

Report No 02147-10
Version C

PROPOSED RESIDENTIAL DEVELOPMENTS
NEAR CANBERRA AIRPORT:
ASSESSMENT OF AIRCRAFT NOISE IMPACTS

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1 INTRODUCTION

The proposed Tralee residential development is located to the southeast of Jerrabomberra, south of Queanbeyan. The proposed development is within NSW, immediately adjacent to the NSW - ACT border. It consists of two sections, referred to as Tralee North and Tralee South. The proposed residential developments at the properties known as Environa, the Robin land, Forrest, Morrison and Tralee Station are immediately adjacent to Tralee and are affected by aircraft noise to a similar or lesser extent.

The area is currently subject to noise from aircraft departing Canberra Airport in the 17 direction (departures to the south), and to a lesser extent aircraft arriving in the 35 direction (arrivals from the south).

This report presents a description of the current and likely future aircraft noise impacts within the proposed Tralee development area, with comments on the suitability of the area for residential use, from the point of view of aircraft noise exposure.

2 EXISTING NOISE EXPOSURE

This analysis of existing aircraft noise exposure at the Tralee site is based on detailed data supplied by Airservices Australia from their Noise and Flight Path Monitoring System, for the period June 2002 to June 2004. Comparison with more general information published by Airservices Australia for year 2005 indicates that the pattern and nature of aircraft operations in this area has not altered significantly since that time.

2.1 Aircraft Operations at Canberra Airport

Canberra Airport has one major runway, oriented approximately north to south, which takes the majority of jet aircraft operations, and a smaller cross runway, oriented approximately north-west to south-east, which takes mostly smaller aircraft. Tralee is situated to the south of the Airport, and is affected only by aircraft operating to the south on the main runway – that is, aircraft approaching from the south or departing to the south. Using standard runway designations, aircraft approaching from the south are said to be approaching on runway 35, or “in the 35 direction”, while aircraft departing to the south are said to be departing on runway 17, or “in the 17 direction”. Conversely, aircraft approaching the main runway from the north are said to be approaching on runway 17, while aircraft departing to the north are said to be departing on runway 35.

The direction in which aircraft land and take off at an airport is governed by a combination of meteorological conditions (particularly wind) and airport policy. In most circumstances, landings and take-offs cannot be undertaken if the wind speed is greater than five knots coming from behind the aircraft, or greater than 20 knots at right angles to the aircraft’s direction. In many cases this will ensure that only one of the two possible directions of the main runway is available for use. Where both directions are possible (for example, when the wind speed is below five knots) one direction will be “preferred”.

The preferred runway for departures at Canberra Airport at all times of day is runway 35 (i.e. departing to the north), with runway 17 having second preference. During the daytime this means that most arrivals are also on runway 35 (i.e. arriving from the south), although formally runways 35 and 17 have equal priority. This is because the use of a single runway direction provides more efficient processing of operations.

2.2 Aircraft Flight Tracks Affecting Tralee

Figure 2-1 to Figure 2-8 show actual recorded flight tracks for jet aircraft arriving in the 35 direction, and departing in the 17 direction, for four separate weeks in 2005, as recorded by Airservices Australia’s Noise and Flight Path Monitoring System. Tracks for non-jet aircraft are generally more dispersed, but these are much less significant in terms of noise exposure.

As shown in those Figures, jet aircraft arriving in the 35 direction generally follow the runway centre-line, which is to the east of Tralee but directly over some developed areas in south Jerrabomberra. On the other hand, jet aircraft departing to the south generally execute a right turn, taking their flight track directly over both Tralee North and Tralee South. The number of such operations is, however, much lower than the number of arrivals from the south.

A change in procedures for southerly departures was implemented in 2004, and the effect of this can be seen in the much narrower spread of departure tracks in June and July of that year compared with February. The spread of departure tracks in February is consistent with that found in previous years. The spread for June and July is consistent with more general information published by Airservices Australia for subsequent months, and is considered to be representative of current operations.

By way of comparison, Figure 2-9 and Figure 2-10 show aircraft arrival and departure tracks at Sydney Airport over a one-week period in December 2005.

Figure 2-1 Track Plots coloured by Altitude for Jet Arrivals during the Period 02/03/2005 to 08/03/2005

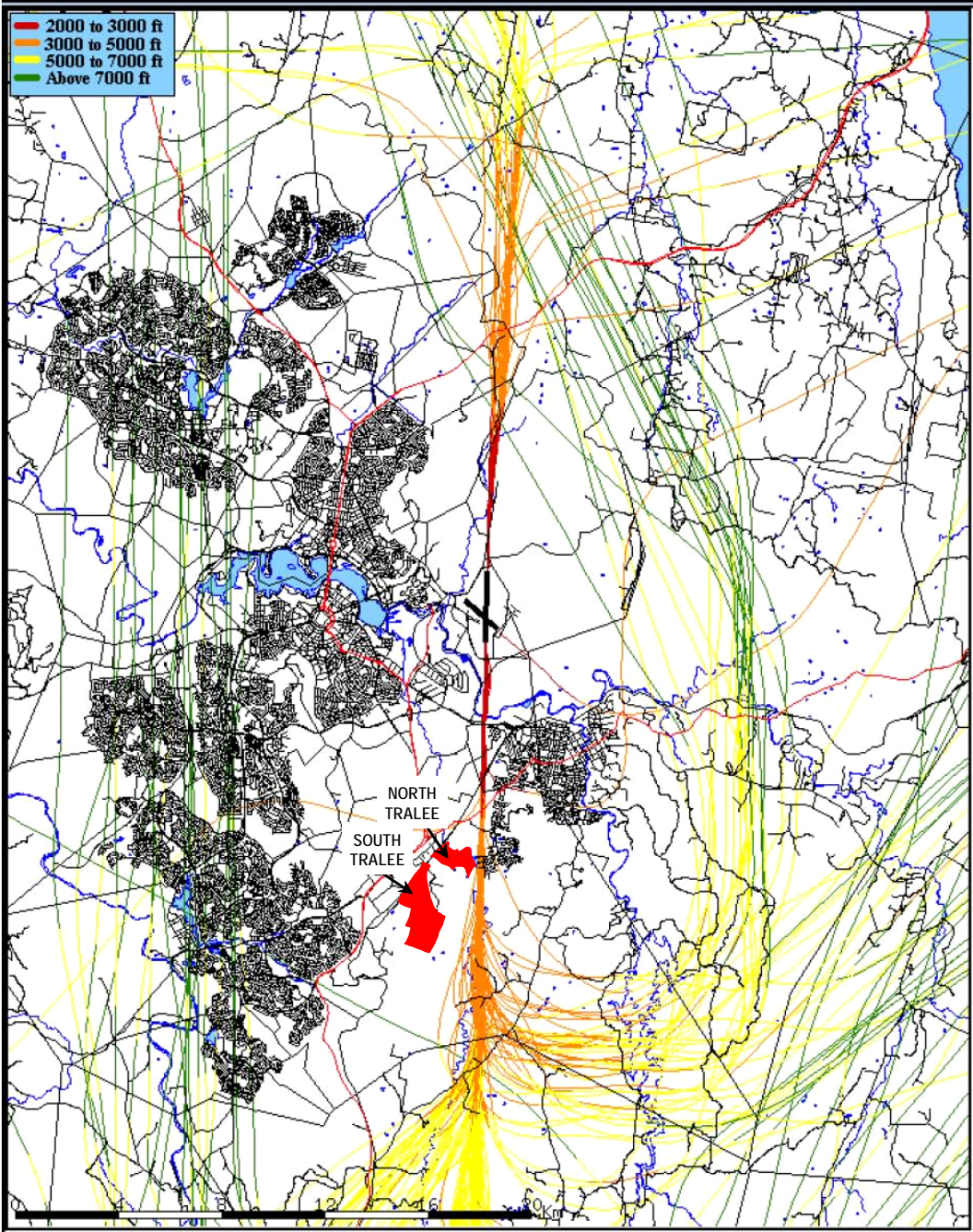


Figure 2-2 Track Plots coloured by Altitude for Jet Departures during the Period 02/03/2005 to 08/03/2005

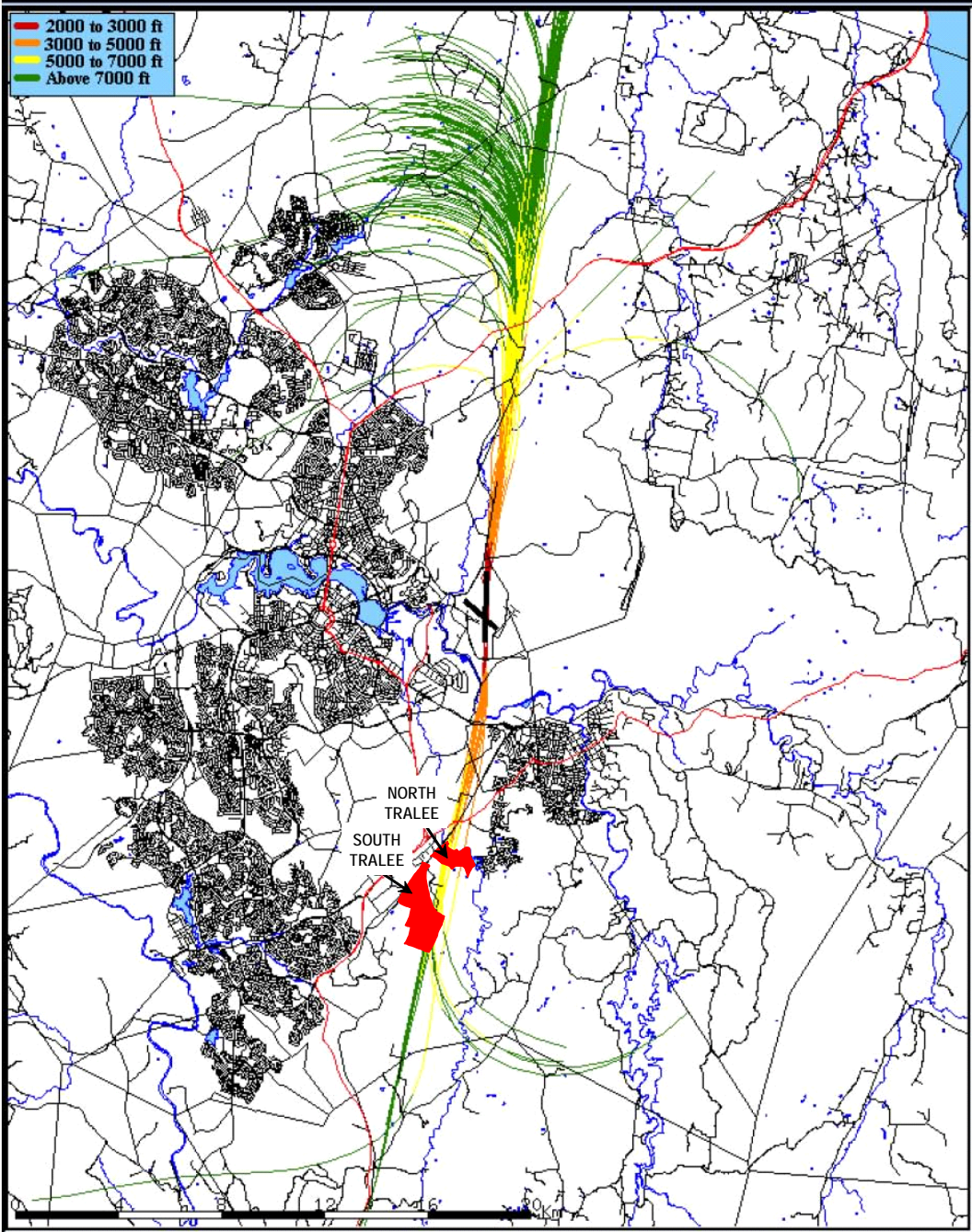


Figure 2-3 Track Plots coloured by Altitude for Jet Arrivals during the Period 02/06/2005 to 08/06/2005

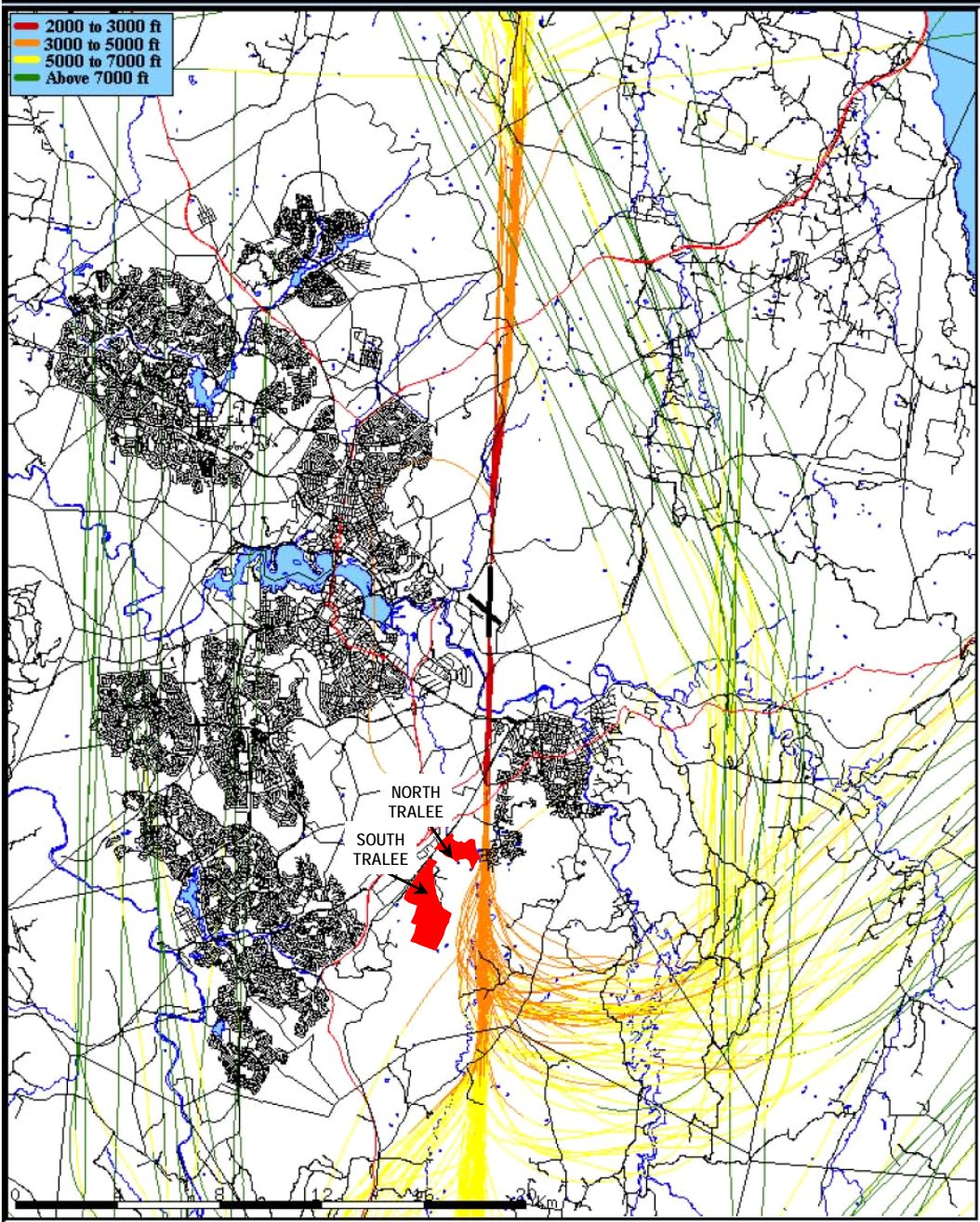


Figure 2-4 Track Plots coloured by Altitude for Jet Departures during the Period 02/06/2005 to 08/06/2005

