

# PART SEVEN

# OPTIONS TO BETTER UTILISE OTHER EXISTING INFRASTRUCTURE TO GAIN CAPACITY TO MEET FORECAST DEMAND



## Key points

- Bankstown Airport could be upgraded and made available to accommodate a limited level of operations by turboprop Regular Public Transport (RPT) aircraft.
  - A proposal by the airport operator for a 220 metre extension of the main runway would enable up to Code 3C aircraft to operate at the airport.
  - Airservices Australia advises that the operation of RPT jet aircraft at Bankstown would conflict with operations at Sydney (Kingsford-Smith) Airport in some conditions.
- Bankstown is Sydney's major General Aviation (GA) airport, with a large volume of Visual Flight Rules (VFR) flights, including a high proportion of training flights. The operation of Instrument Flight Rules aircraft at levels of more than 10 to 12 per hour would create significant disruption and risks to VFR activity.
  - If a significant level of RPT services – above about 10 per hour – were to commence at Bankstown, provision would need to be made to relocate GA activity to other airports.
- The commencement of any significant level of RPT activity at Bankstown and any extension of the runway would require regulatory approvals, with public consultation and assessment of the environmental impacts.
  - Given the location of Bankstown Airport in a heavily urbanised area, aircraft noise and impacts on road congestion are likely to be significant issues of local concern.
- Utilisation of Bankstown Airport for RPT services would require upgrades of airport and road access infrastructure to the airport. Any upgrades should also consider linkages with Sydney (Kingsford-Smith) Airport and be consistent with NSW Government transport plans.
- RAAF Base Richmond is presently capable of accommodating jet RPT services but would require a significant upgrade of airport infrastructure to accommodate civil traffic.
  - The RAAF supports opening up the Richmond base to civil access, as it is compatible with its plans for a reduced presence and would extend the life of the RAAF Base at the location.
- Based on preliminary cost estimates, an initial investment of around \$150 million would provide a functional joint civil/RAAF facility able to handle around one million passengers per year.
  - An investment of \$500 million would extend the capacity to an estimated five million passengers per year.
- RAAF Base Richmond has significant operational limitations, including:
  - the prevalence of fog at certain times of the year and the proximity to the Blue Mountains;
  - operations on the east-west runway would have some impact on flight paths to Sydney (Kingsford-Smith) Airport.
- In addition, the communities of Richmond and Windsor, which are located close to the ends of the current east-west runway, would experience a level of additional aircraft noise from civil operations.

- Better noise outcomes and additional capacity could be achieved if additional land was acquired and a new runway was constructed on a north-south alignment. This would provide a major airport able to service all market segments. However, it could cost around \$4.0 billion for a single 2,600 metre runway with a terminal suitable for up to 20 million passengers per year, or around \$10.0 billion for a single 4,000 metre runway and terminal facilities suitable for 30 million passengers per year.
- RAAF Base Richmond will remain a constrained site and it would be challenging to develop it into a parallel runway airport. However, providing civilian access to the site based on use of the existing runway would serve the growth of North West Sydney and Western Sydney.
- Canberra and Newcastle (Williamstown) airports are important airports serving RPT markets to the south and north of Sydney. Neither is located close enough to the population of Sydney to take the role of Sydney's second RPT airport, but both will provide additional options for a small proportion of passengers who are prepared to travel the extra distance.
- Canberra Airport is the only curfew-free airport within reach of Sydney and provides the potential for night-time services which cannot be accommodated at Sydney (Kingsford-Smith) Airport, including overnight freight services, and possibly some international Low Cost Carrier (LCC) services. It is important that Canberra's 24-hour unrestricted curfew-free status be protected.
- Newcastle Airport serves the growing population in the Hunter Valley region and parts of the Central Coast. The civil operations are conducted under an agreement with the RAAF. However, because of RAAF requirements, the scope for continued growth of civil services is unclear.
- Other aerodromes in the region may also want to attract some RPT (such as Illawarra Regional Airport). However, even if a combination of the options considered for maximising the use of existing airports is implemented, they do not provide sufficient additional capacity to meet the long-term demand for aviation services in the Sydney region.

## 7.1 Options for better use or expansion of other existing aerodromes

It is anticipated that Sydney (Kingsford-Smith) Airport will be able to undertake a range of actions to improve efficiencies across the airport to better handle increased throughput, to manage delays and improve the passenger experience. However, the aviation infrastructure options do little to manage the expected long-term forecast demand.

As a result, the Steering Committee also examined options to better use or expand other existing aerodromes to help cater for the demand that cannot be met by Sydney (Kingsford-Smith) Airport.

### Potential to expand the RPT role of existing aerodromes

There is a range of other existing aerodromes in the Sydney region that currently fulfil a role serving particular demand segments.

However, Bankstown and Richmond are the two aerodromes close to the Sydney market base able to undertake an expanded role to service a proportion of RPT.

RAAF Base Williamtown (Newcastle Airport) has the physical capacity to accommodate existing demand levels and can accommodate some growth in its current RPT services. However, its distance from Sydney means that the airport principally serves the Hunter and Central Coast regions.

Canberra Airport is expected to continue to grow and potentially to introduce some international services, but it will largely serve its own market to the south of the Sydney region. It is the only RPT airport in the region that is currently cap-free and curfew-free. This gives Canberra Airport an opportunity to target both late night international flights, especially from LCCs (though demand for this would be long term), as well as overnight freight. Overnight air freight carried to and from Canberra currently includes overnight express freight envelopes; critical medical items such as blood, plasma and radioactive isotopes for cancer treatment; cash for the banking system; diplomatic parcels; and newspapers. In the *Canberra Airport 2009 Master Plan*, Canberra Airport's lessees have published their objectives to establish a wider overnight freight hub, with night-time connections in and out to major Australian cities and potentially New Zealand.

As Sydney (Kingsford-Smith) Airport operations are expected to remain constrained by the curfew, there will be a need for an alternative airport to meet the growing demand for overnight services. Canberra Airport, provided it remains curfew-free, is expected to play an important role in providing these services.

While further work is continuing on the potential business case for High Speed Rail (HSR), there is as yet no developed analysis of the scope for Canberra or Newcastle airports to serve a substantial share of the Sydney aviation market if connected to a future HSR link. As these airports are too far away from most of the Sydney market, they are unlikely to make a major contribution to meeting the Sydney aviation market demand.

A range of other GA airports or military aerodromes in the region have also been assessed, with a focus on their ability to make a significant contribution.

Illawarra Regional Airport at Dapto near Wollongong has for short periods provided RPT services to Melbourne. Expansion in the level of possible RPT operations could be constrained by a range of environmental issues. Additionally, there could also be significant future noise issues

for major residential development occurring close to the airport, particularly in two new housing estates planned for Calderwood and West Dapto.

A range of other airports were considered but were found to also face constraints in being able to serve RPT demand.<sup>159</sup> Table 33 provides a snapshot of aerodromes assessed and their capacity to assist with future demand levels.

**Table 33** Other aerodromes' ability to assist with future demand levels

Aerodrome	Longest Runway Length	Current Operational Function	Type of RPT That Could Be Provided from Existing /Upgraded Infrastructure				
			Long Haul International	Short Haul International	Domestic	East Coast Domestic	Regional Domestic
RAAF Base Richmond	2,134m	RAAF military logistics facility and supply chain into Sydney basin	✗	✓	✓	✓	✓
Canberra Airport	3,283m	Major RPT airport with some military and VIP aircraft operations	✓	✓	✓	✓	✓
Bankstown Airport	1,416m	Primary GA airport for the Sydney basin	✗	✗	✗	✓	✓ <sup>1</sup>
RAAF Base Williamtown	2,438m	RAAF's primary operational air base in NSW; RPT for Newcastle market	✗ ✓ <sup>2</sup>	✓	✓	✓	✓
Illawarra Regional Airport	1,819m	Provides GA services	✗	✗	✗	✓	✓
Camden Airport	1,464m	Provides GA services	✗	✗	✗	✗	✓ <sup>3</sup>

Note 1: Turboprops only.

Note 2: If agreed by Defence.

Note 3: Turboprops and only with significant upgrades to pavement strength.

Source: WorleyParsons/AMPC.

Based on the assessment, Bankstown Airport and RAAF Base Richmond are considered to be the only existing aerodromes able to serve a significant proportion of the Sydney region's RPT demand. These facilities are considered further in the section below.

This does not limit other aerodromes in the region from expanding RPT services as part of their own planning processes.

159 Further information can be found in Technical Paper A1.

## 7.2 Potential expanded role of Bankstown Airport

Bankstown Airport is located about 4 kilometres west of Bankstown city centre, 37.5 kilometres from Sydney and 14 kilometres from Parramatta by road, in a heavily urbanised part of Western Sydney. It functions as the primary GA aerodrome for the Sydney region and NSW, and it has the second highest number of aircraft movements in Australia.

The annual operational capacity of Bankstown Airport's runway system has been estimated at 480,000 to 500,000 GA aircraft movements per year, with Bankstown Airport recording more than 484,000 aircraft movements in 1989–90 during the pilot's strike.<sup>160</sup> Assuming continued GA growth of 0.5 per cent to 1.0 per cent per year, this level of movement could be reached between 2060 and 2090.

Some capacity at Sydney (Kingsford-Smith) Airport could be released by inducing or requiring by regulation some passenger services (for example, turboprop services) to relocate to Bankstown Airport. This would allow larger aircraft to take up the slots vacated at Sydney (Kingsford-Smith) Airport.

