxi. Private vehicle includes trucks, motorbikes and scooters. Active transport includes cycling and walking. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the chart.

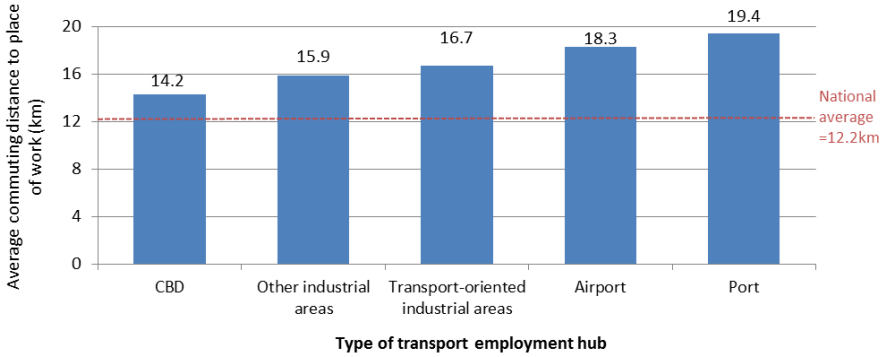
Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2011 (data extracted using Tablebuilder Pro).

The highest private vehicle mode shares for the journey to work occur in the Port of Brisbane (98 per cent), Altona North-Laverton North-Sunshine West-Derrimut (97 per cent) and Dandenong South-Hallam (97 per cent). The Sydney CBD has the lowest private vehicle mode share (16 per cent) and the highest public transport mode share (75 per cent).

Commuting distance

On average, on census day 2011, the place of work of employed Australians was about 12 kilometres (km) straight line distance away from their place of usual residence. Figure 24 shows the average straight line commuting distance for jobs located in each of the five types of transport employment hub. Workers at the port-based hubs have the longest commuting distances (19.4km), followed by those at the airports (18.3km). Workers at the transport-oriented industrial areas travel somewhat further to work, on average, than workers in the other industrial areas (16.7 and 15.9km, respectively). Workers in the CBD-based hubs have the shortest average commute of the different types of transport employment hub (14.2km),[19] but this is still a longer average commuting distance than is typical for Australian workers (or for workers in any of the five largest capital cities). Thus, a key message is that the transport employment hubs tend to attract workers from a considerable distance away. The residential addresses of workers tend to be fairly widely dispersed, and not overwhelmingly concentrated in the home Statistical Area (SA2) and its immediate neighbours.

Figure 24 Average commuting distance to jobs in each type of transport employment hub, 2011



Notes: 1. Average commuting distances estimated by BITRE based on the straight line commuting distances between the population-weighted centroid of the SA2 of usual residence (derived using SA1 data) and the area-based centroid of the DZ of work. Those who worked at home on census day were assigned a commuting distance of zero. Any commutes of over 200km were excluded from the calculation, on the basis that it would be generally unlikely that people would travel this distance to and from work every day. The national average commuting distance was derived based on SA2 (rather than DZ) place of work data, with job-weighted SA2 centroids (derived from DZ data) used to calculate distances.
2. Transport employment hubs defined by BITRE based on DZ and SA2 boundaries—definitions provided in Appendix A. Table 1 and Figure 13 detail which hubs are classified to each type. Bowen Hills is excluded from the chart.

Source: BITRE analysis of ABS *Census of Population and Housing* data for 2011 (data extracted using Tablebuilder Pro).

The Port of Brisbane has the highest average straight line commuting distance (21.9km), followed by Brisbane Airport (21.5km). The average commuting distance is also relatively high (19–20km) for the Port Melbourne Industrial Area, Melbourne Airport and West Melbourne (Dynon). The eight hubs with the longest average commuting distances are all located in either Brisbane or Melbourne. The Adelaide CBD has the shortest average commuting distance of 11.2km, and is the only one of the 33 hubs that lies below the national average commuting distance.

