AIRSERVICES AUSTRALIA

Sydney Airport

N410 Australian Noise Exposure Index

1 October - 31 December 2000

REPORT No: EO 01-095

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DISCLAIMER

This report contains a summary of data collected over the specified period and is intended to convey the best information available from the TAAATS database and from the Noise and Flight Path Monitoring System. The aircraft noise contours referred to in this report have been calculated using the best available modelling process. The data input to that process includes data derived from external sources, and Airservices cannot warrant its accuracy. Airservices accepts no liability for any reliance placed on any data in this report by any third party. Airservices accepts no liability for any interpretation of this data by third parties.

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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 October 2000 to 31 December 2000 inclusive (Reference Number N410).

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 were 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				21.0^{o}C
Airport Average Humidity				58.5%

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 October to 31 December 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 80,324. A total of 103 of these movement records (0.13%) 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 81,736 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 81,736 or an average of 888 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 October and 31 December 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 decreases the distance between the aircraft and the ground that is used to calculate aircraft noise levels, thereby decreasing or increasing the calculated noise levels or ANEF value at that point.

The types of aircraft that operated at Sydney Airport were assigned to 29 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 October to 31 December 2000 Sydney ANEI

707320	Represents B707, C135 and DC8 type aircraft
727EM2	Boeing B727 fitted with hushkitting
737300	Boeing B737-300
737400	Boeing B737-400
757PW	Boeing B757-200
767300	Boeing B767-300
767JT9	Represents 55% of B767-200 movements
767CF6	Represents 45% of B767-200 movements
74720B	Represents B747-200 and B747-300
747400	Boeing B747-400
777200	Boeing B777-200
A310	Airbus Industries A310
A320	Airbus Industries A320
A340	Airbus Industries A340
BAE300	Represents BAe146
BEC58P	Represents GA twin piston-engine aircraft
CL601	Represents Canadair CL601 Challenger and B717-200 aircraft
CNA441	Represents GA twin turbine-engine aircraft
DC1030	Represents DC10 and MD11 type 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%.

However, in some cases, the percentage of aircraft movements allocated to the backbone track and their subsidiary tracks were adjusted to more realistically represent aircraft distribution across the spread of the track, especially when there were two tracks allocated to cover the extent of the spread of aircraft flight tracks.

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 21.0°C and an average humidity of 58.5% were used for the 1 October – 31 December 2000, ANEI (N410).

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 October - 31 December 2000 ANEI (N410) were consistent with flight tracks and the aircraft operations for the period and the use of terrain data.

The 1 October - 31 December 2000 ANEI (N410) had average daily movements of 888. This was an increase of 94 aircraft movements per day over the 17 September – 31 December 1999 ANEI (N405), which was modelled with average daily movements of 794. This is attributable to the ending of the Olympics, and subsequent departure of those attending or involved in the Olympics and two (2) new start-up airlines.

4.0 Comparison of the 1 October - 31 December 2000 ANEI (N410) with the 17 September - 31 December 1999 ANEI (N405)

The 1 October - 31 December 2000 ANEI (N410) contours for Sydney Airport are shown in **Attachment D.** In addition, a plot of the ANEI (N410) with terrain contours is included as **Attachment C**. For comparison purposes, the 17 September - 31 December 1999 ANEI (N405) 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 October - 31 December 2000 ANEI (N410) was prepared using terrain and the newer version of INM (INM 6.0a), a direct comparison between N410 contours and those for the 17 September - 31 December 1999 ANEI (N405) for Sydney airport is not possible. However, a comparison has been made between ANEI N410 and ANEI N405 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 N410 and ANEI N405, 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 have ground levels that 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 80.88 in ANEI N405 to 97.06 in ANEI N410. 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. Standard Instrument Departure Procedures for 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 location. 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.

Long-haul 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 long-haul aircraft bound for the USA that departed from Runway 34L in ANEI N410 was on average 3.75 aircraft per day. Of these aircraft, an average of 2.18 maintained runway heading while the remainder (an average of 1.57) tracked via the Richmond SID. By comparison, the number of long-haul aircraft bound for the USA that departed from Runway 34L in ANEI N405 was, on average, 3.39 aircraft per day. Of these aircraft, an average of 1.79 maintained runway heading while the remainder (an average of 1.60) tracked via the Richmond SID.

North of the Airport

Average daily arrivals on Runway 16R have decreased from 85.24 in ANEI N405 to 83.79 in ANEI N410. However, the ANEI contours associated with these arrivals has increased slightly in their extent. This can be attributed to the inclusion of terrain in the modelling of ANEI N410 and the slight increase in the number of long-haul jet aircraft departures to the USA that are maintaining runway heading before turning east. See **Attachment C** for details of the terrain contours in relation to ANEI N410.

Average daily arrivals on Runway 16L have decreased from 52.41 in ANEI N405 to 50.26 in ANEI N410. However, the ANEI contours associated with these arrivals have increased slightly in their extent. This can be attributed to an increase in the number of jet arrivals, 21.60 in ANEI N406 to 22.31 in ANEI N410 and the inclusion of terrain in the modelling of ANEI N410. See **Attachment C** for details of the terrain contours in relation to ANEI N410.

East of the Airport

Average daily arrivals on Runway 25 have increased from 10.53 in ANEI N405 to 15.71 in ANEI N410. Average daily departures from Runway 07 have increased from 0.64 in ANEI N405 to 2.57 in ANEI N410. Accordingly, the contours associated with the arrivals and departures have shown an increase in their extent.

Average daily departures from Runway 34R have increased from 78.74 in ANEI N405 to 98.86 in ANEI N410. The ANEI contours associated with these departures have shown an increase in their extent.

The inclusion of terrain in the modelling has also influenced the increases in the extent of the ANEI contours. See **Attachment C** for details of the terrain contours in relation to ANEI N410.

West of the Airport

Average daily arrivals on Runway 07 have increased from 45.33 in ANEI N405 to 49.30 in ANEI N410. Average daily departures from Runway 25 have decreased from 20.33 in ANEI N405 to 19.36 in ANEI N410. The ANEI contours associated with these aircraft arrivals and departures have shown an increase in their extent, which is mainly attributable to the increase in arriving aircraft. The inclusion of terrain in the modelling has have also influenced the increase in the extent of the ANEI contours. See **Attachment C** for details of the terrain contours in relation to ANEI N410.

