



**AIRSERVICES AUSTRALIA**

## **Sydney Airport**

**N464 Australian Noise Exposure Index**

**1 July to 30 September 2009**

**REPORT No: EO 10-205**

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# Sydney Airport

## N464 Australian Noise Exposure Index

### 1 July to 30 September 2009

## 1. 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 an Australian Noise Exposure Index (ANEI) for the period 1 July 2009 to 30 September 2009 inclusive (Reference Number N464 ).

### 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, elevation data and displaced threshold information for Sydney Airport were obtained from airport data held by Airservices Australia and are shown in Table 1.1.

**Table 1.1 Sydney Airport Runway Data**

| Location                  | Latitude (WGS84) | Longitude (WGS84) | Elevation AHD (m) | Displaced Landing Threshold (m) |
|---------------------------|------------------|-------------------|-------------------|---------------------------------|
| Aerodrome Reference Point | 33 56 45.6S      | 151 10 37.6E      | 6.4               |                                 |
| Runway End 07             | 33 56 37.5S      | 151 09 49.1E      | 5.3               | 0m                              |
| Runway End 25             | 33 56 15.1S      | 151 11 23.8E      | 6.0               | 340m                            |
| Runway End 16R            | 33 55 45.7S      | 151 10 17.8E      | 2.1               | 85m                             |
| Runway End 34L            | 33 57 51.4S      | 151 10 50.4E      | 4.1               | 0m                              |
| Runway End 16L            | 33 56 58.6S      | 151 11 17.9E      | 4.5               | 230m                            |
| Runway End 34R            | 33 58 19.0S      | 151 11 38.1E      | 3.1               | 38m                             |

The airport average temperature and humidity were obtained from Bureau of Meteorology data. The temperature and humidity shown in Table 1.2 are an average taken over the period of the ANEI.

**Table 1.2 Sydney Airport Meteorological Data**

|                             |         |
|-----------------------------|---------|
| Airport Average Temperature | 14.9 °C |
| Airport Average Humidity    | 57.8 %  |

## **2. The Integrated Noise Model (INM)**

The Integrated Noise Model version 7.0b (INM 7.0b) developed by the US Federal Aviation Administration (FAA) as a means of evaluating the impact of aircraft noise was used to model the noise contours for the period 1 July to 30 September 2009 for Sydney Airport.

### **2.1 INM Terrain Data**

The INM program can import and use terrain elevation data for use in calculating noise metrics. The terrain data is set out in a grid format and includes elevation in feet above mean sea level. The INM interpolates this data to prepare the ground contours for presentation at the required interval. The terrain contours included in Attachment C are a graphical representation of ground contours prepared by the INM program. They indicate the areas to the north, east and west of the airport are higher than that of the airport, which has had the effect of increasing the extent of the length and width of the ANEI contours in these areas.

### **2.2 Changes Incorporated in INM Version 7.0b**

INM7.0b is the most recent release of INM and it includes database updates and correction of minor software issues. The database updates and changes includes performance data updates for many existing Airbus aircraft types and replacing existing fixed-point STANDARD arrival flight profiles with new procedural profiles.

INM Version 7.0b also includes the addition of several new aircraft types to the INM database, including two Airbus A380 variants, five new propeller driven aircraft and new three helicopters. Some substitutions were deleted and several substitution assignments were modified to make use of new aircraft data and minor corrections were made to the data for several existing aircraft.

As a result care should be exercised when comparing this ANEI with studies that were prepared using earlier versions of the INM program.

### 3. 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

Runway and associated airport data were obtained from airport data held by Airservices Australia. Aircraft movement data were obtained directly from the Airservices Australia Noise and Flight Path Monitoring System (NFPMS). The total number of movement records from the unadjusted NFPMS data for the study period is shown in Table 3.1.

Flyover movements were checked using the NFPMS to determine whether any of these aircraft had made an arrival or departure at Sydney Airport. The records that could not be described as a movement at Sydney Airport were then excluded from the original NFPMS data.

**Table 3.1 NFPMS Aircraft Movements**

| <b>Operation</b>                | <b>Movements</b> |
|---------------------------------|------------------|
| Arrivals                        | 36,078           |
| Departures                      | 36,003           |
| General (Arrival and Departure) | 305              |
| <b>Total</b>                    | <b>72,386</b>    |

The NFPMS movements shown above were corrected to ensure the total number of departures and arrivals movements were equal. Movement data derived from Airservices Australia's published 'Movements at Australian Airports' for Sydney Airport for the period of 1 July to 30 September 2009 and the daily average aircraft movements for this period are shown in Table 3.2. The NFPMS movements were then factored to the Avcharges recorded number of aircraft movements and the daily average number of movements was calculated.

**Table 3.2 Avcharges Recorded Movements**

| <b>Period</b>                    | <b>Movements</b> |
|----------------------------------|------------------|
| 1 July to 30 September 2009      | 72,466           |
| Daily Average during this period | 787.6            |

The flight tracks used in the model were determined from the NFPMS. Flight track plots from the NFPMS were used to identify the major flight paths associated with aircraft movements to and from the airport. A representative period between 1 July and 30 September 2009 was selected.

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 entered into the INM as ‘point type’ tracks. Each ‘nominal backbone track’ was prepared with subsidiary tracks that provided a realistic lateral spread of traffic along the nominal tracks.

A small number of tracks that are mainly used by turbo-propeller and other propeller aircraft departing from Runway 07 for the north-west and Runway 25 for the east were not spread due to the small variations in their dispersal and the minimal number of movements that occur on these routes. In those cases a single nominal track was determined from the NFPMS.

### 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 7.0b. The terrain data was aligned to the Aerodrome Reference Point (ARP) and incorporated by INM when calculating the ANEI contours.

The use of terrain data changes the shape of the ANEI contours when compared to a flat ground model. Variances in ground elevation change the distance between the aircraft and the ground, hence the calculated aircraft noise levels at each grid point on the ground.

The types of aircraft that operated at Sydney Airport were assigned to 36 representative aircraft types that are contained within the INM database and are shown in Table 3.3. 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, two helicopter profiles were developed. Their profiles were based on the single engine Bell 206 LongRanger and twin engine Eurocopter AS355F Ecureuil 2. All helicopters that operate at Sydney airport were then assigned to a type depending on the number of engines. In addition, all helicopters were modelled as arriving to or departing from the Helipad that is located south of the threshold of Runway 25.

The aircraft types were assigned to representative tracks based on the type of aircraft (jet, turbo-propeller, engine propeller or helicopter) 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 for each ANEI prepared for Sydney airport.



**Table 3.3 Aircraft Types Used by INM for ANEI N464**

| <b>INM Type</b> | <b>Aircraft</b>                                                              |
|-----------------|------------------------------------------------------------------------------|
| 707320          | Represents B707, C135 and DC8 type aircraft                                  |
| 717200          | Boeing B717-200 aircraft                                                     |
| 727EM2          | Boeing B727-200 aircraft fitted with hushkitting                             |
| 737300          | Boeing B737-300 aircraft                                                     |
| 737400          | Boeing B737-400 aircraft                                                     |
| 737700          | Boeing B737-700 aircraft                                                     |
| 737800          | Boeing B737-800 aircraft                                                     |
| 74720B          | Represents B747-200 and B747-300 aircraft                                    |
| 747400          | Boeing B747-400 aircraft                                                     |
| 757PW           | Boeing B757-200 aircraft                                                     |
| 767300          | Boeing B767-300 aircraft                                                     |
| 767JT9          | Represents B767-200 aircraft                                                 |
| 777200          | Boeing B777-200 aircraft                                                     |
| 777300          | Boeing B777-300 aircraft                                                     |
| A320-211        | Airbus Industries A320 aircraft                                              |
| A330-301        | Airbus Industries A330 aircraft                                              |
| A340-211        | Airbus Industries A340-200 and A340-400 aircraft                             |
| A340-642        | Airbus Industries A340-500 and 600 aircraft                                  |
| A380-841        | Airbus Industries A380 aircraft fitted with RR Trent engines                 |
| A380-861        | Airbus Industries A380 aircraft fitted with Engine Alliance engines          |
| BAE300          | Represents BAe146 aircraft                                                   |
| BEC58P          | Represents GA twin piston-engine aircraft                                    |
| C130            | Represents C130, P3 and other 4 engine turbo-prop aircraft                   |
| CL601           | Represents Canadair CL601 Challenger aircraft                                |
| CNA441          | Represents GA twin turbine-engine aircraft                                   |
| DHC6            | Represents Twin Otter and similar aircraft                                   |
| DHC830          | Represents Dash 8, FK50 type aircraft                                        |
| GASEPF          | Represents GA single engine fixed pitch propeller aircraft.                  |
| GASEPV          | Represents GA single engine variable pitch propeller and/or turbine aircraft |
| GV              | Represents Embraer 170 aircraft                                              |
| JPATS           | Represents Pilatus PC-12 and other single engine turbo-prop aircraft         |
| LEAR35          | Represents other small business type jet aircraft                            |
| MD11GE          | Represents DC10 and MD11 type aircraft                                       |
| SF340           | Saab 340 aircraft                                                            |
| AS355F          | Represents Eurocopter AS355 Ecureuil 2 and all twin engine helicopters       |
| B206L           | Represents Bell 206 LongRanger and all single engine helicopters             |

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. In the majority of cases the percentage of aircraft operations allocated to the backbone tracks and their subsidiary tracks were generally the default percentages set by the INM.