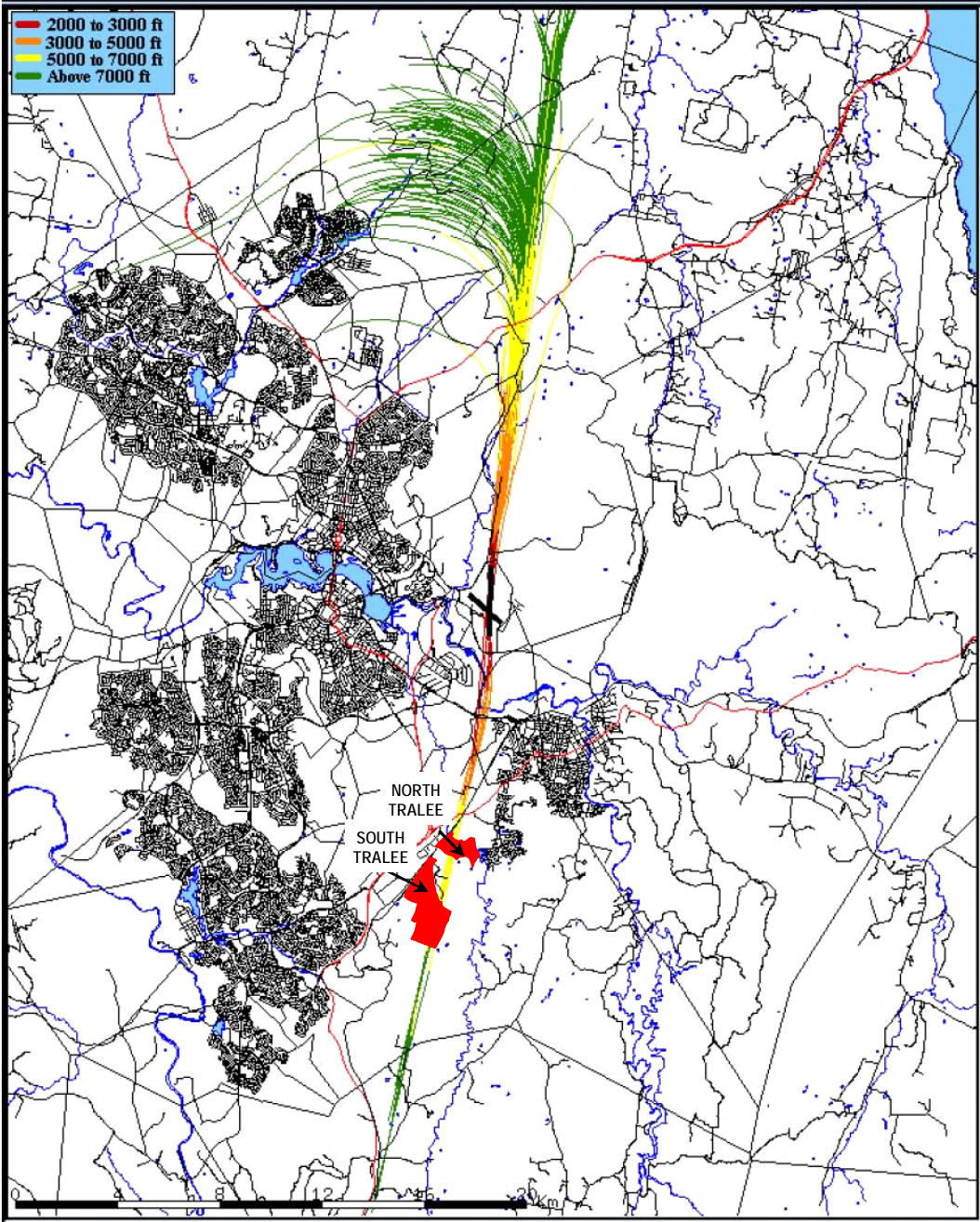


Figure 2-5 Track Plots coloured by Altitude for Jet Arrivals during the Period 02/09/2005 to 08/09/2005

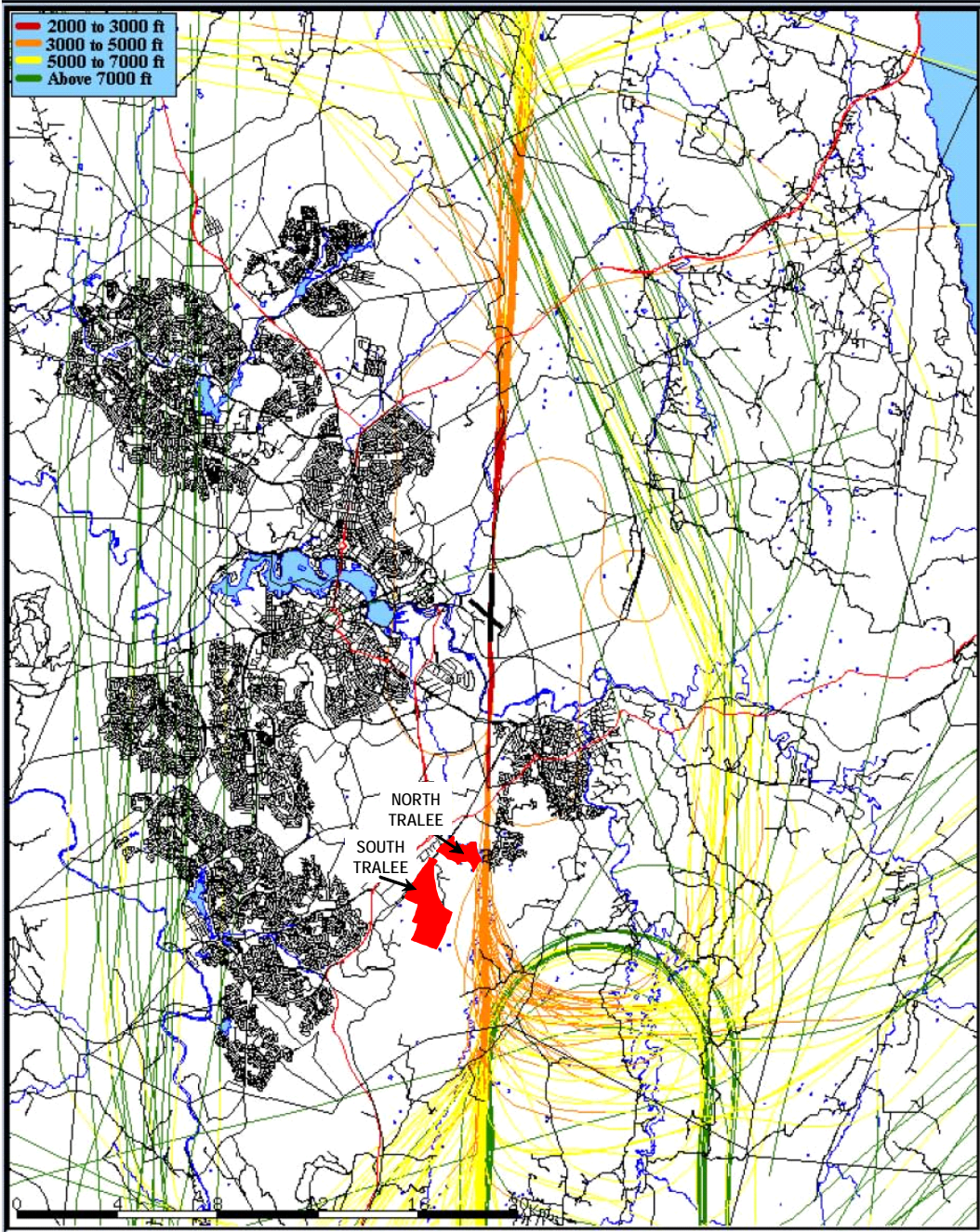


Figure 2-6 Track Plots coloured by Altitude for Jet Departures during the Period 02/09/2005 to 08/09/2005

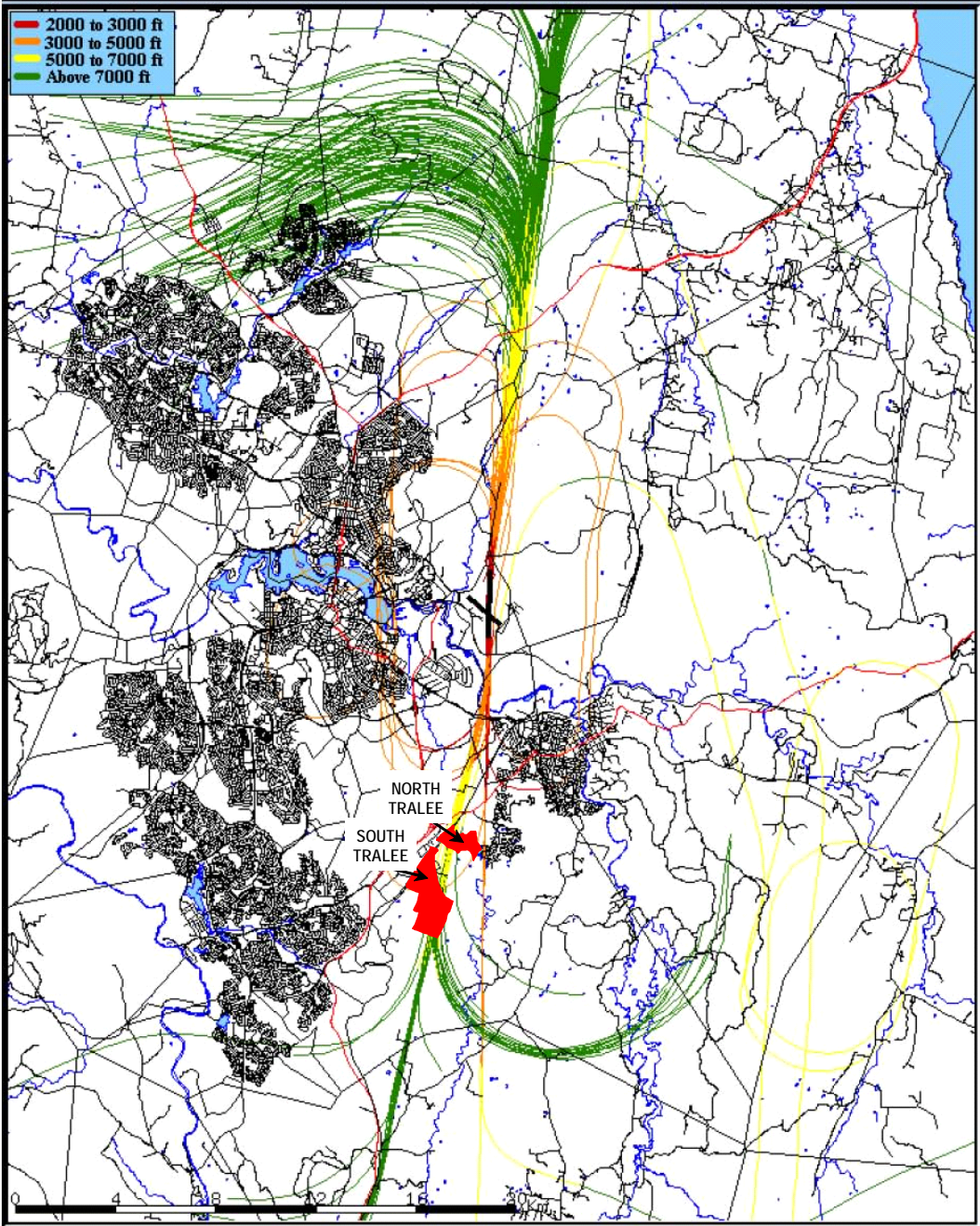


Figure 2-7 Track Plots coloured by Altitude for Jet Arrivals during the Period 02/12/2005 to 08/12/2005

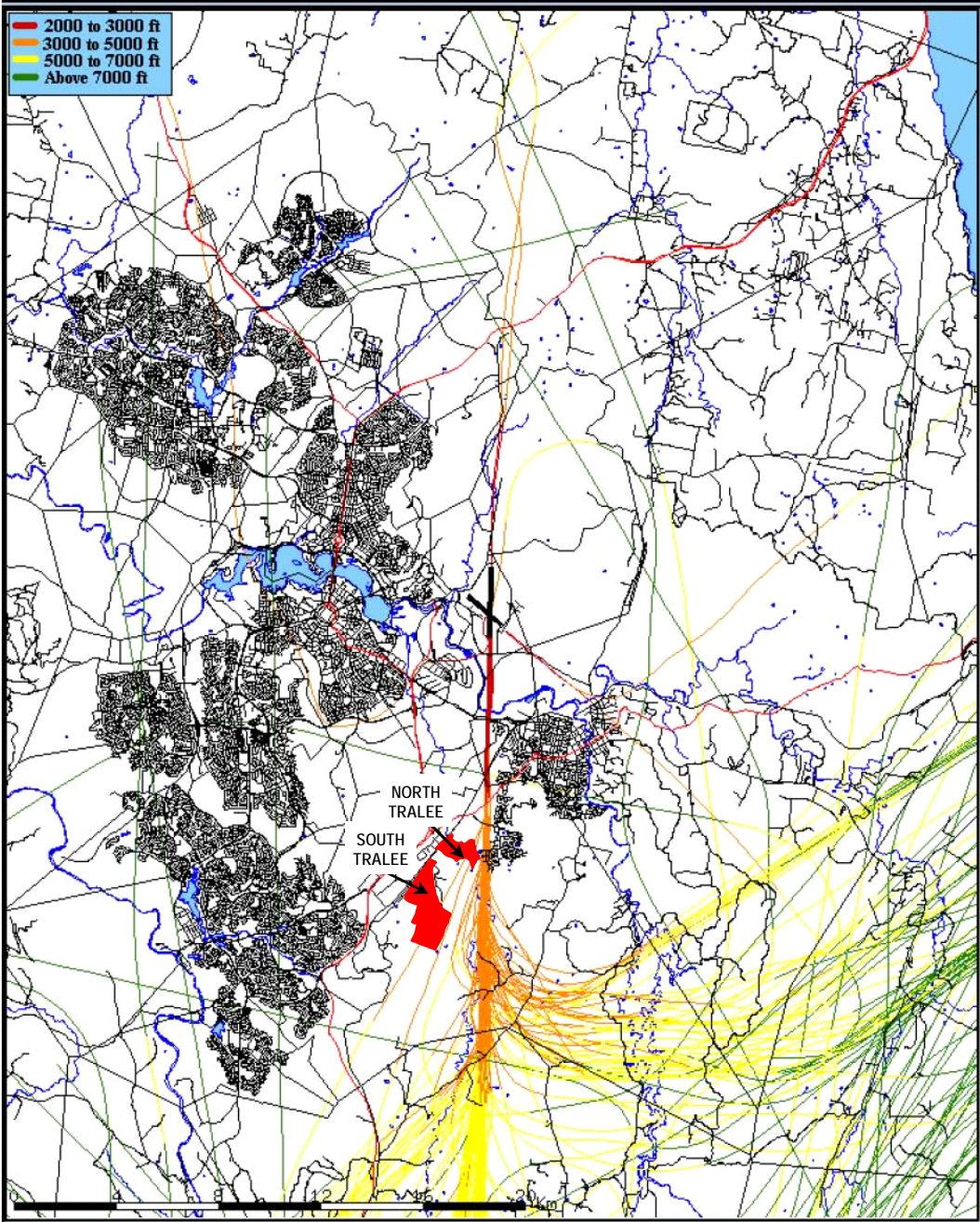


Figure 2-8 Track Plots coloured by Altitude for Jet Departures during the Period 02/12/2005 to 08/12/2005

