PART FOUR

CAPACITY OF EXISTING AIRPORTS TO COPE WITH FORECAST DEMAND

P4

Key points

Sydney (Kingsford-Smith) Airport

- The *Sydney Airport Master Plan 2009* (the Master Plan) includes a program of upgrades to terminals, taxiways, aprons and gates, reflecting Sydney Airport Corporation Limited's (SACL's) assessment that, with those changes, the airport can cope with forecast demand to 2029.
- This Joint Study has identified that a range of capacity pressures will have significant implications well before 2029 and these will continue to increase with growth at the airport.
- Investment in infrastructure upgrades is important to help address the impacts of those capacity pressures, but the constraints of the site mean that the capacity of the airport will not be able to be upgraded to meet the level of demand forecast in the longer term.
- At current demand levels, the existing gates, stands and apron areas are already heavily utilised at each terminal during peak times. Specifically:
  - all available contact gates at the current International Terminal (T1) are utilised during the morning peak period 7.30am to 10.00am;
  - all available contact gates at current Domestic Terminal 2 (T2) are utilised at various times during the day. Some stand-off capacity is available at these times, although much of it is limited to turboprop operations at 'walk out' stands;
  - gates at the current Qantas Domestic Terminal 3 (T3) are consistently in use throughout the day; and
  - individual apron areas are already virtually at full capacity during peak times.
- It is estimated, by 2015, there will be a shortfall of 25 aircraft stands compared to projected demand based on the infrastructure shown in the Master Plan. This shortfall could be reduced if terminal and apron work proposed in the Master Plan is brought forward.
- By 2020, there will be an estimated shortfall of 18 stands, even if works proposed in the Master Plan for 2014 to 2019 have been completed.
- There is already a requirement to tow aircraft off to remote stands, particularly from the International Terminal, to free up gate availability in peak periods. This has flow-on effects to the runways and taxiways.
- Taxiway capacity also becomes an issue where there is congestion and delay arising from a shortage of gates or parking stands or when queues develop as a result of the imbalance between usage of the two parallel runways.
- There are significant limitations on runway 16L/34R due to its shorter length. Standard operating procedures generally preclude aircraft above B767 from using runway 16L/34R. On runway 16L/34R the taxiway fillet design does not cater for long wheel base aircraft such as the B777-300. This creates an imbalance between the two runways and reduces the capacity to operate the parallel runway system efficiently.
- Currently, delays on the taxiways and apron areas are estimated to be approximately six minutes for each arrival and 12 minutes for each departure during peak period movements.
- Capacity pressures at the airport will contribute to increases in these delays. The delays will be exacerbated when the airport experiences reduction in capacity due to factors such as non-visual conditions due to rain, storms, low cloud or fog, or when winds require use of the cross runway.

- Over the Master Plan period, taxiway delays can only be kept within tolerable (but far from ideal) limits if airspace and air traffic management procedures can be changed and the fleet mix allows a more even spread of traffic flow onto the main and parallel north-south runways.
  - Airservices Australia has advised that there remains significant challenges to achieve the required runway rebalancing.
- The site of Sydney (Kingsford-Smith) Airport measures some 907 hectares, small by comparison to other major airports in Australia and overseas.
  - Any further extension of the site is limited by urban development and by Botany Bay to the south, the Cooks River to the west and Port Botany to the south-east.
- The constraints of the small airport site rule out any significant realignment of runways or major rationalisation of the taxiway and apron systems. A change to the movement cap could provide some additional capacity, provided the necessary gate, taxiway and parking capacity can be made available.
  - Analysis by Airservices Australia indicates that, in good weather conditions, the parallel runway system could process between 85 and 87 runway movements per hour and that sustainable capacity of the runway system would be around 85 movements per hour.
  - An increase in the maximum movement rate would require substantial investment in taxiway, apron and gate capacity as the current infrastructure struggles to handle for sustained periods even the current peak movement levels of close to 80 movements per hour.
- The limited space at the airport affects the scope to provide appropriate wingtip clearance for very large aircraft along certain taxiways, which may affect the scope for continued upgauging to those aircraft types in the medium and longer term.
- The scope for operations at the airport to recover following periods of reduced capacity will progressively decrease as movements increase, leading to longer periods of disrupted operations at the airport and flow-on impacts throughout the aviation network.
- Capacity pressures will limit the scope for airlines to schedule new services. Under the Slot Management Scheme operating at Sydney (Kingsford-Smith) Airport, the slot allocations which are a prerequisite for scheduling operations are limited to 80 per hour, consistent with the runway movement cap.
- Allocations for peak periods (7.00am to 9.00am and 5.00pm to 7.00pm) are already at or close to this limit – for example:
  - on Fridays, the allocations for the 7.00am and 8.00am hours are full; and
  - on Thursdays, the allocations for the 7.00am hour are full.
- As demand continues to grow, airlines will increasingly be unable to schedule new services at their preferred times. Assuming the airlines are able to reschedule proposed services to the nearest available slots, the peak will continue to spread.
  - By 2020, all slots on weekdays between 6.00am and 12.00noon and between 4.00pm and 7.00pm would be fully allocated.
  - By 2027, there would effectively be no slots unallocated, with unmet demand for more than 100 flights per day.
- In practice, the scope for airlines to shift proposed services to suboptimal schedules will often be limited and the proposal for new services may be shelved if the preferred slot is not available.

  - The impacts of limited capacity will be seen in foregone services well before the projected allocation of all slots. As fewer slots become available, Sydney will increasingly miss out on the benefits from new services.
- The lack of available capacity means that, for the busiest hour (8.00am to 9.00am):
  - demand for an estimated four movements in that hour will not be met by 2015;
  - demand for an estimated 12 movements will not be met by 2020; and
  - demand for an estimated 85 movements will not be met by 2060.
- Demand is likely to increase in all hours of the day.
  - Demand will first exceed the maximum that can be allocated in peak hours, then in the hours around peak times.
  - By 2035, it is unlikely that there will be usable capacity available for new services at Sydney (Kingsford-Smith) Airport.
- As movement numbers grow over time at the airport, the scope to use the noise-sharing modes under the Long Term Operating Plan (LTOP) will decrease. Airservices Australia analysis on the effect of forecast demand on the LTOP suggests:
  - By 2015, nine hours of the day will have scheduled movements above 55 movements per hour, approximately the rate above which the noise sharing modes cease to be viable options for managing the air traffic.
  - By 2035, only two hours in the late evening will operate at less than 55 movements.
- Assessments undertaken for the Sydney Airport Community Forum (SACF) have found the LTOP targets are not being met with the levels of traffic demand now presenting at the airport.
- In the absence of major investment in the surface transport networks serving the airport, continued growth of passenger air services would also lead to overloading of the road and rail systems.
  - Increasingly, road traffic to and from the airport will be subject to substantial delays.
  - At the current train capacity of eight trains per peak hour to the CBD, by 2013 services past the airport in the morning peak will be full before they reach the airport stations.
  - By 2018, even with the increase proposed by the NSW Government to 12 trains per hour, trains would be at capacity during peak hours unless additional rolling stock and train paths can be allocated to the airport rail link.
  - Sometime between 2015 and 2023, the capacity of existing road junctions at the entrance to the Domestic Terminal precinct will be exceeded, resulting in a near constant traffic jam on key roads to the CBD and the motorway (this does not include the impacts on the M5 motorway itself).

Canberra and Newcastle airports

- Canberra Airport and RAAF Base Williamtown (Newcastle Airport) have physical capacity to meet the level of their projected demand, but the scope for growth of civil operations at Newcastle Airport is limited by agreement with RAAF, reflecting the projected requirement of RAAF Base Williamtown as an operational base.
  - The scope for RAAF Base Williamtown (Newcastle Airport) to support the demand in the growing Hunter and Central Coast regions over the longer term is unclear.

The anticipated level of economic and population growth of the Sydney region will see unconstrained demand for:

- 57.6 million passenger and 421,000 regular public transport (RPT) aircraft movements by 2020;
- 87.4 million passenger and 528,600 RPT aircraft movements by 2035;
- 165 million passenger and 800,800 RPT aircraft movements by 2060;
- a quadrupling of air freight tonnage by 2060; and
- a 50 per cent increase in General Aviation (GA) activity between 2010 and 2060.

Capturing the economic and social benefits associated with this activity will depend in large part on the ability of existing airports, and their surface transport linkages, to meet this demand.

While Canberra and Newcastle airports will see continuing growth in demand for RPT services, this is not expected to reduce demand at Sydney (Kingsford-Smith) Airport.

Sydney (Kingsford-Smith) Airport will continue to be the largest airport in the region both in terms of RPT and freight services. Unconstrained demand at Sydney (Kingsford-Smith) Airport (which already facilitates 89 per cent of passenger movements in the Sydney region) is forecast to be more than double the current number of passenger movements by 2035 and quadruple the number of passenger movements by 2060.

The Steering Committee considered a wide range of issues that affected the capacity of existing infrastructure and associated surface transport links to determine whether they could meet forecast demand.

4.1 Factors affecting airport capacity

A range of factors affect the capacity of an aerodrome, including the size and location of the site, the standard of airport infrastructure, the standard of air traffic management facilities and services and any regulatory measures implemented to limit social and environmental impacts. The interaction of the various components is also important. For example, the orientation, number and length of available runways, location of gates and aircraft parking areas on an airport can require aircraft to taxi or be towed across runways; similarly, the location of the runway threshold can require extended taxiing. Either case can reduce operational efficiency and capacity of an airport.

Not only does an adequate level of infrastructure and other capacity elements need to be in place but it must also be of the right type, in the right place and available at the right time.

Physical size and location of the airport

The size and location of an airport will determine the types of services an airport can offer. Surrounding urban development may present obstructions that affect aircraft approach and take-off paths. Equally, airport buildings and installations need to be sufficiently set back to avoid becoming hazards. Taxiways, aprons and parking areas need to allow adequate clearance between aircraft.

In addition, the ability of the airport to grow to meet demand will be limited where there is not adequate suitable space to build new facilities such as gates, taxiways, terminals or runways.

Airport airside infrastructure

Airside infrastructure of an airport includes:

- **aprons:** defined areas for the safe parking of aircraft, where passengers and freight are transferred between aircraft and terminal facilities and where maintenance and parking of aircraft takes place in between flights
- **stands:** the physical location of an aircraft parking position for either passenger or cargo aircraft;
- **gates:** the physical location where passengers depart or arrive at a terminal to access aircraft – either directly via aerobridges for contact stands or via bus or walking for remote stands;
- **taxiways:** the links between the apron areas and the runways that facilitate the movement of aircraft around the surface of the aerodrome; and
- **runways:** the defined areas provided for aircraft to land and take off.

The length, width, strength and configuration of a runway and the supporting taxiway system will determine the type of aircraft able to land and depart at a particular airport. In addition, there must be a corresponding level of available apron, gate and parking space to manoeuvre aircraft around the airport as well as access to facilities, such as terminals or freight-handling areas, to facilitate the transfer of passengers, baggage and freight from the airport to transport connections and their onward destination.

Facilities for the maintenance of the aircraft and infrastructure for fuel supply are also required.

The availability of airside infrastructure and how efficiently aircraft can move around an airport are key determinants for how much and what type of traffic an airport can handle.

Airspace management and air traffic control

A key requirement of air traffic management and air traffic control is to ensure an appropriate separation distance between aircraft. The appropriate separation distance is important from a safety perspective to minimise the risk of collision. Also, aircraft travelling at speed create different levels of wake turbulence, with the level depending on their type and size. The wake turbulence separation distances applied by Air Traffic Control (ATC) vary substantially depending on the size of aircraft in front and behind. This has implications for the number of aircraft that can be processed by ATC over a given time period.

Other issues that impact on the capacity of an airport include its proximity to other airports and the type of activity at those airports, due to the potential interaction of the departure and approach flight paths.

Minimising social and environmental impacts

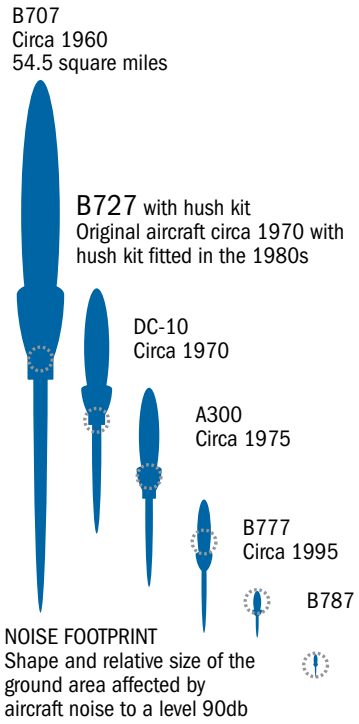
Many airports operate with measures in place to reduce and mitigate the adverse impacts of aircraft noise on communities surrounding the airport. These mitigation controls range from:

- noise abatement controls on types of aircraft operations (for instance, bans in place on noisier, older jet aircraft types);
- preferred flight paths to minimise over-flight of noise-sensitive residential areas;
- controls on night movements, from voluntary limitations (such as no flying training activity at night) through to legislated controls – in particular, curfews; and
- in the case of Sydney (Kingsford-Smith) Airport, a direct control on the maximum number of movements each hour.

While important to protect community concerns, these measures limit the capacity of airport operations. Considerable progress has been made within the industry in reducing noise exposure through technology, including improved air navigation procedures and the introduction of more modern, quieter aircraft. The progressive upgrading of airline fleets has provided a significant improvement in the industry's noise impacts on communities and this trend is expected to continue.

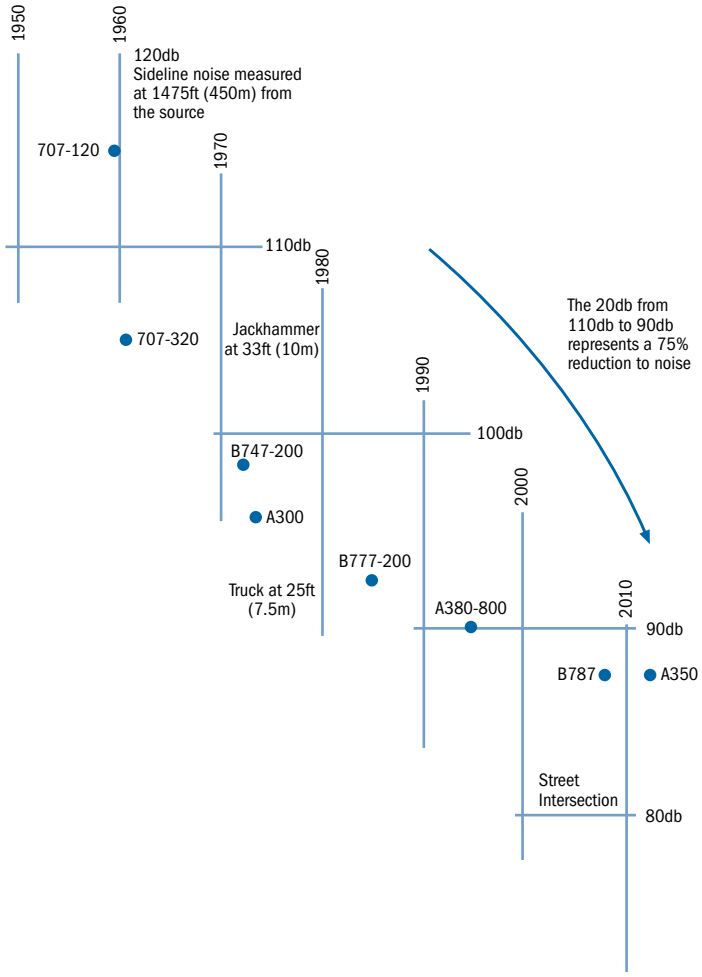
While there has been an increasing number of larger aircraft, the actual noise footprint per passenger has actually reduced. Figure 67 and Figure 68 illustrate historical improvements in noise performance of passenger aircraft. Major aircraft manufacturers continue to pursue aircraft noise reduction as an important marketing feature of new aircraft. However, the reduction in noise across the fleet is often not perceived by the community, especially where there is a countervailing growth in aircraft numbers.

Figure 67 **Reductions in noise footprints over time**



Source: Australian Government, National Aviation Policy Green Paper, December 2008.

Figure 68 **Comparison of aircraft noise with other activities (decibels)**



Source: Australian Government, National Aviation Policy Green Paper, December 2008.

Weather

Over and above the physical capability of an airport and the policy settings that may affect airport capacity, there are some unpredictable factors that can reduce capacity. Weather conditions may affect the capacity to use the most efficient runway configuration or require greater separation between aircraft. In practice, the effective operating capacity of an airport will always be less than the theoretical capacity of the infrastructure, with the difference arising from impacts of adverse events and the recovery from delays caused by such events.

Surface transport

Adequate capacity in the transport network surrounding airports is necessary to ensure the efficient transportation of passengers, employees and goods to and from those locations. Increasing congestion in the surface transport system serving an airport places pressure upon the road and rail systems. Delays from congestion impact on the airport users, leading to delayed departures or missed flights. Congestion also affects transport in the surrounding areas, placing economic costs on surrounding business and industry.

Peaks in demand

Variation in demand between peak and non-peak periods is a reality for most airports, and is reflected in the scheduling decisions by operators. In large measure, scheduling decisions are

driven by commercial factors, with airlines services planned as close as possible to the preferred travelling times of their customers. Operational issues such as planning of rotations for aircraft and crew and restrictions such as curfews or slot limitations at other airports may also limit the window within which services need to be scheduled. The scope for operators to schedule services outside peak periods may in many cases be limited. An airport may need to turn away potential new services if peak period capacity is exhausted, even if capacity is available at other times.

4.2 Current capacity at Sydney (Kingsford-Smith) Airport to meet demand

Sydney (Kingsford-Smith) Airport is the largest RPT airport in the region. As discussed in Part Three, unconstrained demand for the airport is forecast to reach approximately 76.8 million passenger movements and 428,900 RPT aircraft movements by 2035, which is more than twice its current throughput. There would be more than 145 million passenger movements and 652,700 RPT aircraft movements by 2060.

In their submission to the Joint Study, SACL estimated the practical capacity of Sydney (Kingsford-Smith) Airport to be potentially as high as 558,800 annual movements. This is based on modelling which assumes no movement cap and a physical capacity (and achievement) of about 91 movements per hour on the parallel runway modes of operation for all 17 non-curfew hours per day, with a small margin to provide for adverse weather conditions. Alternatively, SACL estimates that, with the retention of the statutory cap of 80 movements per hour and the Long Term Operating Plan (LTOP), the capacity will be 454,546 annual movements.[85]

Airservices Australia has estimated that, with the movement cap, and based on historical analysis of weather and traffic acceptance rates, the practical capacity is approximately 446,000 movements per year. This is based on continual parallel runway operations (except when weather does not allow) to meet growth in traffic demand.

However, a comparison of aircraft movement forecasts with an assessed theoretical capacity of the airport only provides a very broad approximation of an airport's actual operations. In particular, such a broad measure does not indicate how the airport is meeting traffic demand across peak and non-peak periods and whether there is congestion and delays to passengers and aircraft.

In examining the factors which affect capacity, it becomes apparent that the airport, under its current operating framework (including its Master Plan[86]), will over time become unable to meet the forecast demand effectively. The limitations are already evident but will increase with continued growth of services and impact in the medium to long term. While there are measures that can be taken to get the most out of the existing site, these are constrained by a range of factors, as described below.

Physical size and location of the airport

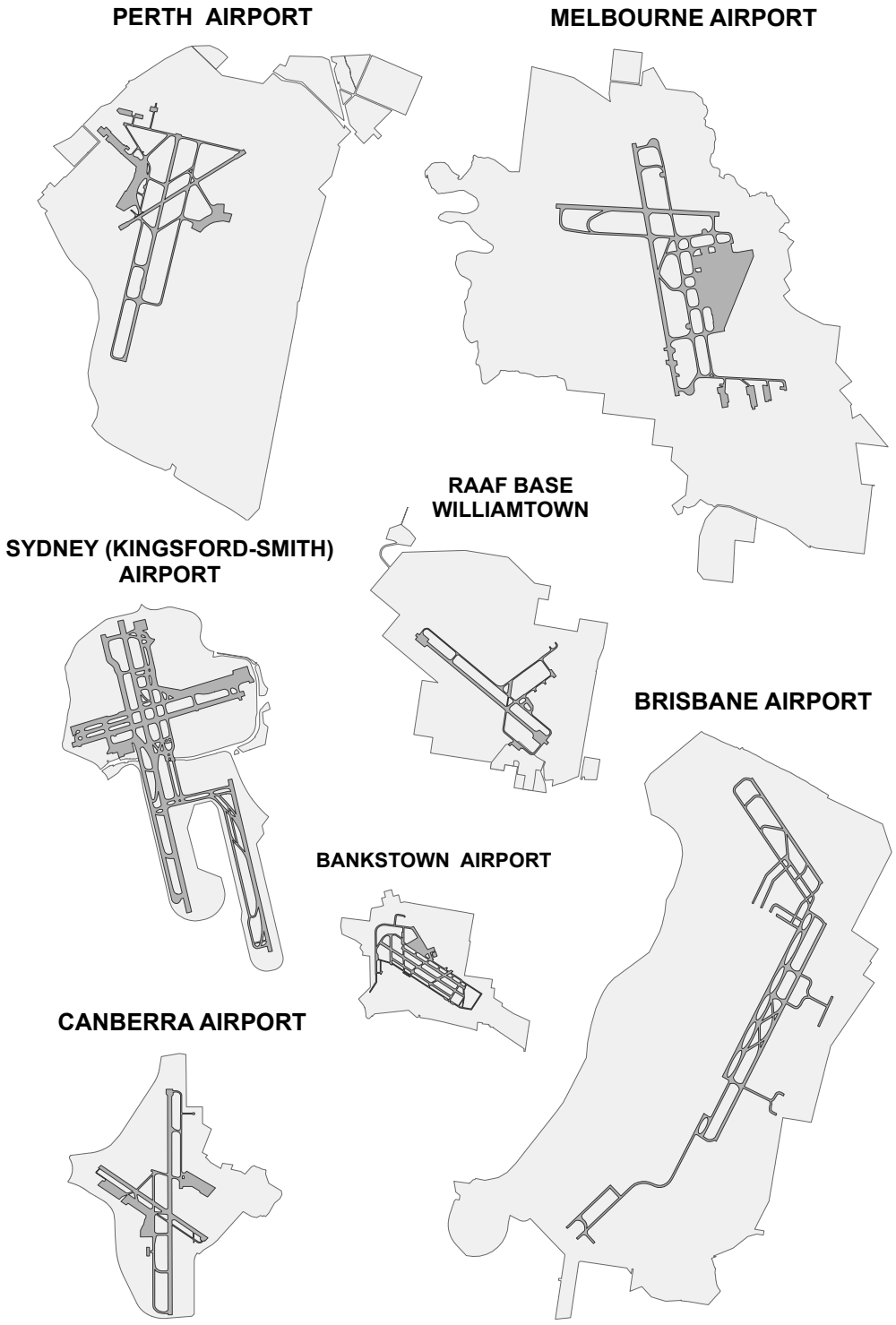
While Sydney (Kingsford-Smith) Airport is Australia's busiest airport in terms of international and domestic RPT, the airport occupies a relatively small land area compared with other major Australian RPT aerodromes. This is also small by international standards.

Figure 69 shows the land area of a number of capital city airports, and some aerodromes in the Sydney region.

85 SACL submission to the Joint Study, 2011.

86 SACL's *Sydney Airport Master Plan 2009* (referred in this Report as the Master Plan) provides for the operation and development of the airport to the year 2029, based on no changes to aircraft fight paths, the curfew, the cap as well as no new runways and no change to access arrangements for regional airlines.

Figure 69 Land areas of some Australian aerodromes



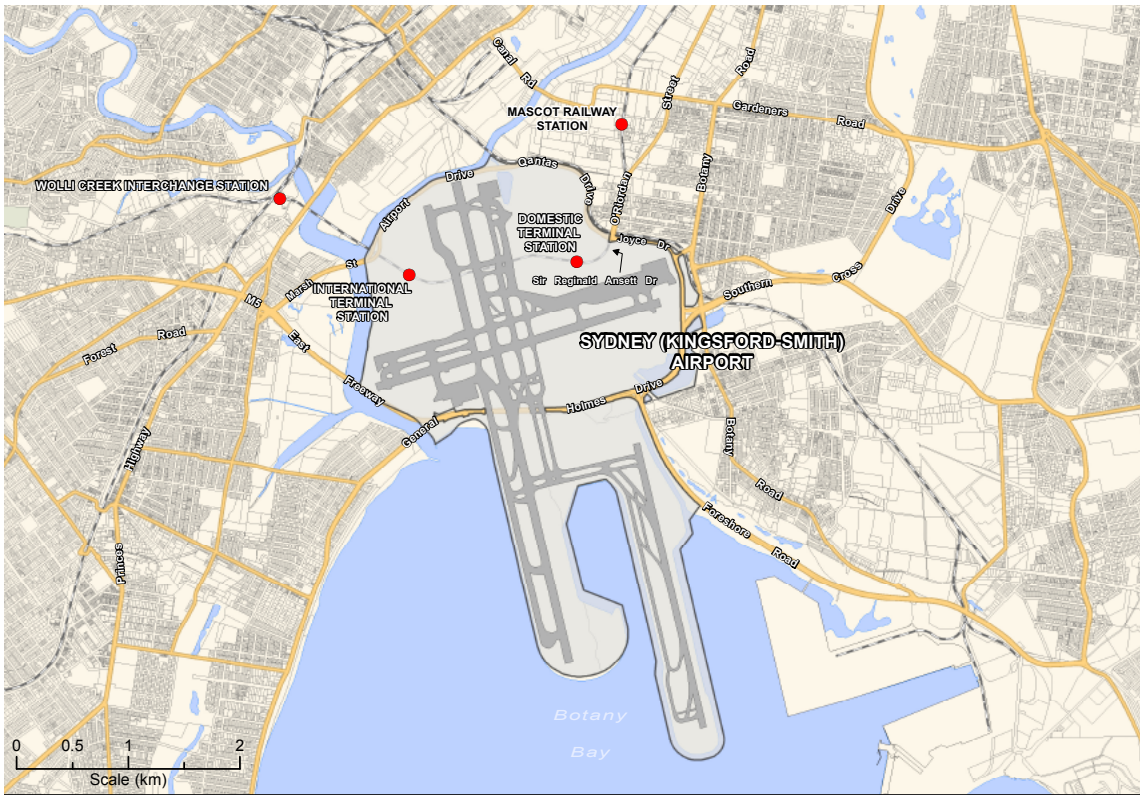
Source: Australian Department of Infrastructure and Transport.

Sydney (Kingsford-Smith) Airport has been an airport since the early 1920s. It has grown and developed to meet the demands and opportunities at different points of time rather than being planned to meet demand in the long term. This is evident in the configuration of the Domestic and International Terminals separated by the main runway and in the location and length of the much shorter medium-spaced parallel runway, which has been built out into Botany Bay. There is limited land to significantly extend terminal facilities, particularly in the International Terminal

precinct, and no opportunity to extend existing runways or build another. The land available for additional taxiway and apron capacity is also limited.

Figure 70 shows Sydney (Kingsford-Smith) Airport in relation to the surrounding environment. It is surrounded by Botany Bay on one side and urban development on the other sides. The Cooks River, Alexandria Canal, the Southern and Western Suburbs Ocean Outfall Sewer[87] and M5 tunnel also affect development to the west.