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 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 under the ANEF process.

### 3.5 Preparation and verification of the model output.

The ANEI contours produced by the INM were plotted using a GIS software package onto a base map. The contours produced for the 1 July to 30 September 2009 ANEI (N464) are consistent with flight tracks and the aircraft operations for the period and the use of terrain data.

Table 3.4 shows the average daily aircraft movements for the 1 July to 30 September 2009 ANEI (N464) compared to the same period for the previous year - the 1 July to 30 September 2008 ANEI (N459).

**Table 3.4 Comparison of Average Daily Movements**

| ANEI Study | Period                      | Average Daily Aircraft Movements |
|------------|-----------------------------|----------------------------------|
| N459       | 1 July to 30 September 2008 | 825.2                            |
| N464       | 1 July to 30 September 2009 | 787.5                            |

## 4. Comparison of the 2009 ANEI (N464) with the 2008 ANEI (N459)

The 1 July to 30 September 2009 ANEI (N464) contours for Sydney Airport are shown in Attachment D. In addition, a plot of the ANEI contours (N464) with terrain contours is included as Attachment C. For comparison purposes, the 1 July to 30 September 2008 ANEI (N459) for Sydney Airport has been included as Attachment E.

ANEI N464 (1 July to 30 September 2009) was prepared with INM 7.0b and ANEI N459 (1 July to 30 September 2008) was prepared with INM 6.2a. Both studies used terrain data during the calculation of their contours.

### 4.1 Comparison of ANEI N464 with ANEI N459

The changes evident in the contours for ANEI N464, when compared with the contours for ANEI N459, are consistent with the changes in aircraft types, movement numbers, runway usage, night movements and aircraft flight path use during the two periods.

Table 4.1 shows a comparison of average daily arrival and departure movements by runway for ANEI N464 and ANEI N459. This comparison provides the basis for evaluation of the ANEI N464 contours. When INM disperses the movements assigned for each aircraft type from the nominated 'nominal backbone track' to its subsidiary tracks, there are sometimes slight differences between the reported number of arrivals and departures for that aircraft type, runway or INM study due to rounding.

In accordance with a directive from the Civil Aviation Safety Authority (CASA) issued in 2003 Sydney Airport Corporation Limited (SACL) was to construct a Runway End Safety Area (RESA) for Runway 25 by 3 May 2009 in order to comply with the International Civil Aviation Organization (ICAO) requirements. To maintain safe operations on Runway 25 after the May 2009 and prior to the construction of the RESA, SACL obtained approval from CASA for a temporary RESA which incorporated 97 metres of the existing western end of Runway 25. Additionally, SACL restricted aircraft arrivals on Runway 07 to those times when weather conditions operationally required its use (SACL Draft Major Development Plan – Runway Safety Enhancement Runway 25 - Runway End Safety Area, Sydney Airport). Work began on the permanent RESA on 15 January 2009.

This work has resulted in a reduction in the number of arrivals and departures on Runway 25 and Runway 07 only being available for limited numbers of departures. The reduction in the number of movements on Runway 07/25 is reflected in the 1 July – 30 September 2009 ANEI.

**Table 4.1 Comparison of Average Daily Runway Movement**

| Runway         | ANEI N464                    |               |               | ANEI N459                    |               |               |
|----------------|------------------------------|---------------|---------------|------------------------------|---------------|---------------|
|                | (1 July - 30 September 2009) |               |               | (1 July - 30 September 2008) |               |               |
|                | Arrivals                     | Departures    | Totals        | Arrivals                     | Departures    | Totals        |
| <b>07</b>      | 0.11                         | 0.04          | <b>0.15</b>   | 0.48                         | 0.05          | <b>0.53</b>   |
| <b>16L</b>     | 33.64                        | 46.81         | <b>80.45</b>  | 58.48                        | 58.31         | <b>116.79</b> |
| <b>16R</b>     | 53.14                        | 70.70         | <b>123.84</b> | 88.55                        | 126.41        | <b>214.96</b> |
| <b>25</b>      | 14.88                        | 25.70         | <b>40.58</b>  | 33.84                        | 37.74         | <b>71.58</b>  |
| <b>34L</b>     | 213.26                       | 117.63        | <b>330.89</b> | 151.58                       | 90.14         | <b>241.72</b> |
| <b>34R</b>     | 72.67                        | 126.77        | <b>199.44</b> | 73.06                        | 93.26         | <b>166.32</b> |
| <b>Helipad</b> | 6.06                         | 6.06          | <b>12.12</b>  | 6.63                         | 6.63          | <b>13.26</b>  |
| <b>Total</b>   | <b>393.76</b>                | <b>393.71</b> | <b>787.47</b> | <b>412.62</b>                | <b>412.62</b> | <b>825.16</b> |

### North-West of the Airport

Average daily departures from Runway 34L have increased by 27.49 movements from the ANEI N459 figures. The 'north-west bump' in the 20 ANEI contour associated with departures using the Richmond SID and the Katoomba SID has shown a corresponding increase in its extent.

Long-haul jet aircraft departing from Runway 34L for destinations in the USA were split between those following the Richmond Two SID and those aircraft maintaining runway heading before turning east. The proportion of aircraft on each track was determined from analysis of NFPMS data prepared for the INM. Table 4.2 shows a comparison of departures that maintained runway heading and those that tracked via the Richmond Two SID.

**Table 4.2 Comparison of Average Daily Long Haul Departures from Runway 34L**

| Runway 34L<br>US Departures | ANEI N464<br>(1 July - 30 March 2009) |                        | ANEI N459<br>(1 July - 30 March 2008) |                        |
|-----------------------------|---------------------------------------|------------------------|---------------------------------------|------------------------|
|                             | Movements                             | % of USA<br>Departures | Movements                             | % of USA<br>Departures |
| Maintain Runway<br>Heading  | 4.06                                  | 61%                    | 2.66                                  | 66%                    |
| RICHMOND TWO SID            | 2.65                                  | 39%                    | 1.36                                  | 34%                    |
| <b>Total</b>                | <b>6.70</b>                           |                        | <b>4.02</b>                           |                        |

### North of the Airport

Average daily arrivals on Runway 16R have decreased by 35.41 movements from the ANEI N459 figures. The ANEI contours associated with these arrivals have shown a corresponding increase in extent.

Average daily arrivals on Runway 16L decreased by 24.84 movements from the ANEI N459 figures and the ANEI contours associated with arrivals to Runway 16L have also shown a corresponding increase in their extent.

### East of the Airport

Average daily arrivals on Runway 25 have decreased by 18.96 movements from the ANEI N459. Average daily departures from Runway 07 have decreased by 0.01 and departures from Runway 34R have increased by 33.51 movements from the ANEI N459

The contours associated with arrivals to Runway 25 and departures from Runway 07 have shown a corresponding decrease in extent.

The contours associated with departures from Runway 34R have shown an increase in their extent as a result of the increase in departures from this runway.

### West of the Airport

Average daily arrivals on Runway 07 have decreased by 0.37 movements from the ANEI N459 and average daily departures from Runway 25 have decreased by 12.04 movements from the ANEI N459.

The change in the ANEI contours associated with arrivals on Runway 07 is not discernable due to the small number of arrivals to this runway. There is also no noticeable change in the contours associated with departures from Runway 25. The limited change in the extent of the ANEI contours associated with departures from Runway 25 is attributed to the majority of the reduction in departures being by all jet and non-jet aircraft during the day period which

was offset by an increase in number of departures during the night period by various aircraft e.g. B737, B767, B777, A320 and A330 aircraft.

### South of the Airport

Average daily departures from Runway 16L have decreased by 11.50 movements from ANEI N459. However, the ANEI contours associated with departures from Runway 16L have only shown a small increase in their extent. This increase is attributed to the reduction in departures being mainly by medium sized jet aircraft and non-jet aircraft e.g. B737 and A320 jet aircraft and Dash 8 and SAAB 340 turbo-prop aircraft, which was offset by an increase in number departures by heavier jet aircraft e.g. B747 and B767-200 aircraft.

Average daily arrivals on Runway 34R have decreased by 0.39 movements from ANEI N459. However, the contours associated with these arrivals have shown a slight increase in their extent. Further analysis indicated this increase can be attributed to the noise impact of the increased number of arrivals to runway 34L.

Average daily departures from Runway 16R have decreased by 55.71 movements from ANEI N459. Average daily arrivals on Runway 34L have increased by 61.68 movements from ANEI N459. The ANEI contours associated with departures from Runway 16R have shown corresponding decreases in their extent and the ANEI contours associated with arrivals to Runway 34L have increased accordingly.

## **4.2 Comparison of Runway Use**

Table 4.3 shows a comparison of runway usage in the 1 July to 30 September 2009 ANEI (N464) to the 1 July to 30 September 2008 ANEI (N459).