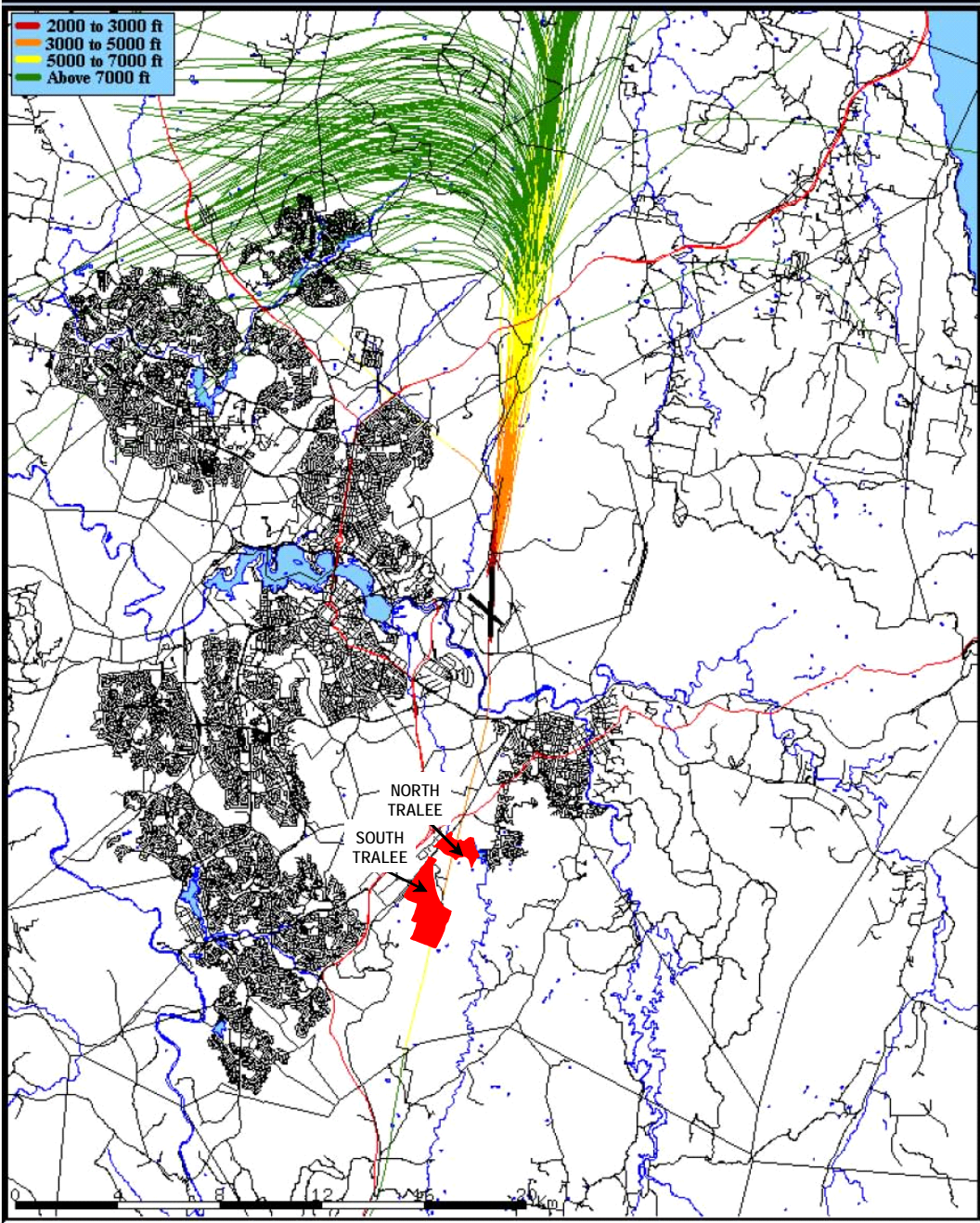


Figure 2-9 Sydney Airport - Track Plots coloured by Altitude for Jet Arrivals during the Period 02/12/2005 to 08/12/2005

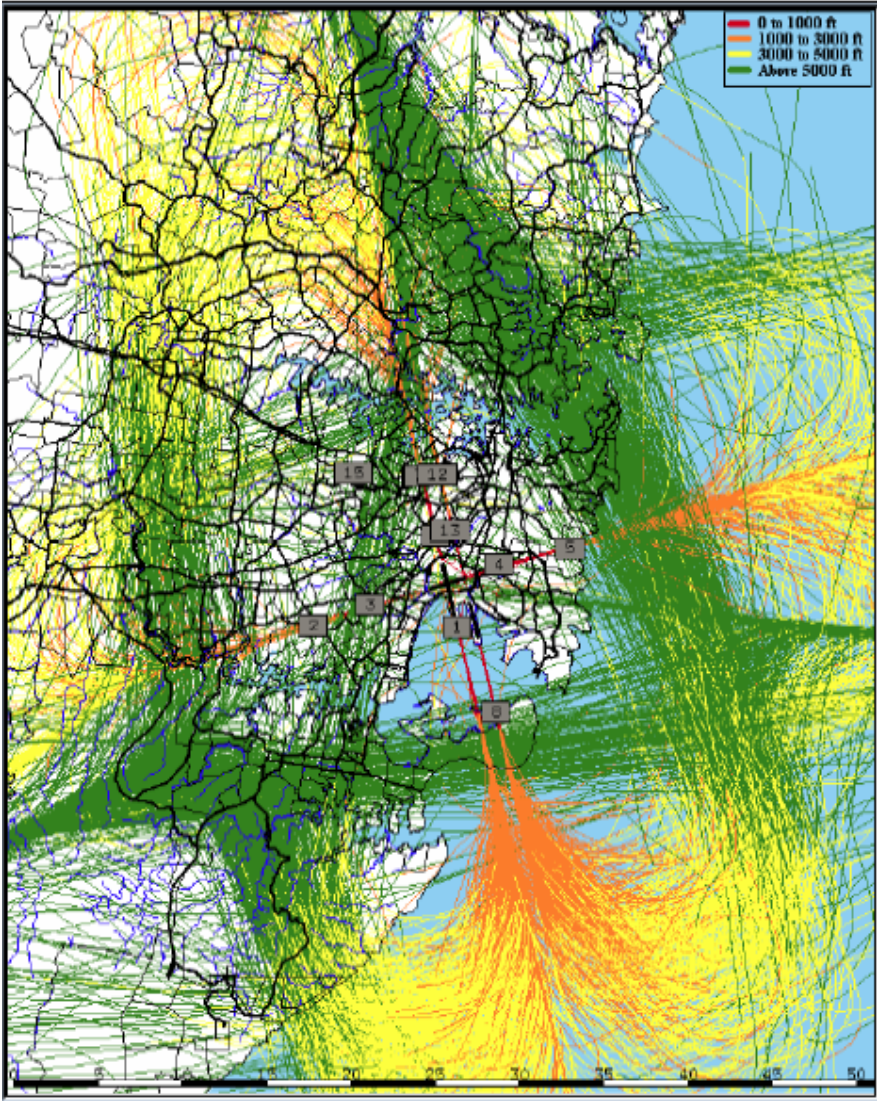
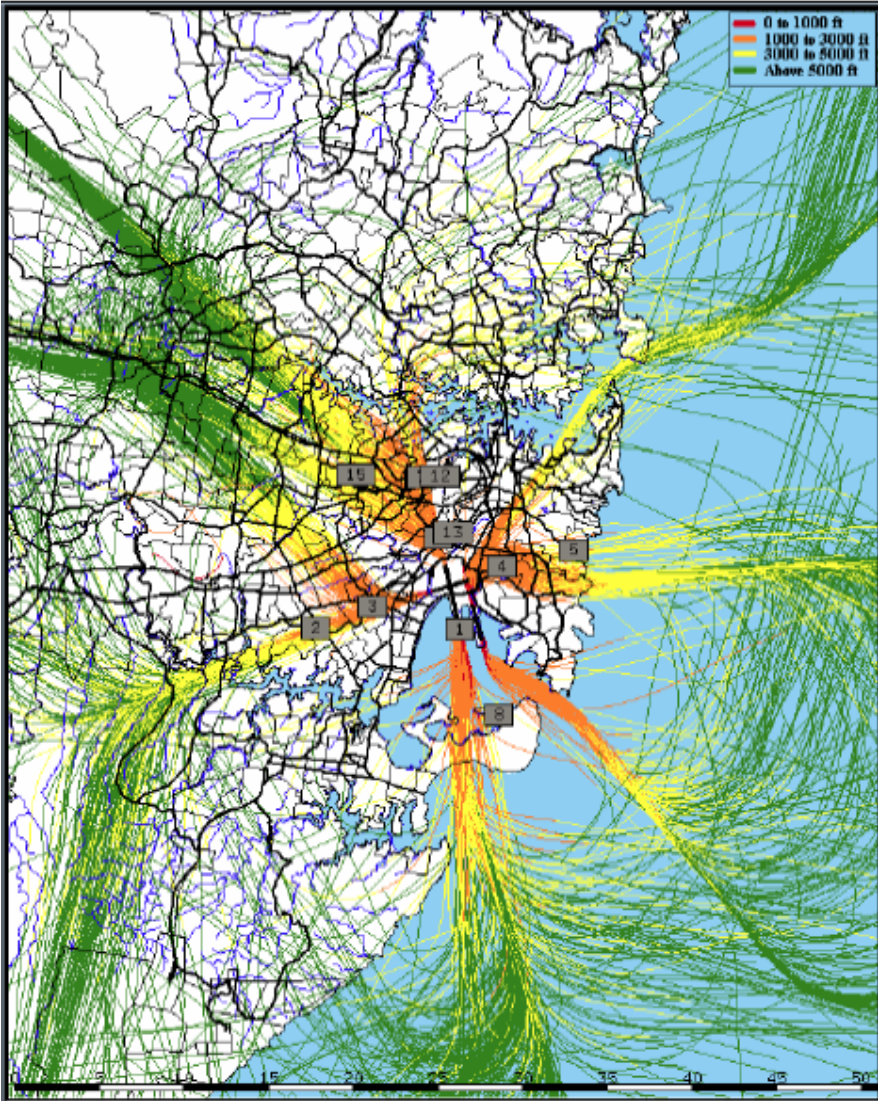


Figure 2-10 Sydney Airport - Track Plots coloured by Altitude for Jet Departures during the Period 02/12/2005 to 08/12/2005



2.3 Numbers & Types of Aircraft Operations Affecting Tralee

Figure 2-11 to Figure 2-14 show the number of arrivals on runway 35, and departures on runway 17, at Canberra Airport for the period July 2002 to June 2004. The total number of arrivals and departures at the airport per month was approximately constant through this period, as was the number of jet arrivals and departures. Between approximately 5% and 25% of all departures occurred on runway 17, and approximately 50% of all arrivals occurred on runway 35. Considering only operations by jet aircraft, once again between approximately 5% and 25% of departures occurred on runway 17, while between 60% and 90% of jet arrivals used runway 35.

Departures on 17 have a strong tendency to occur on specific days. This is particularly true for jet departures, which result in higher noise levels in the area of the Tralee development (see Section 2.4). As an example, Figure 2-15 shows the number of jet departures on 17 and jet arrivals on 35 for each day of April and May 2004.

The general pattern of operations is that on any day there will be approximately 15-30 approaches and 15-30 departures by jet aircraft. On most days, both approaches and departures are on runway 35, so that operations affecting the Tralee development are restricted to approaches. However, on some days this is reversed, due to wind conditions, and there are 15-30 jet departures which may affect Tralee. On average for the period June 2002 to June 2004 there were 4.6 days per month, or approximately one day per week, with more than 10 jet departures on runway 17.

Figure 2-11 Total Departures at Canberra Airport, and Percentage on Runway 17 By Month – July 2002 to June 2004

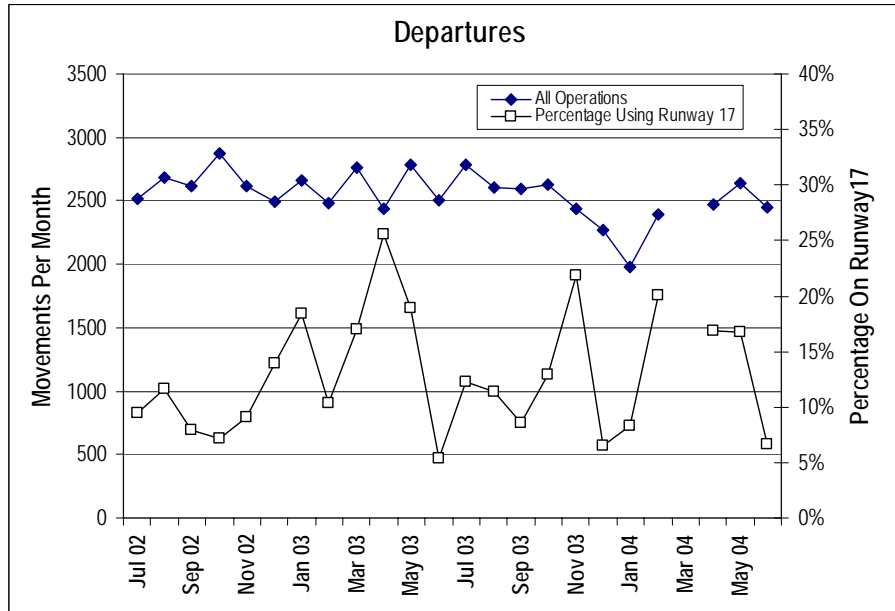


Figure 2-12 Total Jet Departures at Canberra Airport, and Percentage on Runway 17 By Month – July 2002 to June 2004

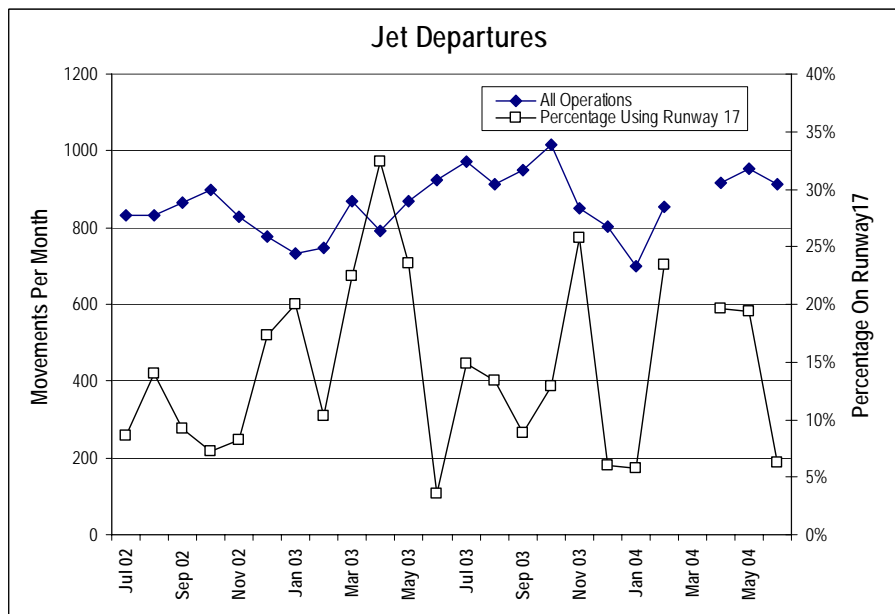


Figure 2-13 Total Arrivals at Canberra Airport, and Percentage on Runway 35 By Month – July 2002 to June 2004