South of the Airport

Average daily departures from Runways 16L have increased from 62.92 in ANEI N405 to 63.30 in ANEI N410. However, the ANEI contours associated with these departures have shown a decrease in their extent. This is attributable to a decrease in the number of night departures, from 14.31 in ANEI N405 to 12.34 in ANEI N410, which includes a decrease in the number of night jet departures, from 8.81 in ANEI N405 to 8.06 in ANEI N410 and a decrease in the number of heavy jet departures from Runway 16L.

Average daily departures from Runway 16R have decreased from 146.87 in ANEI N405 to 146.30 in ANEI N410. The ANEI contours associated with these departures have shown a slight decrease in their extent to the south of the airport. However, the shape of the ANEI contours associated with these departures has changed, with an increase in their extent along the western edge of the contours. This is attributable to changes in the departure associated with the DEENA ONE SID that was introduced on the 15th June 2000.

Average daily arrivals on Runway 34L have increased from 125.11 in ANEI N405 to 148.07 in ANEI N410. Average daily arrivals on Runway 34R have increased

from 78.74 in ANEI N405 to 80.34 in ANEI N410. 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 October - 31 December 2000 ANEI (N410) compared with the percentage of runway operations used in the 17 September - 31 December 1999 (N405) are shown in Table 4.1 and Figure 4.1a and 4.1b.

Table 4.1 Runway usage of ANEI N410 compared with ANEI N405.

Runway	ANEI N410 (1July - 31 December 2000)		ANEI N405 (17 September - 31 December 1999)	
	N410 Arrivals	N410 Departures	N405 Arrivals	N405 Departures
Rwy 07	5.6	0.3	5.7	0.1
Rwy 25	1.8	2.2	1.3	2.6
Rwy 16L	5.7	7.1	6.6	7.9
Rwy 16R	9.4	16.5	10.7	18.5
Rwy 34L	16.7	10.9	15.7	10.2
Rwy 34R	9.0	11.1	9.0	9.9
Helipad	1.9	1.9	0.9	0.9

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 N410 with ANEI N405. 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 27.5% (N405) to 26.0% (N410) 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 51.1% (N405) to 49.3% (N410). The proportion of movements to the east of the airport (arrivals on R25 and departures from R07 and R34R) has increased from 11.3% (N405) to 13.2% (N410). 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 8.3% (N405) to 7.8% (N410).

Figure 4.1a Arrival Runway Use

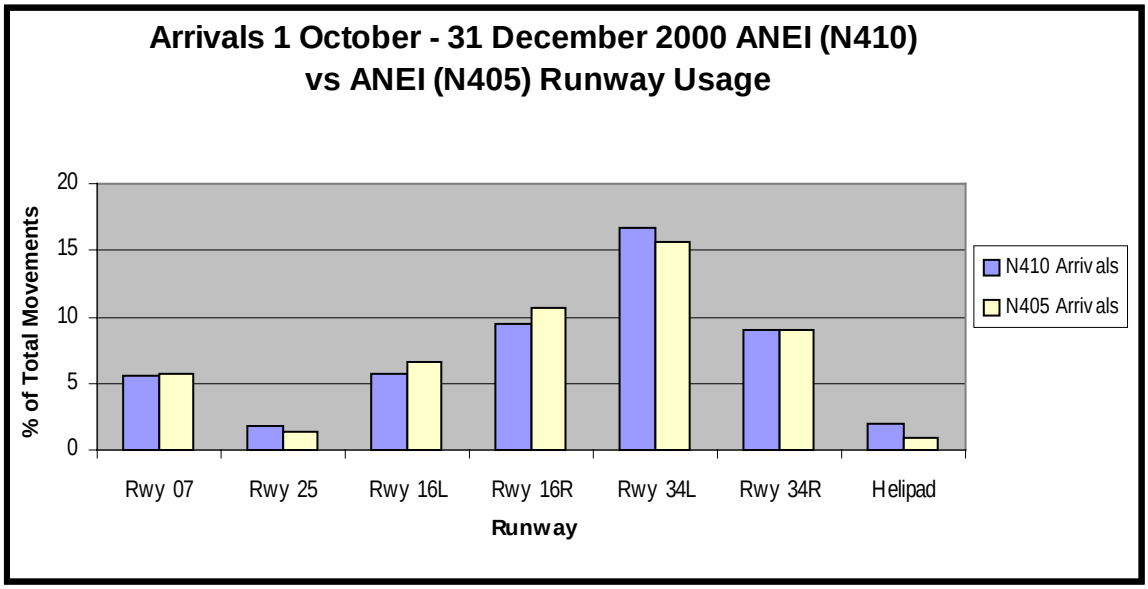
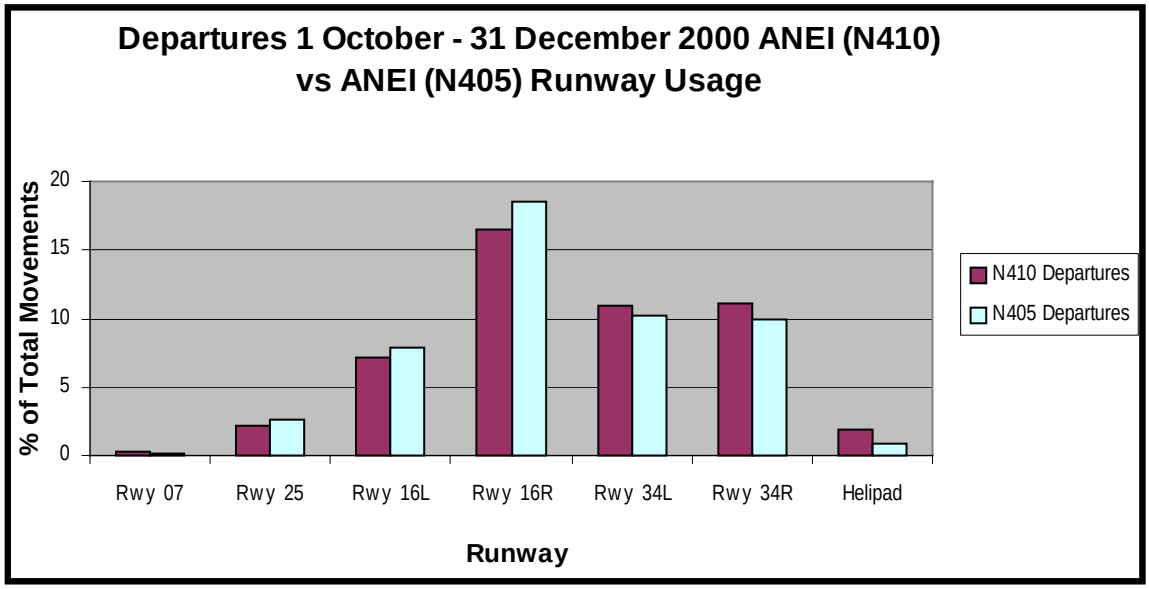