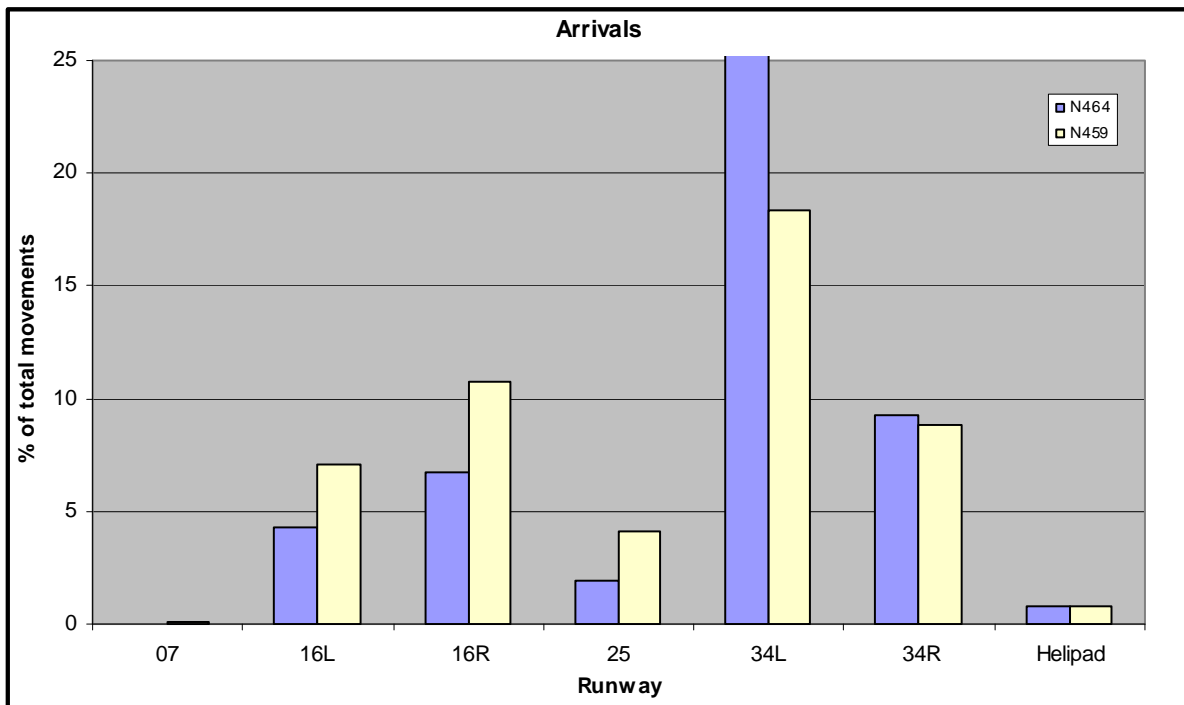
**Table 4.3 Runway Use Comparison**

| Runway  | ANEI N464<br>(1 July - 30 March 2009) |                      | ANEI N459<br>(1 July - 30 March 2008) |                      |
|---------|---------------------------------------|----------------------|---------------------------------------|----------------------|
|         | N464 Arrivals<br>%                    | N464 Departures<br>% | N459 Arrivals<br>%                    | N459 Departures<br>% |
| 07      | 0.0                                   | 0.0                  | 0.1                                   | 0.0                  |
| 16L     | 4.3                                   | 5.9                  | 7.1                                   | 7.1                  |
| 16R     | 6.7                                   | 9.0                  | 10.7                                  | 15.3                 |
| 25      | 1.9                                   | 3.3                  | 4.1                                   | 4.6                  |
| 34L     | 27.1                                  | 14.9                 | 18.4                                  | 10.9                 |
| 34R     | 9.2                                   | 16.1                 | 8.9                                   | 11.3                 |
| Helipad | 0.8                                   | 0.8                  | 0.8                                   | 0.8                  |

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

Figures 4.1a and 4.1b depict this comparison for arrivals and departures respectively.

**Figure 4.1a Runway Use Comparison - Arrivals**



**Figure 4.1b Runway Use Comparison - Departures**

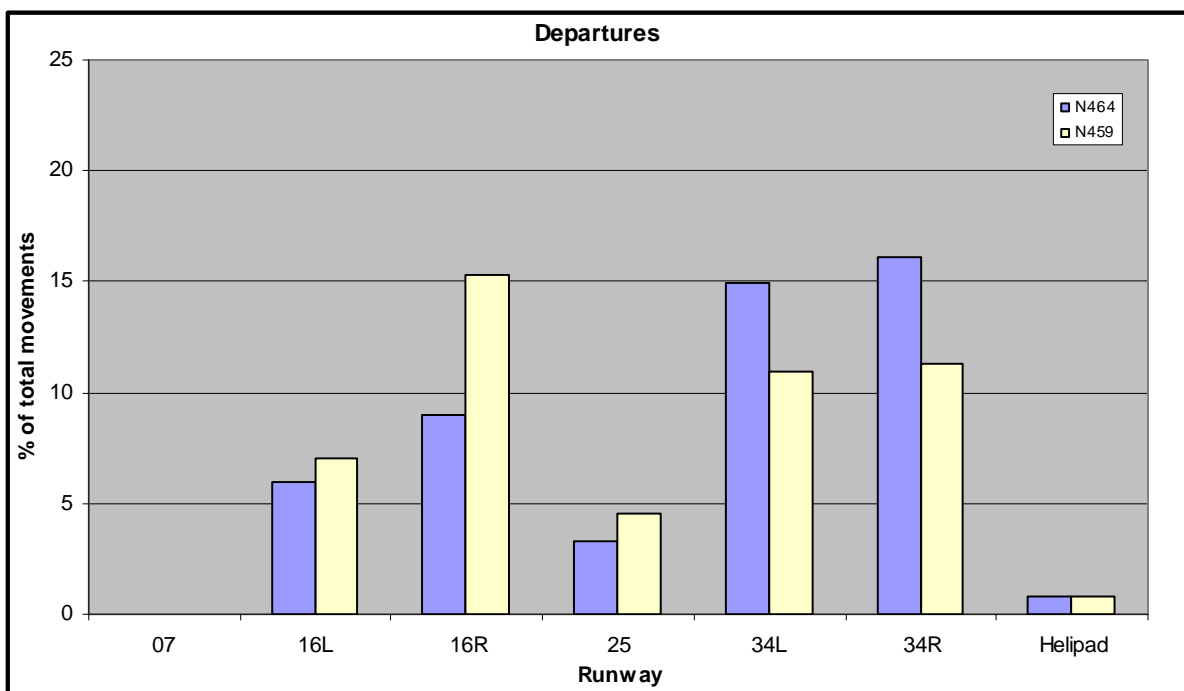


Table 4.4 details the proportion of aircraft movements to the north, south, east and west of Sydney Airport for ANEI N464 compared with ANEI N459. In calculating the proportion of aircraft movements, helicopter operations were not included.

**Table 4.4 Runway End Impact Comparison**

| Direction | Operation      |                  | ANEI N464<br>% | ANEI N459<br>% |
|-----------|----------------|------------------|----------------|----------------|
|           | Arrival Runway | Departure Runway |                |                |
| North     | 16L and 16R    | 34L              | 26.4           | 29.2           |
| South     | 34L and 34R    | 16L and 16R      | 52.0           | 50.4           |
| East      | 25             | 07 and 34R       | 18.3           | 15.7           |
| West      | 07             | 25               | 3.3            | 4.7            |

### 4.3 Comparison of Population Counts

The estimated population within each of the contours of the 1 July to 30 September 2009 ANEI (N464) and the 1 July to 30 September 2008 ANEI (N459) is shown in Table 4.5. These population estimates are based on the Australian Bureau of Statistics 2006 Census of Population and Housing data and have been rounded to the nearest 100.

**Table 4.5 Comparison of Total Population Estimates within each ANEI Contour.**

| ANEI | Period                      | >=20   | >=25   | >=30  | >=35 | >=40 |
|------|-----------------------------|--------|--------|-------|------|------|
| N459 | 1 July to 30 September 2008 | 83,600 | 17,500 | 2,100 | 200  | 0    |
| N464 | 1 July to 30 September 2009 | 92,300 | 19,300 | 2,000 | 100  | 0    |

A more detailed listing of the number of people within the various ANEI contours is shown by suburb for ANEI N464 and ANEI N459 in Attachment B. Notes and methodology specific to the suburbs and contour population counts are also included in Attachment B.

## 5. 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 shows for all areas around the airport how many aircraft noise events louder than 70 dB(A) there were, on a daily average, during the period from 1 July to 30 September 2009 ANEI (N464).

70 dB(A) is generally considered to be the external sound level below which no difficulty with reliable communication from radio, television or conversational speech in a typical room with windows open is expected. (Reference - Department of Transport and Regional Services, 2000, *Expanding Ways to Describe and Assess Aircraft Noise*, pp23-35).

### 5.2 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 was prepared by running the Time-Above (TA) metric, which is a standard metric within the INM 7.0b, 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 propriety software and 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 N464 N70 Aircraft Noise Map - 1 July to 30 September 2009.

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 to 30 September 2009 ANEI (N464).

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 are 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’ 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 were used in the preparation of the N70 chart.