Figure 70 Sydney (Kingsford-Smith) Airport and its immediate surrounds



Note: Some sections of the road network around Sydney (Kingsford-Smith) Airport are tunnel roads.

Source: Australian Department of Infrastructure and Transport.

Urban redevelopment in the surrounding area will add to land transport access pressures on the road and rail system to and from the airport. Additionally, greater urban density in the CBD to airport corridor will increase pressure for high-rise developments which may conflict with the Obstacle Limitation Surface (OLS)[88] for the airport and potentially create a level of interference for on-airport infrastructure such as air traffic surveillance equipment and radio navigation aids. Traffic in the vicinity of the airport is also affected by the substantial and increasing traffic to Port Botany and by the volumes of through-traffic accessing the M5 or other arterial roads in the area.

87 A key part of the Sydney Water's Southern and Western Suburbs Ocean Outfall Sewer Main traverses the Sydney (Kingsford-Smith) Airport site, roughly in line with General Holmes Drive and also along the western edge of the airport between the Cooks River and the western end of Runway 07/25.

88 Obstacle Limitation Surfaces (OLS) protects the airspace and sets the maximum height of buildings to prevent interference with aircraft operations.

Airport airside infrastructure

Sydney (Kingsford-Smith) Airport Master Plan

Under the Commonwealth *Airports Act 1996,* an airport's operator or lessee is required to provide the Australian Government with a Master Plan every five years. The Master Plan sets out the airport lessee's proposals for operation and development at the site over the next 20 years, including proposals for investment and infrastructure development. The most recent Master Plan for Sydney (Kingsford-Smith) Airport was approved in 2009.

While SACL acknowledged in its Master Plan that the historical development of the airport had impacted on the investment and infrastructure decisions that can be made under the Master Planning process, it stated that, with the proposed changes under the Master Plan, the airport would be able to cater for forecast demand to 2029 in accordance with existing regulatory settings.

To meet the demand, SACL planned to undertake extensive redevelopment of all three terminals in addition to the development of a new remote aircraft parking apron to the south-east corner of the cross runway. A number of new taxiway elements would also be required to meet demand. These developments are intended to cater for the growth in aircraft movements, including the projected upgauging of aircraft types, such as a move to greater use of Code E and F aircraft types.

Aprons, stands and gates

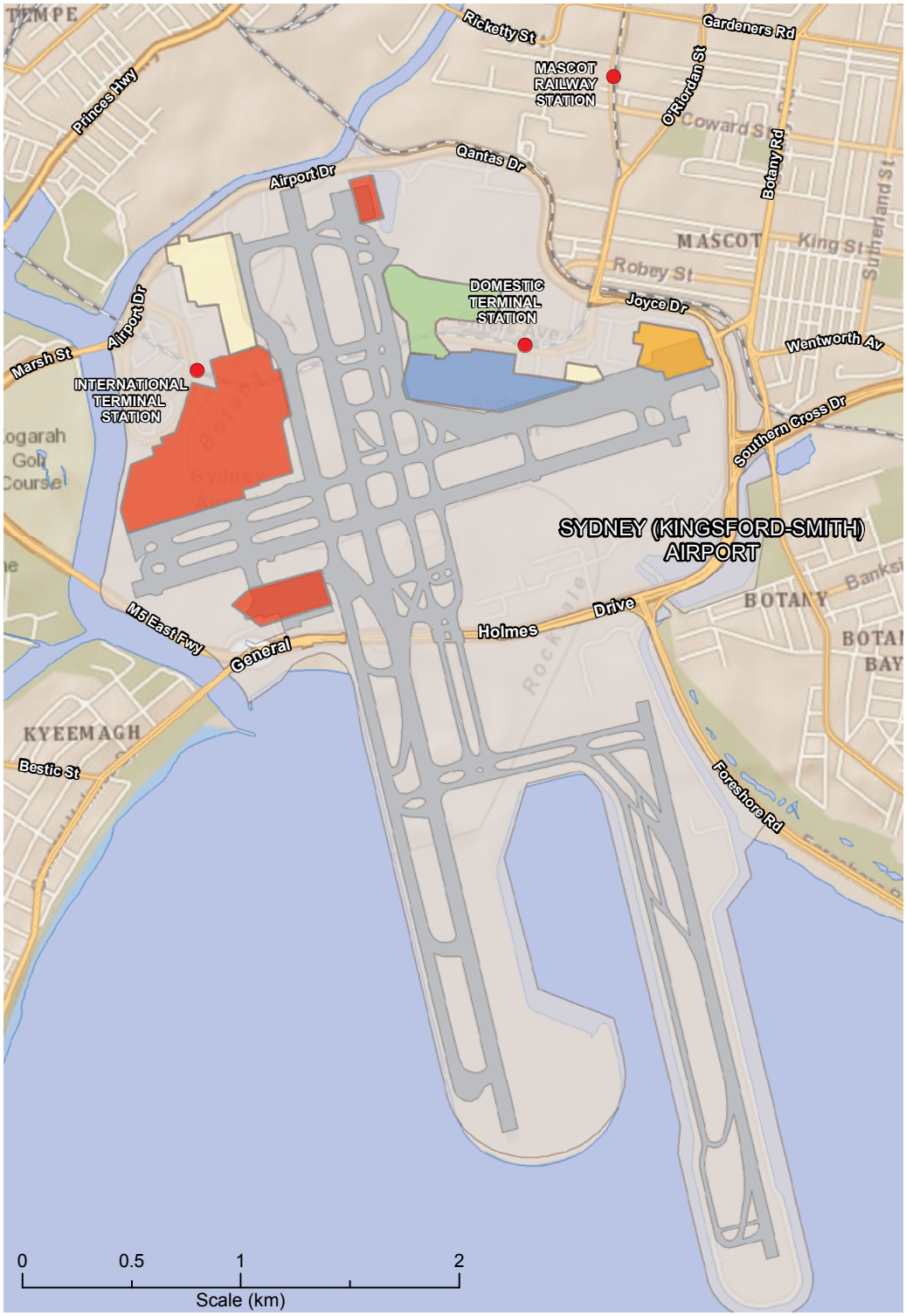
The current apron, stand and gate provisions are outlined in Table 6. These are located on the airport site in the corresponding colours, as highlighted in Figure 71.

Table 6 **Current apron, stand and gate provisions**

	Passenger						Freight		
	T1		T2		T3				
AC Type	Contact	Remote	Contact	Remote	Contact	Remote	International	Domestic	General Aviation
B1900	-	-	-	2	-	-	-	-	6
B737-800	3	1	15	14	7	-	-	5	2
B767-300	-	1	3	-	7	-	-	-	-
B747-400	17	6	-	-	2	-	4	-	2
A380-800	5	1	-	-	-	-	1	-	-
Total	25	9	18	16	16	-	5	5	10

Source: Landrum & Brown (L&B).

Figure 71 Existing airfield gate layout



Note: Highlighted areas in the map are indicative of key features only; a more detailed representation of the layout is in the following figure.

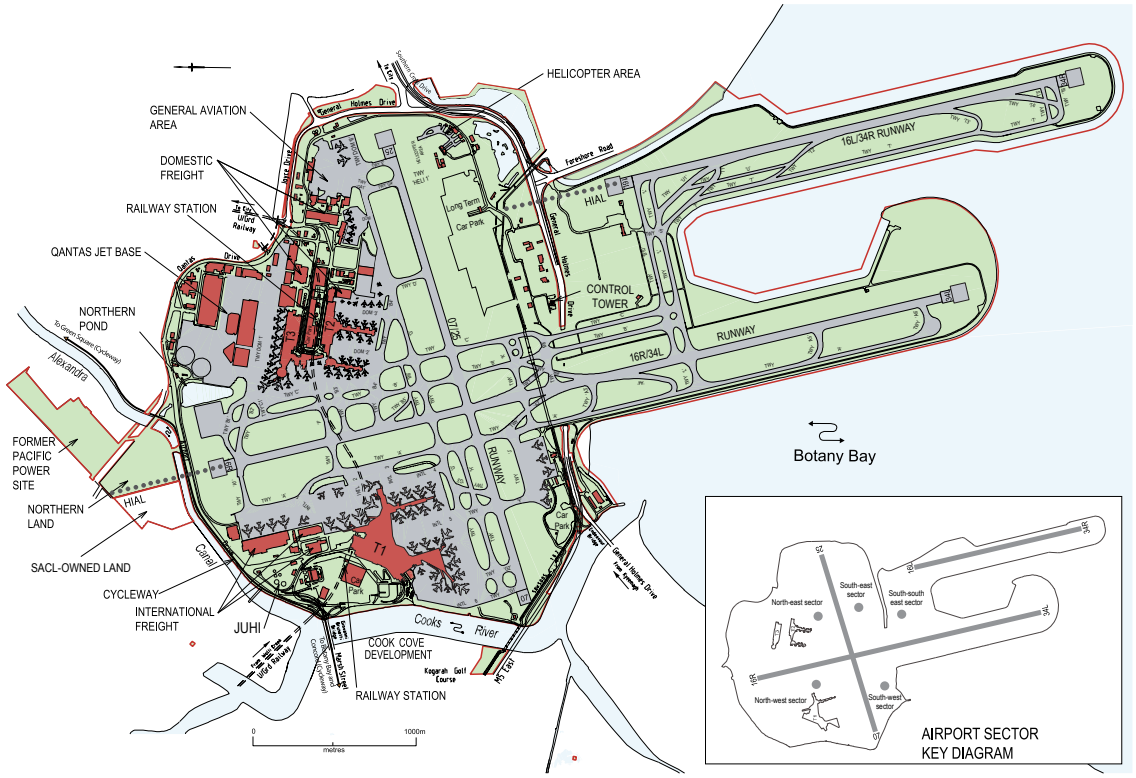
Source: L&B.

Under the Master Plan additional apron, stand and gate areas are to be provided to meet projected demand. This includes completion of apron development in the south-west sector by 2014, which would require towing across the cross-runway 25/07 and new apron development in the south-east and north-east sectors by 2024. The current GA facilities are relocated to the

south-east sector and displace the domestic freight precinct to the northern sector. The north-east sector will be part of a reconfiguration of the Qantas Jet Base maintenance area.[89]

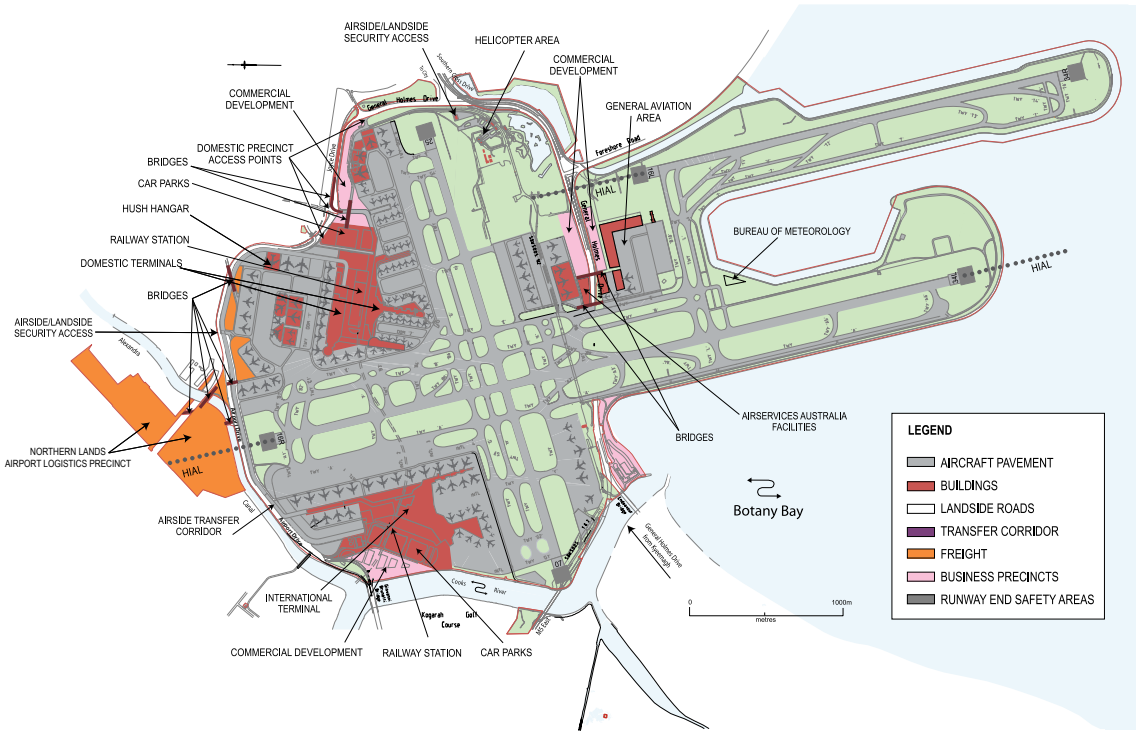
Figure 72 and Figure 73 outline the airport layout in 2009 and the 2029 Master Plan concept.

Figure 72 Layout of Sydney (Kingsford-Smith) Airport, 2009



Source: SACL Sydney Airport Master Plan 2009

Figure 73 Proposed Master Plan layout of Sydney (Kingsford-Smith) Airport, 2029



Source: SACL Sydney Airport Master Plan 2009

89 It is worth noting that Qantas's long-term lease of the maintenance area expires during the Master Plan period.

The proposed number of stands for aircraft types to meet the forecast demand, as outlined in the Master Plan, is shown in Table 7.

Table 7 Master Plan stand demand forecast, 2029

Category[1]	International	Domestic[2]	Freight[3]
Active[4]			
Code F	17	0	0
Code E	19	11	3
Code C	2	36	0
Subtotal	38	47	3
Layover[5]			
Code F	7	0	0
Code E	11	3	0
Code C	0	13	0
Subtotal	18	16	0
Total	56	63	3

Note 1: The stand demand for each category was determined on the basis of the largest aircraft type using a stand. Larger stands should be able to cater for smaller aircraft codes subject to detailed project planning.

Note 2: Domestic stand demand includes regional aircraft types. For the purposes of land use planning and to maintain future flexibility, domestic Code C regional stands were sized to accommodate the largest code aircraft type.

Note 3: This is the demand for freight stands occurring concurrently with passenger peak stand demand. Dedicated freight aircraft will operate from common use passenger stands.

Note 4: Active stands are those used for actual passenger processing. They can be a contact stand or passengers can be bussed from other locations.

Note 5: Layover stands are those where aircraft, not carrying out immediate turnaround, are towed and parked prior to being towed back for departure.

Source: SACL Sydney Airport Master Plan 2009

For the purposes of this Joint Study, Airservices Australia commissioned Landrum & Brown (L&B) to undertake a review and modelling of the airport's airside infrastructure capacity as outlined in the Master Plan against the airport's current and forecast demand.[90] The analysis was considered against the same time frames as the demand forecasts, taking into account expected aircraft sizes and movement schedules. It highlighted the difficulty of sustaining the current movement and handling rates, let alone catering for the projected growth in traffic, given the constraint of the existing airfield layout and the interaction between taxiways, runways, gates and apron parking slots.

The analysis does not address a new concept SACL has started to develop, which SACL expect will provide scope for additional gates and apron; and support more efficient use of the terminal infrastructure. This new concept is discussed in Part Six of this Report.

L&B's analysis found that it was unlikely the current apron, stands and gates infrastructure plans under the Master Plan would be sufficient to meet future demand, with particular challenges created by the timing set out in the Master Plan.

90 L&B undertook its analysis based on an example of possible forecast schedules developed by Booz & Company.This included likely arrival and departure times, aircraft types, service destinations and other criteria, consistent with Booz & Company's annual forecast demand and constrained planning day profiles, as discussed in Technical Papers A3 and B3. The full L&B report can be found at Technical Paper B1.

At current demand levels, the existing gates, stands and apron areas are already heavily utilised at each terminal during peak times. Specifically:

- all available gates at the current International Terminal 1 (T1) are utilised during the early morning peak between 7.30am and 10.00am;
- all available gates at the current Domestic Terminal 2 (T2) are utilised at various times during the day but some stand capacity is available, although much of this is limited to turboprop aircraft at 'walk out' stands;
- gates at the current Qantas Domestic Terminal 3 (T3) are consistently utilised throughout the day; and
- individual terminal apron areas are already virtually at capacity.

Individual terminal areas are already at maximum capacity in terms of aircraft stand utilisation during peak times, although additional aircraft can be accommodated at other times of the day, mainly on uncovered 'walk out' stands. Growth in aircraft sizes, particularly in peak times, will require additional aircraft gate capacity in the near to medium term future.

In many cases, there is already a requirement to tow aircraft off to remote stands, particularly from the International Terminal, to free up gate availability. This has flow-on effects to the runways and taxiways, as often aircraft tows crossing the main runway cause congestion, delays and flow complications on the taxiways.

By 2015, without the bringing forward of planned terminal and apron work identified in the Master Plan, it is estimated there will be a shortfall of 25 aircraft stands to meet projected demand.

Table 8 below shows the stand allocation and usage outcomes in 2015.

Table 8 Expected stand allocation and usage outcomes, 2015

Stand	Average Flight Turnaround Time[1]	Average Turns per Stand[2]	Maximum Turns per Stand[2]	Aircraft Turns Not Accommodated	Additional Stands Required
T1	3hr 13 min	4	6	12	8
T2	1hr 20 min	7	11	19	9
T3	1 hr 32 min	6	8	28	8
Total	n/a	n/a	n/a	59	25

Note 1: Turnaround (paired) flights only. Does not include arrival-only or departure-only flights.

Note 2: Does not include remote stands for aircraft tow-off.

Source: L&B based on forecast schedules by Booz & Company.

This lack of gates will mostly impact on international arrivals in the morning peak hours, as there will not be any available stands at the International Terminal to accept any additional flights after 2015. There will also be a similar constraint at T2 and T3 in peak periods. This shortfall will especially impact on the larger Code E aircraft, with no available stands at T2 and T3.

Part of this shortfall is the result of upgauging of aircraft for domestic services to meet the anticipated demand when there has not been a similar increase in the size of aircraft stands. If airlines deferred upgauging in order to facilitate increased movements at Sydney (Kingsford-Smith) Airport, this could reduce the number of additional stands required by approximately five stands. However, the use of smaller aircraft would result in reduced passenger throughput, and therefore less of the total amount of passenger demand would be met.

By 2020, there will be an estimated shortfall of 19 stands, assuming all infrastructure development is achieved in accordance with the schedule foreshadowed in the Master Plan. Of

this, a shortfall of five stands could potentially be mitigated if airlines operated services with a smaller aircraft size to cope with the constraint; however, as described above, this has other negative implications. Aircraft at T3 as well as those at T1 will still be unaccommodated.

By 2035, the planned gate provisions, as detailed under the Master Plan, will be insufficient by a shortfall of 16 stands. The reduction in the shortfall compared to 2020 is likely to be due in part to an increased percentage of larger aircraft in the forecast fleet mix, and completion of the foreshadowed work.

Table 9 **Expected stand allocation and usage outcomes, 2035**

Gate	Average Flight Turnaround Time[1]	Average Turns per Stand[2]	Maximum Turns per Stand[2]	Aircraft Turns Not Accommodated	Additional Stands Required
T1	2hr 58 min	4	7	7	6
T2	1hr 11 min	9	12	27	8
T3	1hr 24 min	9	10	5	2
Total	n/a	n/a	n/a	39	16

Note 1: Turnaround (paired) flights only. Does not include arrival-only or departure-only flights.

Note 2: Does not include remote stands for aircraft tow-off.

Source: L&B based on forecast schedules by Booz & Company.

It should be noted the shortfall in gates includes a number of gates which will only be required in peak periods and may have only one projected aircraft turnaround per day. It is unlikely providing gates for one turnaround will be commercially viable for either the airlines or the airport. In addition, the analysis shows that, by 2035, with a spreading of movements, half of the airport hours of operation (eight hours) will be at the 80 movements per hour cap and another five hours will be at 75 movements or higher. This peak spreading creates a consistent high demand for tight turnaround times for all aircraft movements.

Even with the projected Master Plan investments, a significant number of aircraft turnarounds will not be able to be accommodated at T1, T2 and T3. The reaction of the airlines and the airport to the constraints could be to seek to organise schedules to reduce the need for some of these gates. However, there is limited scope for this without changing routes or aircraft types (especially using smaller aircraft to better utilise the gates available) and therefore this could result in redistribution or suppression of demand. This will limit the scope for upgauging of the airlines' aircraft fleet – one of the key coping strategies the airlines and the airport will seek to adopt as scheduling slots become further constrained.

Airlines could be under pressure to reduce the time allowed for turnarounds between arrivals and departures of subsequent services by the same aircraft; however, this may lead to more frequent schedule disruptions, as it reduces the margin for managing unexpected hitches in the operations and the flexibility to manage any delays from previous sectors.

The Master Plan layout needs to be developed by 2020 to accommodate the forecast schedule demand, especially during peak morning, evening and overnight periods.

Taxiway network

Under the Master Plan, SACL proposes a number of changes to the existing taxiway network – in particular, the:

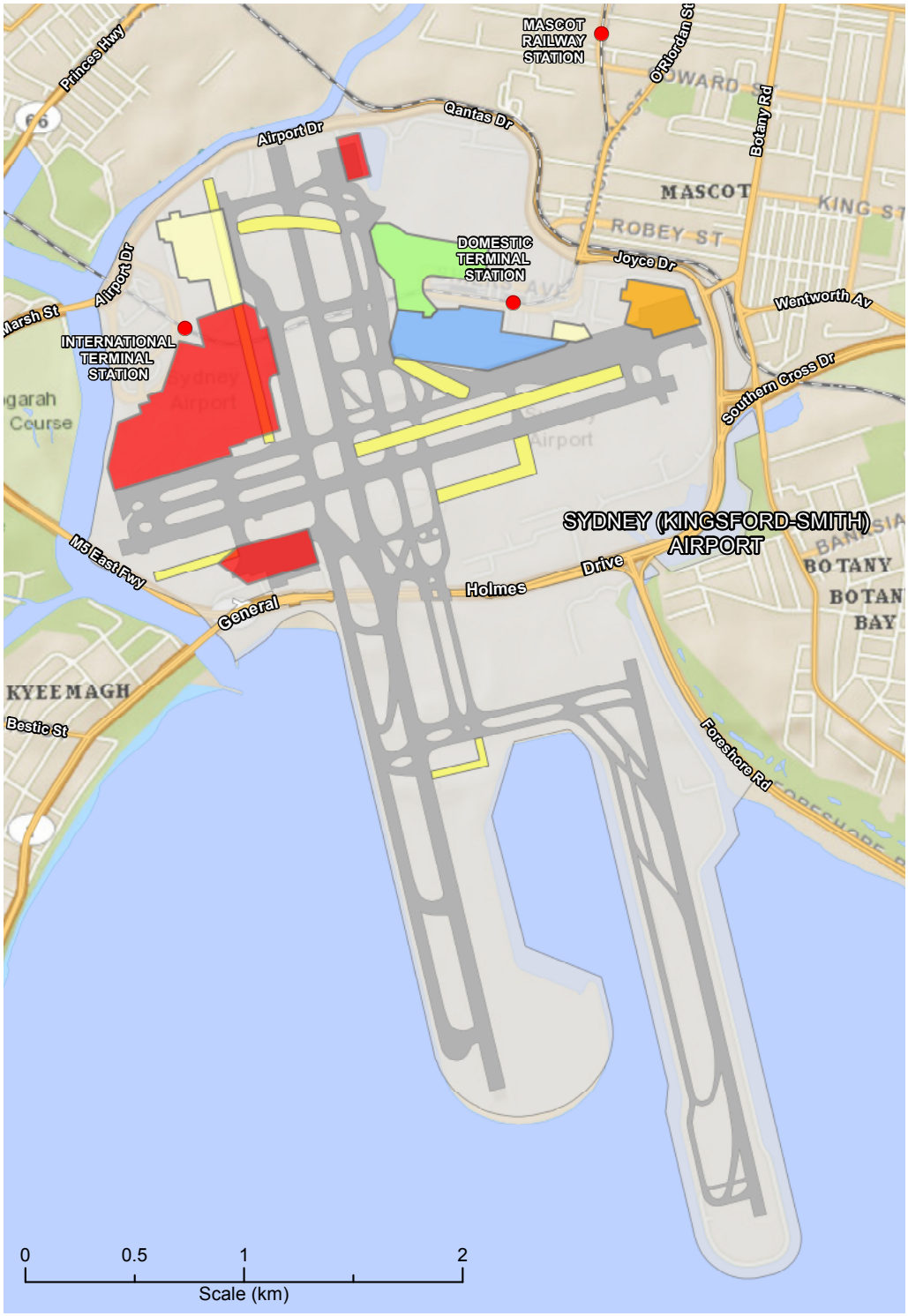
- taxiway J extension;
- taxiway C extension;
- straightening of taxiway A;
- new parallel taxiway east of the current International Terminal (T1);
- additional northern taxiway across the main runway; and
- taxiway H extension.

These can be seen schematically in Figure 74, delineated in yellow. (A more detailed explanation of the current and planned taxiways can be seen in Figure 72 and 73.)

The airport layout has some restrictions which prevent certain aircraft movements in particular areas. Large aircraft such as A380, B777 and A340, for example, must use specific taxi routes. There are also restrictions due to clearance issues, requiring holding on the taxiways. This means that greater than anticipated upgauging of aircraft, which might help increase capacity, will place greater pressure on the taxiway system, potentially causing it to become a limiting factor.

L&B advises that, with the works foreshadowed by SACL in its Master Plan, it is possible that taxiways have sufficient capacity to 2035. Delays would be within tolerable (but far from ideal) limits, but only if sustained movement rates do not exceed the capacity of gates and there is a more balanced utilisation between the parallel runways than currently occurs. It is noted, however, that there are operational limitations that impede the balancing of traffic flow onto the two parallel runways; hence, L&B considers that inadequate taxiway capacity remains a risk through the Master Plan period.

Figure 74 Master Plan taxiway network proposed changes



Note: Highlighted areas in the map are indicative of key features only; this should be read in context of other proposed developments in the Master Plan, for example in terms of aircraft parking areas. A more detailed representation of the developments can be seen in the preceding figures.

