2 The need for Western Sydney Airport

2.1 Introduction

This chapter provides a review of the need for an airport in Western Sydney and the process that led to the selection of the Commonwealth-owned land at Badgerys Creek as the airport site.

As nationally significant infrastructure assets, airports generate considerable direct and indirect economic benefits including jobs for their surrounding regions and the nation. Airports are key international gateways for travel and freight, taking on an increasingly important role in a globalised economy. Sydney in particular is reliant on the aviation system to maintain its status as a global city, tourist destination and major financial and services centre in the Asia Pacific region.

The need for an airport in Western Sydney is driven principally by the increasing demand for aviation services in the Sydney region and the limited capacity of existing airports, in particular Sydney (Kingsford Smith) Airport (Sydney Airport), to accommodate that growth.

Alternatives to the development of a new airport in Western Sydney have been assessed over a number of decades. Commonly referenced alternatives include increasing the capacity of Sydney Airport or other existing airport facilities, establishing a greenfield airport outside the Sydney basin or using high speed rail as a substitute for domestic aviation services along the east coast. While these alternatives demonstrate potential to provide marginal capacity benefits, they would not replace the need for a Western Sydney Airport. Detailed studies have been undertaken over a number of decades to assess these options and have consistently found that the most effective way to address increasing aviation demand, while mitigating environmental and social impacts, is to develop a new airport at Badgerys Creek.

Western Sydney is identified as the source of many of Sydney's greatest opportunities for economic and employment growth in the NSW Government's A Plan for Growing Sydney (DP&E 2014). It is also a region in which several of Sydney's challenges – ageing infrastructure, housing demand growth and access to employment – are most pressing. Development of the proposed airport would be a catalyst for investment and job creation in the region by accelerating the delivery of vitally important infrastructure and the release of employment and housing land, and providing a long term and diverse source of local jobs and economic activity. Additionally, the proposed airport would improve access to aviation services for Western Sydney.

This chapter provides an analysis of the role the proposed airport would have in accommodating increased aviation demand and, in conjunction with other major projects in the area, supporting the continued emergence of Western Sydney as a major economic, social and cultural region.

2.2 Importance of aviation in the Australian context

Aviation is an industry of vital strategic importance to Australia. The Australian continent is relatively isolated and is characterised by geographically dispersed population centres. The aviation sector provides an essential service in physically connecting people and businesses domestically and internationally, a factor which is increasingly important in a globalised economy.

Aviation is also a critical enabling industry for the broader economy, playing a central role in facilitating international and domestic trade and underpinning our tourism industry. According to the Bureau of Infrastructure Transport and Regional Economics (BITRE), major transport hubs such as airports directly contribute to economic growth and are major employment centres in their own right (BITRE, 2014a).

Air freight has become increasingly important for the transportation of goods to, from and around Australia, particularly in relation to time-critical and high value goods (Hamal 2011). Sydney has always played a strong part in facilitating this trade, with Sydney Airport being the nation's largest import/export airport in terms of combined trade value (BITRE 2014b). Businesses and agricultural producers in and around the Sydney region rely on air services to transport fresh produce, meat and seafood as well as manufactured goods to export markets in South East Asia and beyond. Sydney Airport also accounted for more than half of total Australian air freight imports by value in 2011−12, largely related to imports of pharmaceuticals, mobile phones and computer equipment (BITRE 2014b). These imported goods support the health and living standards of Australians and facilitate industries such as health, communications and professional services across Australia.

Aviation is also of vital importance to the tourism industry, which has long played an important role in Australia's economy. Tourism Research Australia (2014a) identified that in 2012−13 the tourism industry contributed approximately $91 billion to Australian gross domestic product (GDP) per year (or 6 per cent of GDP). Approximately 25 per cent of the direct economic contribution of tourism was delivered by international tourists, 99 per cent of whom travel to Australia by air (Tourism Research Australia 2014a). At a regional level, aviation is critical to the tourism industry in NSW. According to Destination NSW, the state welcomed 29.7 million visitors in 2014, more than any other state or territory, contributing approximately $28 billion to the NSW economy and supporting over 150,000 jobs in NSW (Destination NSW 2014). Many of these visitors rely on aviation to travel to and from Sydney and other regions in NSW. Tourism is expected to be one of the world's fastest growing industries over the next 20 years, particularly in Asia (Deloitte 2014). Aviation is critical to supporting current tourism activity and positioning Australia to take advantage of future growth in the industry.

Finally, it is important to note that airports themselves directly contribute to economic and employment growth, supporting flow-on benefits to almost all other sectors of the economy. According to BITRE, airports have become some of the most important job growth hubs in Australian cities, providing direct and indirect employment opportunities across a diverse range of industries, occupations and qualification levels (BITRE 2013).

2.3 Aviation demand

2.3.1 Drivers of aviation demand

Aviation plays a central role in the Australian economy with demand for aviation services having increased considerably over recent decades, particularly in the Sydney basin. This increase has largely been driven by population growth, economic growth, increased competition and growth in international tourism. Sydney and Australia have benefited greatly from these trends, both in terms of increased living standards and exposure to global markets and cultures.

Existing major airports such as Sydney Airport will continue to play a significant role in accommodating current and future growth in aviation activity. However, airport capacity in the Sydney basin will not be able to fully absorb the growth in aviation demand in the long term, and without additional aviation capacity demand will go unmet.

Four key factors are expected to continue to drive increased demand for aviation services in the Sydney basin:

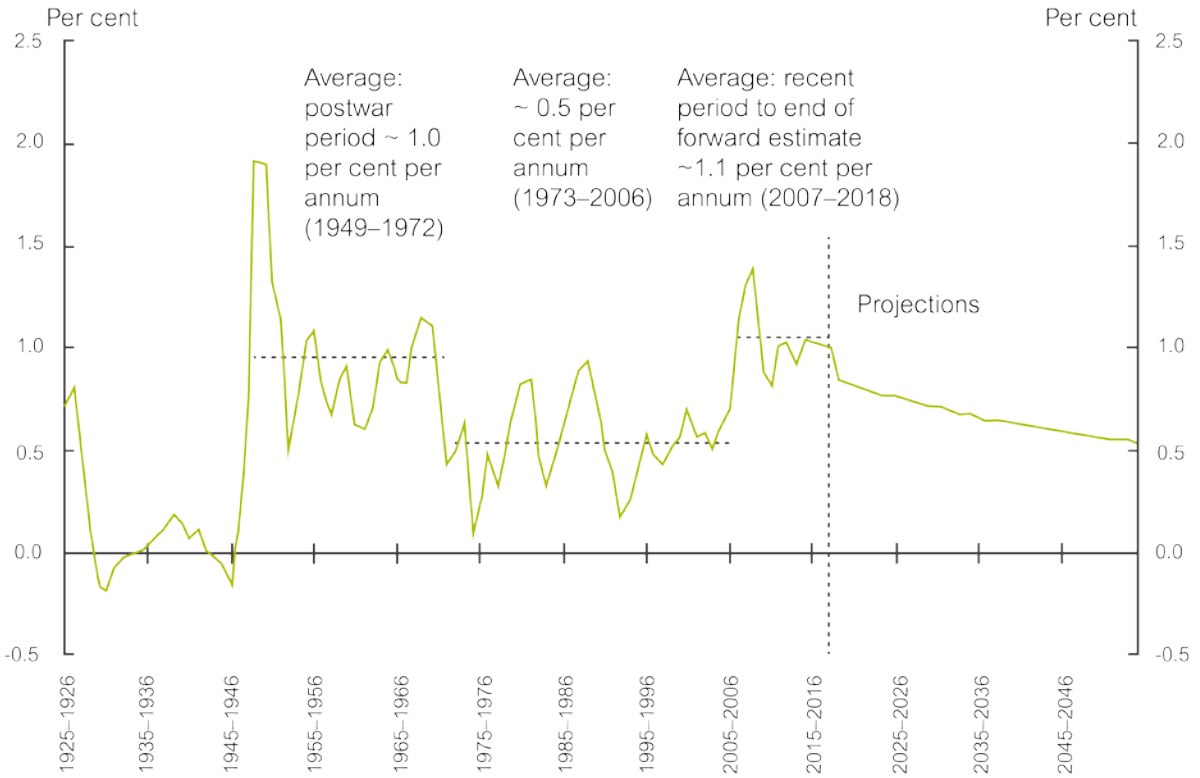
- population growth;
- economic growth;
- increased competition and low cost carrier penetration; and
- increasing international tourism demand – particularly from Asia.

These factors are discussed below.

2.3.2 Expected population growth

A growing population will result in a greater demand for goods and services from businesses, including aviation services. The 2015 Intergenerational Report (IGR) indicates that, based on forecast patterns of migration, fertility and mortality, Australia's population will grow at 1.3 per cent per year to 2054–55, to 39.7 million people. This represents a 66 per cent increase on the current 23.9 million people in Australia (The Treasury 2015).

Net migration to Australia is a key component of expected population growth and a contributor to growing demand for aviation services across Australia. As demonstrated in Figure 2–1, net migration has varied substantially over recent decades, reaching a peak of 300,000 in 2008−09, and is expected to remain above 0.5 per cent of the population (nearly 200,000 net migrants per year) for the next 40 years.



Source: 2015 Intergenerational Report

Figure 2–1 Historical and forecast net migration to Australia

Continued net migration has important implications for the Australian international aviation sector. Migration represents more than just a single movement to Australia. It also contributes to increases in both inbound and outbound travel in the long term.

Sydney's population and resulting demand for aviation services is also expected to grow significantly. SGS Economics and Policy (SGS) forecast that Sydney's population will grow from 5.7 million in 2015 to 7.1 million by 2030, and to 8.9 million by 2050. This represents a 96 per cent increase in population over the next 60 years, or a compound annual growth rate of 1.1 per cent (SGS 2015). Western Sydney is expected to be home to a large proportion of this growing population, with a further one million residents expected by 2030 (SGS 2015).