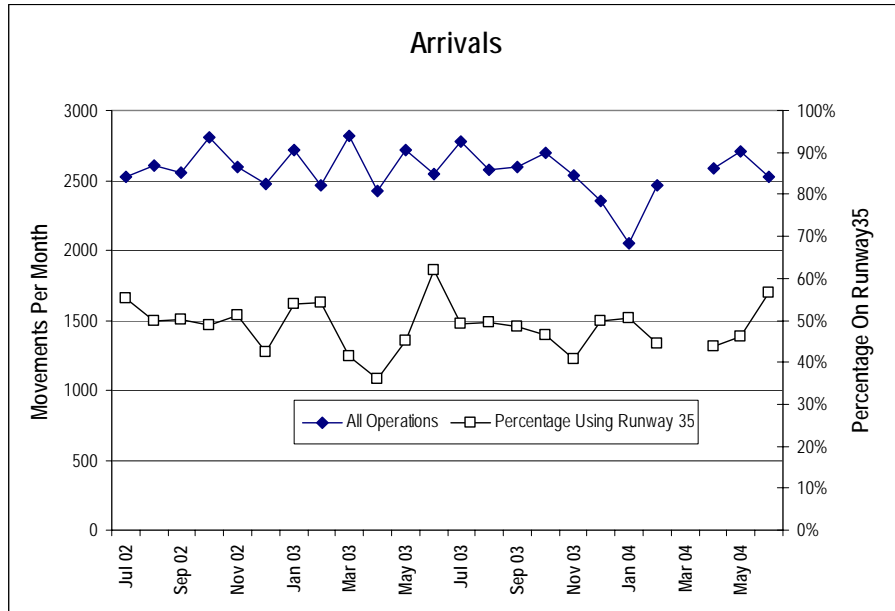


Figure 2-14 Total Jet Arrivals at Canberra Airport, and Percentage on Runway 35 By Month – July 2002 to June 2004

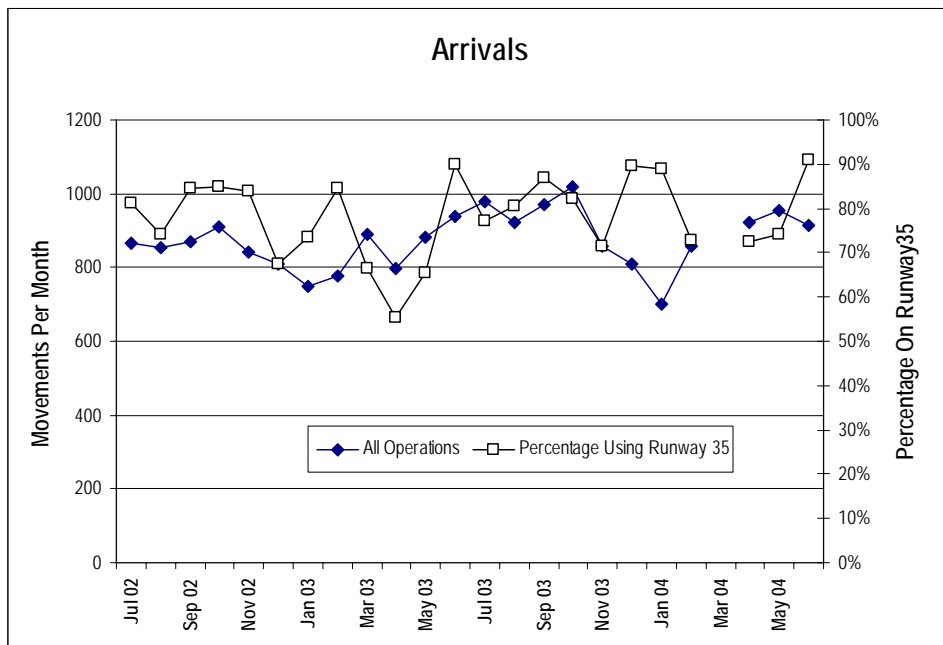
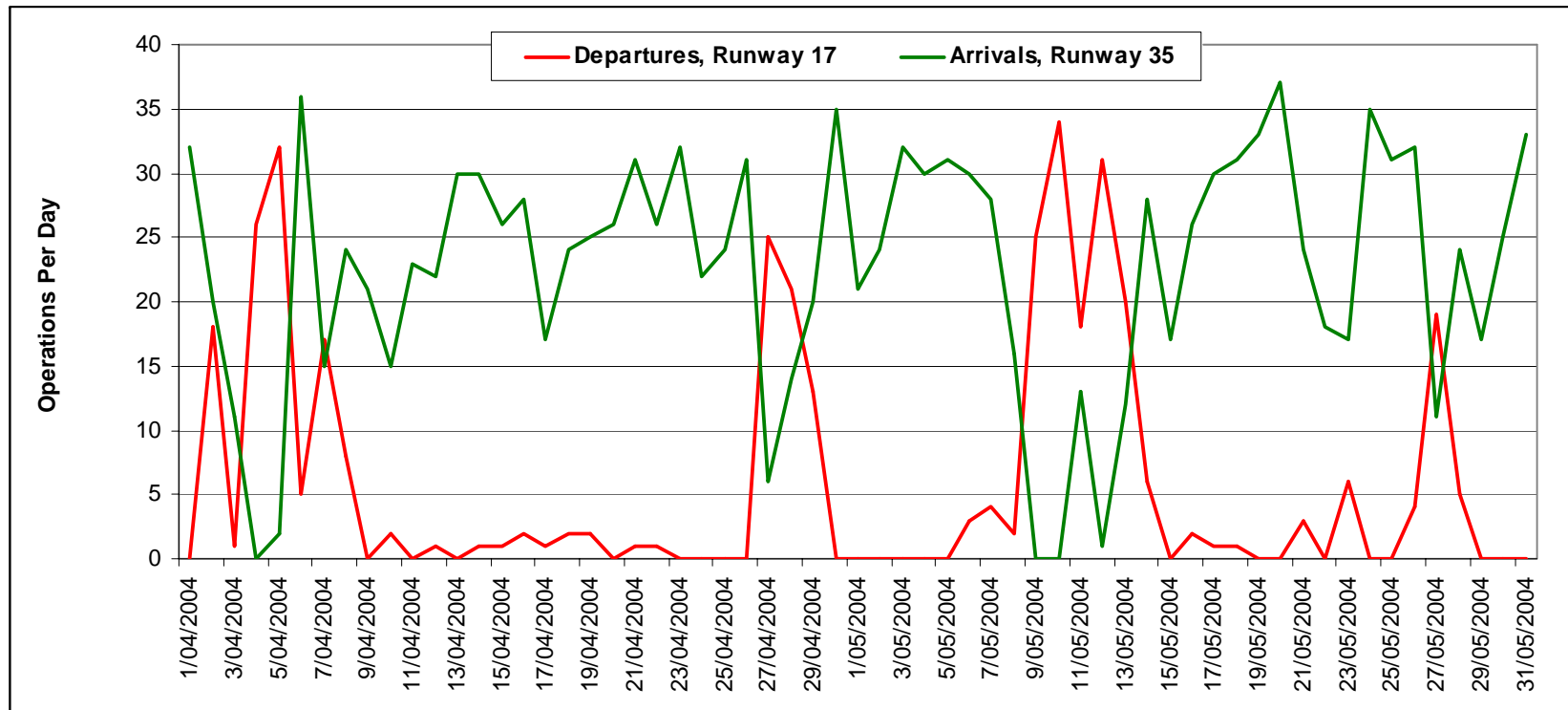


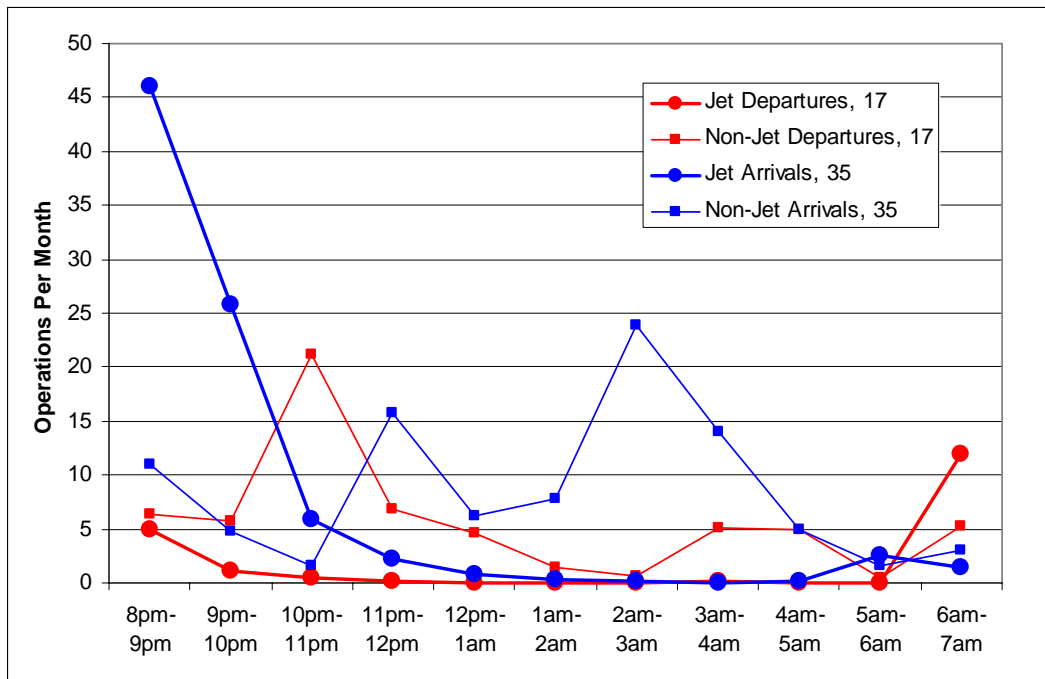
Figure 2-15 Daily Jet Arrivals and Departures to the South of Canberra Airport, April – May 2004



2.4 Night Time Operations

Between 8.00pm and 7.00am the preferred runway for approaches is runway 17, so that in the preferred mode both approaches and departures occur to the north of the airport. The average number of operations per month which occur to the south of the airport between 8.00pm and 7.00am is shown in Figure 2-16.

Figure 2-16 Night-Time Operations to the South of Canberra Airport



In practice, after 9.00pm there are few operations to the south. One light turboprop aircraft appears to depart regularly on runway 17 between 10.00-11.00pm (independent of other runway utilisation), and one arrives regularly between 2.00-3.00am, but apart from this the number of night time operations to the south of the Airport is very low. Over most of Tralee, noise from the arriving aircraft would be negligible.

2.5 Noise Levels from Aircraft Overflights – Calculated

Maximum noise levels within the proposed development areas due to operations by various aircraft types can be calculated using tables provided in Australian Standard 2021:2000. This method is approximate only, but has been shown to give a useful estimate of maximum noise levels in the absence of exact flight path parameters which are required for detailed modelling.

Table 2-1 shows calculated maximum noise levels due to departures of various aircraft types at two locations:

- a “worst case” location in Tralee North, directly beneath a departing aircraft ; and
- a “worst case” location in Tralee South. In Tralee South, noise levels depend significantly on ground height, and the most affected location is at the highest point at which residential development would take place, which is understood to be approximately RL 740.

Table 2-1 Calculated Maximum Noise Levels from Aircraft Departures on Runway 17 at Most-Affected Locations in Tralee North & South

Aircraft Group	Calculated Maximum Noise Level (dBA)		Operations Per Month
	Tralee North	Tralee South	
737-300, -400, -700 and -800	71	69	61
BAe146	70	68	26
Corporate Jets	68	66	6
DHC8, SF340, DHC6 and similar	60	60	87
Light General Aviation	66	65	61
[Other]			5

The following description may assist in interpreting the noise levels shown in Table 2-1:

- A noise level of 70dBA would be likely to cause a speaker to raise their voice, or for some speech to be missed from a constant-volume source such as a television, if the speech heard is indoors with windows open to a normal extent.
- An external noise level of 80dBA would be required to cause the above effects if the windows of a room are closed.

A noise level of 60dBA would be likely to cause a speaker to raise their voice if the listener is outside. A maximum noise level of 70dBA is often considered the point at which the immediate impacts of aircraft noise begin to become important, although all noise levels above 60dBA may result in some impact.

From Table 2-1, the only aircraft types which are predicted to result in noise levels exceeding 70dBA on departure at Tralee North are Boeing 737 aircraft.

For the period June 2002-June 2004, there were approximately 85 such operations per month, mostly concentrated in four or five days in that month. Note that Table 2-1 shows the noise level from an aircraft departing directly overhead at the worst-case location in Tralee North. Due to spreading of departure tracks (even after the change in procedures in 2004) not all 737 departures will result in noise levels exceeding 70dBA at that point, although the proportion which would is difficult to estimate.

At Tralee South, no departing aircraft are predicted to result in noise levels exceeding 70dBA.

The impact of noise from arriving aircraft is currently limited to a small section on the eastern edge of Tralee North. Table 2-2 shows calculated noise levels from these operations at the north-eastern corner of Tralee North, and at a point 500m west of that, which is toward the centre of the site.

Table 2-2 Calculated Maximum Noise Levels from Aircraft Arrivals on Runway 35 at Locations in Tralee North

Aircraft Group	Calculated Maximum Noise Level (dBA)		Operations Per Month
	Most Affected	Centre of Site	
737-300 and -400	71	<60	375
BAe146	68	<60	212
Corporate Jets	63	<60	42
DHC8, SF340, DHC6 and similar	65	<60	144
Light General Aviation	64	<60	352
[Other]			32

From Table 2-2, at the eastern edge of Tralee North noise levels from arriving aircraft will be similar to those from departing aircraft, and there are many more arrivals than departures. However, at the centre of the site, noise from arriving aircraft is virtually negligible. This is the case for the whole of Tralee South.

2.6 Noise Levels from Aircraft Overflights - Measured

The predicted noise levels described above may be verified using the results of noise monitoring. In the case of arriving aircraft, noise levels have been monitored since 5 June 2002 by Airservices Australia at a noise monitoring terminal in Jerrabomberra.

As shown in Figure 2-17, the monitor is at a similar position relative to the runway centre-line as the most affected location in Tralee North. (The monitor is approximately 200m closer to the airport and at a higher RL, which has the effect of increasing predicted noise levels by approximately 1dBA compared with Tralee North.)

Figure 2-17 Location of Airservices Australia Noise Monitor

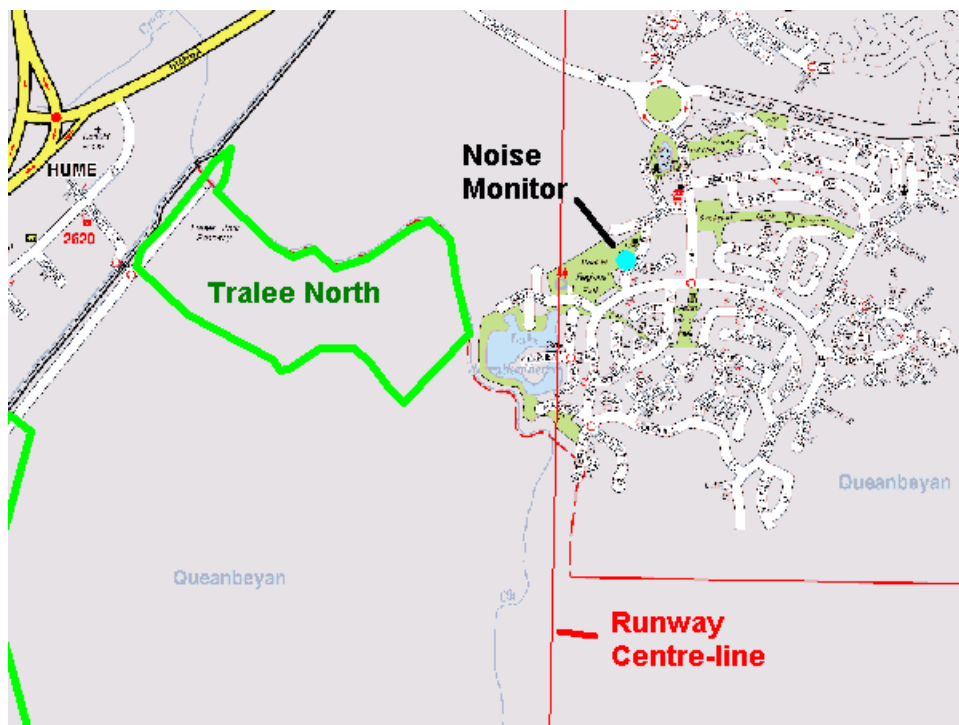


Table 2-3 shows predicted and measured noise levels at this monitor, based on noise levels monitored between June and October 2002. Mean measured noise levels for 737 and BAe146 aircraft are 1dBA above the predicted levels. This small difference may be attributable to site-specific factors.