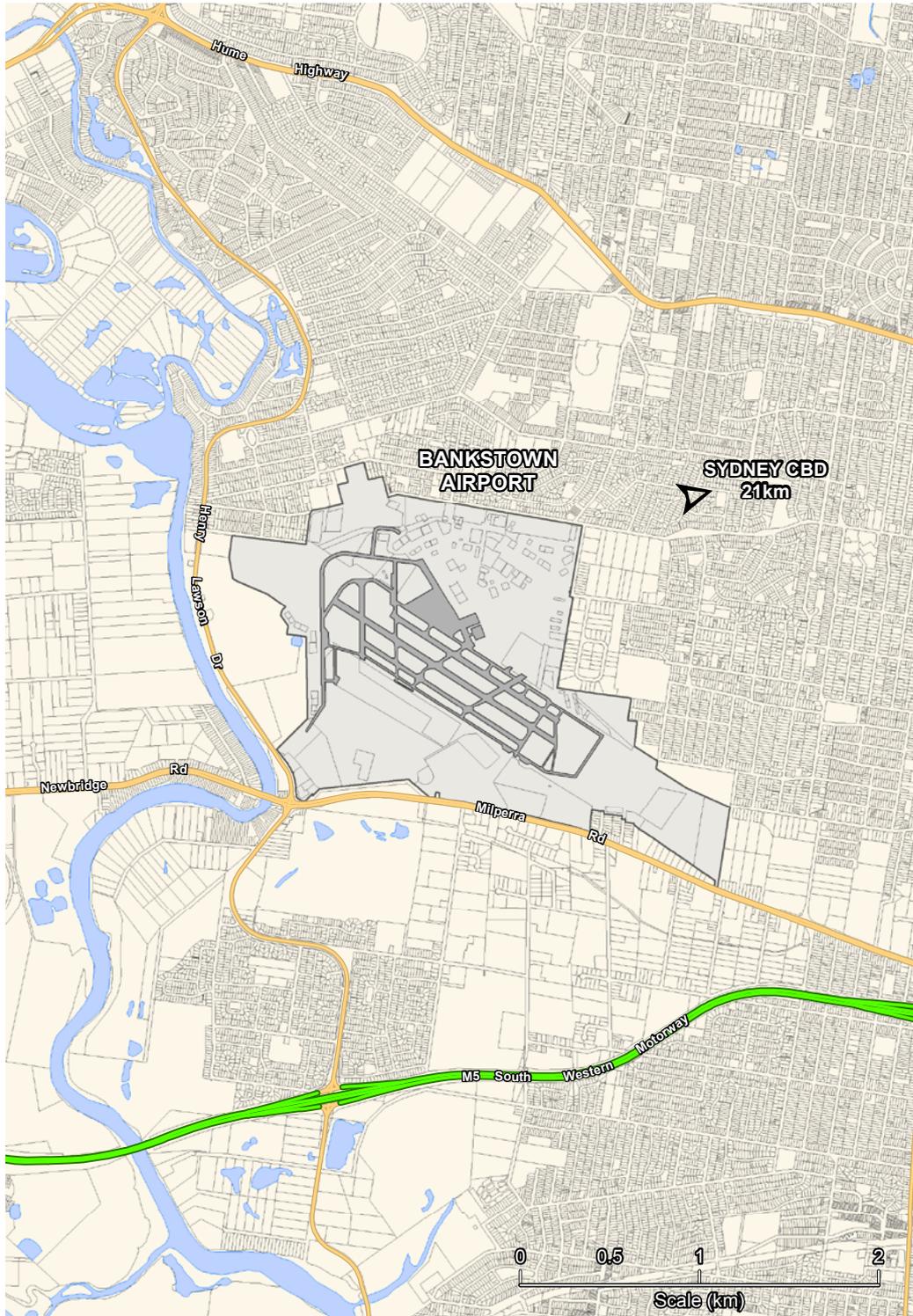
The airport lessee, Bankstown Airport Limited (BAL), has long expressed an interest in establishing point-to-point passenger services targeting Melbourne, Brisbane and Canberra, as well as regional NSW. The approved *Bankstown Airport Master Plan 2004/05* (the 2005 Bankstown Master Plan) foreshadows up to 12 RPT movements per day. In the draft Master Plan submitted in 2010 BAL sought to extend the provision to 32 RPT movements per day. However, as the draft Master Plan was not accepted by the Australian Government, this change has not as yet been realised.

While there are no RPT services currently, the airport is technically capable of accommodating up to Code 3C aircraft such as the BAe-146 (albeit with possible pavement and/or payload limitations). The airport is currently not capable of serving domestic jet aircraft operations. While some extension of the runway is possible, the airport site is relatively small and constrained. Further its location in a heavily urbanised region means that a public consultation process and government approval would be required for any runway upgrade.

Considering the potential physical capacity of Bankstown Airport, options have been considered for the airport to expand its role to provide RPT capacity in the region.

160 Bankstown Airport Limited, Aviation Development Concept – Proposed Requirements, Bankstown Airport Master Plan, 2004/05.

**Figure 127** Bankstown Airport site and surrounds



Note: Distances are 'as the crow flies'.

Source: Australian Department of Infrastructure and Transport.

## Provide incentives to relocate or otherwise induce all NSW intrastate turboprop aircraft movements to Bankstown Airport

Current airline schedules indicate that approximately 240 RPT turboprop movements occur at Sydney (Kingsford-Smith) Airport per weekday, principally on intrastate services.<sup>161</sup> In 2010, approximately 90 per cent of all intrastate aircraft movements at the airport were by turboprop aircraft.<sup>162</sup>

### Airspace management and air traffic control

Airservices Australia advises that a level of turboprop operations could be accommodated within the current airspace configuration; however, the proximity of Bankstown Airport to Sydney (Kingsford-Smith) Airport precludes the segregated operation of larger RPT jet traffic from both airports.

Airservices Australia also suggests current airspace classification and control zone dimensions for Bankstown Airport do not support a combination of high-density GA traffic and significant RPT turboprop movements. As a result, a level of RPT movements above about 10 to 12 per hour<sup>163</sup> would require the relocation of most GA Visual Flight Rules traffic, including flying training, to another airport.<sup>164</sup>

Considering the current and forecast movement levels at Bankstown Airport, it would be difficult for other GA aerodromes in the region to collectively accommodate the demand, as some are located significant distances from Sydney. More remote locations may not be viable for some of the businesses operating at GA airports. Bankstown Airport is home to a significant number of GA-related businesses and privately-owned infrastructure. The relocation of GA movements to alternative aerodromes in the region would also require the relocation of these businesses. This is likely to be costly.

### Potential capacity

There may be potential to put in place relocation incentives to induce all NSW intrastate turboprop movements from Sydney (Kingsford-Smith) Airport to Bankstown Airport. This would enable a proportion of slots used by the 64,000 intrastate<sup>165</sup> movements to become available for other movements at Sydney (Kingsford-Smith) Airport.

There would be a requirement for incentives or regulatory intervention to drive take-up and demand for this option if it is to achieve slot capacity increases at Sydney (Kingsford-Smith) Airport. As capacity pressures build at Sydney (Kingsford-Smith) Airport, some RPT airline views on the use of Bankstown Airport may change by normal market forces. However, over recent years, airlines, including those operating intrastate, have had the option of relocating operations to Bankstown Airport but have not done so. This has been despite potential savings in aeronautical charges as well as avoiding peak capacity challenges at Sydney (Kingsford-Smith) Airport. Operations to Bankstown Airport would not meet the needs of passengers transferring to major domestic or international services. Airlines are also likely to be reluctant to split their operations between Sydney (Kingsford-Smith) Airport and Bankstown Airport.

<sup>161</sup> Airservices Australia. Other turboprops operate from Sydney to Canberra but are not considered 'intrastate'.

<sup>162</sup> BITRE data.

<sup>163</sup> It is anticipated by Airservices Australia that the 10–12 movements per hour would be the maximum. Depending on the number of GA operating in that hour it may be significantly less. Such operations would need the approval of the Civil Aviation Safety Authority.

<sup>164</sup> Further information can be found in Technical Papers C3 and C4.

<sup>165</sup> Other turboprops operate from Sydney to Canberra but are not considered 'intrastate'.

If all turboprop movements were relocated, this could delay capacity issues for aircraft movements accessing Sydney (Kingsford-Smith) Airport by up to six years.

## Infrastructure improvements

To allow full use by Code 3C aircraft at Bankstown Airport, it is likely that a 220 metre extension of the centre runway from 1,416 to 1,635 metres would be required. This would allow Code 3C aircraft to operate at Maximum Take Off Weight (MTOW) without undue payload or flight distance restrictions. This runway extension would not make Bankstown Airport capable of accommodating Code 4C aircraft such as B737-800 and A320-200.

While the runway has a strength rating of 20,000 kilograms and accommodates occasional use by aircraft up to 50,000 kilograms, some strengthening may be required to handle regular use by turboprop aircraft with a MTOW over 20,000 kilograms, such as the Q400. Similarly, some strengthening may also be required on a parallel taxiway and associated parking aprons.

The existing passenger terminal will need to be redeveloped or expanded if passenger demand exceeds the current processing capacity of 170 departing passengers and 150 arriving passengers at International Air Transport Association Level of Standard 'Category C'. The scale and rate of redevelopment would largely depend on the scheduled distribution of aircraft throughout the day and the extent to which the schedule generates peaks in terminal use.

At Sydney (Kingsford-Smith) Airport, the change in aircraft mix arising from any substantial diversion of turboprop operations to Bankstown Airport would likely require some restructuring of airside infrastructure and capital expenditure to accommodate a fleet of generally larger aircraft.

## Surface transport connections

One of the reasons that Bankstown Airport is often cited to assist with aviation capacity in the Sydney region is its proximity to Sydney CBD and the region's population relative to other existing aerodromes. Bankstown Airport is located 37.5 kilometres and a travel time of 41 minutes (as of 2011, assuming relatively free-flow traffic) from the CBD by road. In contrast, Sydney (Kingsford-Smith) Airport is located 11.7 kilometres and a travel time of approximately 15 minutes from the entry to the Domestic Terminals via the Eastern Distributor to the CBD and 16.9 kilometres and a travel time of 17 minutes from the International Terminal. This suggests at least an additional 25 minutes travel time each way for passengers to Bankstown Airport seeking to access the city centre. However, Bankstown Airport is comparatively closer to the Parramatta CBD than to Sydney in terms of both distance and travel time (14 kilometres or 32 minutes from Bankstown Airport by road), suggesting that for some travellers this option may result in an improvement in overall journey time.

As any significant level of RPT services would also involve a significant increase in the number of users accessing the airport, road congestion around Bankstown Airport at peak times would be a significant challenge, with increased Bankstown traffic joining high peak time traffic volumes on the M5 motorway, Henry Lawson Drive and Milperra Road.

Increased local traffic would also be an issue for local residents.

While there is a Bankstown Station on the CityRail network 4.7 kilometres away, connections between the airport and the rail line are only currently served by charter bus services to and from Bankstown Airport. To connect this level of patronage in the CityRail network would either require increased bus services or an underground branch rail line.

The distance from Bankstown Airport to Sydney (Kingsford-Smith) Airport would present challenges for those passengers connecting to interstate or international services. For these

passengers connecting with other services, this would require at least an additional 30 minutes to travel between the two airports to connect to another flight and at additional cost.

Managing the impact of RPT on surface transport connections around Bankstown Airport will therefore require appropriate integration with current transport and land use planning strategies.

