



Sydney Airport

N409 Australian Noise Exposure Index

1 July – 30 September 2000

REPORT No: EO 20-091

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Sydney Airport
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1.0 INTRODUCTION

1.1 Background

In accordance with recommendation 21 of the Proponent’s Statement for the Long Term Operating Plan (LTOP) at Sydney Airport, Airservices Australia has prepared a three month Australian Noise Exposure Index (ANEI) for the period 1 July 2000 to 30 September 2000 inclusive (Reference Number N409).

1.2 Airport Layout

Sydney Airport has three runways. Runway 07/25 (2529m long and 45m wide), Runway 16R/34L (3962m long and 45m wide) and Runway 16L/34R (2438m long and 45m wide). The runway end coordinates and elevations, Aerodrome Reference Point coordinates and elevation data were supplied by the Sydney Airports Corporation Limited (SACL) at Sydney Airport along with displaced threshold information. The airport average temperature and humidity was obtained from Bureau of Meteorology data. The temperature and humidity are an average taken over the three month period. These data are shown in Table 1.1.

Table 1.1 Sydney Airport Runway Data

Location	Latitude (AGD66)	Longitude (AGD66)	Elevation AHD	Displaced Landing Threshold
Aerodrome Reference Point	33 56 51.3S	151 10 33.4E	6.4m	
Runway End 07	33 56 43.2S	151 09 44.8E	5.3m	0m
Runway End 25	33 56 20.8S	151 11 19.7E	6.0m	340m
Runway End 16R	33 55 51.4S	151 10 13.5E	2.1m	85m
Runway End 34L	33 57 57.1S	151 10 46.1E	4.1m	0m
Runway End 16L	33 57 04.3S	151 11 13.7E	4.5m	230m
Runway End 34R	33 58 21.6S	151 11 33.8E	3.1m	38m
Airport Average Temperature				14.9°C
Airport Average Humidity				58.9%



2.0 THE INTEGRATED NOISE MODEL (INM)

The Integrated Noise Model (version INM 6.0a) developed by the US Federal Aviation Administration (FAA) was used to model the noise contours for the period 1 July to 30 September 2000 for Sydney Airport.

3.0 ASSUMPTIONS AND METHODOLOGY USED IN THE DEVELOPMENT OF THE ANEI

3.1 Introduction

The development of the ANEI consisted of the following stages:

- i) collection and verification of the required data;
- ii) preparation of the data as INM input files;
- iii) running of the model; and,
- iv) preparation and verification of model's output.

3.2 Collection and verification of the required data

The runway and associated airport data was supplied by Sydney Airports Corporation Limited (SACL).

The aircraft movement data were obtained directly from the Airservices Noise and Flight Path Monitoring System (NFPMS). A correction factor was applied to ensure that the total number of movements for departures and arrivals were equal.

The total number of movement records from the unadjusted NFPMS data for the study period was 78,430. A total of 28 of these movement records (0.04%) lacked sufficient information to be included in the calculations. This data deficiency included aircraft type, runway and airport destination or origination. Movement data derived from published Avcharges data indicated that there were 80,482 movements at Sydney for the same period. Once the departure and arrival figures had been adjusted to be equal, the total number of movements used in the modelling for the ANEI was factored to 80,482 or an average of 875 movements per day.

The flight tracks used in the model were determined from the NFPMS. Track plots from the NFPMS were used to identify the major flight paths associated with



aircraft movements to and from the airport. Representative periods were selected between 1 July and 30 September 2000.

A nominal backbone track for all the major flight paths was identified by means of geographic coordinates along the length of the track and from NFPMS track plots. The corresponding spread of the track was also determined from the NFPMS plots. These tracks were put into the INM as 'point type' tracks. Each 'nominal backbone track' was prepared with four subsidiary tracks; two either side. This provided a realistic lateral spread of traffic along the nominal tracks.

3.3 Preparation of INM input file

The aircraft movement data extracted from the NFPMS were organised into:

- aircraft types and the associated operation (departure or arrival);
- the runway used; and,
- the time of day or night.

For the purposes of modelling and using the Australian Noise Exposure Forecast (ANEF) metric, night is considered to be between the hours of 7:00pm and 7:00am and carries a weighting of 4.

Terrain around the airport was also taken into account. Terrain data for the Sydney region was compiled in accordance with the INM User's Guide into a format suitable to be read by INM 6.0a. This data was aligned to the aerodrome reference point (ARP) and incorporated by the INM when calculating the ANEI contours.

The use of terrain data results in changes to the shape of the contours when the terrain surrounding the airport is either higher or lower than the ARP. The change in elevation increases or reduces the distance between the aircraft and the ground that is used to calculate aircraft noise levels, thereby reducing or increasing the calculated noise levels or ANEF value at that point.

The types of aircraft that operated at Sydney Airport were assigned to 32 representative aircraft types that are contained within the INM database and are shown in Table 3.1. Where possible, the actual aircraft type was matched to its INM counterpart. However, in cases where a particular aircraft type had a small number of movements, it was grouped with a major INM type or INM substitute. In order to model helicopters a generic single engine helicopter profile was developed. This type of helicopter accounts for 90% of all helicopter operations at Sydney airport. All helicopters were modelled as departing from, or arriving to the Helipad that is situated south of the threshold of Runway 25.

**Table 3.1 Aircraft types used to model the 1 July to 30 September 2000 Sydney ANEI**

707320	Represents B707, C135 and DC8 type aircraft
727EM2	Boeing B727 fitted with hushkitting
717200	Represents Boeing B717-200, modelled using CL601
737300	Boeing B737-300
737400	Boeing B737-400
74720B	Represents B747-200 and B747-300
747400	Boeing B747-400
757PW	Boeing B757-200
767300	Boeing B767-300
767JT9	Represents 55% of B767-200 movements
767CF6	Represents 45% of B767-200 movements
777200	Boeing B777-200
A300	Airbus Industries A300
A310	Airbus Industries A310
A320	Airbus Industries A320
A340	Airbus Industries A340
BAE300	Represents BAe146
BEC58P	Represents GA twin piston-engine aircraft
CL601	Canadair CL601 Challenger
CNA441	Represents GA twin turbine-engine aircraft
DC1030	Represents DC10 and MD11 type aircraft
DC930	Represents DC9 aircraft
DHC6	Represents Twin Otter and similar aircraft
DHC830	Represents Dash 8, FK50 type aircraft
F10065	Fokker F100
GASEPF	Represents GA single engine fixed pitch propeller aircraft.
GASEPV	Represents GA single engine variable pitch propeller and/or turbine aircraft
HS748A	Represents BAe 748A and Hawker Siddley 748A, FK27 aircraft
LEAR25	Represents Lear 24/25 and Falcon 20 aircraft
LEAR35	Represents other small business type jets
SF340	Saab 340
HELO	Represents helicopters

The aircraft types were assigned to representative tracks based on the type of aircraft (jet, turbo-propeller or propeller) and the general cardinal direction from Sydney Airport of the destination or originating airport. This was further refined by determining the way-points associated with the major routes. As stated previously, the tracks were prepared as point type tracks, the location of which, and lateral spread, being determined from the NFPMS data.

Each operation associated with a particular runway and direction was assigned to a specific track. Where there was more than one track associated with a particular route, the percentage of operations was proportioned, based on the



data obtained from the NFPMS. The percentage of aircraft operations allocated to the backbone tracks and their subsidiary tracks was as follows:

Backbone track (Nominal) - 39%
First subsidiary track (x2) - 24%, and
Second subsidiary track (x2) - 6.5%.