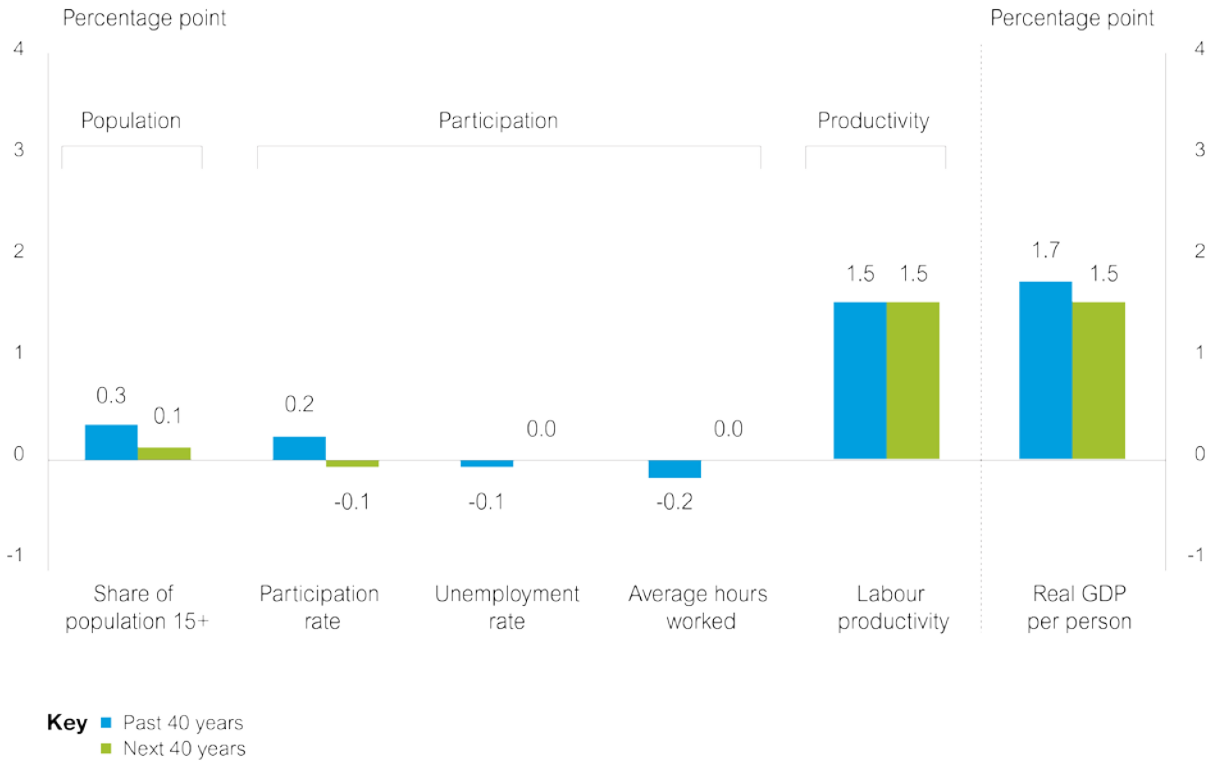
2.3.3 Expected economic growth

Real economic growth, particularly growth per capita, increases living standards and average discretionary spending, with accompanying increased demand for goods and services such as air travel. Historical growth rates for the airline industry indicate that demand for air travel may grow, at a minimum, at the same rate as GDP (Boston Consulting Group 2006).

According to both the IGR and the NSW Government's *State Infrastructure Strategy Update* (NSW Government 2014), the key drivers of economic growth can be attributed to population, productivity and participation.

Australian real GDP is expected to grow at approximately 2.8 per cent per year to 2054−55; average annual growth in real GDP per capita is projected to be 1.5 per cent per year (The Treasury 2015). Productivity has historically been the most important driver of Australia's economic performance, and it is expected that productivity improvements, particularly driven by technological advances, will continue to drive Australia's economy over the coming 40 years as they have done for the last 40 years (The Treasury 2015).

Figure 2–2 demonstrates how population, productivity and participation are forecast to contribute to growth in real GDP per capita across Australia over the next 40 years.



Source: 2015 Intergenerational Report

Figure 2–2 Australian GDP per capita projections to 2054-55

While this represents a slight slowing in the rate of economic growth relative to the previous 40 years, it remains significant and indicates that Australians will continue to access a growing discretionary income base to support growing aviation demand. Further to this, the *State Infrastructure Strategy Update* indicates that over the coming 20 years, the Sydney basin is anticipated to experience particularly strong economic growth (NSW Government 2014).

Forecasts for economic activity and employment in the Sydney Greater Metropolitan Area show that GDP in the Sydney Greater Metropolitan Area is expected to increase from $283 billion in 2010 to $849 billion in 2050 and employment is expected to increase from approximately 3 million jobs in 2010 to approximately 4.8 million jobs in 2050 (SGS 2015). These forecasts indicate that the Sydney region is likely to continue experiencing growth in economic activity, which will drive demand for aviation services.

Table 2–1 Economic activity forecasts, Sydney Greater Metropolitan Area (real 2015 values)

Type	2010	2030	2050
GDP ($ billions, 2015 dollars)	283	519	849
Employment (millions of jobs)	3.08	3.91	4.73

2.3.4 Increased competition and low cost carrier penetration increasing demand

Increased competition in the provision of aviation services, and the increasing market share of low cost carriers, has altered the Australian and global aviation market over the last decade, driving down real air fares and stimulating demand.

In the domestic market, low cost carriers have taken significant market share on key leisure and main haul routes. Accounting for the change in Virgin Australia's status to a full service carrier, domestic low cost carrier market share in Australia has increased from around eight per cent in 2005 to 31 per cent in 2013. Market penetration rates of international low cost carriers in Australia have been historically low. However, these rates have increased in recent years as a result of new international carriers to the Sydney basin (such as Air Asia X and Scoot) which have been supported by the emergence of a growing price-sensitive middle class in key markets, particularly in Asia. This has increased international low cost carrier market penetration in Australia from five per cent in 2008 to nine per cent in 2013.

In more mature international markets such as Europe, the Americas and Australasia, low cost carrier penetration (including hybrid full service / low cost carriers) currently ranges between 35 and 45 per cent. Over the next 10 years, low cost carriers are forecast to continue to take share in these markets, until a point of market saturation is reached (at around 50 per cent of the market, including hybrid carriers). Asia is forecast to show the strongest growth, with low cost carrier penetration increasing from around 25 per cent to just over 40 per cent over the next 10 years.

In Australia, low cost carrier domestic penetration is expected to increase as competition between carriers intensifies in this segment of the market – rising to 35 per cent of domestic demand by 2050. Over the forecast period, international low cost carrier penetration is forecast to increase to around 16 per cent of international demand, driven by growth in medium haul routes, such as Australia to South East Asia.

Overall, forecast increases in international low cost carrier market penetration and marginal increases in domestic low cost carrier operations are expected to contribute to increased demand for aviation services in the Sydney basin.

2.3.5 Expected international tourism growth

Tourism is expected to play an increasingly important role in both Australia's economy and demand for aviation services in Sydney. International tourism demand is expected to continue growing in the medium to long term. In the 2013−23 period it is anticipated that international tourism to Australia will grow by approximately 4.5 per cent per year to 9.6 million tourists, greatly increasing total demand for access to Sydney aviation services (Tourism Research Australia 2014b). Australia's top five inbound markets – New Zealand, China, the United Kingdom, the United States and Singapore – are expected to provide 56 per cent of the additional 3.4 million arrivals over this period (Tourism Research Australia 2014b). Sydney is one of Australia's prime tourist destinations. In line with the growth expected nationally, total visitor nights in NSW (the number of nights' business and leisure travellers stay in NSW) are expected to almost double over the 10 years to 2023 (Tourism Research Australia 2014c).

Increasing demand for inbound aviation services to Sydney has been particularly strong in Asian markets. Over the last three years, passenger demand between Sydney and key Asian markets has grown by 7.3 per cent. China alone is expected to contribute around a quarter of the increase in inbound arrivals in 2013–23 period (Tourism Research Australia 2014b). This is driven by the increasing wealth of the Asian middle classes, liberalisation of air travel markets particularly through the growth in Asian low cost carrier carriers, and the continued attractiveness of Australia as a tourism destination. In the long term, demand for international aviation services to Sydney are expected to be driven primarily by improvements in living standards in neighbouring countries. Asian economies are forecast to grow at 4.4 per cent per year to 2033. In particular, China is forecast to show strong growth over the forecast period, with 6 to 7 per cent GDP growth in the short to medium term, and 4 per cent in the long term.

Concurrently, short term international departures by Australian residents are expected to grow by 3.8 per cent per year on average to reach 12.3 million by 2023. Malaysia, China, Indonesia, Fiji and Singapore are forecast to be the top five fastest growing destinations for Australian residents over the forecast period. Of all the Australian states and territories, NSW has the highest propensity for international outbound travel, accounting for 70.6 trips per 100 people in 2013 (Destination NSW 2013).

2.4 Existing airports in the Sydney basin

2.4.1 Sydney (Kingsford Smith) Airport

Sydney Airport is Australia's largest airport in terms of passengers and freight. It is located on 907 hectares of land in Mascot, approximately eight kilometres south of Sydney's Central Business District. There are currently 34 international, six domestic and six regional airlines operating from the airport, together servicing 97 destinations, including 11 international and eight regional destinations not served by any other Australian airport. In 2014, approximately 307,000 aircraft movements, 38.7 million passengers, and around 408,500 tonnes of international air freight passed through Sydney Airport (BITRE 2015).

Sydney Airport operates three passenger terminals, comprising an international terminal (Terminal 1) located in the north-west sector of the site and a domestic terminal complex (housing Terminals 2 and 3) in the north-east sector of the site. Terminal 2 is used by a number of domestic and regional airlines, while Terminal 3 currently is operated exclusively for Qantas.