For other aircraft types the apparent difference is higher. However, in this case the recorded noise levels must be interpreted carefully. The noise monitor records only noise events which exceed a pre-set trigger value and which are not influenced by extraneous noise. This means that measured noise levels may represent only the relatively loud noise events, giving a mean noise level which is biased toward being too high.

For 737 and BAe146 operations, a large proportion of the total movements were recorded, and hence the measured mean value can be considered reliable. For other aircraft types the true mean noise level would be lower than shown in Table 2-3.

Table 2-3 *Maximum Noise Levels Measured at Airservices Australia Noise Monitor*

Aircraft Group	Maximum Noise Level (dBA)		Proportion Measured
	Predicted	Measured (Mean)	
737-300 and -400	72	73	97%
BAe146	69	70	88%
Corporate Jets	64	68	56%
DHC8, SF340, DHC6 and similar	66	70	64%
Light General Aviation	65	68	18%

Of the noise events exceeding 70dBA at the monitor, 70% were due to 737 aircraft, 19% to BAe146 aircraft and the remainder to other types. More recent data indicates that this apportioning is still likely to be valid.

Measurement of noise levels from departures over Tralee is more difficult, because there is not a permanent monitor installed in a relevant location. Attended monitoring is rendered more difficult by the extreme clustering of the events on a few days per month. Nevertheless, attended monitoring was performed on eight days between 9 October 2002 and 10 January 2003, with deployment of monitoring personnel being based on wind speed and direction as advised by the Fairbairn meteorological station.

Equipment for this monitoring consisted of a Bruel & Kjaer Type 2206 Sound Level Meter; with field calibration checked using a Bruel & Kjaer calibrator. Monitoring was conducted at one of two locations as shown in Figure 2-18 which were chosen to be representative of points in Tralee North and Tralee South respectively.

Results of this monitoring are shown in Table 2-4. These measured noise levels show good agreement with predictions, remembering that predicted noise levels are for an aircraft tracking directly overhead. Because the tracks of departing aircraft show significant spread, recorded noise levels can be expected to vary from approximately the predicted noise level down to lower levels representing aircraft which track further from the monitoring position.

From these results it can be noted that:

- At Tralee North, the only aircraft with maximum noise levels exceeding 70dBA were 737 aircraft. Of these, six of the 16 measured aircraft had maximum levels exceeding 70dBA; and
- At Tralee South, none of the 16 measured aircraft had a noise level exceeding 70dBA.

Figure 2-18 Locations of Attended Noise Monitors

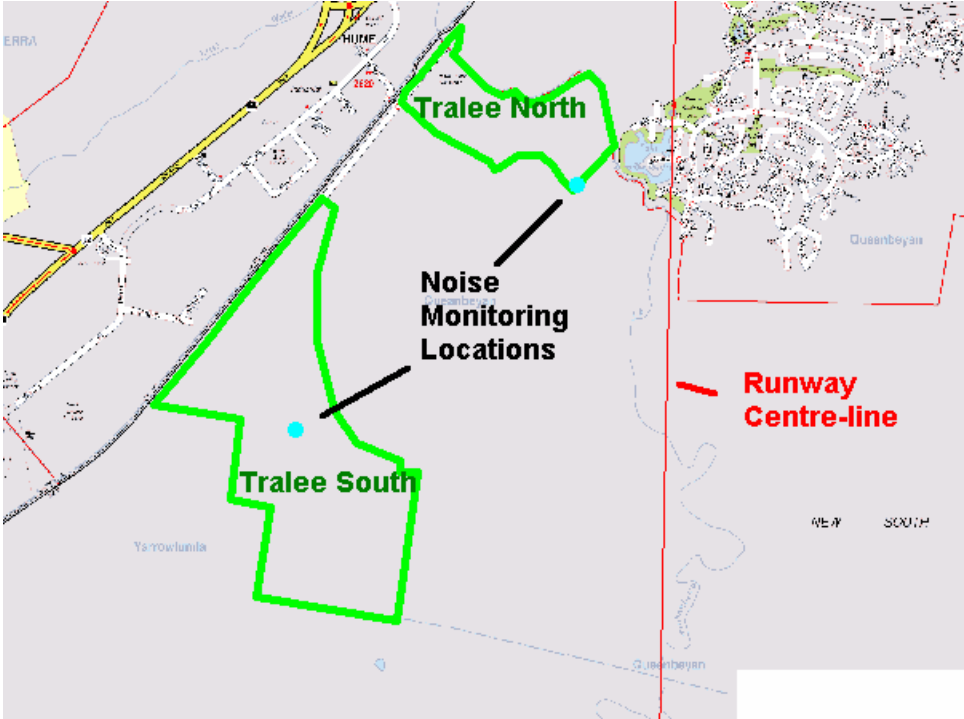


Table 2-4 Measured Noise Levels from Aircraft Departures Over Tralee

Aircraft Group	Measured Noise Level (dBA)		Number Recorded	Predicted Noise Level (dBA) ⁽¹⁾
	Mean	Range		
Tralee North				
737	69	61 – 74	16	71
BAe146	69	66-70	4	70
DHC8	61	53-65	8	60
SF340	58	54-61	2	68
Tralee South				
737	66	56-70	11	69
Bae146	54	-	1	68
DHC8	61	-	1	60
SF340	58	51-68	3	66

Note: 1) For an aircraft tracking directly over the monitoring location

3 COMPARISON WITH OTHER AREAS AFFECTED BY AIRCRAFT NOISE

3.1 Other Areas around Canberra Airport

To understand the significance of current aircraft noise levels at Tralee, it is useful to compare the noise exposure with that in other areas around Canberra Airport. One particularly useful comparison is with various locations in Jerrabomberra, which is in a similar geographical location and affected by operations on the same runway. For comparison, three locations were selected in Jerrabomberra, two in Tralee North and one in Tralee South, as shown Figure 3-1.

Table 3-1 summarises the existing noise exposure at these locations, based on noise levels calculated using the procedures above.

Figure 3-1 Locations for Comparative Noise Assessment

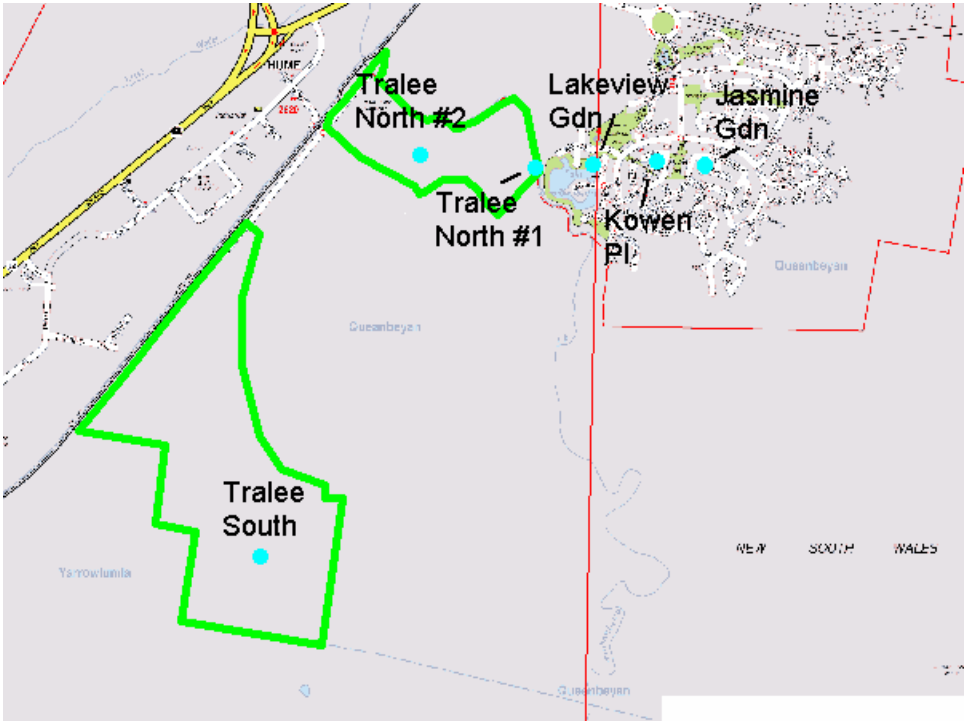


Table 3-1 Comparison of Noise Exposure at Three Points in Tralee and Three Point in Jerrabomberra

Operation	Aircraft Type	Parameter	Tralee Nth #1	Tralee Nth #2	Tralee South	Lakeview Garden	Kowen Place	Jasmine Garden
Approach	737	Max Noise Level (dBA)	71	<60	<60	75	71	66
		Est. Proportion of Events > 70dBA	60%	0%	0%	100%	60%	10%
	BAe146	Max Noise Level (dBA)	68	<60	<60	72	68	62
		Est. Proportion of Events > 70dBA	30%	0%	0%	70%	30%	0%
Departure	737	Max Noise Level (dBA)	71	71	69	-	-	-
		Est. Proportion of Events > 70dBA	50%	50%	20%	-	-	-
	BAe146	Max Noise Level (dBA)	70	70	68	-	-	-
		Est. Proportion of Events > 70dBA	30%	30%	10%	-	-	-
SUMMARY								
Maximum Predicted Noise Level (dBA)			71	71	69	75	71	66
Events Per Month Exceeding 70dBA (estimated)			338	34	13	552	305	40

From Table 3-1, current noise exposure at any point in Tralee is significantly lower than at the worst-case location in developed areas in Jerrabomberra, as represented by residences in Lakeview Garden. The worst-case location in Tralee would experience noise from arrivals, and would have a similar noise environment to Kowen Place in Jerrabomberra.

The bulk of Tralee North would currently experience similar maximum noise levels to Kowen Place, but with much lower numbers of events per month. As described above, residents in Tralee North would experience significant numbers of overflights approximately once per week, whereas residents of Kowen Place experience these levels approximately six days per week.

In Tralee South, maximum predicted noise levels are intermediate between those in Kowen Place and Jasmine Garden, but once again the number of events experienced would be much lower.

3.2 Other Australian Airports

This section describes areas around some major Australian airports at which aircraft noise exposure is in some ways comparable to the current exposure at Tralee. All these areas include a substantial amount of existing residential development.

3.2.1 Sydney Airport

At Sydney, the area with noise exposure closest to Tralee would include the suburbs of Darling Point, Point Piper and Double Bay, as shown in Figure A-1. This area experiences noise from departures only, from runway 34R, and on a reasonably sporadic basis. It is also about the same distance from the end of the relevant runway as Tralee, so the maximum noise level from a given aircraft type would be similar, within 1-2dBA. It also experiences very few 747 overflights, and the mix of jet aircraft types is quite similar to Tralee. However, it experiences an average of about 22 jet aircraft departures per day, compared with four at Tralee.

Sydney Airport is known to record more noise complaints than any other airport in Australia, although exact data are not publicly available for other airports. In the 12 months to November 2003, nearly 4,400 noise complaints were recorded at Sydney. Of these, only seven were from the suburbs of Darling Point, Point Piper, or Double Bay, and of these at least three were from the same complainant. The total population of these suburbs is approximately 11,800 people.

3.2.2 Perth Airport

In Perth, the best comparison would be with an area in east Greenmount, about 800-3000m from the centre-line of the cross runway (runway 06/24). The area is shown in Figure A-2. Based on statistics for the third quarter of 2003, this area currently experiences noise from 18 departures per day (all aircraft types), compared with nine for Tralee. Departures in Perth would not fly directly overhead, but the noise level would be similar to that in Tralee, at between 55-71dBA. In Perth the most-affected location would also experience noise from 28 arrivals per day at up to 63dBA, compared with 42 arrivals per day at a similar level in Canberra. However, in most of the area noise from arrivals would be negligible.

The two areas are also in a similar position with respect to the ultimate-capacity ANEF for the airport (see below).

3.2.3 Melbourne Airport

Here the best current comparison with Tralee would be an area to the west of the Calder Highway, beneath one of the western departure tracks, in the area of Plumpton (Figure A-3). This is further from the airport than Tralee, but noise levels are comparable because the departing aircraft include 747's. The number of departing aircraft using this track is difficult to determine, but from available track density plots and other information it is estimated at about 30 per day, compared with 10 for Tralee.

In this case, the area is not in a comparable location with respect to future noise exposure (as shown in the ANEF) due to the fact that Melbourne Airport's ANEF allows for the presence of a parallel east-west runway to the south of the existing one.

3.2.4 Adelaide Airport

Figure A-4 shows an area in Adelaide, generally in and near the suburb of Glenside, with comparable noise exposure to Tralee, experiencing departures only with noise levels from individual events similar to those at Tralee. The number of operations per day using this track cannot be defined precisely from available data, but is estimated at about 25 per day compared with 10 for Tralee.

3.2.5 Brisbane Airport

Around Brisbane Airport, the area which most closely resembles Tralee in terms of noise exposure is around the suburbs of Virginia and Banyo (Figure A-5). This is further from the airport in terms of track miles for departures, but the departures include long-range 747's. Results from a nearby noise monitoring terminal confirm that noise levels at the location shown would be similar to those at Tralee. However, in this case the number of operations would be significantly higher with an estimated average of 45 operations per day.

4 FUTURE NOISE EXPOSURE

4.1 Projected Future Movements – 2050 ANEF

The Canberra International Airport Year 2020 Master Plan includes an ANEF chart labelled “2050 ANEF”, which is understood to represent the official ANEF for Canberra Airport, although it has since been described as representing the ultimate capacity of the airport rather than a projection for any specific year. This forecast includes a total of 810 aircraft operations per day, compared with the current average of approximately 180, and the current rate of approximately 780 movements per day at Sydney Airport.

The forecasts included in the “2050 ANEF” projections have been questioned in a number of reports, notably “Canberra Airport: Aviation Aspects of Noise Study – Village Building Company Development at Tralee” by The Ambidji Group. That report proposes what it describes as a “more realistic dataset” for use in calculating a future noise exposure around Canberra Airport, with a projected ultimate movement rate of approximately 500 movements per day.

The following points may also be noted with regard to the “2050 ANEF” projections:

- The projections incorporate significant numbers of 767 aircraft in addition to the 737 aircraft currently operating, although the projected number of 747 aircraft remains very low. In combination, these types represent over 50% of the projected departures on runway 17. For short-range departures, 767 aircraft would be approximately 1dBA louder than 737 aircraft at Tralee, and arrivals would be approximately 2dBA louder at Jerrabomberra. Hence, the use of these aircraft would tend to increase noise exposure in both these locations.
- The projections assume that there would be no light piston-engined general aviation aircraft departing on runway 17.
- The use of business jets is projected to increase dramatically.
- The use of military aircraft is projected to increase, although the number of movements remains small.

