

Report

# Hamilton Airport Australian Noise Exposure Forecast for 2030 (ANEF 2030)

**Prepared for Southern Grampians Shire Council**

**By Kneebush Planning Pty Ltd in association with Airports Plus Pty Ltd**

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## **1 Introduction**

Kneebush Planning Pty Ltd, in association with Airports Plus Pty Ltd, has been commissioned by the Shire of Southern Grampians to prepare an Australian Noise Exposure Forecast (ANEF) for Hamilton Airport for the year 2030 in association with the preparation of a master plan for the airport. This report sets out the methodology, input data and results of the ANEF study.

## **2 Hamilton Airport**

Hamilton Airport is situated approximately 11 km north of the Hamilton town centre in the Shire of Southern Grampians.

The airport is owned and operated by the Southern Grampians Shire Council. The airport has two runways.

Runway 17/35 is oriented north-south and is 1404m long with a bituminous sealed width of 30m. This is the primary runway due to the prevailing wind and night lighting. Council propose to extend runway 17/35 by 300m to the north making it 1704 metres long. This ANEF study is based on the extended runway.

Runway 10/28 is oriented in the northwest-southeast direction and is 1233m long with a gravel surface 30m wide.

Aircraft activity at the airport comprises a Regular Passenger Transport (RPT) service and a pilot training school, both operated by Sharp Airlines, in addition to the usual range of General Aviation (GA) activities. The RPT service currently uses Metro III/23 aircraft with 19 passenger seats and connects to Melbourne (Essendon) and Adelaide. The pilot training school conducts circuit training using both runways.

## **3 Methodology**

This section describes the study methodology.

### **3.1 Data Gathering**

The first phase of the study involved gathering the necessary data for the noise modelling. The key sources of data were:

- Council staff including Rod Treloar – Aerodrome Reporting Officer.
- Sharp Airlines Managing Director, Malcolm Sharp.
- Hamilton Airport Business Plan prepared by Airbiz (December 2005).
- Aeronautical Information Publication - Enroute Supplement Australia (AIP-ERSA).
- Google Earth for runway end coordinates and elevations.
- The Bureau of Meteorology website.
- CAAP 166-1(0): Operations in the vicinity of non-towered (non-controlled) aerodromes (CASA, 3 June 2010).
- Airport users and operators workshop held on 1 September 2010.

The input data for the modelling is discussed in section 4 of this report. This data has been agreed with the Shire of Southern Grampians and aerodrome users/operators.

### 3.2 Integrated Noise Model (INM)

The ANEF contours were prepared using the Integrated Noise Model (INM) computer program version 7.0b. The INM was developed by the US Federal Aviation Administration as a means of evaluating the impact of aircraft noise.

The data used to calculate the noise contours includes runway configuration, aircraft types, flight tracks, number of movements and time of day of movements. This data was entered into the INM which then produced the ANEF contour chart (Appendix 2).

## 4 INM Input Data

This section sets out the input data used for the INM study.

### 4.1 Aerodrome Details

The information used to establish the setup data for the INM study is shown in Tables 1, 2 and 3 below. This data was obtained from the Aeronautical Information Package - Enroute Supplement Australia (AIP-ERSA), Google Earth Pro and the Bureau of Meteorology.

**Table 1: Aerodrome Reference Point**

Airport Code	Latitude	Longitude	Elevation
YHML	-37.648333°	142.065000°	803 feet

**Table 2: Runway End Data**

Runway	Latitude*	Longitude*	Elevation
Runway 10	-37.645978°	142.059350°	781 feet
Runway 28	-37.650383°	142.072158°	804 feet
Runway 17	-37.638672°	142.061967°	755 feet
Runway 35	-37.654017°	142.061967°	783 feet

\* WGS84 Coordinate System

**Table 3: Average Meteorological Data**

Temperature	14.7°C
Pressure	759.97 mm-Hg (default)
Humidity	70%
Headwind	14.8 km/hr (default)

### 4.2 Flight Tracks

A flight track represents the plan view of where an aircraft flies. There are four different types of flight tracks: arrival tracks, departure tracks, training tracks and helicopter tracks.

The configuration of the tracks for this study takes into account:

- Hamilton Airport is a non-towered (non-controlled) aerodrome and as such the flight tracks must comply with procedures set down by CASA.<sup>1</sup>
- The operational characteristics of the modelled aircraft.
- The advice of the airport users and operators.
- The advice of Airports Plus Pty Ltd.

