

## Development of the Long Term Operating Plan

In his Direction to Airservices Australia, the Minister for Transport and Regional Development, the Hon. John Sharp MP, provided 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 (07-25), 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.
- Where it is not possible for flight paths to be over water, the objective is to operate the airport to ensure that the overflight of residential areas is minimised and that noise arising from such flight paths is fairly shared.
- 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.

The Task Force further developed the following principles as part of the process of review and development of the Long Term Operating Plan:

- The concept of respite is an integral component of fairly sharing aircraft noise, particularly for residents close to the airport. This means seeking to maximise the number of hours each day either totally free of aircraft movements or ensuring an absolute minimum of unavoidable overflights.
- To the extent practicable, residential areas overflowed by aircraft arriving on a particular runway should not also be overflowed by aircraft departing from the same runway.
- Flight paths for arriving aircraft should be developed to ensure as far as practicable that descent profiles of arriving aircraft are commensurate with low-power, low-noise operations.

Despite many public submissions to the contrary, the review did not consider that there would be any additional runway facilities, at Sydney Airport. However, the Task Force did consider other infrastructure developments such as taxiway enhancements and changes to operational facilities, that would assist in optimising runway and airspace utilisation.

Airservices Australia then conducted an assessment on how runways are currently used and the impact of this usage on the Sydney community. This assessment also addressed how runways may be better used to ensure maximum aircraft movements over water and non-residential areas.

Based on this assessment and initial analysis of the objectives and requirements, the following foundations for the development of the long term operating plan were established:

- that new runway configurations or modes of operation be determined,
- that substantial changes to runway selection processes would be required,

- resulting from the determination of new runway configurations or modes and the identification of runway selection processes, fundamental changes in the patterns of runway use and in the operations of the Sydney Terminal control area would result, and
- consequential changes to enroute operations including an examination of military airspace would occur.

The plan has two major components:

1. A set of 10 proposed modes of operation (runway configurations) that would allow for more or less regular changes of mode, providing periods of respite from noise to residential areas. By assessment against stringent criteria, the number of possible Runway Modes of Operations was reduced from the initial 16 to 10, seven of which are currently in use. Subsequently, Mode 14A, a variation to Mode 14, was added, making a total of 17 modes.
2. New flight paths and changes to controlled airspace in the Sydney Terminal Area (within 45 nautical miles of the airport) by taking flight paths beyond the more densely populated areas.

The proposed modes of operation have been designed to meet the Government's objective of maximising flight paths over water and non-residential areas and achieve fairer sharing of remaining aircraft noise. The plan will not compromise aviation safety standards and would maintain the efficiency of the airport.

### *Sabre Decision Technologies Runway Capacity Study*

It was considered desirable to obtain independent advice on the potential capacity of these modes. Accordingly, after consultations involving the Sydney Airport Community Forum, Airservices engaged Sabre Decision Technologies (Sabre) to model the potential capacity of these modes. Sabre, a United States aviation consultancy company, was selected from two other international consultancies judged capable of carrying out the study.

Sabre undertook its assessment using the United States Federal Aviation Administration's (FAA) Airport and Airspace simulation model (SIMMOD). The assessment involved quantifying the hourly capacity of each of the runway modes of operation identified by the Task Force assuming existing airfield layout (runways, taxiways and terminal layout) and current operational procedures.

The study required Sabre to recommend improvements and quantify benefits of changes to operational procedures and airfield layout (e.g. new runway exits, taxiways)

Mode	Arrivals	Sabre	Departures	Sabre	Sabre Total
1	34L	13	Current Curfew 16R	10	23
2	34R-16R (heavy)	27	16R	29	56
3	34L	21	16L-34L (heavy)	28	49
4	34L	15	16L-16R (heavy)	28	43
5	25-16R (heavy)	25	16L-16R	28	53
6	34L-34R	37	07-34L (heavy)	30	67
7	34L-34R	38	25-34L (heavy)	35	73
8	34L-34R		25-34R/34L (heavy)		78-80
9	34L-34R	44	34L-34R	38	82
10	16L-16R	49	16L-16R	38	87
11	16L-16R/07		16L-16R		56
12	07	23	07	10	33
13	25	22	25	11	33
14A	16R-07	26	16L-16R	49	75
15	34L	20	34R-34L (heavy)	35	55
16	34R-34L (heavy)		34L		62