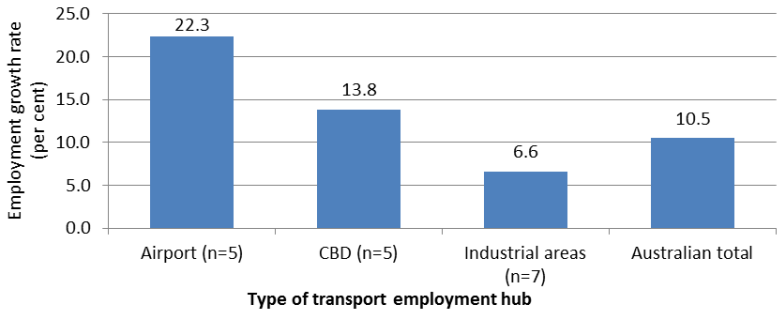
Changes in employment, 2006 to 2011

The ABS overhauled its statistical geography between the 2006 and 2011 censuses, with the introduction of the Australian Statistical Geography Standard (ASGS). DZ boundaries also changed significantly over the period. The significant boundary changes mean that like-for-like comparisons of 2006 and 2011 census job data could only be made for 17 transport employment hubs. Due to large scale boundary changes, valid change estimates could not be produced for any of the port-based hubs.

Figure 25 summarises the rate of employment growth nationally and for key types of transport employment hub. The number of persons employed in Australia increased by 10.5 per cent between 2006 and 2011. The airports experienced very rapid job growth of 22.3 per cent between 2006 and 2011. The CBDs also recorded relatively rapid job growth of 13.8 per cent, while the industrial areas experienced more modest job growth of 6.6 per cent.

[19] If information was available on commuting times, it would probably display a rather different pattern of variation across the different types of hub. In particular, due to inner city congestion, average commuting times for CBD workers may be towards the upper end of the spectrum.

Figure 25 Employment growth rates by type of transport employment hub, 2006 to 2011



Note: The 2011 boundaries of the transport employment hubs were approximated based on ABS Statistical Local Area (SLA) and DZ and Bureau of Transport Statistics (BTS) travel zone boundaries for 2006—definitions provided in Appendix A. Table 3 provides a listing of the 17 hubs for which change estimates could be produced and outlines issues related to data quality.
Australian total based on place of usual residence counts of employment in 2006 and 2011.
n = number of hubs within category—note that the combined Melbourne Airport-Tullamarine hub has been classified to the airport category for the purposes of this chart, even though the Tullamarine component is a transport-based industrial area.

Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2006 and 2011 (data extracted using Tablebuilder Pro) and BTS 2006 place of work counts for travel zones in NSW.

Table 3 presents estimates of employment change for 17 major transport employment hubs. The largest increases in the number of jobs occurred in the CBD-based hubs, which have a much larger employment base than the remaining hubs (see Table 1). In particular, Melbourne CBD-Southbank-Docklands stands out, having added almost 44 000 jobs between 2006 and 2011, corresponding to a 22 per cent increase in employment. The rate of job growth in the Sydney CBD and Brisbane CBD-Spring Hill was slightly below the national benchmark (10.5 per cent), despite a large number of jobs being added in each hub.

Table 3 Employment growth for selected transport employment hubs, 2006 to 2011

Transport employment hub	Type	Change in employed persons, 2006 to 2011	Growth rate, 2006 to 2011 (per cent)
Melbourne CBD-Southbank-Docklands	CBD	43 900	22
Sydney CBD	CBD	21 100	9
Perth CBD	CBD	20 300	18
Adelaide CBD	CBD	10 500	12
Brisbane CBD-Spring Hill	CBD	8 200	7
Perth Airport	Airport	6 000	121
Altona North-Laverton North-Sunshine West-Derrimut	Transport-oriented industrial area	4 700	17
Brisbane Airport	Airport	4 300	41
Western Sydney Employment Area-Minchinbury	Transport-oriented industrial area	4 200	83
Melbourne Airport-Tullamarine [a]	Airport	3 800	17
Wingfield-Regency Park-Dry Creek-Gepps Cross	Other industrial areas	1 400	6
Banksmeadow-Botany	Transport-oriented industrial area	1 300	13
Adelaide Airport	Airport	900	26
Geebung-Virginia-Northgate-Banyo	Other industrial area	900	4
Dandenong South-Hallam	Other industrial area	800	2
Sydney Airport-Mascot	Airport	600	2
Wetherill Park-Smithfield-Yennora	Other industrial area	–3 200	–10

