

Employment Generation and Airports

At a glance

- Employment and economic activities in and around an airport varies with different geographic scales being examined, position of the airport in the market (including spatial competition among airports when there is a secondary airport) and industry structure of the region.
- European evidence on the direct on-site jobs created by airports suggest medium to large sized airports create around 1000 jobs for every million passengers per annum (mppa) and equivalent American airports about 700 jobs per mppa, although this can vary from as low as 300 to over 2000 jobs per mppa depending on the airport.
- According to ABS census data, a total of 68 000 people were employed in 2011 at a set of 10 major Australian airport sites (all mainland capital city airports plus Gold Coast, Cairns and Townsville). Sydney, Melbourne, Brisbane and Perth Airports each have between 10 000 and 15 000 jobs located on-site.
- On-site employment at the selected major Australian airports is principally in the Transport, postal and warehousing industry (48 per cent) and in Public administration and safety (16 per cent). About 20 per cent of people employed at these airports have a bachelor degree or higher qualification, while 39 per cent have no post-school qualification.
- On average, across the ten selected major Australian airport sites, there were about 580 people employed onsite in 2011 for every million annual passengers. This is broadly in line with the average ratio for United States airports, but lower than the European average.
- In recent years, airports have been amongst the most important job growth hubs in Australian cities. Between 2006 and 2011, employment growth was particularly pronounced at the Perth Airport site (which added about 6 000 jobs), the Brisbane Airport site (4 300 jobs added), and at Melbourne Airport and its immediate surrounds (4 500 jobs added). Employment at airports has been growing as passenger numbers increase and as airports expand their scale of operations and create retail and office-based developments on-site.
 - Despite 19 per cent growth in passenger numbers at Sydney Airport between 2006 and 2011, there was minimal employment growth at the Sydney Airport site (200 jobs added) or at nearby Mascot (400 jobs added).

Introduction

This Information Sheet provides evidence about the relationship between airport infrastructure and economic activity. It draws together evidence from the international literature and evidence for major Australian airports.

Part One summarises the international evidence about the effects of airports on employment. Part Two summarises BITRE's examination of available economic impact studies of Australian airports. Part Three examines the evidence from the ABS Census of Population and Housing on the number of jobs located at major Australian airports in 2011, the industry structure and skill mix of that employment, and recent growth in employment.

PART ONE – International evidence on effect of airports on employment

The international evidence on airport employment shows that airports can be significant sources of employment, providing jobs for both skilled and unskilled workers. The number of jobs generally varies with airport size, the range of services provided by the airport and whether the airport caters for international services, with jobs per passenger typically higher at larger airports that cater to international air services and/or serve as route hubs (ACI Europe 1998).

As well as direct employment, airports also contribute to employment in upstream industries that supply goods and services to airports. Employment at airports tend to be less correlated with employment in the associated city than with aircraft operations providing a potential source of counter-cyclical employment during local economic downturns. On the other hand, employment at these airports can be heavily affected by fluctuations in aviation activity. This section summarises the key results of international studies into airport employment.

Employment levels

The traditional 'rule-of-thumb' for airport employment was considered to be generally around 1000 *direct on-site* jobs per million passengers per annum (mppa). This number is supported by several European studies, including Robertson (1995), Twomey and Tomkins (1995), ACI Europe (1998), Hakfoort et al. (2001) and York Aviation (2004). For example, ACI Europe (1998) reports an average direct on-site job density of 1100 jobs per mppa for a sample of 23 European airports.

However, job density varies considerably across airports from as low as 300 jobs per mppa to over 2000 jobs per mppa. Based on a sample of European airports, ACI Europe (1998) delineates four broad airport types by job density:

- Low job density airports (350–750 jobs per mppa)—tend to have low to medium passenger and/or freight
 volumes serving mainly domestic and charter (package holiday) markets, with no airlines based at the airport
 and limited associated airport-related developments such as office space. In particular, the Spanish airports of
 Barcelona, Gran Canaria and Malaga have very low on-site job densities (370–420 jobs per mppa) because of
 their dependence on incoming tourism traffic and the centralised organisation structure of Spanish airports
 (ACI Europe 1998).
- Medium density airports (750–1100 jobs per mppa) —such as Munich, Oslo and Zurich tend to have medium to high passenger and/or freight volumes, service international routes, and have some airlines based at the airport with significant associated services.
- High density airports (1100–1500 jobs per mppa) —such as Heathrow, Paris Charles de Gaulle and Amsterdam Schiphol tend to be major international hubs with high passengers and/or freight volumes, and are often the base for one or more major airlines, with associated office space and other services.
- Small/medium specialised service airports (over 1500 jobs per mppa)—such as Brussels, Cardiff and Hamburg that have high job densities as they serve as airline headquarters and/or maintenance bases or have low economies of scale or large volumes of freight.

The average job density at North American airports, however, generally appears to be lower than at equivalent European airports. For example, a combined sample of nearly 30 American airports implies an average job density of 680 jobs per mppa (Leigh Fisher 2011, Table 7 and ACI North America 2002). Both small and large American airports appear to have lower job densities than their European peers. Whether this regional difference is due to fundamental differences in airport operations or definitional differences in employment measures (See Box 1) is unclear.

Box I Measuring airport employment

Total employment generated by an airport includes i) the number of workers employed **directly** at the airport, ii) the number of jobs **indirectly** generated in the chain of suppliers and iii) **induced** employment arising from expenditure by direct and indirect employees. It is often not made clear whether direct employment includes only direct aviation and airport-service related jobs at the airport or also includes all **on-site** jobs, including, for example, employment at business parks located within the airport precinct. The employment estimates for Australian airports presented in Part Three make clear this distinction.

It is also often not clear whether airport employment estimates in many international studies are the raw sum of casual, part- and full-time jobs or whether they have been converted to a full-time equivalent measure. One exception is York Aviation (2004) which explicitly states that the job estimates are not full-time equivalents.

Lack of independence is an issue with overseas evidence, as many of the larger studies tend to be commissioned by interest groups such as the airports themselves or the Airports Council International (ACI). While there are some independent academic studies, the airport statistics they report tend to come from airport commissioned studies. This is not an issue for the Australian airport employment estimates, presented in Part Three, which are based on ABS employment data.

Importantly, direct airport employment levels and job density may be decreasing over time due to productivity improvements in airport operations and also with the increase in 'no frills' airlines (York Aviation 2004).

The reported total employment generated by an airport (the sum of direct, indirect and induced jobs), relative to direct employment, varies widely across studies, from 1.5 to as much as 7.2 times the number of direct jobs (Twomey and Tomkins 1995, Hakfoort et al. 2001 and York Aviation 2004) though it is most commonly between 2 and 3 times the number of direct jobs. According to Hakfoort et al. (2001) this ratio can change because of the geographical area assumed to be affected, different patterns of economic activity at different airports, different assumptions regarding upstream and downstream industry linkages, and different base case assumptions about the counterfactual scenario— i.e. the level of production and employment in the region in the absence of the airport. As an example of how the choice of geographical area affects the reported results, York Aviation (2004), reviewing impact studies from across 25 airports, found on average for every million workload units¹ European airports supported total employment (direct, indirect and induced) of 2950 jobs nationally, 2000 jobs regionally or 1425 jobs sub-regionally. However, even when the area assumed to be affected is kept constant different studies can give very different results as shown by three different studies for Manchester airport conducted around the same time (1988–1993) covering the same area (North West England) but with results showing total employment as 2.5, 3.6 and 4.4–5.6 times on-site employment (Hakfoort et al. 2001).

Airport employment and skills mix

Airports typically provide direct employment across a range of industries employing a mix of both skilled and unskilled workers, with the industry and skilled–unskilled distributions often varying across airports. Measuring the skills mix of employment at airports is often difficult, and different studies provide significantly different results. Key findings from selected studies include:

- York Aviation (2004) report that 64 per cent of on-site workers at European airports are employed by airlines, handling agents or aircraft maintenance, with the rest divided between airport operators (14 per cent), catering, restaurants, bars and retailing (12 per cent), air traffic control and related agencies (6 per cent), freight, fuelling and other (4 per cent combined) (York Aviation 2004). The industry distribution of workers varies with size—airport operators tend to account for a higher proportion of employment at smaller airports and vice versa at large airports. Airline employment comprised a similar proportion of private employment at San Francisco International Airport (Reich et al. 2005) and Hartsfield Atlanta International Airport (ACI North America 2002).
- A 2012 study by the UK Commission for Employment and Skills found that 'Air transport' workers as classified by their Labour Force Survey had the lowest percentage of low qualification workers (Level 1 and below) of any of the transport sectors—12 per cent compared to 37 per cent for the transport sector in general and 23 per cent for the UK workforce as a whole. However, practically all Air transport workers in the Labour Force

Survey were managers and senior officials, associate professionals and technical workers (air traffic controllers, pilots, flight engineers) or personal services workers (air travel assistants), suggesting that their definition of Air transport workers excludes retail staff, cleaners, etc.