The flight tracks used for this study are shown on the plans at Appendix 1. For each runway there are five arrival tracks, five departure tracks, one training track and one helicopter track - a total of 48 flight tracks. These have been agreed with the Shire of Southern Grampians and aerodrome users/operators.

There are two different types of flight tracks used by the INM: point-type tracks which are entered graphically and vector-type tracks which are entered numerically. For this study the arrival, departure and training tracks were all entered as vector-type tracks and the helicopter tracks were entered as point-type tracks.

It should be noted that whilst the flight tracks are based on the CASA procedures, they do not necessarily represent the exact path of every aircraft. Some aircraft may fly along a different flight track due to the characteristics of the particular aircraft or due to weather conditions. The flight tracks are, however, a suitable representation for noise modelling purposes.

### **4.3 Aircraft Types**

The aircraft used in this study have been determined based on discussions with the Shire and airport users and operators. A large number of different aircraft types currently use the airport and will use the airport in the future. Furthermore, the INM's database of aircraft does not include every aircraft type. For modelling purposes 12 fixed wing types of aircraft and two helicopters were included in this study to represent eight different categories of aircraft appropriate for this airport.

Table 4 shows the aircraft types used in this study and their corresponding INM substitute aircraft. These have been agreed with the Shire of Southern Grampians and airport users/operators.

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<sup>1</sup> CAAP 166-1(0): Operations in the vicinity of non-towered (non-controlled) aerodromes (CASA, 3 June 2010).

**Table 4: Aircraft Types**

Category	Aircraft Type	INM Aircraft
Regular Passenger Transport (RPT)	Metroliner (See note 1)	DHC6
	Dash 8-300 (See note 1)	DHC830
	Embraer 170 (See note 1)	GV
Business/Medical (BM)	Beech King Air 200	DHC6
	Cessna Citation	CNA500
Freight (F)	Aero Commander	CNA441
Military (M)	Challenger 604	CL601
Agriculture/Fire (AF)	Air Tractor 802	CNA208
	Dromadar	DC3
General Aviation (GA)	Cessna 172 / Piper Warrior	GASEPF (See note 2)
	Cessna 210 / Beech Bonanza	GASEPV (See note 3)
	Piper PA-31 / Beech Baron	BEC58P (See note 4)
Circuit Training (CT)	Cessna 172 / Piper Warrior	GASEPF
	Cessna 210 / Beech Bonanza	GASEPV
	Piper PA-31 / Beech Baron	BEC58P
Helicopters (H)	Bell 407 (See note 5)	B407
	Robinson R22 (See note 5)	R22

**Notes:**

1. Sharp Airlines currently operate Metroliner III and 23 aircraft in and out of Hamilton Airport. The Embraer 170 and Dash 8-300 have been included as being representative of the types of RPT aircraft that could operate in the future.
2. GASEPF = Typical low performance single engine piston aircraft with fixed pitch propeller such as Cessna 172, Piper Archer and Piper Warrior.
3. GASEPV = Typical high performance single engine piston aircraft with variable pitch propeller such as Cessna 210, Beech Bonanza and Piper Lance.
4. BEC58P = Conventional twin engine piston aircraft such as Piper PA-31, Cessna 337, Cessna 340 and typified by the Beech Baron.
5. The Bell 407 and Robinson R22 represent large and small helicopters respectively. They are both single engine helicopters. INM 7.0b does not contain perceived noise level data, required for ANEF contours, for any twin engine helicopters.

**4.4 Aircraft Movements**

This study is based on a forecast of 14,352 movements in 2030. This forecast was agreed with the Shire of Southern Grampians and airport users/operators. The forecast was based on the following considerations:

- An estimate of 10,656 movements in 2010. As the Shire does not collect or maintain any movement data, this estimate was derived from discussions with the Aerodrome Reporting Officer and various airport users/operators.

- Sharp Airlines advised that they do not expect their RPT and pilot training movements to dramatically increase in the foreseeable future.
- Growth in general aviation in Australia has been stable at 1 - 2% per annum for the last twenty years. The Commonwealth Department of Infrastructure produces general aviation activity reports annually verifying this growth trend.

Based on this information, a 1.5% compound growth rate was applied for all aircraft activity.