A small number of tracks, for example turbo-propeller and other propeller aircraft departing from Runway 25 for the east, were not spread due to the small variations in their dispersal and the correspondingly few number of movements on these routes. In those cases a single nominal track was determined from the NFPMS.

The average daily movements for each aircraft type by runway, time of day and type of operation are shown in **Attachment A**.

3.4 Running of the Model

The INM was run using standard noise profile data for each of the aircraft types. The Australian Noise Exposure Forecast (ANEF) metric is a modification of the US Noise Exposure Forecast (NEF) within INM 6.0a. The parameters used for the ANEF metric were:

Day multiplier	1.0
Night multiplier	4.0

The evening multiplier is included as part of the night period (7:00pm to 7:00am) and is not modelled separately as in the US NEF process.

INM 6.0a allows for the use of average temperature and humidity for the period being modelled when calculating the noise levels. An average temperature of 14.9°C and an average humidity of 58.9% were used for the 1 July – 30 September 2000 ANEI (N409).

3.5 Preparation and verification of the model output.

The ANEI contours produced by the INM were plotted on a proprietary software base map. The contours produced for the 1 July - 30 September 2000 ANEI (N409) were consistent with flight tracks and the aircraft operations for the period and the use of terrain data.

The 1 July - 30 September 2000 ANEI (N409) had average daily movements of 875. This was an increase of 89 aircraft movements per day over the 1 July – 16 September 1999 ANEI (N403), which was modelled with average daily movements of 786. This is attributable to the lead up to the Olympics, during the Olympics and two (2) new start-up airlines.



4.0 Comparison of the 1 July - 30 September 2000 ANEI (N409) with the 1 July - 16 September 1999 ANEI (N403)

The 1 July - 30 September 2000 ANEI (N409) contours for Sydney Airport are shown in **Attachment D**. In addition, a plot of the ANEI (N409) with terrain contours is included as **Attachment C**. For comparison purposes, the 1 July - 16 September 1999 ANEI (N403) for Sydney Airport has been included as **Attachment E**.

It should be noted that the terrain contours displayed in **Attachment C** are not an accurate representation of actual ground contours as they have been prepared by the INM program by interpolating ground elevation data that is set out in a grid format. The INM requires the terrain data to be prepared in feet; therefore, the terrain contours have been produced at 50 feet, or approximately 15 metre, intervals. The terrain contours in **Attachment C** are shown in metres.

As the 1 July - 30 September 2000 ANEI (N409) was prepared using terrain and the newer version of INM (INM 6.0a), a direct comparison between N409 contours and those for the 1 July - 16 September 1999 ANEI (N403) for Sydney airport is not possible. However, a comparison has been made between ANEI N409 and ANEI N403 in regard to runway movement numbers. Where possible, comments have been included in regard to any changes in the shape of the contours between ANEI N409 and ANEI N403, taking into account what effect the modelling of terrain has had on the resultant contours. In **Attachment C** it can be seen that areas to the north, east and west of the airport are higher than that of the airport. This has had the effect of lengthening the contours in these areas.

North-West of the Airport

Average daily departures from Runway 34L have increased from 72.62 in ANEI N403 to 102.50 in ANEI N409. The 20 ANEI contour bumps to the north-west of the airport, especially the contour bump associated with jet departures via the Richmond and Katoomba SIDs, have increased in their extent accordingly. The increase in the bump associated with jet departures via Katoomba is attributable to the increase in the number of jet aircraft and turbo-prop aircraft departures from this runway. Departures from Runway 34L require jet aircraft that are using Katoomba SID to turn when they reach an altitude of 800 feet and turbo-prop aircraft to turn when they reach an altitude of 600 feet. This has resulted in the majority of these aircraft types turning at approximately the same lateral position. This factor, along with increased number of departures has resulted in an increase in the extent of the 20 ANEI contour. The inclusion of terrain has also had an effect on the 20 ANEI contour. In **Attachment C** it can be seen that the bump associated with these departures is located close to a 30 metre terrain contour.



Jet aircraft departing for destinations in the USA were split between the RICHMOND TWO SID and a track that maintains runway heading before turning east. The proportion of aircraft on each track was determined from analysis of NFPMS data. The number of B747 aircraft bound for the USA that departed from Runway 34L in ANEI N409 was on average 5.10 aircraft per day. Of these aircraft, an average of 3.66 maintained runway heading while the remainder (an average of 1.44) tracked via the Richmond SID. By comparison, the number of B747 aircraft bound for the USA that departed from Runway 34L in ANEI N403 was, on average, 2.87 aircraft per day. Of these aircraft, an average of 1.87 maintained runway heading while the remainder (an average of 1.00) tracked via the Richmond SID. The increase in the number of jet departures to the USA in ANEI N409 was based on data available from the NFPMS and included all jet aircraft types that were found to operate to the USA. The increase may also be attributable to the lead up to and the period of the Olympics.

North of the Airport

Average daily arrivals on Runway 16R have decreased from 83.01 in ANEI N403 to 73.09 in ANEI N409. However, the ANEI contours associated with these arrivals have not changed in their extent. This can only be attributed to the inclusion of terrain in the modelling of ANEI N409. See **Attachment C** for details of the terrain contours in relation to ANEI N409.

Average daily arrivals on Runway 16L have decreased from 46.48 in ANEI N403 to 43.55 in ANEI N409. However, the ANEI contours associated with these arrivals have only increased slightly in their extent. This can be attributed to an increase in the number of night jet arrivals to Runway 16L in ANEI N409 and the inclusion of terrain in the modelling of ANEI N409. See **Attachment C** for details of the terrain contours in relation to ANEI N409.

East of the Airport

Average daily arrivals on Runway 25 have increased from 30.15 in ANEI N403 to 46.40 in ANEI N409. Average daily departures from Runway 07 have increased from 0.04 in ANEI N403 to 0.11 in ANEI N409. The contours associated with the increase arrivals and departures have shown an increase in their extent accordingly.

Average daily departures from Runway 34R have increased from 69.86 in ANEI N403 to 92.50 in ANEI N409. The ANEI contours associated with these departures have shown an increase in their extent accordingly.

The inclusion of terrain in the modelling may have also influenced these increases in the extent of the ANEI contours. See **Attachment C** for details of the terrain contours in relation to ANEI N409.



West of the Airport

Average daily arrivals on Runway 07 have decreased from 28.54 in ANEI N403 to 10.57 in ANEI N409. Average daily departures from Runway 25 have increased from 40.10 in ANEI N403 to 45.01 in ANEI N409. The ANEI contours associated with these aircraft arrivals and departures have shown a reduction in their extent which is mainly attributable to the reduction in arriving aircraft. The inclusion of terrain in the modelling may have also influenced the reduction in the extent of the ANEI contours. See **Attachment C** for details of the terrain contours in relation to ANEI N409.

South of the Airport

Average daily departures from Runways 16L have decreased from 57.51 in ANEI N403 to 48.24 in ANEI N409. The ANEI contours associated with these departures have shown a corresponding decrease in their extent.

Average daily departures from Runway 16R have decreased from 140.51 in ANEI N403 to 133.52 in ANEI N409. However, the ANEI contours associated with these departures have shown an increase in their extent. This is attributable to an increase in the number of jet night departures from Runway 16R.