### Aircraft noise

Aircraft noise associated with the introduction of RPT services is likely to be a significant issue. Bankstown Airport is located in a heavily urbanised area, with residential area in close proximity to the site. While the airport is currently used by turboprop and small jet aircraft, the predominant operations are by smaller piston engine aircraft. Current aircraft operations generate some noise complaints, but the airport is able to operate without a curfew.

Regular RPT services using larger turboprop aircraft will generate different noise patterns in the vicinity of the airport. Even though these aircraft may be relatively quiet compared to passenger jet aircraft, the changed noise patterns are still likely to raise concerns with potentially affected residents. There will likely be a need for a full environmental assessment of the proposed introduction of RPT services.

### Bankstown Airport to accommodate up to 32 RPT turboprop movements per day

In the 2005 Bankstown Master Plan, Bankstown Airport Limited published its plans for RPT movements commencing with four movements per day, six days per week (1,248 aircraft movements per year), increasing to 12 movements per day, six days per week (3,744 aircraft movements per year).<sup>166</sup> In its *Bankstown Airport Preliminary Draft Master Plan 2010*, Bankstown Airport Limited was seeking to increase movements to up to 32 movements a day in 2011–12.<sup>167</sup>

This number of movements per day is equivalent to around 11,700 RPT movements per year. If this level of RPT is relocated from Sydney (Kingsford-Smith) Airport<sup>168</sup> to Bankstown Airport, this is equivalent to a saving of two per cent of total slots. Provision for the higher level of 32 RPT movements per day relative to the 12 per day currently in the 2005 Bankstown Master Plan may increase the attractiveness for airlines, allowing the chance of take-up by natural market forces – in particular, as capacity pressures increase at Sydney (Kingsford-Smith) Airport. Although, this is significantly lower than the option of 10–12 movements per hour.

At a level of 32 RPT movements per day, GA could still be accommodated at Bankstown Airport but may require the displacement of some GA IFR operations if there are periods of peak demand for IFR operations (RPT and other) and the maximum hourly rate of IFR movements (10–12) is reached.

Other GA operations may also be displaced or interrupted by RPT movements because of separation requirements, but the extent of this displacement has not been analysed. This level of movements would require Civil Aviation Safety Authority (CASA) approval given the potential safety implications for an arrangement where both GA and RPT services are operating at Bankstown Airport in what is currently Class D airspace.

Table 34 below summarises the range of impacts that may occur as a result of the Bankstown Airport RPT options.

<sup>166</sup> Bankstown Airport Limited, *Master Plan Bankstown Airport 2004/05, Aviation Development Concept – Traffic Forecast, 2005*.

<sup>167</sup> Bankstown Airport Limited, *Bankstown Airport: Preliminary Draft Master Plan 2010, 2010*. Note that this Master Plan was not approved by the Minister for a variety of reasons and a new preliminary draft is currently being developed.

<sup>168</sup> Note not all of the activity is likely to relocate. Some of it will be induced demand.

Table 34 Possible Bankstown RPT options

Option	Potential Impacts	Potential Timing		
		Short Term (0–10 years)	Medium Term (10–25 years)	Long Term (25–50+ years)
Provide relocation incentives or otherwise induce regional movements to Bankstown Airport. If level of RPT conflicts with GA operations, commence relocation of GA (such as training traffic) out of Bankstown Airport. <sup>1</sup>	<p><b>Noise:</b> less noise initially at Sydney (Kingsford-Smith) Airport, but not as demand takes up capacity created.</p> <p><b>Noise implications at Bankstown Airport:</b> greater noise per aircraft, but if GA relocated 80 per cent reduction in total movements. Noise implications at GA aerodromes accommodating Bankstown Airport's current GA.</p> <p><b>Peak slot availability:</b> greater peak slot availability at Sydney (Kingsford-Smith) Airport.</p> <p><b>Slot availability:</b> potential 12 per cent increase in total Sydney (Kingsford-Smith) Airport slots, delaying constraints by around six years. Timing would depend on intrastate service take-up of the relocation incentives. Capacity issues created for GA movements in the region.</p> <p><b>Airside infrastructure:</b> investment and capital expenditure required at Sydney (Kingsford-Smith) Airport, Bankstown Airport and GA airports accommodating approximately 330,000 GA movements. GA operator and intrastate airline operator investment to relocate.</p> <p><b>Surface transport:</b> congestion on roads to access Sydney (Kingsford-Smith) Airport could be reduced; however, surface transport to Bankstown Airport and other GA aerodromes accommodating the GA demand could become more congested and may require investment.</p> <p><b>Delay impacts:</b> less flow-on delays at Sydney (Kingsford-Smith) Airport in the short term, but impacts would resume as demand takes up capacity.</p> <p><b>Passenger impacts:</b> more expensive and longer transits for those passengers interlining with domestic or international services. Closer proximity to Western Sydney, including Parramatta.</p> <p><b>Relocation of services:</b> Shortfall in GA capacity, with current GA airports in the vicinity unable to accommodate the relocated services.</p> <p><b>Airspace implications:</b> This level of activity will need to be assessed by CASA.</p>	●	●	
Bankstown Airport serves up to 32 Code 3C propeller and jet aircraft RPT movements per day.	<p><b>Noise sharing:</b> minor impact at Sydney (Kingsford-Smith) Airport due to scale of movements, though Bankstown Airport would be affected by noise from both GA and RPT operations.</p> <p><b>Peak slot availability:</b> minimal impact due to the scale of movements relative to overall Sydney (Kingsford-Smith) Airport movements.</p> <p><b>Slot availability:</b> potential two per cent increase in total Sydney (Kingsford-Smith) Airport slots (around one year delay of constraints). Timing would depend on intrastate service take-up of the relocation incentives. Capacity issues created for GA movements in the region.</p> <p><b>Airside infrastructure:</b> given the scale of movements, minimal if any airside infrastructure restructure and capital expenditure is expected.</p> <p><b>Surface transport:</b> minimal impact for Sydney (Kingsford-Smith) Airport due to the scale of movements; however, surface transport to Bankstown Airport may require investment.</p> <p><b>Delay impacts:</b> minimal impact due to the scale of movements relative to overall Sydney (Kingsford-Smith) Airport movements.</p>	●		

Note: 1. This option may be undertaken without relocating GA if movements are kept to below 10–12 per hour or as assessed by CASA.

Source: PwC and Australian Department of Infrastructure and Transport.

In summary, relocation of all RPT turboprops to Bankstown Airport would create a significant amount of slot capacity at Sydney (Kingsford-Smith) Airport and could provide an additional six years in capacity. However, this capacity expansion needs to be balanced against other factors such as relocation of GA traffic to another airport or other airports.

Limiting RPT operations to 32 turboprop movements per day at Bankstown Airport would still enable GA operations at the airport; however, it provides limited additional capacity for Sydney (Kingsford-Smith) Airport.

The commencement of any substantial level of RPT operations at Bankstown would raise significant issues for the local community, including around aircraft noise and increased road congestion.

### 7.3 Potential expanded role of RAAF Base Richmond

RAAF Base Richmond is located between the towns of Windsor and Richmond, which lie to the immediate east and west of the aerodrome respectively. The base is within proximity of the North West Growth Centre.

Its location within the Sydney region (65 kilometres from the CBD by road) provides it with reasonable transit times, particularly for large parts of Northern and Western Sydney. A range of investments in passenger facilities would be required to accommodate significant RPT.

Two potential options have been explored for RAAF Base Richmond investment to accommodate RPT movements, one involving use of the existing east-west runway for a level of RPT services and the other involving construction of a north-south runway to provide an expanded capacity for RPT services. Both presume the continuance of Defence operations at the base.

#### Ability to accommodate RPT on existing east-west runway

RAAF Base Richmond has a similar runway capability to RAAF Base Williamtown (albeit the main runway is 300 metres shorter, at 2,134 metres) and is able to presently accommodate aircraft types such as B737, A320 and EMB 190.<sup>169</sup> It currently has no RPT usage and has relatively less RAAF usage than Williamtown.

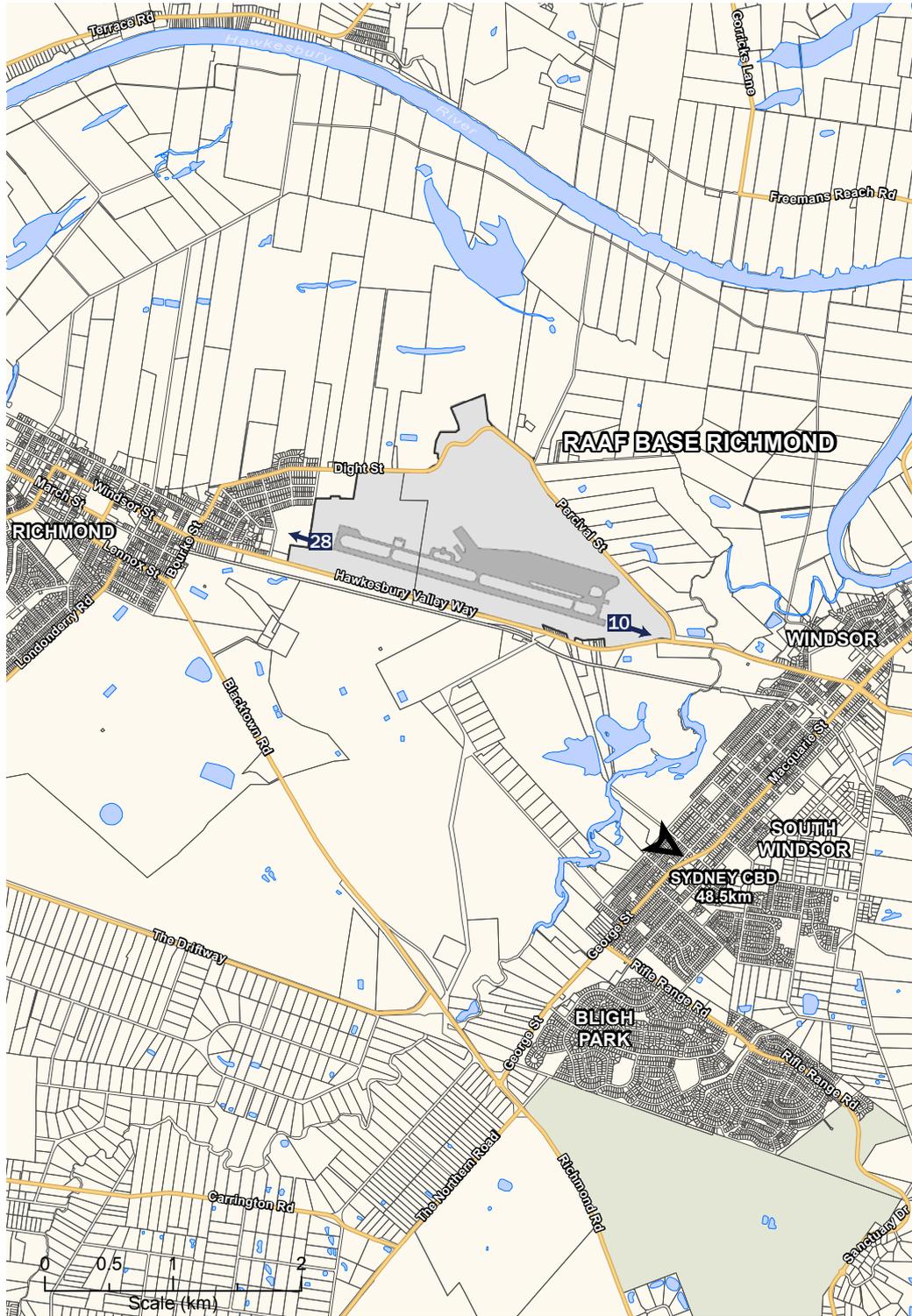
The addition of civilian movements would likely extend the duration of RAAF use of the site, as it would also facilitate a number of necessary infrastructure upgrades. However, arrangements for interactions between civil and military movements would need to be considered.