*Figure 1: Capacity for suggested modes of operation*

### *Terminal Area Procedures*

In developing new airspace procedures for the Terminal Area the associated flight paths were determined taking into account many factors. These included:

- Compliance with established air traffic separation standards.
- Performance characteristics of aircraft.
- Destination or point of origin of the flight.
- Location of ground navigation aids for non-area navigation equipped aircraft.
- Established en route structure beyond the terminal area.
- As well as these operational standards, two other factors used in determining flight paths are:
  - Minimising flights over populated areas.
  - Maximising flights over water.

In order to minimise unnecessary flight over populous areas, flight paths for aircraft inbound to Sydney should be moved beyond the major population area and as a consequence maintain as high a level as practicable, commensurate with a low power/low noise flight.

The significant areas of change in this initiative will be the tracking of aircraft on paths that are further displaced from the immediate vicinity of the airport and the spreading of departure tracks after takeoff which will share the impact of aircraft operations.

#### *Arrival paths to Runways 16L and 16R*

For aircraft landing on Runway 16, towards the south, the new track from the south and western points of origin will take them from the Camden area at an increased altitude via Richmond to a 'gate' approximately 20 nm to touchdown. Whilst this, thus far, has avoided areas of major population and in particular a downwind leg over such suburbs as Bankstown, Auburn and Parramatta, the options for avoiding concentrated flight paths to the airport are limited.

A consequence of this initiative is the loss of flexibility for fine tuning the arrival sequence, a feature of the current airspace arrangements. This will have an impact on the capacity of the airport when arrivals are from the north.

In addition to these aircraft, traffic from northern port of origin track to join the extended centrelines of the runways and further add to the concentration of traffic. Aircraft arriving from the east will cross the coast around Newport at 6000-8000 ft. As most of these aircraft are large passenger types, Runway 16L is not suitable for their operation as the landing distance available is too short. Consequently they will be tracked to land on Runway 16R. Currently there are only about 30 aircraft per day operating on this route and then only when Runway 16 is the nominated arrival runway.

Aircraft need to be aligned with the runway in stable flight for at least the last 1000 ft of their descent. This equates to the last three miles to touchdown.

The operational standard for independent parallel approaches includes requirements that;

- the aircraft is established on centreline by 4nm from the runway threshold
- a minimum of 1000ft or 3nm is maintained between conflicting aircraft until;
  - one aircraft is established within the final approach fix (IAF) when both aircraft are established on the localiser in visual conditions.
  - one aircraft is established on the localiser in visual conditions and the other is on a heading to intercept final inside the furthest IAF with the runway reported in sight
  - both aircraft are established on a heading to intercept final inside the furthest IAF with the runway reported in sight
- Radar vectors must be such to enable the aircraft to intercept final course at an angle of not greater than 30 degrees.

In essence, in constructing the minimum flight path in visual conditions, it requires a line from the runway threshold along the extended centreline of the runway to a point 4nm along the track then at 30 degrees to the track until displaced at least 3nm from the adjacent parallel flight path. From this minimum point the track can vary so long as it maintains that 3 nm displacement. Some allowance must be made for the turning radius of the aircraft and that aircraft must be established on final by 4nm.

It is considered necessary, in an effort to share the noise burden, to diversify the arrival paths of aircraft in the latter stages of their descent, to the extent practicable and to this end the requirements of the Independent Visual Approach standard can be used to advantage. It is proposed that, in order to avoid the concentration of traffic on the localiser tracks to Runways 16L and 16R, three separate indicative inbound paths be established and that traffic be equitably distributed across these paths.