Average daily arrivals on Runway 34L have increased from 122.03 in ANEI N403 to 160.33 in ANEI N409. Average daily arrivals on Runway 34R have increased from 70.37 in ANEI N403 to 87.94 in ANEI N409. Accordingly, the ANEI contours associated with arrivals on Runway 34L and Runway 34R have shown an increase in their extent.

4.1 Comparison of Runway Use

The percentage of runway operations used in 1 July - 30 September 2000 ANEI (N409) compared with the percentage of runway operations used in the 1 July - 16 September 1999 (N403) are shown in Table 4.1 and Figure 4.1a and 4.1b.



Table 4.1 Runway usage of ANEI N409 compared with ANEI N403.

Runway	ANEI N409 (1 July - 30 September 2000)		ANEI N403 (1 July - 30 September 1999)	
	N409 Arrivals	N409 Departures	N403 Arrivals	N403 Departures
Rwy 07	1.2	0.1	3.6	0.0
Rwy 25	5.3	5.1	3.8	5.1
Rwy 16L	5.0	5.5	5.9	7.3
Rwy 16R	8.4	15.3	10.6	17.9
Rwy 34L	18.2	11.6	15.6	9.2
Rwy 34R	10.1	10.6	8.9	8.9
Helipad	1.8	1.8	1.6	1.6

Note: Numbers represent percentage of total movements for the respective period of the ANEI and have been rounded to one decimal place.

The data in Table 4.1 and Figures 4.1a and 4.1b indicate that the proportion of movements to the north, south, east and west of the airport vary when comparing ANEI N409 with ANEI N403. In calculating the proportion of aircraft movements, helicopter operations were not taken into account.

There was a slight reduction in the proportion of movements to the north of the airport (arrivals on R16L and R16R and departures from R34L) from 25.7% (N403) to 25.1% (N409) while there has been a slight decrease in the proportion of movements to the south of the airport (arrivals on R34L and R34R and departures from R16L and R16R) from 49.6% (N403) to 49.2% (N409). The proportion of movements to the east of the airport (arrivals on R25 and departures from R07 and R34R) has increased from 12.7% (N403) to 15.9% (N409). There has been a corresponding reduction in the proportion of movements to the west of the airport (arrivals on R07 and departures from R25) from 8.7% (N403) to 6.4% (N409).

Figure 4.1a Arrival Runway Use

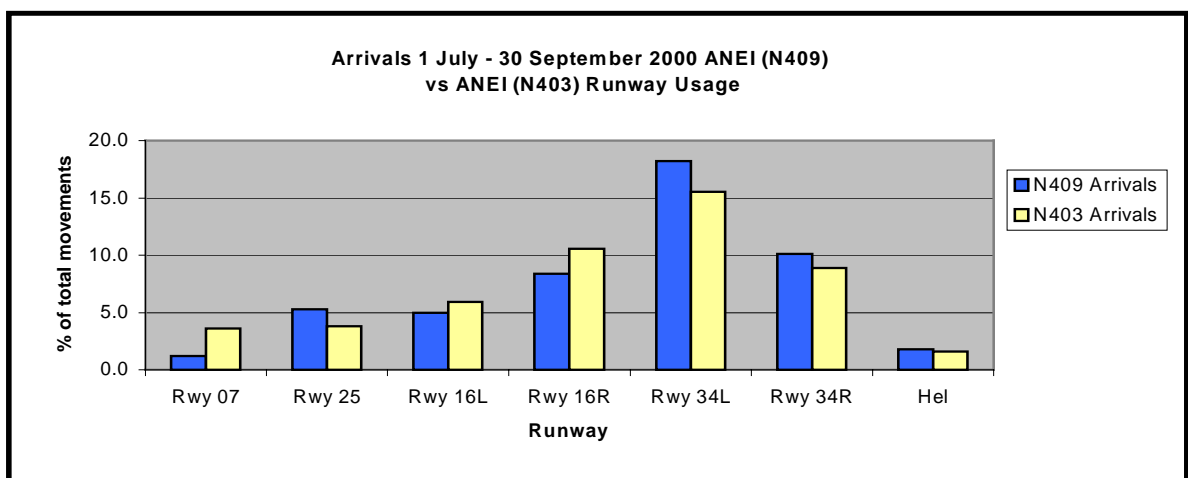
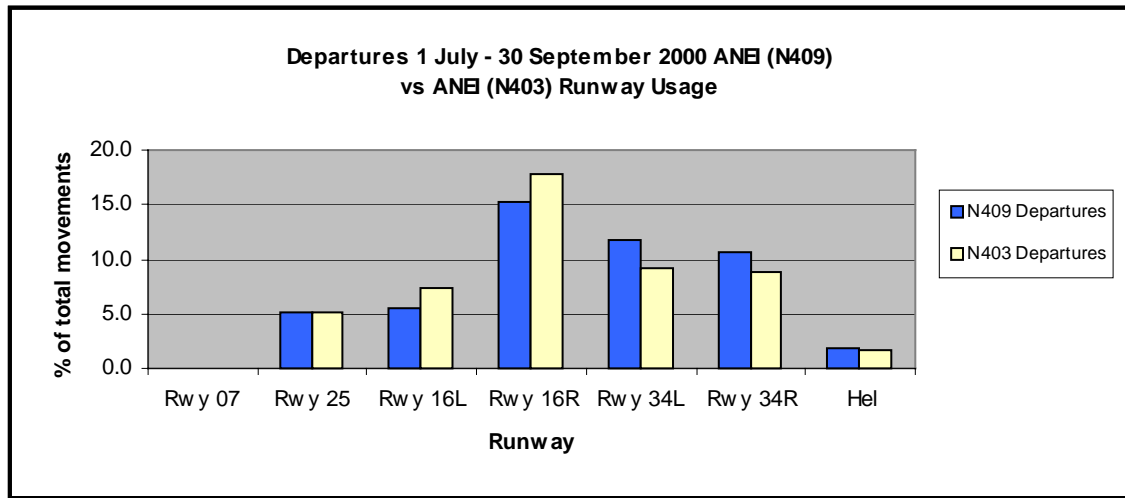




Figure 4.1b Departure Runway Use



4.2 Comparison of Population Counts

The estimated number of people within each of the contours of the 1 July - 30 September 2000 ANEI (N409) are shown in Table 4.2. These population estimates are based on the Australian Bureau of Statistics 1996 Census and have been rounded to the nearest 100.

The use of the newer version of INM (6.0a) and the inclusion of terrain data in the modelling of ANEI N409 does not provide the opportunity to directly compare the estimated population within each contour for the 1 July - 30 September 2000 ANEI (N409) and the 1 July - 16 September 1999 ANEI (N403). Therefore, this has not been provided in this report.

Table 4.2 Estimates of the number of people within each ANEI contour.

Contour	>=20 ANEI	>=25 ANEI	>=30 ANEI	>=35 ANEI	>=40 ANEI
1 Jul-30 Sep 2000 ANEI (N409)	96,200	23,100	4,100	400	0

The number of people within the various ANEI contours listed by suburb is shown in **Attachment B**. Notes and methodology specific to the suburb and contour population counts are included in **Attachment B**.