#### Development scenarios

Figure 128 presents the current layout of RAAF Base Richmond. The RAAF Base and facilities are concentrated to the north-east of the existing runway. Loading areas for explosive ordnance are currently located in the north-west area. Richmond Road and the CityRail Western Line connecting Richmond and Chatswood are located to the south of the existing runway, with Hawkesbury Racecourse, Hawkesbury Showground, Clarendon Station and heritage buildings located to the south-east.

<sup>169</sup> Depending on the level of RPT activity and type of aircraft, adjustments may be required for other infrastructure such as taxiways.

Figure 128 RAAF Base Richmond site and surrounds



Note: Distances are 'as the crow flies'.

Source: Australian Department of Infrastructure and Transport

WorleyParsons/AMPC considered what changes would be needed at the Richmond site to cater for civilian activity.<sup>170</sup> Key issues included the appropriate location of parking and terminal facilities for civil aircraft and the need for relocation of any existing RAAF facilities. A particular requirement of RAAF operations at Richmond is a suitable area for storing and loading ammunition and other explosive ordnance. Irrespective of the options below, the storing and loading of ordnance is complex when integrated with civilian aircraft operations. This would need to be discussed further with Defence to ensure optimum use of the facility.

Three development scenarios for accommodating civil operations were considered.

1. **Scenario A – RPT operations developed to the north-west of the existing runway:** Scenario A assumed it is possible to relocate the ordnance loading area to special uses land and develop an area in the north-west quadrant of the base for RPT civil aviation operations.
2. **Scenario B – RPT operations developed to the south-west of the existing runway:** Scenario B assumed that the existing ordnance loading area is shifted to the north to create an adequate distance from potential RPT civil operations to be developed in the south-west quadrant.
3. **Scenario C – RPT operations developed to the north and south-west of the existing runway:** Scenario C assumed Defence no longer operates an RAAF Base at Richmond and the existing RAAF precinct is adapted for RPT civilian operation.

The area to the south-east of the existing runway was found to be relatively more constrained by the road, railway, rail station, racecourse, showground and heritage buildings. It was not considered possible to develop this area for RPT civil operations without considerable costs being incurred.

Consultation undertaken with the Department of Defence identified that the approach that would align best with military needs would be Scenario B, with civil activity occurring on the south and opposite side of the runway from military operations. While such an approach may allow a greater separation of civil and military operations, in order to achieve this it requires deviation to existing railway and road infrastructure on the southern boundary, involving additional capital expenditure. Scenario B may also reduce the overall movement rates possible on the runway due to the requirement for taxiing civil aircraft to cross the active runway. Both Scenarios A and B would be likely to extend the duration of RAAF use of Richmond, providing RAAF with opportunities to share costs to develop and maintain the facilities and increase investment in the site's infrastructure.

### *Potential capacity*

When considering the capacity of RAAF Base Richmond to accommodate RPT on the existing east-west runway, there are a range of issues that need to be examined. These include the physical capacity of airside infrastructure such as the runway and taxiways; scope to accommodate passenger facilities such as a terminal; and existing airspace arrangements.

RAAF Base Richmond's capability to meet demand will also be dependent on its attractiveness or its ability to attract the demand from civil operators.

In the short term, RAAF Base Richmond has the potential to attract services (up to Code 4C, such as B737/A320) that cannot access Sydney (Kingsford-Smith) Airport due to capacity constraints. In the medium to long term, services at RAAF Base Richmond may attract some demand from Sydney (Kingsford-Smith) Airport and may help build a new market in Western Sydney.

<sup>170</sup> Further information can be found in Technical Paper C5.

As for Bankstown Airport, commercial issues will also impact the airlines' decisions about whether to operate at RAAF Base Richmond. For those already established at Sydney (Kingsford-Smith) Airport, issues include the splitting of operations and catering for interlining passengers. Accordingly, the airport is likely to be best suited to LCC operations targeting the North West and Western Sydney markets, with limited-frequency operations.

## Airspace management and air traffic control

Airservices Australia undertook analysis of the effect on Sydney (Kingsford-Smith) Airport operations of using RAAF Base Richmond as an additional civilian airport. As part of this, estimates of the unconstrained, potential RPT capacity at RAAF Base Richmond were developed for the existing runway, assuming LCC type operations are attracted to the site.

This analysis was limited to consideration of airspace and air traffic management, and assumed that the aerodrome would not be operating as a joint user facility.

Airservices Australia suggests a theoretical maximum hourly capacity of 40 movements, assuming use of Runway 28 under visual meteorological conditions when there is sufficient visibility to maintain visual separation from terrain and other aircraft. Potential interaction with some traffic patterns at Sydney (Kingsford-Smith) Airport may result in lower movement rates.

In practical terms, capacity is likely to be lower due to a number of issues, including:

- weather;
- airspace conflicts;
- physical size of the aerodrome; and
- the intention of the RAAF to retain the site as an operating base and continue to use it for its existing support activities.

## Weather

Under instrument meteorological conditions, however, when weather requires pilots to fly primarily by reference to instruments, the theoretical capacity of RAAF Base Richmond is estimated to be reduced to 30 movements per hour on Runway 28 (approximately 186,000 aircraft movements based on similar key demand periods of day as Sydney (Kingsford-Smith) Airport).

Fog events at RAAF Base Richmond could affect the physical capacity at the aerodrome. Anecdotal evidence indicates the aerodrome is affected by fog for longer periods and more often than Sydney (Kingsford-Smith) Airport, with a longer time to 'burn off'. These fog events are exacerbated by the surrounding river, creek and flood plain topography. Richmond fog data from 1995 to 1999 indicates there are six days, on average, per month of recorded fog events. RAAF Base Richmond is also affected by severe weather (thunderstorm) events, either directly at the aerodrome, in the Sydney basin, or in the surrounding en route airspace. WorleyParsons/AMPC suggests that provision of a CAT II instrument landing system for Runway 28 could reduce the likelihood of diversions in poor weather (primarily fog).

**Table 35** Nominal traffic handling capacity at RAAF Base Richmond, hourly rate

Weather	Mode	Runway 28		Runway 10	
		Day	Night	Day	Night
Visual	Arrivals	20	20	20	15
Meteorological Conditions	Departures	20	20	20	10
Instrument	Arrivals	15	15	5-6	5-6
Meteorological Conditions	Departures	15	15	Nil	

*Note: Departure capacity may increase with a reduction in arrival rates.*

*Note: In this table it is assumed that a satellite-based navigation solution (for example, RNP or GLS) would deliver Runway 28 VMC rates to both runways in all conditions.*

*Source: Airservices Australia.*

## Airspace

Airspace conflicts with Sydney (Kingsford-Smith) Airport and Bankstown Airport may also restrict capacity at the aerodrome.

The airspace above RAAF Base Richmond currently facilitates north-western departures from Sydney (Kingsford-Smith) Airport, which accounted for 12.1 per cent of all jet departures (approximately 16,500), and 4.0 per cent of all non-jet departures (approximately 5,600) in 2007. Any increased use of Precision Runway Monitors (PRM) at Sydney (Kingsford-Smith) Airport would impact on Richmond. In particular, departures from Runway 10 and arrivals to Runway 28 would be in immediate conflict with aircraft conducting PRM circuits to Runway 16R at Sydney (Kingsford-Smith) Airport.

This airspace is also utilised by IFR aircraft departing and arriving from Bankstown aerodrome from the north. Enabling RPT jet aircraft operations to RAAF Base Richmond would significantly change the current traffic patterns in the Sydney basin airspace. Table 36 presents an indication of tracks that will have additional traffic confliction areas as a result of RPT operations on the RAAF Base Richmond east-west runway.<sup>171</sup>

<sup>171</sup> Further information can be found in Technical Papers C6 and C7.

**Table 36** Tracks with potential traffic conflict due to RAAF Base Richmond east-west RPT operations

Tracks	Possible Traffic Confliction
Sydney (Kingsford-Smith) departures	Runway 34L jet departures via Richmond, Katoomba and Wollongong. Runway 34L turboprop departures via Richmond, Katoomba and north-west NSW destinations. Runway 25 jet departures via Richmond, Katoomba and northern destinations. Runway 25 turboprop departures via Richmond, Katoomba and north-west NSW destinations. Runway 16R jet departures via Richmond and Katoomba. Runway 16R turboprop departures via Richmond, Katoomba and north-west NSW destinations.
Sydney (Kingsford-Smith) arrivals	Runway 07 arrival tracks from the north (BOREE and CALGA STARs). Runway 16R arrival tracks from the southwest (RIVET and ODALE STARs). Runway 34L arrival track from the north (BOREE STAR).
Richmond departures	From both Runway 28 and Runway 10, all departure tracks will conflict with one or more of the above Sydney tracks. Departures from Runway 10 will be in immediate conflict with aircraft conducting PRM circuits to Runway 16R at Sydney.
Richmond arrivals	To both Runway 28 and Runway 10, all arrival tracks will conflict with one or more of the above Sydney tracks. Arrivals to Runway 28 will conflict with aircraft conducting PRM circuits to Runway 16R at Sydney.

Source: *Airservices Australia*.