- In contrast, Reich et al. (2005) report that around 28 per cent of the 28 300 strong private-sector workforce at San Francisco International Airport received pay increases due to new 'living wage' policies, with low wage workers concentrated in the 11 000 strong ground-based, non-managerial workforce such as customer service workers, ramp workers, baggage handlers, screeners, cabin cleaners and restaurant and retail workers. Using low-wages as a proxy for low skills, the estimates imply a significant proportion of San Francisco International Airport's workers are low skilled.
- Hakfoort et al (2001) provides similar evidence for the Netherlands, which suggests that slightly more than half the direct, indirect, and induced jobs resulting from growth at Schiphol Airport (Netherlands) are in low skilled occupations, such as drivers, security staff and low-skilled manufacturing activities, especially in the periphery of the Greater Amsterdam Region.

Airports may also provide significant employment benefits to the local area, with studies of employment at UK airports suggesting over 80 per cent of airport-related employees live within 30 minutes' drive of the airport. International airports could increase local resilience to domestic economic downturns—for example, CDM Smith (2012) found a higher correlation between direct full-time equivalent on-airport jobs and air operations amongst 490 American commercial airports, than between direct on-airport jobs and employment in the city. However, this may also expose airports to adverse effects from external economic events.

PART TWO — Impacts of Australian airports

A number of impact studies were identified that had been commissioned by airports or the Australian Airports Association. The latter commissioned a Deloitte Access Economics (DAE) study (2012) on the economic and social contribution of Australia's airports.

Table I summarises BITRE's examination of these studies (summary figures for Perth are cited as the study itself was not available). The impacts of individual airports in Table I are not additive as the methodologies used to derive estimates vary widely.

The direct and indirect contribution for Australia is sourced from the Deloitte Access Economics study (2012), which does not separately identify the impacts of major airports.

	Brisbane	Canberra	Gold Coast	Perth	Melbourne	Sydney	Australia
International passengers 2011–12 (millions)	4.5	0	0.7	3.5	6.7	12	28.9
Domestic/regional passengers 2011–12 (millions)	16.4	3.16	4.6	8.5	21.3	24	108.4
International air freight 2011–12 ('000 tonnes)	104.2	0	5	72.2	233.2	417.9	856.8
Direct contribution– value added (\$ billions)	2.5ª (2011)	. 4⁵ (2010)	0.27° (2010)	2,2 ^d (2003)	0.53° (2007)	8.0 ^r (2006–07)	7.3ª (2010–11)
Direct employment estimate ('000 FTEs)	20.0ª (2011)	10.2 ^b (2010)	∣.3° (20⊺0)	5.96 ^d (2003)	10.96 (2007)	44.4 (2006–07)	5.2 ^g (2010–11)
Indirect contribution (\$ billions)	4.0 (2011)		∣.59° (2010)			8.5 (2006–07)	

Table I Summary of activity, employment and contribution from Australian airport impact studies

a Brisbane Airport Corporation Pty Ltd September 2012 Fact Sheet 2

b ACIL estimates Canberra Airport Gross Regional Product and employment from aviation and non-aviation activity, and regional tourism impacts. BITRE has excluded regional tourism impact benefits. ACIL base estimate does not include 'catalytic benefits'.

No information on methodology used for Gold Coast Airport, Indirect benefits are 'facilitated tourism impact' for the region.

d No information available on the methodology used for Perth International Airport. Estimate includes "all airport related activities" and may therefore not be comparable to other estimates presented.

e SKM (2008) utilised general equilibrium modelling to determine the direct economic contribution.

URS (2008) uses value-add as an approximate for gross state product. Indirect benefits are flow on impacts' in the order of \$8.5 billion.

g DAE (2012) includes 'core airport operations' as well as the wider 'Airport precinct'.

Sources DAE (2012); SKM (2008); URS (2008); BITRE (2013); ACIL Tasman (2011); Perth Airport Pty Ltd. (2011); Gold Coast Airport (2011); Brisbane Airport Corporation Pty. Ltd. (2012)

Notes:

The key points that emerge from BITRE's examination of these studies are summarised below:

- The lack of independence raises concerns that studies may over-state the "benefits" of the airport-related activity (measured in jobs, Gross State Product, et cetera).
 - For example, URS (2008) found that the economic impact of Sydney Airport was equivalent to approximately 2 per cent of the Australian economy (2006–07). This is very high given that Australia's whole tourism sector share of value added was 2.6 per cent of GDP in 2009–10 (ABS 2010) and the total value added of the Air and space transport industry was 0.52 per cent of the Australian economy in 2010–11 (ABS 2012).
- The individual airport studies differ in the methodology used.
 - For example, the URS (2008) study uses input-output analysis as the primary 'economic impact' measure, to which it adds estimated indirect or flow on impacts (but excluding so-called catalytic benefits), while the SKM study (2008) used a general equilibrium model.
- The individual airport study findings are often not presented in a comparable way.
 - For example, SKM (2008) do not estimate Melbourne Airport's contribution to Gross State Product, while the URS (2008) study for Sydney Airport gives no breakdown of regional, domestic and international sectors.
- A key variable is FTE employment. Table 1 suggests substantially higher 'direct employment' for Sydney (FTE 44 389) than Melbourne (10 965). This gap in employment is much larger than expected given the difference in passenger numbers at the two airports (see Table 2).
- The DAE (2012) study estimates that the total economic contribution of Australia's airports in 2011 was:
 - \$3.183 billion for core airport operations, with employment of 6865 full time equivalent.
 - an additional \$14.083 billion for the airport precinct (eg car parking, unrelated retail activities), with precinct employment estimated at 108 291 full time equivalent.
- The scope and importance of non-aviation activity varies substantially.
 - DAE (2012) state that 'Regional and remote airports generate about 25 per cent of their revenue from non-aeronautical sources. This compares to around 44 per cent in major and major regional airports.'
 - Non-core employment can be more than 90 per cent of full time employment. ACIL Tasman (2011) estimates that most of Canberra Airport's direct employment is from non-aviation activity (9 219 of 10 194 FTE).
- While new airport infrastructure can be an important enabler of new activity, the actual economic impact—that is, increased rather than diverted activity—depends on whether this potential results in reduced fares and/or improved service quality.
 - If prices are reduced or service quality improved, this will result in both new passengers (who would not otherwise have travelled) and a transfer of passengers from other modes (for example, road) or other airports.
- Traffic composition is important in determining the impacts. This differs substantially across the airports—for example, Sydney had just under twice the number of international passengers and almost twice the freight of Melbourne, while Canberra has no international activity.

PART THREE — Employment at major Australian airports

Approach

The analysis in this section is focused on jobs that are physically located at major Australian airport sites. It does not attempt to capture offsite jobs that are directly or indirectly associated with airport activity. The scope of this analysis is all Australian airports which had at least 750 000 revenue passenger movements in the 2011 calendar year (reflecting the sum of inbound and outbound domestic and international passengers on regular public transport operations), according to BITRE Airport Traffic Statistics. This scope captures 16 Australian airports, including airports in all eight capital cities, as well as major regional airports (e.g. Mackay, Launceston) and secondary metropolitan airports (e.g. Avalon).

Estimates of employment located at Australian airports are available from the Australian Bureau of Statistics (ABS) Census of Population and Housing at 5-yearly intervals. The employment data is a count of the total number of employed persons who reported a place of work at the relevant airport, irrespective of whether they are working on a full-time or part-time basis. The ABS census data presented in this section provides a conservative estimate of employment at airports, which is comparable across cities. The census job data differs from the estimates provided in Table I, which are typically produced by the airports themselves, and are expressed on a full-time equivalent basis. The ABS census data is likely to systematically underestimate employment at airports, due to census under-enumeration and because about 5 per cent of those who participate in the census do not respond to the census place of work question and about 5 per cent of responses could not be coded to a Statistical Local Area (response rates are for 2006).

The geographic boundaries of the airport sites were established using airport master plans, and then approximated using ABS Australian Statistical Geography Standard (ASGS) Statistical Area Level 2 (SA2) boundaries and the state governments' destination zone boundaries for 2011. It was possible to closely approximate the airport site for 10 of the 16 in-scope airports, constituting the principal airports of each of the 7 mainland capital cities as well as the Gold Coast, Townsville and Cairns airports.

Several of the airports (i.e. Darwin, Townsville and Newcastle) are attached to a RAAF base, and for those airports, the available statistical boundaries did not separate out the civil zone, and so it was necessary to define the airport site as containing both the civil and military zones. Consequently, employment estimates for these airports incorporate a substantial number of jobs in the Defence industry.

For the remaining 7 in-scope airports, for which statistical boundaries did not provide a close approximation to the airport site, employment estimates were produced for the airport's surrounds. This data on 'airport surrounds' relates to the smallest available statistical boundary which includes the airport site, and will capture some surrounding rural, residential and industrial areas. For example, 'Mackay airport surrounds' is based on the 'South Mackay' SA2 boundary, which contains only a single destination zone, and incorporates a significant residential area in addition to the airport.

Sydney Airport constitutes a special case, as it is the only in-scope airport for which there has been a large-scale spillover of aviation employment beyond the airport site into the surrounding area. The adjacent suburb of Mascot actually contains more Air and space transport industry jobs than does the airport site itself (7753 vs 5586). For this reason, we have presented results for 'Sydney Airport surrounds' in this Information Sheet (which includes Mascot as well the KSA site), in addition to the Sydney Airport site results.

Details of how BITRE has defined the airport sites and airport surrounds, based on SA2 and destination zone boundaries, are provided in Appendix A.