5.0 Number of Aircraft Noise Events above 70dB(A) Noise Map

5.1 Introduction

'Number Above' (Nxx) noise maps are an approach which, while technically less rigorous than the ANEI, provide additional information on aircraft noise in a form that is easier to understand by the community. The contours provide a visual depiction that shows the number of noise events during a given period that are louder than a selected threshold level. The N70 Aircraft Noise Map for Sydney Airport show for all areas around the airport how many aircraft noise events louder than 70 dB(A) there were, on a daily average during the 1 July - 30 September 2000 ANEI (N409) period.

The noise level of 70 dB(A) was selected by reference to what noise level is likely to interfere with normal conversation, telephone usage or sleep. In this case, 70 dB(A) was selected as it represents an external sound level which "should cause no difficulty with reliable communication from radio, television or conversation in a typical room with windows open" (Sydney Draft Noise Management Plan, Volume 2, p6.13). It is also the level which equates to an indoor sound level of 60 dB(A) with doors and windows open.

This 60 dB(A) level is the indoor design sound level which, when heard inside a normal domestic living room by the average listener, will not be judged as intrusive or annoying (Australian Standard 2021 -2000). The external noise level of 70 dB(A) also equates to an indoor noise level of approximately 45 to 50 dB(A) when the windows are closed. This does not exceed the indoor design sound level considered acceptable for relaxing or for sleeping areas (Australian Standard 2021 - 2000).

5.2 Assumptions and Methodology used in the Development of the N70 Aircraft Noise Map

The N70 aircraft noise map was prepared using the same input files as those for the ANEI contours and were prepared by running the Time-Above metric, which is a standard metric within the INM 6.0a, to produce a detailed grid output file. It is important to note that the TA metric, unlike the ANEF metric, does not use any night weighting in the calculations.

The detailed grid output file was then modified using a software program, then imported into a GIS software package for plotting onto a base map.

5.3 Analysis of the N70 Aircraft Noise Map

The N70 map prepared for Sydney Airport is shown in **Attachment F Sydney Airport N409 N70 Aircraft Noise Map - 1 July - 30 September 2000**.



The map output is consistent with the patterns that would be expected given the position of the flight paths and the number and types of aircraft using the flight paths modelled in the 1 July - 30 September 2000 ANEI (N409).

The N70 aircraft noise map provides information on the total number of aircraft noise events that exceeded 70 dB(A) in a grid area that were likely to have interfered with conversation, sleeping and listening to the radio or television inside a house with the windows open.

However, it is important to note several limitations with the N70 aircraft noise maps. These include:

- Unlike the ANEI computations, 'Number Above' metrics based on a large INM grid format have so far had limited use in formal noise assessment documents in Australia and they are therefore not tested or verified. The figures that may be derived from the N70 aircraft noise maps are therefore purely indicative.
- The INM does not provide users with a direct way of computing a "Number Above" map, unlike the ANEI and TA contours. It is only possible to derive "Number Above" values on a rectangular grid, which is shown in **Attachment F**.



Attachment A

N409 ANEI Average Daily Aircraft Movements by Runway



Runway	Aircraft Type	Arrivals			Departures			Totals
		Day	Night	Total	Day	Night	Total	
07	717200	0.19	0.15	0.34	0.01	0.00	0.01	0.35
07	727EM2	0.00	0.02	0.02	0.00	0.00	0.00	0.02
07	737300	0.69	0.63	1.32	0.00	0.00	0.00	1.32
07	737400	0.54	0.30	0.83	0.00	0.00	0.00	0.83
07	74720B	0.08	0.02	0.10	0.00	0.00	0.00	0.10
07	747400	0.11	0.15	0.26	0.00	0.00	0.00	0.26
07	767300	0.46	0.27	0.74	0.00	0.00	0.00	0.74
07	767CF6	0.34	0.24	0.59	0.00	0.00	0.00	0.59
07	767JT9	0.28	0.20	0.48	0.00	0.00	0.00	0.48
07	777200	0.01	0.02	0.03	0.00	0.00	0.00	0.03
07	A310	0.01	0.01	0.02	0.00	0.00	0.00	0.02
07	A320	0.36	0.45	0.81	0.00	0.01	0.01	0.82
07	A340	0.01	0.09	0.10	0.00	0.00	0.00	0.10
07	BAE300	0.04	0.09	0.13	0.01	0.00	0.01	0.14
07	BEC58P	0.08	0.23	0.31	0.00	0.00	0.00	0.31
07	DC1030	0.07	0.01	0.08	0.00	0.00	0.00	0.08
07	DHC6	0.88	0.66	1.54	0.03	0.01	0.04	1.58
07	DHC830	1.10	0.14	1.24	0.00	0.00	0.00	1.24
07	F10065	0.02	0.01	0.03	0.00	0.00	0.00	0.03
07	GASEPV	0.01	0.01	0.02	0.02	0.00	0.02	0.04
07	HS748A	0.00	0.03	0.03	0.00	0.00	0.00	0.03
07	LEAR25	0.00	0.02	0.02	0.00	0.00	0.00	0.02
07	LEAR35	0.12	0.09	0.21	0.00	0.00	0.00	0.21
07	SF340	1.04	0.27	1.32	0.01	0.00	0.01	1.33
		6.45	4.13	10.57	0.09	0.02	0.11	10.68
16L	717200	0.48	0.09	0.57	0.52	0.31	0.83	1.40
16L	737300	4.89	0.68	5.57	4.17	2.03	6.20	11.77
16L	737400	2.49	0.19	2.68	3.10	0.91	4.01	6.69
16L	74720B	0.00	0.00	0.00	0.00	0.03	0.03	0.03
16L	747400	0.00	0.00	0.00	0.00	0.04	0.04	0.04
16L	757PW	0.01	0.00	0.01	0.01	0.00	0.01	0.02
16L	767300	1.90	0.40	2.30	2.07	0.53	2.60	4.90
16L	767CF6	1.41	0.48	1.89	2.13	0.62	2.75	4.64
16L	767JT9	1.15	0.39	1.54	1.74	0.50	2.25	3.79
16L	777200	0.00	0.00	0.00	0.00	0.02	0.02	0.02
16L	A310	0.00	0.00	0.00	0.00	0.01	0.01	0.01
16L	A320	1.63	0.11	1.74	1.46	0.91	2.37	4.11
16L	A340	0.00	0.00	0.00	0.00	0.04	0.04	0.04
16L	BAE300	0.33	0.14	0.47	0.26	0.12	0.38	0.85
16L	BEC58P	2.03	0.24	2.27	1.10	0.08	1.17	3.44
16L	CNA441	0.04	0.00	0.04	0.01	0.00	0.01	0.05
16L	DC930	0.01	0.00	0.01	0.00	0.00	0.00	0.01
16L	DHC6	7.35	1.33	8.68	7.41	2.09	9.51	18.19
16L	DHC830	7.27	1.10	8.37	7.58	1.56	9.15	17.52
16L	F10065	0.04	0.00	0.04	0.03	0.01	0.04	0.08
16L	GASEPV	0.02	0.00	0.02	0.03	0.00	0.03	0.05
16L	HS748A	0.00	0.02	0.02	0.00	0.00	0.00	0.02
16L	LEAR25	0.00	0.00	0.00	0.01	0.00	0.01	0.01
16L	LEAR35	0.26	0.08	0.34	0.22	0.03	0.25	0.59
16L	SF340	6.02	0.96	6.98	5.19	1.32	6.51	13.49
		37.36	6.19	43.55	37.05	11.19	48.24	91.79