## Physical size of the airport

The size of the existing site at RAAF Base Richmond will impact on the scale of RPT operations possible. It has a relatively small site area of approximately 277.5 hectares, comprising the main base area of 202 hectares and leased land of 77.2 hectares. The Londonderry Drop Zone is an additional property of 63 hectares located about 10 kilometres from the Base.

WorleyParsons/AMPC advises that a limited-service airport accommodating all RPT segments and satisfying civil Code 4C requirements (with the potential to accommodate passenger aircraft types such as the B737 series) could at a minimum be located on a land area of around 330ha. In contrast, a minimum service airport type serving GA and limited RPT (principally turboprop) could at a minimum be located on a 170 hectares site.

This compares to Avalon Airport, which is estimated to occupy a site size of 1,776 hectares; Gold Coast Airport, 385 hectares; and Canberra Airport, 437 hectares.

An example of an international secondary RPT airport of a similar land area is London Luton, with a land area of 235 hectares. London Luton serves nine million passengers and some 95,000 aircraft movements per year, with principally LCC airlines operating services to Europe and Africa. Its facilities include a 2,160 metre long Category 3 Instrument Landing System (CAT 3 ILS)<sup>172</sup> runway, 38 commercial aircraft stands, a 68,000 square metre passenger terminal and two fixed-base operators, a cargo terminal and a number of hangars for private and business aviation.<sup>173</sup>

<sup>172</sup> CAT 3 ILS means aircraft will be able to make an approach and landing in the worst of weather conditions.

<sup>173</sup> abertis airports website, *London Luton Airport*, 2011.

## Potential demand

While RAAF Base Richmond is located further from the Sydney CBD than Sydney (Kingsford-Smith) Airport, its location relative to some major population centres in the Sydney region suggests it is accessible for a substantial number of residents and users (depending on increasing congestion). Some examples of current road travel times and distances (as of 2011, assuming relatively free-flow traffic) are:

- **distance to Sydney CBD:** 65 kilometres and travel time of approximately one hour, five minutes;
- **distance to Penrith:** 27 kilometres and travel time of approximately 39 minutes;
- **distance to Blacktown:** 27 kilometres and travel time of approximately 44 minutes; and
- **distance to Parramatta:** 44 kilometres and travel time of approximately 52 minutes.

Clarendon Station is located 800 metres from RAAF Base Richmond. The journey from Clarendon Station to Central Station is approximately 58 kilometres and has a current travel time of one hour and 20 minutes. Current service frequency is approximately every half hour and the cost of a rail trip is \$6.00 one way.

The relative attractiveness of RAAF Base Richmond for passenger demand is expected to increase over time in line with NSW Government projections that population growth will occur in Sydney's west and north-west regions. By 2036, half of Sydney's population will live in Western Sydney, suggesting a gradual westward trend for the centre of Sydney's population.

In addition, some new LCC operators may be interested in using RAAF Base Richmond as a Sydney base, and some existing airlines may be attracted to commence a level of operation at RAAF Base Richmond due to limited availability of domestic movement slots at Sydney (Kingsford-Smith) Airport at the more popular times of day.

Despite the westward trend for Sydney's population, RAAF Base Richmond would be competing with Sydney (Kingsford-Smith) Airport for Sydney air traveller demand. The decision whether to use RAAF Base Richmond will be based on considerations such as cost, availability of services at preferred times and convenience of access. For users travelling to the Sydney CBD, arriving at RAAF Base Richmond would mean 50 minutes more travel time than if they arrived at Sydney (Kingsford-Smith) Airport. However, it would only be 12 minutes more travel time than Sydney (Kingsford-Smith) Airport for users travelling to Parramatta on current travel times, and as outlined elsewhere in this report travel time from Sydney (Kingsford-Smith) Airport are expected to rise.

Considering factors such as generalised trip cost for different market segments, as well as potential airline service offerings, Booz & Company assessed potential demand levels at RAAF Base Richmond for Sydney air travellers. This analysis assumed that demand growth for RPT services at RAAF Base Richmond will increase when unmet demand for Sydney (Kingsford-Smith) Airport is equal to the demand estimated to be captured by the new services and, where the generalised cost of travel utilising the new site is cheaper than the alternative airport. As a result, a portion of passengers was estimated to shift from one airport to the other.<sup>174</sup>

174 Further details can be found in Technical Report C9.

The analysis considered when unmet demand at Sydney (Kingsford-Smith) Airport is of the level and type that will warrant the following volume of airline services:<sup>175</sup>

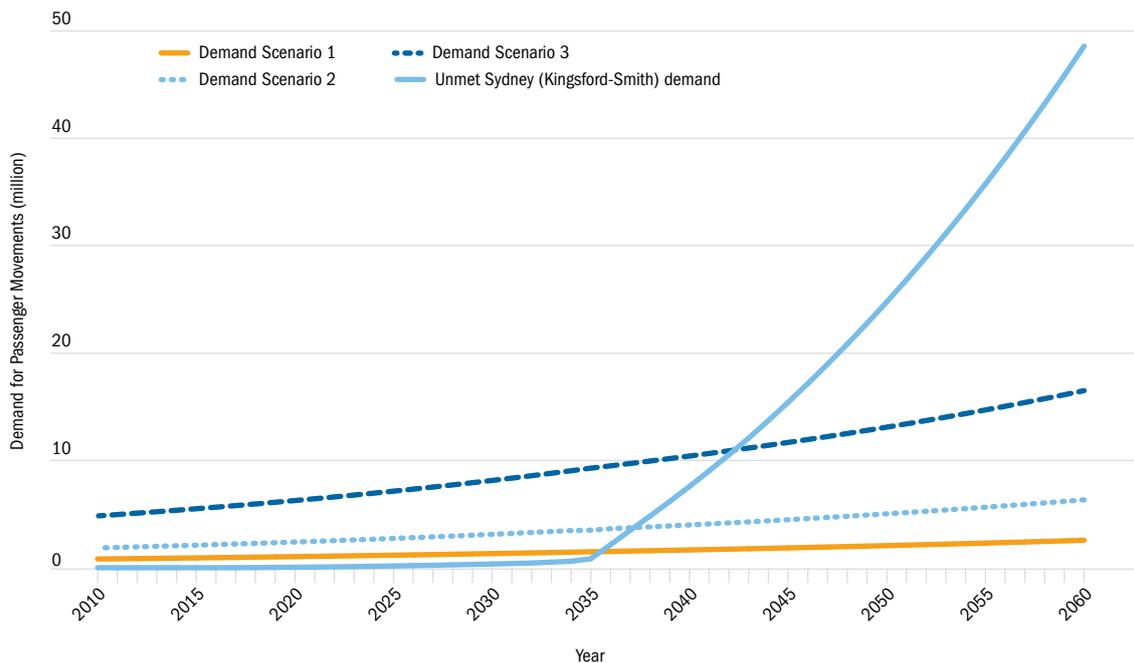
- **Demand Scenario 1 – airline services supporting around two million passengers per year serving predominantly short-haul domestic services:** such as Gold Coast, Brisbane, Melbourne, Canberra and Adelaide. This is a similar service offering as that currently at Avalon Airport, which serves domestic LCC demand.
- **Demand Scenario 2 – airline services supporting around five million passengers per year serving up to medium-haul domestic and some trans-Tasman and international services:** Booz & Company analysis of such a service offering for a new location in the Sydney region assumed that it would involve a significantly broader range of domestic services than the two million passengers per year offering above (for example, North Queensland and Central Australia services) and also include some trans-Tasman services. This is a similar service offering as that currently at Gold Coast Airport.
- **Demand Scenario 3 – airline services supporting around 20 million passengers per year serving some medium-haul international services:** such as South-East Asia, China and India. This volume would be adequate to support two major airlines and a range of additional airlines.

Figure 129 shows the potential growth profiles of the scenarios identified, compared with the forecast unmet demand as described in Part Four. Booz & Company's analysis suggests that the level of unmet passenger demand at Sydney (Kingsford-Smith) Airport could support a progressive increase in airline services in all three options.

In particular, the modelling suggested that there would be some passenger demand to access RPT services at RAAF Base Richmond if it was operational today. For example, if an airline operation the size of Demand Scenario 1 was in place, the modelling suggested that around 800,000 Sydney region passengers would have been attracted to RAAF Base Richmond in 2010. An implication, however, of any RPT operations commencing at RAAF Base Richmond prior to Sydney (Kingsford-Smith) Airport reaching constraints in its movements is that it would involve competitive impacts in the region and this would vary the result.

175 The level of capital investment required at RAAF Base Richmond is considered separately by Worley Parsons/AMPC.

**Figure 129** Indicative timing when particular services at RAAF Base Richmond have the potential to accommodate Sydney region passenger demand, 2010 to 2060



Note: Unmet demand was derived from analysis of the unconstrained demand discussed in Part Three, and assumptions about factors including aircraft upgauging, peak spreading, load factors and traveller share under a constrained scenario, as discussed in Part Four. Possible demand scenarios assume a competitive model relative to Sydney (Kingsford-Smith) Airport. A level of induced demand may be created from the provision of aviation capacity.

Source: Booz & Company analysis.

Similarly, if an airport operation the size of Demand Scenario 3 was able to be located at RAAF Base Richmond, Booz & Company estimates that the aerodrome could serve demand of 16.5 million passengers by 2060. There would still be a significant level of unmet demand, however – in particular, long-haul international passenger demand that could not be accommodated given the east-west runway length.

This analysis assumes a portion of induced demand in the catchment area around Richmond would be created by the development of a new RPT facility (this is not included in the unmet demand for Sydney). However, the majority is estimated to be passengers who would otherwise use Sydney (Kingsford-Smith) Airport.

### Summary of potential capacity created in the Sydney region

In summary, Airservices Australia estimates suggested that RAAF Base Richmond may have an unconstrained, theoretical RPT aircraft capacity of between 186,000 and 250,000 movements. This would provide an additional 35 per cent to 50 per cent of RPT capacity compared to current Sydney (Kingsford-Smith) Airport slots. Theoretically, if the 200,000 aircraft were B737/A320s and carried 120 passengers per movement, the airport could cater for up to approximately 24 million passengers per annum.

However, the practical capacity is likely to be lower than this due to air space conflicts with departures from Sydney (Kingsford-Smith) Airport and aircraft departing from and arriving at Bankstown aerodrome from the north. In addition, the type of forecast demand that needs to be catered for will not be able to be serviced by just B737/A320 aircraft. It would also require activity to be consistent across all hours of the day, which is unlikely given peak demand and operational requirements.

Practical capacity would also be affected by the size of the site. RAAF Base Richmond's current land footprint is smaller than a number of medium-sized RPT Australian airports.