Figure 4.1b Departure Runway Use



4.2 Comparison of Population Counts

The estimated number of people within each of the contours of the 1 October - 31 December 2000 ANEI (N410) 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 N410 does not provide the opportunity to directly compare the

estimated population within each contour for the 1 October - 31 December 2000 ANEI (N410) and the 17 September - 31 December 1999 ANEI (N405). 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 Oct-31 Dec 2000 ANEI (N410)	87,100	24,800	5,100	500	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 more easily understood 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 October - 31 December 2000 ANEI (N410) 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).

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 N410 N70 Aircraft Noise Map - 1 October - 31 December 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 October - 31 December 2000 ANEI (N410).

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 fully 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" chart, unlike the ANEI and TA contours. It is only possible to derive "Number Above" values on a rectangular grid, which is then processed for importing into the GIS software package. The accuracy of the "N70" contours shown in **Attachment F** is therefore at best plus or minus 500 metres, the distance between grid points used by INM in the calculations. In addition, the superimposed contours may have incurred errors in the transformation from INM coordinates to the map coordinates that was used in the preparation of the "N70" chart.

Attachment A

N410 ANEI
Average Daily Aircraft Movements by Runway

Runway	Aircraft Type	Arrivals			Departures			Totals
		Day	Night	Total	Day	Night	Total	
07	727EM2	0.03	0.07	0.10	0.00	0.00	0.00	**0.10**
07	737300	3.29	2.10	5.39	0.11	0.01	0.12	**5.51**
07	737400	3.21	2.26	5.47	0.14	0.00	0.14	**5.61**
07	767300	2.59	1.31	3.90	0.17	0.01	0.18	**4.08**
07	767CF6	1.57	0.88	2.45	0.13	0.01	0.13	**2.58**
07	767JT9	1.28	0.72	2.00	0.10	0.00	0.11	**2.11**
07	74720B	0.24	0.24	0.48	0.04	0.00	0.04	**0.52**
07	747400	0.16	0.56	0.72	0.14	0.04	0.18	**0.90**
07	777200	0.11	0.23	0.34	0.02	0.00	0.02	**0.36**
07	A310	0.09	0.00	0.09	0.01	0.00	0.01	**0.10**
07	A320	1.94	1.39	3.33	0.05	0.01	0.07	**3.40**
07	A340	0.16	0.21	0.37	0.02	0.01	0.03	**0.40**
07	BAE300	0.58	0.46	1.04	0.04	0.00	0.04	**1.08**
07	BEC58P	0.52	0.49	1.01	0.04	0.02	0.07	**1.08**
07	CL601	1.95	1.03	2.98	0.08	0.01	0.09	**3.07**
07	CNA441	0.01	0.00	0.01	0.00	0.00	0.00	**0.01**
07	DC1030	0.08	0.12	0.20	0.00	0.00	0.00	**0.20**
07	DHC6	4.88	1.93	6.81	0.55	0.14	0.69	**7.50**
07	DHC830	4.74	0.90	5.63	0.28	0.00	0.28	**5.91**
07	F10065	0.21	0.01	0.22	0.01	0.00	0.01	**0.23**
07	GASEPF	0.00	0.00	0.00	0.01	0.00	0.01	**0.01**
07	GASEPV	0.01	0.00	0.01	0.02	0.00	0.02	**0.03**
07	LEAR25	0.01	0.00	0.01	0.00	0.00	0.00	**0.01**
07	LEAR35	0.44	0.19	0.62	0.13	0.02	0.15	**0.77**
07	SF340	5.12	0.99	6.11	0.18	0.00	0.18	**6.29**
		33.21	**16.09**	**49.30**	**2.28**	**0.29**	**2.57**	**51.87**
16L	737300	4.84	0.53	5.37	5.50	1.98	7.49	**12.86**
16L	737400	3.68	0.48	4.17	5.91	1.38	7.28	**11.45**
16L	757PW	0.02	0.00	0.02	0.00	0.00	0.00	**0.02**
16L	767300	3.05	0.43	3.47	2.44	1.03	3.47	**6.94**
16L	767CF6	1.69	0.49	2.18	2.47	0.69	3.16	**5.34**
16L	767JT9	1.38	0.40	1.79	2.02	0.57	2.59	**4.38**
16L	747400	0.00	0.00	0.00	0.01	0.00	0.01	**0.01**
16L	A320	2.55	0.12	2.67	2.30	0.94	3.24	**5.91**
16L	BAE300	0.48	0.12	0.60	0.77	0.24	1.01	**1.61**
16L	BEC58P	2.07	0.30	2.37	1.25	0.13	1.38	**3.75**
16L	CL601	1.40	0.19	1.59	2.23	1.18	3.41	**5.00**
16L	CNA441	0.01	0.00	0.01	0.02	0.00	0.02	**0.03**
16L	DHC6	8.31	1.07	9.38	10.09	1.76	11.85	**21.23**
16L	DHC830	7.75	0.99	8.74	9.36	1.05	10.41	**19.15**
16L	F10065	0.02	0.00	0.02	0.07	0.01	0.08	**0.10**
16L	GASEPV	0.01	0.00	0.01	0.00	0.00	0.00	**0.01**
16L	LEAR25	0.00	0.01	0.01	0.02	0.00	0.02	**0.03**
16L	LEAR35	0.35	0.07	0.42	0.41	0.04	0.46	**0.88**
16L	SF340	6.67	0.77	7.43	6.09	1.35	7.44	**14.87**
		44.30	**5.96**	**50.26**	**50.96**	**12.34**	**63.30**	**113.56**