The projected movement rates in the 2050 ANEF are considered very high by the standards of most single-runway airports. The projections assume an average of 615 movements per day in the period 7.00am-7.00pm, or an average of 51 movements per hour. Given normal hourly variability in the number of presenting aircraft, this would correspond to a peak-hour value of at least 70 movements per hour. It is considered very questionable whether this movement rate could be sustained in an airport with only one major runway.

There are also questions as to whether the projected movement numbers are realistic given the projected growth in Canberra’s population. However, these are beyond the scope of this report.

In the following, both the “2050 ANEF” movement projections and those of The Ambidji Group are considered in terms of their impact on noise levels, and hence land use planning issues, at Tralee.

4.2 Night-Time Exposure

The 2050 ANEF indicates that movements in the ANEC “night” period from 7.00pm-7.00am would increase from the current value of approximately 30 per day to approximately 195. This is an even higher rate of increase than for operations as a whole. Table 4-2 shows relevant numbers of operations per day for operations affecting Tralee. These increase by a still higher proportion.

Table 4-1 *Night Time (7.00pm-7.00am) Aircraft Movements Per Day*

Operation	Aircraft Type	Current (2003/4)	“2050 ANEF”
17 Departures	All	3.2	19.7
	Jet	1.0	15.3
35 Arrivals	All	7.3	63.0
	Jet	3.6	50.7

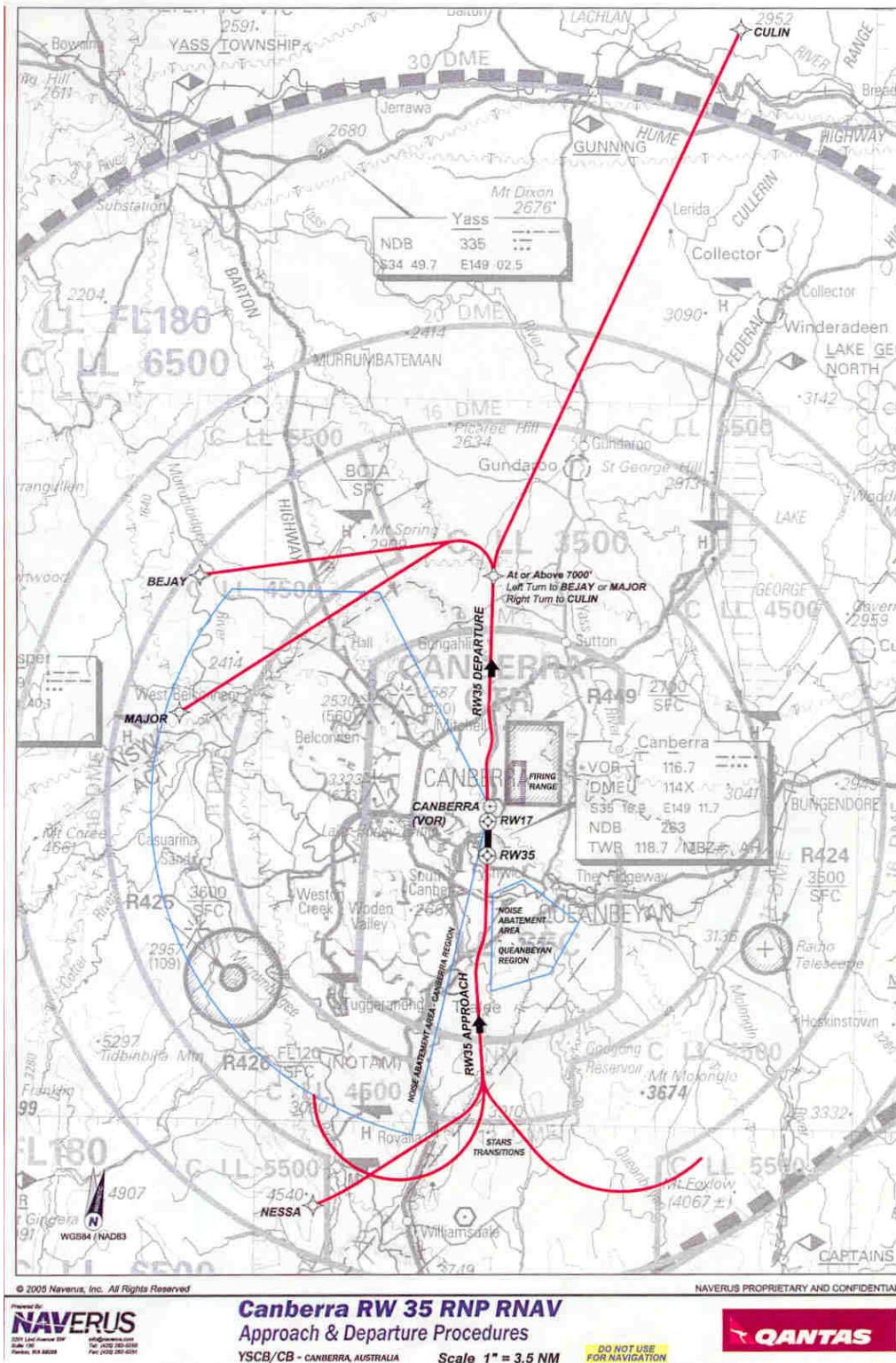
On the basis of social survey data, the ANEF unit provides for one aircraft movement between 7.00pm-7.00am to be equivalent to four movements between 7.00am-7.00pm in terms of noise impact. Hence, the increases in number of operations predicted for this period have had the effect of significantly increasing the extent of noise contours in the 2050 ANEF.

4.3 Possible Use of Required Navigation Performance Procedures

From the point of view of impact on the “Tralee” development, the most important potential alteration to aircraft flight tracks is the possible introduction of Required Navigation Performance (RNP) procedures for arrivals and departures to the south of Canberra Airport. This potential development is discussed in The Ambidji Group’s report *Canberra Airport: Impact on External Development – RNP and Airspace Paper*.

Under the procedure currently under discussion, approach tracks for a large number of arriving aircraft would be diverted to the west of the runway centre-line until a point approximately 6km from the runway end, as shown in Figure 4-1. This would take arriving aircraft directly over the eastern corner of North Tralee, approximately 450m from their current position. Departure tracks may move slightly to the east of their current position, but would still be located largely over North Tralee.

Figure 4-1 Approach and Departure Tracks for Runway 35 under RNP Procedures



The effect of these potential alterations on the ANEC contours in this area is discussed in a separate paper. However, the effect on noise levels and numbers of events exceeding 70dBA at Tralee is described below.

The above report by The Ambidji Group estimates that if RNP procedures are adopted as currently proposed, then:

- if the movement numbers projected in the “2050 ANEF” were realised, then up to 67% of jet arrivals on runway 35 could use RNP procedures; and
- if the movement numbers in the “more realistic dataset” provided by Ambidji were realised, then up to 96% of jet arrivals on runway 35 could use RNP procedures.

In either scenario, maximum noise levels experienced in Jerrabomberra would not change as a result of the procedure, as some aircraft would continue to use the existing approach track, but the number of events exceeding 70dBA would be reduced.

To provide an indication of the effect of RNP procedures on noise exposure in both Tralee and Jerrabomberra, the assessment of existing exposure in Table 3-1 was repeated under the assumption that RNP procedures were available, and that 96% of jet arrivals on runway 35 could use the RNP arrival track. Table 4-2 shows the result of this analysis.

Table 4-2 Comparison of Noise Exposure at Three Points in Tralee and Three Point in Jerrabomberra, With RNP Arrival Procedures

Operation	Aircraft Type	Parameter	Tralee Nth #1	Tralee Nth #2	Tralee South	Lakeview Garden	Kowen Place	Jasmine Garden
Approach	737	Max Noise Level (dBA)	75	71	<60	75	71	66
		Est. Proportion of Events > 70dBA	98%	60%	0%	75%	20%	2%
	BAe146	Max Noise Level (dBA)	72	68	<60	72	68	62
		Est. Proportion of Events > 70dBA	70%	30%	0%	35%	5%	0%
Departure	737	Max Noise Level (dBA)	71	71	69	-	-	-
		Est. Proportion of Events > 70dBA	50%	50%	20%	-	-	-
	BAe146	Max Noise Level (dBA)	70	70	68	-	-	-
		Est. Proportion of Events > 70dBA	30%	30%	10%	-	-	-
SUMMARY								
Maximum Predicted Noise Level (dBA)			75	71	69	75	71	66
Events Per Month Exceeding 70dBA (estimated)			550	330	13	360	86	8

Comparing Table 4-2 with Table 3-1, the most significant increase in noise impact occurs at the point Tralee North #2, toward the centre of Tralee North. Here the maximum noise level experienced remains marginally above 70dBA, but with the introduction of RNP procedures the number of such events per month increases from an estimated 34 to 330. Noise exposure at this point would be comparable with that currently experienced at Kowen Place, Jerrabomberra – not the worst case noise level in this area, but a location toward the centre of the suburb. At Tralee North #1, noise exposure with RNP procedures would be similar to current exposure at Lakeview Garden, the most exposed area in Jerrabomberra.

Conversely, the most significant reduction in noise impact would be at locations similar to Kowen Place, where the number of noise events per month exceeding 70dBA would be reduced by a factor of approximately three, although the maximum level experienced would not change due to some aircraft remaining on the existing track. At more exposed locations in Jerrabomberra the reduction in noise impact would be more modest, and may not be perceived as significant.

Noise exposure in South Tralee would be virtually unaffected by the proposed RNP procedures.

It should be noted that the use of RNP procedures has not been incorporated in the Airport's ANEF forecast, and therefore their feasibility, and any effects on aircraft operations, have not been fully assessed. The ANEF remains the only forecast of future noise exposure which has been subject to any formal external scrutiny or assessment.

4.4 Introduction of "Noise Sharing"

A number of publications have raised the prospect that residential development at Tralee would result in "noise sharing" policies being adopted by Canberra International Airport. It has been claimed that these policies would result in more aircraft being forced to fly over existing residential areas in Jerrabomberra, Queanbeyan and/or Canberra. This section provides comments on the "noise sharing" principle and its possible implications for Canberra Airport if the Tralee development is approved.

4.4.1 Noise Sharing at Sydney Airport

Although some other Australian airports adopt some policies which can broadly be described as "noise sharing", Sydney Airport provides by far the best example of this approach to airport management.

The experience at Sydney Airport which led to the development of the "noise sharing" approach has been documented in the *Falling on Deaf Ears?* report of the Senate Select Committee on Aircraft Noise in Sydney (1995). The policy was adopted by Sydney Airport as a result of recommendations made by Airservices Australia in the document *The Long-Term Operating Plan for Sydney (Kingsford-Smith) Airport and Associated Airspace*, published in 1996.

In short, the opening of the third runway at Sydney Airport produced significant changes to existing patterns of noise exposure around the Airport, resulting in some existing residents being exposed to much greater numbers of overflights. Many of these residents felt they had not been adequately warned of these changes.

In particular, following the opening of the new runway, overflights which had previously occurred on the east-west runway were redistributed to the north-south runways (both the new runway and the existing runway). Residents perceived this as unfair, and lobbied strongly for a reversal of this change. While a total reversal was not possible, after much community consultation “noise sharing” arrangements were finally adopted which allowed a partial return to the pre-third runway situation. An important part of these arrangements was an attempt to provide “respite” for residents in the most-affected areas so that, at least at certain times of the day, aircraft were directed over other areas whenever possible. The policy is generally considered successful by both residents’ groups and aviation authorities, although “targets” for percentage movements on different runways have in practice proved difficult to meet.

More recently, the concept of “noise sharing” has been used by some residents to argue against further, more localised changes which would have the effect of “concentrating” noise in specific areas. In some cases these calls have been successful, while in other cases (notably the introduction of a Precision Runway Monitor for approaches on runway 16R) they have not.

A number of points arise from the experience at Sydney Airport which are relevant to discussion of the Tralee development.

- “Noise sharing” at Sydney Airport arose in response to a sudden change in noise exposure for existing residents and, at least originally, represented an attempt to return to the pre-existing situation.
- The object of the policy is to provide a more equal distribution of noise between exposed populations, and in particular to provide some respite for the most-affected residents.
- The policy has generally been invoked to attempt to limit “concentration” of noise in certain areas, rather than to expand the total area affected. There are cases – notably the introduction of departures on runway 34R – where aircraft were directed over previously unexposed areas as part of the agreed Long-Term Operating Plan. However, the main thrust of “noise sharing” principles has been to more fairly share noise between areas which are already exposed. This is embodied in Airservices Australia’s *Environmental Principles and Procedures for Minimising the Impact of Aircraft Noise*, as discussed below.
- The policy has not limited the potential growth of the Airport. Indeed, where there has been a conflict between the “noise sharing” policy and the operational requirements of the Airport, history indicates that the Airport’s requirements have taken precedence.

In comparisons with Canberra Airport, it is also relevant to note that the size of the

noise problem at Sydney Airport, in terms of numbers of residents affected to any given extent, is at least 100 times greater than at Canberra Airport.

4.4.2 Relevance to Canberra Airport & the Tralee Development

A media release from Airservices Australia (16 August 2002) argues that:

... the public perception of noise will become an issue for future generations of residents of Tralee. If this occurs, Airservices Australia will have very little scope to provide noise respite to the Tralee residents.

Noise Abatement areas, specifically created by Airservices Australia over five years ago to offer a level of protection to the residents of much of Canberra and Queanbeyan, will be at risk.

It is also highly likely that other Canberra and Queanbeyan residents, who do not currently experience aircraft overflights, may well do so in the future if we are placed in a situation where we are required to re-distribute noise to provide respite for future Tralee residents.

This possibility is clearly an important issue for the ACT Chief Minister, who in a media release (7 June 2003) indicated his concern at ... *the imposition by Airservices Australia of a 'share the noise' policy – similar to that operating in Sydney – that would see a proportion of the aircraft movements directed over Canberra suburbs.*

If the Tralee development proceeds, the behaviour of future residents in that development cannot, of course, be guaranteed. In most cases their noise exposure would be lower than other nearby areas, particularly parts of Jerrabomberra (even with the proposed RNP approach profile in place). In addition, if currently-proposed procedures are implemented, before purchasing a property they will have received detailed information about the nature and pattern of aircraft noise to which they will be exposed, allowing noise-sensitive people to make an informed decision not move in. Nevertheless, there may be noise-related complaints, and there may be calls for “noise sharing” to be implemented.

If this were the case, the Airport would be faced with a number of alternatives, which may be summarised as:

1. Continue existing procedures.
2. Redirect some aircraft to the east of Tralee, over currently-exposed areas in Jerrabomberra.
3. Redirect some aircraft to the west of Tralee, over areas in Tuggeranong, including Macarthur and Fadden, which currently have very little or no exposure to aircraft noise.

Options 2 and 3 would require the approval of Airservices Australia, who would ultimately implement the changes. To indicate the principles which would be adopted in assessing such changes from an environmental point of view, Airservices Australia produce a document called *Environmental Principles and Procedures for Minimising the Impact of Aircraft Noise*. This is available on their website and is included as Appendix C to this report. To assess Option 2, principles 3 and 4 would be relevant:

Principle 3: Noise exposure should be fairly shared whenever possible.

Principle 4: No suburb, group or individual can demand or expect to be exempt from aircraft noise exposure.

Moving more aircraft noise from Tralee to Jerrabomberra would result in a less equal sharing between these areas. Calls for “respite” from residents of Tralee would be unlikely to be taken seriously given that:

- In the absence of RNP procedures, the exposure of some Tralee residents would already be intermittent, and substantially lower than that of the residents who, under this option, would receive more noise; and
- With RNP procedures, many residents in North Tralee would already effectively be sharing noise with residents in Jerrabomberra, since a proportion of aircraft will in any case fly tracks taking them over each suburb.