However, this should not deter consideration of RAAF Base Richmond to provide RPT capacity in the Sydney region. London Luton, which operates on a smaller land area, serves nine million passengers and around 95,000 aircraft movements per year. The east-west runway could easily serve a patronage of up to five million passengers.

## Development cost estimates

WorleyParsons/AMPC prepared capital cost estimates to provide an indication of the cost of developing an RPT operation at RAAF Base Richmond. Compared to other costs developed for this Joint Study, these have been developed to a greater level of detail, reflecting they are based on an existing site and are inclusive of a 70 per cent allowance for contingencies and risks, project management and uncosted items.

Scenario A was examined and indicative costs were estimated for the start-up and medium-term demand levels. This scenario does not involve major relocation of civil infrastructure in and around the airport, with minimal works required to increase apron and terminal size. To accommodate one million passengers per year, capital costs of around \$150 million were estimated. To accommodate demand levels of five million passengers per year, capital costs of around \$500 million were estimated. Both of these estimates exclude land acquisition and off-airport costs but include a 70 per cent allowance of total costs to consider factors such as risk, contingency, management costs and uncosted items.

Scenario B would have a cost estimate comparable to Scenario A, but would involve additional cost for land acquisition from the University of Western Sydney, the relocation of railway and construction of a new airport station, a pedestrian footbridge, and associated additional parking and road access.

Scenario C could have further additional costs associated with the off-site relocation of RAAF infrastructure.

Table 37 summarises relative capital costs for each of the potential development scenarios and also the scale and level of operations.

**Table 37** Indicative capital costs for RAAF Base Richmond east-west runway development scenarios, 2011 dollars

Development Scenario	Level of Operations Assumed	Preliminary Cost Estimate
Minimal Scenario A	1 million passengers per year	\$144 million
Scenario A	5 million passengers per year	\$504 million
Scenario B	5 million passengers per year	Scenario A + additional land acquisition cost + road and railway and some other relocation costs
Scenario C	5 million passengers per year	Scenario A, with no on-site RAAF relocation costs (potential off-site relocation has not been considered or costed)

*Note: Includes costs for runway, taxiways, aprons, terminal, car parking, roads and services on site, other airport infrastructure, RAAF facilities, project management fees, 70 per cent allowance of total costs to consider factors such as risk, contingency, management costs and uncosted items (estimated to a P50 level). Excludes land acquisition, government fees, charges and levies, and off-airport works.*

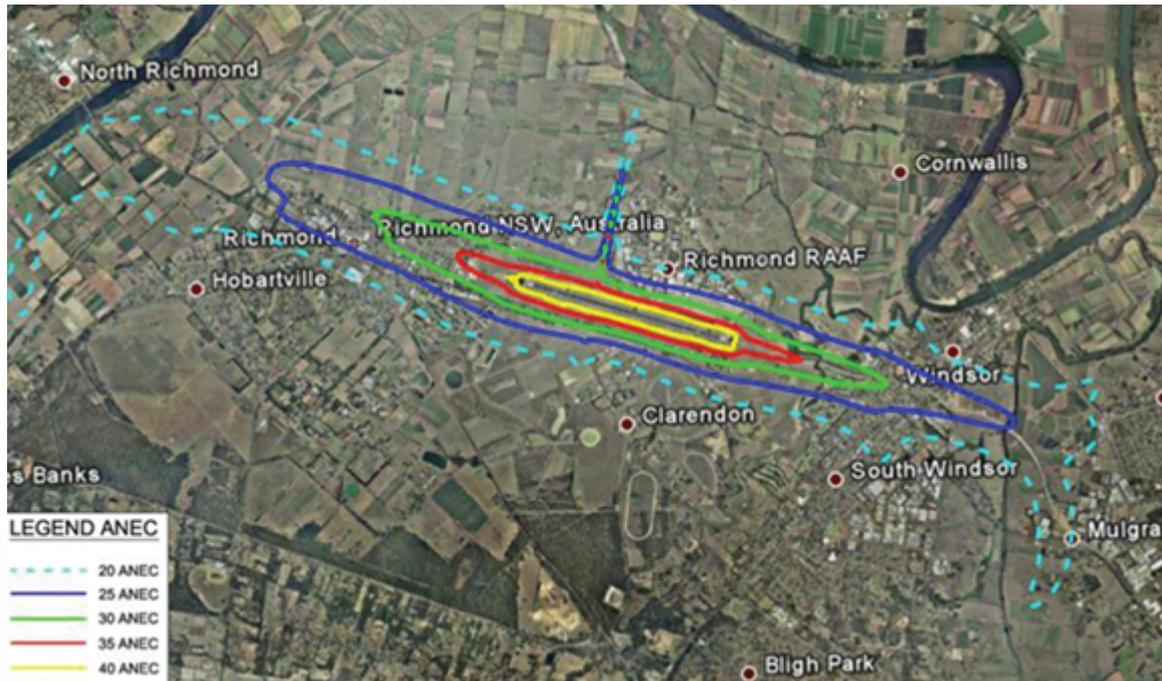
Source: WorleyParsons/AMPC.

## Noise implications

The impact of civil jet aircraft noise on residents in the Richmond region needs to be considered. As the runway is aligned roughly east-west, and has the townships of Richmond and Windsor at either end, potential noise is a key issue for local residents.

Figure 130 shows the locations of centres around RAAF Base Richmond and the ANEC<sup>176</sup> contours for an airport catering for one million passengers.

**Figure 130** ANEC contours expected for a Richmond east-west layout supporting one million passengers

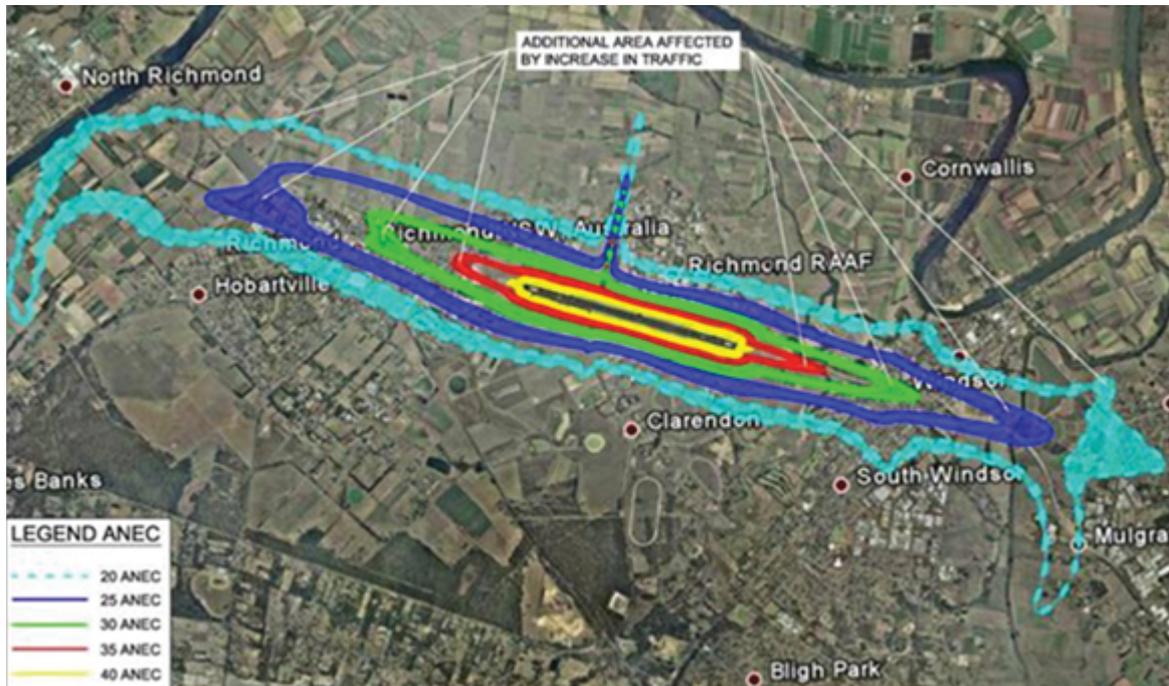


Source: WorleyParsons /AMPC.

<sup>176</sup> ANEC reports the noise impacts of aircraft noise under Australian Standard AS2021, based on the Australian Noise Exposure Forecast (ANEF) system. It takes into account the frequency, intensity, time and duration of aircraft activities and calculates the total sound energy generated at any location.

Figure 131 shows the locations of centres around RAAF Base Richmond and the ANEC contours for an airport catering for five million passengers.

**Figure 131** ANEC contours expected for a Richmond east-west layout supporting five million passengers



Source: WorleyParsons/AMPC.

For the purposes of assessing potential noise impacts, WorleyParsons/AMPC considered three levels of demand for RPT services on the east-west runway at RAAF Base Richmond at representative points from start-up to the medium and long term. Assuming a 180-seat aircraft configuration and an 85 per cent load factor, the following demand levels considered:

- one million passengers per year, resulting in 6,536 annual aircraft movements (18 average daily movements);
- three million passengers per year, resulting in 19,608 annual aircraft movements (54 average daily movements); and
- five million passengers per year, resulting in 32,680 annual aircraft movements (90 average daily movements).

Considering the impact of a range of operating levels of between 6,000 and 30,000 annual civilian aircraft movements, assuming RAAF aircraft movements remain constant at approximately 16,500 aircraft movements per year, WorleyParsons/AMPC suggest that there would only be a small increase in the size of the ANEC relative to projections for military-only operations. With these civilian operating levels, the contours would extend marginally to the west over Richmond urban areas and to the east to a larger extent over Windsor urban areas.

However, there would be a noticeable increase in the overall flight activities at RAAF Base Richmond. Analysis of potential N70 contours<sup>177</sup> show a larger area of impact with increasing levels of civilian traffic extending to the western side of the Nepean River and to the east, extending about 4 kilometres east of the Windsor urban area. The N70 contours suggest that residents will experience more overflights than under a military-only scenario.

<sup>177</sup> N70 contours indicate the number of aircraft noise events that exceed 70 dB (A) (the external noise level threshold for an average residence with doors and windows closed). This is supplementary to the ANEC developed to describe aircraft noise in terms that are more readily understood by the public.

The Airservices Australia analysis of the effect on Sydney (Kingsford-Smith) Airport operations from the use of RAAF Base Richmond as an additional civilian airport indicates there will be implications for the LTOP flight paths, and any significant increase in aviation activity at RAAF Base Richmond will necessitate a redesign of the LTOP.