# Attachment A

## ANEI N464 Average Daily Aircraft Movements by Runway

**Table A1 Average Daily Movements by Runway**

| Runway | Aircraft Type | Arrivals |       |       | Departure |       |       | Total |
|--------|---------------|----------|-------|-------|-----------|-------|-------|-------|
|        |               | Day      | Night | Total | Day       | Night | Total |       |
| 07     | DHC6          | 0.00     | 0.08  | 0.08  | 0.02      | 0.00  | 0.02  | 0.10  |
| 07     | DHC830        | 0.01     | 0.00  | 0.01  | 0.00      | 0.00  | 0.00  | 0.01  |
| 07     | LEAR35        | 0.00     | 0.00  | 0.00  | 0.01      | 0.01  | 0.02  | 0.02  |
| 07     | SF340         | 0.02     | 0.00  | 0.02  | 0.00      | 0.00  | 0.00  | 0.02  |
| 07     |               | 0.03     | 0.08  | 0.11  | 0.03      | 0.01  | 0.04  | 0.15  |
|        |               |          |       |       |           |       |       | 0.00  |
| 16L    | 717200        | 0.02     | 0.00  | 0.02  | 0.01      | 0.01  | 0.02  | 0.04  |
| 16L    | 727EM2        | 0.00     | 0.02  | 0.02  | 0.00      | 0.00  | 0.00  | 0.02  |
| 16L    | 737300        | 0.31     | 0.06  | 0.38  | 0.14      | 0.35  | 0.49  | 0.87  |
| 16L    | 737400        | 0.88     | 0.13  | 1.01  | 1.19      | 0.92  | 2.11  | 3.12  |
| 16L    | 737700        | 2.67     | 0.41  | 3.08  | 3.81      | 1.10  | 4.92  | 8.00  |
| 16L    | 737800        | 6.21     | 1.05  | 7.26  | 8.13      | 3.82  | 11.95 | 19.21 |
| 16L    | 747400        | 0.00     | 0.00  | 0.00  | 0.15      | 0.03  | 0.18  | 0.18  |
| 16L    | 757PW         | 0.05     | 0.00  | 0.05  | 0.00      | 0.00  | 0.00  | 0.05  |
| 16L    | 767300        | 2.37     | 0.41  | 2.78  | 3.32      | 1.53  | 4.85  | 7.63  |
| 16L    | 767JT9        | 0.11     | 0.00  | 0.11  | 0.08      | 0.19  | 0.27  | 0.38  |
| 16L    | 777300        | 0.00     | 0.00  | 0.00  | 0.02      | 0.11  | 0.13  | 0.13  |
| 16L    | A320-211      | 4.64     | 0.43  | 5.08  | 5.78      | 2.06  | 7.84  | 12.92 |
| 16L    | A330-301      | 0.00     | 0.06  | 0.06  | 0.18      | 0.19  | 0.38  | 0.44  |
| 16L    | A340-211      | 0.00     | 0.00  | 0.00  | 0.04      | 0.00  | 0.04  | 0.04  |
| 16L    | BAE300        | 0.00     | 0.06  | 0.06  | 0.00      | 0.00  | 0.00  | 0.06  |
| 16L    | BEC58P        | 0.05     | 0.11  | 0.16  | 0.05      | 0.00  | 0.05  | 0.21  |
| 16L    | CL601         | 0.02     | 0.00  | 0.02  | 0.03      | 0.01  | 0.04  | 0.06  |
| 16L    | CNA441        | 0.05     | 0.01  | 0.06  | 0.02      | 0.00  | 0.02  | 0.08  |
| 16L    | DHC6          | 1.85     | 0.37  | 2.22  | 2.17      | 0.44  | 2.61  | 4.83  |
| 16L    | DHC830        | 5.04     | 0.16  | 5.21  | 4.30      | 0.67  | 4.97  | 10.18 |
| 16L    | GV            | 1.48     | 0.22  | 1.70  | 1.83      | 0.76  | 2.59  | 4.29  |
| 16L    | JPATS         | 0.01     | 0.00  | 0.01  | 0.04      | 0.00  | 0.04  | 0.05  |
| 16L    | LEAR35        | 0.40     | 0.06  | 0.46  | 0.59      | 0.07  | 0.65  | 1.11  |
| 16L    | MD11GE        | 0.00     | 0.00  | 0.00  | 0.00      | 0.02  | 0.02  | 0.02  |
| 16L    | SF340         | 3.61     | 0.26  | 3.87  | 2.47      | 0.15  | 2.62  | 6.49  |
| 16L    |               | 29.80    | 3.84  | 33.64 | 34.37     | 12.44 | 46.81 | 80.45 |

**Attachment A**

| Runway | Aircraft Type | Arrivals |       |       | Departure |       |       | Total  |
|--------|---------------|----------|-------|-------|-----------|-------|-------|--------|
|        |               | Day      | Night | Total | Day       | Night | Total |        |
| 16R    | 707320        | 0.01     | 0.00  | 0.01  | 0.00      | 0.00  | 0.00  | 0.01   |
| 16R    | 717200        | 0.00     | 0.00  | 0.00  | 0.01      | 0.02  | 0.03  | 0.03   |
| 16R    | 727EM2        | 0.00     | 0.05  | 0.05  | 0.00      | 0.28  | 0.28  | 0.33   |
| 16R    | 737300        | 0.08     | 0.12  | 0.19  | 0.23      | 0.45  | 0.68  | 0.87   |
| 16R    | 737400        | 2.40     | 0.38  | 2.78  | 2.68      | 0.45  | 3.13  | 5.91   |
| 16R    | 737700        | 2.37     | 0.61  | 2.98  | 2.50      | 0.58  | 3.09  | 6.07   |
| 16R    | 737800        | 8.80     | 1.71  | 10.51 | 10.05     | 2.09  | 12.14 | 22.65  |
| 16R    | 74720B        | 0.04     | 0.02  | 0.06  | 0.04      | 0.00  | 0.04  | 0.10   |
| 16R    | 747400        | 2.09     | 0.71  | 2.80  | 4.04      | 0.19  | 4.23  | 7.03   |
| 16R    | 757PW         | 0.01     | 0.00  | 0.01  | 0.08      | 0.00  | 0.08  | 0.09   |
| 16R    | 767300        | 4.76     | 0.96  | 5.72  | 5.13      | 1.25  | 6.38  | 12.10  |
| 16R    | 767JT9        | 0.09     | 0.00  | 0.09  | 0.08      | 0.11  | 0.18  | 0.27   |
| 16R    | 777200        | 0.19     | 0.09  | 0.28  | 0.31      | 0.00  | 0.31  | 0.59   |
| 16R    | 777300        | 1.97     | 0.58  | 2.55  | 2.41      | 0.57  | 2.98  | 5.53   |
| 16R    | A320-211      | 3.31     | 0.75  | 4.06  | 4.77      | 0.76  | 5.53  | 9.59   |
| 16R    | A330-301      | 2.56     | 1.13  | 3.69  | 3.57      | 0.74  | 4.31  | 8.00   |
| 16R    | A340-211      | 0.23     | 0.02  | 0.25  | 0.31      | 0.00  | 0.31  | 0.56   |
| 16R    | A340-642      | 0.18     | 0.24  | 0.42  | 0.62      | 0.05  | 0.67  | 1.09   |
| 16R    | A380-841      | 0.05     | 0.28  | 0.33  | 0.39      | 0.12  | 0.51  | 0.84   |
| 16R    | A380-861      | 0.05     | 0.27  | 0.31  | 0.37      | 0.11  | 0.48  | 0.79   |
| 16R    | BAE300        | 0.02     | 0.09  | 0.11  | 0.02      | 2.79  | 2.81  | 2.92   |
| 16R    | BEC58P        | 0.01     | 0.02  | 0.03  | 0.10      | 0.58  | 0.67  | 0.70   |
| 16R    | C130          | 0.00     | 0.00  | 0.00  | 0.01      | 0.00  | 0.01  | 0.01   |
| 16R    | CL601         | 0.10     | 0.00  | 0.10  | 0.06      | 0.02  | 0.08  | 0.18   |
| 16R    | CNA441        | 0.03     | 0.00  | 0.03  | 0.06      | 0.02  | 0.08  | 0.11   |
| 16R    | DHC6          | 0.69     | 0.31  | 1.01  | 1.31      | 1.11  | 2.42  | 3.43   |
| 16R    | DHC830        | 4.99     | 0.18  | 5.17  | 5.71      | 0.77  | 6.48  | 11.65  |
| 16R    | GASEPV        | 0.01     | 0.00  | 0.01  | 0.00      | 0.00  | 0.00  | 0.01   |
| 16R    | GV            | 2.31     | 0.39  | 2.69  | 2.75      | 0.35  | 3.10  | 5.79   |
| 16R    | JPATS         | 0.03     | 0.00  | 0.03  | 0.00      | 0.00  | 0.00  | 0.03   |
| 16R    | LEAR35        | 0.41     | 0.10  | 0.51  | 0.63      | 0.34  | 0.97  | 1.48   |
| 16R    | MD11GE        | 0.38     | 0.03  | 0.41  | 0.37      | 0.02  | 0.39  | 0.80   |
| 16R    | SF340         | 5.45     | 0.48  | 5.93  | 5.94      | 2.37  | 8.31  | 14.24  |
| 16R    |               | 43.63    | 9.52  | 53.14 | 54.55     | 16.16 | 70.70 | 123.84 |