Runway	Aircraft Type	Arrivals			Departures			Totals
		Day	Night	Total	Day	Night	Total	
16R	707320	0.02	0.00	0.02	0.00	0.01	0.01	0.03
16R	717200	2.16	0.43	2.59	2.76	1.13	3.89	6.48
16R	727EM2	0.02	0.08	0.10	0.10	0.34	0.44	0.54
16R	737300	6.42	1.47	7.89	9.45	4.28	13.73	21.62
16R	737400	4.21	1.26	5.47	6.28	2.07	8.34	13.81
16R	74720B	2.42	0.51	2.92	2.83	1.41	4.24	7.16
16R	747400	4.27	2.96	7.23	9.42	1.81	11.23	18.46
16R	757PW	0.01	0.00	0.01	0.01	0.00	0.01	0.02
16R	767300	5.62	1.40	7.01	7.51	3.01	10.51	17.52
16R	767CF6	3.37	1.17	4.54	4.21	2.39	6.60	11.14
16R	767JT9	2.75	0.96	3.71	3.45	1.95	5.40	9.11
16R	777200	0.47	0.41	0.88	0.12	1.45	1.57	2.45
16R	A300	0.01	0.00	0.01	0.02	0.00	0.02	0.03
16R	A310	0.13	0.08	0.21	0.40	0.29	0.69	0.90
16R	A320	2.97	1.14	4.11	4.73	2.03	6.76	10.87
16R	A340	0.65	0.41	1.05	0.87	1.20	2.07	3.12
16R	BAE300	0.71	0.48	1.20	1.25	3.76	5.02	6.22
16R	BEC58P	1.18	0.25	1.43	2.48	4.16	6.63	8.06
16R	CNA441	0.01	0.00	0.01	0.09	0.02	0.12	0.13
16R	DC1030	0.57	0.22	0.79	0.50	0.83	1.33	2.12
16R	DHC6	5.30	1.32	6.62	7.11	9.74	16.85	23.47
16R	DHC830	4.42	0.54	4.96	7.31	1.49	8.80	13.76
16R	F10065	0.03	0.00	0.03	0.26	0.00	0.26	0.29
16R	GASEPV	0.02	0.00	0.02	0.05	0.02	0.08	0.10
16R	HS748A	0.00	0.03	0.03	0.01	1.16	1.17	1.20
16R	LEAR25	0.03	0.03	0.07	0.05	0.05	0.11	0.18
16R	LEAR35	0.88	0.16	1.04	1.29	1.29	2.59	3.63
16R	SF340	8.07	1.07	9.13	12.48	2.58	15.06	24.19
		56.72	16.37	73.09	85.06	48.46	133.52	206.61
25	717200	0.90	0.68	1.58	1.12	0.85	1.97	3.55
25	727EM2	0.07	0.23	0.30	0.01	0.05	0.06	0.36
25	737300	2.96	2.78	5.74	3.12	2.53	5.65	11.39
25	737400	2.11	2.01	4.12	2.27	1.31	3.58	7.70
25	74720B	0.23	0.27	0.50	0.43	0.19	0.61	1.11
25	747400	0.43	0.79	1.22	0.66	0.21	0.86	2.08
25	757PW	0.00	0.01	0.01	0.00	0.00	0.00	0.01
25	767300	2.13	1.73	3.86	2.17	1.39	3.56	7.42
25	767CF6	1.50	1.21	2.71	1.70	0.98	2.68	5.39
25	767JT9	1.23	0.99	2.22	1.39	0.80	2.19	4.41
25	777200	0.03	0.11	0.14	0.00	0.12	0.12	0.26
25	A310	0.07	0.08	0.14	0.06	0.02	0.09	0.23
25	A320	1.55	1.67	3.22	1.21	1.13	2.34	5.56
25	A340	0.11	0.33	0.44	0.01	0.14	0.15	0.59
25	BAE300	0.33	0.48	0.81	0.59	0.33	0.91	1.72
25	BEC58P	0.51	1.23	1.74	0.89	0.41	1.29	3.03
25	CNA441	0.01	0.01	0.02	0.02	0.01	0.04	0.06
25	DC1030	0.16	0.11	0.27	0.09	0.02	0.11	0.38
25	DHC6	4.02	2.30	6.32	4.81	1.59	6.40	12.72
25	DHC830	3.88	0.88	4.76	3.63	0.97	4.59	9.35
25	F10065	0.20	0.00	0.20	0.07	0.01	0.08	0.28
25	GASEPV	0.02	0.00	0.02	0.01	0.00	0.01	0.03
25	HS748A	0.00	0.09	0.09	0.00	0.00	0.00	0.09
25	LEAR25	0.01	0.01	0.02	0.03	0.00	0.03	0.05
25	LEAR35	0.27	0.21	0.48	0.41	0.25	0.66	1.14
25	SF340	4.29	1.19	5.47	5.27	1.75	7.02	12.49
		27.00	19.40	46.40	29.96	15.05	45.01	91.41



Attachment A

Runway	Aircraft Type	Arrivals			Departures			Totals
		Day	Night	Total	Day	Night	Total	
34L	707320	0.03	0.02	0.05	0.04	0.02	0.07	0.12
34L	717200	4.63	0.88	5.50	0.15	0.00	0.15	5.65
34L	727EM2	0.03	0.18	0.21	0.06	0.16	0.21	0.42
34L	737300	13.82	3.79	17.62	8.46	1.44	9.90	27.52
34L	737400	8.88	2.53	11.41	6.35	1.10	7.45	18.86
34L	74720B	5.20	1.45	6.65	4.44	0.85	5.29	11.94
34L	747400	9.15	8.93	18.09	13.98	0.71	14.68	32.77
34L	757PW	0.00	0.00	0.00	0.01	0.00	0.01	0.01
34L	767300	10.07	3.59	13.66	6.98	0.98	7.96	21.62
34L	767CF6	6.07	2.48	8.55	1.59	0.47	2.05	10.60
34L	767JT9	4.96	2.03	6.99	1.30	0.38	1.68	8.67
34L	777200	0.84	0.60	1.44	0.09	0.69	0.78	2.22
34L	A300	0.02	0.00	0.02	0.01	0.00	0.01	0.03
34L	A310	0.53	0.63	1.15	0.60	0.14	0.74	1.89
34L	A320	5.57	2.34	7.91	4.04	0.55	4.59	12.50
34L	A340	1.56	0.68	2.24	1.08	0.49	1.57	3.81
34L	BAE300	1.48	3.29	4.77	0.06	0.02	0.08	4.85
34L	BEC58P	1.87	2.43	4.30	3.55	0.23	3.78	8.08
34L	CNA441	0.03	0.03	0.07	0.02	0.00	0.02	0.09
34L	DC1030	0.96	0.40	1.35	0.40	0.65	1.05	2.40
34L	DHC6	9.79	6.49	16.29	9.54	2.44	11.98	28.27
34L	DHC830	9.21	1.00	10.21	9.13	1.28	10.41	20.62
34L	F10065	0.19	0.00	0.19	0.03	0.00	0.03	0.22
34L	GASEPV	0.04	0.01	0.05	0.05	0.01	0.07	0.12
34L	HS748A	0.02	1.01	1.03	0.02	0.01	0.04	1.07
34L	LEAR25	0.05	0.04	0.10	0.03	0.00	0.03	0.13
34L	LEAR35	1.56	1.42	2.98	0.62	0.07	0.69	3.67
34L	SF340	15.76	1.78	17.54	15.04	2.19	17.23	34.77
		112.30	48.03	160.33	87.63	14.87	102.50	262.83
34R	717200	0.98	0.25	1.23	4.13	0.84	4.97	6.20
34R	727EM2	0.04	0.04	0.09	0.00	0.00	0.00	0.09
34R	737300	9.80	1.19	10.99	11.39	2.25	13.63	24.62
34R	737400	5.00	0.54	5.54	5.88	0.78	6.66	12.20
34R	757PW	0.02	0.00	0.02	0.02	0.00	0.02	0.04
34R	767300	5.11	1.12	6.23	7.70	1.45	9.16	15.39
34R	767CF6	3.19	0.85	4.04	7.18	1.05	8.23	12.27
34R	767JT9	2.61	0.69	3.30	5.87	0.86	6.73	10.03
34R	A320	3.41	0.44	3.85	4.61	0.97	5.57	9.42
34R	BAE300	0.81	0.26	1.08	1.78	0.27	2.06	3.14
34R	BEC58P	3.84	1.10	4.93	2.01	0.09	2.09	7.02
34R	CNA441	0.03	0.01	0.04	0.00	0.00	0.00	0.04
34R	DC930	0.00	0.00	0.00	0.01	0.00	0.01	0.01
34R	DHC6	14.75	2.59	17.34	10.39	1.62	12.01	29.35
34R	DHC830	13.33	1.65	14.98	10.05	1.52	11.57	26.55
34R	F10065	0.13	0.01	0.14	0.21	0.01	0.22	0.36
34R	GASEPV	0.07	0.00	0.07	0.00	0.00	0.00	0.07
34R	LEAR25	0.06	0.00	0.06	0.08	0.00	0.08	0.14
34R	LEAR35	0.59	0.15	0.75	1.37	0.24	1.61	2.36
34R	SF340	12.12	1.15	13.27	6.65	1.23	7.89	21.16
		75.79	12.05	87.94	79.32	13.18	92.50	180.46
H	HELO	15.06	0.35	15.41	15.03	0.38	15.41	30.82
		15.06	0.35	15.41	15.03	0.38	15.41	30.82
Grand Total		330.78	106.52	437.29	334.16	103.15	437.31	874.60