Note: The 2011 boundaries of the transport employment hubs were approximated by BITRE based on ABS SLA and DZ and BTS travel zone boundaries for 2006—definitions provided in Appendix A. The 17 hubs presented in the table are those for which BITRE was able to get a reasonably close match between the 2006 and 2011 geographic boundaries—only hubs where the 2006 job count had a margin of error of less than 3 per cent were included in the table. Nevertheless, for the 17 hubs shown in the table, minor differences between the geographic scope of the 2006 and 2011 data may impact on the accuracy of the change estimates. In addition, the number of respondents coded by ABS to an undefined place of work in capital cities was seven times larger in 2011 than in 2006—this methodological change will be reflected in a general underestimation of the extent of job growth occurring in small areas of capital cities between 2006 and 2011.
[a] This represents the combination of two adjoining hubs—Melbourne Airport and the Tullamarine industrial area. Boundary changes meant that separate estimates could not be produced for the two component hubs.

Source: BITRE analysis of ABS *Census of Population and Housing* place of work data for 2006 and 2011 (data extracted using Tablebuilder Pro) and BTS 2006 place of work counts for travel zones in NSW.

Three of the airport-based hubs added more than 3000 jobs—Perth Airport (which added 6000 jobs), Brisbane Airport (4300) and the combined Melbourne Airport-Tullamarine hub (3800). The number of jobs located at Perth Airport more than doubled between 2006 and 2011 (a 121 per cent increase), and four of the five airports exceeded the national rate of job growth. The exception was Sydney Airport-Mascot which recorded very modest job growth between 2006 and 2011 (adding 600 jobs).

The transport-oriented industrial areas experienced substantial job growth from 2006 to 2011, particularly Altona North-Laverton North-Sunshine West-Derrimut (which added 4700 jobs) and WSEA-Minchinbury (4200). Both are outer suburban industrial areas that are well-located on their respective city's motorway network, with low densities and opportunities for expansion. The Western Melbourne hub is currently much larger and more established than the Western Sydney hub, which experienced very rapid job growth of 83 per cent between 2006 and 2011, but both have benefited from the trend towards large scale warehousing and distribution centres. Just to the east of WSEA-Minchinbury, the Wetherill Park-Smithfield-Yennora industrial area lost about 10 per cent of its jobs from 2006 to 2011.

For the transport employment hubs located in NSW, the availability of detailed 2006 census data by travel zone and industry enables us to identify which industries added the most jobs (or lost the most jobs) between 2006 and 2011. Box 1 discusses the main industry contributors to job growth and decline in Sydney's transport employment hubs.

Box 1: Industry contributors to job growth and decline in selected Sydney transport employment hubs

The TPW industry was the principal contributor to job growth for WSEA-Minchinbury and Banksmeadow-Botany between 2006 and 2011 (adding around 1300 and 1600 jobs, respectively). However, for Sydney Airport-Mascot, the TPW industry was the principal source of job loss, with about 800 fewer jobs in 2011, than in 2006. There were smaller declines in TPW jobs for the Sydney CBD (–500) and Wetherill Park-Smithfield-Yennora (–300).

The TPW industry had only a minor influence for the Sydney CBD, where the main industry contributors to job growth were Financial and insurance services (which added around 8100 jobs) and Professional, technical and scientific services (7600). At Sydney Airport-Mascot, the Wholesale trade industry was the principal contributor to job growth, adding about 600 jobs.