Many submissions to the Task Force stated that aircraft tracking on either localiser track created a noise nuisance to the same group of residents such that the effect of operations on the 16 parallel runways created continuous disruption as the noise from one aircraft receded as the noise from the next aircraft, albeit on the other flight path, began to build.

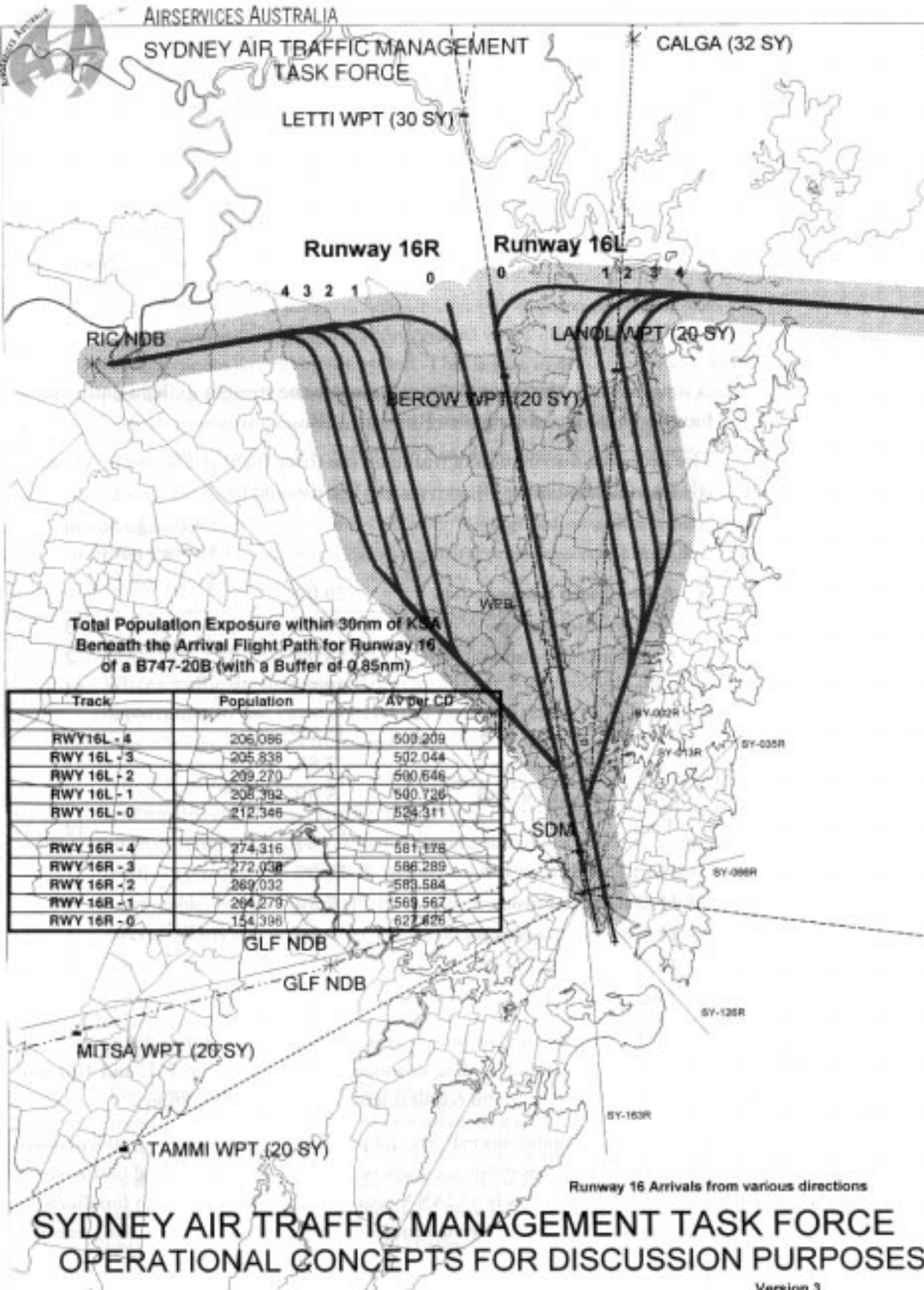
If one were to take the typical noise footprint of a Boeing 747-200 at 60 dB(A), which is approximately 3.2 km wide, and place this on both runway localiser tracks, it can be seen that as there is only approximately 1 km between the tracks, there is significant overlap of the noise.