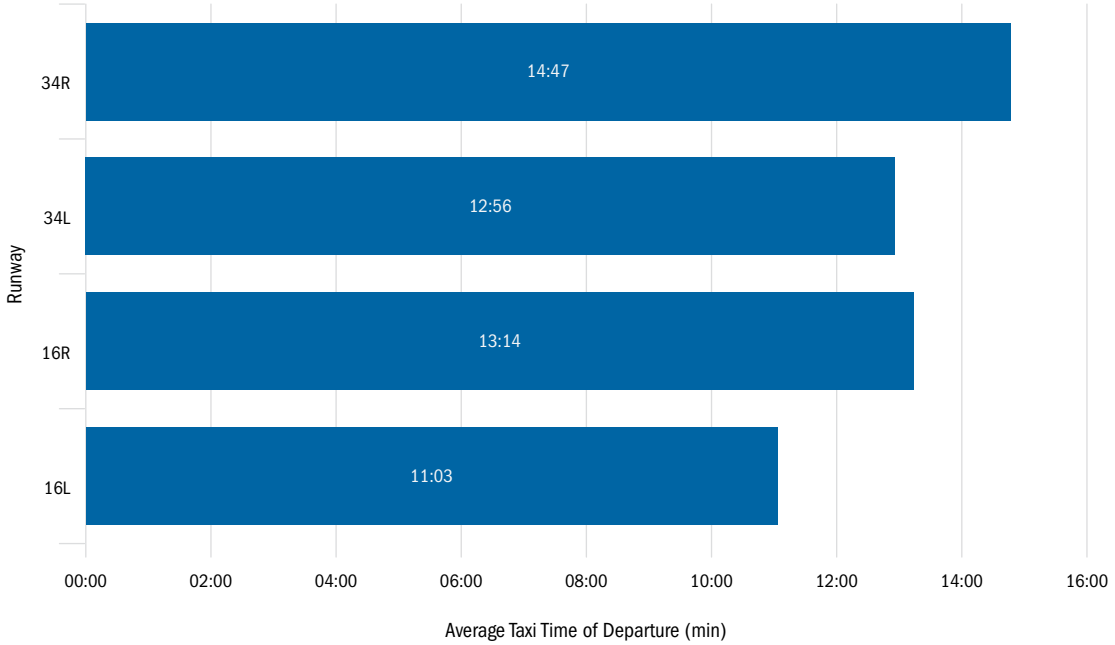
Source: L&B.

Assessment of the ability of the Master Plan's proposed taxiway infrastructure to support future gate demand and surface movement traffic suggests that the current taxiway layout is less than optimal and is the cause of extended taxiing times and some congestion. Runway crossings and towing operations during peak operating periods negatively affect taxiway operational performance. The fact traffic flow cannot be evenly shared between the two parallel runways

is a further cause of taxiway congestion. Many aircraft types are only able to use the western parallel runway due to its longer effective operational length. The airport is already exposed to departure queues for the western parallel runway during peak periods, while the other parallel runway is under-utilised.

Figure 75 highlights current capacity issues on the taxiways. This shows it takes approximately two minutes longer to taxi and depart to the south from the longer parallel runway than the shorter runway, despite a significantly shorter distance travelled. As a result, a queue forms on the taxiways, causing congestion in peak times.

Figure 75 Average taxi times of departure aircraft by runway, 2010



Source: L&B.

Runways

There are currently three runways (with six runway ends) at Sydney (Kingsford-Smith) Airport (as shown in Figure 76):

- 16R/34L, which is the longest of the three runways at 3,962 metres (the 'main runway');
- 16L/34R, known as the third runway, at 2,438 metres; and
- the cross (or east-west) runway 25/07 at 2,530 metres.

Runways 16R/34L and 16L/34R are not wide-spaced parallel runways and are not able to operate independently to achieve 80 movements per hour in all weather conditions.

Figure 76 **Runway layout at Sydney (Kingsford-Smith) Airport**

Source: Australian Department of Infrastructure and Transport.

The length and strength of the runways determine the capability to meet aircraft type and movement demand. Runway 16R/34L is able to accommodate all aircraft types, although there can be some issue in accessing the runway due to wing-tip clearance requirements between Code D, E and F aircraft using the adjacent taxiway network, slowing movement along the taxiway. (Aircraft in these codes that could be affected by this include the A380, B767 and B777.)

There are significant limitations on runway 16L/34R. Its taxiway fillet design does not cater for long wheel based aircraft such as B777-300 or larger. Standard operating procedures generally preclude aircraft greater than the B767 from using that runway.

In addition, some services are more likely to use the longer runway. For example, aircraft departing for Melbourne would, under normal circumstances, be required to depart from the long runway (16R) in order to mesh with the adjacent route structures for their destination.

Many of the heavier, larger and/or long-haul aircraft require use of the long runway. Historically, the runway usage split typically averages 67 per cent of operations on the longer runway and 33 per cent on the shorter runway.

There is therefore an imbalance between the utilisation of the two parallel runways and reduces the capacity to operate the parallel runway system efficiently. Sydney (Kingsford-Smith) Airport differs from other airports with parallel runways, such as London's Heathrow Airport, where runways are of similar length, providing for greater flexibility and allowing for more balanced runway utilisation. As the number of movements increase, ATC will be forced to put more aircraft on the shorter parallel runway. This will increase taxiing times for a number of aircraft. However, as the proportion of large aircraft in the overall fleet mix also increases over time (as the airlines upgauge their fleets), the opportunity for a balanced runway utilisation again comes under

pressure as the need to use the longer runway increases. The runway configuration is, therefore, a limiter and potential cause of increased delays. While demand pressures will create incentive for a greater use of the third runway, upgauging to larger aircraft which need to use the main runway is likely to counter this.

Analysis of the runway system undertaken by Airservices Australia found that, in good weather conditions, Sydney (Kingsford-Smith) Airport can process between 85 and 87 movements per hour on the parallel runways. This is consistent with international practice, with most runways currently catering for about 40 movements per hour where there is a typical RPT fleet mix and separation standards are applied as specified by the International Civil Aviation Organization (ICAO).

Considering the combined capacity of Sydney (Kingsford-Smith) Airport's runways, airspace, taxiways and gates, Airservices Australia suggests that sustainable capacity is not more than 85 movements per hour.

An increase in the maximum movement rate would require substantial investment in taxiway, apron and gate capacity, as the current infrastructure struggles to handle even the current peak movement levels of close to 80 movements per hour for sustained periods. Achievement of this level of movements is also predicated on good weather, more balanced runway utilisation and a suitable fleet mix given the time required between movements, particularly large aircraft. Separation standards between leading and trailing aircraft are required for safety reasons to ensure there is no risk posed by wake turbulence remaining from the preceding aircraft on the same route. Minimum wake turbulence separations standards to be applied between an A380 and a lighter aircraft range between two and four minutes or between six and eight nautical miles depending on the operational circumstance.

Table 10 and Table 11 outline the minimum separation standards required by the Civil Aviation Safety Authority. These are described in terms of nautical miles (typically for arriving aircraft) and minutes (typically for departing aircraft).

Table 10 Minimum wake turbulence separation standards (nautical miles)

Aircraft Categories		Time Separation Minimums				
Leading Aircraft	Following Aircraft	Arrival	Displaced Landing Threshold	Opposite Direction	Departure (Full Length)	Departure (Intermediate)
Super	Heavy	3	3	3	2	4
	Medium	3	3	3	3	4
	Light	4	3	3	3	4
Heavy	Medium	2	2	2	2	3
	Light	3	2	2	2	3

Source: Airservices Australia Aeronautical Information Service (AIS) Publications.

Table 11 Minimum wake turbulence separation standards (minutes)

		Trailing		
		Heavy	Medium	Light
Leading	Super	6	7	8
	Heavy	4	5	6
	Medium	n/a	n/a	5

Note: ATC apply these standards to aircraft traffic arriving or departing circling an airport. Where the required separation can be determined by distance using an aircraft report or Air Traffic Service Surveillance System, ATC need not apply the time standard.

Source: Airservices Australia Aeronautical Information Service (AIS) Publications.

Increased delay

One of the indications of capacity pressures at an airport is when average delays begin to exceed acceptable levels. The United States Federal Aviation Administration has historically defined the 'acceptable average delay' as approximately four to eight minutes per aircraft.

However, given that each airport is different, a more appropriate level of 'acceptable' delay is one in which the schedule integrity can be maintained and that the operation can recover from periods of high delays quickly – usually within an hour.

Any significant delay to aircraft operations can have the following impact on passengers, airlines and productivity:

- passengers are more likely to miss connecting services or appointments;
- airline crews will miss connecting flight assignments;
- the delay to an arriving aircraft results in a significant delay to the corresponding departure that can then cascade delays throughout the entire network of airline schedules across the country and at overseas ports; and
- in extreme cases, arriving aircraft are diverted to other airports because they do not have sufficient fuel reserves to carry out the required airborne holding.

One key factor in determining an airport's capability of performing at peak performance under all weather conditions is the aerodrome layout – the combination of runways, taxiways, apron areas and gates. L&B examined the capability of the taxiways, aprons and gates at Sydney (Kingsford-Smith) Airport to cope under sustained load as indicated in forecast schedules for 2015, 2020 and 2035. Both existing infrastructure and intended infrastructure, as set out in the Master Plan, were tested under load.

Based on the 2009 daily demand level of 888 arrival and departure operations, the L&B taxiway simulations for the existing airfield layout computed an average peak hour delay of 5.7 minutes (Mode 9) and 5.4 minutes (Mode 10) for arrivals and 12.0 minutes (Mode 9) and 11.1 minutes (Mode 10) for departures.

By 2035, the modelling undertaken by L&B found there would be little change in delay patterns if:

- the airport was able to operate in the parallel runway mode of operation;
- the weather conditions were good;
- the hourly movements did not exceed the 80 movement cap;
- there was a 55/45 percentage split in the utilisation of the two parallel runways;
- SACL brought forward its investment in infrastructure; and
- demand-only gated schedules were considered.[91]

These assumptions presume an optimal operating environment and should be seen as a theoretical minimum. If these assumptions could not be met, L&B found that delay would continue to increase.

Often the recovery from schedule disruption leads to delay and some cancellations. In order to show how delays will worsen over time as capacity at Sydney (Kingsford-Smith) Airport is reached, a scenario was examined which considered the impacts when movements were constrained to 55 movements per hour for a period of two hours in the morning peak. It

91 Demand for gates was based on analysis of forecast passenger and aircraft size trends.L&B did not consider in the modelling any of the aircraft that could not get a stand/gate.This in effect meant that Sydney (Kingsford-Smith) Airport was not tested at the anticipated growth levels, as these extra aircraft were already considered to be suppressed as there was no capacity to cater for them.

assumed that displaced flights would be shifted to the next available operating hour, disrupting all succeeding flights in the hourly profile.

As shown in Table 12, by 2035 runway capacity constraints of 55 movements per hour between 7.00am to 8.59am could cause 75 services to be displaced if flights were shifted to the next hour. The effect of the 75 displaced services will impact the consequent hours for the majority of the day. Aside from the delay between 7.00am and 8.59am, assuming services are moved to the next available hour, there will be 556 movements delayed at Sydney (Kingsford-Smith) Airport alone; the flow-on effects to other airports have not been illustrated in this scenario. All delayed flights will be allocated to an available slot by 9:00pm. At 10.00pm, the normal hourly movement profile will resume without the need to receive delayed services.[92]

Table 12 **Impact of limiting Sydney (Kingsford-Smith) Airport aircraft movements to 55 per hour between 7.00am and 9.00am, 2010, 2015, 2020 and 2035**

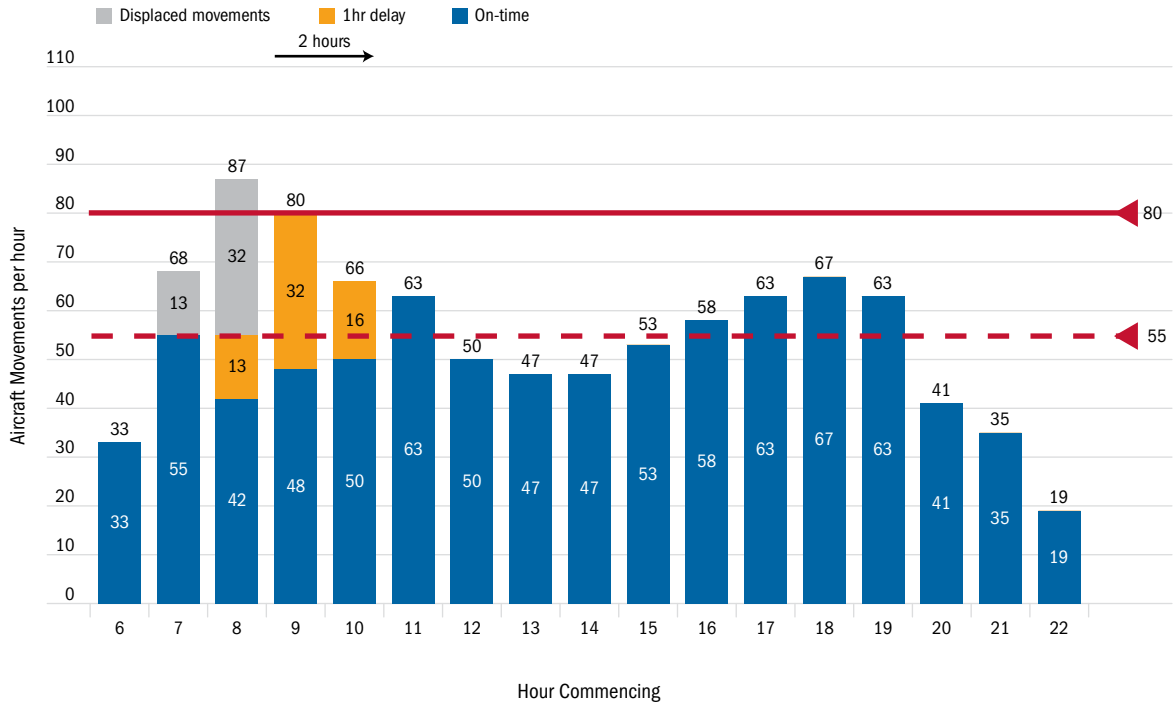
Year	Number of Displaced Movements	Number of Movements Delayed by One Hour[1]	Number of Hours Affected	Time of Day in which Schedule is Recovered
2010	45	48	2	11.00am
2015	69	135	4	1.00pm
2020	75	211	5	2.00pm
2035	75	556	13	10.00pm

1. After 8.59am (when the available runway slots resume to 80 movements per hour). This excludes the construct of delay created by limitation of 55 movements per hour for a two hour period.

Source: Booz & Company analysis.

Figure 77 to Figure 79 show the hourly delay impact for the years 2010, 2020 and 2035 in which Sydney (Kingsford-Smith) Airport's spare capacity is fully utilised.

Figure 77 **Sydney (Kingsford-Smith) Airport total aircraft movements by hour of day, limited to 55 per hour between 7.00am and 8.59am: minimising the delay time of surplus services, 2010**

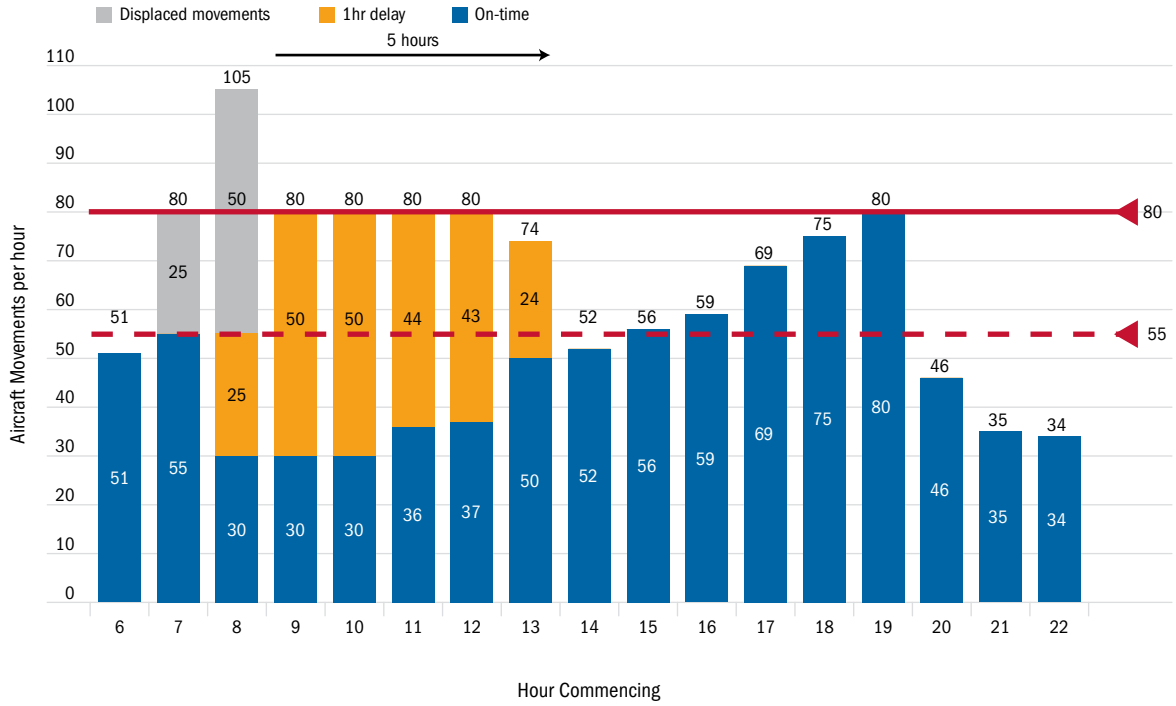


Note: This scenario assumes if the reallocation of movements to the shoulder hour causes movements to exceed 80 per hour, scheduled flights for the hourly profile receiving the delayed flights are moved to the next hour.

Source: Booz & Company analysis

92 Further information can be found in Technical Paper B3.

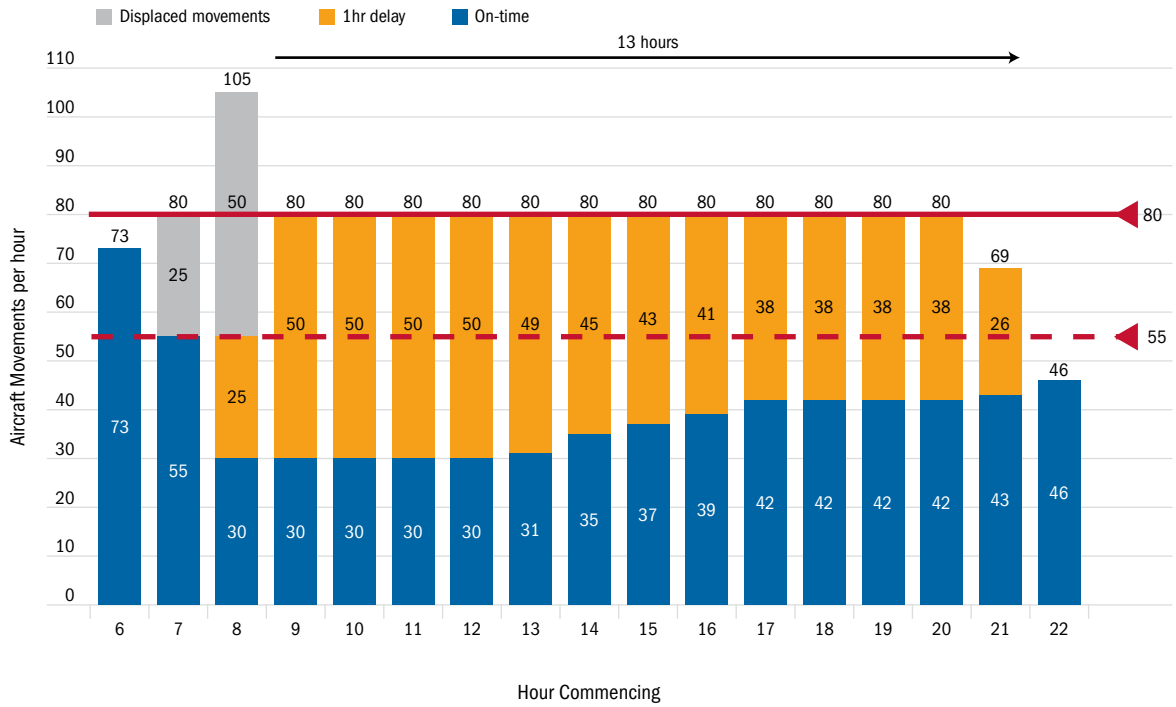
Figure 78 **Sydney (Kingsford-Smith) Airport total aircraft movements by hour of day, limited to 55 per hour between 7.00am to 8.59am: minimising the delay time of surplus services, 2020**



Note: This scenario assumes if the reallocation of movements to the shoulder hour causes movements to exceed 80 per hour, scheduled flights for the hourly profile receiving the delayed flights are moved to the next hour.

Source: Booz & Company analysis

Figure 79 **Sydney (Kingsford-Smith) Airport total aircraft movements by hour of day, limited to 55 per hour between 7.00am and 8.59am: minimising the delay time of surplus services, 2035**



Note: This scenario assumes if the reallocation of movements to the shoulder hour causes movements to exceed 80 per hour, scheduled flights for the hourly profile receiving the delayed flights are moved to the next hour.

Source: Booz & Company analysis.

In practice, airlines are likely to seek to ameliorate these impacts by consolidating services where possible by moving passengers to services with remaining seat capacity and cancelling some flights. However, this also has implications for passengers, particularly those on connecting flights or with only a few service options. At Sydney (Kingsford-Smith) Airport the scope for recovery of any backlog of delayed flights is limited to those periods of the day that still have spare capacity. As demand increases in coming years, the peak hours will spread across a longer period of each day and the opportunity for schedule recovery becomes reduced. Modelling suggests that by 2035 almost half of all non-cancelled movements will be late and almost 10 per cent of desired movements will be cancelled.[93]

Growth in traffic has also seen an increase in scheduled flying times between city pairs. For example, an extra 10 minutes has been added to the scheduled timing for flights between Melbourne and Sydney above what was the norm for airlines back in 2006. This increased flying time reflects increased delay, whether it is due to airborne holding or waiting for a gate or waiting to push back or take off.

Delays and increased scheduled flight times not only cause inconvenience but a loss of productivity. Increased delays and increasing scheduled flight times should not be accepted as 'normal'.

Airspace management and air traffic control

Airspace management, including the provision of air traffic control services, is primarily to ensure the safe movement of air traffic. It can also enable the efficient movement of aircraft and reduce the environmental impact of air traffic operations. Improvements in ATC technology and procedures can help in ensuring a more efficient processing of traffic. For example, the expansion of the hours of use of Precision Runway Monitor (PRM)[94] procedures at Sydney (Kingsford-Smith) Airport provides improvements to all weather operations. Wider application of this technology will assist in reducing delay due to poor weather conditions, but it will not increase the overall runway capacity of the airport.

Minimising environmental impacts

Slot capacity

The Commonwealth *Sydney Demand Management Act 1997* (the Act) provides a framework for the regulation of aircraft movements (take-offs and landings) at Sydney (Kingsford-Smith) Airport.

Movement cap

The Act prescribes a maximum of 80 runway movements for every operating hour. This is measured not only in each clock hour but also between any one-hour period measured from each quarter-hour mark – for example, 7.00am to 8.00am, 7.15am to 8.15am, and 7.30am to 8.30am and so on. The maximum movement rate of 80 movements per hour is only achievable when using the parallel runways.

Slot Management Scheme

The Act also provides a framework to authorise movements for aircraft operating to and from the airport at a specified time on a specified day. This is managed by a Slot Manager with responsibility for the day-to-day administration of the Slot Management Scheme. The aim of the scheme is to encourage efficiency of operations by staging the scheduling of aircraft movements to avoid congestion when airlines will otherwise cluster their scheduling times. Allocations of

93 BITRE analysis, 2011.

94 Precision Runway Monitor (PRM) is a radar system that enables ATC to monitor simultaneous close parallel instrument approaches to airports.Under PRM procedures, ATC uses high resolution radar (with accuracy of about one milliradian) to ensure that aircraft on final approach to different runways do not come into conflict.The reduced separation standards enable the best possible movement rates.

slots are required to be consistent with the runway movement cap and no more than 80 slots are allocated per hour.

Slot allocation

The allocation of slots to aircraft operators is reviewed each scheduling season (twice per year).

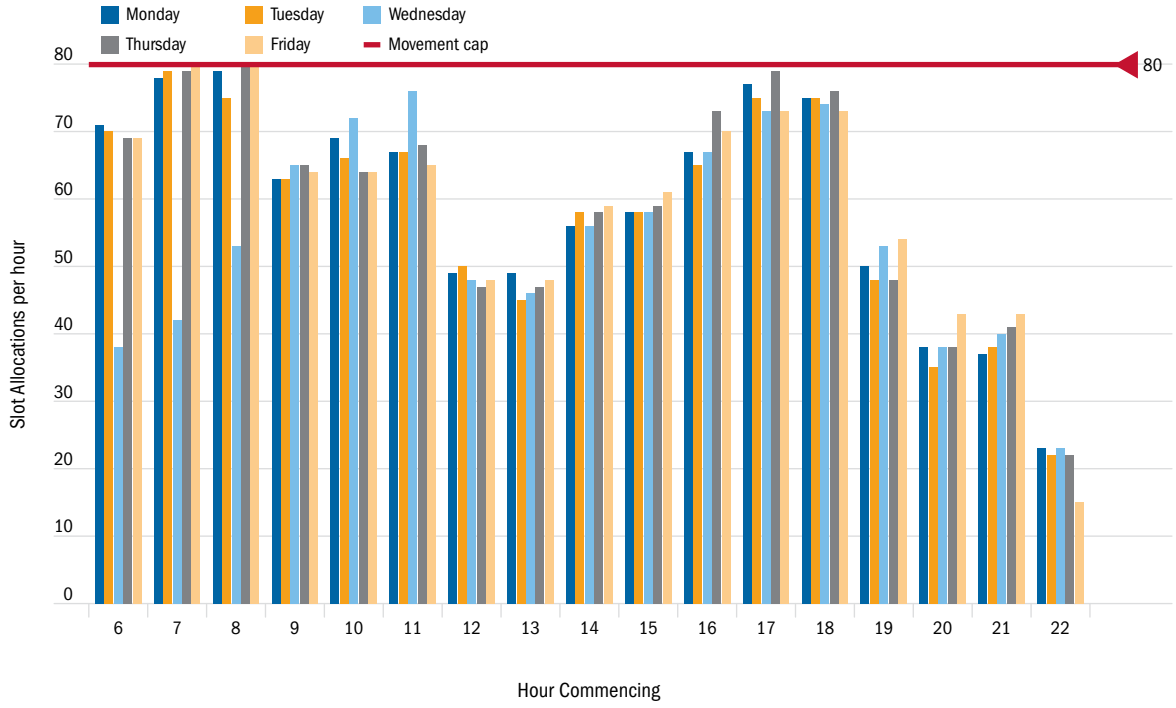
Applications ('filings') for slots by aircraft operators are submitted to the Slot Manager, who assesses them against the rules set out in the Slot Management Scheme and allocates slots accordingly. This slot allocation process is undertaken at two levels. The main allocation of slots is made after filings and a Schedules Conference is held before each scheduling season. Additional allocations of unallocated slots are made in response to more immediate events or requests from airlines.

Penalty action may be taken if an operator carries out a movement without a slot. Penalty action may also be taken if an operator carries out too many off-slot movements and the reasons for operating off-slot are within the operator's control. To date, no penalty action has been taken by the Australian Department of Infrastructure and Transport.

Figure 80 shows the slot allocations for the northern hemisphere winter (30 October 2010 to 26 March 2011) scheduling period. As can be seen, while allocations vary throughout the day, allocations for peak periods (7.00am to 9.00am and 5.00pm to 7.00pm) are already at or close to the 80 movements permitted per hour. Friday slots are fully allocated in both hours commencing 7.00am and 8.00am; Monday slots are nearly fully allocated for the same times; and Thursday slots are fully allocated in the hour commencing 8.00am.

For airlines to be viable, they need slots at the same time on several days of the week. So while there are still a small number of slots available on Wednesday, it is unlikely these will be taken up without other days becoming available.