Overview of airport employment in 2011

Table 2 presents estimates of the number of persons employed in 2011 at 10 major Australian airport sites, based on ABS Census of Population and Housing data. These 10 airport sites have a combined employment total of 68 001 jobs. The four busiest airports in Australia (i.e. Sydney, Melbourne, Brisbane and Perth) all have between 10 000 and 15 000 jobs located on-site, with Brisbane Airport having the most on-site jobs (14 731). There also tends to be a large number of jobs located in the immediate surrounds of these airports, as can be seen from the Sydney Airport surrounds data, which reveals that the adjoining suburb of Mascot contains more jobs (16 544) than Sydney Airport itself (12 275), while also containing more jobs in the Air and space transport industry.

	Total revenue passengers on regular public transport flights	Total jobs	Transport, postal and warehousing jobs	Air and space transport jobs	Share employed in Transport, postal and warehousing (per cent)	Share employed in Air and space transport (per cent)
Airport sites						
Sydney	35 624 452	12 275	7 196	5 586	59	46
Melbourne	27 607 163	13910	8 205	5 079	59	37
Brisbane	20 278 027	14 731	7 255	4 027	49	27
Perth	11 328 099	023	5 029	2 282	46	21
Adelaide	7 021 407	4 446	1 944	I 207	44	27
Gold Coast	5 261 773	352	465	234	34	17
Cairns	3 848 728	1912	843	599	44	31
Canberra	3 206 103	4 860	367	217	8	4
Darwin#	743 664	2012	787	535	39	27
Townsville#	6 5 772	I 480	193	125	13	8
Airport surroun	ds					
Sydney^	35 624 452	28 821	16 617	13 339	58	46
Hobart	844 68	9 6	234	100	12	5
Newcastle#	9 59	4 066	223	159	5	4
Launceston	25 6 4	08	242	54	22	5
Mackay	1 082 601	5	147	49	13	4
Sunshine Coast	857 415	62	359	41	31	4
Avalon	758 894	906	176	120	19	13

Notes: Census-based employment estimates will be conservative, due to census under-enumeration, non-response and 'place of work' coding difficulties. Job counts represent the sum of full-time and part-time jobs, and are not full-time equivalent. Detail of airport site and airport surround geographic classifications are provided in the Appendix A.

The employment data for these airports include a RAAF base as well as the civil airport.

Both the Sydney Airport site and Sydney Airport surrounds are included in the table, as it is the only airport where there is large scale spillover of aviation industry jobs beyond the airport site, into adjoining areas (specifically, Mascot).

BITRE analysis of ABS ASGS and destination zone boundaries for 2011, ABS Census of Population and Housing place of work data for 2011 and Sources: BITRE Airport Traffic Statistics data for 2011 calendar year.

At the five major capital city airports, about half of all on-site employment is in the Transport, postal and warehousing industry. One component of the Transport, postal and warehousing industry is the Air and space transport industry, which accounts for between 21 and 46 per cent of on-site employment at the different airports. At some of the smaller airports, the transport industry represents a relatively small fraction of overall employment. In particular, only 8 per cent of Canberra Airport on-site employment is in the transport industry, due to the office and retail development that has occurred on airport land in recent years. Transport similarly accounts for a relatively small share of employment at Townsville Airport, but that is because the great majority of employment is in the Defence industry, due to the colocation with the RAAF base.

Figure I presents the industry mix of employment at ten major Australian airport sites. The Transport, postal and warehousing industry dominates, with 48 per cent of employment. The Public administration and safety industry contributes 16 per cent of jobs at these airport sites, reflecting the government's role in customs, quarantine and security at airports, as well as RAAF employment at Darwin and Townsville airports, and substantial office-based public sector employment at the Canberra airport site (e.g. the ACT Emergency Services Agency, the Department of Defence, the Australian Research Council). Other significant industries of employment at Australian airport sites include Retail trade, Accommodation and food services, and Manufacturing.



Figure 1 Industry mix of employment at 10 major Australian airport sites, 2011

Note: Data relates to 10 major airport sites (all capital cities apart from Hobart; plus Gold Coast, Cairns and Townsville). Excludes industry inadequately described, not applicable and not stated.

Source: BITRE analysis of ABS Census of Population and Housing 2011 place of work data for SA2 and destination zone boundaries.

Figure 2 summarises the occupational mix at these 10 major Australian airport sites. The principal occupations are Clerical and administrative workers (17 per cent), Community and personal service workers (15 per cent), Technicians and trade workers (15 per cent) and Professionals (14 per cent). Canberra Airport has a different profile to the other airports, with a substantially higher proportion of Professionals (31 per cent) and Managers (22 per cent), and far fewer Machinery operators and drivers (2 per cent). Both Sydney and Melbourne have a relatively low proportion of Professionals and Managers working at the airport site.



Figure 2 Occupational mix of employment at 10 major Australian airport sites, 2011

Note: Data relates to 10 major airport sites (all capital cities apart from Hobart; plus Gold Coast, Cairns and Townsville). Excludes occupation inadequately described, not applicable and not stated.

Source: BITRE analysis of ABS Census of Population and Housing 2011 place of work data for SA2 and destination zone boundaries.

Information sheet

46



Figure 3 Highest educational qualifications of workers at 10 major Australian airport sites, 2011

Note: Data relates to 10 major airport sites (all capital cities apart from Hobart; plus Gold Coast, Cairns and Townsville). Excludes level of education inadequately described or not stated.

Source: BITRE analysis of ABS Census of Population and Housing 2011 place of work data for SA2 and destination zone boundaries.

Employment per million annual passengers

Employment in the Air and space transport industry at a particular airport site is closely connected to that airport's passenger throughput. Figure 4 shows a very high correlation of 0.98. On average, in 2011, across the 10 selected major Australian airport sites, there were about 170 on-site jobs in the Air and space transport industry per mppa. The ratio ranged from a low of 44 for Gold Coast to a high of 307 for Darwin.

Figure 4 Relationship between passenger numbers and industry employment at 10 major Australian airport sites, 2011



Notes: Data relates to 10 major airport sites (all capital cities apart from Hobart; plus Gold Coast, Cairns and Townsville). Census-based employment estimates will be conservative, due to census under-enumeration, non-response and 'place of work' coding difficulties. Source: BITRE analysis of ABS ASGS and destination zone boundaries for 2011, ABS Census of Population and Housing place of work data for 2011, and BITRE Airport Traffic Statistics data for 2011 calendar year.

Figure 4 also shows the association between on-site employment in the Transport, postal and warehousing industry and passenger numbers at the airport. The relationship is not as strong as that for the Air and space transport industry, with a lower correlation coefficient of 0.92. On average, in 2011, across the 10 selected major Australian airport sites, there were about 270 on-site jobs in the Transport, postal and warehousing industry per mppa. Again, there was wide variation around this average across the individual airport sites.

The total number of jobs at an airport site is also positively associated with the number of passengers at the airport, although the correlation coefficient of 0.86 is lower than that for the transport-specific industries. Figure 5 shows that the ratio of on-site jobs per mppa varies widely across the ten selected airport sites. While the rule of thumb discussed in the European literature (see part one of Information Sheet) is 1 000 jobs per mppa, the ratios are typically lower than that for Australian airports.

Canberra Airport has by far the highest ratio of about 1 500 jobs per mppa in 2011, reflecting the large-scale office park development that has occurred over the last decade on the Canberra Airport site (i.e. Brindabella Business Park, Majura Park, Fairbairn). Darwin and Townsville also have relatively high ratios, reflecting significant defence-related employment at these airports. Gold Coast and Cairns have relatively low ratios, a result which is consistent with the international evidence that airports which are highly dependent on incoming tourism traffic, such as the Spanish airports of Malaga and Gran Canaria, tend to have low on-site employment densities and ratios of less than 500 jobs per million passengers (ACI Europe 1998). Sydney Airport site has a low ratio by itself, reflecting the constraints of the site. However when including the large scale spillover of aviation-related jobs beyond the airport site into adjacent areas of Mascot, the ratio was more than doubled.

On average, across the ten selected major Australian airport sites, there were about 580 people employed at airport sites in 2011 for every million annual revenue passengers. There was wide variation around this average. This ratio is broadly comparable to the average for US airports (i.e. 680 jobs per mppa), as discussed in part one. It is considerably lower than the European average.



Figure 5 Ratio of on-site employment per million passengers for ten major Australian airports, 2011

Notes: Data relates to 10 major airport sites (all capital cities apart from Hobart; plus Gold Coast, Cairns and Townsville). Excludes passengers on charter flights. Census-based employment estimates will be conservative, due to census under-enumeration, non-response and 'place of work' coding difficulties.

[#] The Townsville and Darwin airport sites have been defined as including both the civil and military zones of the airport. Both therefore include a RAAF base, which represents a substantial proportion of total employment.

Source: BITRE analysis of ABS ASGS and destination zone boundaries for 2011, ABS Census of Population and Housing place of work data for 2011 and BITRE Airport Traffic Statistics data for 2011 calendar year.

While the ratio for the Sydney Airport site is less than 400 jobs per mppa, the ratio for Sydney Airport and surrounds (which includes the adjacent suburb of Mascot) is just under 800 jobs per mppa.