Attachment A

Runway	Aircraft Type	Arrivals			Departures			Totals
		Day	Night	Total	Day	Night	Total	
16R	707320	0.01	0.00	0.01	0.03	0.00	0.03	**0.04**
16R	727EM2	0.04	0.11	0.15	0.09	0.28	0.37	**0.52**
16R	737300	7.73	1.51	9.24	11.37	3.22	14.59	**23.83**
16R	737400	4.68	1.04	5.72	6.99	2.04	9.03	**14.75**
16R	767300	6.76	1.65	8.42	11.11	2.79	13.90	**22.32**
16R	767CF6	3.74	1.00	4.74	5.21	2.01	7.22	**11.96**
16R	767JT9	3.06	0.82	3.88	4.26	1.64	5.91	**9.79**
16R	74720B	3.20	0.78	3.98	4.20	1.43	5.63	**9.61**
16R	747400	6.00	3.31	9.31	9.86	2.19	12.05	**21.36**
16R	777200	1.17	0.64	1.81	1.27	1.64	2.91	**4.72**
16R	A310	0.58	0.04	0.62	0.81	0.02	0.83	**1.45**
16R	A320	3.74	1.18	4.92	6.35	2.47	8.82	**13.74**
16R	A340	1.04	0.30	1.34	0.89	1.06	1.95	**3.29**
16R	BAE300	0.95	0.47	1.42	1.48	3.52	5.00	**6.42**
16R	BEC58P	1.07	0.31	1.38	2.44	2.62	5.06	**6.44**
16R	CL601	3.22	0.50	3.73	4.10	1.58	5.68	**9.41**
16R	CNA441	0.00	0.00	0.00	0.01	0.06	0.07	**0.07**
16R	DC1030	0.70	0.26	0.96	0.56	0.71	1.27	**2.23**
16R	DHC6	4.51	1.22	5.72	7.01	8.53	15.54	**21.26**
16R	DHC830	4.90	0.60	5.50	8.42	1.49	9.91	**15.41**
16R	F10065	0.07	0.00	0.07	0.22	0.00	0.22	**0.29**
16R	GASEPV	0.02	0.00	0.02	0.02	0.00	0.02	**0.04**
16R	HS748A	0.00	0.02	0.02	0.00	1.01	1.01	**1.03**
16R	LEAR25	0.01	0.00	0.01	0.01	0.01	0.02	**0.03**
16R	LEAR35	0.60	0.16	0.77	1.07	1.23	2.30	**3.07**
16R	SF340	9.08	0.96	10.04	14.51	2.44	16.95	**26.99**
		66.89	**16.90**	**83.79**	**102.30**	**43.99**	**146.30**	**230.09**
25	727EM2	0.02	0.02	0.04	0.00	0.00	0.00	**0.04**
25	737300	1.22	0.57	1.79	1.51	0.90	2.41	**4.20**
25	737400	1.11	0.44	1.54	1.22	0.71	1.93	**3.47**
25	767300	0.88	0.41	1.28	1.11	0.47	1.59	**2.87**
25	767CF6	0.50	0.39	0.89	0.72	0.28	1.00	**1.89**
25	767JT9	0.41	0.32	0.73	0.59	0.23	0.82	**1.55**
25	74720B	0.17	0.10	0.27	0.21	0.05	0.26	**0.53**
25	747400	0.30	0.34	0.63	0.32	0.06	0.39	**1.02**
25	777200	0.03	0.10	0.13	0.01	0.03	0.04	**0.17**
25	A310	0.02	0.00	0.02	0.02	0.00	0.02	**0.04**
25	A320	0.69	0.46	1.15	0.59	0.50	1.09	**2.24**
25	A340	0.08	0.10	0.17	0.02	0.04	0.07	**0.24**
25	BAE300	0.13	0.08	0.21	0.21	0.13	0.34	**0.55**
25	BEC58P	0.09	0.14	0.23	0.25	0.11	0.36	**0.59**
25	CL601	0.58	0.25	0.83	0.71	0.65	1.36	**2.19**
25	DC1030	0.02	0.04	0.07	0.03	0.01	0.04	**0.11**
25	DHC6	1.48	0.37	1.85	1.89	0.54	2.43	**4.28**
25	DHC830	1.37	0.15	1.52	1.75	0.43	2.17	**3.69**
25	F10065	0.07	0.00	0.07	0.03	0.00	0.03	**0.10**
25	GASEPF	0.01	0.00	0.01	0.00	0.00	0.00	**0.01**
25	GASEPV	0.00	0.00	0.00	0.01	0.00	0.01	**0.01**
25	LEAR25	0.00	0.00	0.00	0.01	0.01	0.02	**0.02**
25	LEAR35	0.23	0.05	0.28	0.12	0.05	0.17	**0.45**
25	SF340	1.70	0.28	1.98	2.13	0.67	2.80	**4.78**
		11.10	**4.62**	**15.71**	**13.47**	**5.90**	**19.36**	**35.07**