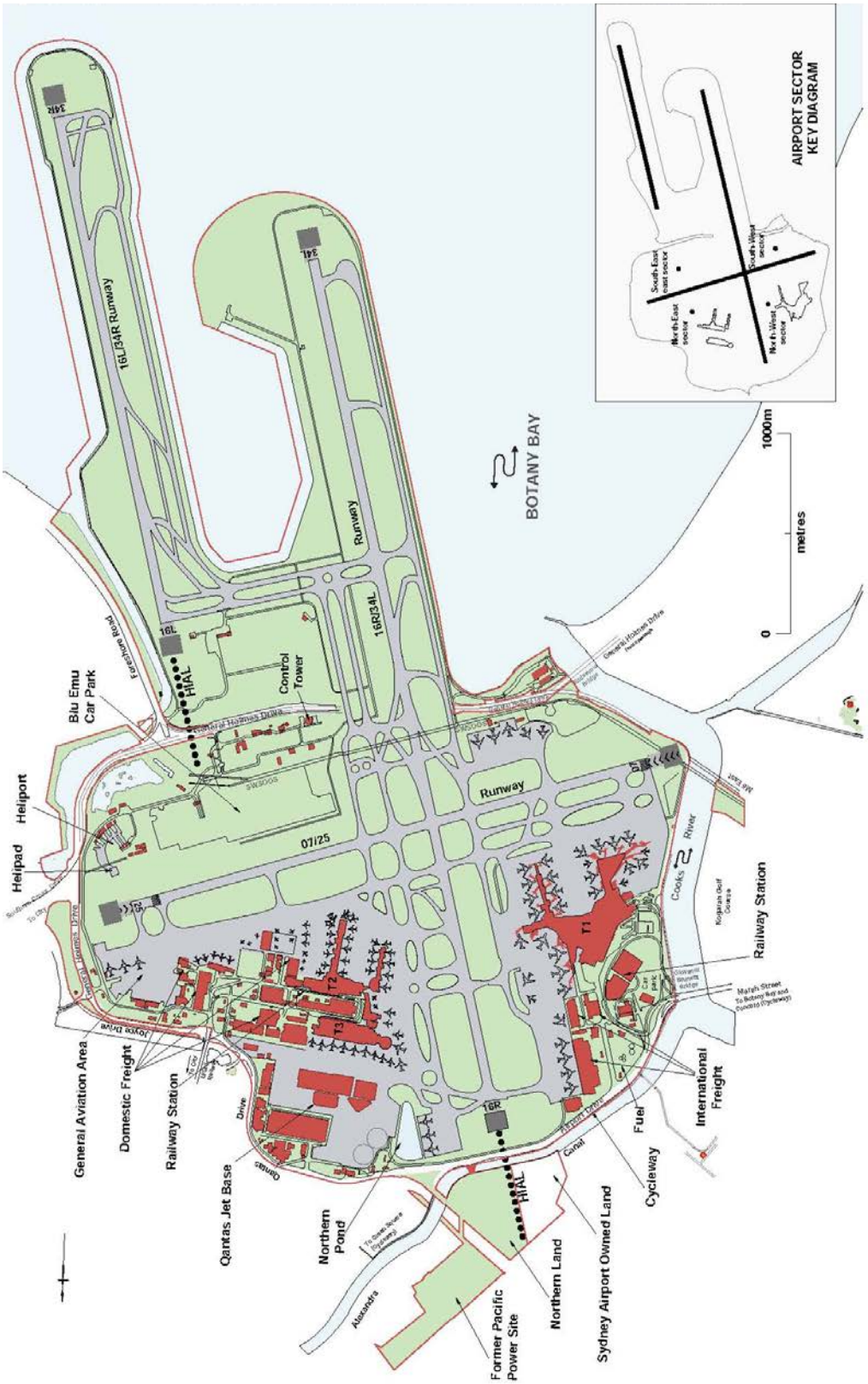
Sydney Airport has three runways, comprising two parallel runways on an approximate north−south alignment and a cross runway on an east−west alignment as shown in Figure 2–3. Runway 16R/34L is the main runway for the airport and is 3,962 metres in length. It parallels the shorter (2,438 metre) Runway 16L/34R, which was completed in 1994. Runway 07/25 is the cross runway and is approximately 2,530 metres long, on an approximate east−west alignment through the centre of the airport.

The runways are supported by a comprehensive taxiway system designed to facilitate the efficient movement of aircraft between the runways and terminal areas. Rapid exit taxiways are provided on the parallel runways to reduce runway occupancy. The runways and their supporting taxiways can accommodate operations of aircraft up to and including the Airbus A380 (currently the world's largest passenger airliner) (SACL 2014).

Apron areas are provided to facilitate aircraft parking (the parking position is known as an aircraft 'stand' or 'gate'). There are 106 aircraft stands dedicated to supporting international, domestic, regional and freight operations at Sydney Airport. The apron areas also support activities associated with the servicing of aircraft such as baggage handling, movement of freight, refuelling and in-flight catering. A network of airside roads provides for ground support equipment and other vehicle movements (SACL 2014).

The general aviation parking area is located in the north-east sector of the airport. The area provides aircraft parking for a number of freight, corporate and private aircraft as well as a variety of aviation support facilities such as maintenance hangars, freight handling and administrative buildings (SACL 2014).

Engineering facilities are located in the north-east sector of the airport. The general aviation parking area is also located in the north-east sector of the airport, east of T2/T3. It provides aircraft parking for a number of freight, corporate and private aircraft. A variety of aviation support facilities such as maintenance hangars, freight handling and administrative buildings are located adjacent to the general aviation parking area (SACL 2014).



Source: Sydney Airport Master Plan 2033 (SACL 2014).

Figure 2–3 Sydney Airport

There are four international cargo terminal operators and two domestic cargo terminal operators operating at Sydney Airport. A helicopter precinct is located in the south-east sector of the airport, which includes a touchdown and lift off area, taxiways, parking pads, storage/maintenance hangars and administrative buildings (SACL 2014).

2.4.2 General aviation airports – Bankstown and Camden

General aviation is the sector of the aviation industry that is non-military and excludes the larger airlines operating scheduled passenger services. The general aviation sector undertakes a diverse range of passenger and freight activities including charter operations, flight training, aerial agriculture, aerial work, private and business flying and sports related activities.

The two main general aviation airports in the Sydney basin are Bankstown Airport and Camden Airport, which are described below. Their locations relative to other airports (including the proposed Western Sydney Airport) are shown on Figure 2–4. There are also a number of other smaller general aviation airports within the region. These airports typically provide general aviation facilities and cater for activities such as private flying, flight training and sports aviation.

Figure 2–4 Existing airports in the Sydney basin

Bankstown Airport

Bankstown Airport is located approximately 25 kilometres south-west of Sydney's Central Business District. The airport caters for a wide range of general aviation (both fixed wing and helicopter) activities including flight training, charter flights, air freight and emergency services.

Bankstown Airport is operated and managed by Bankstown Airport Limited (BAL), a subsidiary of BAC Airports Pty Limited. It is situated on approximately 313 hectares of land. There are three parallel runways – 11L/29R (1,100 metres in length), 11C/29C (1,416 metres in length) and 11R/29L (1,038 metres in length). The runways are supported by a taxiway network totalling approximately 11.5 kilometres. There is also a designated helicopter landing site at the airport (BAL 2014).

Bankstown Airport has approximately 70,600 square metres of paved aircraft parking aprons and approximately 45,000 square metres of designated grass-surfaced small aircraft parking (BAL 2014). The passenger terminal is a single storey building with approximately 715 square metres gross floor area. There is no regular scheduled passenger service at the airport, although the terminal building is used occasionally to process charter flight passengers, facilitating approximately 4,000 passengers per year (BAL 2014).

There are 90 separate hangar structures at the airport and not all hangars are used for aircraft storage. Other activities within the hangar buildings include aircraft maintenance, flying schools, executive flight operations and air freight handling. Most of the hangars have annexes or space for supporting ancillary activities such as offices, classrooms, storage, workshops, toilets and kitchens (BAL 2014).

Bankstown Airport accommodates an average of around 600 aircraft movements per day. The majority (61.5 per cent) of aircraft operating at the airport are single-engine piston aircraft, typically engaged in flight training, private flying and related activities. Twin-engine piston aircraft are the second largest category (18.8 per cent). Rotary aircraft (helicopters) account for 13.9 per cent of aircraft activity and are typically involved in emergency services and government agency operations, flight training, charter or freight activity. A further 4.5 per cent of aircraft are turbo-prop aircraft, which are typically involved in charter, business, corporate and other aerial work activities. Jet turbine activity contributes only 1.3 per cent of aircraft operating at Bankstown and typically includes business and private activities as well as maintenance of other aircraft (BAL 2014) because of runway restrictions.

Bankstown Airport serves as a base for the NSW Police Air Wing, the NSW National Parks and Wildlife Service, the Royal Flying Doctor Service, Forestry Corporation of NSW, Greater Sydney Area Helicopter Medical Service and the Aviation Studies program of the University of NSW (BAL 2014).

Camden Airport

Camden Airport is located approximately 53 kilometres south-west of Sydney's Central Business District. The airport caters for general aviation and is used for sport aviation, private flying, flight training and ballooning activities (CAL 2010).

Camden Airport is operated and managed by Camden Airport Limited (CAL), a subsidiary of BAC Airports Pty Limited. It is situated on approximately 196 hectares of land and has four runways – two for powered fixed wing aircraft and two for gliders. Runway 06/24 is approximately 1,464 metres in length. It has an asphalt surface and is the main runway for aircraft movements. It is equipped with single stage, low intensity runway lights and runway ends and threshold lighting. Runway 10/28 is a grass surface crosswind runway, approximately 723 metres long. It is unlit and can only be used during daylight hours under conditions of good visibility. The airport is equipped with a non-directional beacon, which supports a circling non-precision approach (CAL 2010).

There are two grass surface runways reserved for glider operations. One runway parallels Runway 06/24, while the other parallels Runway 10/28. Both are approximately 780 metres in length and neither is equipped with landing aids. There is a designated helicopter landing site with a grass surface to the north of Runway 06/24 (CAL 2010).

Camden Airport has approximately 8,084 square metres of paved aircraft parking aprons and approximately 3,000 square metres of designated grass-surface aircraft parking (CAL 2010). Two large hangars and open parking for an estimated 40 aircraft support the glider operations. There are 17 hangar buildings for aircraft storage. The hangars also provide space for a variety of aviation-related activities including aircraft maintenance, flying schools and corporate/executive aviation facilities (CAL 2010).

Camden Airport has a number of taxiways (both sealed and grass) providing access to the runways, the airport building complex and the aprons.

Camden Airport accommodates between around 100 and 150 aircraft movements per day. The majority of aircraft identified at Camden Airport (93.7 per cent) are single-engine piston aircraft. These aircraft are typically engaged in flight training, private flying and related activities. Twin-engine piston aircraft are the second largest category at 5.2 per cent. These aircraft are typically involved in flight training. The remaining 1.1 per cent is split between turbo-prop and other aircraft (typically military and overseas registered aircraft) (CAL 2010).

Camden Airport serves as a base for helicopters involved in supporting seasonal bush firefighting activities and for air training for the Scout Association of Australia (CAL 2010).

2.4.3 Military airfields – Holsworthy and Richmond

There are two airfields operated by the military within the Sydney basin (see Figure 2–4):

- Royal Australian Air Force (RAAF) Base Richmond, operated by the RAAF. RAAF Base Richmond is located approximately 50 kilometres north-west of Sydney's Central Business District. The airport houses the military aviation activities of the RAAF Heavy Lift Group. The main aircraft type operated at the base is the Lockheed C-130 Hercules. The airport occupies approximately 270 hectares and has a single sealed runway approximately 2,134 metres in length. Some civilian general aviation activity is allowed, including practice instrument landing system approaches and gliding activity on weekends (BAL 2014).