**Attachment A**

| Runway | Aircraft Type | Arrivals |       |       | Departure |       |       | Total |
|--------|---------------|----------|-------|-------|-----------|-------|-------|-------|
|        |               | Day      | Night | Total | Day       | Night | Total |       |
| 25     | 707320        | 0.00     | 0.00  | 0.00  | 0.02      | 0.00  | 0.02  | 0.02  |
| 25     | 727EM2        | 0.00     | 0.02  | 0.02  | 0.00      | 0.01  | 0.01  | 0.03  |
| 25     | 737300        | 0.08     | 0.06  | 0.14  | 0.07      | 0.28  | 0.35  | 0.49  |
| 25     | 737400        | 0.42     | 0.21  | 0.63  | 0.43      | 1.17  | 1.60  | 2.23  |
| 25     | 737700        | 0.62     | 0.52  | 1.14  | 0.74      | 1.54  | 2.28  | 3.42  |
| 25     | 737800        | 1.99     | 1.05  | 3.04  | 2.10      | 4.60  | 6.70  | 9.74  |
| 25     | 74720B        | 0.00     | 0.00  | 0.00  | 0.01      | 0.00  | 0.01  | 0.01  |
| 25     | 747400        | 0.37     | 0.23  | 0.59  | 0.35      | 0.06  | 0.41  | 1.00  |
| 25     | 757PW         | 0.02     | 0.00  | 0.02  | 0.00      | 0.00  | 0.00  | 0.02  |
| 25     | 767300        | 0.91     | 0.74  | 1.64  | 1.07      | 1.51  | 2.59  | 4.23  |
| 25     | 767JT9        | 0.03     | 0.01  | 0.04  | 0.02      | 0.10  | 0.12  | 0.16  |
| 25     | 777200        | 0.03     | 0.03  | 0.06  | 0.02      | 0.00  | 0.02  | 0.08  |
| 25     | 777300        | 0.27     | 0.12  | 0.39  | 0.20      | 0.31  | 0.51  | 0.90  |
| 25     | A320-211      | 1.14     | 0.66  | 1.80  | 1.23      | 2.57  | 3.80  | 5.60  |
| 25     | A330-301      | 0.43     | 0.25  | 0.68  | 0.43      | 0.31  | 0.75  | 1.43  |
| 25     | A340-211      | 0.03     | 0.00  | 0.03  | 0.04      | 0.00  | 0.04  | 0.07  |
| 25     | A340-642      | 0.00     | 0.05  | 0.05  | 0.04      | 0.00  | 0.04  | 0.09  |
| 25     | A380-841      | 0.01     | 0.06  | 0.07  | 0.04      | 0.00  | 0.04  | 0.11  |
| 25     | A380-861      | 0.01     | 0.05  | 0.06  | 0.04      | 0.00  | 0.04  | 0.10  |
| 25     | BAE300        | 0.00     | 0.04  | 0.04  | 0.00      | 0.00  | 0.00  | 0.04  |
| 25     | BEC58P        | 0.01     | 0.02  | 0.03  | 0.01      | 0.01  | 0.02  | 0.05  |
| 25     | CL601         | 0.02     | 0.00  | 0.02  | 0.01      | 0.05  | 0.06  | 0.08  |
| 25     | CNA441        | 0.01     | 0.00  | 0.01  | 0.00      | 0.00  | 0.00  | 0.01  |
| 25     | DHC6          | 0.35     | 0.26  | 0.61  | 0.42      | 0.56  | 0.98  | 1.59  |
| 25     | DHC830        | 1.17     | 0.34  | 1.50  | 1.17      | 0.60  | 1.76  | 3.26  |
| 25     | GASEPV        | 0.00     | 0.00  | 0.00  | 0.01      | 0.00  | 0.01  | 0.01  |
| 25     | GV            | 0.58     | 0.15  | 0.74  | 0.51      | 0.97  | 1.48  | 2.22  |
| 25     | LEAR35        | 0.09     | 0.08  | 0.16  | 0.11      | 0.16  | 0.27  | 0.43  |
| 25     | MD11GE        | 0.05     | 0.03  | 0.09  | 0.01      | 0.03  | 0.04  | 0.13  |
| 25     | SF340         | 1.00     | 0.27  | 1.27  | 0.96      | 0.78  | 1.74  | 3.01  |
| 25     |               | 9.64     | 5.24  | 14.88 | 10.07     | 15.63 | 25.70 | 40.58 |

**Attachment A**

| Runway | Aircraft Type | Arrivals |       |        | Departure |       |        | Total  |
|--------|---------------|----------|-------|--------|-----------|-------|--------|--------|
|        |               | Day      | Night | Total  | Day       | Night | Total  |        |
| 34L    | 707320        | 0.02     | 0.00  | 0.02   | 0.00      | 0.00  | 0.00   | 0.02   |
| 34L    | 717200        | 0.01     | 0.02  | 0.03   | 0.00      | 0.00  | 0.00   | 0.03   |
| 34L    | 727EM2        | 0.00     | 0.40  | 0.40   | 0.01      | 0.26  | 0.27   | 0.67   |
| 34L    | 737300        | 0.40     | 0.92  | 1.32   | 0.19      | 0.13  | 0.32   | 1.64   |
| 34L    | 737400        | 7.59     | 2.51  | 10.10  | 2.27      | 0.32  | 2.59   | 12.69  |
| 34L    | 737700        | 8.35     | 4.04  | 12.39  | 3.14      | 0.98  | 4.12   | 16.51  |
| 34L    | 737800        | 29.35    | 12.62 | 41.97  | 11.62     | 2.59  | 14.21  | 56.18  |
| 34L    | 74720B        | 0.15     | 0.05  | 0.21   | 0.12      | 0.10  | 0.22   | 0.43   |
| 34L    | 747400        | 7.12     | 5.83  | 12.95  | 10.97     | 0.55  | 11.52  | 24.47  |
| 34L    | 757PW         | 0.06     | 0.00  | 0.06   | 0.19      | 0.00  | 0.19   | 0.25   |
| 34L    | 767300        | 14.59    | 6.08  | 20.67  | 2.37      | 1.34  | 3.71   | 24.38  |
| 34L    | 767JT9        | 0.41     | 0.09  | 0.50   | 0.22      | 0.06  | 0.28   | 0.78   |
| 34L    | 777200        | 0.89     | 0.49  | 1.37   | 1.37      | 0.02  | 1.39   | 2.76   |
| 34L    | 777300        | 6.61     | 3.48  | 10.10  | 6.95      | 2.47  | 9.42   | 19.52  |
| 34L    | A320-211      | 12.53    | 7.51  | 20.04  | 3.44      | 0.32  | 3.77   | 23.81  |
| 34L    | A330-301      | 8.67     | 6.71  | 15.38  | 10.30     | 2.96  | 13.26  | 28.64  |
| 34L    | A340-211      | 0.98     | 0.19  | 1.18   | 1.03      | 0.03  | 1.06   | 2.24   |
| 34L    | A340-642      | 0.40     | 1.69  | 2.09   | 1.35      | 0.50  | 1.85   | 3.94   |
| 34L    | A380-841      | 0.16     | 1.52  | 1.67   | 1.09      | 0.43  | 1.52   | 3.19   |
| 34L    | A380-861      | 0.15     | 1.44  | 1.58   | 1.03      | 0.41  | 1.44   | 3.02   |
| 34L    | BAE300        | 0.02     | 2.51  | 2.53   | 0.03      | 0.00  | 0.03   | 2.56   |
| 34L    | BEC58P        | 0.10     | 0.50  | 0.59   | 0.16      | 0.06  | 0.22   | 0.81   |
| 34L    | CL601         | 0.19     | 0.10  | 0.29   | 0.04      | 0.00  | 0.04   | 0.33   |
| 34L    | CNA441        | 0.02     | 0.05  | 0.08   | 0.05      | 0.01  | 0.06   | 0.14   |
| 34L    | DHC6          | 2.97     | 3.07  | 6.04   | 3.74      | 0.57  | 4.31   | 10.35  |
| 34L    | DHC830        | 15.64    | 1.27  | 16.90  | 16.00     | 1.99  | 17.99  | 34.89  |
| 34L    | GASEPF        | 0.02     | 0.01  | 0.03   | 0.02      | 0.02  | 0.03   | 0.06   |
| 34L    | GASEPV        | 0.03     | 0.00  | 0.03   | 0.04      | 0.00  | 0.04   | 0.07   |
| 34L    | GV            | 7.90     | 2.10  | 10.00  | 1.22      | 0.00  | 1.22   | 11.22  |
| 34L    | JPATS         | 0.09     | 0.00  | 0.09   | 0.05      | 0.01  | 0.06   | 0.15   |
| 34L    | LEAR35        | 1.60     | 0.77  | 2.37   | 0.62      | 0.05  | 0.68   | 3.05   |
| 34L    | MD11GE        | 0.83     | 0.24  | 1.07   | 0.75      | 0.37  | 1.11   | 2.18   |
| 34L    | SF340         | 17.55    | 1.64  | 19.20  | 15.88     | 4.81  | 20.69  | 39.89  |
| 34L    |               | 145.41   | 67.84 | 213.26 | 96.26     | 21.37 | 117.63 | 330.89 |