Attachment B

N409 ANEI Number of People within each ANEI Contour Shown by Suburb



Number of People within each ANEI Contour shown by Suburb

Run No	Name	Suburb	Population	Contour (ANEF)				
				>=20	>=25	>=30	>=35	>=40
N409	Annandale		7700	1000	100	0	0	0
N409	Arncliffe		11800	1200	100	0	0	0
N409	Banksia		1900	1600	300	0	0	0
N409	Bexley		17800	5000	0	0	0	0
N409	Botany		4700	2000	200	100	0	0
N409	Brighton-Le-Sands		7400	500	0	0	0	0
N409	Coogee		20900	4000	0	0	0	0
N409	Daceyville		1300	900	300	0	0	0
N409	Drummoyne		9500	1600	0	0	0	0
N409	Eastlakes		7400	1700	500	0	0	0
N409	Enmore		1800	1700	0	0	0	0
N409	Erskineville		3500	0	0	0	0	0
N409	Kingsford		12400	3500	200	0	0	0
N409	Kurnell		2400	1000	200	0	0	0
N409	Kyeemagh		800	800	300	0	0	0
N409	Leichhardt		15900	11200	3100	0	0	0
N409	Lewisham		4600	1400	0	0	0	0
N409	Lilyfield		2100	400	0	0	0	0
N409	Marrickville		16700	13900	5800	1400	0	0
N409	Marrickville South		11300	2900	100	0	0	0
N409	Mascot		8500	6900	1200	300	0	0
N409	Newtown		11700	4500	0	0	0	0
N409	Pagewood		1500	200	0	0	0	0
N409	Petersham		6300	6300	2200	0	0	0
N409	Randwick		28700	2200	0	0	0	0
N409	Rockdale		9900	6800	2200	0	0	0



Run No	Name	Suburb	Contour (ANEF)					
			Population	>=20	>=25	>=30	>=35	>=40
N409	Rosebery		4900	100	0	0	0	0
N409	Rozelle		6100	100	0	0	0	0
N409	St Peters		2900	2700	500	100	0	0
N409	Stanmore		6400	5700	2700	600	0	0
N409	Sydenham		1100	1100	1100	1100	400	0
N409	Tempe		3500	3400	2000	400	0	0
Totals						Contour (ANEF)		
N409				96200	23100	4100	400	0

Notes

1. Contour and suburb population counts have been rounded to the nearest 100. Totals of the rounded individual suburb counts may not agree exactly with the rounded totals.
2. Suburbs with all contour populations less than fifty before rounding are included in the above listing and are listed as having zero population within each contour.
3. A suburb may intersect a contour but have no population under the contour. This can occur because the population distribution within a suburb is modelled to ensure that there is no significant population in parks and uninhabited areas.

Data and methodology

Suburb and contour population counts are approximations based on Census District (CD) populations from the 1996 Census and suburb boundary information from MapInfo Australia. Populations are calculated according to the proportion of the area of overlap of a suburb/contour and a CD to the CD total area. Some editing of CD boundaries and populations was performed to more accurately reflect population distribution in critical areas (close to the airport or flight paths).