The forecast total of 14,352 is well within the airport's capacity.

Table 5 below shows a breakdown of the forecast of annual aircraft movements.

**Table 5: Aircraft Movements Per Year**

Category	Percent of Total	Movements by Category	Aircraft Type	Movements by Aircraft
Regular Passenger Transport (RPT)	23.42%	3362	Metroliner (DHC6)	1681
			Dash 8-300 (DHC830)	840
			Embraer 170 (GV)	840
Business/Medical (BM)	4.13%	593	Beech King Air 200 (DHC6)	296
			Cessna Citation (CNA500)	296
Freight (F)	4.69%	673	Aero Commander (CNA441)	673
Military (M)	0.19%	27	Challenger 604 (CL601)	27
Agriculture/Fire (AF)	9.38%	1347	Air Tractor 802 (CNA208)	673
			Dromadar (DC3)	673
General Aviation (GA)	14.08%	2020	Cessna 172 / Piper Warrior (GASEPF)	673
			Cessna 210 / Beech Bonanza (GASEPV)	673
			Piper PA-31 / Beech Baron (BEC58P)	673
Circuit Training (CT)	43.17%	6196	Cessna 172 / Piper Warrior (GASEPF)	2065
			Cessna 210 / Beech Bonanza (GASEPV)	2065
			Piper PA-31 / Beech Baron (BEC58P)	2065
Helicopters (H)	0.94%	135	Bell 407 (B407)	67
			Robinson R22 (R22)	67
<b>Total</b>	<b>100%</b>	<b>14,352</b>		<b>14,352</b>

The INM requires a daily input figure for modelling purposes, so the yearly figures were divided by 365 in order to get an annual average day (39.32 movements per day).

#### 4.5 Runway & Track Usage

The distribution of movements by runway was based on an estimate of the overall runway utilisation provided by the airport users/operators (Table 6) and estimates of the runway usage by aircraft type having regard to the aircraft performance characteristics (Table 7).

**Table 6: Runway Utilisation**

<b>RWY 17</b>	<b>RWY 35</b>	<b>RWY 10</b>	<b>RWY 28</b>
40%	40%	5%	15%

The above percentages reflect the fact that runway 17/35 is the primary runway due to the prevailing wind direction, its length, sealed construction and night lighting. Runway 10/28 is shorter and only has a gravel surface.

**Table 7: Runway Usage by Aircraft Category**

<b>Aircraft Category</b>	<b>RWY 17</b>	<b>RWY 35</b>	<b>RWY 10</b>	<b>RWY 28</b>
Regular Passenger Transport (RPT)	50%	50%	0%	0%
Business/Medical (BM)	50%	50%	0%	0%
Freight (F)	50%	50%	0%	0%
Military (M)	50%	50%	0%	0%
Agriculture/Fire (AF)	35.2%	35.2%	7.4%	22.2%
General Aviation (GA)	35.2%	35.2%	7.4%	22.2%
Circuit Training (CT)	35.2%	35.2%	7.4%	22.2%
Helicopters (H)	35.2%	35.2%	7.4%	22.2%

Table 8 shows the average daily movements for each runway by aircraft type based on the above percentages.



**Table 8: Movements Per Day by Aircraft Type and Runway**

Aircraft	Runway				Total
	17	35	10	28	
Metroliner (RPT)	2.3026	2.3026	0.0000	0.0000	4.6051
Dash 8-300 (RPT)	1.1513	1.1513	0.0000	0.0000	2.3026
Embraer 170 (RPT)	1.1513	1.1513	0.0000	0.0000	2.3026
Beech King Air 200 (BM)	0.4059	0.4059	0.0000	0.0000	0.8118
Cessna Citation (BM)	0.4059	0.4059	0.0000	0.0000	0.8118
Aero Commander (F)	0.9225	0.9225	0.0000	0.0000	1.8450
Challenger 604 (M)	0.0369	0.0369	0.0000	0.0000	0.0738
Air Tractor 802 (AF)	0.6494	0.6494	0.1365	0.4096	1.8450
Dromadar (AF)	0.6494	0.6494	0.1365	0.4096	1.8450
GASEPF (GA)	0.6494	0.6494	0.1365	0.4096	1.8450
GASEPV (GA)	0.6494	0.6494	0.1365	0.4096	1.8450
BEC58P (GA)	0.6494	0.6494	0.1365	0.4096	1.8450
GASEPF (CT)	1.9916	1.9916	0.4187	1.2561	5.6580
GASEPV (CT)	1.9916	1.9916	0.4187	1.2561	5.6580
BEC58P (CT)	1.9916	1.9916	0.4187	1.2561	5.6580
Bell 407 (H)	0.0649	0.0649	0.0137	0.0410	0.1845
Robinson R22 (H)	0.0649	0.0649	0.0137	0.0410	0.1845
<b>TOTAL</b>	<b>15.7283</b>	<b>15.7283</b>	<b>1.9660</b>	<b>5.8981</b>	<b>39.3208</b>
<b>Percentage</b>	<b>40.0%</b>	<b>40.0%</b>	<b>5.0%</b>	<b>15.0%</b>	<b>100.0%</b>