In recognition of this fact, these two tracks should be treated as one for the purpose of assessing noise exposure. Two alternate nominal tracks can be established, one on either side of the localiser tracks but displaced sufficiently to ensure to the extent practicable there is no overlap between the noise footprints of the flight paths.

If aircraft were to be distributed across the three nominal tracks, the burden of aircraft overflight can be further spread to share the noise. As the outer flight paths converge on the centrelines to enable the aircraft to align with final approach to the runways there must be a convergence of the noise events until the point four miles from touchdown when aircraft are tracking directly to the runway to land.

There are few obvious tracks to the north of the airport which do not involve considerable overflight of populous areas with the exception of Ku-ring-gai Chase and Garigal National Parks. Figure 7 shows a selection of possible nominal tracks that have adequate displacement from the centrelines to minimise noise overlap, together with the population overflown.

Figure 2: Possible alternative tracks to north of Airport.



Indicatively, were these three nominal tracks used, the sharing of traffic movements could be shown as follows:

The current traffic mix over 24 hours at Sydney is estimated as:

Operation Type		Port of Origin			
		South	North	South	North
• International Aircraft	15%	7%	8%		
• Scheduled Domestic Jets	40%	20%	20%		
• Scheduled Props	32%	17%	15%		
• General aviation	7%	3%	4%		
• Curfew operations	4%				
• Helicopters	2%				

A majority of International aircraft require the straight in flight path. One in four domestic jets will require Runway 16R.

The proposed distribution of traffic on the three flight paths, west (A) centre (B) east (C), assuming 40 arrivals per hour would be:

	%	Average No. of Aircraft per hour
A All southern domestic jets	20.0%	9
Half southern props	8.5%	3
Half general aviation	4.0%	2
Total	32.5%	14
B All International Jets	15.0%	7
Half northern props	7.5%	3
Northern jets for 16R	5.0%	2
Total	27.5%	12
C Northern jets for 16L	15.0%	7
Half northern props	7.5%	3
Half southern props	8.5%	3
Half general aviation	3.0%	1
Total	34.0%	14

The slight inequity in distribution of jet traffic over the three flight paths is a product of the unequal landing distance available between 16L and 16R and the anticipated operational requirements of some jet operations.

Foreign international aircraft are not permitted to participate in independent parallel approach operations, except where they are established on the straight in approach path. This is a CASA requirement associated with familiarisation with the standard and training requirements. It is also a sound, long established practice which recognises operational difficulties associated with infrequent



flight by these aircrews into Sydney and an adherence to published procedures to preempt any language difficulties.

The area covered by the flight track is depicted in the attached flight path map for mode 10 later in this chapter, as a broad area, known as the 'Trident', to indicate the extent of the total area likely to be affected by arriving aircraft.

There should be no concentration of traffic on any particular path as this would amount to the reintroduction of flight corridors, albeit over different people. Subject to weather conditions prevailing and the need for instrument approaches, aircraft tracks will be varied within this area to achieve noise sharing to the greatest extent possible.

Early simulation of this proposal has shown that there is a potential loss of capacity using this airspace arrangement when compared with current arrangements as previously stated. This is due to difficulties associated with processing aircraft from the south to Runway 16L, necessary to balance arrivals across the two runways, and a higher level of flow control input to compensate for the lack of flexibility in close downwind tracking.