Airservices Australia also suggests that any development of RAAF Base Richmond as an additional civilian airport with traffic levels and mix similar to RAAF Base Williamtown will impact Sydney (Kingsford-Smith) Airport operations, requiring airspace redesign and development of an integrated airspace operating plan.

As indicated above, investment in airside infrastructure and passenger facilities is required to accommodate civil aircraft and passengers at RAAF Base Richmond. This may require relocation of RAAF operational facilities and more detailed planning on the management of the explosive ordnance operations to accommodate civil functions.

Surface transport links to RAAF Base Richmond would also need consideration and are likely to require some investment – for example, to provide upgraded road connections in and around the airport and more frequent train services. Depending on the development scenario, land acquisition and relocation of existing road and rail infrastructure may also be required.

## Develop a north-south runway to accommodate RPT

The Committee also examined the option of building a larger airport at RAAF Base Richmond based on an alternative north-south runway alignment on a larger site.

- A north-south alignment would assist to minimise some of the possible airspace conflicts with Sydney (Kingsford-Smith) Airport that would arise from RPT services operating on the east-west runway. A north-south alignment could also reduce significantly noise impacts on residents, as air traffic would avoid the townships of Richmond and Windsor. There is also the potential to construct the north-south runway to a greater length than the east-west runway so that it could cater for up to long-haul internationals.

## Development scenarios

WorleyParsons/AMPC considered five development scenarios for a north-south runway using rural lands currently undeveloped but owned and used by the University of Western Sydney.<sup>178</sup> In order to minimise impact on existing military operations, it was assumed that any RPT civilian airport would operate as a single runway (with civilian use of the existing east-west runway confined to periods of high crosswinds<sup>179</sup>). This would allow RAAF operations to continue at RAAF Base Richmond on the northern side of the existing runway. Joint operations would provide the RAAF with opportunities to share costs of developing and maintaining the facilities and to increase investment in the site's infrastructure, extending the duration of RAAF use of Richmond.

The preferred option for development of a new runway at RAAF Base Richmond was on an orientation of runway 01/19. This reflects constraints of existing development on the RAAF Base, the approach and departure paths and existing urbanised areas. This alignment is also likely to be more compatible with operations of the parallel runways at Sydney (Kingsford-Smith) Airport, as it is close to parallel in orientation.

The scenarios considered for the runway and related development required consideration of possible constraints from the need to maintain flood evacuation routes, existing public and private recreation areas, and other existing infrastructure (such as the Richmond Sewage Treatment Plant). In addition, relocations and adjustments to existing road and rail systems

178 Further information can be found in Technical Paper C9.

179 Although the runway configuration could operate similar to that of Melbourne or Brisbane, increasing capacity it would also increase the noise footprint.

would be required, with the form and scale depending upon decisions such as whether a close connection between the airport terminal and the rail system is required.

The five development scenarios for the concept of a north-south runway address different runway lengths and locations as follows (grouped by potential types of air service):

**Domestic capacity** similar to the three east-west runway operating scenarios discussed above – for example, services operated by a Code 4C aircraft such as B737/A320 for interstate LCC operations (typical routes being Gold Coast and Melbourne):

- **Option A1** – a 2,600 metre long runway (partly on RAAF Base Richmond);
- **Option A2** – a 2,600 metre long runway (fully off RAAF Base Richmond); and
- **Option B** – a 2,800 metre long runway (partly on RAAF Base Richmond).<sup>180</sup>

**Limited international, domestic and intrastate traffic** operated by aircraft up to Code E, such as the A330 and B787, for international; the full range of medium, narrow body jet aircraft such as the B737 and A320 series, predominantly for domestic; and the Code D DHC8-400, predominantly for intrastate; and with typical international routes including South-East Asian ports such as Singapore, Hong Kong:

- **Option C** – a 3,000 metre long runway (partly on RAAF Base Richmond).

Full international, domestic and intrastate traffic – for example, services operated by aircraft up to and including the Code F A380 for long-haul international operations to ports such as Los Angeles:

- **Option D** – a 4,000 metre long runway (partly on RAAF Base Richmond).

## Runway capacity

Airservices Australia suggests that the theoretical physical capacity of a single runway is estimated to be approximately 40–50 movements per hour for an assumed aircraft mix. This is between 250,000 and 260,000 aircraft movements per year. Therefore, if used as a single runway configuration, the east-west and north-south runways technically could provide for the same number of movements (albeit noting Airservices Australia's advice on airspace interactions with Sydney (Kingsford-Smith) Airport on the east-west).

If the east-west and north-south runways were used in a similar configuration to Melbourne or Brisbane, it is estimated that up to 65 movements per hour could be accommodated.

## Airspace management and air traffic control

There would be complex airspace arrangements within the Sydney basin from operation of a north-south runway with significant RPT movements at RAAF Base Richmond. Figure 132 provides an indication of the possible flight tracks from Option D.

<sup>180</sup> The operational differences between a 2,600m and 2,800m long runway are not of such significance as would suggest notionally different traffic types.

**Figure 132** RAAF Base Richmond 4,000m north-south runway 01/19 southern OLS and flight tracks



Source: WorleyParsons/AMPC.

## Weather

As noted above, fog events at RAAF Base Richmond could affect capacity at the aerodrome. Fog data from 1995 to 1999 indicates that on average there are six days per month of recorded fog events.

## Physical size of the airport

For a north-south runway, acquisition of additional land is required. It is also expected that major relocations and adjustments to existing road and rail systems would be required.

For the development scenarios explored in this Joint Study, WorleyParsons/AMPC suggests that the new civil RPT apron, parallel and link taxiways, International and Domestic Terminals and car park could be located to the south of the existing base on lands currently owned by the University of Western Sydney. This would affect the current alignments of Hawkesbury Way and the Richmond rail line.

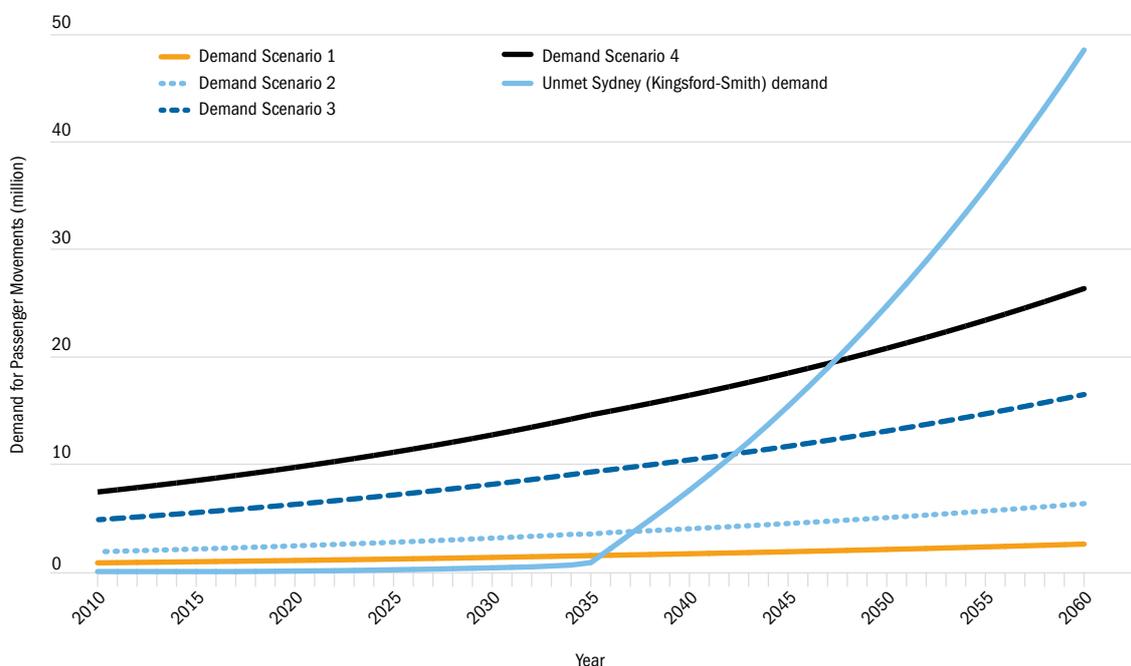
## Potential demand

The demand that would be met will be determined by the type of aircraft and services offered. For the purposes of providing information on the type of demand that could be catered for, the analysis considered when unmet demand at Sydney (Kingsford-Smith) Airport is of the level and type that will warrant use of the existing RAAF Base Richmond runway, as well as the potential for providing short-haul and long-haul international services on a north-south runway. Specifically, Booz & Company tested a fourth scenario based on operations up to 30 million passengers per year with the capability to support domestic as well as short- and medium-haul international services.

Booz & Company's modelling of the relative generalised trip cost for Sydney region airport users to access Sydney (Kingsford-Smith) Airport or RAAF Base Richmond suggested such services

could meet demand for 26 million passengers by 2060. It suggested there would be some passenger demand to access RPT services at RAAF Base Richmond if it was operational today.

**Figure 133** Indicative timing when particular airline services at RAAF Base Richmond with a north-south runway have the potential to accommodate Sydney region passenger demand, 2010 to 2060



Note: Unmet demand was derived from analysis of the unconstrained demand discussed in Part Three, and assumptions about factors including aircraft upgauging, peak spreading, load factors and traveller share under a constrained scenario, as discussed in Part Four. Possible demand scenarios assume a competitive model relative to Sydney (Kingsford-Smith) Airport. A level of induced demand may be created from the creation of aviation capacity.