- Holsworthy (Military) Airfield, operated by the Australian Army. Holsworthy Airfield is located within the Holsworthy Military Reserve, which is a training area and artillery range for the Australian Army, approximately 26 kilometres south-west of Sydney's Central Business District. Access to the airport is restricted and only suited to light aircraft. The airfield has a single sealed runway (Runway 11/29) with a length of approximately 580 metres (BAL 2014).

2.5 Capacity constraints

2.5.1 The Joint Study

In response to growing aviation demand, the Australian and NSW governments agreed in 2009 to develop a strategic plan to ensure sufficient future aviation capacity in the Sydney region.

A steering committee comprising government and non-government members with relevant experience and expertise in infrastructure, transport, planning, aviation, economics, the environment and tourism was established to guide the process. In March 2012 the *Joint Study on Aviation Capacity in the Sydney Region* (Joint Study) (Department of Infrastructure and Transport 2012) was released.

The purpose of the Joint Study was to develop an effective strategy for meeting the aviation capacity needs of the Sydney region into the future. It was noted that previous studies had examined options for a second Sydney airport; however, the terms of reference for the Joint Study required a broader examination of:

- the future demand for aviation in the Sydney region;
- how aviation demand relates to the growth of the population and economic activity in the region; and
- how an integrated aviation, surface transport and land development strategy can be developed and implemented over time.

The Joint Study found the Sydney region's demand for aviation services would continue to grow as Sydney's population and business activity grew. It was estimated that annual demand for regular public transport services in the Sydney region would double to approximately 88 million passenger trips by 2035, then double again by 2060.

Overall, the Joint Study concluded that:

- Sydney Airport would continue to be the most important airport for the Sydney region and for Australia, both for passengers and freight;
- even with the implementation of a major terminal redevelopment and revised master plan, Sydney Airport would not be able to cater for the forecast demand in passenger and freight services to and from Sydney;
- the growth in aviation demand and increasing capacity pressures at Sydney Airport would result in increasing impacts on aircraft operations, ground traffic and surrounding communities in terms of reduced scope to mitigate aircraft noise;
- the cost of not accommodating the growth in aviation demand is substantial; by 2060 NSW would have foregone $30.6 billion in expenditure, $17.5 billion in gross state product (GSP) (2010 dollars), and 57,000 jobs; and

- a major greenfield airport in the Sydney basin was the only suitable long term strategy to accommodate the expected growth in aviation demand and ensure significant economic and employment opportunities are not forgone.

The Joint Study forecast that demand for aviation services would continue to grow along with Sydney's ongoing growth in population and business activities. The study conservatively estimated that growth in aviation demand would be less than three per cent per year.

The Joint Study found that on an unconstrained basis (which presumes that all necessary capacity is provided to meet growth), estimated annual aviation demand in the Sydney region would be:

- 57.6 million passenger and 421,200 aircraft movements by 2020;
- 87.4 million passenger and 528,600 aircraft movements by 2035; and
- 165 million passenger and 800,800 aircraft movements by 2060.

As noted earlier, this growth represents a doubling of passenger movements in the Sydney region by 2035 and another near doubling by 2060. In relation to freight, the Joint Study found that on an unconstrained basis, annual demand for freight tonnage would quadruple between 2010 and 2060.

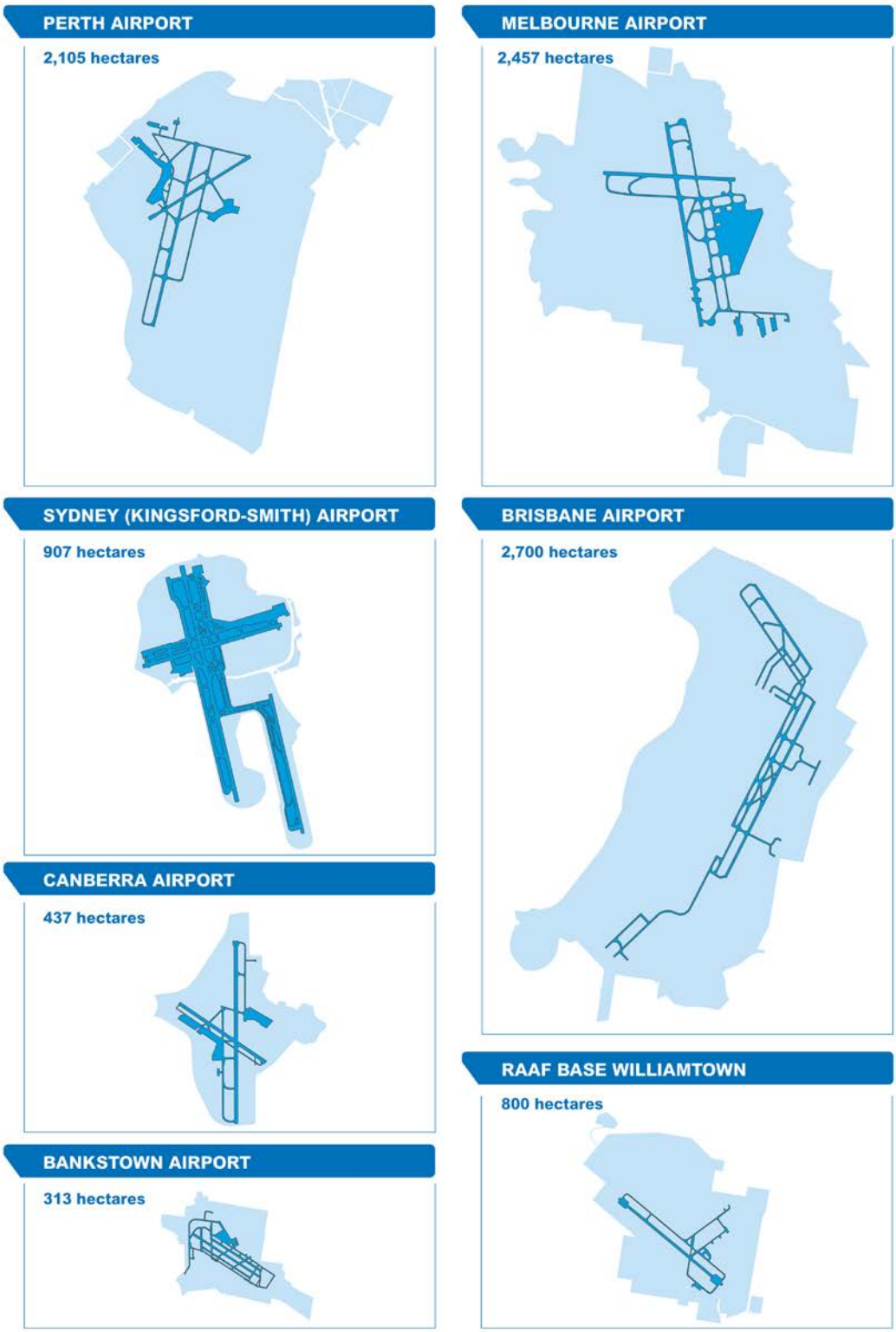
In the absence of other major passenger airports close to Sydney, Sydney Airport would be the only option for servicing this demand. By 2035, Sydney Airport would need to accommodate close to 80 million passengers a year; which is equivalent to around 430,000 annual aircraft movements and represents a 50 per cent increase on movements in 2010. The Joint Study found that due to capacity constraints, Sydney Airport would not be able to accommodate all of the forecast demand.

2.5.2 Sydney Airport capacity

Sydney Airport's capacity to continue to grow to meet demand is constrained by a number of factors. The existing footprint of 907 hectares is small by comparison with other major airports in Australia, as illustrated in Figure 2–5. It is also small compared to other major airports overseas. The airport has operated since 1920 and has been developed progressively, including the extension of runways into Botany Bay. The particular configuration of the runways, taxiways, terminals and aprons arises from the constraints of the site. It therefore does not reflect the contemporary optimal layout for terminals and runways at a major airport.

The configuration and length of the runways and associated taxiway and apron systems restrict the use of the shorter runways for larger aircraft, creating an imbalance in runway operations and reducing the ability of the dual runway system to be operated efficiently.

Capacity is further restricted when weather prevents the use of the dual runway system, as the length of the cross runway means that it is not suitable for all larger aircraft. The length of the runways also limits the scope for 'up-gauging', a process that provides additional capacity through use of larger aircraft to accommodate growing passenger numbers without increasing the number of aircraft movements.



Source: Joint Study (Department of Infrastructure and Transport 2012)

Figure 2–5 Comparison of land areas of selected Australian airports

Collectively, the relatively small size of Sydney Airport, along with its location amid surrounding urban development and proximity to Port Botany and Botany Bay, suggest that any significant expansion of the airport site, realignment of runways or rationalisation of the taxiway and apron systems would be extremely challenging to achieve. At current demand levels, the existing stands and apron areas are heavily utilised at each terminal during peak service periods and any growth in aircraft movements would require additional gate capacity in the near to medium term.

The Joint Study considered that the limitations of existing infrastructure at Sydney Airport will start to be felt from 2015. After this time, there is predicted to be a progressive shortfall in the ability to meet demand, particularly for international services during peak periods. The increase in demand will result in the following capacity restrictions:

- by 2020, all weekday slots for periods between 6.00 am and 12 noon and between 4.00 pm and 7.00 pm will be fully allocated;
- by around 2027, all slots will be allocated, so no new entrants can be accommodated unless another service is cancelled; and
- by around 2035, there will be practically no scope for further growth of regular passenger services at the airport.

The effects of pressure on existing operations at Sydney Airport will grow progressively as airport passenger numbers continue to increase. This includes increased risk of delays, lack of access for new services at peak times, impacts upon the surrounding community due to a restricted ability to use ‘noise sharing’ arrangements and increased road congestion and pressure on the ground transport system.

Additional capacity pressures on taxiways and aprons result in increasing delays to airline services during peak hour periods, when handling rates can only be sustained for a limited number of consecutive hours before flow-on delays are likely. This results in a reduction in potential for Sydney Airport to recover from any disruption to services, with any delays during the morning peak periods continuing to have effects throughout the day. The Joint Study also concluded that there would be a substantial shortfall in aircraft stands and increased capacity pressures on aprons, gates and taxiways, resulting in major impacts and costs.

Reduced capacity to cater for new services at commercially viable times for airlines will mean that airlines will have limited ability to shift any new services to a different schedule, if their preferred slots are unavailable. In practice, the capacity pressure will therefore result in a loss of opportunity well before the available slots run out.