Should there be any change to fleet mix over time, additional measures may need to be taken to ensure an efficient throughput of traffic is maintained. This proposal will be subject to the monitoring processes recommended to ensure its continued effectiveness.

#### *Departure Paths from Runways 34L and 34R*

Where traffic departs from Runway 34L or Runway 34R there is more opportunity to use various headings after departure which will share the noise over a wider area and thus lessen the impact of concentrated traffic.

Aircraft using Runway 34L for departure will consist of jet traffic to the west and northwest, non-jet traffic to the west, northwest and south and other aircraft which may operationally require the use of the long runway. For traffic departing Runway 34L departure tracks will be varied, to the extent practicable, but will normally be a reflection of the ultimate destination of the aircraft. This is necessary to avoid complex cross-overs of traffic which will have safety implications. It is proposed that, over time, the distribution of traffic on the nominal tracks shown on the plan be equitable, monitoring over a short period, say one hour, may not show that equity if there is a concentration of departures to similar destinations.

The principle of avoiding areas that are subject to concentrated exposure to arriving air traffic will also be employed to the extent practicable. Consistent with this principle the flight path maps indicate that these aircraft to turn to the west after takeoff and would eventually turn east and overfly additional suburbs further north of the airport. However, it is anticipated that there maybe some opportunity in light traffic periods for international aircraft bound for destinations to the east of Sydney to continue on runway heading as this



will enable them to be turned to the east as early as possible, thus minimising flight over land. All other aircraft will be turned to the southwest, west or northwest after takeoff, depending on their ultimate destination.

Aircraft using Runway 34R for departure will consist of jet traffic to northern and southern destinations, and non-jet traffic to northern destinations.

The departure tracks currently in use for these aircraft take all jet aircraft over the golf course area to the east of the aerodrome and over the coast at Coogee, and non-jet aircraft over the Moore Park, Centennial Park areas towards South Head.

These tracks were designed to make use of the open golf course area, and the shortest route to the sea, to facilitate over water tracking, and to avoid the 'obstacle clearance area' posed by the city. Additionally, the design had to satisfy the requirement of the independent parallel runway separation standard, which dictates a turn of a minimum of 15 degrees to the east from runway heading.

Further limitations to aircraft departing on these tracks is occasioned by arriving aircraft operating on southbound flight paths to the east of the coast. This arriving traffic flow limits the climb of the departing traffic until separation between the flight paths is achieved. With the current aircraft fleet mix using Sydney Airport, this altitude limit is 5000 ft to accommodate non-pressurised aircraft which service destinations to the north.

As the Eastern Suburbs of Sydney are densely populated, there are few opportunities to identify alternative tracks that could be used over less populous areas than the two in current use. Also, the track to Coogee, whilst over significant open land in the vicinity of the airport and providing the shortest track to the coast, is almost the reciprocal of the arrival track from the east to Runway 25. The Task Force sought to avoid this where possible, and also to provide more than one departure track, where practicable, to share the noise. The Task Force was also mindful of the impact of any track over the Prince of Wales Hospital at Randwick.

To accommodate these aims, a track to the south of the existing Coogee track over the Maroubra/Matraville area was considered. It was foreseen that a major limitation for the use of this track would be the requirement for departing aircraft to be held to an even lower altitude (than on the Coogee track) until well east of the coast due to the conflicting paths of arriving aircraft. It was recognised, however, that should future changes to the aircraft fleet mix result in small aircraft being replaced by aircraft with better performance characteristics, then a higher altitude restriction could be used.

Following representations arising from public consultation, Airservices conducted preliminary simulation to determine the optimum easterly departure track to the extent that it is possible to minimise flight on the reciprocal of the arrival track from the east and still achieve a reasonable initial climb altitude

for the departing aircraft. As a result of this simulation, it is proposed that jet aircraft departing for southern destinations be directed to use a track over the golf courses, but further to the south of the existing track, crossing the coast south of Coogee.