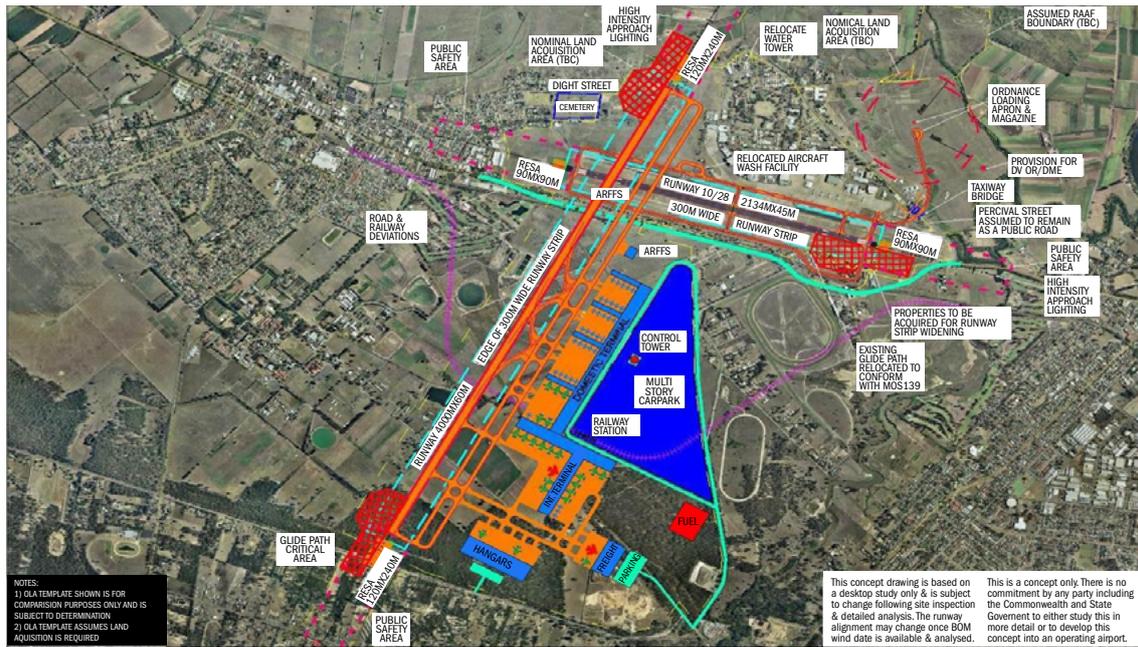
Source: Booz & Company analysis.

## Noise implications

Development of a north-south runway at RAAF Base Richmond will reduce noise impacts on local residents compared to scenarios assuming RPT solely using the existing east-west runway. It is likely that, even after development of a north-south runway, the existing east-west runway would be used in periods of high crosswinds.

For the purposes of developing indicative cost estimates and assessing potential noise impacts, WorleyParsons/AMPC assumed the following forecast RPT passenger movements for each of the north-south runway development scenarios:

- **Options A1, A2 and B:** 20 million passengers per year or approximately 130,700 annual aircraft movements (358 average daily movements) accommodating aircraft types up to Code 4C (B737, A320);
- **Option C:** 25 million passengers per year or approximately 183,300 annual aircraft movements (502 average daily movements), Code 4E (A330, B787); and
- **Option D:** 30 million passengers per year or approximately 178,700 annual aircraft movements (490 average daily movements), Code 4F (A380).

**Figure 134** RAAF Base Richmond Option D 4000m layout

Source: WorleyParsons/AMPC.

WorleyParsons/AMPC analysis indicates that the 20 and 25 ANEC contours for civil operations on a north-south runway are clear of the urban areas of Richmond and Windsor, to the east of Freeman's Reach and clear of Wilberforce. To the south the 20 to 25 ANEC is close to an urban area at Londonderry.

N70 contours show a larger area of impact though to areas relatively less densely populated, most noticeably along the extended runway centreline, east and west of the southern end of the runway, and to the west at the northern end of the runway.

## Development cost estimates

WorleyParsons/AMPC developed cost estimates for the range of north-south runway options identified. These estimates are based on the concepts of runway length described above and assume full development of the concept (that is, no staged development).

As with the costs developed for the RAAF Base Richmond east-west runway scenarios, these costs have been developed to a greater level of detail than those in Part Eight of this Report as they are based on an existing site as opposed to a indicative site. The costs are also inclusive of a 70 per cent allowance for contingencies and risks, project management and uncosted items.

**Table 38** Indicative capital costs for RAAF Base Richmond north-south runway development scenarios, 2011 dollars

Runway Length	Level of Operations Assumed	Indicative Cost Estimate
Minimal start up Option A1 (2,600m runway and minimal terminal)	Up to 20 million passengers per year	\$3.9 billion
2,600m runway (Option A1)	20 million passengers per year	\$5.4 billion
3,000m runway (Option C)	25 million passengers per year	\$8.5 billion
4,000m runway (Option D)	30 million passengers per year	\$10.8 billion

Note: estimated to a P50 level.

Source: WorleyParsons/AMPC.

Cost estimates range from around \$4.0 billion for a 2,600 metre runway with a minimal terminal suitable for up to 20 million passengers per year to over \$10 billion for a 4,000 metre runway and terminal facilities suitable for 30 million passengers per year.

The cost estimates include:

- general construction costs;
- airside north-south runway and airside runway 10/28 works;
- landside works, including widening of access roads, purchase of additional rolling stock, major utilities, aviation fuel pipeline and telecommunications; and
- 70 per cent allowance of total costs to consider factors such as risk, contingency, management costs and uncosted items.

Excluding allowances for project management, design, contingencies and risks, the cost estimates range from \$2.0 billion to \$6.5 billion. The costs also exclude land acquisition, government fees, charges and levies.

A north-south runway able to support RPT operations would require relocation of the existing rail link near RAAF Base Richmond (which is also currently being upgraded) and would require the railway to be lowered into a cut and cover tunnel below the proposed runway in order to ensure the availability of rail access to the new civilian airport, with construction costs of more than \$200 million.

## Economic appraisal of the development of RAAF Base Richmond for RPT

Ernst & Young undertook a cost–benefit analysis (CBA)<sup>181</sup> of options to accommodate RPT at RAAF Base Richmond – on both the existing east-west runway and the development of a north-south runway.

This showed that the Scenario A east-west runway option (handling around five million passengers per year) is viable, though marginally, with a benefit cost ratio (BCR) ranging between 0.9 and 1.1 depending of demand forecasts. Assessment of the minimal start-up scenario for Scenario A (able to handle around one million passengers per year) indicates it is less economically viable with a BCR ranging between 0.0 and 0.3. This reflects the lower benefits of the minimal development option due to its ability to handle fewer passengers.

The north-south option with a 4,000 metre runway has been assessed by Ernst & Young to result in more significant net economic benefits with a BCR ranging between 1.6 and 2.0.<sup>182</sup>

However, without extremely expensive and extensive land acquisition and surface transport re-alignment, the north-south option could never be extended to a parallel runway. This means, it will never by itself meet the unmet demand projected for the Sydney region.

<sup>181</sup> A cost–benefit analysis (CBA) is an analytical tool used to assess the benefits and costs to society of a project or other action. Costs and benefits are examined from the perspective of the community as a whole to help choose the best means to satisfy specified objectives, and to rank competing proposals when resources are limited.

<sup>182</sup> These economic results represent the Ernst & Young scenario involving no land acquisition in order to reflect it is a development on an existing site. Further information can be found in Technical Paper C13.

## Summary of implications from development of RAAF Base Richmond for RPT

Table 39 summarises the range of impacts that may occur as a result of the RAAF Base Richmond RPT options presented above.

**Table 39 RAAF Base Richmond RPT options**

Option	Potential Impacts	Potential Timing		
		Short Term (0–10 years)	Medium Term (10–25 years)	Long Term (25–50+ years)
Operation of RPT services from RAAF Base Richmond east-west runway	<p><b>Noise sharing:</b> minimal impact on noise at Sydney (Kingsford-Smith) Airport, demand takes up capacity created. Redesign of the LTOP may be required due to airspace conflicts. Noise implications at RAAF Base Richmond principally affecting Richmond urban areas to the west, and to a larger extent, east over Windsor.</p> <p><b>Peak slot availability:</b> would create new peak slots in the Sydney region.</p> <p><b>Slot availability:</b> 35 per cent to 50 per cent increase in RPT movement capacity in the Sydney region. Would depend on demand levels, airline service offering and level of infrastructure provided; with scenarios for this suggesting capacity issues could be delayed by 10 years.</p> <p><b>Airside infrastructure:</b> minimal impact on airside infrastructure at Sydney (Kingsford-Smith) Airport, though may require investment if it is largely LCCs attracted away to RAAF Base Richmond. RAAF Base Richmond would require investment in airside infrastructure and passenger facilities to accommodate civil aircraft and passengers.</p> <p><b>Surface transport:</b> minimal impact to reduce road congestion to Sydney (Kingsford-Smith) Airport; however, surface transport to RAAF Base Richmond would be affected and would require investments.</p> <p><b>Airspace:</b> there would be considerable interaction with Sydney (Kingsford-Smith) Airport and Bankstown Airport operations which would need to be investigated further.</p> <p><b>Delay impacts:</b> fog events at RAAF Base Richmond could create delays for operations.</p>			
Development of a new north-south runway at RAAF Base Richmond to facilitate RPT	<p><b>Noise sharing:</b> minimal impact on noise at Sydney (Kingsford-Smith) Airport, given suppressed demand likely to take up capacity created. Noise impacts at RAAF Base Richmond are clear of the urban areas of Richmond and Windsor, to the east of Freeman's Reach and clear of Wilberforce. To the south, the 20 to 25 ANEC is close to an urban area at Londonderry.</p> <p><b>Peak slot availability:</b> given the time period required to develop and construct the new runway, peak slots may be close to exhausted at Sydney (Kingsford-Smith). Would create new peak slots in the Sydney region.</p> <p><b>Slot availability:</b> 50 per cent to 60 per cent increase in RPT movement capacity in the Sydney region. Would depend on timing of construction, demand levels, airline service offering, runway length and level of infrastructure provided.</p> <p><b>Airside infrastructure:</b> minimal impact on airside infrastructure at Sydney (Kingsford-Smith) Airport given time required to develop and construct. RAAF Base Richmond would require investment in airside infrastructure and passenger facilities to accommodate civil aircraft and passengers.</p> <p><b>Surface transport:</b> minimal impact to reduce road congestion to Sydney (Kingsford-Smith) Airport; however, surface transport to RAAF Base Richmond would be affected and would require investments.</p> <p><b>Airspace:</b> improved alignment and interaction with Sydney (Kingsford-Smith) Airport and Bankstown Airport.</p> <p><b>Delay impacts:</b> fog events at RAAF Base Richmond could create delays for operations.</p>			

Source: PwC and Australian Department of Infrastructure and Transport.

In summary, use of the existing east-west runway or construction of a new north-south runway at RAAF Base Richmond would provide a significant level of RPT capacity for the Sydney region. Use of the existing east-west runway for RPT demand is a relatively cost-effective approach to providing capacity and has the potential to be developed more quickly than construction of a new runway.

However, it is likely to have a larger noise impact because of the townships of Richmond and Windsor at either end and could create significant airspace conflicts with Sydney (Kingsford-Smith) Airport.

Construction of a new north-south runway at RAAF Base Richmond would assist to minimise some of the airspace issues and could also minimise noise impacts on residents. There is also greater potential to construct a longer north-south runway, creating more opportunity to meet international demand, which is the fastest-growing RPT segment.

Whichever alignment is concluded, the site also has a number of operational limitations, including the impact of fog and terrain on operations, which will need to be considered.