Changes in airport employment from 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). The significant boundary changes mean that 'like for like' comparisons of 2006 and 2011 census data could only be made for seven of the ten airport sites listed in Table 2. Table 3 presents estimates of employment change for the seven airport sites for which 2006 statistical boundaries closely matched the 2011 boundaries used to approximate the airport site. Estimates of employment change are also presented for Sydney Airport surrounds, Melbourne Airport surrounds and Mackay Airport surrounds.

Perth Airport experienced by far the largest increase in employment between 2006 and 2011, shifting from around 5000 jobs in 2006 to around 11000 jobs in 2011, which represents a 121 per cent increase in total employment at the airport site. Brisbane Airport added about 4 300 jobs between 2006 and 2011, while Melbourne Airport surrounds (which includes the airport site and an adjacent industrial area) added about 4 500 jobs. In contrast, there were employment losses at Cairns Airport site, and for Mackay Airport surrounds.

There is a positive association between the rate of growth in passenger numbers at an airport and the rate of growth in employment at the airport site (correlation = 0.83). For example, the Perth and Gold Coast Airports both experienced very rapid growth in both passenger numbers and on-site jobs, while Cairns Airport experienced the lowest rate of passenger growth and was the only airport site to record a net loss of jobs.

However, an increase in passenger numbers does not always lead to the creation of additional jobs, with the 19 per cent increase in passenger numbers at Sydney Airport between 2006 and 2011 resulting in only a very minor increase in employment. Similarly, the rapid growth in regular public transport (RPT) flight passengers at Mackay Airport did not result in additional jobs for 'Mackay Airport surrounds'. On the other hand, for Canberra Airport, on-site employment growth has considerably outpaced growth in passengers, which reflects new office and retail developments on airport land. The extraordinary growth in on-site employment at Perth Airport reflects a combination of growth in RPT flight passengers, charter flight passengers, and ongoing redevelopment of the airport site.

Airport	Growth rate of revenue passengers on regular public transport flights, 2006 to 2011 (per cent)	Change in number of employed persons, 2006 to 2011	Growth rate of jobs, 2006 to 2011 (per cent)
Airport site			
Sydney	19	200	
Brisbane	21	4 300	41
Perth	52	6 000	121
Adelaide	17	900	26
Canberra	23	700	54
Gold Coast	45	400	42
Cairns	2	-200	-7
Airport surrounds			
Sydney^	19	600	2
Melbourne [#]	28	4 500	34
Mackay	53	-200	-16

Table 3 Employment growth at selected major Australian airports, 2006 to 2011

Notes: For 7 of the 10 airports for which airport site boundaries could be closely approximated using 2011 SA2 and destination zone boundaries (see Table 2), BITRE was able to get a close match between the 2006 and 2011 geographic boundaries and thus perform a 'like for like' comparison of change, For these 7 airports, and the 3 airport surrounds, minor differences between the geographic scope of the 2006 and 2011 data may impact on the validity of the change estimates, which have been rounded to the nearest 100 persons to reflect the margins of error involved. For 2006, adjusted BTS employment data for destination zones was used for Sydney, while for other cities ABS destination zone employment data was used. Detail of airport site and airport surround geographic classifications are provided in Appendix A.

Both the Sydney Airport site and Sydney Airport surrounds are included in the table, as it is the only airport where there is large scale spillover of aviation industry jobs beyond the airport site, into adjoining areas (specifically, Mascot).

The Melbourne Airport site could not be closely approximated using 2006 destination zone boundaries. 'Melbourne Airport surrounds' extends beyond the airport site to include a significant adjacent industrial area to the south of the airport, and enables a 'like for like' comparison of the 2006 and 2011 data to be made. This industrial area contained about 3800 jobs in 2011, compared to the total of 17 745 jobs in 'Melbourne Airport surrounds'.

Sources: BITRE analysis of BITRE Airport Traffic Statistics for 2006 and 2011 calendar years, ABS Census of Population and Housing data for 2006 and 2011 at destination zone and SA2 scale and NSW Bureau of Transport Statistics place of work data for destination zones in 2006.

The seven airport sites listed in Table 3 added about 13 000 jobs in total, representing a 35 per cent growth in employment since 2006. Passenger numbers at the seven airport sites rose by 16.4 million between 2006 and 2011, representing a 23 per cent growth rate. On average, for every one million additional passengers that travelled through these airports between 2006 and 2011, roughly 800 additional on-site jobs were created.

Figure 6 compares job growth at airports (and, in the case of Melbourne Airport, their immediate surrounds) to city-wide jobs growth between 2006 and 2011. It reveals that for each city (apart from Sydney), airport employment growth was considerably higher than the city's overall rate of employment growth. In particular, the Perth Airport site experienced employment growth of 121 per cent between 2006 and 2011, compared to the 17 per cent employment growth for the Perth Statistical Division (SD) over this period. The important exception to the overall pattern was Sydney Airport. Total employment in the Sydney SD grew by 8 per cent between 2006 and 2011, while employment at the airport site rose by just over 1 per cent and employment at 'Sydney Airport surrounds' (which includes Mascot) rose by 2 per cent.



Figure 6 Comparison of airport jobs growth to city-wide jobs growth, 2006 to 2011

Notes: Data on job growth at airports relates specifically to the airport site, except for Melbourne (see below). The city-wide jobs growth figures relate to capital city statistical divisions (defined based on 2006 ABS ASGC boundaries). The substantial changes in ABS statistical geographies created practical difficulties in producing 'like for like' comparisons of total employment change for statistical divisions could be made on the capital city statistical divisions which contain one of the airports listed in Table 3 (i.e. for which valid change comparisons could be made between 2006 and 2011).

The growth rate of airport jobs relates to 'Melbourne Airport surrounds', which includes an adjacent industrial area as well as the airport site. The airport site accounts for about 80 per cent of jobs in 'Melbourne Airport surrounds'.

Source: BITRE analysis of ABS Census of Population and Housing data for 2006 and 2011 at destination zone and SA2 scale.

There was also strong employment growth at the four busiest airport sites during the preceding 2001 to 2006 period:

- The Sydney Airport site added about 2400 jobs between 2001 and 2006, which was a 25 per cent growth rate (Transport Data Centre 2008). However, 'Sydney Airport surrounds' added just 500 jobs, reflecting job losses at Mascot between 2001 and 2006 (BITRE 2012).
- The Melbourne Airport site added about 2100 jobs, which was a 19 per cent growth rate (BITRE 2011)
- The Brisbane Airport site added about 3 200 jobs, involving a growth rate of about 45 per cent (BITRE forthcoming)
- The Perth Airport site added about 1700 jobs, which was a growth rate of about 50 per cent (BITRE 2010).

Profiles of airport employment

Table 4 provides some summary indicators of the characteristics of workers at seven of the eight capital city airports. The table is based on ABS Working Population Profile data for SA2s from the 2011 census. The airport sites account for at least two-thirds of employment in each of the listed SA2s, and in the case of Sydney, Melbourne and Adelaide the SA2s essentially capture all airport on-site employment. Thus, the SA2 profiles should provide a useful guide to how the characteristics of workers differ across these airports.

Males typically account for just under two-thirds of employment, with Canberra having a slightly lower proportion of males (60 per cent) than the other airports. The median age of airport workers typically lies within the 40 to 44 age category, but is a little lower than this for the Adelaide and Darwin airports. Employment is principally on a full-time basis, with the proportion of full-time workers ranging between 73 per cent (for Sydney and Adelaide) and 87 per cent (for Canberra).

BITRE's estimates of average gross weekly individual income vary widely across the airport sites, from a low of \$1211 in Adelaide to a high of \$1752 for Canberra. These differences in income reflect the skill mix of airport employment, with Adelaide Airport having a much lower representation of Managers and Professionals in its workforce than Canberra (23 vs 53 per cent). The highly skilled occupational mix of the Majura SA2, which contains Canberra Airport, reflects the prominence of office park based employment at Canberra Airport as well as Department of Defence offices located elsewhere in this SA2.

Typically, more than 90 per cent of airport workers are using a private vehicle for the journey to work. Sydney has a lower private vehicle mode share of 83 per cent, with about 14 per cent of Sydney Airport workers using public transport to get to work (principally by train). Darwin Airport also has a lower private vehicle mode share than the other cities (89 per cent), reflecting relatively high use of cycling and walking (6 per cent, combined).

Airport	Proxied by the following SA2	Share of Male workers (per cent)	Median age (range, years old)	Share of full-time workers (per cent)	Average income (\$)	Share of private vehicles for the journey to work (per cent)
Sydney	Sydney Airport	63	40–44	73	1261	83
Melbourne	Melbourne Airport	64	40–44	68	1272	94
Brisbane	Brisbane Airport^	66	40–44	80	1380	94
Perth	Perth Airport#	66	40–44	77	1339	95
Adelaide	Adelaide Airport	66	35–39	73	2	92
Canberra	Majura^	60	40–44	87	1752	93
Darwin	Darwin Airport#	63	35–39	82	1384	89

Table 4 Selected indicators of the characteristics of workers at capital city airports, 2011

Notes: Hobart was excluded as the Hobart Airport site constitutes a relatively minor part of the Cambridge SA2 to which it belongs, so that the SA2 employment profile is unlikely to provide a useful guide to the characteristics of airport employment. The Sydney Airport, Melbourne Airport and Adelaide Airport SA2 are a close match to the airport site (as defined in the airport master plan).