A third track that would take aircraft over Alexandria and Waterloo and then over the City was also considered feasible. This requires aircraft to climb at a steeper gradient than is required for other tracks due to the height of city buildings. The complexity of aircraft tracking requirements and conflict with departing jets crossing the outbound track of non-jet aircraft in the Manly area would mitigate against jets using this track.

It is proposed therefore that jet aircraft departing for northern destinations be directed to track over Moore Park/Centennial Park and that non-jet aircraft use the track over the city.

#### *Arrival Paths to Runways 34L and 34R.*

Aircraft arriving from southern and western ports of origin will track from the Camden area at higher altitudes than are presently the case and proceed clear of the major areas of population to cross the coast well to the south of Port Hacking. From there, tracking will be over water until crossing the Kurnell Peninsula on final approach to the runway.

Aircraft from the north will track towards the sea, leaving the inbound track 60 km north of the airport and cross the coast 40 km north. From there, tracking will be over water until crossing the Kurnell Peninsula on final approach to the runway.

Following simulation of a number of flight track proposals from the north, it was concluded that the path depicted on the maps, which has jet aircraft crossing the coast between Newport and Barrenjoey, is required to meet requirements. Availability of navigation aids for aircraft not equipped with area navigation systems, such as GPS, dictated that non jet aircraft turned to the east after reaching the navigation aid at Calga (Central Coast).

Segregation of jet and non-jet paths is required due to the significantly different performance characteristics of aircraft types. Were jet aircraft to be turned seawards earlier and cross the non-jet path, a separation complexity would have been introduced that would impact on efficiency in order to maintain safety.

Similarly, the angle at which the track intercepts the new southbound routes east of the coast needed to be at an appropriate angle that ensures aircraft do not overshoot the intercept and come into conflict with northbound departing traffic.

Altitudes of arriving aircraft will be commensurate with their planned track miles to touchdown but when over land will be significantly higher than current practice. Aircraft to the north will cross the coast, between Newport and Barrenjoey, at approximately 10,000 ft.

The practice of aircraft tracking over Menai-Grays Point and over the inner Northern and Eastern Suburbs will, in normal circumstances, be avoided.

Submissions to the Task Force from Kurnell residents proposed that aircraft track inbound via Botany Bay Heads for a landing. There is insufficient room to manoeuvre an aircraft for a stabilised approach from 500-700 feet and still remain clear of the Kurnell village.

#### *Departure Paths from Runways 16L and 16R*

Current departure tracks for jet aircraft through Botany Bay Heads and over the Kurnell sand hills will continue to be used whilst non-jet aircraft will continue to use existing tracks to the east and west of these jet tracks.

Consideration is being given to amending the flight path which is aligned, over water, just to the east of Cronulla. One option is for aircraft to turn left after crossing the Kurnell Peninsula to track further to sea. This proposal requires testing in aircraft simulators to assess the additional cockpit workload generated by requiring jet aircraft to execute a series of turns in quick succession, shortly after takeoff. There is also the possibility that there could be an increase in the noise experienced at Cronulla as aircraft turn, with jet efflux directed at the coast and an assessment of the relative noise exposure should be undertaken to assess the benefits.

Alternatively, aircraft could track on runway heading or further to the right, but not as far right as the current track, to position them further to the sea off Cronulla. This would have a greater impact on Kurnell residents but would not compromise the independent parallel separation standard nor add to cockpit workload.

Another option under consideration is for all jet aircraft bound for southern destinations to depart from Runway 16L and track to sea via Botany Bay Heads. These aircraft make up 18 per cent of all departing traffic and would reduce the amount of jet aircraft over water but in close proximity to Cronulla by over 40 per cent. The impact on Kurnell and Botany must be considered.

Further assessment of these options is required to confirm the noise benefits perceived.