While TPW was the main contributor to the rapid job growth at WSEA-Minchinbury from 2006 to 2011, this hub also had considerable job growth in Retail trade (900), Wholesale trade (800) and Manufacturing (700). In contrast, at Wetherill Park-Smithfield-Yennora most industries experienced job losses, with job losses most evident in Manufacturing (–2100), Wholesale trade (–400) and Retail trade (–400). The decline in Manufacturing jobs in this location reflects the long term national trend of declining Manufacturing employment, with the industry becoming more capital intensive to remain competitive in an increasingly globalised trading environment (Department of Infrastructure and Transport 2013). The correspondence between the declining industries at Wetherill Park-Smithfield-Yennora and the growth industries at WSEA-Minchinbury suggests there may also be some movement of businesses and jobs to the newer and larger sites available at the nearby WSEA-Minchinbury. This is supported by Urbis (2013) which reports evidence that business relocations are prevalent from Wetherill Park and Smithfield to the WSEA.

Concluding remarks

This study identifies the 33 largest spatial concentrations of transport industry employment within Australia. These major transport employment hubs are all located within the five most populous capital cities and include airports, ports, CBDs and a range of industrial areas. This Information Sheet presents evidence on the number of jobs located in each of these transport employment hubs, the industry mix of those jobs, and the characteristics of workers in each location. In particular, it focuses on investigating the nature of employment in the industrial area hubs, many of which serve important freight and logistics functions.

Unlike the earlier BITRE Information Sheets in this series that explored the relationship between employment at the airport/port site and key measures of airport/port activity (BITRE 2013, 2014b), due to a lack of data availability, this study has not explored the relationship between employment at the freight-based

hubs and measures of freight activity. This gap represents an opportunity for further research as new small area data on freight activity are made available (see Box 2).

Box 2: Relating freight activity data and employment data

BITRE (2013) identified a strong positive correlation between airport employment and passenger numbers, while BITRE (2014a) identified a positive correlation between the number of TPW jobs in the port precinct and the number of port calls. It would also be helpful to understand the relationship between employment and the relevant transport-related activity measures for the remaining transport employment hubs (i.e. those that are not ports or airports).

The key transport-related function across these transport employment hubs is the provision of Road freight transport services. Unfortunately, national road freight activity data is not currently available at the small area scale (DZs) used in this study. However, the ABS' *National Road Freight Survey* is currently in the field and will represent a new source of information on the volume of freight to and from broad regions (e.g. Statistical Area Levels 3 and 4).

BITRE has separate work underway to model container flows in cities, and modelled freight movement data is available for specific states. For example, the NSW Bureau of Transport Statistics (BTS) has recently produced 2011 base year data (and forecasts to 2046) for heavy commercial vehicle (HCV) and light commercial vehicle (LCV) movements in the Sydney Greater Metropolitan Area (BTS 2014a,b). This freight movement data aligns well with BITRE's transport employment hubs which contain 19 of the top 20 travel zones, ranked according to total HCV trips. Wetherill Park-Smithfield-Yennora is the main hub for HCV movements, while the Sydney CBD is the main hub for LCV movements.

This Information Sheet, by identifying and profiling the major freight-based employment hubs in our cities, complements the work that is currently underway by state and federal governments to develop improved small area measures and forecasts of freight activity.

Logistics hubs are 'local networks of businesses that provide a wide array of logistics services, including transportation carriers, warehousing companies, freight forwarders and third party logistics service providers' and also include the distribution operations of retailers and manufacturers (Sheffi 2012, p.1). This Information Sheet has shown how the TPW, Manufacturing and Wholesale trade industries and the distribution centres of major retailers tend to co-locate, forming logistics hubs in strategically located industrial areas within Australia's major population centres. These industries all play key roles in the supply chain involved in moving goods from producer to consumer. The agglomeration of logistics activities in particular locations can make supply chains more efficient by reducing costs and improving service levels and flexibility, which are important factors for logistics firms[20] when making decisions about where to locate (Rivera, Sheffi and Welsch 2014). In the United States, there is evidence that logistics activities are increasingly concentrating in clusters and that these clusters are growing relatively strongly over time (ibid).