Attachment A

Runway	Aircraft Type	Arrivals			Departures			Totals
		Day	Night	Total	Day	Night	Total	
34L	707320	0.01	0.01	0.02	0.00	0.00	0.00	**0.02**
34L	727EM2	0.00	0.20	0.20	0.05	0.23	0.27	**0.47**
34L	737300	11.98	3.95	15.93	7.19	2.07	9.26	**25.19**
34L	737400	7.67	2.76	10.44	4.99	1.42	6.41	**16.85**
34L	757PW	0.00	0.00	0.00	0.03	0.00	0.03	**0.03**
34L	767300	9.34	3.53	12.87	5.71	1.17	6.88	**19.75**
34L	767CF6	5.48	2.52	8.00	1.31	0.69	2.00	**10.00**
34L	767JT9	4.48	2.06	6.55	1.07	0.56	1.63	**8.18**
34L	74720B	4.19	1.25	5.44	3.51	0.75	4.26	**9.70**
34L	747400	7.47	5.65	13.11	9.66	1.52	11.18	**24.29**
34L	777200	1.70	0.94	2.64	1.11	0.85	1.96	**4.60**
34L	A310	0.67	0.07	0.73	0.60	0.00	0.60	**1.33**
34L	A320	5.36	2.96	8.32	3.91	1.18	5.09	**13.41**
34L	A340	0.91	0.58	1.49	0.76	0.59	1.35	**2.84**
34L	BAE300	1.90	3.37	5.26	0.05	0.09	0.14	**5.40**
34L	BEC58P	1.99	1.55	3.53	3.46	0.31	3.77	**7.30**
34L	CL601	5.04	1.66	6.70	0.12	0.09	0.21	**6.91**
34L	CNA441	0.02	0.05	0.08	0.02	0.01	0.04	**0.12**
34L	DC1030	0.66	0.38	1.04	0.32	0.65	0.98	**2.02**
34L	DHC6	7.99	7.06	15.05	7.74	2.72	10.45	**25.50**
34L	DHC830	8.70	1.33	10.03	9.15	2.07	11.23	**21.26**
34L	F10065	0.14	0.01	0.15	0.04	0.00	0.04	**0.19**
34L	GASEPV	0.01	0.01	0.02	0.02	0.02	0.03	**0.05**
34L	HS748A	0.00	0.99	0.99	0.00	0.00	0.00	**0.99**
34L	LEAR25	0.07	0.02	0.09	0.01	0.00	0.01	**0.10**
34L	LEAR35	1.05	1.38	2.43	0.59	0.06	0.66	**3.09**
34L	SF340	14.56	2.41	16.97	15.36	3.24	18.60	**35.57**
		101.39	**46.68**	**148.07**	**76.79**	**20.28**	**97.06**	**245.13**
34R	727EM2	0.03	0.12	0.15	0.00	0.00	0.00	**0.15**
34R	737300	7.56	1.10	8.66	9.82	2.69	12.51	**21.17**
34R	737400	5.47	1.11	6.58	7.70	1.43	9.13	**15.71**
34R	757PW	0.00	0.01	0.01	0.00	0.00	0.00	**0.01**
34R	767300	4.87	0.68	5.55	7.32	2.16	9.48	**15.03**
34R	767CF6	2.41	1.03	3.44	6.45	1.74	8.19	**11.63**
34R	767JT9	1.97	0.84	2.82	5.28	1.42	6.70	**9.52**
34R	74720B	0.00	0.02	0.02	0.00	0.00	0.00	**0.02**
34R	747400	0.01	0.03	0.04	0.00	0.00	0.00	**0.04**
34R	777200	0.01	0.01	0.02	0.00	0.00	0.00	**0.02**
34R	A320	3.99	0.44	4.43	5.00	1.53	6.53	**10.96**
34R	A340	0.01	0.01	0.02	0.00	0.00	0.00	**0.02**
34R	BAE300	0.65	0.19	0.83	2.35	0.48	2.83	**3.66**
34R	BEC58P	3.14	0.84	3.98	1.76	0.10	1.86	**5.84**
34R	CL601	2.47	0.33	2.79	5.87	2.02	7.88	**10.67**
34R	CNA441	0.03	0.01	0.04	0.01	0.00	0.01	**0.05**
34R	DC1030	0.02	0.00	0.02	0.00	0.00	0.00	**0.02**
34R	DHC6	13.35	2.12	15.47	11.12	2.20	13.32	**28.79**
34R	DHC830	11.54	1.86	13.41	8.99	1.85	10.83	**24.24**
34R	F10065	0.09	0.00	0.09	0.23	0.00	0.23	**0.32**
34R	GASEPV	0.02	0.00	0.02	0.01	0.00	0.01	**0.03**
34R	LEAR25	0.01	0.00	0.01	0.05	0.00	0.05	**0.06**
34R	LEAR35	0.45	0.16	0.61	1.12	0.29	1.41	**2.02**
34R	SF340	9.86	1.46	11.31	6.20	1.69	7.89	**19.20**
		67.97	**12.37**	**80.34**	**79.27**	**19.59**	**98.86**	**179.20**
H	HELO	15.03	1.65	16.67	15.18	1.49	16.67	**33.34**
		15.03	**1.65**	**16.67**	**15.18**	**1.49**	**16.67**	**33.34**
Grand Total		**339.89**	**104.27**	**444.14**	**340.25**	**103.88**	**444.12**	**888.26**

Attachment B

N410 ANEI
Number of People within each
ANEI Contour by Suburb

Number of People within each ANEI Contour by Suburb

Suburb			Contour (ANEF)				
Run No	**Name**	**Population**	**>=20**	**>=25**	**>=30**	**>=35**	**>=40**
N410	Annandale	7700	1000	100	0	0	0
N410	Arncliffe	11800	500	100	0	0	0
N410	Banksia	1900	1100	300	0	0	0
N410	Bexley	17800	6900	2600	0	0	0
N410	Botany	4700	2000	200	0	0	0
N410	Brighton-Le-Sands	7400	0	0	0	0	0
N410	Coogee	20900	0	0	0	0	0
N410	Daceyville	1300	500	0	0	0	0
N410	Drummoyne	9500	2200	0	0	0	0
N410	Eastlakes	7400	900	100	0	0	0
N410	Enmore	1800	1300	0	0	0	0
N410	Erskineville	3500	0	0	0	0	0
N410	Hurstville	17700	3000	0	0	0	0
N410	Kingsford	12400	1400	0	0	0	0
N410	Kurnell	2400	1000	200	0	0	0
N410	Kyeemagh	800	600	0	0	0	0
N410	Leichhardt	15900	10400	3500	0	0	0
N410	Lewisham	4600	1400	0	0	0	0
N410	Lilyfield	2100	400	0	0	0	0
N410	Marrickville	16700	13500	5400	1600	0	0
N410	Marrickville South	11300	2900	100	0	0	0
N410	Mascot	8500	6800	800	0	0	0
N410	Newtown	11700	4600	0	0	0	0
N410	Petersham	6300	6200	2100	200	0	0
N410	Randwick	28700	100	0	0	0	0
N410	Rockdale	9900	5400	3100	800	0	0
N410	Rosebery	4900	100	0	0	0	0