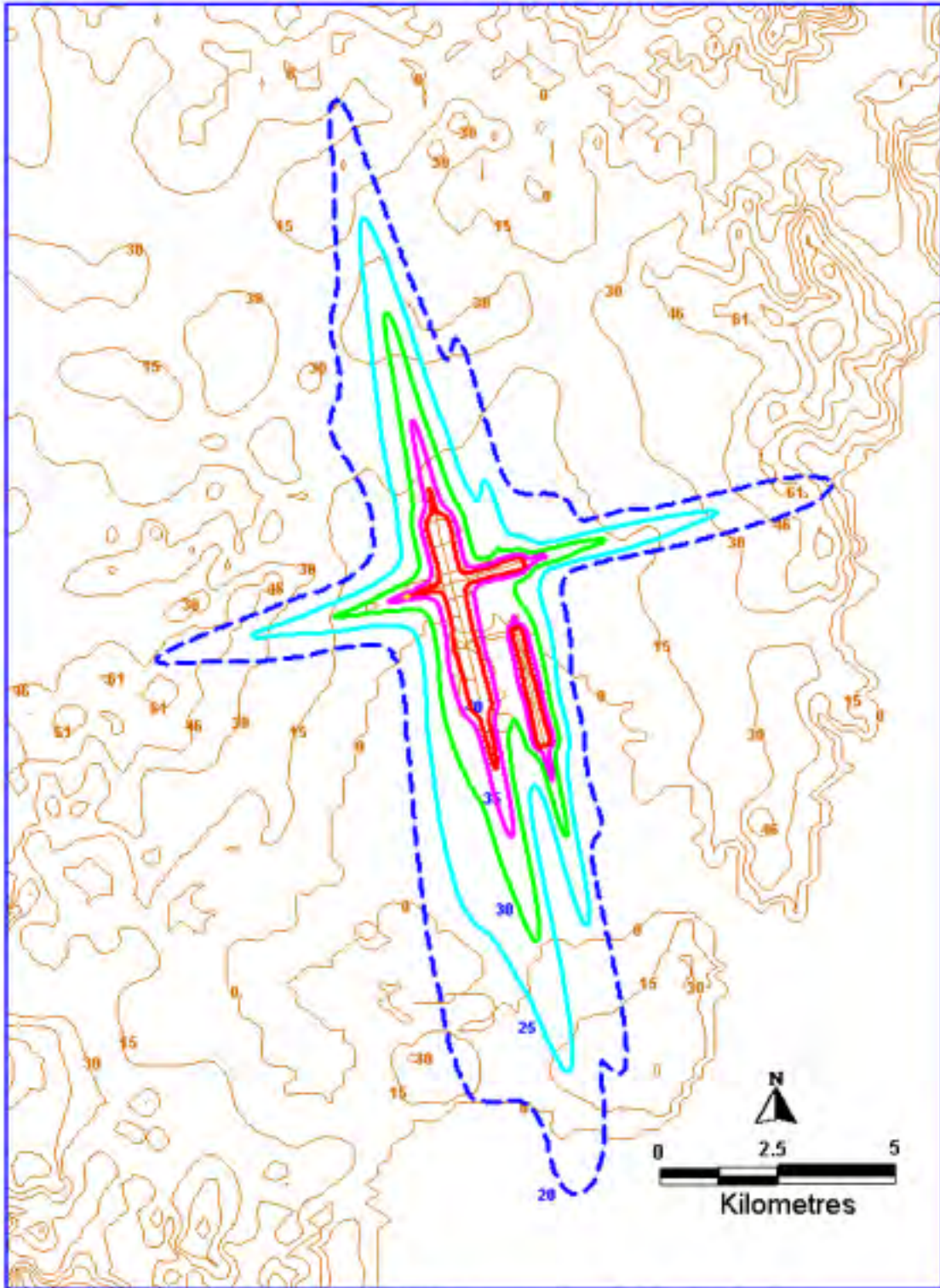


Attachment C

Sydney Airport N409 ANEI With Terrain Contours



AIRSERVICES AUSTRALIA Sydney Airport N409 ANEI with Terrain **Attachment C**



N409 1 July - 30 September ANEI contours with underlying terrain data.
Terrain contour heights shown in metres.

Prepared by
Environment Services Branch



Attachment D

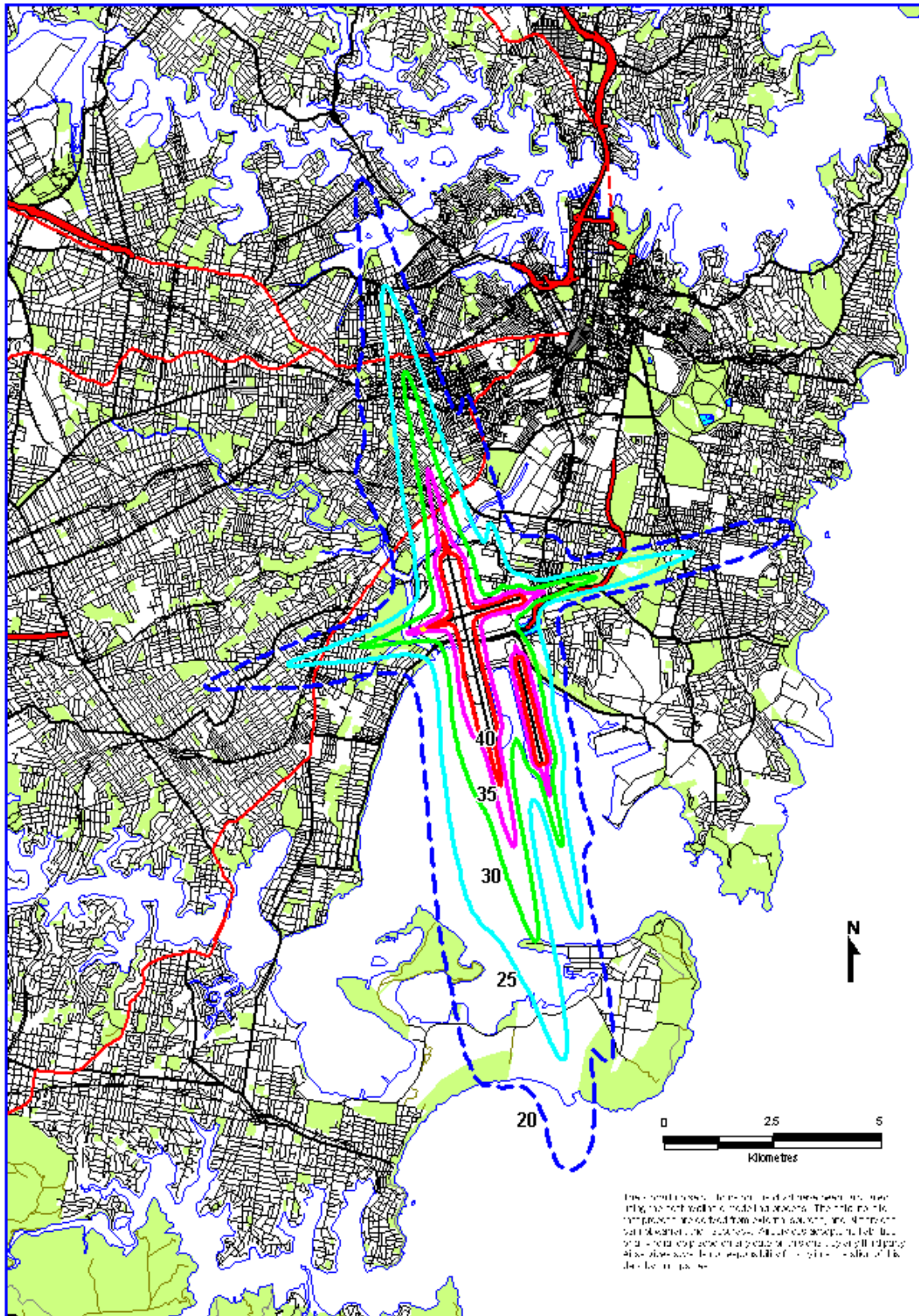
Sydney Airport N409 3 Month ANEI 1 July - 30 September 2000

The contours for ANEI N409 have been prepared using terrain data.



Sydney Airport N409 3 Month ANEI

Attachment D



This contour model is based on data provided by the flight operations and noise modelling process. The noise contours represent the predicted noise levels and do not represent an absolute measure of noise. The contours are based on a model of noise and do not take into account the variability of noise levels over time.

Prepared by:
Environment Services Branch

N409 ANEI for the period 1 July - 30 September 2000
ANEI contours modelled with INM 6.0a incorporating terrain data.