**Attachment A**

| Runway             | Aircraft Type | Arrivals      |              |               | Departure     |              |               | Total         |
|--------------------|---------------|---------------|--------------|---------------|---------------|--------------|---------------|---------------|
|                    |               | Day           | Night        | Total         | Day           | Night        | Total         |               |
| 34R                | 707320        | 0.01          | 0.00         | 0.01          | 0.02          | 0.00         | 0.02          | 0.03          |
| 34R                | 727EM2        | 0.02          | 0.08         | 0.10          | 0.01          | 0.02         | 0.03          | 0.13          |
| 34R                | 737300        | 0.77          | 0.18         | 0.95          | 0.57          | 0.57         | 1.14          | 2.09          |
| 34R                | 737400        | 1.70          | 0.26         | 1.96          | 5.86          | 1.17         | 7.03          | 8.99          |
| 34R                | 737700        | 4.74          | 0.90         | 5.64          | 9.31          | 1.51         | 10.82         | 16.46         |
| 34R                | 737800        | 12.98         | 2.22         | 15.19         | 27.83         | 5.14         | 32.97         | 48.16         |
| 34R                | 757PW         | 0.12          | 0.00         | 0.12          | 0.00          | 0.00         | 0.00          | 0.12          |
| 34R                | 767300        | 5.32          | 1.30         | 6.62          | 17.30         | 2.61         | 19.91         | 26.53         |
| 34R                | 767JT9        | 0.28          | 0.02         | 0.30          | 0.08          | 0.11         | 0.18          | 0.48          |
| 34R                | A320-211      | 9.78          | 1.00         | 10.78         | 18.38         | 2.44         | 20.82         | 31.60         |
| 34R                | A330-301      | 0.03          | 0.25         | 0.28          | 1.18          | 0.22         | 1.40          | 1.68          |
| 34R                | BAE300        | 0.01          | 0.11         | 0.12          | 0.02          | 0.00         | 0.02          | 0.14          |
| 34R                | BEC58P        | 0.16          | 0.12         | 0.28          | 0.11          | 0.02         | 0.13          | 0.41          |
| 34R                | C130          | 0.01          | 0.00         | 0.01          | 0.00          | 0.00         | 0.00          | 0.01          |
| 34R                | CL601         | 0.02          | 0.00         | 0.02          | 0.17          | 0.06         | 0.23          | 0.25          |
| 34R                | CNA441        | 0.02          | 0.02         | 0.04          | 0.06          | 0.00         | 0.06          | 0.10          |
| 34R                | DHC6          | 3.78          | 1.16         | 4.93          | 4.06          | 0.49         | 4.55          | 9.48          |
| 34R                | DHC830        | 12.15         | 0.34         | 12.49         | 8.26          | 1.82         | 10.08         | 22.57         |
| 34R                | GASEPV        | 0.01          | 0.00         | 0.01          | 0.00          | 0.00         | 0.00          | 0.01          |
| 34R                | GV            | 2.82          | 0.40         | 3.22          | 8.77          | 1.19         | 9.96          | 13.18         |
| 34R                | JPATS         | 0.02          | 0.01         | 0.03          | 0.04          | 0.01         | 0.05          | 0.08          |
| 34R                | LEAR35        | 0.85          | 0.08         | 0.93          | 1.63          | 0.21         | 1.83          | 2.76          |
| 34R                | SF340         | 8.01          | 0.62         | 8.63          | 5.02          | 0.52         | 5.54          | 14.17         |
| 34R                |               | 63.63         | 9.04         | 72.67         | 108.67        | 18.10        | 126.77        | 199.44        |
|                    |               |               |              |               |               |              |               | 0.00          |
| H                  | AS355F        | 0.68          | 0.02         | 0.70          | 0.58          | 0.13         | 0.70          | 1.40          |
| H                  | B206L_H       | 5.34          | 0.02         | 5.36          | 5.33          | 0.03         | 5.36          | 10.72         |
| H                  |               | 6.02          | 0.04         | 6.06          | 5.91          | 0.16         | 6.06          | 12.12         |
|                    |               |               |              |               |               |              |               |               |
| <b>Grand Total</b> |               | <b>298.16</b> | <b>95.60</b> | <b>393.76</b> | <b>309.86</b> | <b>83.87</b> | <b>393.71</b> | <b>787.47</b> |

# Attachment B

## ANEI N464 Estimated Population within each ANEI Contour by Suburb

**Table B1 Comparison of Estimated Population within each ANEI Contour by Suburb**

| Study | Suburb            |            | Contours (ANEF) |      |      |      |      |
|-------|-------------------|------------|-----------------|------|------|------|------|
|       | Name              | Population | >=20            | >=25 | >=30 | >=35 | >=40 |
| N459  | Alexandria        | 5800       | 200             | 0    | 0    | 0    | 0    |
| N464  | Alexandria        | 5800       | 300             | 0    | 0    | 0    | 0    |
| N459  | Annandale         | 8300       | 700             | 0    | 0    | 0    | 0    |
| N464  | Annandale         | 8300       | 400             | 0    | 0    | 0    | 0    |
| N459  | Arncliffe         | 8500       | 1800            | 100  | 0    | 0    | 0    |
| N464  | Arncliffe         | 8500       | 2100            | 100  | 0    | 0    | 0    |
| N459  | Banksia           | 2900       | 2900            | 1000 | 0    | 0    | 0    |
| N464  | Banksia           | 2900       | 2900            | 1000 | 0    | 0    | 0    |
| N459  | Banksmeadow       | 500        | 0               | 0    | 0    | 0    | 0    |
| N464  | Banksmeadow       | 500        | 0               | 0    | 0    | 0    | 0    |
| N459  | Bexley            | 17900      | 200             | 0    | 0    | 0    | 0    |
| N464  | Bexley            | 17900      | 300             | 0    | 0    | 0    | 0    |
| N459  | Botany            | 7500       | 3600            | 800  | 200  | 0    | 0    |
| N464  | Botany            | 7500       | 5200            | 2000 | 300  | 0    | 0    |
| N459  | Brighton-le-sands | 7200       | 800             | 0    | 0    | 0    | 0    |
| N464  | Brighton-le-sands | 7200       | 1000            | 0    | 0    | 0    | 0    |
| N459  | Camperdown        | 6500       | 0               | 0    | 0    | 0    | 0    |
| N459  | Coogee            | 13200      | 300             | 0    | 0    | 0    | 0    |
| N459  | Daceyville        | 1200       | 1000            | 0    | 0    | 0    | 0    |
| N464  | Daceyville        | 1200       | 1000            | 0    | 0    | 0    | 0    |
| N459  | Drummoyne         | 10400      | 500             | 0    | 0    | 0    | 0    |
| N464  | Dulwich Hill      | 12200      | 100             | 0    | 0    | 0    | 0    |
| N459  | Eastlakes         | 6600       | 1700            | 400  | 0    | 0    | 0    |
| N464  | Eastlakes         | 6600       | 6500            | 300  | 0    | 0    | 0    |
| N459  | Kingsford         | 14200      | 2700            | 0    | 0    | 0    | 0    |
| N464  | Kingsford         | 14200      | 2100            | 0    | 0    | 0    | 0    |
| N459  | Kurnell           | 2100       | 1200            | 0    | 0    | 0    | 0    |
| N464  | Kurnell           | 2100       | 1200            | 0    | 0    | 0    | 0    |
| N459  | Kyeemagh          | 800        | 800             | 500  | 0    | 0    | 0    |
| N464  | Kyeemagh          | 800        | 800             | 500  | 0    | 0    | 0    |
| N459  | Leichhardt        | 12300      | 8600            | 1600 | 0    | 0    | 0    |
| N464  | Leichhardt        | 12300      | 9600            | 400  | 0    | 0    | 0    |
| N459  | Lewisham          | 2800       | 0               | 0    | 0    | 0    | 0    |
| N464  | Lewisham          | 2800       | 1500            | 0    | 0    | 0    | 0    |
| N459  | Lilyfield         | 6800       | 3000            | 0    | 0    | 0    | 0    |
| N464  | Lilyfield         | 6800       | 2000            | 0    | 0    | 0    | 0    |
| N459  | Marrickville      | 23200      | 9800            | 2900 | 500  | 0    | 0    |
| N464  | Marrickville      | 23200      | 13100           | 3700 | 200  | 0    | 0    |
| N459  | Mascot            | 8500       | 8500            | 3100 | 300  | 0    | 0    |
| N464  | Mascot            | 8500       | 8500            | 4500 | 100  | 0    | 0    |
| N459  | Matraville        | 8800       | 0               | 0    | 0    | 0    | 0    |
| N464  | Matraville        | 8800       | 0               | 0    | 0    | 0    | 0    |
| N459  | Newtown           | 13500      | 5400            | 0    | 0    | 0    | 0    |
| N464  | Newtown           | 13500      | 3000            | 0    | 0    | 0    | 0    |



**Attachment B**

| Study | Suburb      |            | Contours (ANEF) |      |      |      |      |
|-------|-------------|------------|-----------------|------|------|------|------|
|       | Name        | Population | >=20            | >=25 | >=30 | >=35 | >=40 |
| N459  | Pagewood    | 3000       | 0               | 0    | 0    | 0    | 0    |
| N464  | Pagewood    | 3000       | 0               | 0    | 0    | 0    | 0    |
| N459  | Petersham   | 7400       | 6800            | 1600 | 0    | 0    | 0    |
| N464  | Petersham   | 7400       | 7400            | 1300 | 0    | 0    | 0    |
| N459  | Randwick    | 25800      | 2200            | 0    | 0    | 0    | 0    |
| N464  | Randwick    | 25800      | 900             | 0    | 0    | 0    | 0    |
| N459  | Rockdale    | 14000      | 6400            | 0    | 0    | 0    | 0    |
| N464  | Rockdale    | 14000      | 6600            | 0    | 0    | 0    | 0    |
| N459  | Rosebery    | 7400       | 2500            | 0    | 0    | 0    | 0    |
| N464  | Rosebery    | 7400       | 4000            | 0    | 0    | 0    | 0    |
| N459  | Russell Lea | 5100       | 100             | 0    | 0    | 0    | 0    |
| N459  | St Peters   | 2600       | 2600            | 500  | 100  | 0    | 0    |
| N464  | St Peters   | 2600       | 2500            | 500  | 100  | 0    | 0    |
| N459  | Stanmore    | 7100       | 5100            | 2500 | 0    | 0    | 0    |
| N464  | Stanmore    | 7100       | 4900            | 2100 | 0    | 0    | 0    |
| N459  | Sydenham    | 1000       | 1000            | 1000 | 800  | 200  | 0    |
| N464  | Sydenham    | 1000       | 1000            | 1000 | 800  | 0    | 0    |
| N459  | Tempe       | 3200       | 3100            | 1600 | 300  | 0    | 0    |
| N464  | Tempe       | 3200       | 3200            | 1800 | 400  | 0    | 0    |
| N464  | Wolli Creek | 2700       | 0               | 0    | 0    | 0    | 0    |