For the flight track usage the movements were evenly distributed across the relevant tracks. For example, the Embraer 170 has 0.5756 arrivals per day on runway 17 (1.1513 movements divided by 2). There are five arrival tracks on runway 17. Therefore 0.5756 divided by five equals 0.1151 movements per arrivals track. This approach was agreed with the Shire of Southern Grampians and airport users/operators.

#### 4.6 Night Movements

The proportion of movements at night was agreed to be 5%, which is typical of a small regional airport. This represents the number of movements which occur between 7.00pm and 7.00am.

#### 4.7 ANEF Parameter Settings

Table 9 shows the parameter settings used for producing the ANEF contours. These are standard settings for all ANEF studies.

**Table 9: ANEF Parameter Settings**

<b>Parameter</b>	<b>Setting</b>
Family	Perceived
Type	Exposure
Day Multiplier	1.0
Night Multiplier	4.0
10 log(T)	88.0
Refinement	10
Tolerance	0.1

#### **4.8 Assumptions and Limitations**

The following assumptions and limitations apply to this study in addition to those outlined elsewhere in this report:

- Standard INM profiles were used for all aircraft types.
- Stage 1 departure lengths (0-500 nmi) were used for all aircraft types.
- Terrain was not used in the modelling.
- Dispersion of flight tracks was not used.
- All input data including aircraft types, movement forecast and runway usage have been agreed with the Shire of Southern Grampians and airport users/operators.
- The modelling includes the proposed 300m extension to runway 17/35.
- INM Version 7.0b was used for the ANEF modelling.
- The ANEF has not yet been submitted to or endorsed by Airservices Australia.

## **5 Results**

The ANEF contours chart is attached at Appendix 2. This shows the 15 ANEF contour and above.

It is noted that there is only one existing house located within the ANEF contours. This house is located approximately 240 metres north-east of the existing north end of Runway 17/35. The house is located in the 20-25 ANEF zone.

## **6 Land Use**

### **6.1 Australian Standard AS2021-2000**

Recommendations relating to land use within the ANEF contours are contained in Australian Standard AS2021-2000 "Acoustics – Aircraft Noise Intrusion – Building Siting and Construction". These recommendations are summarised in Table 10 below. This is a summary only; Council should consult the Australian Standard for full details of the land use recommendations, and associated notes and conditions.

**Table 10: Building Site Acceptability Based on ANEF Zones**

(Based on Australian Standard AS 2021-2000 Table 2.1)

Building Type	ANEF Zone of Site		
	Acceptable	Conditional	Unacceptable
<b>House, home unit, flat, caravan park</b>	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
<b>Hotel, motel, hostel</b>	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
<b>School, university</b>	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
<b>Hospital, nursing home</b>	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
<b>Public building</b>	Less than 20 ANEF	20 to 30 ANEF	Greater than 30 ANEF
<b>Commercial building</b>	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
<b>Light industrial</b>	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
<b>Other industrial</b>	Acceptable in all ANEF zones		

'Acceptable' means that special measures are usually not required to reduce aircraft noise.

'Conditional' means that special measures (noise attenuation) are required to reduce aircraft noise.

'Unacceptable' means that the development should not normally be considered.