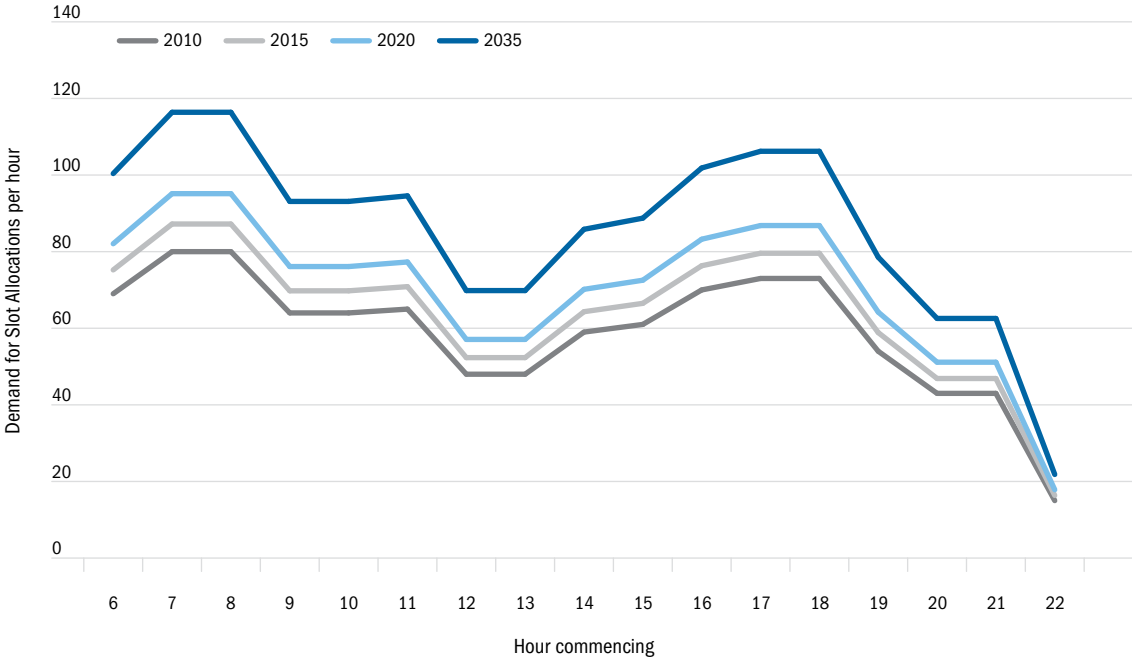
Figure 80 **Sydney (Kingsford-Smith) Airport, weekday slot allocations, 30 October 2010 to 26 March 2011**



Source: Airport Coordination Australia.

Figure 81 shows the expected unconstrained demand for slots at each hour for 2015, 2020 and 2035, based on the current allocations.

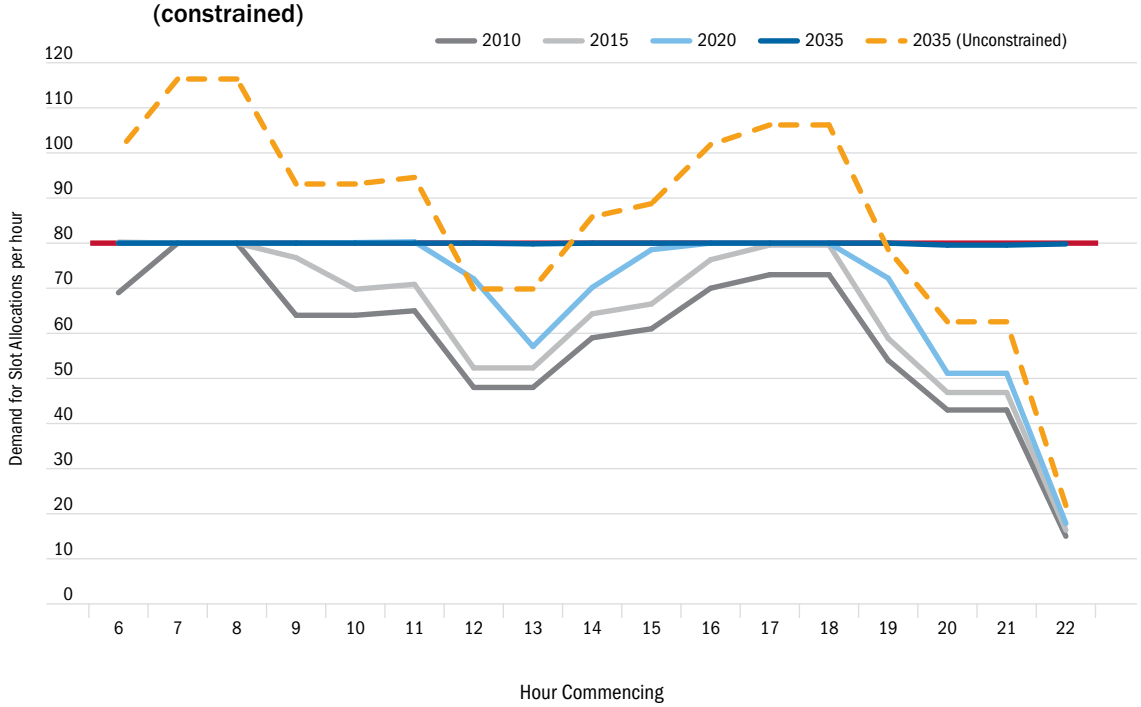
Figure 81 **Demand for slots at Sydney (Kingsford-Smith) Airport, 2010, 2015, 2020 and 2035 (unconstrained)**



Source: Booz & Company analysis of Airport Coordination Australia data.

Figure 82 shows the allocation of slots likely to result, assuming airlines are willing to operate at a less preferred time. When all 80 slots are allocated in one hour, some of the demand will spread or be redistributed to other hours. A level of demand may be suppressed.

Figure 82 **Demand for slots at Sydney (Kingsford-Smith) Airport, 2010, 2015, 2020 and 2035 (constrained)**



Source: Booz & Company analysis of Airport Coordination Australia data. The 2035 (unconstrained) case shows forecast growth in slot allocations, based on 2010 allocation in Figure 80 and forecast growth in aircraft movements. 2010, 2015, 2020 and 2035 constrained forecasts assume that, when more than 80 slots are demanded in an hour, some will be 'peak spread' and be redistributed to other hours of the day, while others will be suppressed and not allocated. This figure shows a 'medium' peak spreading scenario. Outcomes of other scenarios are identified in Technical Paper B3.

The above analysis presumes passengers are able and willing to travel at other available times and that airlines are similarly able (based on their overall network scheduling strategy) to shift from less than optimal times to whatever slot is available. This will not always be the case, especially for international services that are often limited in their scheduling options due to operational or commercial constraints.

Factors which limit the flexibility of an operator to accept a slot at a different time may include:

- a curfew or other operating restrictions at the other airports to be served;
- important flight connections for transferring passengers;
- rotation requirements for aircraft and crew; and
- the need to align the timing of slots across several days to market the service.

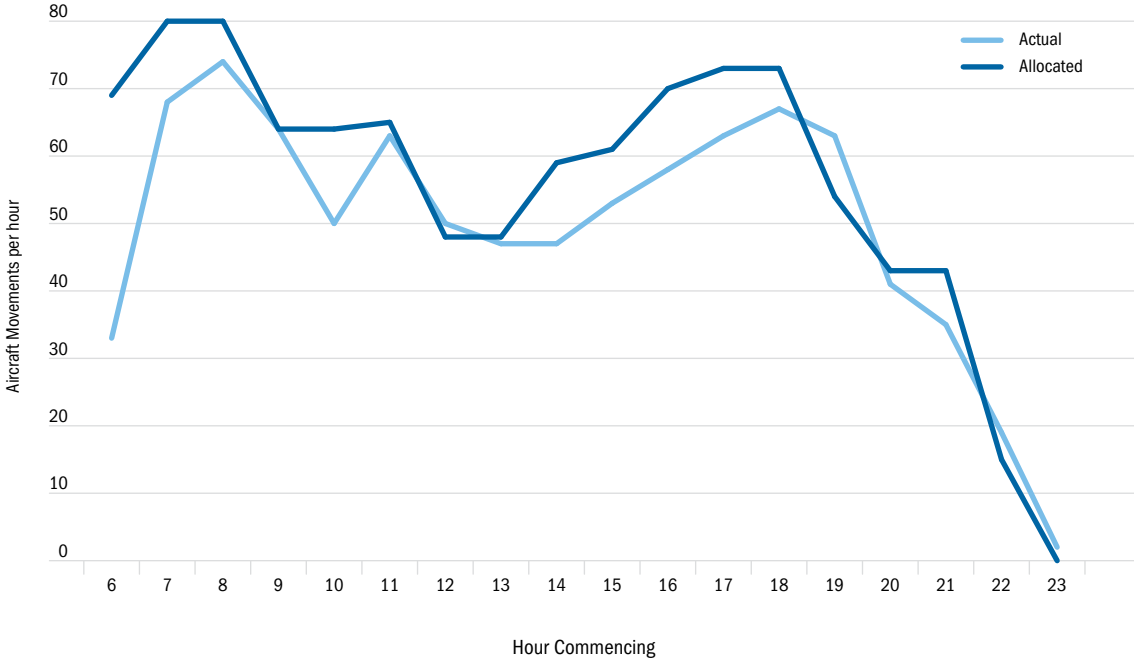
Based on expected demand, it is estimated that by 2027 all slots across the day would have been allocated. Even if operators can adjust schedules to fit available services, it is expected that, based on forecast demand, there will be no slots for new services to access Sydney (Kingsford-Smith) Airport despite approximately 100 aircraft wishing to do so.

Actual movements

In practice, the number of actual movements on a particular day is more commonly lower than the number of allocated slots. To maintain their right to slots, airlines are required to use their allocated slots at least 80 per cent of the time, which takes account of days of disrupted traffic, mechanical failures and a host of other issues which can cause flight cancellations. There is also seasonal variation, such as holiday periods, which can see airlines decrease their operations in certain times of day or on particular routes as the demands of passengers change.

Figure 83 shows a comparison of scheduled and actual movements based on a single representative day.[95] An average of five slots per hour is not used between 7.00am and 11.00pm.[96] However, the cancellations cannot be predicted and there is no practical way to use a slot cancelled at short notice for an alternative service.

Figure 83 Comparison of allocated slots and actual movements, by hour of day, at Sydney (Kingsford-Smith) Airport, 2010



Note: Actual movements reflect the planning day, 12 November 2010. Slot allocations were based on the Friday allocations of the corresponding slot allocation season (northern winter, 30 October 2010 to 26 March 2011).

Source: Airport Coordination Australia and Airservices Australia; Booz & Company analysis.

Peak hour utilisation

Demand for movements in some hours will soon exceed the level which can be allocated under the movement cap. As discussed in the preceding sections, slots in two hours of the morning peak are essentially completely allocated.

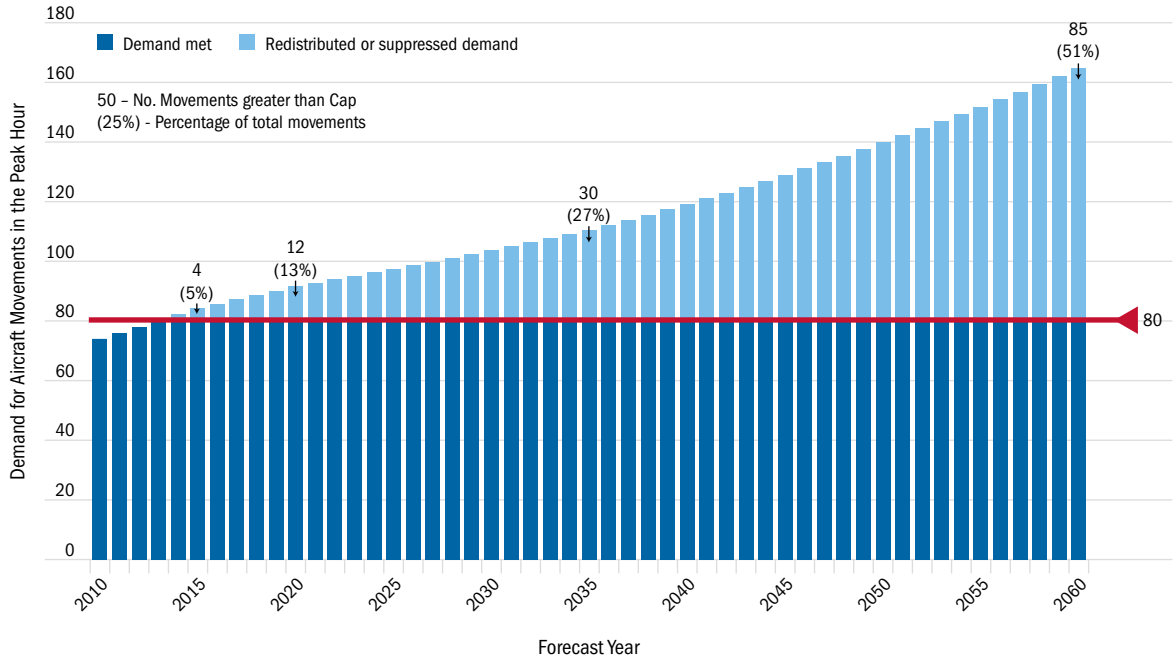
Figure 84 shows the impact of the movement cap on actual movements, against forecast growth rates described in Part Three. Even presuming the gap between allocations and actual movements closes to zero, it is expected that no new services will be able to operate for the peak hour from 2014.[97] By 2015, projected growth in actual movements suggests demand for peak slots will be significantly constrained, increasing progressively over time. These movements will either have to be redistributed to a less preferred time or be suppressed (that is, not operate to Sydney (Kingsford-Smith) Airport at all).

95 Actual movements are based on Airservices Australia data for the planning day (Friday, 12 November 2010). Planned movements are based on allocated slots for a Friday for the corresponding northern hemisphere winter season from Airport Coordination Australia.A planning day is determined usually at around the 30th busiest day to ensure that plans can accommodate the majority of services required without overcatering for peaks such as seasonal holidays.

96 The hour commencing 06:00 was excluded from the average calculation, as the difference between actual and allocated during this hour was 36 movements, which was considered an outlier for the purposes of calculating the average across the operating day.

97 For the planning day used (12 November 2010), this is 8.00am to 9.00am, as shown in Figure 83 (comparison of allocated slots and actual movements).

Figure 84 **Peak hour capacity issues based on expected aircraft movements at Sydney (Kingsford-Smith) Airport, 2010 to 2060**



Note: Figure shows the unconstrained aircraft movement demand in the peak hour, year on year, against the legislated 80 movement per hour cap. Peak hour was identified as occurring between 8.00am and 9.00am, as shown in the hourly movement profile of the planning day, 12 November 2010 (Figure 83 'Actual'). A growth rate was applied consistent with Technical Papers A3 and B3.

Source: Booz & Company analysis.

The lack of available capacity will mean a growing amount of peak demand cannot be met at Sydney (Kingsford-Smith) Airport. Modelling shows that, for the busiest hour (8.00am to 9.00am), an estimated:

- four movements of peak hour demand per day (or five per cent) will not be met by 2015;
- 12 movements of peak hour demand per day (or 13 per cent) will not be met by 2020;
- 30 movements of peak hour demand per day (or 27 per cent) will not be met by 2035; and
- 85 movements of peak hour demand per day (or 51 per cent) will not be met by 2060.

Further, the demand at other hours of the day will be similarly increasing, approaching or exceeding the movement cap.

International airlines proposing new services to Sydney in peak periods will need to consider whether to:

- redistribute a proposed service to non-peak hours, if slots remain available and commercially viable;
- redistribute to other Australian airports;
- go to other airports internationally, representing a loss to the Australian economy (suppressed demand); or
- not offer services at all, again representing a loss to the economy (suppressed demand).

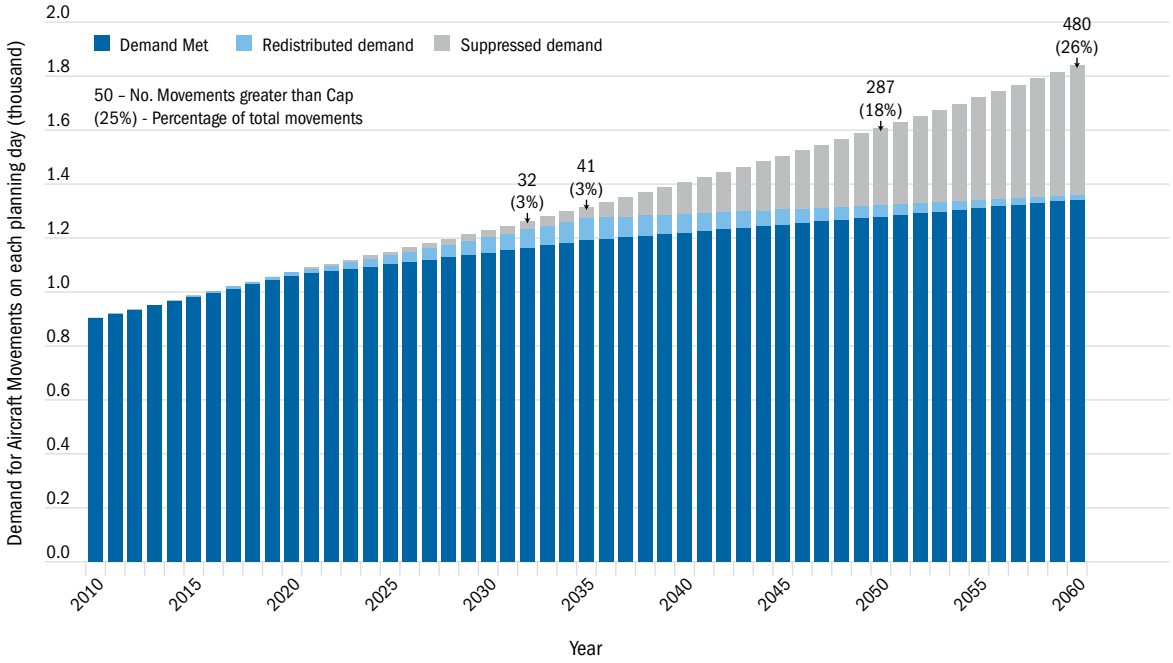
These are commercial options for airlines, but obviously they have an impact on any passenger wishing to fly to Sydney, as they may not be able to do so or, if they do, it is likely to be at a higher cost.

Redistribution and suppression of passenger demand is already starting to take effect as passengers either choose to fly at a different time or not to fly at all, and this will increase in the years ahead as the demand for aircraft movement slots increases. This has a direct link to pricing, with fewer low-cost seats likely to be made available in peak periods.

Existing domestic operators may be able to upgauge aircraft to operate existing slots or reallocate slots within their own holdings across their services to some extent, but they will be unable to introduce additional flights. New domestic operators will not be able to get slots at peak times to inject new competition.

Figure 85 shows the aircraft movements over the entire planning day that will be redistributed and suppressed.[98]

Figure 85 Aircraft movements expected to be redistributed or suppressed on the planning day, 2010 to 2060



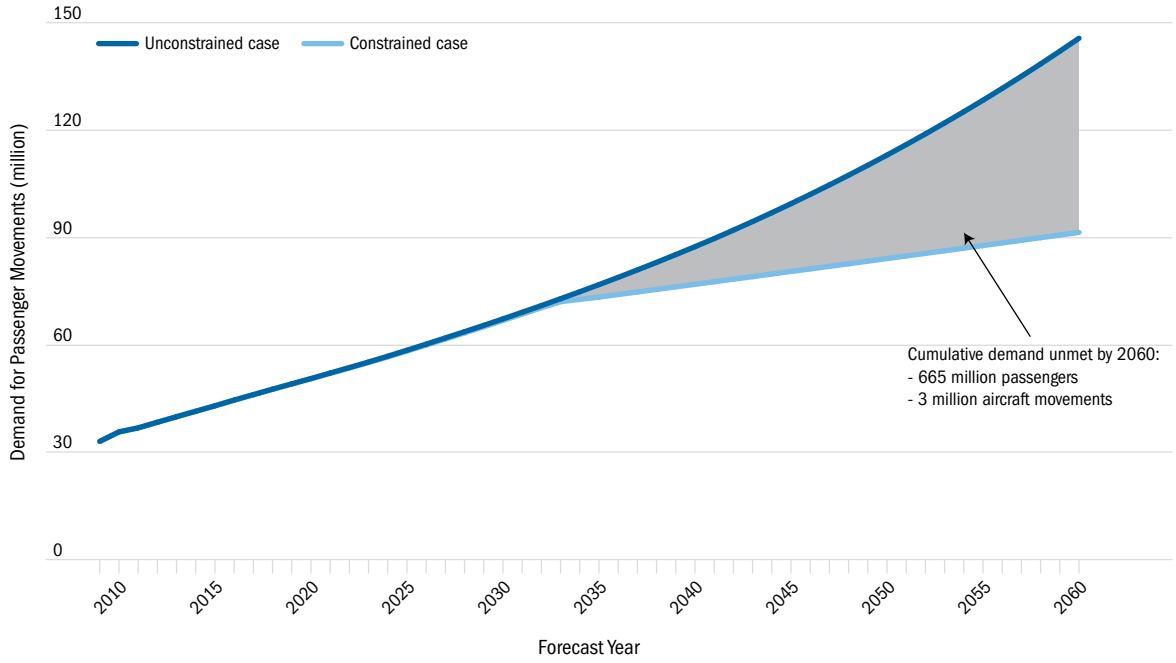
Note: Figure shows the potential redistribution and suppression of services over a planning day as aircraft movements reach the legislated 80 movement per hour cap. A medium level of peak spreading is assumed and a growth rate applied, year on year, consistent with Technical Papers A3 and B3.

Source: Booz & Company analysis.

Assuming airlines opt to operate to Sydney (Kingsford-Smith) Airport, despite the challenges of accessing the airport identified above, the maximum potential redistribution is estimated to occur around the mid-2030s. Figure 86 shows the impact of this.

98 These are aircraft movements that are redistributed or suppressed, not actual passengers.Redistribution and suppression of passenger numbers begin significantly earlier.

Figure 86 **Expected capacity shortfall for passenger and RPT aircraft movements at Sydney (Kingsford-Smith) Airport, 2010 to 2060**



Note: Excludes Military and GA movements. Legislated 80 movement per hour cap applies. Assumes gap between allocated and actual slots (as identified in Figure 83) declines as capacity constraints increase. A 'medium' peak spreading scenario applies, with accelerated aircraft upgauging and load factor changes in the constrained case.

Source: Booz & Company analysis.

By 2035, there is unlikely to be any usable capacity available at Sydney (Kingsford-Smith) Airport. For additional services, passenger growth would be met only by increasing load factors and the upgauging of aircraft (presuming the airport has capacity to meet this).

By 2060 approximately 260,000 RPT aircraft movements per year and 54 million passengers per year will be unable to be accommodated at Sydney (Kingsford-Smith) Airport. This represents a cumulative total of approximately 665 million passengers between 2035 and 2060.

Curfew

There has been a curfew in effect at Sydney (Kingsford-Smith) Airport since 1963. The current curfew was imposed by legislation with bipartisan support in 1995 through the Commonwealth *Sydney Airport Curfew Act 1995*.

The Act and the Sydney Airport Curfew Regulations 1995 regulate movements at Sydney (Kingsford-Smith) Airport between 11.00pm and 6.00am each day. The Act essentially prohibits the operation of large jet aircraft at Sydney (Kingsford-Smith) Airport during this period. There are very limited exceptions.

Flights allowed during the curfew

Small propeller-driven aircraft that meet weight and noise requirements, small low-noise jet aircraft of specific types authorised by the Minister and a limited number of smaller freight aircraft can operate during the curfew.

In addition, a small number of international passenger jet landings are allowed during the 5.00am to 6.00am curfew shoulder provided no more than 24 such movements occur per week

(and no more than five on any one day).[99] This is to cover time differences associated with the northern hemisphere summer scheduling season. Additionally, these jet aircraft must meet the strictest international standards on aircraft noise.

During the curfew shoulder period, all aircraft must use the main north–south runway (take off from runway 16R and land on runway 34L) to ensure their operations are over the water.

In exceptional circumstances, the Minister may grant dispensations for aircraft to operate when they would not otherwise be allowed to do so. Historically, dispensations have been very limited in number, in line with guidelines. The guidelines set strict criteria for any exemptions that would include the need for a movement during curfew hours for a reason that was outside the operator's control, that could not be foreseen and where no reasonable alternative was open.

The curfew restrictions do not apply in cases of genuine emergency.

Impact of the curfew on capacity

The curfew was introduced to ensure an appropriate balance between protecting the surrounding communities from aircraft noise and enabling economic development of a key piece of infrastructure. The Australian Government has indicated it has no intention to relax the current legislated curfew arrangements.

In relation to international services, the effects of the curfew at Sydney (Kingsford-Smith) Airport need to be considered with the effects of other curfews at point of origin or destination airports. Where curfews apply at the international destination airports as well, the flexibility of an operation to accept different slot times will be heavily constrained. For example, London's Heathrow Airport, a key destination for Australian international traffic, also has a curfew from midnight to 6.00am. There is only a narrow period where aircraft travelling on this route can depart from one airport, stop off en route and arrive before the curfew commences at the destination. The alternative is for airlines to extend ground time for aircraft at either airport, possibly having to park overnight. This will impact on viability of the service, fleet utilisation and aircraft parking requirements.

The shoulder curfew period (5.00am to 6.00am) is only allocated to international flights. This limited access assists in reducing pressure on the International Terminal in the busy 6.00am to 7.00am period, and is tied to the particular requirements of daylight savings time. It is used for the northern summer scheduling periods (that is, the last Sunday in March to the last Saturday of October every scheduling season).

The Long Term Operating Plan

The LTOP was introduced in 1997 to address concerns raised regarding aircraft noise in the context of the operation of the new parallel runway at Sydney (Kingsford-Smith) Airport. Its aim is to achieve a distribution of flights to share noise rather than to allow a concentration of aircraft noise under one set of flight paths.

The LTOP was developed against the following terms of reference:

- the safety of aviation operations is not to be compromised;
- all three runways at the airport, including the full length of the east-west runway, are to be available for use by jet and propeller aircraft;
- maximum use is to be made of flight paths over water and non-residential areas;

99 Quota set by regulation.

- where it is not possible for flight paths to be over water, the objective is to operate the airport to ensure that the over-flight of residential areas is minimised and noise arising from such flight paths is fairly shared; and
- the capacity of the airport is to be maintained to the maximum practicable extent consistent with noise-sharing objectives, but the programmed movement rate is not to exceed 80 movements per hour.

Usage rates for the LTOP

When the LTOP was introduced, noise-sharing targets were identified for the amount of aircraft movements to the north, south, east and west of the airport. The plan is designed to place as many flights as possible over water (55 per cent to the south over Botany Bay) and for the remaining flights to be shared between the other three directions as equally as operationally feasible (west, 15 per cent; north, 17 per cent; and east, 13 per cent).

ATC nominates the runway in use

ATC is responsible for nominating the runway in use at Sydney (Kingsford-Smith) Airport for all hours of the day. The key requirement is to ensure the safety of operations but also, to the extent practicable, the use of the runway (or combination of runways) that best achieves the noise-sharing objectives.

Under the LTOP, when making runway selections each day, the ATC must ensure, subject to safety and weather conditions:

- as many flights as practical come and go using flight paths over water or non-residential areas where aircraft noise has the least impact on people;
- the rest of the air traffic is spread or shared over surrounding communities as fairly as possible; and
- runway modes change throughout the day, so individual areas have some break (or respite) from aircraft noise on most days.