The full-time proportion calculation excludes those who were away from work on census day or did not state their hours of work.

Average income was estimated by BITRE using the midpoint income of each census income range, with negative, nil and not stated income responses excluded from the calculation and the '2000 or more' category assigned a conservative average value of \$3000 (based on evidence from the ABS Survey of Income and Housing 2009–10 and ABS special tabulations of average census incomes).

The airport site accounts for the majority of employment in this SA2.

[#] The airport site extends somewhat beyond this SA2, but the great majority of onsite employment is located within the SA2 boundary.

Source: BITRE analysis of ABS Census of Population and Housing 2011 Working Population Profiles for SA2s.

Appendix B provides more detailed information on employment at each major Australian airport. Where data is readily available, a profile of airport employment has been provided (based on the ABS' 2011 Working Population Profile), covering age, gender, employment status, income, occupation and transport use. Information is provided on recent changes in airport employment, for those airports where a 'like for like' comparison was practical. Differences in data availability and data comparability over time mean that some of the airport profiles contain much more detailed information than others.

Appendix A—Details of airport geographical classification

Table A1 Details of geographic classification of each airport site

Airport site	Defined as consisting of the following spatial units for 2011	Comments on match to airport site (as defined in airport master plans)	Defined as consisting of the following spatial units for 2006	Comments on match of 2006 to 2011 classification
Sydney	SA2 of Sydney Airport (117011325)	Very close match. Missing small logistics site in the north of airport (in Tempe).	DZ codes of 0411, 0415, 0425 and 0581	Exact match.
Melbourne	SA2 of Melbourne Airport (210051248)	Close match. SA2 extends beyond airport site in several places, into peri-urban areas which are likely to contain minimal employment.	na	Like for like comparison not feasible.
Brisbane	DZ code 310361608	Close match. DZ extends beyond airport site to include some commercial areas adjoining airport to west.	DZ code 0135	Reasonably close match. Some minor boundary differences, with army stores area excluded from 2006 DZ and golf course included.
Perth	SA2 of Perth Airport (506021121), plus DZ codes of 510611724 and 510611722	Close match. The DZs have been included to ensure most of a commercial precinct in the north-east of the airport site is captured. One of the DZs includes a substantial land area beyond the airport site, but this non-airport land seems to contain relatively little employment.	DZ codes of 1280, 1285, 1290, 1704, 1705 and 1706	Close match. Some minor boundary differences, with part of the airport conservation area excluded from 2006 DZs, but this is unlikely to impact on employment.
Adelaide	SA2 of Adelaide Airport (404031104)	Close match. Misses Patawalonga and Torrens precincts of airport, which are likely to contain minimal employment.	DZ code of 0086	Exact match.
Gold Coast	DZ code of 312311968	Reasonable match to Queensland part of airport site, although does include nearby landfill site, park and residential strip between airport and coastline (which includes several tourist accommodation establishments). Excludes NSW part of airport, but there was no aviation industry employment in the relevant NSW DZ.	DZ code of 0477	Reasonably close match. Some minor boundary differences, with a small residential area and set of tourist accommodation excluded from the 2006 DZ.
Cairns	DZ code of 311401031	Very close match. Missing some approach planning areas and greenspace planning areas of airport that are likely to contain minimal employment.	DZ code of 0940	Reasonably close match. Some minor boundary differences, with a small residential area included within the 2006 DZ (but not the 2011 DZ).
Canberra	DZ codes of 810331509,810331512 and 810331514	Very close match to airport site. Includes Brindabella Office Park, Majura Park and Fairbairn precinct, which are located within the airport boundary.	DZ code of 0509	Very close match. A small area of land in the Fairbairn precinct is omitted from the 2006 DZ, but this is unlikely to impact on employment.
Darwin	SA2 of Darwin Airport (701011001) plus DZ code of 710061161	Close match to combined Airport Land Boundary and Defence Area Boundary. Includes RAAF base and minor additional residential area.	na	Like for like comparison not feasible.
Townsville	DZ code of 314751094	Reasonably close match to combined Civil Area, Joint User Area and Military Area. Missing some of the airport's land area, but missing components seem to have minimal employment.	na	Like for like comparison not feasible.

DZ—destination zone, SA2—ABS Statistical Area Level 2 na—not available as a like for like comparison to airport site was not practical using 2006 statistical geographies

Airport surrounds area	Defined as consisting of the following spatial units for 2011	Comments on match to airport site (as defined in airport master plans)	Defined as consisting of the following spatial units for 2006	Comments on match of 2006 to 2011 classification
Sydney	SA2 of Sydney Airport (117011325) plus DZ codes of 113221467 and 113221468	Extends beyond airport site to include commercial area of Mascot. Missing small logistics site in the north of airport (in Tempe).	DZ codes of 0411,0415,0425, 0581,0404 and 0406	Exact match.
Melbourne	SA2 of Melbourne Airport (210051248) plus DZ code of 212281864	Extends beyond airport site to include a substantial industrial area in the suburb of Tullamarine. Also extends beyond airport site in several places, into peri-urban areas.	DZ code of 0745	Reasonably close match. Some minor boundary differences, with 2006 DZ containing some extra land to north-east of airport site, and missing land to east of freeway.These differences are expected to have a minor impact of employment.
Hobart	DZ code of 610051025	Extends beyond airport site to include Cambridge Aerodrome, town of Cambridge, and rural surrounds.	na	Like for like comparison not feasible.
Williamtown	DZ code of 111257214	Extends geographically well beyond the combined Newcastle Airport Limited lease area and RAAF Williamtown base to include some peri-urban settlements, such as Salt Ash.	na	Like for like comparison not feasible.
Launceston	DZ code of 610621099	Extends geographically well beyond the airport site to include significant peri-urban areas and the town of Evandale.	na	Like for like comparison not feasible.
Mackay	SA2 of South Mackay (312021356)	Extends well beyond the airport site to include substantial residential areas. As the SA2, contains only 1 DZ it cannot be further disaggregated.	DZ code of 0719	Close match. The 2006 DZ includes one beach resort that was not part of the 2011 SA2.
Sunshine Coast	DZ code of 314261341	Extends well beyond the airport site to include the residential suburb of Marcoola and some of Mudjimba.	na	Like for like comparison not feasible.
Avalon	DZ code of 210433293	Extends geographically well beyond the airport site into surrounding peri-urban areas. However, the airport site appears to	na	Like for like comparison not feasible.

Table A2 Details of geographic classification of each airport surrounds area

DZ—destination zone, SA2—ABS Statistical Area Level 2

na-not available as a like for like comparison to 2011 airport surrounds definition was not practical using 2006 statistical geographies

account for the vast majority of jobs.

Appendix B— Profiles of employment at major Australian airports

The data in this section is based on the ABS Census of Population and Housing. The data has been sourced in several ways, including *TableBuilderPro* tabulations for 2006 and 2011, ABS Working Population Profiles for SA2s in 2011, special data requests, and from census–based publications.

Sydney Airport

Kingsford Smith Airport (KSA) site, as defined in the airport master plan, can be very closely approximated by ASGS SA2 boundaries for 2011. Based on 2011 census data, the Sydney Airport SA2 is estimated to contain a total of 12 275 jobs. There are 7196 jobs (59 per cent) in the Transport, postal and warehousing industry, of which 5586 (46 per cent of the airport total) are in the Air and space transport industry. Other important industries at the airport include Public administration and safety (16 per cent) and Retail Trade (6 per cent).

The 'Sydney Airport' SA2 captures nearly all employment at the airport site, although it does miss a small logistics site at the northern edge of the airport site. The ABS Working Population Profile for this SA2 can be used to better understand the nature of employment at this airport. Males account for 63 per cent of employment in this SA2. While employment is widely spread across age categories, 35–39 year olds contribute the largest share of jobs (14 per cent). During census week, 69 per cent were working full-time, 25 per cent were working part-time and 5 per cent were away from work. The majority of workers (60 per cent) were Australian born. The most frequent personal income category reported by workers was \$600–\$799 per week (16 per cent), and BITRE estimates average income at about \$1261 per week. The major occupational categories were Community and personal service workers (17 per cent) and Clerical and administrative workers (16 per cent). About 83 per cent journeyed to work on census day by private vehicle, while 14 per cent used public transport (11 per cent train, 3 per cent bus) and 1 per cent used active transport.

Map I illustrates the place of residence of airport staff. A substantial proportion of Sydney Airport staff are sourced from just three SLAs—Rockdale, Sutherland Shire East and Sutherland Shire West—each of which contribute about 10 per cent of Airport employees. The Rockdale SLA is located to the immediate west of the Airport and Sutherland Shire is located to the south on the opposite side of Botany Bay and the Georges River. Modelled information from the NSW Bureau of Transport Statistics at the travel zone scale has been used to derive average commuting distances and times for Airport staff, based on 2006 commuting patterns. The great majority of staff travelled to the Airport by road, commuting an average road distance of 23km to Sydney Airport, which is well above the Sydney SD average road distance commuted to work of 15km. Airport staff who commuted by road during peak periods spent 55 minutes, on average, commuting one way. Again, this is well above the Sydney SD average of 33 minutes. Only 20 per cent of staff lived within a 30 minute commute by road during peak periods. While it is clear that Airport staff tend to travel relatively long distances to access their workplace, because the majority of Airport staff work shifts (Sydney Airport Corporation Limited 2006), the peak hour commuting times are likely to significantly overstate the actual time spent commuting by Airport staff. Our investigations suggest that off peak commuting times may be just 40–50 per cent of peak commuting times to Sydney Airport (i.e. averaging around 22 minutes one way).