#### *Aircraft Both Arriving and Departing over Botany Bay*

Runway Modes of Operation 1,2,3 and 4 involve aircraft departing in a southerly direction and arriving towards the north. Flight paths primarily have an effect on residents to the south of the airport.

Mode 1 is the current Curfew operating mode and only involves use of the main runway. All arrivals track over the western edge of the Kurnell village and departures track over the sand hills further to the west.

Whilst traffic levels are low during the curfew period, operational complexity is compounded by keeping outbound aircraft in potential conflict with arrivals for a considerable period.

It is proposed that those aircraft departing from Runway 16R, which are able to remain clear of the Kurnell village, be permitted to turn left after takeoff and track through Botany Bay Heads to minimise this conflict.

Aircraft types operating during the curfew do not include heavy jet departures and most are quite capable of containing their flight over water, within the bay. This procedure was permitted until January 1995.

Submissions to the Task Force from Kurnell residents proposed that aircraft track inbound via Botany Bay Heads for a landing. There is insufficient room to manoeuvre an aircraft for a stabilised approach from 500-700 feet and still remain clear of the Kurnell village.

Modes 3 and 4 involve aircraft departing from Runway 16L and tracking through Botany Bay Heads and arriving aircraft tracking over the western edge of the Kurnell village to land on Runway 34L. These Modes provide maximum over water tracking and should be used whenever weather conditions permit.

In Mode 2, all arriving aircraft track over the Kurnell village to land on 34R. All aircraft would depart from Runway 16R. This would place aircraft very close to or over Cronulla and would negate any initiatives discussed above to move aircraft further to sea off Cronulla.

To meet the required separation standard, the minimum divergence between the departure and arrival tracks is 15 degrees. This would place departing aircraft over, or in close proximity to, Cronulla. Any greater divergence between the departure and arrival paths increases the requirement for aircraft to track further over land with this mode, defeating the purpose of the opposite direction operation—to confine operations over water.

The standard established for Mode 3/4, where there is a divergence of 30 degrees, limits independent operations to the two runways when there is a cloud base of less than 2500 ft or visibility less than 8 km. Initial implementation of simultaneous opposite direction operations has specified a cloud base of 3000 ft and a visibility of 10 km to better provide for controller and pilot familiarisation. Unless independent operations are available, traffic movement rates can be little better than Mode 1 with the enhancement of a left turn after departure.

Any angular difference of less than 30 degrees will require further restriction to the weather minima applicable. The diagram for Mode 2 reflects this 30 degree divergence as the availability of the mode would be significantly limited by the higher weather minima requirement.

The flight path map for Mode 2 depicts arrival paths from the southwest which overfly populous areas to the north of the airport.

To enable this mode to achieve the traffic capacities modelled, arrivals and departures need to be segregated to minimise traffic conflict and therefore complexity. This precludes tracking this traffic to the south of the airport. Tracking further to the north, clear of populous areas would create a significant cost penalty to aircraft operators. Aircraft on the depicted track would be approximately 10,000-12000 ft over the Bankstown area and 8000 ft crossing the coast.

It is proposed that aircraft bound for western destinations that depart from Runway 16L under Mode 3 or Mode 4 climb east of the coast to reach an altitude of 10,000 ft before crossing the coast westbound around Sydney Harbour.

Flight paths showing aircraft turning to track back over the airport in Mode 15 would include altitude requirements to ensure aircraft reach an altitude of 10,000 ft before re-crossing the airport.

#### *Arrival Paths to Runway 25*

Aircraft arriving from southern and western ports of origin will track from the Camden area at higher altitudes than are presently the case and proceed clear of the major areas of population to cross the coast to the south of Port Hacking. From there, tracking will be over water until crossing the coast at Coogee on final approach.

Aircraft from the north will track towards the sea, leaving the inbound track 60 km north of the airport and cross the coast 40 km north as discussed above. From there, tracking will be over water until crossing the coast at Coogee on final approach to the runway.