2.6 Strategic alternatives

2.6.1 Overview

The development of a new greenfield airport at Badgerys Creek has consistently been found to be the most effective solution to address long term aviation demand in the Sydney region, a position confirmed by the Joint Study. In coming to this conclusion, the Joint Study also provided a re-evaluation and broad consideration of a number of strategic alternatives to the development of a greenfield airport in the Sydney basin, including:

- expanding Sydney Airport to meet increased demand;
- review of the policy setting and operational restrictions to optimise the use of Sydney Airport;
- optimising the use of other existing airports in the Sydney region;
- use of high speed rail to reduce demand for aviation services; and
- development of existing airports outside the Sydney basin.

While the Joint Study acknowledged that some of the options had potential to provide marginal capacity benefits, such as amending cap and curfew arrangements at Sydney Airport, they were considered extremely short term solutions and incapable of addressing long term aviation capacity requirements. Proposals, such as expanding Sydney Airport or connecting a high speed train to Canberra or Newcastle airports, were found to require significant capital investment and would not necessarily address the underlying key driver of growth in aviation demand.

The Joint Study identified that a major greenfield airport in the Sydney basin was required before the end of 2030 and that a greenfield airport in Western Sydney would be best placed to meet this growing demand. A review of the key findings of the Joint Study and supplementary assessments to address aviation demand is presented below.

2.6.2 Physical expansion of Sydney Airport

Through a comprehensive assessment of Sydney Airport's existing facilities, investment plans and master planning intentions, the Joint Study concluded that there is no real option to significantly increase the capacity of Sydney Airport. This is primarily due to the physical constraints associated with the airport's location, runway lengths, taxiways, and gate and apron capacities, which prevent any significant upgrades or reconfigurations of the airport.

Given the limited scope to expand within its current footprint, a range of options have been considered to expand the airport beyond its boundaries including:

- expansion to the Kurnell/Towra Point area of Botany Bay;
- development of an offshore airport;
- modified or new runways, including extending the shorter north−south runway (Runway 16L/34R) or constructing a second east−west cross runway; and
- terminal redevelopment.

Kurnell/Towra Point

Potential configurations for a new dual runway airport in the Kurnell or Towra Point area on the southern foreshore of Botany Bay were considered in previous studies, to either complement or replace services at Sydney Airport. These options were not seen as cost effective as they would effectively restrict and displace the existing airport operations without enabling a significant increase in capacity in the region.

New runways in Kurnell were also considered to have high potential for environmental impacts associated with reclamation of land in Botany Bay and the coastal dune system. Since the option was initially investigated, the Kurnell Peninsula has also been restricted by progressive development which includes an oil refinery, a desalination plant and additional residential development.

Offshore airport

The potential for an offshore airport in the vicinity of Sydney has previously been considered but ruled out based on cost and environmental considerations. Passenger access would be expensive to establish and operate, with difficult and costly linkages to the existing transportation networks. Security of infrastructure would also be a key consideration for such a development, and the potential environmental impacts would be even more significant than for the Kurnell or Towra Point options.

Extending existing runways

A range of options were considered to either extend the shorter north−south runway (Runway 16L/34R) or construct a second east−west cross runway at Sydney Airport. Each option would require expansion of the Sydney Airport boundary into Botany Bay, or onto land to the east of the airport. The option of extending the runway into Botany Bay is limited by the location of the container terminal facilities on the north-eastern foreshore of Botany Bay, while extending to the east would require considerable land acquisition and relocation of roads and transport networks.

Lengthening the shorter runways would allow for better balancing of runway operations for use by larger aircraft, but would provide minimal capacity improvements as the parallel runway configuration would remain the same.

The separation for the two parallel runways is below the ICAO Standards to permit independent arrivals and departures. More importantly, addressing runway balance would not address other critical congestion points due to the lack of suitable land for taxiways, aircraft parking and terminal developments.

Terminal redevelopment

Sydney Airport Master Plan 2033 (SACL 2014) includes details of a proposed terminal redevelopment plan to expand and make better use of the existing airport terminals. While the proposal may help ensure the airport operates efficiently and that the use of infrastructure is maximised, it does not address underlying capacity limitations. The redevelopment would have minimal influence on the capacity of the runway system, and would not address the immediate shortage of gates available to accommodate the growth of demand into the medium and long term.

2.6.3 Review of operational policy settings

The Joint Study noted that there are three operational policy settings that constrain Sydney Airport's capacity:

- the demand management system, which imposes a maximum aircraft movement limit per regulated hour on the runways and a limit on the slot allocations;
- the curfew, which limits take-offs and landings between 11.00 pm and 6.00 am; and
- the regional ring fence that protects the number of intrastate NSW movements in and out of the airport.

An overview of this analysis is outlined below. The Joint Study concluded that options for changing policy settings at Sydney Airport could provide some additional capacity in the short term but would not meet the medium to long term capacity gap, particularly in the peak periods when demand is already constrained.

Demand management

A demand management system operates at Sydney Airport, setting a cap of 80 movements per hour. The slot management system, which allocates services to the runways, is required to be consistent with the airport movement cap.

The Joint Study considered the effect of allowing up to 85 movements per hour on airport capacity for two scenarios:

- increasing the number of movements during peak hours only; and
- increasing the number of movements for all non-curfew operating hours.

Increasing the cap in the morning peak (6.00 am to 8.00 am) and afternoon peak (5.00 pm to 7.00 pm) would provide 20 additional slots, or a six per cent increase in capacity, during peak periods. Increasing the cap for all non-curfew operating hours (between 6.00 am and 11.00 pm) would make available an additional 85 slots per day, including the additional 20 slots during peak periods. Increasing the cap under either of these scenarios would delay the onset of capacity issues at the airport by around one or three years, respectively, and is not a long term solution to Sydney's aviation capacity needs in either scenario.

It was considered that any increase in peak movement would place additional strain on limited airside infrastructure and increasingly congested surface transport linkages.

Curfew shoulder settings

A curfew has been in place at Sydney Airport since 1963 to protect the communities close to the airport (the distance from the end of the runway to the nearest suburban residences is just 600 metres) and flight paths from noise exposure.

The *Sydney Airport Curfew Act 1995* allows a small number of movements in the shoulder periods, including a maximum of 35 weekly arrivals between 5.00 am and 6.00 am and 14 movements between 11.00 pm and midnight, or to such lower levels as set out in regulations. The current regulations set a lower limit of no more than 24 movements per week between 5.00 am and 6.00 am and zero movements between 11.00 pm and midnight. In total, this means that the regulated level for curfew shoulder movements is currently 1,248 movements per year; however, the absolute maximum curfew shoulder level allowed under the *Sydney Airport Curfew Act 1995* is equivalent to 2,548 movements per year.

Possible refinements to the curfew shoulder period have been proposed as a way to increase capacity at Sydney Airport. The effectiveness of this option to provide capacity would be driven by the level of demand for movements in the curfew shoulder hours.

As a result of Sydney's geographic position, international demand is currently characterised by early morning arrival peaks from Europe, Asia and the United States. International flights cannot be spread evenly throughout the day because of:

- scheduling in Asia and Europe;
- connections at hub airports in the above locations;
- aircraft and crew rotations; and
- the number of sectors per day required to commercially operate trans-Tasman routes.

Considering current demand for international landings in the morning peak, it is likely changes to the curfew would attract some interest from international airlines. Such a measure would reduce pressure on the international terminal and airport infrastructure and relieve some pressure on passenger processing facilities. However, demand for international landings is principally driven by the northern hemisphere summer scheduling period, a time when arrivals of overseas passengers to Australia are at their highest. Therefore, any increased capacity in the curfew shoulder, if utilised, may only be taken up during those six months.

Overall, the Joint Study found that because early morning and late night flights are principally driven by limited seasonal international demand, changes to curfew arrangements at Sydney Airport would only have a limited effect on increasing the operational capacity of Sydney Airport. The Joint Study concluded that, at best, changes to Sydney Airport's curfew could delay the onset of capacity issues for less than one year and would not address the long term aviation capacity constraints.

NSW intrastate ring fence and minimum aircraft size

Sydney Airport currently operates a system of allocating aircraft slots to airlines arriving and departing from regional destinations, known as the 'regional ring fence'. This system includes specific provisions to protect slots for intrastate NSW air services and ensure these slots are not squeezed out by international or major domestic services, to preserve equitable access to the airport for regional communities in NSW.

While the protection of regional access is an important policy objective, these services limit the commercial operations of Sydney Airport as regional services are often operated by small aircraft and do not represent an efficient use of the limited airport capacity in terms of the movement of passengers. This was recognised in amendments to the Slot Management Scheme in 2001, which set a cap for the maximum number of NSW intrastate slots allocated in peak periods.

Any change to the regional ring fence or minimum aircraft size requirements would have the potential to affect the level and pattern of services to regional NSW. Potential implications may include:

- a need for regional airports to be upgraded to cater for larger aircraft;
- reduction in service frequency, but potentially higher capacity in seat numbers;
- increased 'hub and spoke' activity, with consolidation of smaller flights in regional hubs and larger aircraft operating to Sydney Airport;
- operation of smaller aircraft into another airport in the region, such as Bankstown Airport, if available;
- withdrawal of some services to markets with low demand, where only small aircraft are viable and services through a regional hub are not a realistic option; and
- increased travel times and higher costs for many regional passengers.

While a progressive increase in the size of aircraft using Sydney Airport may be a prudent strategy to increase the efficiency of airport operations, the additional capacity created by this change would be limited and would not significantly address the underlying increase in demand for aviation services in the Sydney basin.

Such a strategy would likely require a significant change to the fleet mix used by some airlines and may not be economically viable.

2.6.4 Optimising use of existing airports in the Sydney basin

Bankstown Airport

A potential option to increase capacity at Sydney Airport is to relocate existing turbo-prop movements to Bankstown Airport, leaving these vacated slots available for larger aircraft to operate at Sydney Airport.

The relocation of all turbo-prop aircraft movements to Bankstown Airport would create an increase in slot capacity at Sydney Airport, potentially accommodating increased demand for an additional six years. However, this capacity expansion needs to be balanced against other factors such as the relocation of general aviation traffic to another airport and its associated impacts. Due to the relatively high density of urban development adjacent to and around Bankstown Airport, the commencement of any substantial level of passenger services at Bankstown may have significant impacts on the local community, including increased noise and road congestion.

RAAF Base Richmond

The Joint Study outlined that Airservices Australia estimates that RAAF Base Richmond may have an unconstrained, theoretical regular public transport aircraft capacity of between 186,000 and 250,000 movements per year. This would provide an additional 35 to 50 per cent of regular public transport capacity above current Sydney Airport slots. Theoretically, if RAAF Base Richmond were capable of accommodating 200,000 aircraft movements by Boeing 737 and Airbus 320s carrying 120 passengers per movement, it could cater for up to approximately 24 million passengers per year.