About 200 additional jobs were added at the Sydney Airport site between 2006 and 2011, which represents only a 1 per cent increase over the five year period. This differs from the larger growth in revenue passenger movements at KSA, which rose from 30.0 to 35.6 million between 2006 and 2011, representing a 19 per cent increase over the five years. There were 9760 workers at the airport site in 1996 and 9690 in 2001. This was followed by a sharp (25 per cent) increase in employment to 12 100 jobs in 2006 (Transport Data Centre 2008), followed by minimal growth between 2006 and 2011.



Map I Statistical Local Area of residence of employees of Sydney Airport, 2006



Sydney Airport is a specialised centre with a strong connection to the neighbouring business/industrial parks which expands the airports influence to the surrounding area and the commercial centre of Mascot. A 'Sydney Airport surrounds' area has been defined which corresponds to the Sydney Airport site plus the adjacent suburb of Mascot, which contains a large number of aviation-related jobs. It contained 28 821 jobs in 2011, of which 58 per cent (16 617 jobs) were in Transport, postal and warehousing, and 46 per cent (13 339 jobs) were in Air and space transport. 'Sydney Airport surrounds' added 600 jobs between 2006 and 2011, which represents growth of just 2 per cent. Employment increased by 500 jobs between 2001 and 2006 (BITRE 2012). Thus, between 2001 and 2011, employment growth for 'Sydney Airport surrounds' has averaged just 0.4 per cent per annum, which is less than the 1.0 per cent average annual growth rate of jobs for Sydney as a whole over the 10 year period.

Mascot-Eastlakes SA2, the location of the commercial centre, is closely related to the Sydney Airport SA2 in terms of industry function and employment. This adjacent SA2 needs to be taken into account as much of its employment is directly associated with Sydney Airport. About 80 per cent of the 20 919 jobs in this SA2 are located in the Mascot area which falls within the 'Sydney Airport surrounds' classification.

Males account for 59 per cent of employment in the Mascot-Eastlakes SA2. While employment is widely spread across age categories, 35–39 year olds and 40–44 years contribute the largest share of jobs (14 per cent each). During census week, 70 per cent were working full-time, 22 per cent were working part-time and 6 per cent were away from work. The majority of workers (58 per cent) were Australian born. While the Transport, postal and warehousing industry is the dominant employer, other key industries in this SA2 are Wholesale Trade (7 per cent) and Accommodation and food services (6 per cent). A notable feature of this SA2 is the high income resulting from the high skilled jobs. The

most frequent personal income category reported by workers was much higher than the Sydney Airport SA2, at \$2000 or more per week (20 per cent), and BITRE estimates average income at about \$1438 per week. The major occupational categories were Professionals (21 per cent) and Clerical and administrative workers (17 per cent). About 74 per cent journeyed to work on census day by private vehicle, while 19 per cent used public transport and 4 per cent used active transport.

Melbourne Airport

The Melbourne Airport site (as defined in the airport master plan) can be closely approximated by ASGS boundaries for 2011. Based on 2011 census data, the Melbourne Airport is estimated to contain a total of 13 910 jobs. There are 8 205 jobs (59 per cent) in the Transport, postal and warehousing industry, of which 5 079 (37 per cent of the airport total) are in the Air and space transport industry. Other important industries at the airport include Public administration and safety (10 per cent) and Accommodation and food services (8 per cent).

Males account for about 64 per cent of employment in the Melbourne Airport SA2. While employment is widely spread across age categories, 40–44 year olds contribute the largest share of jobs (14 per cent). During census week, 68 per cent were working full-time, 24 per cent were working part-time and 6 per cent were away from work. The majority of workers (67 per cent) were Australian born. The most frequent personal income category reported by workers was \$1 000–\$1 249 per week (17 per cent), and BITRE estimates average income at about \$1 272 per week. The major occupational categories were Community and personal service workers (18 per cent) and Technician and trades workers (16 per cent). About 94 per cent journeyed to work on census day by private vehicle, while 3 per cent used public transport and 1 per cent used active transport.

The 'Melbourne Airport surrounds' area is used to provide a common boundary for comparisons over time. It includes a significant industrial area to the south of the airport in addition to the airport site itself. About 4500 additional jobs were added in 'Melbourne Airport surrounds' between 2006 and 2011, with employment increasing from 13 200 to 17 700 jobs. This represents a 34 per cent increase over the five year period. This reflects growth in revenue passenger movements at Melbourne Airport, which rose from 21.6 to 27.6 million between 2006 and 2011, representing a 28 per cent increase. In the preceding 2001 to 2006 period, there were about 2100 jobs added in the 'Melbourne Airport surrounds' area, representing 19 per cent growth (BITRE 2011). Thus, over the 2001 to 2011 period, the number of persons employed in 'Melbourne Airport surrounds' has risen by about 5 per cent per annum on average, considerably outpacing the rate of job growth for Melbourne as a whole, which averaged almost 2 per cent per annum over the 10 year period.

Brisbane Airport

The Brisbane Airport site (as defined in the airport master plan) can be closely approximated by a single destination zone boundary for 2011. Based on 2011 census data, the Brisbane Airport site is estimated to contain a total of 14 731 jobs. There are 7255 jobs (49 per cent) in the Transport, postal and warehousing industry, of which 4027 jobs (27 per cent of the airport total) are in the Air and space transport industry. Other important industries at the airport include Public administration and safety (11 per cent of jobs) and Manufacturing (8 per cent).

There is a 'Brisbane Airport' SA2 which extends beyond the boundaries of the airport site to include the Bulwer Island oil refinery and nearby industrial areas. Since the airport site accounts for 88 per cent of the total employment in this SA2, the Working Population Profile for this SA2 can be used to better understand the nature of employment at the airport. Males account for about two-thirds (66 per cent) of employment in this SA2. While employment is widely spread across age categories, 35–39 and 40–44 year olds contribute the largest share of jobs (13 per cent each). During census week, 75 per cent were working full-time, 19 per cent were working part-time and 5 per cent were away from work. The majority of workers (68 per cent) were Australian born. The most frequent personal income category reported by workers was \$1000–\$1249 per week (16 per cent), and BITRE estimates average income at about \$1380 per week. The major occupational categories were Clerical and administrative workers (17 per cent) and Technicians and trades workers, and also Professionals (each 15 per cent). About 94 per cent journeyed to work on census day by private vehicle, while 3 per cent used public transport and 1 per cent used active transport.

About 4 300 additional jobs were added at the Brisbane Airport site between 2006 and 2011, representing a 41 per cent increase over the five year period. This reflects growth in revenue passenger movements at Brisbane Airport, which rose from 16.7 to 20.3 million between 2006 and 2011, which was a 21 per cent increase. It is also likely to reflect significant commercial development at the Brisbane Airport site during this period. In the preceding 2001 to 2006 period, there were about 3 200 jobs added to the Brisbane Airport site, representing 44 per cent

growth (BITRE forthcoming). Thus, over the 2001 to 2011 period, the number of people employed at Brisbane Airport has effectively doubled from about 7200 to 14731, representing average annual growth of around 7 per cent. Employment growth at the airport has considerably outpaced the rate of job growth for Brisbane as a whole, which averaged almost 3 per cent per annum over the 10 year period.

Perth Airport

The Perth Airport site (as defined in the airport master plan) can be reasonably closely approximated by ASGS and destination zone boundaries for 2011. Based on 2011 census data, the Perth Airport site is estimated to contain a total of 11 023 jobs. There are 5029 jobs (46 per cent) in the Transport, postal and warehousing industry, of which 2282 (21 per cent of the airport total) are in the Air and space transport industry. Other important industries at the airport include Mining (9 per cent of jobs), Retail trade (9 per cent) and Public administration and safety (8 per cent).

The 'Perth Airport' SA2 boundary captures more than 90 per cent of employment at the airport site, and can be used to better understand the nature of employment at this airport. Males account for about two-thirds of employment in this SA2. While employment is widely spread across age categories, 25–29 year olds contribute the largest share of jobs (14 per cent). During census week, 72 per cent were working full-time, 22 per cent were working part-time and 5 per cent were away from work. The majority of workers (59 per cent) were Australian born, with significant numbers also born in the UK (12 per cent). The most frequent personal income category reported by workers was \$1000–\$1249 per week (18 per cent), and BITRE estimates average income at about \$1339 per week. The major occupational categories were Machinery operators and drivers (19 per cent) and Clerical and administrative workers (19 per cent). About 95 per cent journeyed to work on census day by private vehicle, while 2 per cent used public transport and 1 per cent used active transport.