The altitude that aircraft cross the coast on approach to Runway 25 is approximately 1200 ft AMSL which is an altitude commensurate with the distance to run to touch down.

#### *Departure Paths from Runway 07*

Departing traffic from Runway 07 will follow the paths discussed above under Runway 34R Departures. Currently the tracks used take all jet aircraft over the golf course area to the east of the airfield crossing the coast at Coogee. This is the shortest route to the sea to facilitate over water tracking. Non-jet aircraft track over the Moore Park, Centennial Park area towards South Head.

The track to Coogee, whilst over significant open land and providing the shortest track to the coast, is almost the reciprocal of the arrival track. The Task Force sought to avoid this where possible and also to provide more than one departure track, where possible, to share the noise. The Eastern Suburbs of Sydney are densely populated and there are few opportunities to identify

alternative tracks that could be used over less populous areas than the two currently used. The Task Force was mindful of the impact of any track over the Prince of Wales Hospital at Randwick. This precluded the establishment of any additional track between the two established tracks.

A track to the south of the existing track, over the Maroubra/Matraville area would be available for non-jet aircraft or at times for jet aircraft to the south to provide the diversity of tracking and to avoid the use of the reciprocal arriving flight path. Unlike the flight paths associated with arriving traffic to Runway 34, there is no potential conflict between departures and arrivals when Runway 07 is used by itself.

A track that takes non-jet aircraft over the industrial areas of Alexandria and Waterloo and thus over the city would also be utilised to provide variation in tracking, thus sharing the noise. This track requires aircraft to climb at a steeper gradient than required for other tracks due to the height of the city buildings.

Departing jet aircraft will reach altitudes of approximately 4000 ft crossing the coast at Coogee or 5000 ft in the Dover Heights area. Climb performance will not be hindered by conflicting arriving traffic east of the coast where Runway 07 is in use and these altitudes may well be exceeded, depending on prevailing weather conditions and aircraft weight. However altitudes over a geographical point, particularly in the early stages of flight, are generally lower than those achieved by aircraft that depart Runway 34R because the distance travelled from the start of the take-off roll is less.

Once aircraft are established east of the coast over water tracking can be employed for most aircraft until beyond the areas of major population. Where jet aircraft are bound for western destinations it is proposed that an altitude requirement of 8000-10,000 ft be reached before re-crossing the coast to the north of the airport.

#### *Arrival Paths to Runway 07*

Arriving traffic to Runway 07 from northern departure points will be tracked further to the west than the current flight paths to be positioned for final approach in the Camden area at an altitude commensurate with a low power/low noise descent profile.

Whilst there will be some variation in the flight paths beyond 10 nm, closer to the aerodrome aircraft will be aligned with the runway.

Aircraft arriving from the east will be held above the departing traffic and cross the coast at Port Hacking at an altitude commensurate with the distance to run to touchdown. It is anticipated that this altitude will be approximately 10,000ft. Simulation during the implementation phase will be undertaken to optimise this track and altitude.

### *Departure Paths from Runway 25*

Departures to the west will track on diverse paths which, to some extent will be determined by the ultimate destination of the aircraft. It is proposed that, over time, the distribution of traffic on the nominal tracks shown on the plan be equitable. Monitoring over a short period, say one hour, may not show that equity if there is a concentration of departures to similar destinations.

The track depicted on the flight path maps showing aircraft departing Runway 25 and tracking to the east over Sydney Harbour would not be a frequently used track as this runway is generally unsuitable for use by aircraft to oceanic destinations except in strong headwind conditions.

Avoidance of the reciprocal approach path will be employed to the extent practicable, in particular for western and northern jets. In order to utilise non-populous areas, particularly the area associated with the Holsworthy military establishment, it may be necessary to maintain southbound aircraft on runway heading for approximately 8 nm before turning to the south. The point at which the aircraft commence their turn and thus the altitude of the turn will vary with tracking requirements and provide some variation in flight paths to limit noise concentration.