Runway mode selection

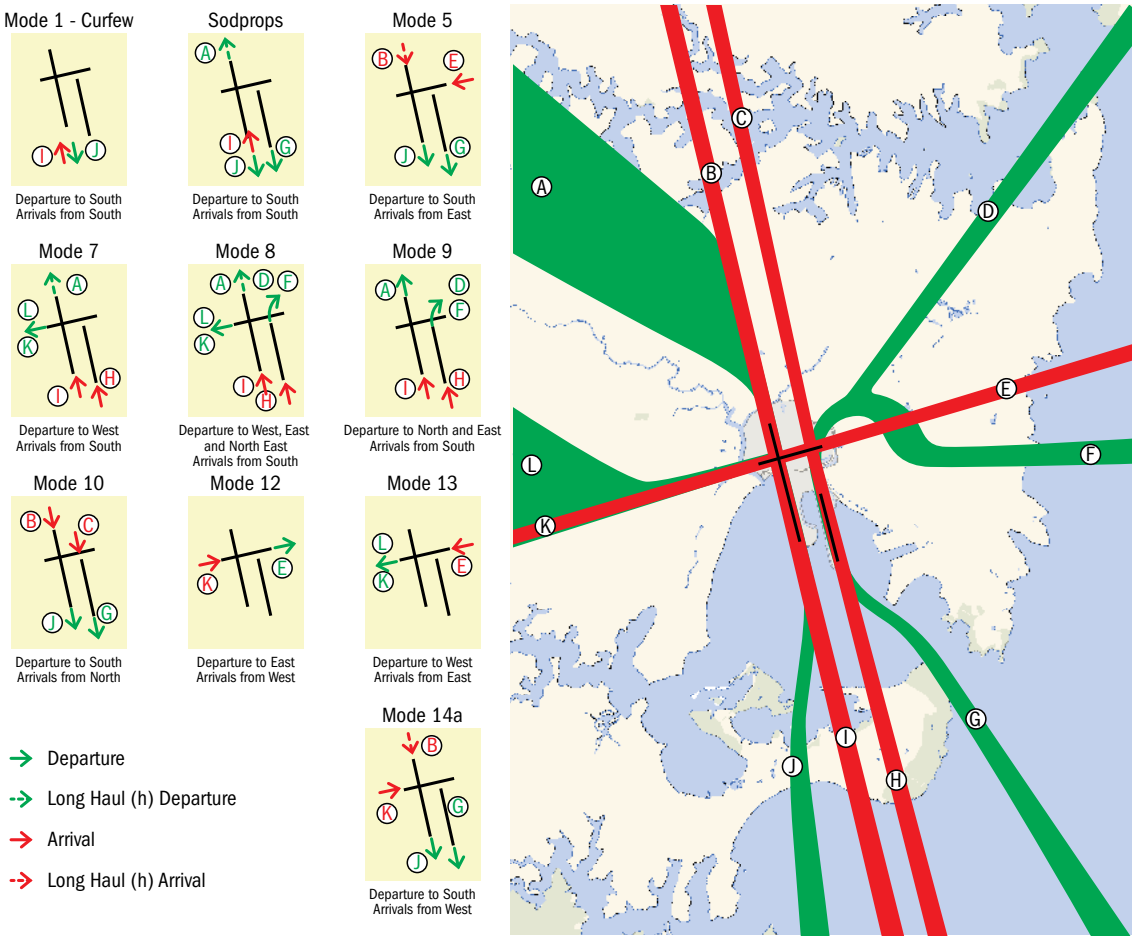
While considering the ability to share noise, the choice of runway mode of operation is affected by the weather conditions and/or the level of traffic demand at any point in time. If the weather and traffic conditions permit then the preferred noise-sharing runway for the particular time of day will be nominated by ATC.

The wind strength and direction are the primary considerations in selecting a safe runway operating mode, but the cloud base and visibility affecting final approach can also be a determining factor. For example, for safety reasons:

- in selecting the runway in use, ATC cannot nominate a runway where the downwind will exceed five knots or the crosswind will exceed 20 knots. Nominating a runway with a higher downwind or crosswind component could compromise safety;
- when the crosswind on the north-south runways exceeds 20 knots, the east-west runway will have to be nominated by ATC and the airport's movement rate will be significantly reduced due to single runway operations;
- ATC is required to nominate runway 16R (assuming wind speed and direction is suitable) for arrivals when the visibility reduces below 1,500 metres due to the requirement for approach lighting facilities (availability of High Intensity Approach Lighting on 16R); and

- LTOP SODPROPS Mode (Simultaneous Opposite Direction Parallel Runway Operations) is unable to be used whenever the cloud base is below 3,000 feet or visibility is less than 10 kilometres.

Figure 87 **Sydney (Kingsford-Smith) Airport – runway modes of operation**



Source: Airservices Australia.

Traffic demand and the LTOP limitations

There are ten runway modes of operation as shown in Figure 87. The most 'noise preferred' LTOP runway modes are generally the least able to process large volumes of traffic. The parallel runway modes (Modes 9 and 10) are the most efficient traffic modes providing parallel runway capacity and need to be used for significant parts of the day to meet traffic demand. Capacity is reduced under the other modes, which involve either single runway or cross-runway operations.

As traffic demand builds during the course of the day, different noise-sharing runway modes are used to manage demand efficiently – that is, without excessive delay – and to manage aircraft flight paths in an environmentally sensitive manner. The LTOP noise-sharing runway modes are retained in use until an excessive delay trigger point is reached. When arrival traffic demand triggers 20 minutes of airborne holding for an individual aircraft, ATC will switch to a more efficient runway mode of operation to avoid further build-up of cumulative delay to the traffic stream. In effect, this means that the switch from the preferred noise-sharing runway modes to the most efficient parallel runway modes occurs when a movement rate of approximately 55 or more is reached to avoid excessive delay.

Reduced scope to operate the LTOP

Scheduled movement levels are approaching 80 per hour in the peak hours on some days. As overall air traffic demand increases, it is expected peak demand will spread into other parts of the day. Scheduled movements already exceed 55 per hour during peak shoulder periods. Actual movement numbers may also exceed 55 per hour in practice during other periods if a backlog of demand builds up – either from an adverse event such as a storm or from delayed peak traffic.

The opportunity for using the 'noise preferred' LTOP runway modes of operation (single runway operation for either landings or take-offs except for heavy category aircraft) will continue to reduce, requiring longer usage of the parallel runway mode of operation to keep up with demand.

The LTOP performance measure is based on 'runway end usage'. Airservices Australia reports on runway activity for a period aggregated by number of movements, or by time, over the four quadrants – south, north, east and west.

Table 13 below shows, for the period 1998 to 2010, the percentage of average runway usage time for the four directions compared to the LTOP target.

Table 13 Usage of the LTOP runway ends

Direction	Target (per cent)	Actual Usage (per cent)
South	55	51
North	17	28
East	13	14
West	15	7

Source: Airservices Australia.

Assessments undertaken for the Sydney Airport Community Forum (SACF) have found the LTOP targets are unable to be met with the levels of traffic demand now presenting at the airport.

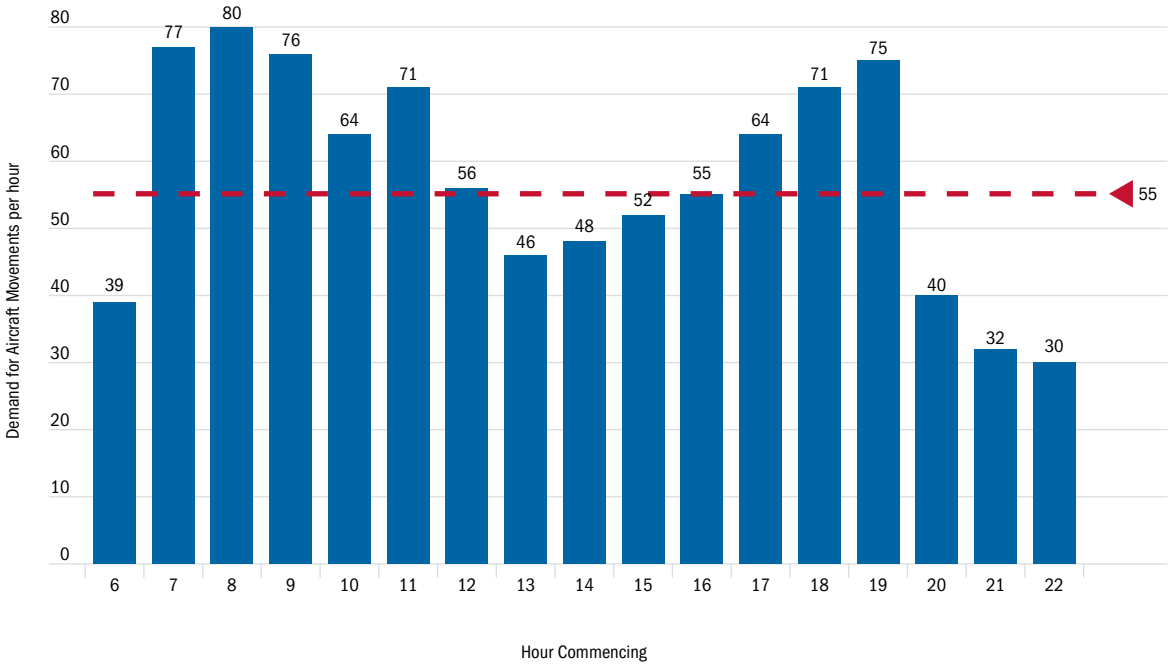
Airservices Australia analysis on the effect of forecast demand on the LTOP suggests:

- there are already some issues with utilising the full range of the LTOP modes (of the 10 modes, four are either currently experiencing limits or will do prior to 2015); and
- utilisation of the LTOP noise-sharing modes will completely reduce over time with demand growth.[100]

It is expected within a few years the ability to share noise will be limited to a few hours of the day. Figure 88 shows that, by 2015, nine hours of the day will have scheduled demand above 55 movements per hour (the point at which the noise-sharing modes cease to be viable in managing air traffic demand) and four hours have scheduled demand at or just below 55 movements per hour. With a small number of flights delayed in the morning peak, this will see these hours also become unviable for noise sharing.

100 Further information can be found in Technical Paper B4.

Figure 88 **Expected forecast aircraft movements at Sydney (Kingsford-Smith) Airport, by hour of the day, 2015**

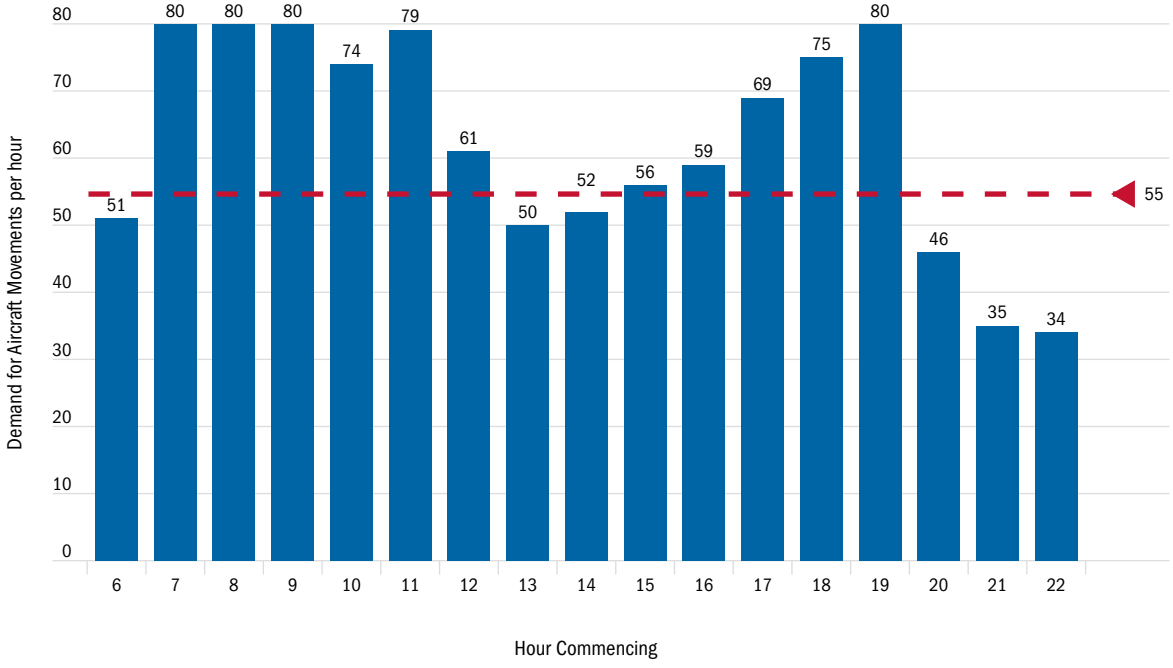


Note: Medium peak spreading assumed.

Source: Constrained planning day forecast developed by Booz & Company; applied to demonstrate LTOP constraints.

As aircraft movements increase at Sydney (Kingsford-Smith) Airport, this will increase peak spreading as more and more aircraft movements, unable to operate in peak periods, start operating in the middle of the day. Figure 89 shows the expected forecast aircraft movements by hour of the day for 2020 against the 55 per hour movement level for the LTOP noise sharing.

Figure 89 **Expected aircraft movements at Sydney (Kingsford-Smith) Airport, by hour of the day, 2020**



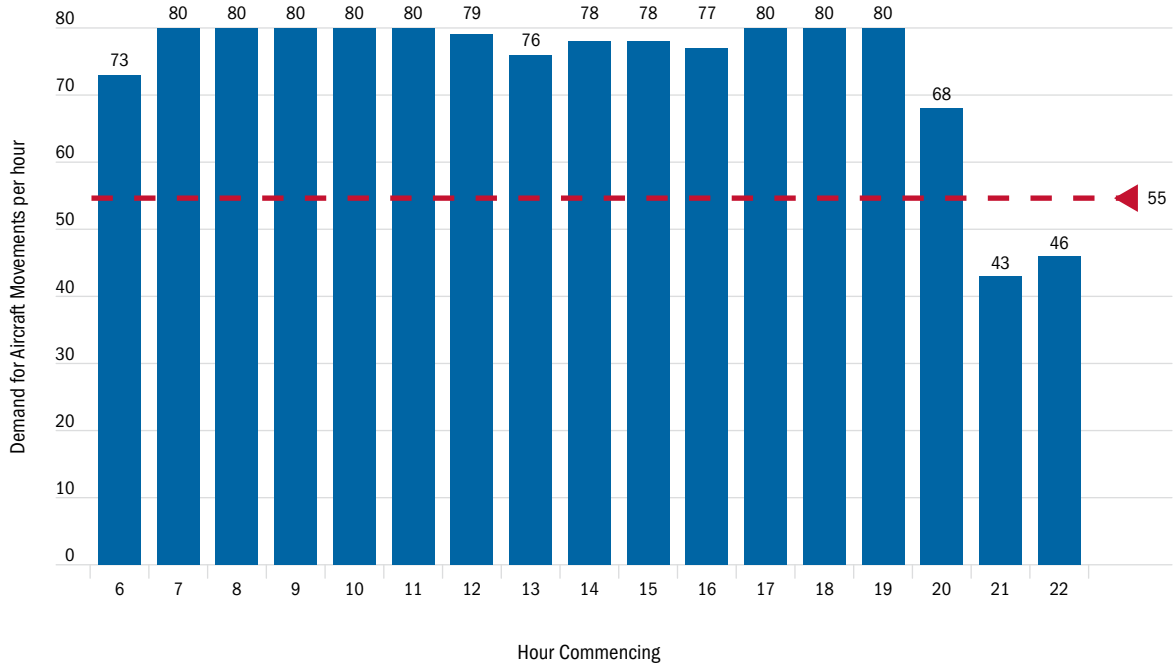
Note: Medium peak spreading assumed.

Source: Constrained planning day forecast developed by Booz & Company; applied to demonstrate LTOP constraints.

By 2020, scheduled movement levels in all the key hours of the day will be above the 55 movements per hour line or approaching it. This means that, effectively, by 2020 the noise-sharing modes will only be able to be operated for a small number of hours after 8.00pm each weekday, and on weekends.

Figure 90 shows the expected planning day profile in 2035. Only two hours in the late evening will operate less than 55 movements.

Figure 90 Expected forecast aircraft movements at Sydney (Kingsford-Smith) Airport, by hour of the day, 2035



Source: Constrained planning day forecast developed by Booz & Company; applied to demonstrate LTOP constraints. Medium peak spreading assumed.

Weather

Sydney (Kingsford-Smith) Airport is sometimes affected by the passage of weather fronts and strong winds. These can produce conditions where safety requires greater spacing between aircraft conducting instrument approaches, slowing the rate of arrivals. When winds exceed 20 knots and, particularly, when they are strong westerly winds (affecting the operation on parallel runways), Airservices Australia adjusts the runway operating patterns, resulting in the operation of approximately 55 movements per hour (or less).[101] It is estimated this occurs for some period on approximately 125 days per year. Thunderstorms also curtail the airport's operations for a few hours per month, particularly in the summer months.

Airservices Australia estimates that approximately 50,000 movements per year can be lost to weather conditions. This, in effect, reduces the theoretical maximum capacity of the airport from 496,000 movements per year to a capacity of 446,000 movements (although this will be difficult to achieve, as movements are unlikely to be evenly distributed either throughout the week or across a day on all days).[102]

101 Airservices Australia advises with particularly severe events this can result in a reduction of less than 40 movements per hour for approximately eight days.
102 Further information can be found in Technical Paper B5.

Surface transport

Efficient land transport access is a crucial dimension of the operational capacity at Sydney (Kingsford-Smith) Airport. Road congestion around the airport precinct has the potential to prevent full capacity of aviation assets being realised. The full Transport for NSW study can be found at Technical Paper C2.

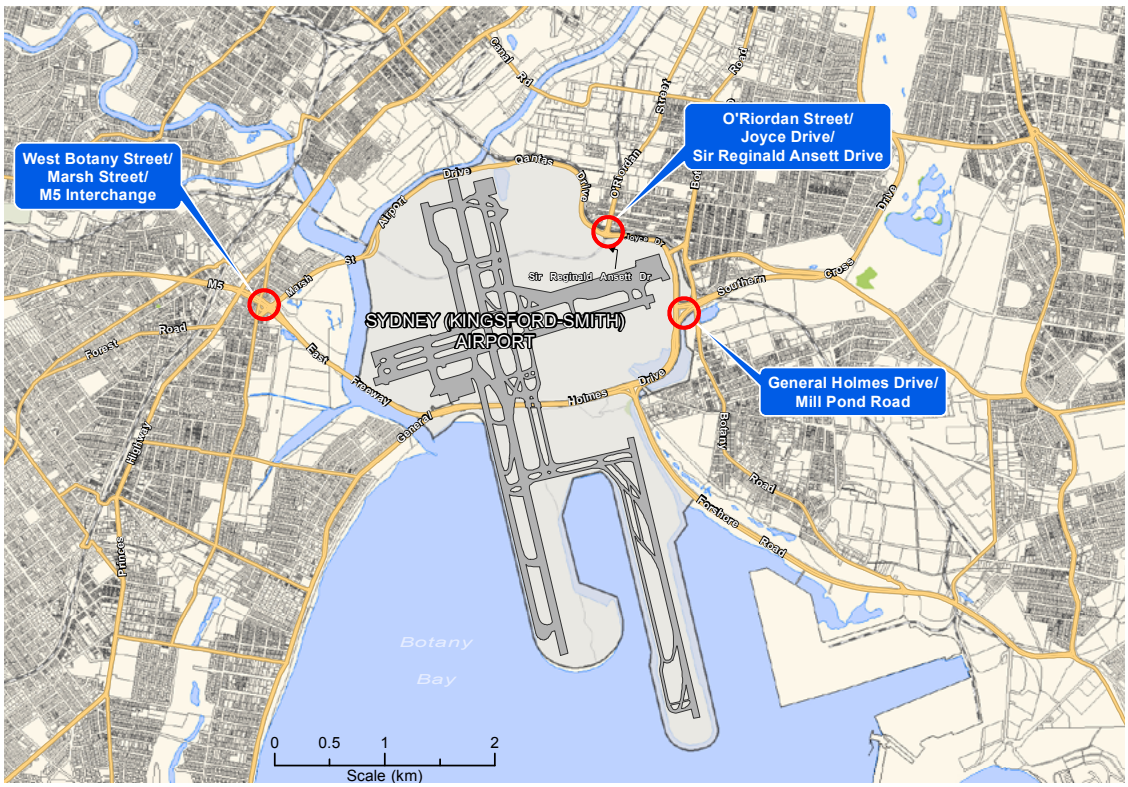
Sydney (Kingsford-Smith) Airport has the advantage of close proximity to Sydney's CBD, making it attractive and accessible for passengers, and especially business travellers. However, it is also at the juncture of a number of key roads and motorways used by commuters accessing the city and forms part of the commercial and freight route between the airport and Port Botany.

Infrastructure Australia and Infrastructure NSW have identified this area of work as a priority project. A coordinated land use and transport approach is essential to the whole triangle between the CBD, Sydney (Kingsford-Smith) Airport and Port Botany.

Surface transport to access Sydney (Kingsford-Smith) Airport

The road and rail network in the immediate airport precinct is presented in Figure 91.

Figure 91 Road and rail network around Sydney (Kingsford-Smith) Airport, 2010



Source: Australian Department of Infrastructure and Transport.

In terms of road access, Sydney (Kingsford-Smith) Airport is served by Southern Cross Drive to the CBD and the M5 East motorway to the west and south-west. The M5 East carries the highest volumes of traffic. The M5 East is at, or near, capacity for large parts of the day and currently carries more than 100,000 vehicles per day. Approximately 10 per cent are heavy vehicles (this level is greater than 10 per cent during some times of the day). The impact of heavy vehicle trips on capacity is high, particularly due to the steeper gradients in the westbound direction (such as for heavier trucks leaving Port Botany).

The Eastern Distributor, Southern Cross Drive and General Holmes Drive provide access to and from the CBD, the north and the east. These roads are also prone to high levels of congestion, particularly in the morning and afternoon peaks.

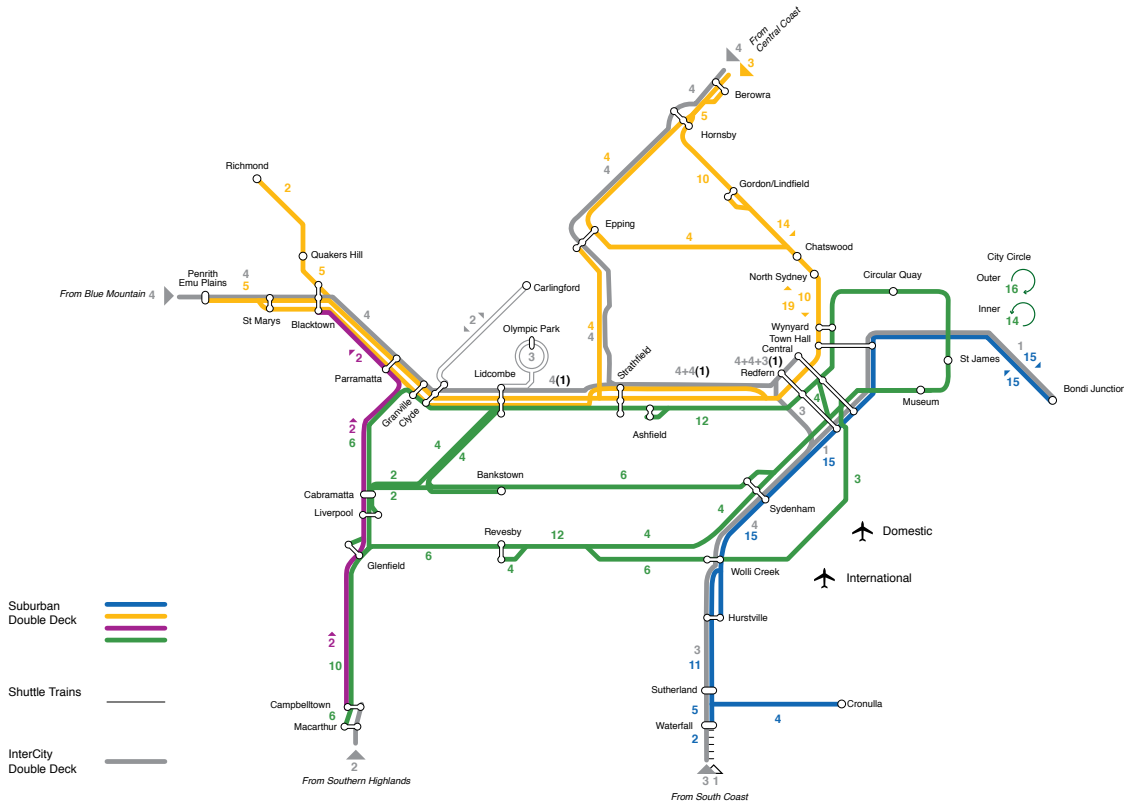
Other significant local roads are Marsh Street, the Princes Highway, Airport Drive (currently part of the airport site leased from the Commonwealth by SACL), Qantas Drive, O'Riordan Street, Botany Road, Joyce Drive, Wentworth Avenue and Millpond Road.

The airport rail corridor connects Macarthur and Revesby with the CBD along the East Hills Line. Currently eight trains per hour run through the airport to the city during peak times. The East Hills Line interchanges with the Eastern Suburbs Line at Wolli Creek, and passes through the airport to the city. Trains then typically (from an operational perspective) continue out of the City Circle down the South Line to Lidcombe.

There are three stations in the vicinity of Sydney (Kingsford-Smith) Airport – International Terminal, Domestic Terminal and Mascot.

Figure 92 shows the simplified train paths on the CityRail network in the morning peak. Only the paths and directions of the CBD-bound trains are shown, except where indicated for the City Circle. The number of trains per hour during the peak is indicated beside each line.

Figure 92 The airport rail line in the CityRail heavy rail network



Note: This diagram represents the 2009 operating plan to be consistent with the modelling and capacity analysis conducted for the Joint Study, and not the most recent timetable.

Source: Transport for NSW.

Trains on the airport rail line operate from Macarthur or Revesby and travel through the City Circle via St James then down the south line to Ashfield and Granville (shown in green). The network has capacity for up to 20 trains per hour through this sector of the rail network, although network enhancements may be required to achieve this on the airport line section. The City

Circle has capacity for 20 trains per hour in each direction and currently the eight airport trains share this capacity with trains from Granville and Bankstown.

Of the current eight trains per hour from the airport to the CBD during the peak, four originate in Macarthur and four originate in Revesby. The airport rail line operates below capacity, on average, throughout much of the day. Trains originating in Macarthur are heavily loaded during the morning peak hour (7.30am to 8.30am). Revesby starters operate with smaller loads during the morning peak and throughout the day. The Revesby starters provide the best opportunities for growth in the morning peak for CBD-bound airport passengers.

However, none of the trains accessing the airport are dedicated airport services. They do not run between approximately 12.00 midnight and 5.00am, impacting on shift workers who may commence or complete work in that period. Nor do they provide facilities such as luggage racks, which meet the needs of air travellers, particularly those with luggage.