About 6000 additional jobs were added at the Perth Airport site between 2006 and 2011, with employment increasing from roughly 5000 to 11000 jobs. This represents a 121 per cent increase over the five year period. This reflects rapid growth in RPT revenue passenger movements at Perth Airport, which rose from 7.5 to 11.3 million between 2006 and 2011, representing a 52 per cent increase. In addition, Perth Airport is likely to have experienced considerable growth in the number of charter passengers associated with increased fly in-fly out travel due to the mining boom.

The Perth Airport also experienced very rapid employment growth between 2001 and 2006, adding about 1700 jobs (BITRE 2010). During this period, it was one of the most rapidly growing employment hubs in Perth, averaging 10 per cent growth in jobs per annum, and the rate of growth appears to have accelerated since 2006. Over the 2001 to 2011 period, the number of persons employed at Perth Airport has more than tripled. Average annual job growth was about 13 per cent, considerably outpacing the rate of job growth for Perth as a whole, which averaged almost 3 per cent per annum over the 10 year period.

To the immediate south of the Perth Airport site is the Kewdale-Welshpool industrial area, which has a strong transport and logistics focus and includes the Kewdale Freight terminal. This industrial area has been a major hub for jobs growth in Perth over the last decade.

Adelaide Airport

The Adelaide Airport site (as defined in the master plan) can be closely approximated by ASGS SA2 boundaries for 2011. Based on the 2011 census data, Adelaide Airport is estimated to contain a total of 4446 jobs. There are 1944 jobs (44 per cent) in the Transport, postal and warehousing industry, of which 1207 (27 per cent of the airport total) are in the Air and space transport industry. Other important industries include Retail trade (12 per cent of jobs), Manufacturing (10 per cent) and Public administration and safety (9 per cent).

The 'Adelaide Airport' SA2 boundary captures nearly all employment at the airport site. Males account for two-thirds of employment in this SA2. While the largest share of jobs is in the 35–39 year old age category (14 per cent), employment is spread widely across the age categories. During census week, 69 per cent of employed persons worked full-time while 25 per cent worked part-time and 5 per cent were away from work. The majority of workers were Australian born (73 per cent), while significant numbers were born in the UK (10 per cent). The most frequently reported personal income categories were \$800–\$999 per peek and \$1000–\$1249 per week (each 16 per cent), and BITRE estimates the average income of the SA2 to be \$1211 per week. The major occupational categories were Clerical and administrative workers (15 per cent) and Technicians and trades workers (15 per cent). About 92 per cent journeyed to work on census day by private vehicle, while 3 per cent used public transport and 2 per cent used active transport.

Information sheet

About 900 additional jobs were added at the Adelaide Airport site between 2006 and 2011, an increase from 3500 to 4400 jobs. This represents a 26 per cent increase in jobs over the five year period. This is reflective of the moderate growth in revenue passengers at Adelaide Airport, which rose from 5.9 to 7.0 million between 2006 and 2011 (17 per cent increase).

Gold Coast Airport

The Gold Coast (Coolangatta) Airport site is split across Queensland and NSW, but the Queensland portion (which contains the airport terminal) can be reasonably closely approximated by a single destination zone boundary for 2011. Based on 2011 census data, the Gold Coast Airport site is estimated to contain a total of 1352 jobs. There are 465 jobs (34 per cent) in the Transport, postal and warehousing industry, of which 234 jobs (17 per cent of the total) are in the Air and space transport industry. Other important industries at the airport include Public administration and safety (18 per cent of jobs) and Accommodation and food services (11 per cent).

About 400 additional jobs were added at the Gold Coast Airport site between 2006 and 2011, representing a 42 per cent increase over the five year period. This reflects rapid growth in revenue passenger movements at Gold Coast Airport, which rose from 3.6 to 5.3 million between 2006 and 2011, representing a 45 per cent increase.

Cairns Airport

The Cairns Airport site (as defined in the airport land use plan) can be closely approximated by destination zone boundaries for 2011. Based on 2011 Census data, the Cairns Airport site is estimated to contain a total of 1912 jobs. There are 843 jobs (44 per cent) in the Transport, postal and warehousing industry, of which 599 jobs (31 per cent of the airport total) are in the Air and space transport industry. Other important industries at the airport include Public administration and safety (18 per cent), Manufacturing (10 per cent) and Accommodation and food services (8 per cent).

There was an overall loss of about 150 jobs at the Cairns Airport site between 2006 and 2011. This represents a 7 per cent decrease over the five year period. This reflects the small 2 per cent increase in RPT revenue passenger movements from 3.76 to 3.85 million between 2006 and 2011, which was one of the lowest increases in revenue passenger movements of the airports in this study.

Canberra Airport

The Canberra Airport site (as defined in the airport master plan) can be reasonably closely approximated by destination zone boundaries for 2011. Based on 2011 census data, the Canberra Airport site is estimated to contain a total of 4860 jobs. There are 367 jobs (8 per cent) in the Transport, postal and warehousing industry, of which 217 (4 per cent of the airport total) are in the Air and space transport industry. The main employing industries at the airport site are Public administration and safety (51 per cent of jobs) and Professional, scientific and technical services (21 per cent).

The Majura SA2 geographically extends well beyond the Canberra Airport site (incorporating significant peri-urban areas and the Department of Defence offices at Campbell Park), but as 70 per cent of this SA2's employment is located at the airport site, it can be used to better understand the nature of employment at the airport. Males account for about 60 per cent of employment in this SA2. While employment is widely spread across age categories, 35–39 and 40-44 year olds contribute the largest share of jobs (14 per cent each). During census week, 82 per cent were working full-time, I 3 per cent were working part-time and 5 per cent were away from work. The majority of workers (77 per cent) were Australian born. The most frequent personal income category reported by workers was \$2000 or more per week (28 per cent), and BITRE estimates average income at about \$1752 per week, which is comparatively high, and reflects the predominantly high skilled jobs located at the airport. The major occupational categories were Professionals (29 per cent), Managers (21 per cent) and Clerical and administrative workers (22 per cent). About 93 per cent journeyed to work on census day by private vehicle, while 3 per cent used public transport and 2 per cent used active transport.

About 1700 additional jobs were added at the Canberra Airport site between 2006 and 2011. This represents a 54 per cent increase over the five year period. This to some extent reflects growth in revenue passenger movements at Canberra Airport, which rose from 2.6 to 3.2 million between 2006 and 2011, representing a 23 per cent increase. Non-aviation related development at the airport site has also been a key driver of recent employment growth. Canberra Airport was purchased from the Commonwealth's Federal Airports Corporation in 1998 and since then

has had substantial aeronautical and commercial infrastructure upgrades (Canberra Airport, 2011a). The Brindabella Business Park hosts the majority of workers at the airport site, with tenants including PDL Toll and KPMG, as well as an assortment of scientific and technology companies. There is a commercial precinct sited at the former RAAF base at Fairbairn and Majura Park—the newest stage of the airport development—includes both retail and commercial office space (ibid).

Darwin Airport

The combined civil and military zones of the Darwin Airport can be reasonably closely approximated by ASGS and destination zone boundaries for 2011. Based on 2011 census data, the Darwin Airport site is estimated to contain a total of 2012 jobs. There are 787 jobs (39 per cent) in the Transport, postal and warehousing industry, of which 535 (27 per cent of the airport total) are in the Air and space transport industry. The other important industry is Public administration and safety, which accounts for 34 per cent of on-site employment, reflecting the significance of the RAAF base to employment.

The 'Darwin Airport' SA2 boundary captures almost 90 per cent of employment at the airport site, and can be used to better understand the nature of employment at this airport. Males account for about 63 per cent of employment in this SA2. While employment is widely spread across age categories, 25–29 year olds contribute the largest share of jobs (16 per cent). During census week, 77 per cent were working full-time, 16 per cent were working part-time and 6 per cent were away from work. The majority of workers (75 per cent) were Australian born. The most frequent personal income category reported by workers was \$1500–\$1999 per week (20 per cent), and BITRE estimates average income at about \$1384 per week. The major occupational categories were Professionals (22 per cent) and Technician and trades workers (18 per cent). About 89 per cent of those who worked in this SA2 journeyed to work on census day by private vehicle, while 2 per cent used public transport and 6 per cent used active transport.

Townsville Airport

The combined civil and military zones of the Townsville Airport site (as defined in the master plan) can be reasonably closely approximated by destination zone boundaries for 2011. Based on 2011 census data, the Townsville Airport site is estimated to contain a total of 1 480 jobs. There are 193 jobs (13 per cent) in the Transport, postal and warehousing industry, of which 125 (8 per cent of the airport total) are in the Air and space transport industry. Other important industries at the airport include Public administration and safety (59 per cent) and Manufacturing (11 per cent).

Hobart Airport

The Hobart Airport site (as defined in the master plan) cannot be closely approximated using ASGS and destination zone boundaries for 2011. A 'Hobart Airport surrounds' area, corresponding to a single destination zone, has been identified which includes the Hobart Airport site as well as the Cambridge Aerodrome, the town of Cambridge and surrounding peri-urban areas. Based on 2011 census data, there are 1916 jobs located in 'Hobart Airport surrounds'. There are 234 jobs (12 per cent) in the Transport, postal and warehousing industry, of which 100 (5 per cent of the airport total) are in the Air and space transport industry. Other important industries in 'Hobart Airport surrounds' include Electricity gas water and waste (15 per cent of jobs), Manufacturing (13 per cent), Retail trade (12 per cent) and Construction (11 per cent).