	Suburb		Contour (ANEF)				
Run No	**Name**	**Population**	**>=20**	**>=25**	**>=30**	**>=35**	**>=40**
N410	Rozelle	6100	100	0	0	0	0
N410	St Peters	2900	2700	400	0	0	0
N410	Stanmore	6400	5400	2600	800	0	0
N410	Sydenham	1100	1100	1100	1000	400	0
N410	Tempe	3500	3400	2000	500	0	0

Totals			**Contour (ANEF)**				
Run No	**Name**	**Population**	**>=20**	**>=25**	**>=30**	**>=35**	**>=40**
N410			87100	24800	5100	500	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

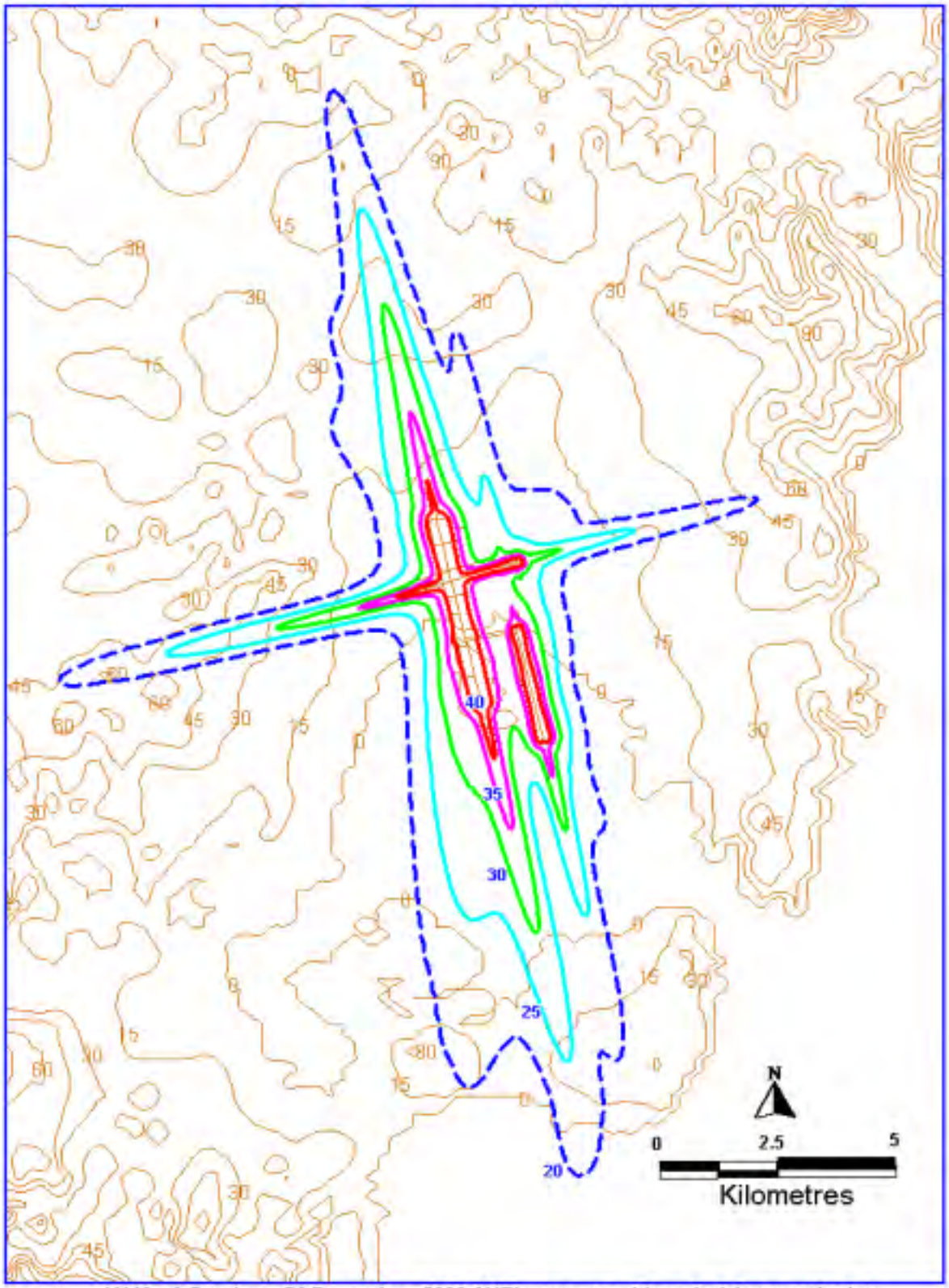
Sydney Airport
N410 ANEI Contours
With Terrain Contours

ENVIRONMENT SERVICES BRANCH
February, 2001
Report No: EO 01-095

AIRSERVICES AUSTRALIA

Attachment C

Sydney Airport N410 ANEI with Terrain



N410 - 1 October - 31 December 2000 ANEI contours with underlying terrain data.