Airport user demand for surface transport

Airport accessibility, at both the points of departure and arrival, plays a significant role in a passenger's decision to use an airport. Accessibility takes into account the movement from the airport terminal to the person's destination (a hotel, office, a home of a relative or friend) and, conversely, the movement from the origin of a person's journey to the airport terminal.

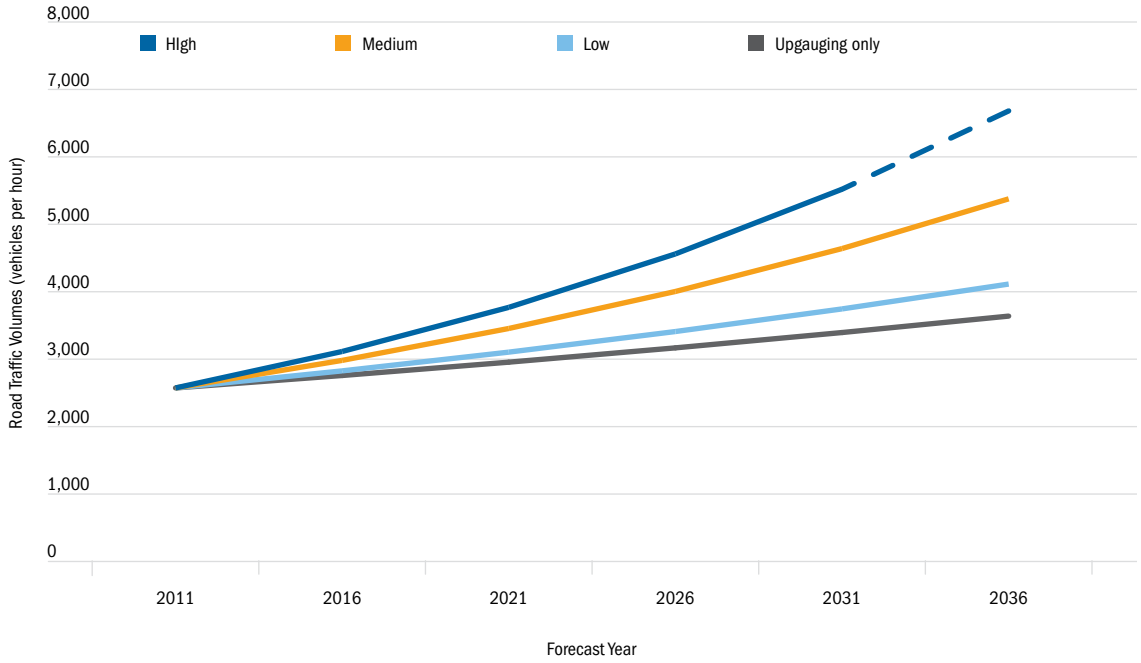
On a typical weekday, there are around 140,000 surface transport trips to and from Sydney (Kingsford-Smith) Airport. This includes an average of 100,000 movements by arriving and departing passengers each day. There is also an estimated 12,000 to 14,000 'meeters and greeters'[103] who either pick up or drop off passengers or travel separately to meet and greet them; and an estimated 16,000 people employed at the airport with between 9,000 and 12,000 employees working on the site on an average day.[104] This suggests an average between 42,000 and 52,000 surface transport trips are undertaken each day by the latter two categories as they travel to and from the airport.

Currently, about 36 million air passengers use Sydney (Kingsford-Smith) Airport each year. In the medium term, the forecasts undertaken for this Report (described in Part Three) estimate unconstrained RPT passenger demand will reach around 76.8 million passenger movements by 2035. This suggests surface transport infrastructure will need to accommodate 200,000 surface transport trips per day. By 2060, constrained demand is estimated to reach 91.4 million passenger trips per year, requiring around 250,000 surface transport trips per day.

Figure 93 shows the total number of vehicles per hour in and out of the airport precinct in the morning peak. This shows the number of surface transport trips will be higher under SACL passenger projections compared with the constrained demand projections of this Report.

103 SACL, *Airport Ground Travel Plan*, 2006.
104 SACL, *Airport Ground Travel Plan*, 2006.

Figure 93 **Expected demand of inbound traffic volumes at the Domestic Terminals under four growth scenarios, 2011 to 2036 (morning peak)**

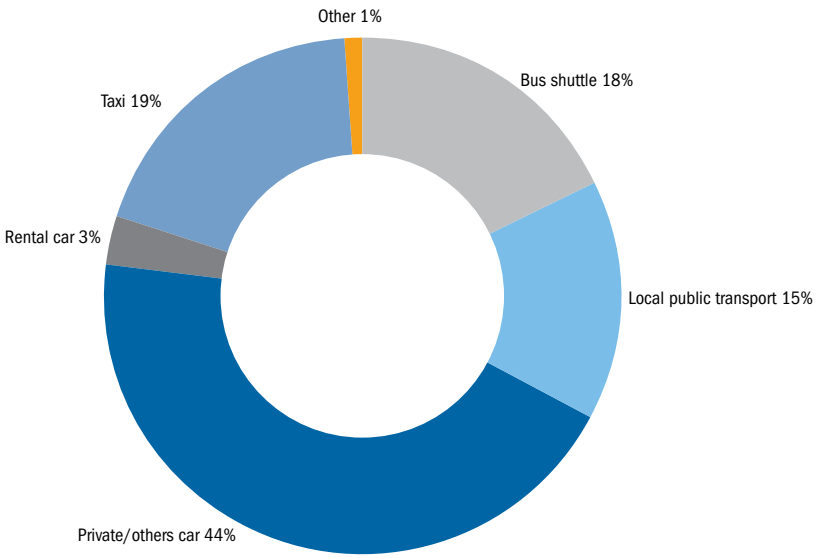


Source: Transport for NSW, based on SACL Sydney Airport Master Plan 2009, Booz & Company annual domestic passenger growth forecasts, and Booz & Company analysis of aircraft movement and average seat capacity 2010–2035 in the 8.00am to 9.00am period.

Passenger mode usage

Figure 94 presents estimates of the surface transport mode split for passenger access to the airport, developed by combining mode share data from various sources and time periods.[105] It indicates 44 per cent of ground access to the airport was by private car; around 19 per cent of passengers took a taxi (or chauffeur-driven hire car); 18 per cent took a shuttle bus (including mini and charter bus); while around 15 per cent used public transport (public bus or rail) and three per cent drove a rental car.

Figure 94 **Surface transport mode share for passenger access to and from Sydney (Kingsford-Smith) Airport, 2005 to 2009**



Source: BITRE analysis of Tourism Research Australia 2005–2009 NVS, IVS and independently commissioned survey data.

105 Further information on aviation users can be found in Technical Paper A2.

Mode split varies across different types of passengers. According to IVS data, 32 per cent of international visitors to Australia use private or company cars to travel from Sydney (Kingsford-Smith) Airport to their first destination (hotel, relative's or friend's residence, or an office). Another 27 per cent used a taxi or were driven in a hire car and three per cent used a rental car. About 21 per cent used chartered or a hotel shuttle bus and another 12 per cent used public transport. In contrast, the majority of Sydney region resident passengers accessed the airport using either their own car or a friend's or relative's car.

For international visitors as well as Sydney region residents, the majority of trips to and from the airport are not by public transport (bus or rail). Analysis undertaken by SACL in collaboration with the NSW Government suggested that, in 2006, 90 per cent of passenger trips to the airport were by road, with 10 per cent by train and two per cent by public bus. This is a similar public transport and rail mode share for all trips (including staff and meeters and greeters), with 2006 estimates showing 89 per cent of total trips to the airport were by road, with 11 per cent by train and four per cent were by public bus. While there are estimates the rail mode share could now be closer to 17 per cent, it remains a relatively low proportion of total surface transport trips.[106]

The Productivity Commission has linked the current low usage of rail to access Sydney (Kingsford-Smith) Airport in part to the high price of tickets.[107] Users of the airport stations must pay a 'station access fee' of $11.80 per adult in addition to the standard one-way, single fare of $3.20 (total one-way fare of $15). It is important to note that the surcharge varies for single-trip, weekly and monthly rail tickets. In particular, the total surcharge paid per weekly ticket (likely to be purchased by airport staff) is significantly lower per trip than that paid for a return or single trip. The station access fee, which is retained by the private station operator (Airport Link Company), was part of the terms and conditions agreed to by the then NSW Government when it commissioned the construction of the line.

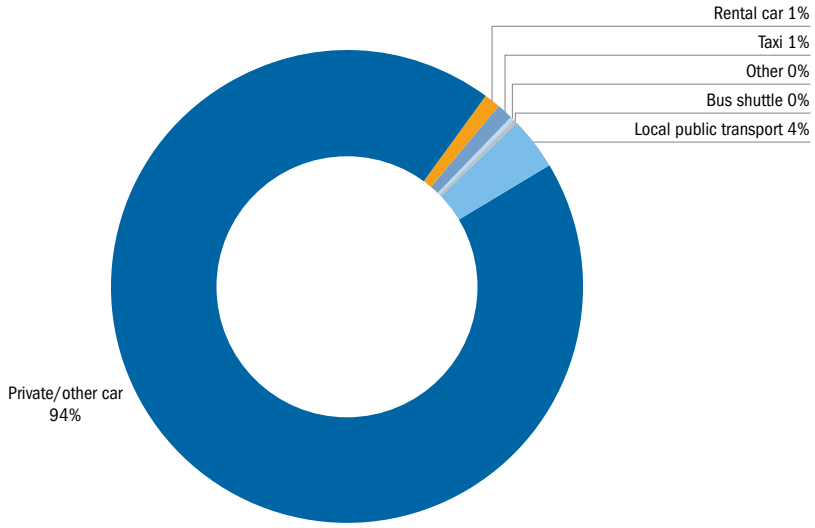
Just as important as the fee structure is the capacity, service quality and flexibility of travel offered by the rail access to the airport. The rail service needs to be able to offer peak demand with a quality of service for airport travellers which meets airport user requirements.

Meeters and greeters mode usage

Figure 95 shows meeters and greeters overwhelmingly use their own car to access the airport (94 per cent). The only other significant transport mode for meeters and greeters was public transport (four per cent).

106 PwC and High Range Analytics analysis based on Sydney Strategic Travel Model (STM) RCZ modelling mode shares adjusted with other travel demand information, 2011.
107 Productivity Commission, Economic Regulation of Airport Services Draft Report, August 2011.

Figure 95 **Surface transport mode share for meeter and greeter access to or from Sydney (Kingsford-Smith) Airport, 2010**



Source: BITRE analysis of independently commissioned survey data.

Airport staff

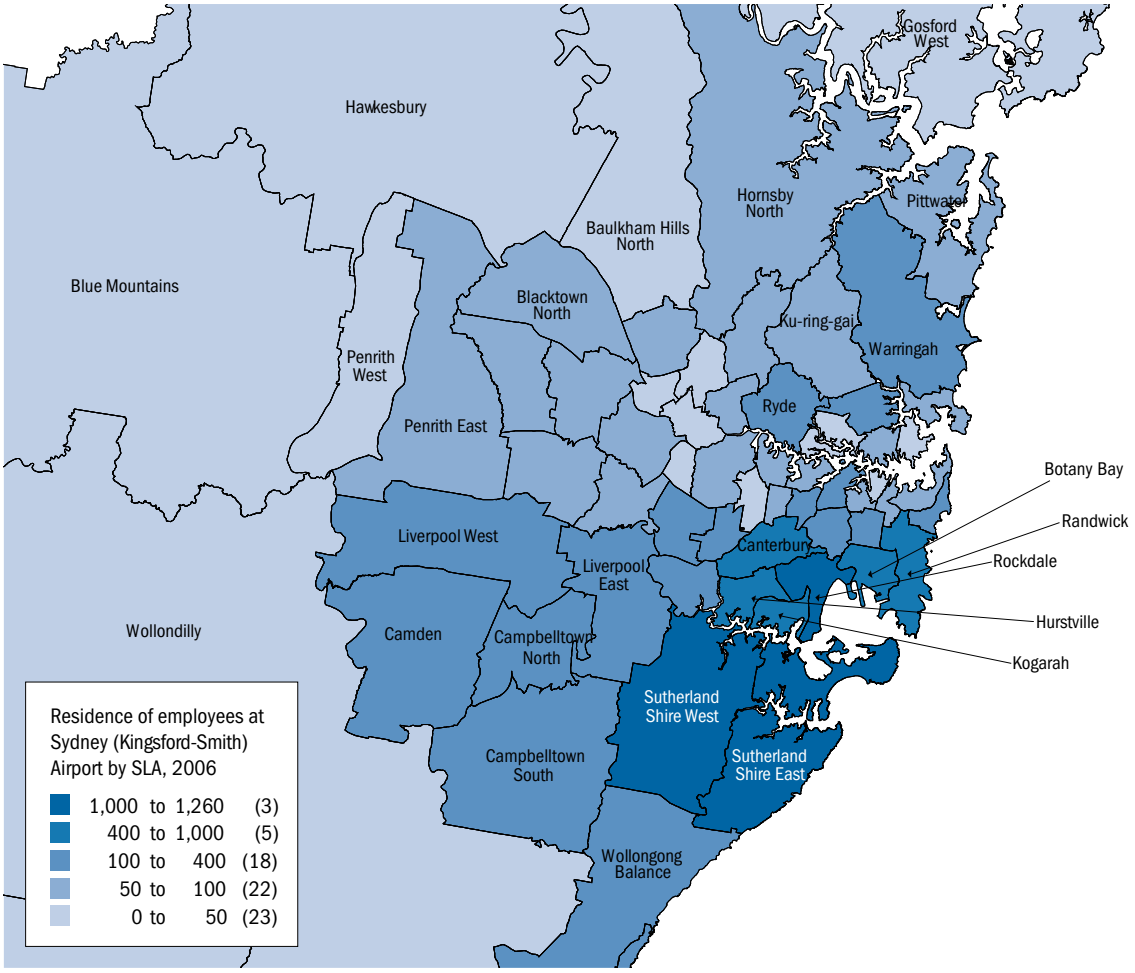
There are 16,000 jobs estimated to be located on site in total, with between 9,000 and 12,000 employees working there on an average day.[108] The ABS 2006 *Census of Population and Housing* indicated airport employment would increase a total of 11 per cent between 2006 and 2011. This suggests the total number of employees has not increased markedly in recent years.

Airport employees operate in shifts, with some commencing as early as 3.00am to meet the demand for aircraft arrivals at 6.00am, and some extending beyond midnight. Meeting the land transport needs of airport employees presents additional challenges to a typical commercial centre due to the extended hours of operation.

The majority of Sydney (Kingsford-Smith) Airport employees (74 per cent) live in four key planning subregions of the Greater Sydney Metropolitan Area – South (which is dominant, contributing 45 per cent of employees), East (which includes the airport and contributes 12 per cent), West Central (nine per cent) and South West (seven per cent). This is illustrated in Figure 96. A substantial proportion of Sydney (Kingsford-Smith) Airport staff is sourced from just three Statistical Local Areas (SLAs) – Rockdale, Sutherland Shire East and Sutherland Shire West – each of which contribute about 10 per cent of Sydney (Kingsford-Smith) Airport employees and belong to the South subregion of Sydney.

108 SACL, *Airport Ground Travel Plan,* 2006.

Figure 96 **Sydney (Kingsford-Smith) Airport employees by Statistical Local Area of residence, Sydney, 2006**



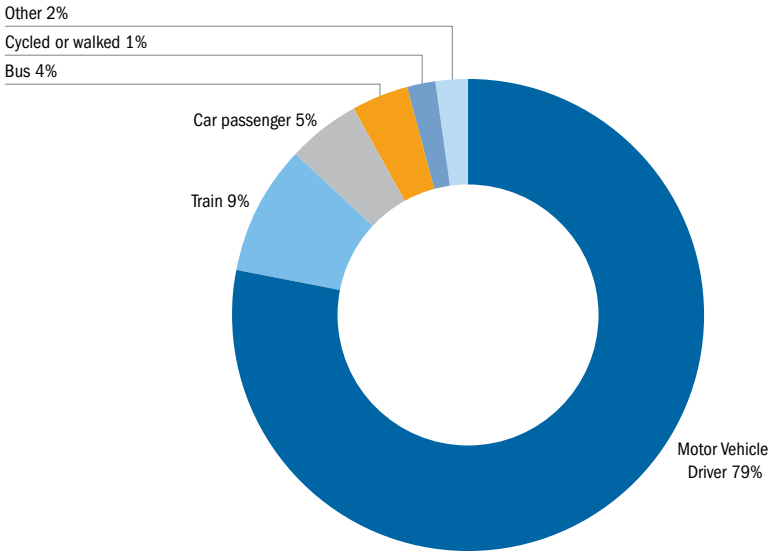
Note: Airport employees are defined as those who had a place of work in travel zones 411, 415, 425 and 581. Excludes those working at Mascot and those living in the Lower Hunter or outside the Sydney Greater Metropolitan Area.

Source: 2006 ABS Census of Population and Housing data, sourced from NSW Bureau of Transport Statistics (BTS).

Information from the ABS *2006 Census of Population and Housing* has been used to build a profile of the transport mode used by Sydney (Kingsford-Smith) Airport employees to journey to work on the day of the Census. As can be seen from Figure 97, the dominant mode of transportation is motor vehicle driving (79 per cent), while a further five per cent journey to work as a car passenger. Only about 13 per cent of Sydney (Kingsford-Smith) Airport employees travel to work by public transport, with nine per cent travelling by train and four per cent by bus. Around 80 per cent of Sydney (Kingsford-Smith) Airport employees work in roles which involve shifts and this work pattern may limit the surface transport choices available to staff.[109]

109 SACL, *Airport Ground Travel Plan,* 2006

Figure 97 **Surface transport mode share for Sydney (Kingsford-Smith) Airport employees, 2006**



Source: BITRE analysis of 2006 ABS Census of Population and Housing data, sourced from NSW BTS.

Results of the Household Travel Survey (the survey undertaken by the NSW Bureau of Transport Statistics) shows that for Sydney as a whole, public transport experienced a two percentage point increase in mode share for the purpose of commuting between 2005–06 and 2008–09. However, private vehicle usage for non-commute trips (education, social, business) has also risen.

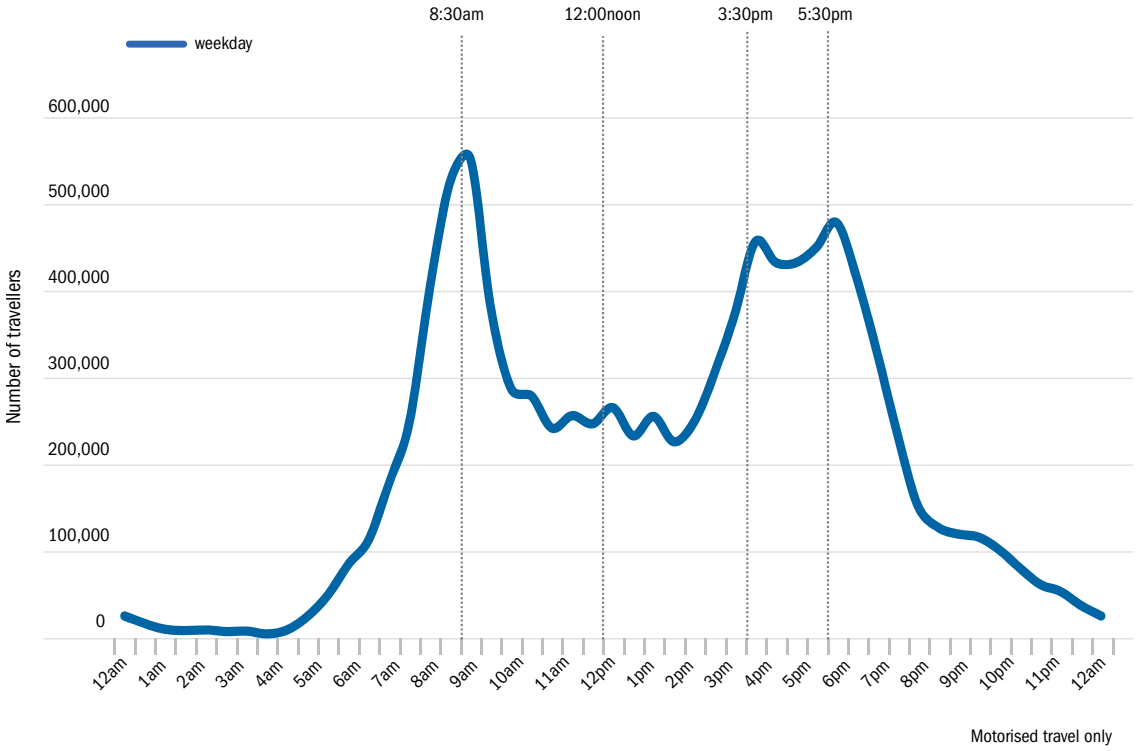
Peak demand

The demand pattern for Sydney (Kingsford-Smith) Airport passenger peak travel follows a generalised travel demand pattern curve. There are four pronounced demand periods: two daily peaks (the morning and afternoon peak), lower demand during the inter-peak period in the middle of the day, and very low activity overnight.

The peak hours for air travel at the airport currently coincide with peak commuter peak hours on the road and rail network. The spreading of the peak in aviation activity will become more apparent for more hours across the middle of the day. Therefore, the aviation peak is expected to continue to coincide with Sydney's road and rail peak in the short to medium term.

Figure 98 illustrates the general demand curve for Sydney's surface transport infrastructure. Aviation activity follows a similar pattern. However, at Sydney (Kingsford-Smith) Airport, the operating curfew restricts travel outside the hours of 6.00am and 11.00pm.

Figure 98 **Demand patterns for land based motorised trips in Sydney statistical division by time of day, average weekday, 2009–10**



Source: Transport for NSW, BTS Household Travel Survey 2009/10, 3-10-1.

Road capacity

Sydney (Kingsford-Smith) Airport is already experiencing capacity pressure on the roads within, and immediately surrounding, the airport precinct. In particular, road traffic congestion in peak periods (broadly 7.00am to 9.00am and 3.00pm to 6.00pm as per Figure 98) around the loop road in the Domestic Terminal precinct is becoming significant.

Over the medium term, congestion and declining service levels are expected on the road network as airport demand increases along with growth in demand for other traffic in the precinct.

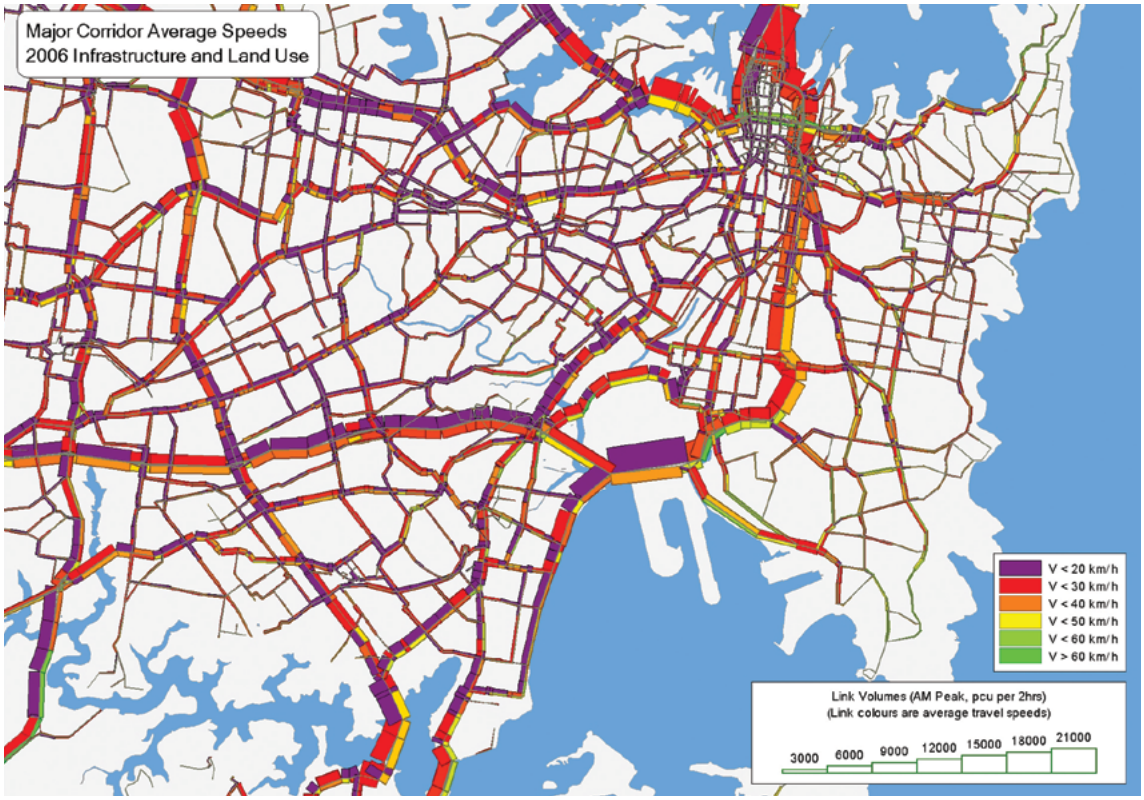
The traffic growth forecast at Sydney (Kingsford-Smith) Airport between 2011 and 2036 will have the following capacity requirements in the am peak:

- **high:** 17,500 vehicles or up to nine lanes of additional motorway capacity to the city;
- **medium:** 13,200 vehicles or up to six lanes of additional motorway capacity; and
- **low:** 5,700 vehicles or up to three lanes or additional motorway capacity.[110]

Figure 99 illustrates the speeds on the roads serving Sydney (Kingsford-Smith) Airport in 2006.

110 Transport for NSW, based on RTA traffic forecasts March 2011, one-hour average of the two-hour peak, 2011–2036.

Figure 99 **Speeds on the roads serving Sydney (Kingsford-Smith) Airport during peak periods, 2006**

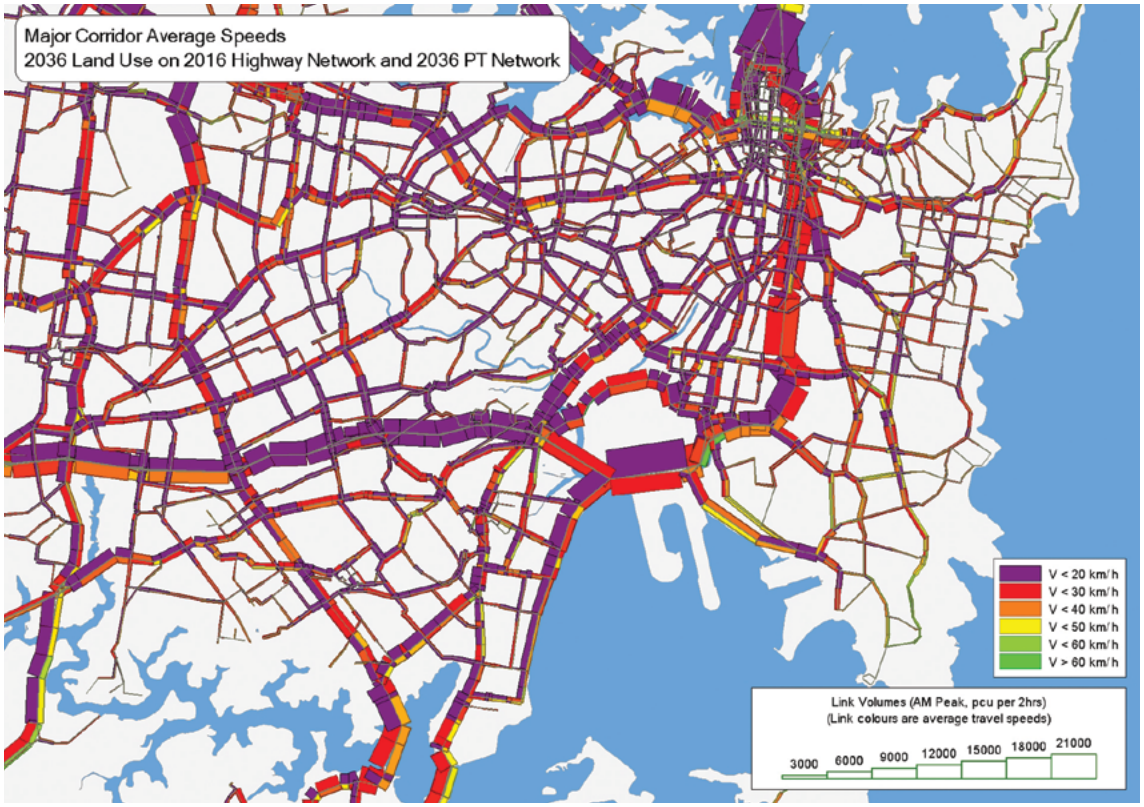


Note: This is Strategic Travel Model output created for the purpose of the Joint Study; it may underestimate the congestion for two reasons: 1) specific junction and link capacities are not finely tuned; and 2) the domestic access road is not included in the calculation. It therefore provides a conservative indication of the quantum of the impact of congestion in the broad vicinity of Sydney (Kingsford-Smith) Airport.