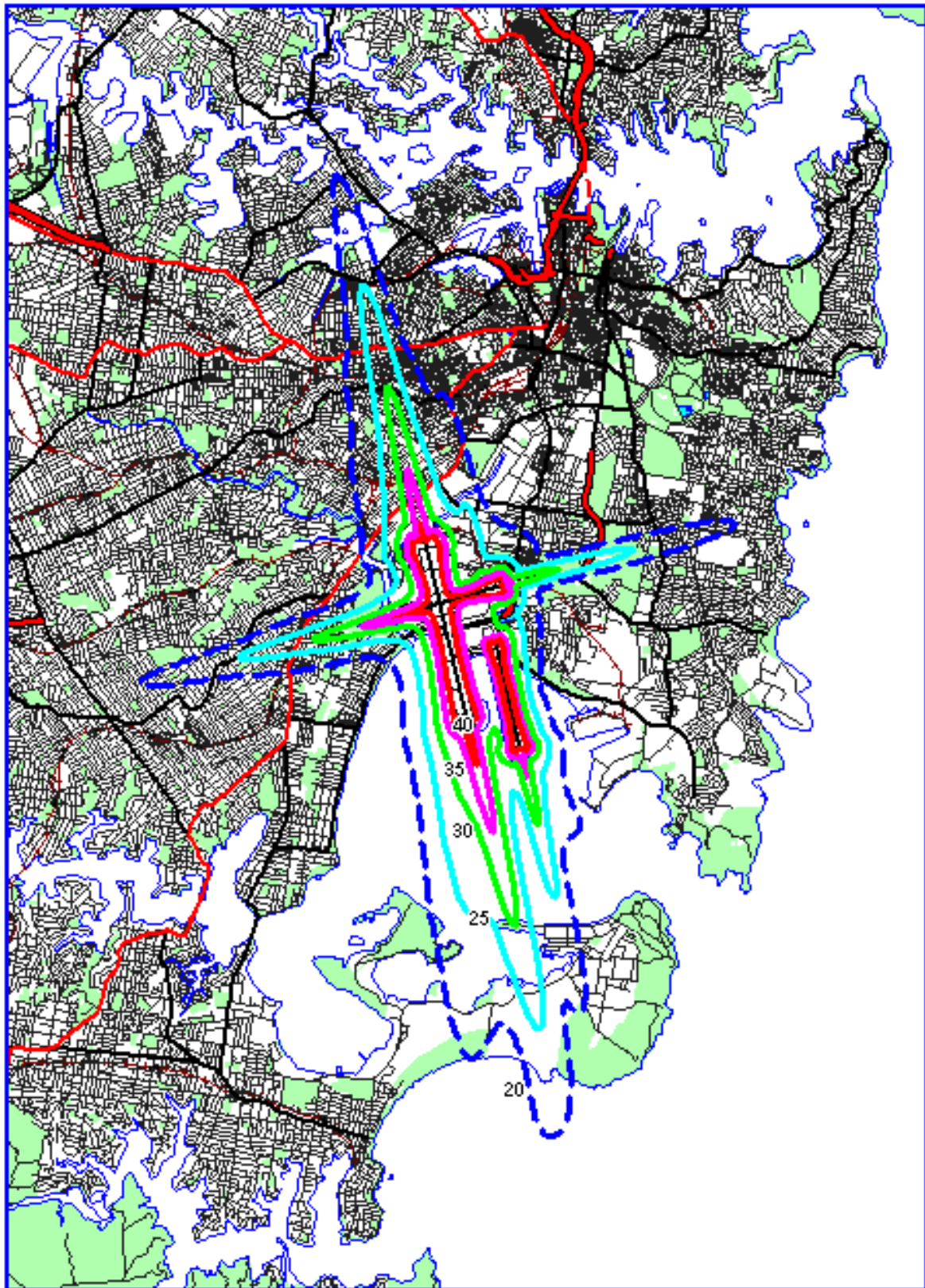
Attachment E

N403 ANEI Contours 1 July - 16 September 1999



Prepared by Environment Services Branch

Attachment E



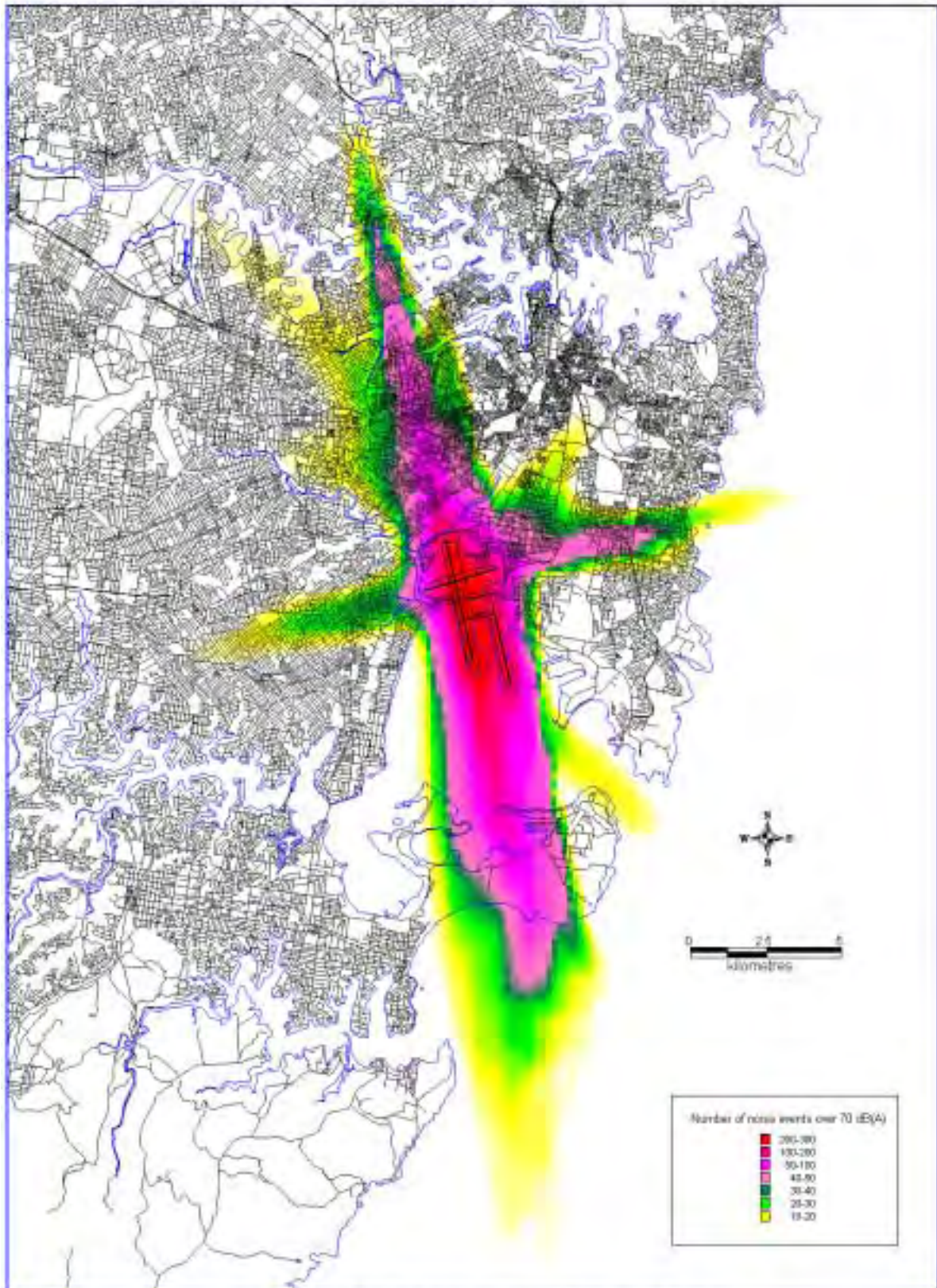
Sydney Airport

N409, 3 Monthly ANEI for the period 1 July - 30 September 1999



Attachment F

Sydney Airport N70 Map 1 July - 30 September 2000



Prepared by
Environment Services Branch
October 2000

Daily average number of aircraft noise events louder than 70 dB(A)
Period - 1 July - 30 September 2000