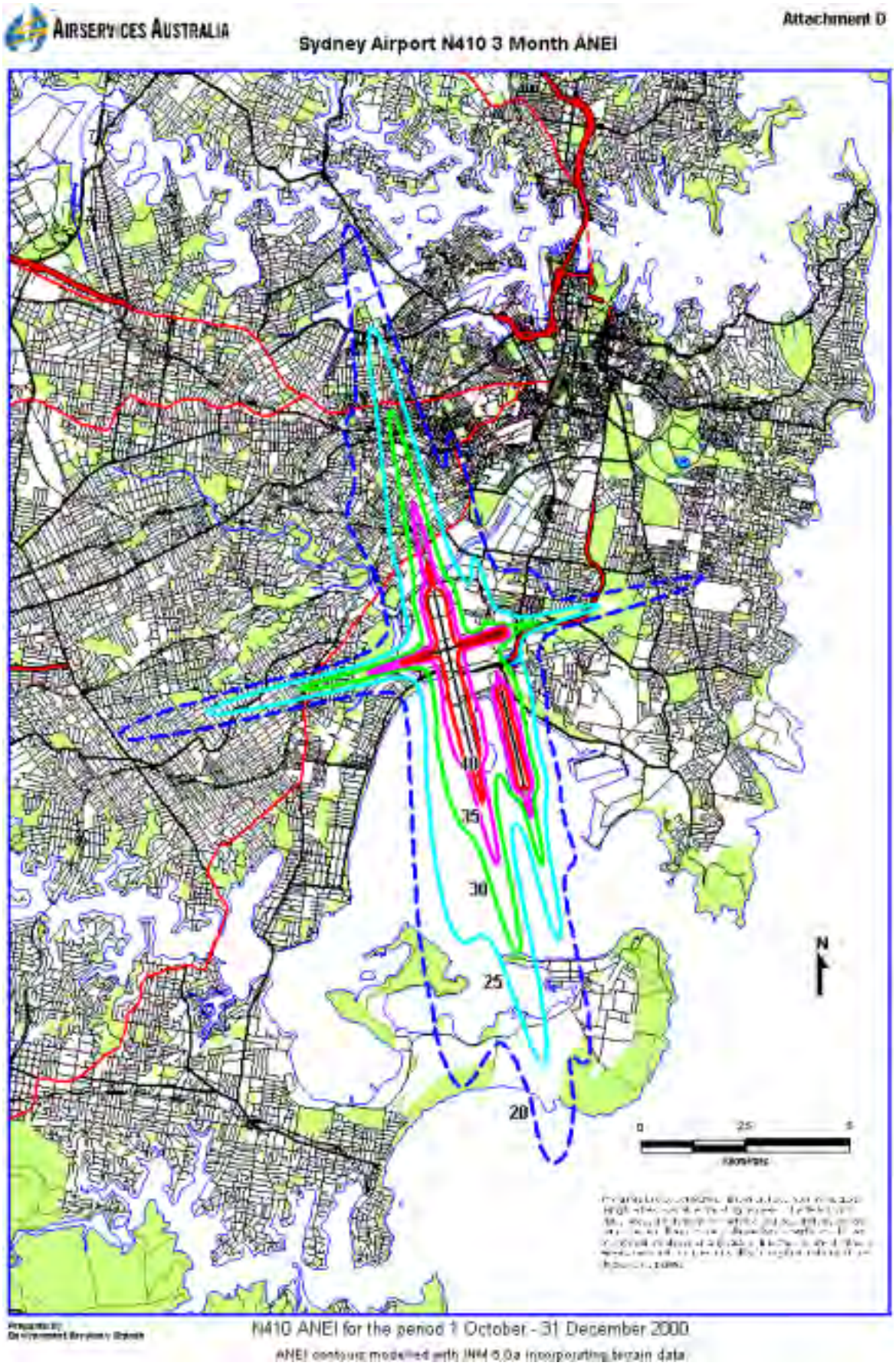
Terrain contour heights shown in metres.

Prepared by
Environment Services Branch

Attachment D

Sydney Airport
N410 3 Month ANEI Contours
1 October - 31 December 2000

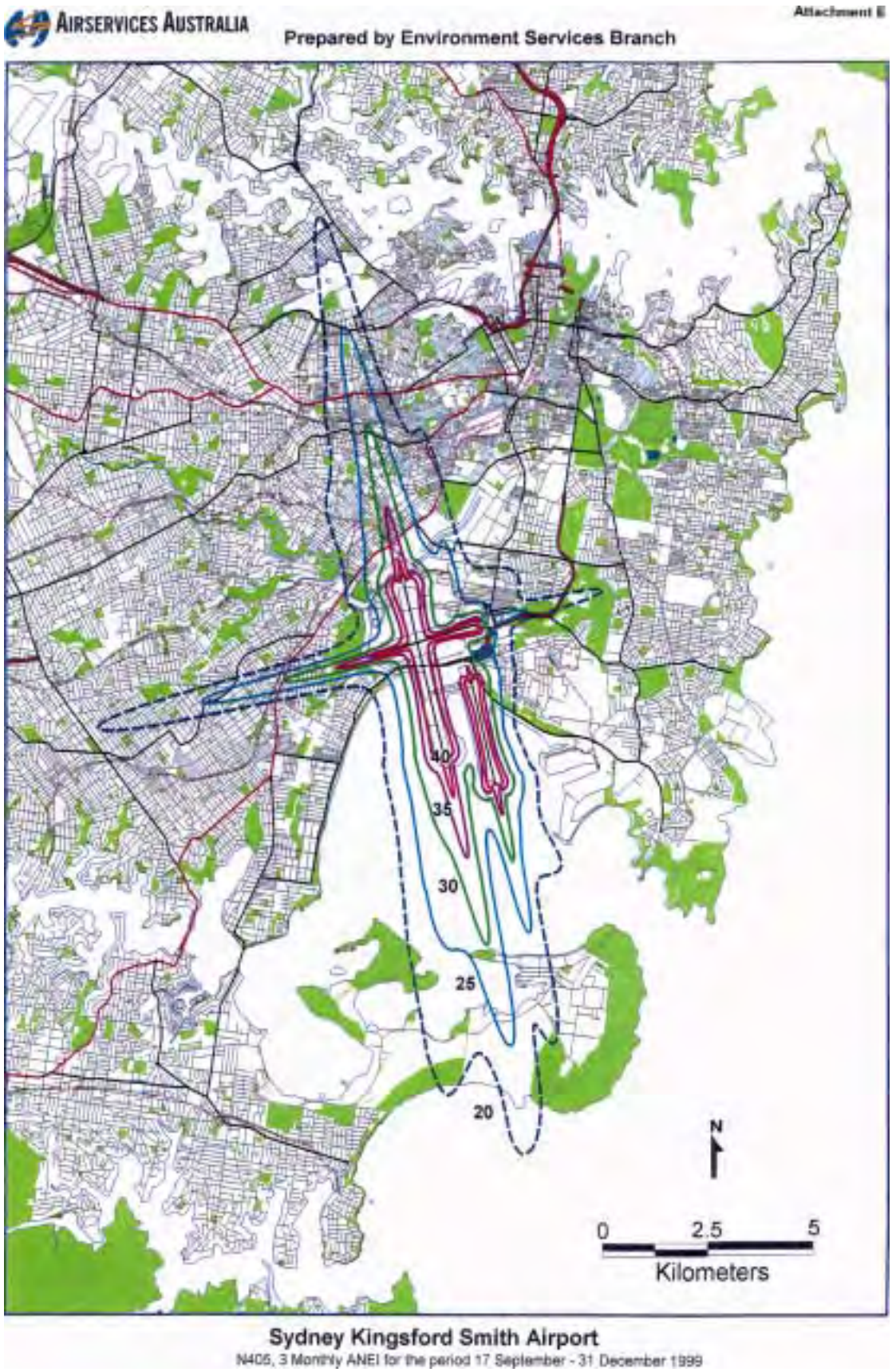
The contours for ANEI N410 have been prepared using terrain data.