Source: Transport for NSW.

In contrast, Figure 100 shows the speed of roads surrounding the airport in 2036, assuming continuation of the 2006 highway network (such as a 'do minimum' scenario). Many sections of road will experience speeds of less than 20 kilometres per hour in both directions during the two-hour morning peak (the purple sections of road).

Figure 100 **Speeds on the roads serving Sydney (Kingsford-Smith) Airport during peak periods, using 2016 highway network, 2036**



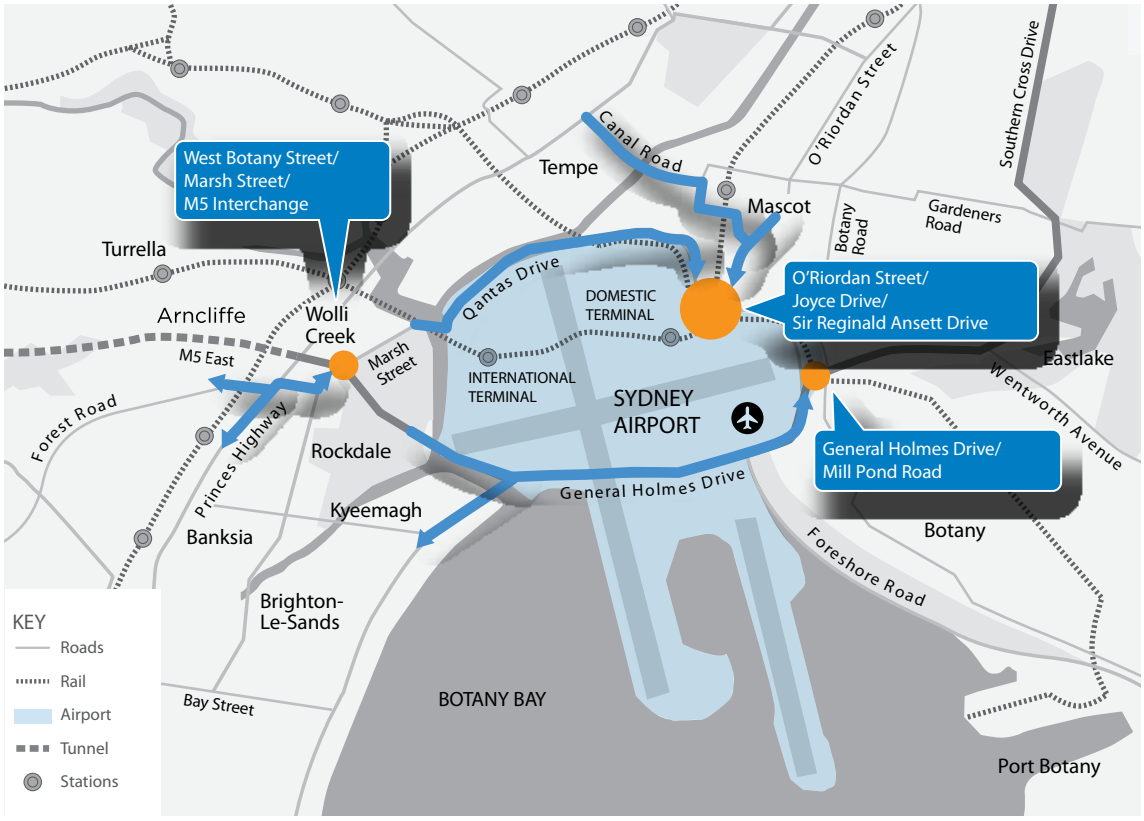
Note: This is Strategic Travel Model output created for the purpose of the Joint Study; it may underestimate the congestion for two reasons: 1) specific junction and link capacities are not finely tuned; and 2) the domestic access road is not included in the calculation. It therefore provides a conservative indication of the quantum of the impact of congestion in the broad vicinity of Sydney (Kingsford-Smith) Airport.

Source: Transport for NSW.

As well as the reduced speed expected in the medium term, under expected patronage growth scenarios at Sydney (Kingsford-Smith) Airport, the airport's three main entrance points to the airport are expected to suffer extensive traffic queue lengths in the morning peak already by 2014, as shown in Figure 101.[111]

111 Modelling by Transport for NSW.Note that the figure is likely to underestimate the extent of queuing, as the lengths were limited by the model area.

Figure 101 **Terminal queue lengths, 2014 morning peak inbound**



Note: The figure shows where traffic queues occur as a result of problems at specific junctions. The arrows show where the queue is too long to measure; it was based on forecast aviation projections in the SACL Sydney Airport Master Plan 2009 and may be superseded. SACL's decision to plan for a major change in terminal function would probably result in markedly different queuing with the potential for some to remain and others to increase. The Steering Committee notes that the NSW Government's submission to Infrastructure Australia seeks funding to allow more detailed modelling of this kind, with different scenarios for terminal function.

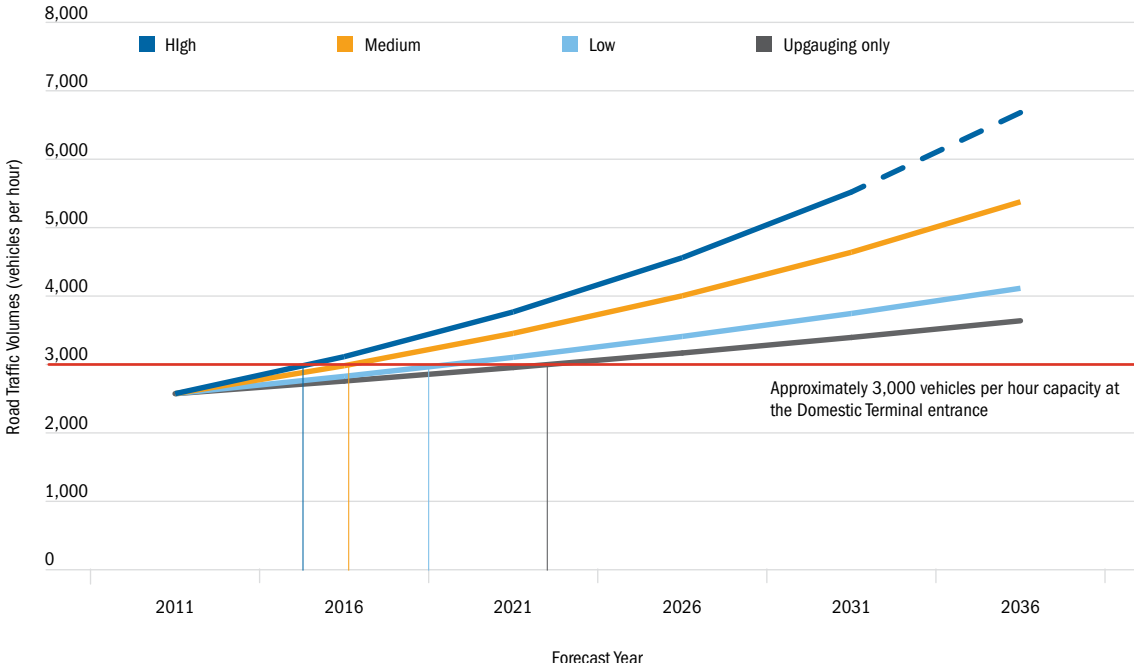
Source: Transport for NSW.

In the morning peak in 2014, the General Holmes Drive queue to the Domestic Terminals will be four kilometres long and the Airport Drive queue to the Domestic Terminals will be over three kilometres long. The queue southbound will stretch the full 2.6 kilometres from the Princes Highway via Canal Road. Other queues extend beyond the illustrated scope of the airport road precinct (as indicated by arrows pointing south to Brighton-Le-Sands.)

The most highly-constrained location in terms of road infrastructure capacity is around the entrance to the Domestic Terminal precinct. The Domestic Terminal loop road has an estimated capacity of 3,000 vehicles per hour. Assuming a medium airport passenger growth scenario, morning peak capacity will be reached in 2017. Modelling of lower and higher growth forecasts indicates it could be as early as 2015 or as late as 2023.

Figure 102 shows forecast traffic to access the Domestic Terminal precinct at Sydney (Kingsford-Smith) Airport and growth in demand for access to the precinct against the capacity of the existing road junctions at the terminal entrance.

Figure 102 **Expected demand of inbound traffic volumes at the Domestic Terminals under four aviation growth scenarios, 2011 to 2036 (morning peak)**



Source: Transport for NSW, based on SACL Sydney Airport Master Plan 2009, Booz & Company annual domestic passenger growth forecasts, and Booz & Company analysis of aircraft movement and average seat capacity 2010–2035 in the 8.00am to 9.00am period.

Nearing this critical point, road users will experience extended delays. Beyond this critical point, the volume of traffic will have exceeded the capacity of the road network, resulting in significant levels of congestion in the morning and afternoon peak periods. The Domestic Terminal road network will reach a level of service quality known as Category F. This category represents the point when road users will experience substantial delays and a near-constant traffic jam, with minimal spacing between vehicles and travel time becoming more unpredictable. This will directly impact on passengers and employees accessing the airport.

NSW Government analysis indicates that morning peak road speeds on key links to the airport already averaged around 30 kilometres per hour in 2006. By 2036 this is estimated to have reduced to below 25 kilometres per hour. Congestion and delays are expected to, in particular, affect northbound links to the CBD, with the average speed in 2036 projected to reduce to 18 kilometres per hour. This means that it could take close to 15 minutes to travel just five kilometres out of the airport precinct. For northbound trips to suburbs such as Surry Hills via O'Riordan Street, it could take up to 40 minutes to travel this same five-kilometre distance out of the airport precinct.[112]

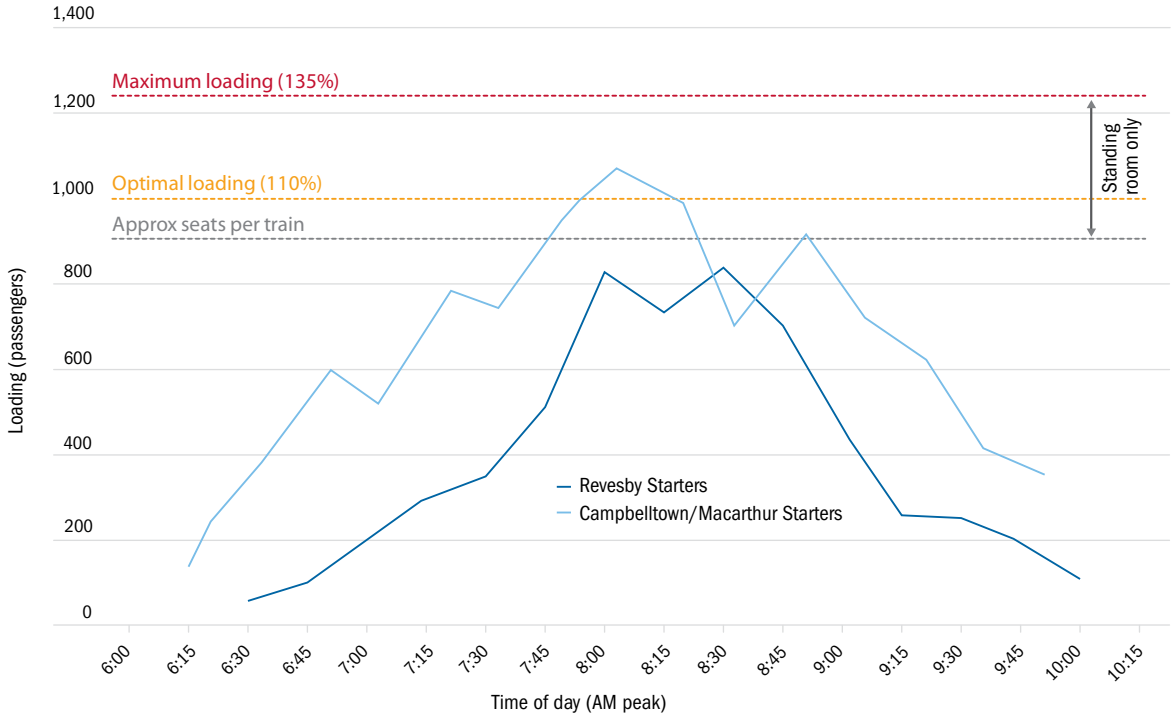
Rail capacity

There is sufficient capacity for growth in the rail corridor under existing arrangements. During the morning peak, the line experiences high passenger demand for through-travel from South West Sydney to the CBD and other employment locations in the Global Economic Corridor. Despite the high peak rail demand, there is still seating and standing room capacity during most hours of the day for services inbound to the CBD, and even in the peak hours there is standing room capacity. The peak for rail travel on this line coincides with the peak for aviation arrivals and departures. However, travel from the CBD to the airport during the morning peak is not affected by crowding from commuters and there is spare capacity in the outbound direction from the CBD.

112 NSW Government analysis, *Average Link Speed (km/hr) AM Peak 7:00-9:00,* based on Bureau of Transport Statistics Strategic Travel Model (derived from BTS 11/029 and 11/119).

Aside from the morning peak CBD-bound trains, the airport train service has ample capacity which could be more utilised to play a role in achieving modal shift to decrease road congestion. In terms of morning peak CBD-bound capacity, eight trains per hour currently run through the airport to the city during peak hours.

Figure 103 Airport rail line loading to Central Station, September 2010



Note: The Campbelltown/Macarthur Starters line – the line achieving the highest passenger loading in the figure – shows observed loads on trains originating in the South West (Campbelltown or Macarthur) and the Revesby Starters line shows the lower-speed, shorter-range Revesby trains. These counts were taken in September 2010, when the observed peak load of 110 per cent occurred between 8.00am and 8.30am.

Source: Transport for NSW.

In the short term, modelling of the Airport Link capacity compared to demand indicates the key rail infrastructure capacity issue for Sydney (Kingsford-Smith) Airport is the rail link between Wolli Creek and the International Terminal. Based on modelling of possible rail scenarios in the morning peak (see this first shaded area in Figure 103), CBD-bound trains will be full before they reach the International Terminal by 2013 unless additional rolling stock and train paths can be allocated to the airport rail line. The NSW Government has a sequence of major rail construction works underway which, once completed in around 2016, will provide a temporary increase in capacity of the line to serve growth and accommodate more services over the medium term:

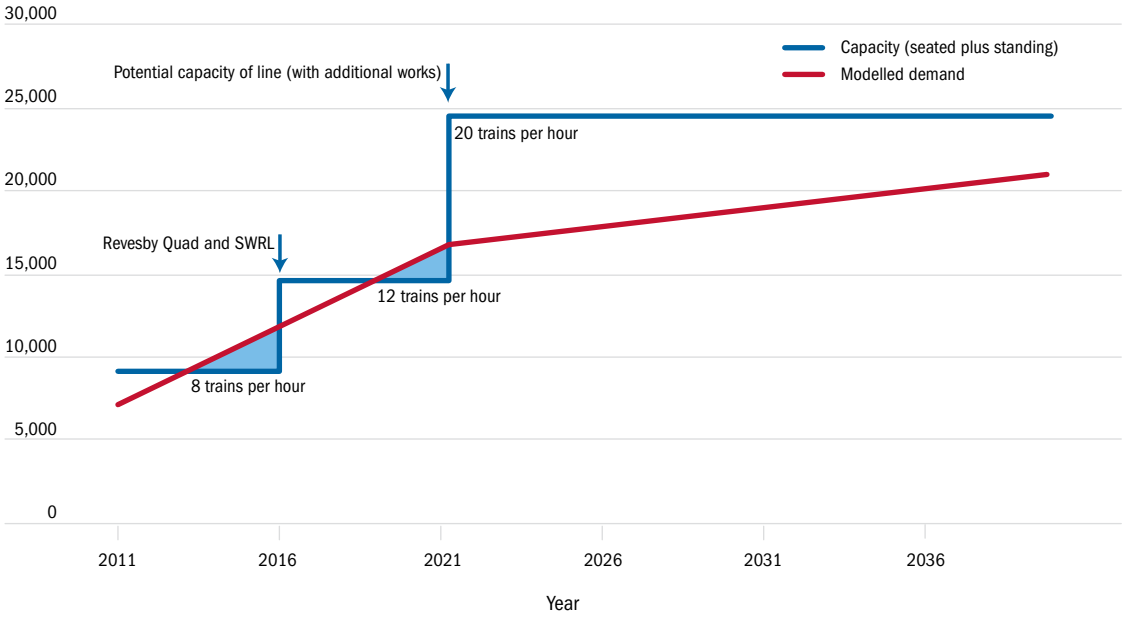
- the South West Rail Link;
- the Kingsgrove to Revesby Quadruplication; and
- construction of the Revesby turnback.

The South West Rail Link includes a major upgrade of Glenfield Station and interchange, and a new twin-track passenger rail line from Glenfield to Leppington via Edmondson Park. The Kingsgrove to Revesby Quadruplication project involves the construction of a second pair of railway tracks between Kingsgrove and Revesby and associated bridge and station works to allow for the physical separation of local and express services on the East Hills Line.

In 2016, after the planned works outlined above, the airport rail line will be served by 12 trains per hour. However, this will require allocation of additional rollingstock to the line. As shown

in Figure 104, this will provide morning peak rail capacity until around 2018, when CBD-bound trains will again be full before they reach the International Terminal, unless additional rolling stock (currently unfunded) and train paths can be allocated to the Airport Link.

Figure 104 Airport rail line capacity against expected demand, 2010 to 2036 (8.00am to 9.00am peak)



Source: Transport for NSW.

A summary of future capacity shortfalls and related implications is shown in Table 14.

Table 14 Likely impacts on Sydney (Kingsford-Smith) Airport given capacity constraints

Capacity Constraint	Potential Impacts	Potential Timing		
		Short Term (0–10 years)	Medium Term (10–25 years)	Long Term (25–50+ years)
Physical Size	**Land footprint:** unable to extend.	●		
Airside Infrastructure	**Gates, stand and aprons:** shortfall of stands as early as 2015.	●		
	Taxiways: improved, but difficult again in medium term.		●	
	Runways: increased runway imbalance due to upgauging, increased delay and congestion with use of parallels for longer periods of a day, adding to safety and traffic management issues.	●		
Environmental and Social Impacts	**Peak slot availability:** reduced access for internationals, domestic business and new LCCs.	●		
	Slot availability: full by 2027.		●	
	LTOP: noise sharing not possible from as early as 2012 in early peak times and from 2020 only possible during a few hours on weekdays.	●		
Surface Transport	**Road:** increased peak road congestion as early as 2015, expanding to off-peak in medium term.	●		
	Rail: capacity available but constrained during peak, no dedicated airport services.	●		
Delays	**Reduced ability to recover from delays:** there will be rising levels of airborne delays and growth congestion at the airport as 80 scheduled movements is neared. This will be made worse with weather and other events.		●	

Source: PwC and Australian Department of Infrastructure and Transport

4.3 Current capacity at Newcastle Airport to meet demand

Civil aircraft operations at Newcastle Airport are managed through an agreement between the Department of Defence and Port Stephens and Newcastle councils. It provides for the use of a 28 hectare site within RAAF Base Williamtown, with a lease currently held until 2045. Civilian activity is limited under the arrangement to six arrivals per hour (assumed to be equivalent to 12 movements).

RAAF Base Williamtown is RAAF's primary operational fighter base in NSW. Unlike joint user facilities at some other aerodromes, such as Darwin and Townsville, RAAF Base Williamtown is a military facility and civil activity is subject to the operational needs of Defence.

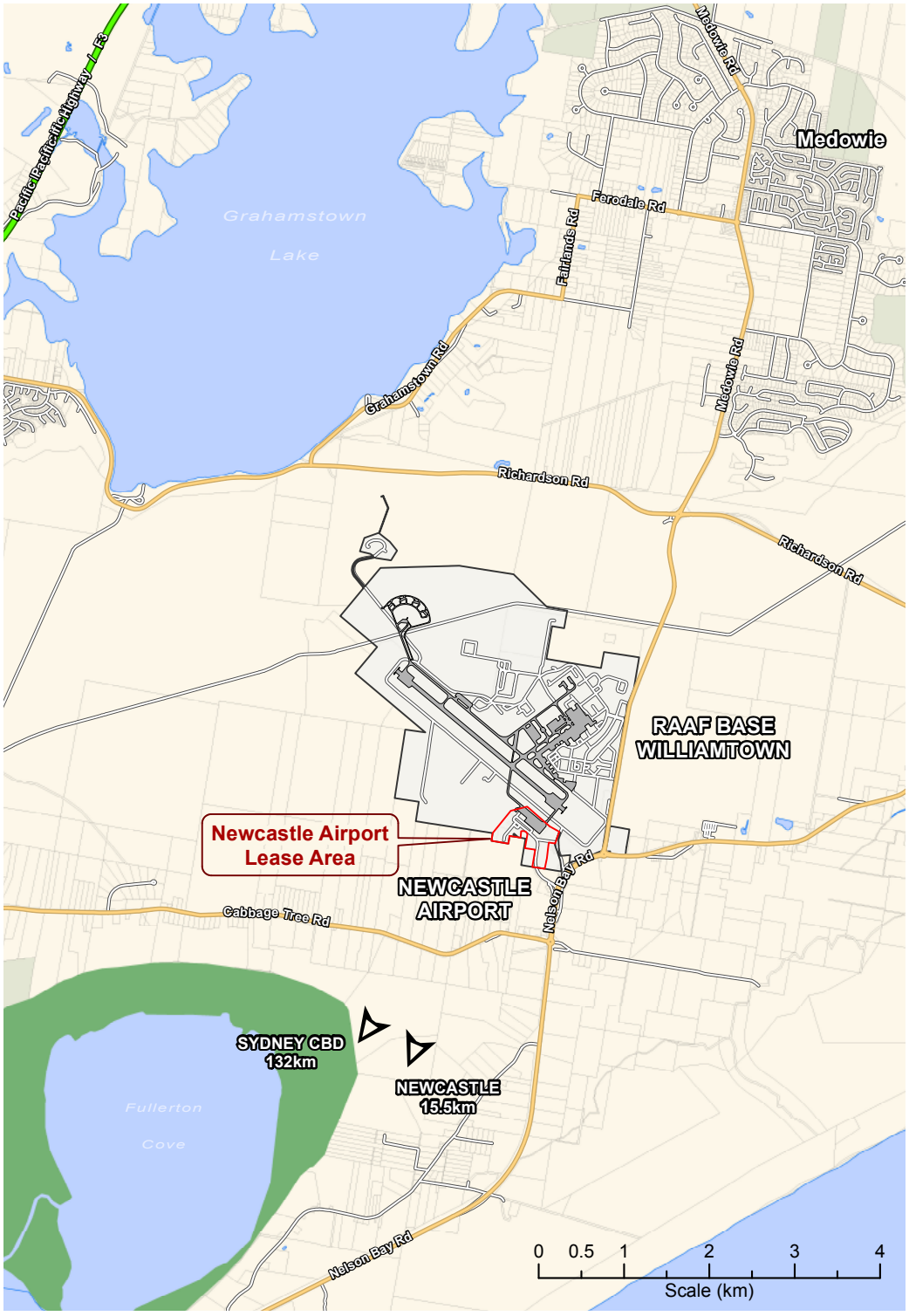
Newcastle Airport's historical growth to date has been significant, with increases in passenger demand of more than 17.8 per cent over the period 2000 to 2010. Given its forecast demand, it is expected Newcastle Airport will likely continue to serve as a civil airport catering for traffic from the growing Newcastle, Port Stephens, Upper and Lower Hunter, Lake Macquarie and Central Coast regions. The Newcastle Airport catchment extends further in the northern and north-western directions towards the Great Lakes and Mid North Coast and New England Regions.

By contrast, parts of the southern end of the Central Coast are broadly midway between Sydney and Newcastle and use both airports, with decisions based on route availability, frequency and airfares. The population of the Central Coast and Lower Hunter Regional Strategy areas, which form the bulk of the Newcastle Airport catchment area, is projected to grow by more than 236,000 from 863,000 in 2011 to approximately 1.1 million by 2036.[113]

In examining the capacity of Newcastle Airport to meet its forecast demand, the only significant capacity concern was the level of aircraft movements currently agreed between Newcastle Airport Limited and the RAAF (six arrivals per hour). At present, the busier hours at Newcastle Airport (such as from 8.00am to 9.00am and 5.00pm to 6.00pm) have two to three civilian arrivals per hour, which means the airport has significant scope, by 2035, to cater for passenger growth from its catchment area.