**Table B2 Comparison of Total Estimated Population within each ANEI Contour**

| Study | Total Suburb Population | Contours (ANEF) |       |      |      |      |
|-------|-------------------------|-----------------|-------|------|------|------|
|       |                         | >=20            | >=25  | >=30 | >=35 | >=40 |
| N459  | 266000                  | 83600           | 17500 | 2100 | 200  | 0    |
| N464  | 245600                  | 92300           | 19300 | 2000 | 100  | 0    |

**Notes**

1. Contour and Suburb population counts have been rounded up to the nearest 100. Contour and Suburb population Totals are calculated using the non-rounded values. The Totals are then rounded up to the nearest 100.
2. Contour and Suburb population counts and Totals with values less than fifty are rounded down to zero.
3. A Contour may overlap a Suburb 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, reserves and industrial areas.

**Data and Methodology**

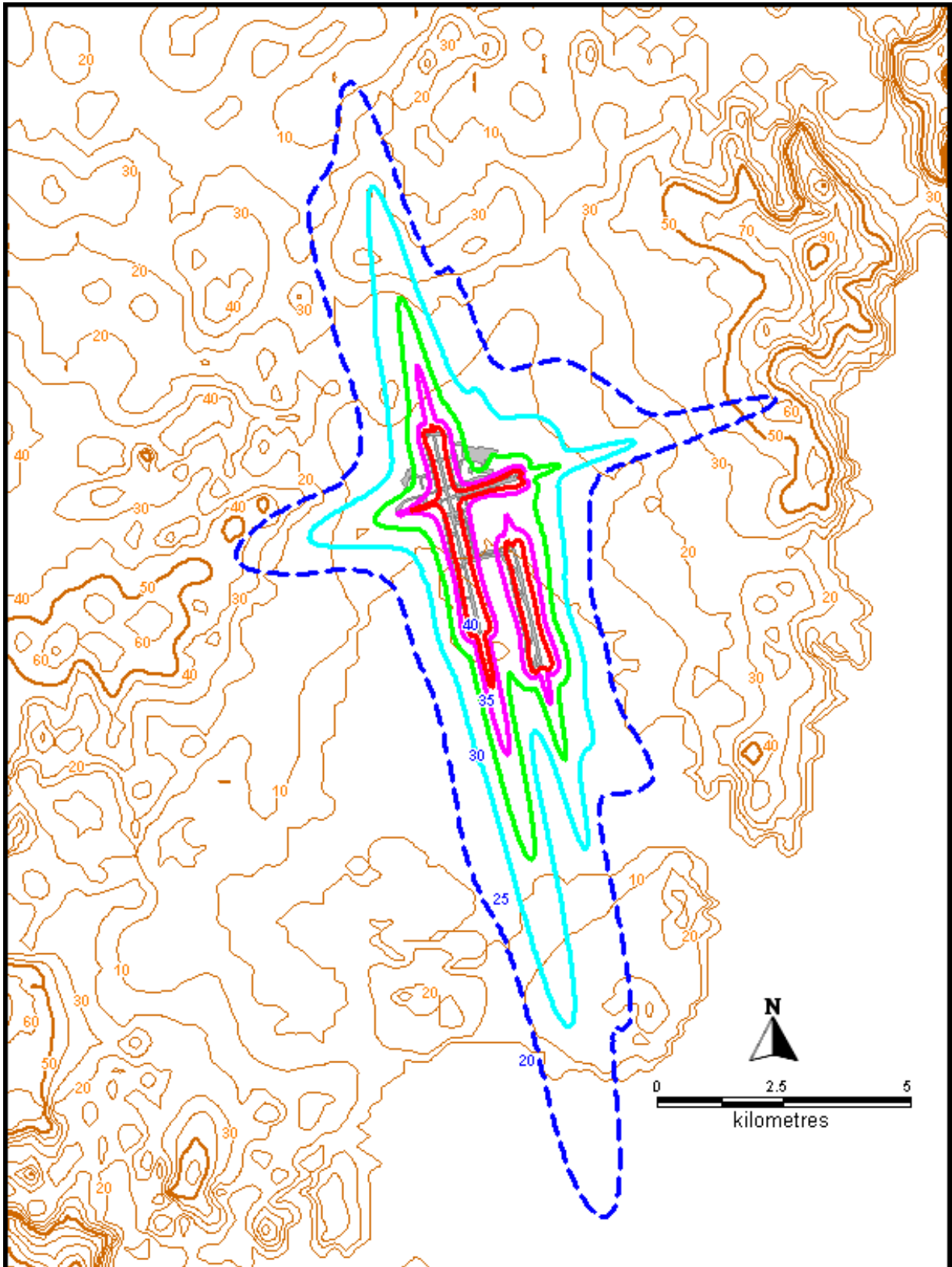
Suburb and contour population counts are approximations based on Census District (CD) populations from Census and Suburb Boundary information from MapInfo Australia. Populations are calculated according to the proportion of the area of overlap of a suburb/contour on a CD to the CD total area. Some editing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

# Attachment C

## ANEI N464 Contours with INM Terrain Contours

Sydney Airport  
1 July to 30 September 2009

Sydney Airport N464 (1 July – 30 September 2009) ANEI Contours with Terrain Data



Terrain contour height shown in metres.

# **Attachment D**

## **ANEI N464 Contours**

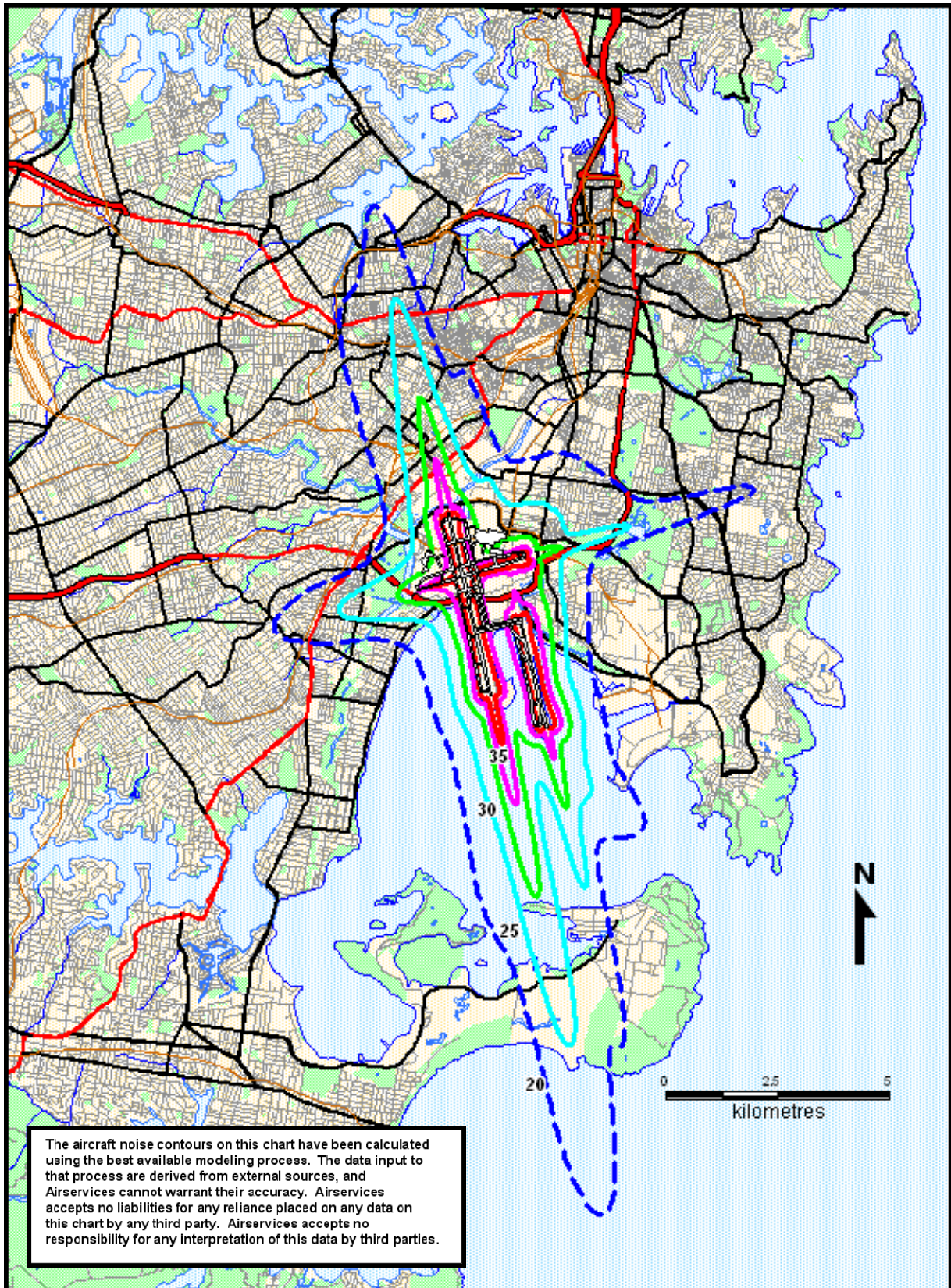
**Sydney Airport**

**1 July to 30 September 2009**

**The contours for ANEI N464 have been prepared using terrain data.**



### Sydney Airport N464 (1 July – 30 September 2009) ANEI Contours



ANEI contours modeled by INM 7.0b incorporating terrain data.