AIRSERVICES AUSTRALIA
Attachment D
Sydney Airport N410 3 Month ANEI
40
35
30
25
20
N
0
25
5
N410 ANEI for the period 1 October - 31 December 2000
ANEI contours modelled with INM 6.0a incorporating terrain data

Attachment E

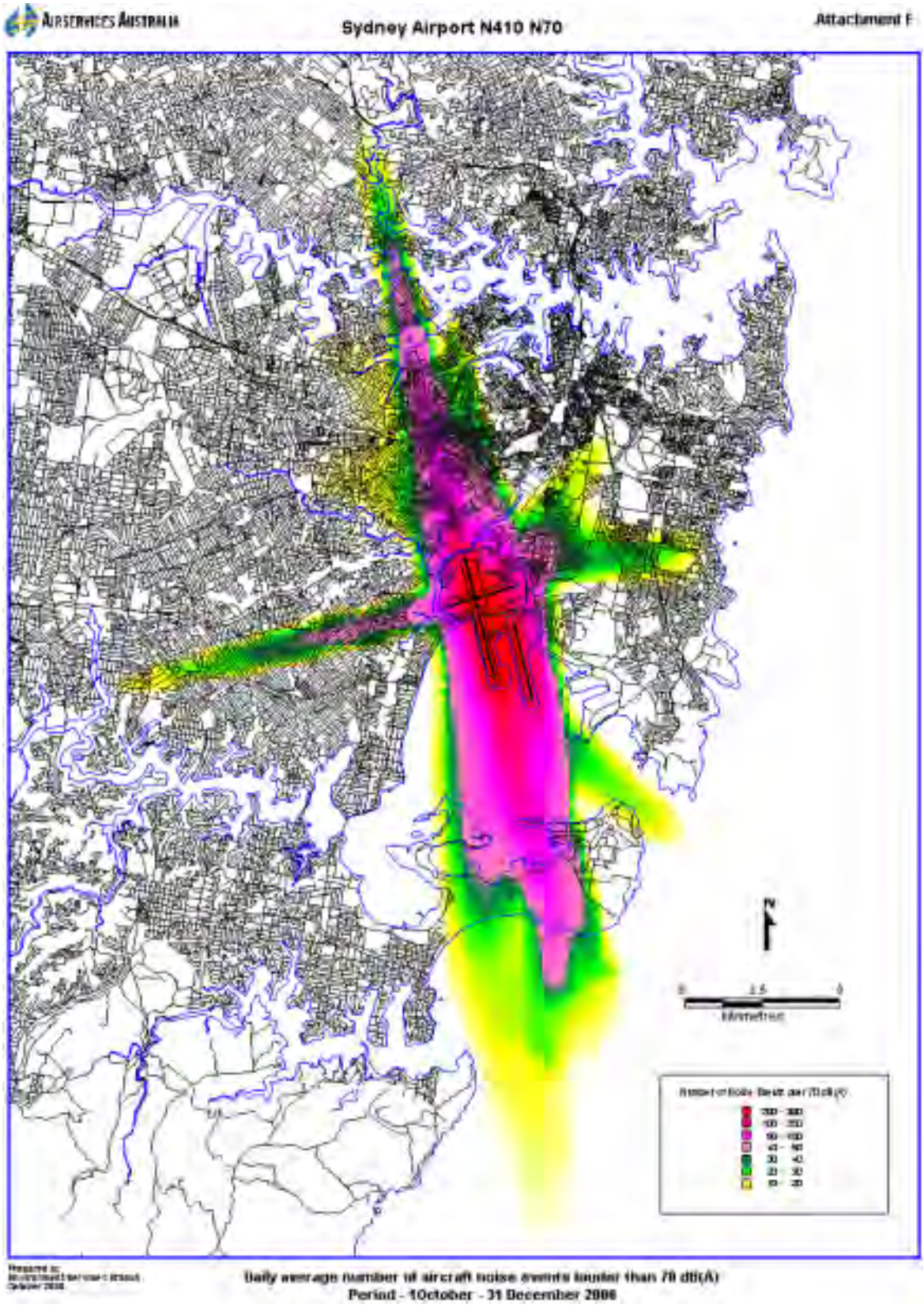
Sydney Airport
N405 ANEI Contours
17 September - 31 December 1999

ENVIRONMENT SERVICES BRANCH
February, 2001
Report No: EO 01-095


AIRSERVICES AUSTRALIA
Prepared by Environment Services Branch
Attachment E
40
35
30
25
20
N
0
2.5
5
Kilometers
Sydney Kingsford Smith Airport
N405, 3 Monthly ANEI for the period 17 September - 31 December 1999

Attachment F

Sydney Airport N70 Chart
1 October - 31 December 2000


Airservices Australia
Sydney Airport N410 N70
Attachment F
Daily average number of aircraft noise events louder than 70 dB(A)
Period - 1October - 31 December 2000