In some Australian cities, strong population growth is leading to pressure to rezone existing industrial land for housing and other purposes (NSW Department of Planning and Environment 2014). An example of a transport employment hub that is undergoing significant transition is Alexandria-St Peters in Sydney's inner south—it overlaps the Green Square urban renewal area, which has experienced substantial population growth and job losses over the last decade, as former employment sites were redeveloped for residential purposes (BITRE 2012).

This Information Sheet has provided some insight into the changes in employment and industry structure that have been occurring in Australia's major freight and logistics hubs in recent years. It has also established a set of replicable boundaries for the 33 major transport employment hubs, which can serve as a basis for future estimates of job growth, when new census data becomes available. This will support further analysis of the processes of transition that are underway, as established industrial areas undergo urban renewal and the newly developing outer suburban industrial areas expand and mature.

[20] This applies not just to TPW businesses, but also to location decisions relating to the logistics functions within other types of businesses (e.g. retailers, wholesalers, manufacturers).

Appendix A Definitions of transport employment hubs

Table A1 Details of geographic classification of each transport employment hub

Transport employment hub	Defined as the following spatial units for 2011	Defined as the following spatial units for 2006
Sydney		
Alexandria-St Peters	DZs 1328–1333, 1335, 1366, 1367, 1433, 1435 and 1437	Like for like comparison not feasible
Banksmeadow-Botany	Botany SA2 plus DZs 1520, 1521 and 9999 from Banksmeadow SA2	Travel zones 0416, 0417, 0420, 0421, 0423 and 0424
Chullora-Strathfield Mail-Strathfield South	DZs 1890, 1892, 1975, 2428 and 2436	Like for like comparison not feasible
Granville-Clyde-Rosehill-Silverwater	DZs 3746, 3894, 3900, 3999, 4023, 4029, 4046, 4047, 4049 and 4050	Like for like comparison not feasible
Lidcombe-Homebush Bay-Homebush	DZs 2411–2414, 4044, 4077 and 4079	Like for like comparison not feasible
Port Botany	Port Botany Industrial SA2 plus DZ 1519	Like for like comparison not feasible
Sydney Airport-Mascot	Sydney Airport SA2 plus DZs 1467 and 1468	Travel zones 0404, 0406, 0411, 0415, 0425 and 0581
Sydney CBD	Sydney-Haymarket-The Rocks SA2	Travel zones 0001–0101, 0105–0114, 0118–0152, 0154–0166, 0236 and 0237
Western Sydney Employment Area-Minchinbury	DZs 5449, 5630 and 5651	Travel zones 1884, 1884, 2179 and 2185–2189
Wetherill Park-Smithfield-Yennora	Wetherill Park Industrial SA2, Smithfield Industrial SA2 and Yennora Industrial SA2 plus DZ 4309	Travel zones 0981, 1040, 1042, 1043, 1817, 1818, 1820, 1823 and 1826
Melbourne		
Altona North-Laverton North-Sunshine West-Derrimut	DZs 1343, 1346, 1347, 1351, 1382, 1383, 1385, 1392–1394, 1396, 1567 and 1607–1619	DZs 0239, 0241, 0245, 0269, 0270, 0272, 0278–0280, 0282, 0454 and 0499–0514
Dandenong South-Hallam	DZs of 2824, 2825, 2827, 2828, 2831, 2832, 2834, 2835, 2870–2883, 2900, 2901, 3034 and 3040	DZs 1608, 1609, 1611, 1612, 1614, 1616–1618, 1620, 1621, 1655–1670, 1692, 1693, 1866 and 1869
Melbourne Airport	Melbourne Airport SA2	Combined Melbourne Airport-Tullamarine hub defined as DZs 0226, 0715, 0716, 0729 and 0745
Melbourne CBD-Southbank-Docklands	Melbourne SA2 plus DZs 1066, 1067, 1070, 1075, 1076, 1078, 1079 and 1080	Melbourne–Inner SLA plus DZs of 0035, 0038, 0044–0053
Port Melbourne Industrial Area	DZs 1095, 1097, 1172, 1174 and 1176	Like for like comparison not feasible
Port of Melbourne	DZs 1074, 1077, 1094, 1096, 1104, 1175, 1423 and 1435	Like for like comparison not feasible
Somerton-Campbellfield	DZs 1851–1853, 1855, 1856, 1858, 1860, 1867 and 1869	Like for like comparison not feasible
Tullamarine	DZs 1326, 1832, 1833, 1847 and 1864	Combined Melbourne Airport-Tullamarine hub defined as DZs 0226, 0715, 0716, 0729 and 0745
West Melbourne (Dynon)	DZs 1105, 1106 and 1107	Like for like comparison not feasible
Brisbane		
Acacia Ridge-Coopers Plains-Rocklea	Coopers Plains SA2 plus DZs 1744–1746 and 1748–1750	Like for like comparison not feasible
Bowen Hills	DZs 1637 and 1638	Like for like comparison not feasible
Brisbane Airport	DZ 1608	DZ 0135
Brisbane CBD-Spring Hill	Brisbane City SA2 plus DZs 1661–1663 and 1666–1668	City–Inner and City–Remainder SLAs plus DZs 0007–0009 and 0011–0013
Geebung-Virginia-Northgate-Banyo	Northgate-Virginia SA2, Geebung SA2 and DZ 1595	DZs 0109, 0119, 0121 and 0122
Larapinta-Heathwood-Parkinson	DZs 1752 and 1753	Like for like comparison not feasible
Murarrie-Hemmant	Murarrie SA2 plus DZs 1818 and 1821	Like for like comparison not feasible
Port of Brisbane	Brisbane Port-Lytton SA2 and DZ 1609	Like for like comparison not feasible
Perth		
Perth Airport	Perth Airport SA2 plus DZs 1722 and 1724	DZs 1280, 1285, 1290 and 1704–1706
Perth CBD	Perth City SA2	Perth Inner SLA plus DZs 1017, 1019– 1021, 1025–1027, 1029, 1031–1033, 1036, 1039, 1040, 1042, 1043, 1046–1054, 1056–1058, 1060, 1062, 1063, 1065, 1066, 1068, 1069, 1071, 1072, 1075, 1080, 1087, 1088, 1095, 1098–1100, 1104, 1106–1108 and 1110–1112
Welshpool-Kewdale-Forrestfield	Welshpool SA2, Kewdale Commercial SA2 and DZs 1142, 1419, 1730 and 1735	DZs 1133, 1298–1306, 1308, 1709, 1712 and 1718