However, the aerodrome's practical capacity is likely to be lower than this, due to airspace conflicts with Sydney Airport and Bankstown Airport and the likely operational mix of aircraft and peak operating times. The practical capacity would also be affected by RAAF operational requirements and the size of the Richmond site, which is considerably smaller than a number of medium-sized regular public transport airports in Australia.

Construction of a new north−south runway at RAAF Base Richmond would help minimise some of the airspace issues and could also reduce noise impacts on residents. There is also potential to construct a longer north−south runway, creating more opportunity to meet international demand, which is the fastest-growing regular public transport segment. However, *A Study of Wilton and RAAF Base Richmond for Civil Aviation Operations* (Department of Infrastructure and Transport 2013) concluded that, even if a north–south runway was developed, RAAF Base Richmond could only ever provide ancillary capacity for the Sydney region and would not address all of the aviation demand expected in the long term.

2.6.5 High speed rail

While it could become part of Australia's long term transport infrastructure, high speed rail is not considered to be an alternative to the development of a greenfield airport. This is because the two forms of transport cater for different demands and travel markets and are in many ways complementary, rather than alternatives.

In 2010, the Australian Government commissioned a strategic study to investigate the feasibility of a high speed rail network linking Melbourne, Canberra, Sydney and Brisbane as well as other regional centres. Since that time, the Australian Government has released two reports on the subject:

- *the High Speed Rail Study Phase 1 Report* (AECOM 2011). This report identified corridors and station locations, potential patronage and provided an indicative cost to build the high speed rail network; and
- *the High Speed Rail Study Phase 2 Report* (AECOM 2013). This report built on the work of the Phase 1 report and refined many of the estimates, particularly around demand and costs as well as the preferred high speed rail route identified in the Phase 1 report. The report also identified next steps in staging a future high speed rail network in Australia.

The study examined a high speed rail network comprising approximately 1,748 kilometres of dedicated route with four city centre stations at capital cities, four city-peripheral stations (one in Brisbane, two in Sydney and one in Melbourne) and 12 regional stations. The estimated cost of constructing the preferred high speed rail alignment in its entirety would be around $114 billion (in 2012 dollars) (AECOM 2013).

A high speed rail network may reduce domestic aviation demand and provide an alternative for some domestic travel, particularly between Sydney and Canberra. However, the Joint Study found that development of a high speed rail network would not be able to address many of the key drivers of aviation demand, in particular international travel and travel to domestic destinations not on the east coast of Australia.

High speed rail and the need for additional aviation capacity should not be considered mutually exclusive. A number of countries around the world have demonstrated that no single transport mode can address all travel needs and that an effective transportation network requires long term investment in multiple modes of transport systems. For example, China, Germany and the United Kingdom have all been investing in additional aviation capacity while also developing and operating high speed rail networks.

As such, any consideration of a future east coast high speed rail system linking Sydney to other major cities does not remove the need to also provide additional aviation capacity.

While high speed rail may have merit as a strategy for long term travel in Australia, the substantial cost associated with its construction and operation, and its inability to address aviation demand on international and some domestic routes, means that it would not be able to provide all of the benefits made possible by the provision of additional aviation capacity. As such, the decision to construct and operate a high speed rail network should be assessed on its own merit and should not influence the decision to expand aviation capacity in the Sydney region.

2.6.6 Development of greenfield airport sites

The Joint Study evaluated potential sites for a new airport, covering a broad range of geographic areas. This included consideration of 80 sites across 18 localities, extending from Newcastle in the north to the NSW South Coast and Canberra in the south. The Joint Study found that Badgerys Creek was the preferred site for a new airport due to its location relative to the Sydney aviation market, and its ability to generate economic and employment benefits, while mitigating impacts on the environment and surrounding communities.

The Joint Study took a four-phase approach to the analysis.

- Phase 1 – assessment of the entire region using a geographic information system modelling approach for the identification of all reasonable locations for a new airport in the Sydney region. This reduced the overall area under consideration by excluding those lands that did not meet basic criteria for an airport, such as unsuitable terrain or an existing urban area.
- Phase 2 – short listing of localities through comparison of a comprehensive set of criteria to determine the potential for each locality to support an airport.
- Phase 3 – identification of sites within each shortlisted locality that were suitable to accommodate either a full sized international airport or a limited service airport aimed primarily at low cost carriers and regional markets.
- Phase 4 – assessment of the identified sites in greater detail using both qualitative data and a rapid cost benefit assessment. When there was more than one site of either type in a locality, these analyses allowed conclusions to be drawn on which was the ‘more suitable’ site.

A range of complex factors were identified and applied throughout the phased assessment process to filter and prioritise options. These were developed from sources spanning four decades of Australian and international aviation studies and reports and incorporated a broad range of assessment criteria. Key issues included proximity to demand, aviation development capacity, airspace conflicts with existing airports, environmental impacts and proximity to growth centres.

Phase 1

Phase 1 included a review of areas where a new airport could realistically be established based upon broad aviation infrastructure acceptability criteria such as degree of existing urbanisation, proximity to demand, topography and land parcel size. To guide the identification of greenfield airport sites, consideration was initially given to four possible airport types which could respond to a range of potential aviation demand segments:

- Type 1: full services airport with runway length up to 4000 metres, serving all regular public transport segments and capable of accommodating a future parallel runway layout;
- Type 2: land constrained full service airport serving all regular public transport segments and capable of supporting a single runway;
- Type 3: limited service airport serving all regular public transport segments accommodating a single shorter runway of up to 2600 metres; and
- Type 4: minimum service airport serving general aviation and limited regular public transport segments.

The phase 1 analysis resulted in 18 localities being identified in the Sydney region and surrounding areas that were potentially suitable for the development of an airport as shown in Table 2–2.

Table 2–2 Greenfield airport localities identified in Phase 1

Region	Locality Number	Locality	Local Government Areas
Northern Localities	1	Ettalong	Cessnock
	2	Watagan Mountains	Cessnock, Lake Macquarie, Wyong
	3	Yengo National Park and Macpherson State Forest	Cessnock, Gosford, Hawkesbury
	4	Central Mangrove-Kulnura	Gosford, Wyong
	5	Central Coast	Lake Macquarie, Wyong
Western and north-west localities	6	Putty Road	Hawkesbury, Lithgow, Singleton
	7	Newnes State Forest and Plateau	Blue Mountains, Lithgow
	8	Great Western Highway	Blue Mountains, Lithgow
	9	Bells Line of Road, Bilpin	Blue Mountains, Hawkesbury

Region	Locality Number	Locality	Local Government Areas
Sydney basin localities	10	Hawkesbury	Baulkham Hills, Blacktown, Hawkesbury, Hornsby, Penrith
	11	Kur-ring-gai National Park and surrounds	Hornsby, Gosford, Pittwater, Warringah
	12	Nepean	Blue Mountains, Liverpool, Penrith, Wollondilly
South-west localities	13	Burragorang	Camden, Wollondilly
	14	Cordeaux-Cataract	Campbelltown, Wingecarribee, Wollondilly, Wollongong
	15	Southern Highlands	Wingecarribee
	16	Goulburn to Marulan	Goulburn-Mulwarree, Upper Lachlan, Wingecarribee
	17	Marulan to Illawarra Highway junction	Goulburn Mulwaree, Upper Lachlan
Southern localities	18	West of Kiama bypass	Shellharbour

Source: Worley Parsons/AMPC Analysis in The Joint Study (Department of Infrastructure and Transport) 2012

Phase 2

Phase 2 involved an assessment of the 18 identified localities to allow short listing against a set of 30 evaluation criteria including proximity to demand, accessibility to land transport networks, economic or commercial opportunities and environmental considerations. The evaluation criteria included consideration of impacts upon protected areas, flora and fauna and noise exposure to surrounding communities. These criteria were used to provide an initial screening tool for environmental impacts, including potential impacts upon matters of national environmental significance and other matters protected by controlling provisions under Part 3 of the EPBC Act.

Proximity to demand and impacts upon protected areas including national parks, state conservation areas and the Greater Blue Mountains World Heritage Area (GBMWHA) were key criteria which distinguished the suitability of each locality.

A number of the identified localities were at the limits of the adopted travel threshold of within two hours' travel to Sydney. These localities were considered too remote to be attractive to airlines or airport users as they would generally involve greater costs in establishing transport links. The more distant localities were not seen to offer any significant advantages over those closer to Sydney and therefore the travel time threshold was reduced to 1.5 hours from Sydney.

Localities positioned within national parks and the GBMWHA were also initially considered technically feasible during the Phase 1 investigations. However, these localities were not considered to provide any additional benefits in comparison to other localities and would result in considerably greater environmental impacts. Localities including Yengo National Park, Newnes Plateau, Great Western Highway and Bells Line of Road are all located partially within the GBMWHA and provide habitat for a range of species of flora and fauna protected under the EPBC Act.

The removal of the more distant localities and those located within protected areas resulted in 11 of the 18 localities were excluded from subsequent consideration. The remaining seven localities underwent a preliminary economic appraisal and a qualitative analysis of cultural heritage items, flora and fauna impacts and noise impacts upon residents and other sensitive receivers. A rapid benefit cost analysis was undertaken by Ernst and Young incorporating key monetised as well as non-monetised impacts as shown in Table 2–3.

Table 2–3 Rapid benefit cost analysis results

Region	Locality Number	Locality	Type 1 airport	Type 2 airport	Type 3 airport	Type 4 airport
Northern localities	4	Central Mangrove-Kulnura	1.37	1.23	0.68	-0.09
	5	Central Coast	2.25	1.64	0.95	0.05
Sydney basin localities	10	Hawkesbury	1.67	1.30	0.74	0.23
	12	Nepean	2.82	1.92	1.22	0.38
South-west localities	13	Burragorang	1.80	1.28	0.72	0.00
	14	Cordeaux-Cataract	2	1.33	0.76	0.18
	15	Southern Highlands	0.81	0.35	0.02	-0.50

Source: Ernst and Young in the Joint Study (Department of Infrastructure and Transport 2012)

The relative benefit cost ratios were developed to provide a comparison between localities. The results indicate that sites in the Nepean locality would have the highest benefit to cost ratio compared to other localities.

The lower economic results for Central Mangrove-Kulnura and the Southern Highlands were principally attributed to higher travel times for aircraft users and the relative site development costs and these localities were subsequently removed from further analysis.

The benefit cost analysis indicates that a Type 1 full service airport is generally more economically viable than other airport types. However, the Joint Study steering committee considered that there was merit in also continuing to assess both Type 1 and Type 3 airports.

Phase 3

Phase 3 involved the identification of the more suitable sites for the establishment of a new airport in the five localities shortlisted as a result of the Phase 2 process. The five shortlisted localities are shown on Table 2–4.