It can be concluded that Option 2 could not be approved under Airservices Australia’s principles of environmental assessment. In assessing Option 3, principle 11 would be relevant:

Principle 11: In deciding between mutually exclusive, but otherwise equivalent options, involving:

- *the overflight of an area which has previously been exposed to aircraft noise for a considerable period of time (and which a large proportion of residents would therefore have been aware of the noise before moving in); or*
- *a newly exposed area;*
- *option (i) should be chosen.*

Clearly, any proposal to move overflights from Tralee to residential areas which are currently unaffected could not be approved under this principle.

On this basis, any “noise sharing” introduced as a result of a residential development at Tralee would be contrary to existing government policy. It would also, in the author’s view, be an inequitable decision, and out of step with the principles of noise sharing as implemented at Sydney Airport. The author’s view is that the probability that additional aircraft movements would be deliberately directed over existing residential areas as a result of residential development at Tralee is virtually nil.

5 ASSESSMENT OF SUITABILITY FOR RESIDENTIAL USE

5.1 Australian Standard 2021

5.1.1 General Provisions

The “ANEF system”, as embodied in the recommendations of Australian Standard 2021, is currently adopted for land use planning around airports by all relevant Australian authorities, including local, State and Federal governments. It involves the production of a chart showing noise exposure for a future year, based on forecast numbers of movements by aircraft type, runway and flight path (among other variables). These forecasts are generally provided by the airport operator. The chart, known as an ANEC chart, is endorsed for technical accuracy by Airservices Australia, after which it becomes an official ANEF chart for the airport in question.

Recently, rather than a forecast for any specific future year, some major airports have produced forecast movements for the airport’s “ultimate capacity”. This is the case for the current ANEF charts for Brisbane and Melbourne Airports. Sydney Airport, on the other hand, has recently produced an ANEF based on forecasts for the year 2024. In some cases several options for future airport development are considered, and the ANEF chart shows contours representing the outer envelope of contours for all options.

The suitability of land around the airport for various land uses is determined from the airport’s ANEF chart according to Table 2.1 of AS2021. For a building type of “house, home unit, flat, caravan park”, the relevant designations are:

- Less than 20 ANEF: “acceptable”
- 20 to 25 ANEF: “conditionally acceptable”
- Greater than 25 ANEF: “unacceptable”

In areas designated “conditionally acceptable”, AS2021 recommends that noise reduction measures should be incorporated into any building to achieve certain specified internal noise levels.

5.1.2 Comparison with Other Noise Sources

It is of interest to compare the provisions of AS 2021 with relevant guidelines for road traffic, rail traffic and industrial noise. In the case of road traffic, the NSW Government’s *Environmental Criteria for Road Traffic Noise* recommends a criterion of 55dBA $L_{Aeq,15hr}$ or 50dBA $L_{Aeq,9hr}$ for “new residential land use developments affected by freeway/arterial traffic noise”, with similar or higher criteria for other types of traffic noise. Although there is no direct conversion between different units of noise exposure, these noise levels typically correspond to approximately 20 ANEF in the case of aircraft noise.

In the case of rail noise, there is no generally-applicable guideline making specific recommendations concerning land use planning, but criteria for noise from a new line

are often used to determine the acceptability of new residential development. These criteria are 55dBA $L_{Aeq,24hr}$ and L_{AMax} 80dBA, which once again are similar to a level of 20 ANEF in a typical aircraft noise situation.

In the case of industrial noise, criteria for a new source, as determined from the NSW *Industrial Noise Policy*, are generally lower than those for the above transportation noise sources. For a source operating constantly in the daytime only, in a suburban area, the noise criterion is likely to be of the order of 45dBA L_{Aeq} . This reflects community expectations for this type of noise compared with transportation noise sources, and the fact that such sources may be perceived more negatively than other noise sources, at the same noise level.

5.1.3 ICAO's "Balanced Approach" to Aircraft Noise Management

The International Civil Aviation Organisation (ICAO), in its *"Consolidated statement of continuing ICAO policies and practices related to environmental protection: Appendix C"* advocates a *"balanced approach to noise management"*, based on *"four principal elements, namely reduction at source, land-use planning and management, noise abatement operational procedures and operating restrictions, with the goal of addressing the noise problem in the most cost-effective manner"*. The land use planning aspect of this approach is described further in Appendix F: *"Land Use Planning and Management"*. In this Appendix the ICAO Council:

"Urges States, where the opportunity still exists to minimize aircraft noise problems through preventive measures, to:

...

c) define zones around airports associated with different noise levels taking into account population levels and growth as well as forecasts of traffic growth and establish criteria for the appropriate use of such land, taking account of ICAO guidance;

d) enact legislation, establish guidance or other appropriate means to achieve compliance with those criteria for land-use; and

e) ensure that reader-friendly information on aircraft operations and their environmental effects is available to communities near airports"

The definition of "zones" around an airport, as described in c) above, and the enacting of guidance as to their use as described in d), is very consistent with the approach taken in AS 2021. The provision of "reader-friendly" information to residents and potential residents is very consistent with the approach recommended for potential residents of "Tralee".

With respect to the actual definition of the "zones" and associated land use criteria, Appendix F refers to ICAO's *Airport Planning Manual, Part 2 - Land Use and*

Environmental Control (Doc 9184). It is indicated that this document is currently being “updated and expanded”. However, the current version of this document (dated 1985), is appended at Appendix D. This indicates (Section 5.3) that zones should be based on noise indices such as NEF, NNI or other country-specific measures. A Table (Table 5-3) is provided giving “a method of relating land uses to three categories in connexion with the use of the NEF method”. This indicates, among other things, that land in areas under 30 NEF (which is approximately 30 ANEF) is compatible with residential use. This recommendation is considered inappropriately lax in the Australian situation, and the AS 2021 recommendation of 20 ANEF as the boundary of acceptability for residential use without restrictions is considered more appropriate. However, it is clear that the concept of defining land use acceptability zones based on clearly-defined noise-related metrics, combined with guidance on land use acceptability which is consistent, transparent and based on research evidence, is strongly supported in ICAO’s “balanced approach” to aircraft noise management.

5.2 Implementation of Australian Standard 2021

The land use planning recommendations in Australian Standard 2021, as described above, are implemented in the following State planning instruments, all of which are in current use:

- Queensland Government State Planning Policy 1/02: “Development in the Vicinity of Certain Airports and Aviation Facilities”
- Western Australian Planning Commission Statement of Planning Policy 5.1 – “Land Use Planning in the Vicinity of Perth Airport”
- Victoria Planning Provisions – “Melbourne Airport Environs Strategy Plan”
- NSW Department of Planning Section 117 Ministerial Directions: Direction No 12 – “Development Near Licensed Aerodromes”.

A number of local government planning instruments also implement the recommendations, either directly or through use of one of the above State planning instruments – an example being the City of Botany Bay Aircraft Noise Development Control Plan.

The above instruments and policies all introduce controls which are fundamentally in accordance with the recommendations of AS 2021, and in particular put no restriction on residential development outside the 20 ANEF contour (or an area which is designed to approximate that contour).

To the author’s knowledge, no planning instrument exists in Australia which puts aircraft noise-related controls on development outside the 20 ANEF contour.

Appendix B describes a number of recent subdivisions approved in areas outside, but close to, the 20 ANEF contour at large Australian airports. These indicate that in general, areas outside the 20 ANEF are in practice considered suitable for residential

development, and the recommendations of AS 2021 are considered to provide sufficient protection for potential residents.

One example which has been discussed in this regard is the treatment of new residential development in the Environmental Impact Statement for a Second Sydney Airport (Badgerys Creek Airport), published by PPK in 1997. That document considered the potential impacts of noise from a new airport in western Sydney, and in Section 12.8, “*Environmental Management*” it considers options for reducing or managing the environmental noise impact from such an airport. Section 12.8.4, “*Land Use Planning*”, states:

“To avoid increases in the impact of aircraft overflight noise with time as a result of the development of new noise sensitive land uses, a restriction could be placed on new development in accordance with the land use compatibility table included in Australian Standard 2021 ... Although such a restriction would substantially limit any increase in populations in the areas of relatively high noise impact, it would still allow increases in population in the lower noise impact areas.”

This is the only restriction on land use around the proposed Airport which is suggested or recommended in the EIS document.

Section 10.6 of the EIS document, “*Impacts on Planning and Future Land Uses*” discusses likely scenarios for future development around the proposed airport, with a view to developing projections of future population under various scenarios. Section 10.6.1, “*Planning Assumptions*”, indicates “*Various State Government planning controls and Australian Standard 2021 suggest that new residential development, schools, hospitals and churches should not be allowed in areas exposed to noise levels greater than 20 [ANEF].*” In addition, “*Growth rates were assumed to be lower, if an airport were developed, in those rural areas that might be affected by aircraft noise greater than 15 [ANEC]. Further, new urban areas would not be allowed to establish on greenfield sites that might be subject to noise levels greater than 15 ANEC.*” The latter sentence has been taken to constitute a recommendation that such development be prohibited. It is in fact simply an assumption as to the likely planning decisions which would be made for areas around this particular site, given all other planning considerations relevant in this area. Its import is that it is one assumption guiding the development of realistic projections of future population growth in western Sydney, in the presence of an airport at Badgerys Creek. The above statement does not in any way constitute a recommendation or suggestion that, in general, large-scale residential development should not occur on greenfield sites within 15 ANEF.

To the author’s knowledge, apart from a decision in 1999 with respect to “The Poplars”, to the north of Tralee, no residential development proposal substantially outside the 20 ANEF contour for a major airport in Australia has been rejected on the basis of aircraft noise. In the case of “The Poplars”, a memo dated 20 October 2000 from Mr David Papps of the NSW Department of Planning acknowledges that The Department’s advice to the Minister to reject the rezoning of the Poplars on the basis of aircraft noise was

unsound.

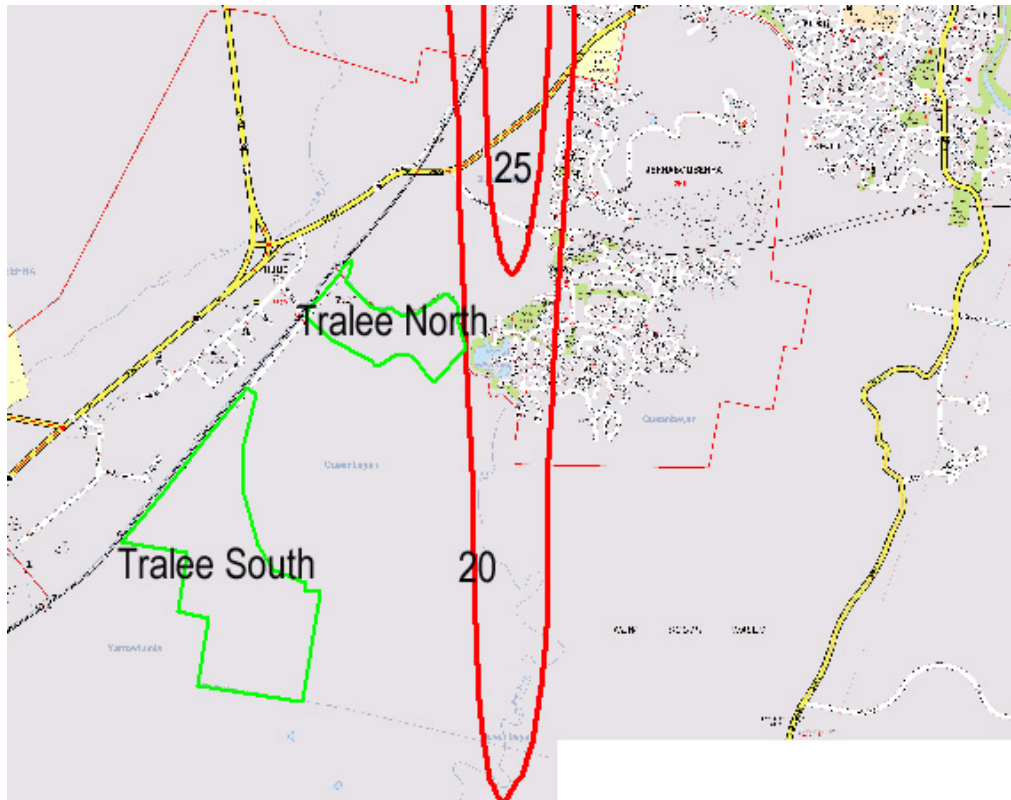
5.3 Canberra Airport ANEF

In January 2002, Airservices Australia endorsed for technical accuracy an ANEC chart produced by Canberra Airport. This is described as a “2050 ANEF”, but is in fact better described as representing “ultimate airport capacity”. The projected aircraft movements included in this ANEF are described in Section 3.1. Airservices Australia’s understanding is that this chart replaces a previous “2020 ANEF”, which included significantly lower numbers of movements. Therefore, for the purpose of this report the “2050 ANEF” will be accepted as representing the current official ANEF for Canberra Airport. Contours from this chart are shown in Figure 5-1.

Tralee is seen to lie entirely outside the 20 ANEF contour. Part of Tralee North has noise exposure between 15 and 20 ANEF, but most of Tralee North has exposure below 15 ANEF. All of Tralee South has aircraft noise exposure well below 15 ANEF.

Under the guidelines in AS2021, both Tralee North and Tralee South are considered “acceptable” for new residential development.

Figure 5-1 Contours from the “2050 ANEF” Chart for Canberra Airport



5.4 Effect of Possible Alternative Operating Procedures

To the author’s knowledge, no attempt has been made by Canberra Airport to replace the existing ANEF chart with one reflecting alternative operating procedures, in particular the RNP approach procedures discussed in Section 4.3. Any such alterations would need to be endorsed by AirServices Australia for technical accuracy before an alternative chart was put in place. Nevertheless, it is of interest to consider the potential alterations in the ANEF chart if RNP procedures were introduced as described in Section 4.3.

Figure 5-2 shows relevant parts of an ANEF chart calculated assuming the same number of operations as in the “2050 ANEF”, but with 65% of jet arrivals located on the RNP track. (Due to lack of more precise information, the location of this track has been scaled approximately from the chart shown in Figure 4-1.) Calculations used the standard INM model, Version 6.2.