Newcastle Airport

The Newcastle Airport site (as defined in the master plan) cannot be closely approximated by ASGS or destination zone boundaries for 2011. A 'Newcastle Airport surrounds' area, corresponding to a single destination zone, has been identified which includes the Newcastle Airport Limited lease area and the Williamtown RAAF base and extends well beyond the airport site into surrounding rural areas (including the settlement of Salt Ash). 'Newcastle Airport surrounds' contained a total of 4066 jobs in 2011. There are 223 jobs (5 per cent) in the Transport, postal and warehousing industry, of which 159 (4 per cent of the airport total) are in the Air and space transport industry. About 69 per cent of employment was in the Public administration and safety industry, reflecting the large numbers employed at the Williamtown RAAF base. The Manufacturing industry accounted for 12 per cent of employment in this destination zone.

Launceston Airport

The Launceston Airport site (as defined in the master plan) cannot be closely approximated using ASGS or destination zone boundaries for 2011. A destination zone was identified which incorporates the Launceston Airport (but extends well beyond the airport site), and is referred to as 'Launceston Airport surrounds'. Based on 2011 census data, there are 1108 jobs in 'Launceston Airport surrounds'. There are 242 jobs (22 per cent) in the Transport, postal and warehousing services industry, of which 54 (5 per cent of the total) are in the Air and space transport industry. Other important industries include Manufacturing (20 per cent), Construction (12 per cent) and Wholesale trade (8 per cent).

Mackay Airport

The Mackay Airport site cannot be closely approximated using ASGS and destination zone boundaries for 2011, and so we use a 'Mackay Airport surrounds' definition based on the SA2 of South Mackay. This SA2 extends well beyond the airport site to include substantial residential areas. Based on 2011 census data, the 'Mackay Airport surrounds' is estimated to contain a total of 1115 jobs. There are 147 jobs (13 per cent) in the Transport, postal and warehousing industry, of which 49 (4 per cent of the total) are in the Air and space transport industry. Other important industries include Education and training (20 per cent), Accommodation and food services (13 per cent), Health care and social assistance (11 per cent) and Construction (10 per cent).

About 200 jobs were lost in 'Mackay Airport surrounds' between 2006 and 2011, which represents a 16 per cent decline over the five year period. The net loss of employment for 'Mackay Airport surrounds' could be coming from the airport site or from the residential areas of South Mackay. Somewhat inconsistent with other airports, the rise in revenue passengers from 708 777 to 1.1 million between 2006 and 2011 (a 53 per cent increase) has not coincided with significant growth in employment for 'Mackay Airport surrounds'.

Sunshine Coast Airport

The Sunshine Coast Airport site could not be closely approximated using ASGS and destination zone boundaries for 2011. A destination zone was identified which incorporates the Sunshine Coast Airport (but extends well beyond the airport site to include substantial residential areas), and is referred to as 'Sunshine Coast Airport surrounds'. Based on 2011 census data, 'Sunshine Coast Airport surrounds' contained a total of 1162 jobs. There are 359 jobs (31 per cent) in the Transport, postal and warehousing industry, of which 41 (4 per cent of the total) are in the Air and space transport industry. Other important industries include Manufacturing (12 per cent) and Accommodation and food services (11 per cent).

Avalon Airport

The Avalon Airport site (as defined in the airport master plan) does not lend itself to close approximation using ASGS and destination zone boundaries for 2011. Since it is not possible to adequately approximate the airport site using ABS boundaries, we use the 'Avalon Airport surrounds' definition. While 'Avalon Airport surrounds' incorporates a significant surrounding peri-urban area, the airport site accounts for the majority of employment. 'Avalon Airport surrounds' is estimated to have 906 jobs in 2011. There are 176 jobs (19 per cent) in the Transport, postal and warehousing industry, of which 120 (13 per cent of the total) are in the Air and space transport industry. Employment is dominated by the Manufacturing industry, which has 545 jobs and accounts for 60 per cent of total employment. The importance of the Manufacturing industry reflects the Qantas maintenance facility located at Avalon Airport.

References

ABS 2010, Australian National Accounts: Tourism Satellite Account, 2009–10, ABS, Cat. 5249.0, ABS, Canberra.

ABS 2012, Australian National Accounts: National Income, Expenditure and Product, ABS, Cat. 5206.0, Canberra.

ACIL Tasman 2011, Economic impact of Canberra Airport: 2010 to 2030, Prepared for Canberra Airport, October.

Airports Council International (ACI) Europe 1998, Creating Employment and Prosperity in Europe—a study by ACI Europe into the social and economic impacts of airports, ACI Europe, September.

Airports Council International (ACI) North America 2002, The Economic Impacts of U.S. Airports, ACI North America.

BITRE 2010, Population growth, jobs growth and commuting flows in Perth, Report 119, BITRE, Canberra.

BITRE 2011, Population growth, jobs growth and commuting flows in Melbourne, Report 125, BITRE, Canberra.

BITRE 2012, Population growth, jobs growth and commuting flows in Sydney, Report 132, BITRE, Canberra.

BITRE 2013, Airport Traffic Data, released 13 January.

BITRE forthcoming, Population growth, jobs growth and commuting flows in South East Queensland, Report 134, BITRE, Canberra.

Brisbane Airport Corporation Pty. Ltd. 2012, Brisbane Airport—an economic driver for Queensland and Australia, Fact Sheet 2, September.

Canberra Airport 2011a, About the Airport, October, </www.canberraairport.com.au/air_newTerminal/wcte.cfm>

Canberra Airport 2011b, *Canberra's new terminal – there's more to come*, August, www.canberraairport.com.au/ air_aboutAirport/about.cfm

CDM Smith 2012, *The Economic Impact of Commercial Airports in 2010,* prepared for Airports Council International North America.

Deloitte Access Economics (DAE) Pty Ltd 2012, Connecting Australia: The economic and social contribution of Australia's airports, Prepared for Australian Airports Association, May.

Gold Coast Airport 2011, Gold Coast Airport 2011 Master Plan, Chapter 4: Economic and Regional Significance.

Hakfoort, J., Poot, T. and Rietveld, P. 2001, 'The Regional Economic Impact of an Airport: The Case of Amsterdam Schiphol Airport', *Regional Studies*, 35(7), pp. 595–604.

Leigh Fisher Management Consultants 2011, *Economic Impact Study Sacramento County Airport System*, prepared for Sacramento County Airport System.

Perth Airport Pty Ltd. 2011, *Corporate information: Economic benefits of Perth Airport*, <www.perthairport.com.au/ AboutUs/CorporateInformation.aspx>.

Reich, M., Hall, P. and, Jacobs K. 2005, 'Living Wage Policies at the San Francisco Airport: Impacts on Workers and Businesses', *Industrial Relations*, 44(1), pp. 106–138.

Robertson, J.A.W. 1995, 'Airports and economic regeneration', Journal of Air Transport Management, 2(2), pp. 81–88.

SKM 2008, The Economic Impact of Melbourne Airport, SKM, April.

Transport Data Centre 2008, 'Employment and commuting in Sydney's centres, 1996 to 2006', *Transfigures*, December 2008, Transport Data Centre, Sydney.

Twomey, J. and Tomkins, J. 1995, 'Development effects at airports: a case study of Manchester Airport' in *Transport and Urban Development*, ed. D. Banister, Alexandrine Press, Oxford.

UK Commission for Employment and Skills 2012, 'Transportation and Storage: Sector Skills Assessment 2012', Evidence Report 67, October

URS 2008, The Economic Impact of Growth at Sydney Airport, Final Report, Prepared for Sydney Airport Corporation Limited, January.

York Aviation 2004, The social and economic impact of airports in Europe, Report prepared for Airports Council International.

© Commonwealth of Australia 2013 ISSN 1440-9593 ISBN 978-1-922205-06-3 October 2014/INFRA 2313

Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, communicate and adapt this publication provided that you attribute the work to the Commonwealth and abide by the other licence terms. A summary of the licence terms is available from http://creativecommons.org/licenses/by/3.0/au/deed.en.

The full licence terms are available from http://creativecommons.org/licenses/by/3.0/au/legalcode.

This publication should be attributed in the following way; Bureau of Infrastructure, Transport and Regional Economics (BITRE), 2013, Employment Generation and Airport, Information Sheet 46, BITRE, Canberra.

Use of the Coat of Arms

The Department of the Prime Minister and Cabinet sets the terms under which the Coat of Arms is used. Please refer to the Department's Commonwealth Coat of Arms and Government Branding web page http://www.dpmc.gov.au/guidelines/index.cfm#brand and in particular, the Guidelines on the use of the Commonwealth Coat of Arms publication.

Contact us

This publication is available in PDF format. All other rights are reserved, including in relation to any Departmental logos or trade marks which may exist. For enquiries regarding the licence and any use of this publication, please contact:

Department of Infrastructure and Regional Development Bureau of Infrastructure, Transport and Regional Economics (BITRE) GPO Box 501, Canberra ACT 2601, Australia

Telephone: (international) +61 2 6274 7210 Fax: (international) +61 2 6274 6855 Email: bitre@infrastructure.gov.au Website: www.bitre.gov.au