Table 2–4 Greenfield airport localities assessed in Phase 3

Region	Locality Number	Locality	Local Government Areas
Northern localities	5	Central Coast	Lake Macquarie, Wyong
Sydney basin localities	10	Hawkesbury	Baulkham Hills, Blacktown, Hawkesbury, Hornsby, Penrith
	12	Nepean	Blue Mountains, Liverpool, Penrith, Wollondilly
South-west localities	13	Burragorang	Camden, Wollondilly
	14	Cordeaux-Cataract	Campbelltown, Wingecarribee, Wollondilly, Wollongong

Source: Worley Parsons/AMPC Analysis in the Joint Study (Department of Infrastructure and Transport 2012)

The assessment considered a range of aviation feasibility and environmental criteria to identify the lands within each locality that were broadly suitable and most suitable. Assessment criteria included:

- site terrain and the degree to which an airport can closely align with existing topography and minimise earthworks volumes;
- air navigation requirements and airspace management;
- wind shear associated with particular terrain formations and escarpments;
- protected ecosystems including National Parks, State Conservation Areas, State Forests and RAMSAR wetlands;
- urban areas and rural settlements, such as the population density located within a 20 ANEC noise contour based upon indicative airport layouts and runway orientation;
- mine subsidence districts;
- distance to land transport networks; and
- future land-use and growth centre plans.

This process identified a number of sites as potentially suitable to support development of a greenfield airport as shown in Table 2–5 and in Figure 2–6.

Table 2–5 Suitable airport sites by locality

Region	Locality number	Locality	Short listed sites
Northern localities	5	Central Coast	Wallarah
			Peats Ridge (Type 3 only)
			Somersby
Hawkesbury	10	Hawkesbury	Wilberforce
			Castlereagh (Type 3 only)
			Windsor Downs (Type 3 only)
			Glenorie
Sydney basin localities	12	Nepean	Luddenham
			Kemps Creek (Type 3 only)
			Badgerys Creek
			Bringelly
			Greendale
			Catherine Field
South-west localities	13	Burragorang	Silverdale (Type 3 only)
			The Oaks (Type 3 only)
			Mowbray Park
	14	Cordeaux-Cataract	North Appin
			Southend (Type 3 only)
			Wilton
			Wallandoola
			Dendrobium (Type 3 only)

Source: Worley Parsons/AMPC Analysis in the Joint Study (Department of Infrastructure and Transport 2012)

Source: Joint Study on Aviation Capacity in the Sydney Region (Department of Infrastructure and Transport 2012)

Figure 2–6 Potential short listed sites for second Sydney Airport

Phase 4

Phase 4 involved applying a set of technical criteria to the sites identified as suitable to determine the best site within each locality. The analysis is presented in full within the Joint Study.

The sites in the Nepean locality (including Luddenham, Kemps Creek, Badgerys Creek, Bringelly and Greendale) were found to be preferable when assessed against most criteria. The key advantage of these sites is their relative proximity to the sources of potential demand and the associated benefits that would accrue to airport users. Site development costs were also estimated to be relatively lower, compared with most sites in other localities.

The Badgerys Creek site was highlighted as the preferred site for a greenfield airport due to its location relative to the growing aviation demand in Western Sydney and proximity to road and rail transport links. It was found to provide the additional benefits of increased employment and economic opportunities for the Western Sydney community and to be a catalyst for much needed supply of housing.

Further investigation of Wilton as an alternative greenfield location

In addition to finding Badgerys Creek as the preferred site for a greenfield airport, the Joint Study also noted that the Wilton site in the Cordeaux-Cataract locality had some merit as an alternative airport site. Due to its location, Wilton was considered as best placed to mitigate noise impacts on surrounding communities and was also one of the least constrained sites in terms of airspace interactions. Wilton was therefore subject to further investigations to consider its viability as a potential alternative location for a greenfield airport. In 2013, the Australian Government released the *Study of Wilton and RAAF Base Richmond for Civil Aviation Operations* (Department of Infrastructure and Transport 2013). The report included a technical scoping study of the suitability of Wilton as an alternative airport site and included consideration of environmental, economic and social impacts associated with construction and operation of an airport at Wilton.

The report found that, while an airport would be feasible at Wilton, the ecological impact would be greater and the earthworks needed to prepare the site would be significantly more costly than at Badgerys Creek. In particular, the report found that development of an airport at Wilton would require:

- an estimated 100 million cubic metres of cut and fill for bulk earthworks which is significantly larger than the estimated requirements for the proposed Western Sydney Airport;
- the majority of the potential airport site would sit within drinking water catchment areas, requiring extremely rigorous and expensive works to prevent contamination;
- extensive vegetation clearance and removal of habitat for a range of threatened species which are known to occur in the area, including the Koala; and
- significant upgrades to surrounding transport and utility infrastructure.

The report also noted that the aviation industry was doubtful that an airport at Wilton would be close enough to the primary market for aviation services to make the case for the kind of investment needed to bring it into service. Further, the aviation industry had a clear preference for a greenfield airport to be located on the Commonwealth-owned land at Badgerys Creek.

2.6.7 Assessment of strategic alternatives against Matters of National Environmental Significance

Controlling provisions

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places which are defined as matters of national environmental significance. Development of a new airport has potential for a range of direct and indirect impacts upon matters of national environmental significance and other protected matters under the EPBC Act. The referral decision instrument identifies the following controlling provisions under the EPBC Act as being relevant to this proposal:

- world heritage properties (sections 12 and 15A);
- national heritage places (sections 15B and 15C);
- listed threatened species and communities (sections 18 and 18A); and
- Commonwealth action (section 28).

As outlined earlier, a range of strategic alternatives were considered as part of the Joint Study, including alternative solutions and alternative locations. The Joint Study found that development of a greenfield airport was the only alternative capable of meeting the anticipated long term aviation demand. As a result, only the alternative airport site locations, as assessed in the Joint Study and described in Section 2.6.6 of this chapter, were assessed against Matters of National Environmental Significance.

World heritage properties

The GBMWHA covers an area of 1.03 million hectares to the west and north of Sydney and is inscribed on the UNESCO World Heritage List and the National Heritage List. The GBMWHA is considered a matter of national environmental significance. Airport localities with potential for direct physical impacts upon the GBMWHA were excluded from further consideration during Phase 2 of the assessment process. Localities including Yengo National Park and Macpherson State Park, Newnes State Forest and Plateau, Great Western Highway and Bells Line of Road, Bilpin were all located partially within the GBMWHA and were removed from the site selection process together with localities within other protected areas.

A new airport in the Sydney region will result in an increase in the number of aircraft flying above the GBMWHA. Given the size of the world heritage area and the structure of existing airspace arrangements, potential indirect impacts associated with aircraft overflights upon the world heritage property would be similar for the alternative sites assessed in the Joint Study. In particular, as the second-best option for a greenfield airport, Wilton is located close to the GBMWHA, being approximately 15 kilometres from Nattai National Park. It is, therefore, likely that it would have similar indirect impacts as expected for a Western Sydney Airport at Badgerys Creek.

National heritage places

The Greater Blue Mountains is also listed on the National Heritage Register together with a range of other protected areas around Sydney including Ku-ring-gai Chase National Park, Kurnell peninsula headland, the Royal National Park and Garawarra State Conservation Area. Similar to the situation with world heritage, localities that would have direct impacts upon national heritage places were excluded during the site selection process. Indirect impacts on national heritage places would be limited to additional aircraft overflights and would be similar for all shortlisted sites, including Wilton.

Listed threatened species and ecological communities

Potential impacts upon flora and fauna was a primary influence on selection criteria as part of Phase 2 of the site selection process in the Joint Study. The potential to impact upon listed threatened species and ecological communities was a relevant consideration in the determination of the potential suitability of the localities. In addition, localities situated in protected areas were excluded. This provides for the conservation of the diversity of habitats and ecological communities within these areas.

In addition, the scoping study of the Wilton site in the *Study of Wilton and RAAF Base Richmond for Civil Aviation Operations* (Department of Infrastructure and Transport 2013) found that it would require larger amounts of bulk earthworks and vegetation clearance compared to an airport at Badgerys Creek. This would suggest that the impact on listed threatened species and ecological communities would be higher at Wilton than for the proposed airport.

The Nepean locality has been largely cleared for agriculture and rural development which limits the extent of potential disturbance to threatened species and communities. The majority of the Badgerys Creek site consists of exotic grassland and cleared land or cropland dominated by exotic species and noxious and environmental weeds. An offset package has been developed to compensate for the removal of the remaining woodland that provides habitat for threatened species and ecological communities at the site (see Chapter 16 (Volume 2a)).

Commonwealth action

The proposed airport at Badgerys Creek and its proposed establishment is an action proposed to be undertaken by the Commonwealth. Impacts upon the environment in general are therefore required to be considered as part of the action. Environmental factors were considered within each phase of the site selection process.

The Nepean locality contains continuous areas of terrain which minimise the extent of earthworks and disturbance necessary to create a level platform for an airport development. The locality is also favourable due to its proximity to growing aviation demand in Western Sydney. The locality also has close proximity to road and rail links, which further reduces the potential disturbance area.

One of the key factors that makes Badgerys Creek the preferred site for a greenfield airport is that the site and its surrounding area (based on the selection of the same north-east/south-west runway alignment) have been protected from urban and noise-sensitive development for nearly three decades. This has been achieved through the implementation of Strategic Direction 5.8 – Second Sydney Airport: Badgerys Creek (Strategic Direction), which was issued by the NSW Minister for Planning to local councils under section 117(2) of the *Environmental Planning and Assessment Act 1979.* The objective of the Strategic Direction is to avoid incompatible development in the vicinity of any future airport at Badgerys Creek, and specifically applies to land within the 20 ANEC contour prepared for the 1985 EIS. Minimising aircraft noise impacts on surrounding communities was a primary determinant in 1985 when selecting the runway alignment and site boundary – the 05/23 alignment was assessed as having a lesser noise impact than a north-south alignment. The 1999 EIS drew the same conclusion. These planning controls have been implemented by local councils through local environment plans and have largely ensured that noise-sensitive and residential developments have not occurred in the vicinity of the airport site.

2.7 Emergence of Western Sydney

The Sydney metropolitan region is currently home to more than four million residents and is the economic capital of Australia (DP&E 2014). A significant proportion of the population resides in Western Sydney – including the local government areas of Blacktown, Blue Mountains, Canterbury-Bankstown, Camden, Campbelltown, Cumberland, Fairfield, Hawkesbury, Liverpool, City of Parramatta, Penrith, The Hills and Wollondilly. At present, Western Sydney represents around 47 per cent of Sydney's residents, 36 per cent of Sydney's jobs and one third of Sydney's gross regional product (DP&E 2014).