Figure 5-2 Contours from an ANEC chart incorporating RNP Arrival Procedures & Future Movement Numbers as in the "2050 ANEF"

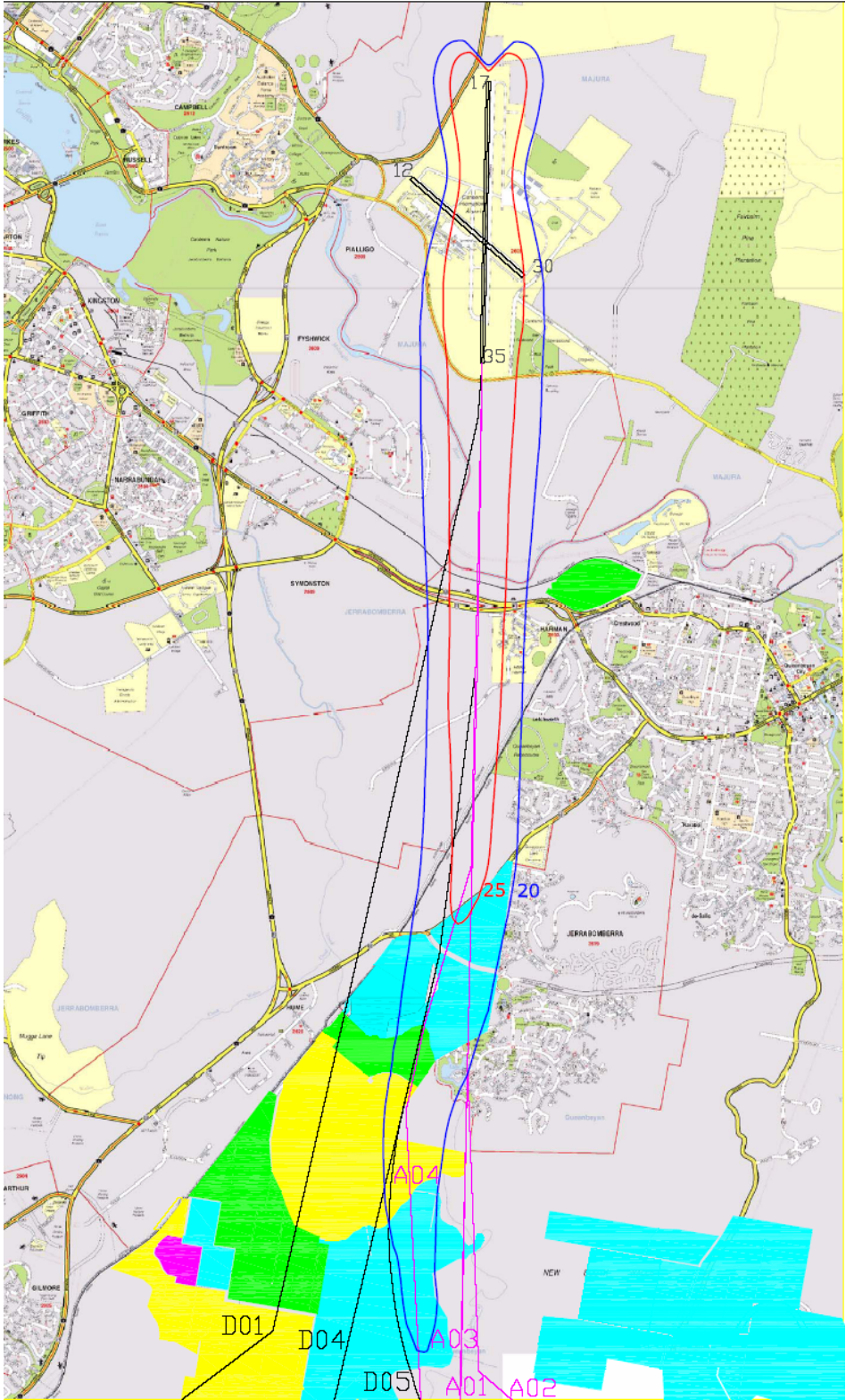


Figure 5-3 Contours from an ANEC chart incorporating RNP Arrival Procedures & Future Movement Numbers as Recommended by The Ambidji Group

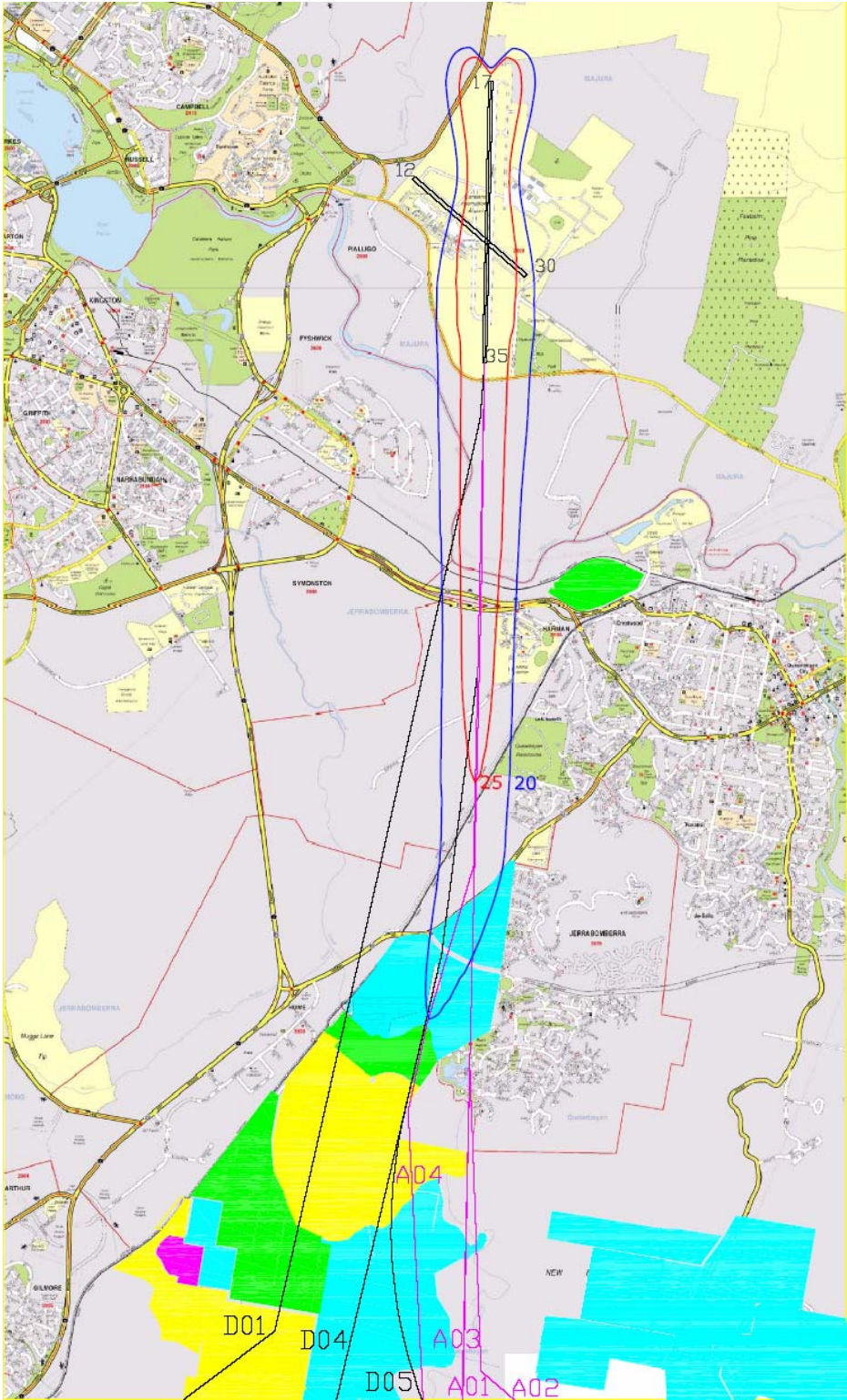


Figure 5-2 indicates that if an ANEF were to be produced and approved under these assumptions, then under AS2021 approximately 30% of the area of North Tralee would require noise reduction measures if residences were to be constructed there. South Tralee remains well outside the 20 ANEC contour, and therefore remains “acceptable” for new residential development.

On the other hand, Figure 5-3 shows relevant parts of an ANEC chart calculated using The Ambidji Group’s “more realistic dataset” for future movements at Canberra Airport. In this scenario, the whole of both North and South Tralee would remain “acceptable” for new residential development.

In conclusion:

- Using the only officially-endorsed ANEF chart, the whole of the proposed Tralee development would be acceptable for new residential land use under AS2107.
- If it is considered prudent to make a less formal assessment of future noise exposure, accounting for possible factors which may not have been incorporated into the existing ANEF, then two factors should be considered – the possible introduction of alternative approach procedures which would increase noise levels in the area of Tralee, and the likelihood that the projected numbers of aircraft movements in the “2050 ANEF” significantly over-estimate the possible number of movements at this Airport. If the former factor is admitted, but not the latter, then a section of North Tralee would be designated as “conditionally acceptable” for new residential development. In other cases, the entire area would be considered “acceptable”.

5.5 Other Noise Exposure Measures

Over the last 10 years, a number of alternative measures of noise exposure have been used to describe aircraft noise impacts, and to assess the implications of a change to aircraft noise exposure in existing residential areas. Examples include the use of “N70” and “Maximum Level” noise contours in the EIS for the proposed Second Sydney Airport.

In 2000, the Department of Transport and Regional Services (DoTRS) produced a discussion paper “Expanding Ways to Describe and Assess Aircraft Noise” (DoTRS, 2000) which sets out a number of alternative measures of aircraft noise exposure, including N70 and respite time. These are put forward as ways to allow residents and potential residents to understand the level and pattern of aircraft noise to which they may be exposed. The alternative measures have proved to be of great assistance, both in allowing people to decide whether to move into a location and to understand the impact of a proposed change to airport operations.

If the Tralee development were to proceed, it is considered important that potential residents be informed of the level and pattern of aircraft noise in the area, using the measures described in the above document among others. The description of current and projected future noise exposure in Sections 2, 3 and 4 of this report is considered to

represent a starting point for such information.

However, the DoTRS discussion paper does not set criteria or guidelines in terms of these alternative exposure measures. This is deliberate. The intention of the measures described is *to give individuals enough information to allow them to make up their own mind whether the noise is likely to affect them or be ‘acceptable’ to them.* (p45 - emphasis in original). Further, the paper and the measures described therein are not intended to provide advice for use in land use planning.

The Synopsis includes the following paragraph:

This paper is not an attempt to replace the ANEF system as a planning tool. The ANEF system continues to be the most technically complete means of portraying aircraft noise exposure and the Department is not proposing any changes to the land use planning principles and restrictions embodied in Australian Standard AS2021.

(p v, emphasis in original).

In determining whether an area is suitable for new residential land use, the recommendations of AS2021 are considered the most appropriate basis for making this decision.

5.6 “Red Zones”

Canberra Airport has released charts showing areas of land around the Airport described as “Red”, “Orange” and “Green” zones. “Red” zones are described as “Residential not suitable”.

The areas covered by these zones bear little relationship to ANEF contours. The “Red Zone” covers all of Tralee, as well as areas well to the south of Tralee South. This “Zone” appears to represent areas in which the Airport fears that complaints may be generated if residential development is permitted.

It has been pointed out that this “Red Zone” corresponds approximately with the 65dBA single-event noise level contour for the noisiest aircraft operation on relevant runways, and suggested that this may represent a suitable criterion for exclusion of new residential development. In this respect, two points should be made. First, the “Red Zone” does not encompass a 65dBA noise level contour for light aircraft using the cross runway at Canberra. If it did, it would include significant areas of existing residential development. Second, general use of such a conservative criterion would clearly be impractical at most large Australian airports. This is demonstrated in Figure 5-4, which shows an equivalent 65dBA noise contour for Sydney Airport, in comparison with the 20 ANEF contour.

Adoption of a general policy which excluded residential development from any area where the noise level from a single aircraft overflight ever exceeds 65dBA would be a very restrictive measure, and out of step with policies adopted consistently throughout

Australian and elsewhere in the world, both for aircraft noise and for other transportation noise sources.

Adoption of *ad hoc* land use planning decisions based solely on the desires of particular interests would represent a step away from the approach which has been in place since 1977, in which AS 2021 has provided a consistent framework for such decisions throughout Australia.

Figure 5-4 Comparison of 65 dBA Single Event Noise Contour (black) and ANEF 20 Contour (blue) for Sydney Airport



6 CONCLUSION

From the above discussion, the following conclusion can be drawn with regard to aircraft noise impact on the proposed residential development at Tralee.

- With the exception of a small area at the eastern edge of Tralee North, current aircraft noise in the area of the proposed development is due almost entirely to aircraft departing Canberra Airport to the south. Most of these aircraft follow tracks which take them over some part of both Tralee North and Tralee South.
- Currently there are an average of approximately 4 jet and 6 non-jet departures per day to the south of Canberra Airport. However, these operations tend to occur on specific days, and a more appropriate description would be that there are 30 jet departures on approximately one day per week, with much smaller numbers on other days.
- In Tralee North, again with the exception of a small area to the east, it is estimated that there are 34 aircraft noise events per month exceeding 70 dBA. These are almost entirely departures by 737 and BAe146 aircraft. In Tralee South there are an estimated 13 events per month exceeding 70dBA.
- Significantly higher noise exposures are currently experienced in existing residential areas in Jerrabomberra. These areas are exposed to events with similar maximum noise levels, but much more often. For example, areas near Kowen Place are estimated to experience over 300 events per month exceeding 70dBA.
- Areas around other major Australian airports which have similar noise exposure to Tralee are described in Section 3.2 in the body of this report. These provide an indication of the pattern, level and acceptability of this noise exposure.
- Required Navigation Performance (RNP) procedures have been proposed for future operations at Canberra Airport, involving in particular a displaced track for aircraft approaching from the south. If this proves to be feasible, it would have the effect of increasing noise levels in a section of Tralee North by approximately 4dBA, while reducing levels in the most affected parts of Jerrabomberra by 1-2dBA. Noise levels at the most-affected point in Tralee would then be comparable with those at what is currently the most-affected point in Jerrabomberra.
- The “2050 ANEF” chart produced by Canberra Airport includes a large predicted increase in numbers of aircraft movements, with total predicted movements being higher than the current movements at Sydney Airport. The predicted pattern of movements by runway is similar to that applying at present, but the increase in departures to the south is even greater than the overall increase in movements.
- Nevertheless, both Tralee North and Tralee South lie entirely outside the 20 ANEF contour on the “2050 ANEF” chart. Under guidelines in Australian Standard 2021, which are accepted by all relevant land use authorities in Australia, the area is therefore described as “acceptable” for new residential development.

- Based on a preliminary assessment of the impact of the RNP procedures described above, if the assumptions in the “2050 ANEF” regarding future traffic volumes are maintained, then with RNP arrival procedures a section of North Tralee is likely to lie within a revised 20 ANEF contour, and hence would be classified as “conditionally acceptable” for new residential development. This means that under AS2021, noise mitigation measures would be required in any new residences in this area. The remainder of North Tralee, and all of South Tralee, would remain “acceptable” for residential development under that Standard.
- On the other hand, if alternative traffic forecasts as proposed by The Ambidji Group are accepted in a new ANEF chart, then even with RNP procedures the whole of the proposed Tralee development would be classified as “acceptable” for residential development under AS2021.
- Charts prepared by Canberra Airport show “Red Zones” in areas around the Airport, marked “Residential Not Suitable”. These zones cover a wide area, including all of the proposed Tralee development. They appear to bear no relationship to ANEF or any other accepted measures of overall noise impact. Adoption of land use planning decisions based solely on the desires of particular interests would represent a step away from the approach which has been in place since 1977, in which AS2021 has provided a consistent framework for such decisions throughout Australia.

Note

All materials specified by Wilkinson Murray Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

Quality Assurance

We are committed to and have implemented AS/NZS ISO 9001:2000 “Quality Management Systems – Requirements”. This management system has been externally certified and Licence No. QEC 13457 has been issued.

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Version	Status	Date	Prepared by	Checked by
A	Draft	5 June 2006	Rob Bullen	
B	Final Draft	5 June 2006	Rob Bullen	
C	Final	29 June, 2006	Rob Bullen	Neil Gross

APPENDIX A

AREAS AROUND AUSTRALIAN AIRPORTS WITH
NOISE EXPOSURE SIMILAR TO TRALEE

APPENDIX B

RECENT SUBDIVISIONS AROUND AUSTRALIAN AIRPORTS

APPENDIX C

AIRSERVICES AUSTRALIA DOCUMENT
*ENVIRONMENTAL PRINCIPLES AND PROCEDURES FOR
MINIMISING THE IMPACT OF AIRCRAFT NOISE*

APPENDIX D

ICAO AIRPORT PLANNING MANUAL
PART 2
LAND USE AND ENVIRONMENTAL CONTROL