(continued)

Table A1 continued

Transport employment hub	Defined as the following spatial units for 2011	Defined as the following spatial units for 2006
Adelaide		
Adelaide Airport	Adelaide Airport SA2	DZ 0086
Adelaide CBD	Adelaide SA2	DZs 0002–0025
Wingfield-Regency Park-Dry Creek-Gepps Cross	DZs 1152, 1157–1159, 1227, 1526, 1592, 1593, plus 2 meshblocks from DZ 1228 (40177810000, 40177841000).	DZs 0149, 0152, 0157–0159, 0227 and 0336

Notes: 1. Airport definitions based on BITRE (2013). Port definitions based on BITRE (2014a). Other transport employment hubs defined by BITRE to capture main spatial concentrations of 1500 or more TPW jobs with a density of at least 100 TPW jobs per square kilometre. Four digit codes for DZs relate to final four digits of DZ long code.
2. Change comparisons were only undertaken for hubs where the 2011 boundary could be closely approximated by 2006 boundaries (to within a 3 per cent margin of error). For the 17 hubs for which change comparisons are made, there may still be minor differences between the geographic scope of the 2006 and 2011 boundaries.

Source: BITRE analysis of ABS DZ, SLA, SA2 and meshblock boundaries; ABS *Census of Population and Housing* place of work data for 2011 and 2006; and BTS 2006 travel zone boundaries for NSW.

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