Western Sydney is regarded as one of Australia's most significant economic growth corridors. It is expected that over the next 20 years Western Sydney's population will grow faster than the rest of Sydney. An extra one million people are expected to live in Western Sydney by 2030 (SGS 2015). Over the next 25 years, Western Sydney is expected to account for 60 per cent of Sydney's population growth and 25 per cent of the nation's population growth (Deloitte 2015).

The anticipated growth in Western Sydney over the coming decades will represent a profound regional transformation. The Australian and NSW governments are shaping this transformation through a number of key projects, including the South West Priority Growth Centre, the positioning of Parramatta as a second Central Business District for Sydney, the Western Sydney Infrastructure Plan, the Western Sydney Employment Area, the South West Rail Link extension, and the Outer Sydney Orbital corridor preservation study. In addition, the Australian and NSW governments are undertaking a Joint Scoping Study into the rail needs of Western Sydney and the proposed airport.

These strategies have emerged partly in response to several issues confronting Western Sydney. Amongst the most pertinent concerns are a lack of infrastructure and employment opportunities in the region. Many Western Sydney residents must travel outside the region for work, particularly for well-paid knowledge-based jobs. Around 28 per cent of the resident workforce, or close to 226,000 people, travel to other parts of the metropolitan area for work every day (DP&E 2014). These issues are adding to congestion and greatly increasing the time Western Sydney residents spend commuting to and from work.

The Australian and NSW governments have established a Western Sydney Infrastructure Plan involving major road and transport linkage upgrades intended to connect the airport site with Sydney's road network, capitalise on the expected economic gains of developing an airport at Badgerys Creek and address the lack of ground transport infrastructure in Western Sydney. The NSW Government has also established the Western Sydney Priority Growth Area, which largely borders the airport site, to provide businesses in the region with land for industry and employment, catering for transport and logistics, warehousing and office space.

Development of the proposed airport would coincide with an expected period of significant economic expansion and growing demand for employment opportunities and access to infrastructure in Western Sydney. Airports transform the local economy, bringing a range of jobs in specialist, knowledge-based industries. The proposed airport is expected to be a catalyst for investment and job growth in the region, providing long term employment opportunities, accelerating infrastructure and housing development and strengthening Western Sydney's emergence as a discrete socio-economic region over the coming decades.

2.8 Role of the proposed Western Sydney Airport

As well as being an important transport gateway and economic centre for Western Sydney, the proposed airport would operate as part of the existing airport system in the Sydney basin. In this context, the proposed airport is expected to have a dual role in:

- providing additional capacity to accommodate future aviation demand in the Sydney basin; and
- providing Western Sydney with better access to aviation services, bringing with it long term economic and employment opportunities and accelerating the development of critical infrastructure and urban development in the region.

2.8.1 Providing additional aviation capacity

At the expected commencement of operations in the mid-2020s and during its initial development phase, the proposed airport's customer base is expected to consist predominantly of domestic and international low cost carrier traffic. This demand is expected to be attracted to the proposed airport due to lower aeronautical charges compared to Sydney Airport, as well as by the availability of peak slots, lower airside congestion and the ability to serve a diverse customer base in Western Sydney. While there is expected to be some demand for full service operations at the proposed airport in its initial development phase, full service operations are expected to remain focused at Sydney Airport. In the long term, and as Sydney Airport reaches capacity, the proposed airport is expected to transition to a full service airport, catering to a diverse range of domestic and international travel routes.

Table 2–6 provides a summary of forecast demand and traffic at the proposed airport. During Stage 1 operations with a single northern runway, total passenger demand at the proposed airport is forecasted to reach approximately 10 million passengers annually within its first five years of operation. Beyond Stage 1, the single runway is expected to reach capacity, at a level of approximately 37 million passengers annually by 2050. This equates to approximately 63,000 air traffic movements for Stage 1 operations and 185,000 air traffic movements in 2050.

In the long term, the proposed airport is expected to include a second parallel runway, reaching operational capacity at approximately 82 million passengers annually and 370,000 air traffic movements by 2063, assuming development occurs in line with the indicative long-term concept design.

Table 2–6 Forecast demand and traffic at Western Sydney Airport

Demand type	Stage 1 operations	First runway at capacity (c.2050)	Long term (c.2063)
Annual passengers (arrivals and departures)	10 million	37 million	82 million
Peak hour passengers (international and domestic)	3,300	9,500	18,700
Total annual air traffic movements (passenger and freight)	63,000	185,000	370,000
Total peak hour air traffic movements	21	49	85

As noted, Sydney Airport is expected to continue to be the most important airport in the Sydney region for the foreseeable future. Concurrent with the operation of the proposed airport, overall demand at Sydney Airport is expected to continue growing to 51 million passengers annually by 2030, 72.7 million passengers annually by 2050 and 85.3 million passengers annually by 2075.

Despite the continued growth in overall demand, it is expected that Sydney Airport will reach its international passenger capacity by 2042 and domestic passenger capacity by 2048. Once Sydney Airport reaches capacity, the majority of air traffic growth in the Sydney basin is expected to occur at the proposed airport. A small amount of growth may occur at Sydney Airport, but this would generally be limited to use of larger passenger aircraft, increases in aircraft seat density and greater operational efficiencies.

In light of the demand expected at the proposed airport during Stage 1, it is forecasted that about five years after opening, the proposed airport would accommodate approximately 800 domestic flights per week, with multiple daily services to Australian capital cities, and approximately 130 international flights per week. By 2050, the proposed airport would accommodate approximately 1,700 domestic flights per week, with multiple daily services to Australian capital cities and regional areas, and approximately 1,200 international flights per week.

The domestic and international passenger mix at the proposed airport is expected to evolve over time, driven by carrier decisions about services and the timing of international and domestic capacity constraints being realised at Sydney Airport. Passenger demand at the proposed airport is expected to be initially biased towards domestic markets, representing approximately 80 per cent of total demand for Stage 1 operations. International services are expected to progressively increase as capacity constraints at Sydney Airport take effect and would make up to 43 per cent of air traffic movements at the proposed airport by 2050. At this time, the proposed airport is forecasted to serve 55 per cent of the Sydney basin's international traffic demand.

In providing additional aviation capacity, the proposed airport is expected to play a critical role in accommodating long term aviation demand and enable the economic and employment opportunities outlined by the Joint Study to be realised.

2.8.2 Providing Western Sydney with better access to aviation services

With a population of about two million, Western Sydney as a region is larger than the population of South Australia (ABS 2015). The proposed airport at Badgerys Creek will provide an airport for this heavily populated and growing region. Development of the proposed airport is expected to provide the current and future community with improved access to aviation services by reducing travel times, increasing destination choice and increasing competition.

As a major transport gateway, the proposed airport is expected to become a vital piece of infrastructure at the centre of Western Sydney's economic transformation. According to NSW DP&E (2014), the proposed airport would emerge as a new economic and transport hub, enabling nearby centres such as Liverpool, Penrith, Campbelltown and Camden to continue to grow as regional city centres. In addition, the airport site is approximately 30 kilometres from Parramatta, which is emerging as Sydney's second CBD.

By accommodating future aviation demand, the proposed airport is expected to attract investment to the area and transform the economic structure of the region, driving growth in a range of industries such as transport and logistics, hospitality, education, research and professional services. This would make the proposed airport a significant catalyst for other economic activity in the area, accelerating investment in critical infrastructure, facilitating development of nearby employment and industrial precincts, and broadening the employment opportunities available to residents.

As infrastructure assets, airports are unique in that they generate more jobs during operation than construction. These jobs will involve a range of industries, skills and qualifications, and will help to support local education, apprenticeships and workplace skills into the future. Finally, these jobs will be close to where people live – cutting travel time to work, reducing the need to travel outside the region for work, and improving lifestyles.

2.9 Conclusion

Aviation has been a critical component in the economic success of Australia, and of Sydney in particular. Over the coming decades, Sydney is expected to become more reliant on its connections to other parts of Australia and the world for its continued economic growth. In addition to its role in facilitating GDP growth, aviation plays an increasingly important social role in connecting Australians with each other and with the rest of the world.

The Joint Study provided a comprehensive review of anticipated demand for aviation services in the Sydney region and potential alternatives to address the increasing aviation capacity constraints in the Sydney region.

The Joint Study predicted that demand for aviation services will continue to grow along with Sydney's ongoing growth in population and business activities, and that the majority of population growth would occur in Western Sydney. Sydney Airport is Australia's busiest regular public transport airport and will continue to be the major focus for international and domestic airlines operating in and out of Sydney. Further development of Sydney Airport is limited by both physical and operational constraints and the airport will not be able to cater for the forecast long term demand in both passenger and freight services to Sydney.

The Joint Study found that the economic cost of not meeting the expected increased demand would be substantial. By 2060, the economy-wide (direct and flow-on) impacts across all sectors of the Australian economy could total $59.5 billion in foregone expenditure and $34.0 billion in foregone gross domestic product (based on 2010 dollars). The NSW economy would be especially heavily affected, with losses across all industries totalling $30.6 billion in foregone expenditure and $17.5 billion in foregone GSP.

The Joint Study also predicted a substantial impact on potential employment in relation to the loss of opportunity to create new jobs to service the increasing demand for aviation services. The number of total jobs that would be foregone is estimated to grow over time, in parallel with unmet demand. By 2060 the estimate of foregone jobs is approximately 57,000 in NSW and 77,990 nationally.

A range of alternatives has been considered both for the expansion of existing airport facilities and the development a new greenfield airport. The Joint Study considered there was limited ability to meet the anticipated aviation demand through expansion of existing airports, and that a greenfield site would be required.

Badgerys Creek has been selected by the Australian Government as the site for the development of a greenfield airport following the completion of an extensive site selection process. In addition to its inherent suitability to be developed as a major airport, the site was selected due to its proximity to an area of increasing aviation demand and having regard to the economic benefits and opportunities that an airport could provide for the growing Western Sydney region.

Development of the proposed airport at Badgerys Creek would simultaneously accommodate long term aviation demand and avoid foregoing economic and employment opportunities. During Stage 1 development, the proposed airport would be focused on low cost carrier domestic operations, although it would be capable of supporting the full range of airline services. In the long term, Sydney Airport will reach capacity and the proposed airport is expected to take a more prominent role in servicing a variety of domestic and international markets. By 2050 the proposed airport is expected to be accommodating the majority of international arrivals and departures in the Sydney basin. In this context, the proposed airport will play a critical role in fostering long term growth and development opportunities in Western Sydney.