# Attachment E

## ANEI N459 Contours

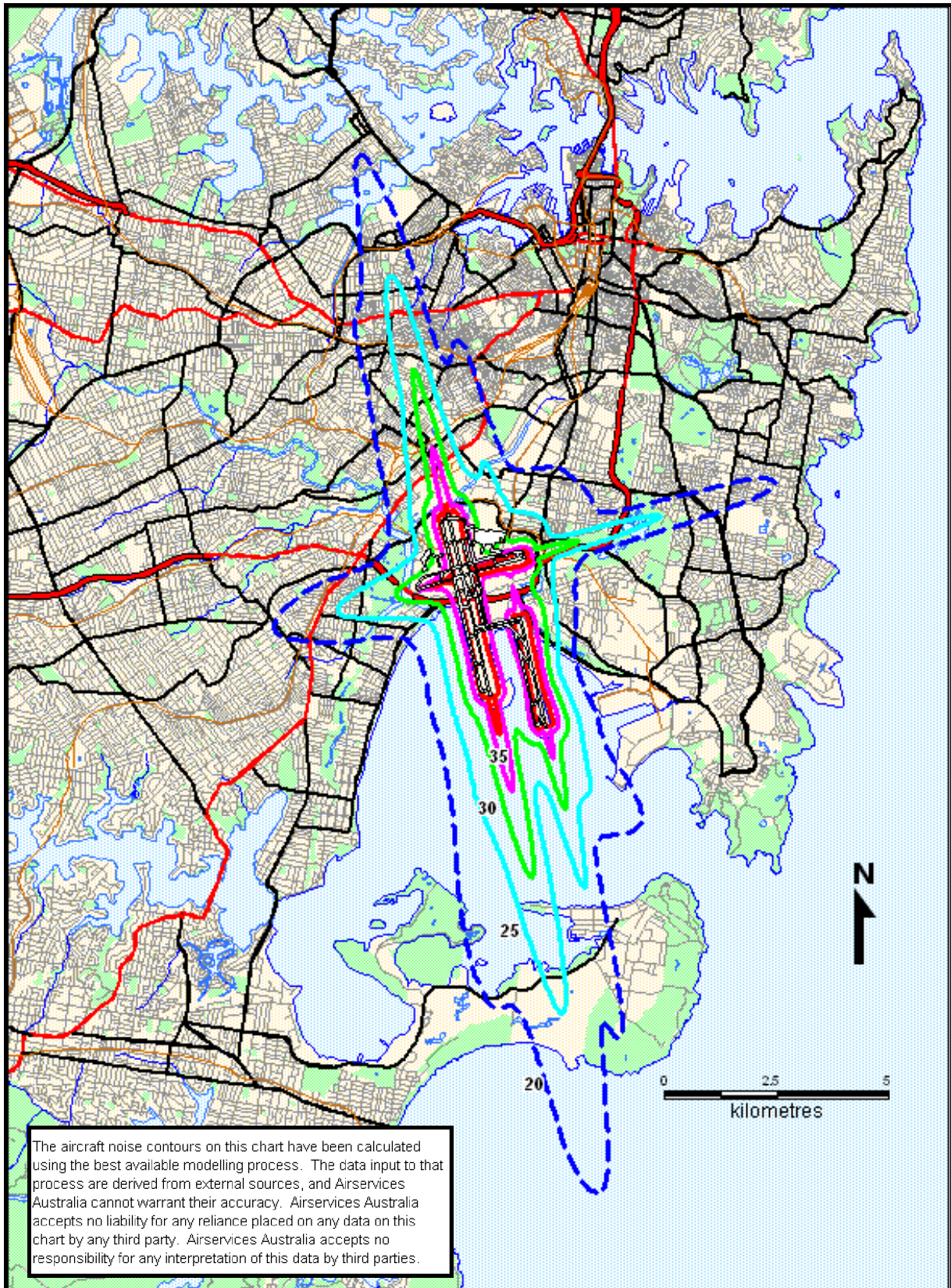
Sydney Airport

1 July to 30 September 2008

The contours for ANEI N459 have been prepared using terrain data.



### Sydney Airport N459 (1 July – 30 September 2008) ANEI Contours



ANEI contours modeled by INM 6.2a incorporating terrain data.

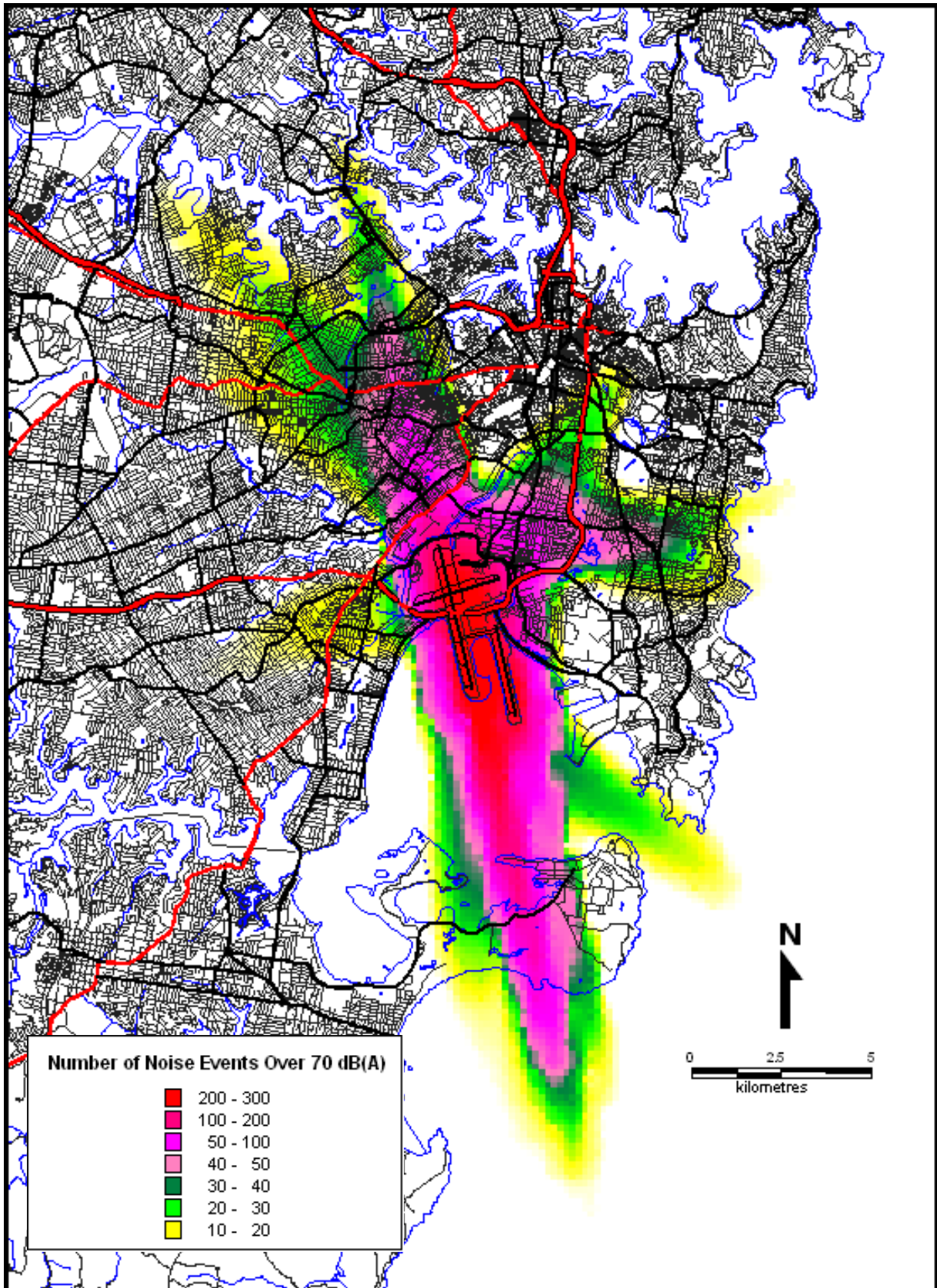


# Attachment F

## N464 N70 Chart

Sydney Airport  
1 July to 30 September 2009

Sydney Airport N464 (1 July – 30 September 2009) N70 Chart



Daily average number of aircraft noise events louder than 70 db(A).