113 NSW Metropolitan Plan, 2010.

Figure 105 RAAF Base Williamtown (Newcastle Airport) site and surrounds



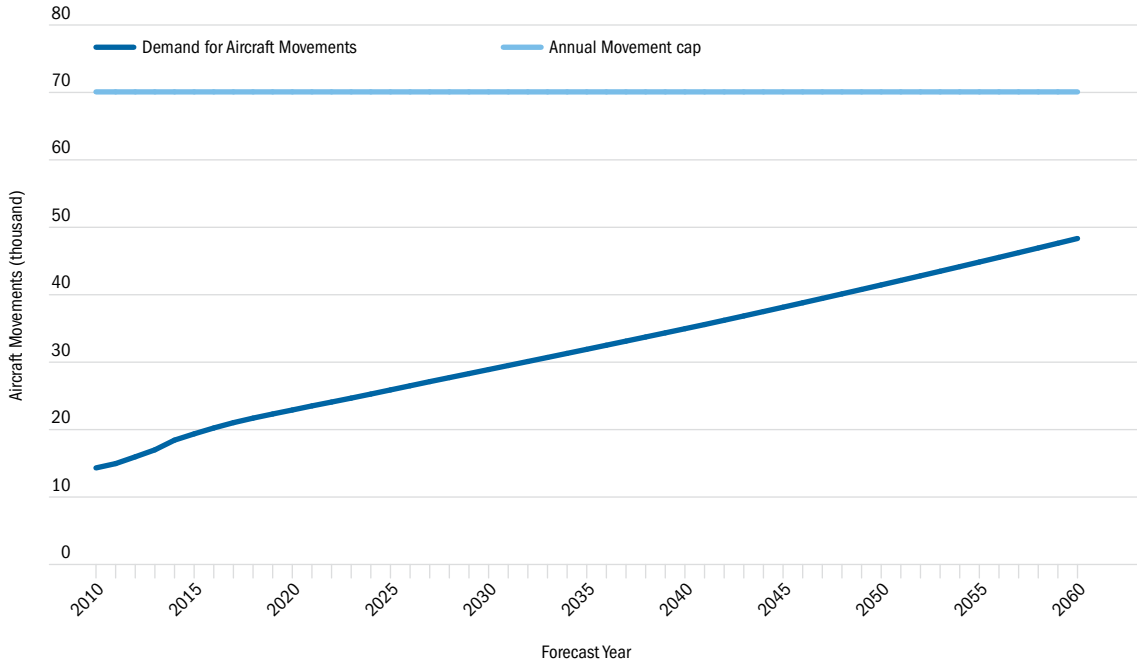
Note: Distances are 'as the crow flies'.

Source: Australian Department of Infrastructure and Transport.

Movement capacity

It is expected the total number of civil movements at Newcastle Airport will continue to climb towards the theoretical capacity limit of approximately 70,000 annual movements, as shown in Figure 106. The theoretical capacity is derived by multiplying the agreed movement cap of 12 movements per hour[114] by the number of hours available in each day, by 365 days per year.[115]

Figure 106 Newcastle Airport expected demand for RPT aircraft movements, 2010 to 2060



Note: 'Annual movement cap' was derived from by multiplying the agreed movement cap of 12 movements per hour (six arrivals and assuming six corresponding departures) by the number of hours available in each day, by 365 days per year.

Source: Booz & Company analysis.

This figure, in itself, does not present any capacity issues, as it shows by 2060 there are still some 20,000 movements before capacity is reached. However this is because at the aggregate (total annual movements) level, it presumes aircraft are able and willing to move to any available hour on any day of the week to meet demand.

The concern is the peak capacity constraint and how this will affect the interaction of RAAF operations with civil movements.

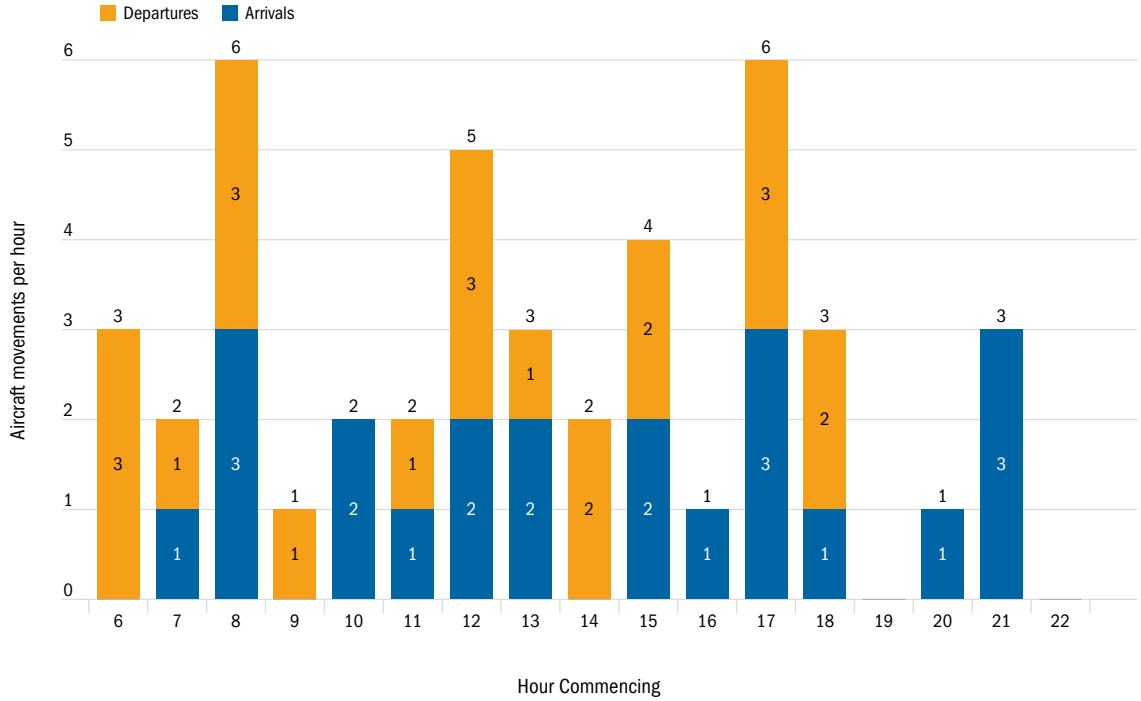
In 2010, an hour-by-hour analysis of activity at Newcastle Airport[116] shows average operations of two to three arrival movements per hour, peaking at six total movements at 8.00am and 5.00pm (as shown in Figure 107).

114 For operational hours, the Department of Defence has agreed with Newcastle Airport Limited to allow a maximum runway movements of six arrivals per hour. For the purposes of analysis, it is assumed each arrival is paired with an associated departure, meaning a cap of 12 civil movements per hour.

115 Newcastle Airport has an agreement with the community which effectively limits any planes after 10.00pm.

116 On the basis of the Newcastle Airport planning day – Wednesday, 13 October 2010. Further information can be found in Technical Paper B6.

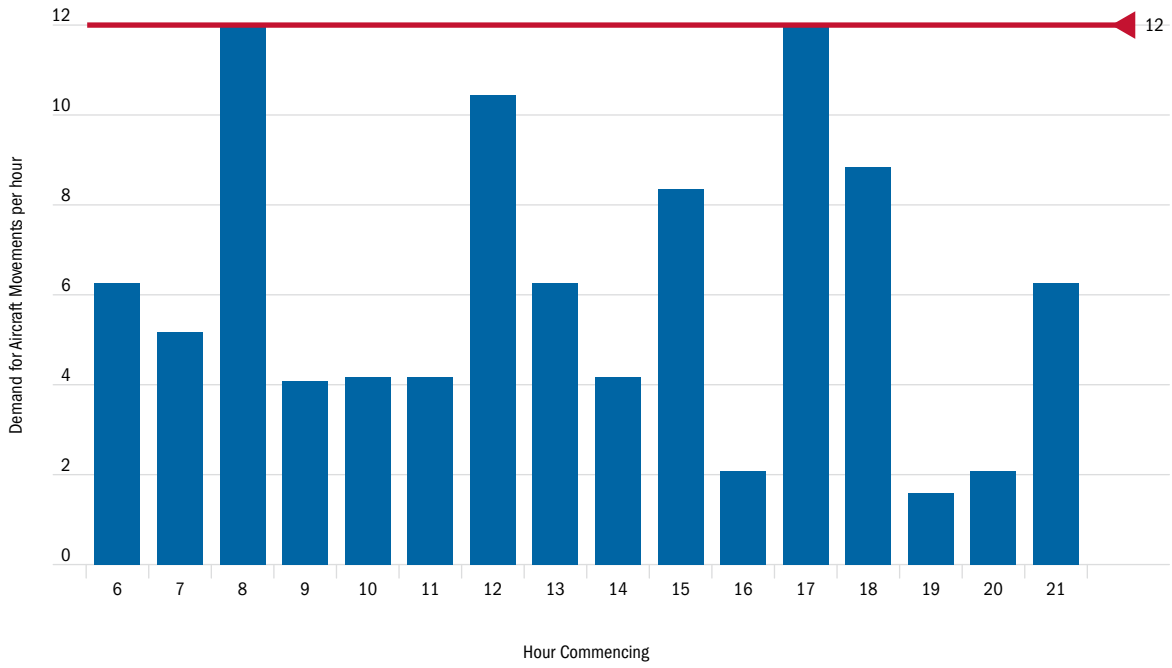
Figure 107 Newcastle Airport aircraft movements by hour of day, 2010



Source: Booz & Company analysis of SRS Analyser data of the Newcastle Planning Day. Further detail is in Technical Paper B6.

Once the arrival cap is reached in the peak, some peak spreading to other hours will be required to meet passenger growth. However, based on forecast growth rates, this is expected to increase and, by 2021, the hourly movement limit will be reached for the 8.00am to 9.00am hour. Figure 108 shows by 2035 both morning and afternoon peaks will reach the movement cap, with the middle of the day also approaching the cap. This will have an impact on the share of usage between RAAF and the civilian operators.

Figure 108 Newcastle Airport expected aircraft movements by hour of day, 2035



Note: Assumes 'annual movement cap' of 12 movements per hour applies. Annual growth rates consistent with those developed in Technical Paper A3 were applied to the planning day profile in Figure 107. A medium peak spreading scenario (including some redistribution and suppression of services) has been applied. Movements are not whole numbers, as forecasts were not rounded after applying growth rates. Further detail is in Technical Paper B6.

Source: Booz & Company analysis.

Interaction with military operations

As stated earlier, RAAF Base Williamtown is Defence's primary fighter aviation facility in NSW. It accommodates most of Australia's military fighter aircraft and is headquarters for the Surveillance and Response Group, Air Combat Group and the Joint Warfare, Doctrine and Training Centre.

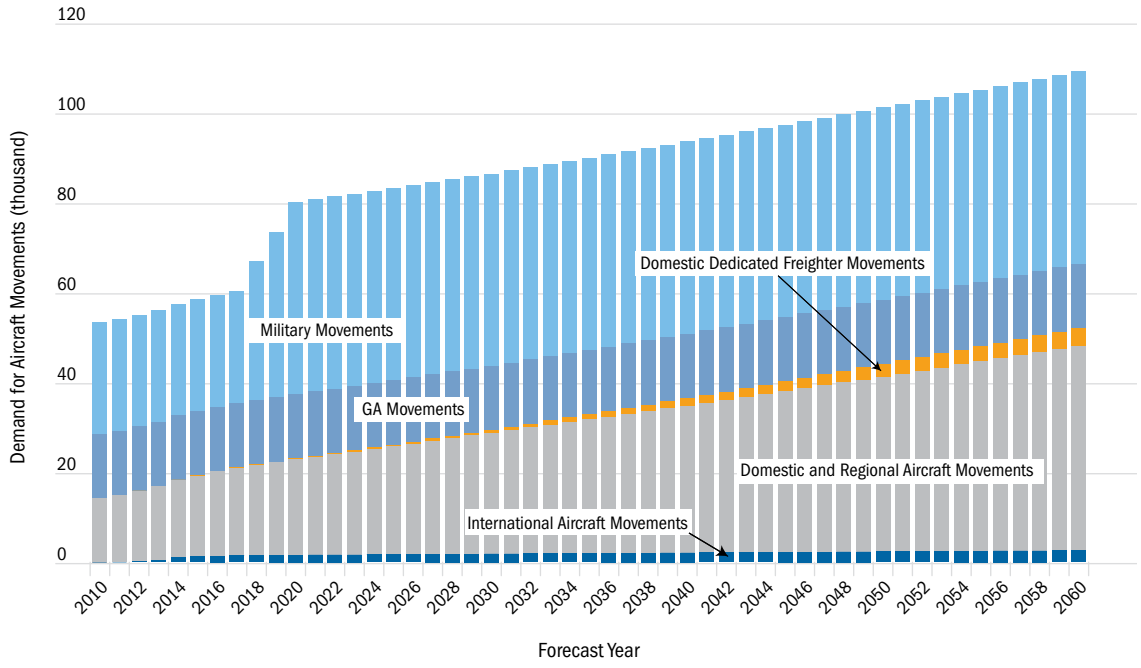
In a recent review of civil access to Air Force airfields, RAAF noted at RAAF Base Williamtown (Newcastle Airport) 'once six to eight civil movements per hour are exceeded regularly, military and civil flying will be affected by both surface manoeuvre area and air space congestion'.[117] Additionally, RAAF is concerned with the use of heavy aircraft, as the increasing separation distances required will disrupt their traffic patterns and cause delays.

This becomes an even higher priority issue with the introduction of the Joint Strike Fighter (JSF) at RAAF Base Williamtown, currently anticipated for around 2017, as it will substantially increase the number of military aircraft movements at the aerodrome. Any extra availability for civil aviation is difficult to predict and provide with any certainty for scheduling purposes.

Planning for future international services will become far more complicated and time critical as a result.

While discussions are ongoing between the parties to consider variations to the movement cap which could provide more flexibility (particularly enabling more civilian movements outside the hours of military operations), these need to be brought forward with a definitive action plan on how to best integrate the civilian needs with RAAF needs, especially given the anticipated growth by 2035.

Figure 109 RAAF Base Williamtown (Newcastle Airport) expected aircraft movement demand by market type, 2010 to 2060



Source: Booz & Company analysis.

117 Air Force, *Review into Civil Aviation Access to Air Force Airfields,* 2011.

4.4 Current capacity at Canberra Airport to meet demand

Canberra Airport serves the Canberra market, as well as that of the surrounding region, including centres such as Yass and the Riverina, Goulburn, Queanbeyan, Cooma and the South Coast. It has a runway capable of handling international aircraft to Code F and has made substantial investment in new terminal facilities, which, when completed, will include capacity for international airline services. Its aviation growth has been consistent with growth around Australia.

The Canberra Airport 2009 Master Plan (the Canberra Airport Master Plan)[118] involves investment in terminal infrastructure to accommodate a high scenario estimate of 8.8 million passengers or 157,257 RPT aircraft movements per year in 2029–30. This will involve investment to develop a new terminal building as well as associated aeronautical and roads infrastructure. Canberra Airport has recently increased the value of the investment into this development; parts of this investment have been completed with the remainder expected by the first half of 2013. The Master Plan indicates that the current runway system will meet the passenger forecasts in the planning period to 2029–30.

ACIL Tasman, which prepared the Canberra Airport Master Plan, identified the airport's potential role in the region's aviation in providing:

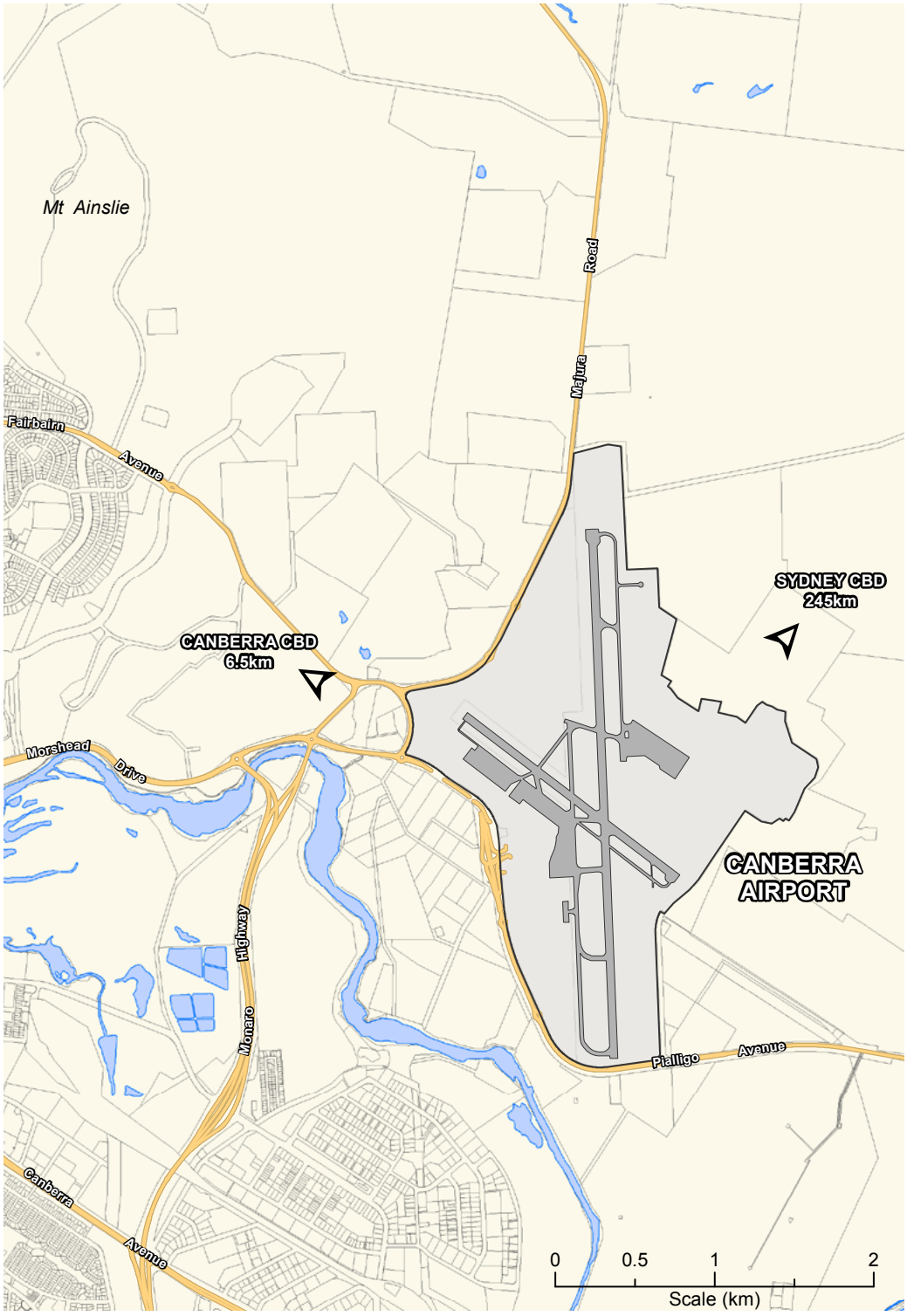
- increased domestic flights that avoid a change of plane at Sydney (Kingsford-Smith) Airport;
- development as an east coast airline hub as Canberra Airport's flight frequencies and range of destinations increase;
- development of a regional hub at Canberra as many of the services sought by regional residents when travelling to Sydney (such as professional services and entertainment) are also available in Canberra;
- international point-to-point services such as Canberra–Auckland and Canberra–Singapore (for traffic to and from those points and for connections beyond such as to Asia, Europe and North America), Canberra–Bali and other leisure destinations; and
- development of a freight hub.[119]

In examining the airport's ability to meet its future demand, there were no current airfield capacity constraints identified, with the airport readily able to cater for passenger growth in its broader catchment area.

Canberra Airport operates without a curfew. The flight paths for the main runway, to the north and south of the airport, are currently over undeveloped land, largely rural in character. There is a concern that any proposed rezoning for residential development around the airport may curtail the future ability of the airport to grow. This especially includes any proposed housing developments that will fall within the 20 to 25 Australian Noise Exposure Forecast (ANEF) contours, as well as areas outside but in close proximity to the 20 ANEF. Such developments will expose residents to high levels of aircraft noise. The operation of aircraft at night, in particular for the overnight freight hub arrangements proposed in the Canberra Airport Master Plan, would inevitably be a major issue for any such communities, leading to calls for a curfew, further restrictions on the operation of the airport and changes to patterns of operations.

118 Canberra Airport Pty Ltd, *Canberra Airport 2009 Master Plan,* 2009.
119 ACIL Tasman, *Economic impact of Canberra Airport: 2010 to 2030,* prepared for Canberra Airport, 2011.

Figure 110 Canberra Airport site and surrounds



Note: Distances are 'as the crow flies'.

Source: Australian Department of Infrastructure and Transport.

4.5 Ability to meet demand for other aviation activity

Air freight

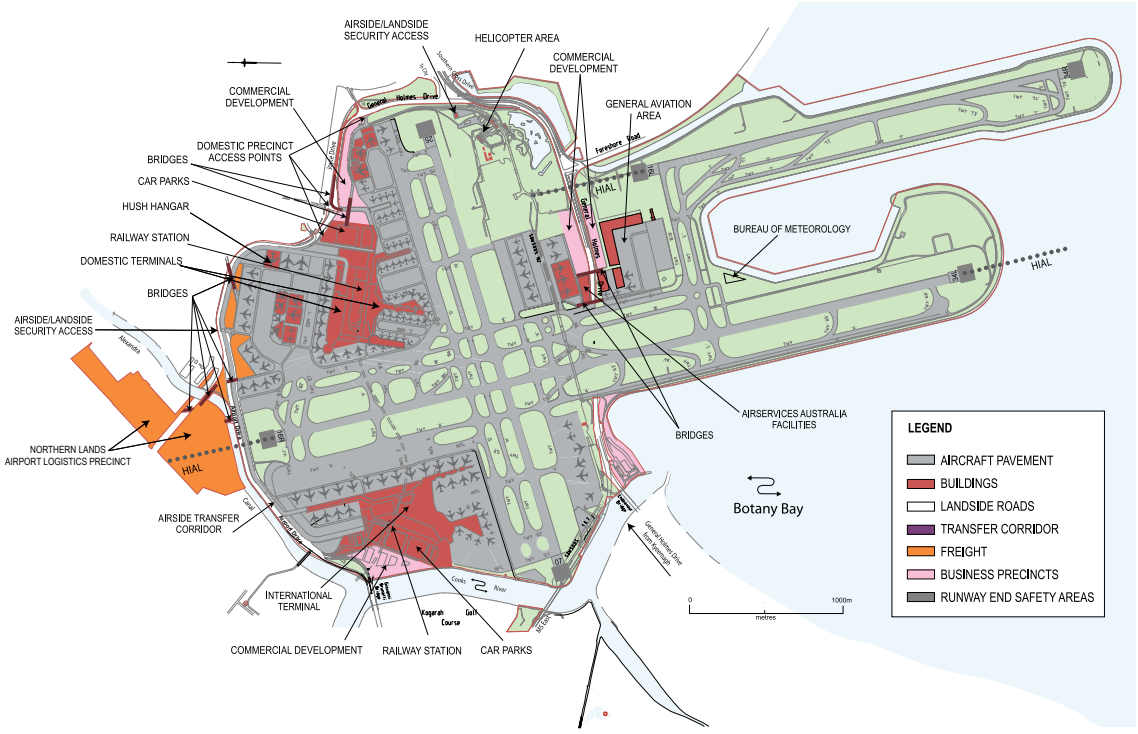
Sydney (Kingsford-Smith) Airport

Currently, there is freight-handling capability to meet the short-term freight tonnage demand at Sydney (Kingsford-Smith) Airport. However, SACL suggested in its Master Plan that international and domestic air freight-handling facilities were already operating near capacity.

In addition, as the International Passenger Terminal is expanded to the north to meet RPT demand, part of the current international freight terminal site will be needed to be relocated.[120] SACL has identified areas to be developed for on-airport freight and freight support facilities within land parcels north of the Alexandra Canal that are owned by SACL. Constrained capacity has already resulted in a number of air freight-handling operators being forced to locate facilities to these off-airport areas. The Master Plan provides for direct landside and airside vehicular access to the proposed logistics areas to enable access. Also, on-airport freight bypass and staging facilities are proposed to be established near the current Qantas Jet Base to support off-airport freight operators.[121]

Figure 111 presents the Master Plan concept with the air freight areas highlighted in orange.

Figure 111 Master Plan layout of Sydney (Kingsford-Smith) Airport, in 2029 – air freight features



Source: SACL Sydney Airport Master Plan 2009.

Besides the increasing pressure on air freight-handling facilities to move off-airport to cater for RPT growth, the ability for dedicated freighters to obtain additional slots in the future will become more limited due to the need to cater for RPT. However, in the short term, there remains scope for operation of dedicated freight services at Sydney (Kingsford-Smith) Airport, particularly as they are not tied to peak period schedules.

120 SACL, *Sydney Airport Master Plan 2009*.
121 SACL, *Sydney Airport Master Plan 2009*.

Canberra Airport

The Canberra Airport Master Plan, currently approved for Canberra, provides for future development and expansion as a 24-hour freight hub. As the only curfew-free airport capable of handling larger freight aircraft within reach of Sydney, Canberra Airport is expected to play an important role in relation to air freight in the future.

The Canberra Airport Master Plan outlines the expected commencement of a domestic overnight express freight hub at the airport in response to the needs of the overnight express freight industry and its development over the planning period. Canberra Airport has been approached by two major domestic overnight air freight operators regarding the opportunity to develop a domestic hub for overnight air freight. While an exact time frame is uncertain, the Master Plan suggests that such a freight hub may commence within five years (that is by 2014).

The Canberra Airport Master Plan outlines the expected commencement of a domestic overnight express freight hub at the airport (in response to the needs of the overnight express freight industry) and its development over the planning period. Canberra Airport has been approached by two major domestic overnight air freight operators regarding the opportunity to develop a domestic hub for overnight air freight. While an exact time frame is uncertain, the Master Plan suggests that such a freight hub may commence within five years (that is by 2014).

The Canberra Airport Master Plan assumes the initial stages of a domestic overnight freight hub will be able to be accommodated at Canberra Airport with little or no additional infrastructure or impact on existing airport users. This includes commencing operations with one to three jets or large turboprop freighter aircraft per night, such as Boeing 737 and ATR-42.

Following the initial establishment of a freight hub, express overnight freight operations at the airport will be expected to continue increasing, growing to five aircraft within two to three years of commencement. Over the 20-year planning period of the Master Plan, it is suggested that additional freight capacity is likely to be achieved through the use of larger aircraft, such as B757F or B767F, on key routes and larger turboprop aircraft, such as on regional freight routes.

Over time, dedicated freight infrastructure is expected to be required to facilitate the growing freight hub – particularly aircraft parking aprons to accommodate the peak overnight period.[122]

The Canberra Airport Master Plan also foreshadows commencement of dedicated international air freight services, suggesting that services could grow gradually, commencing with one airline operating two to three weekly B747-400F (or equivalent) services to and from Canberra Airport in the next five years.

The existing apron at Fairbairn is currently able to accommodate B747-400F and equivalent aircraft and it is expected that this will be sufficient to accommodate aircraft parking requirements in the next five years.

As services grow beyond the five-year time frame, additional apron space will be required. Warehouse and office infrastructure will also be required in the short term to accommodate the commencement of international freight services, especially with respect to Customs and Quarantine requirements. This could initially be accommodated in existing facilities at Fairbairn but may require additional facilities to be constructed in the short to medium term. Some of these facilities may be collocated with facilities supporting the domestic overnight freight hub, although upgraded customs and quarantine facilities and facilities for the international transport of horses and livestock may also be required. The Canberra Airport Master Plan suggests that significant warehouse and office support functions are able to be housed elsewhere on-airport or even on land surrounding the airport.

122 Canberra Airport Pty Ltd, *2009 Master Plan,* 2009.

The ability for Canberra Airport to meet these growth targets will be predicated on its ability to remain curfew free.

General Aviation (GA)

A wide range of GA operators are based at a number of aerodromes in the Sydney region.[123] An assessment of infrastructure in the region has identified sufficient capacity for the future provided the aerodromes currently serving the sector in the Sydney region continue to be available.

Bankstown Airport is by far the largest provider in the region, accounting for more than half the GA movements in the region. It also caters for most of the GA flight training in the region, with over 60 per cent of the airport's activity dedicated to training. Camden Airport is the next busiest airport, with approximately 20 per cent of the market.

123 Canberra Airport Pty Ltd, *2009 Master Plan,* 2009.