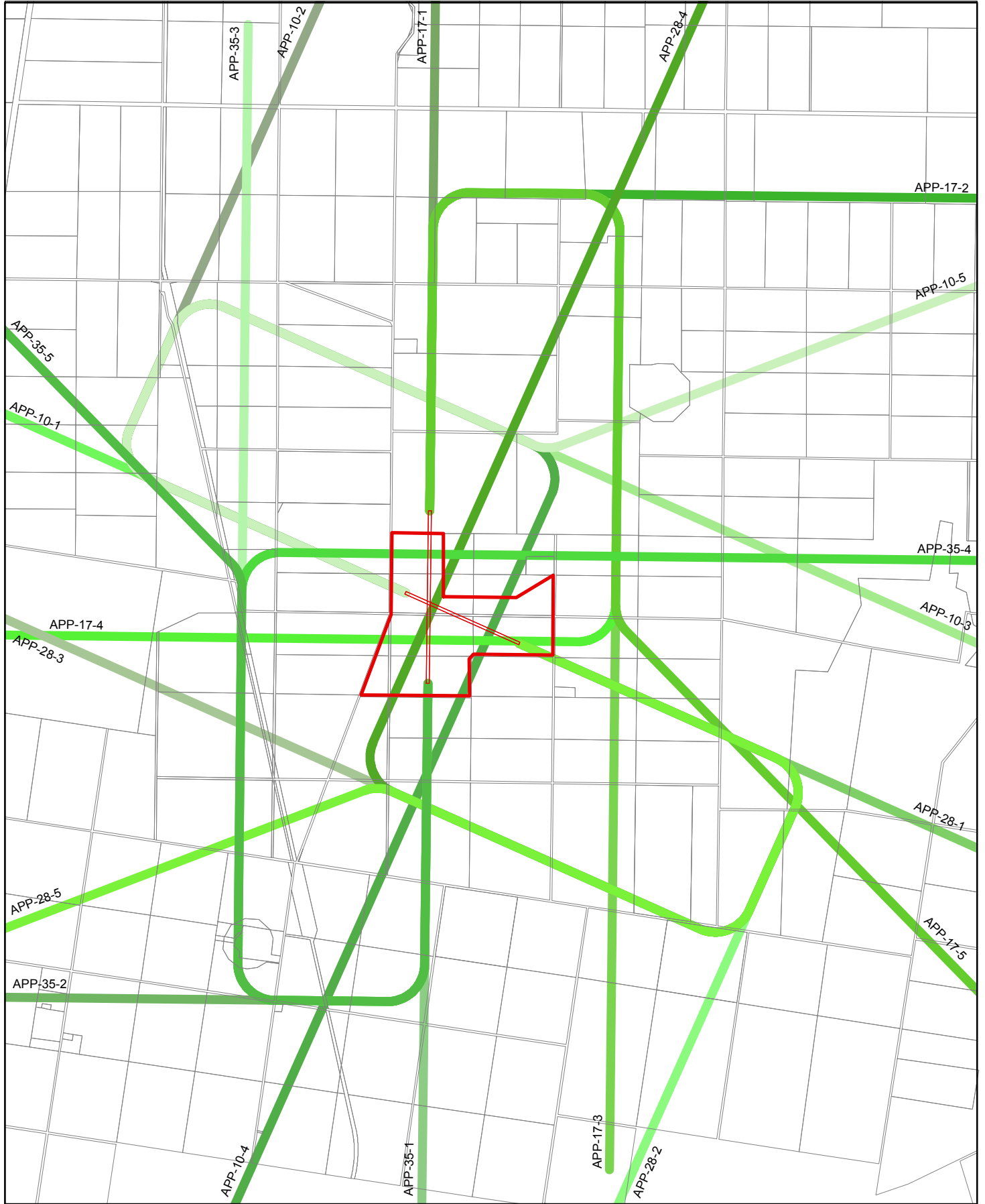
## 6.2 Airport Environs Overlay



In Victorian Planning Schemes, the Airport Environs Overlay (AEO) is used to implement the ANEF and AS2021-2000 land use recommendations. Whilst an AEO currently applies over the Hamilton Airport site and surrounds, due to its rectangular shape it is obviously not based on any ANEF contours.

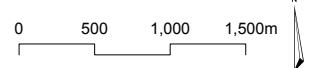
It is recommended that the AEO be amended to correctly relate to the ANEF contours and AS2021-2000.

**Appendix 1**  
**Flight Tracks**

Flight Tracks - Arrivals





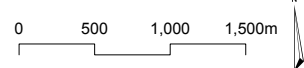
-  Aerodrome Study Area
-  Arrival Paths



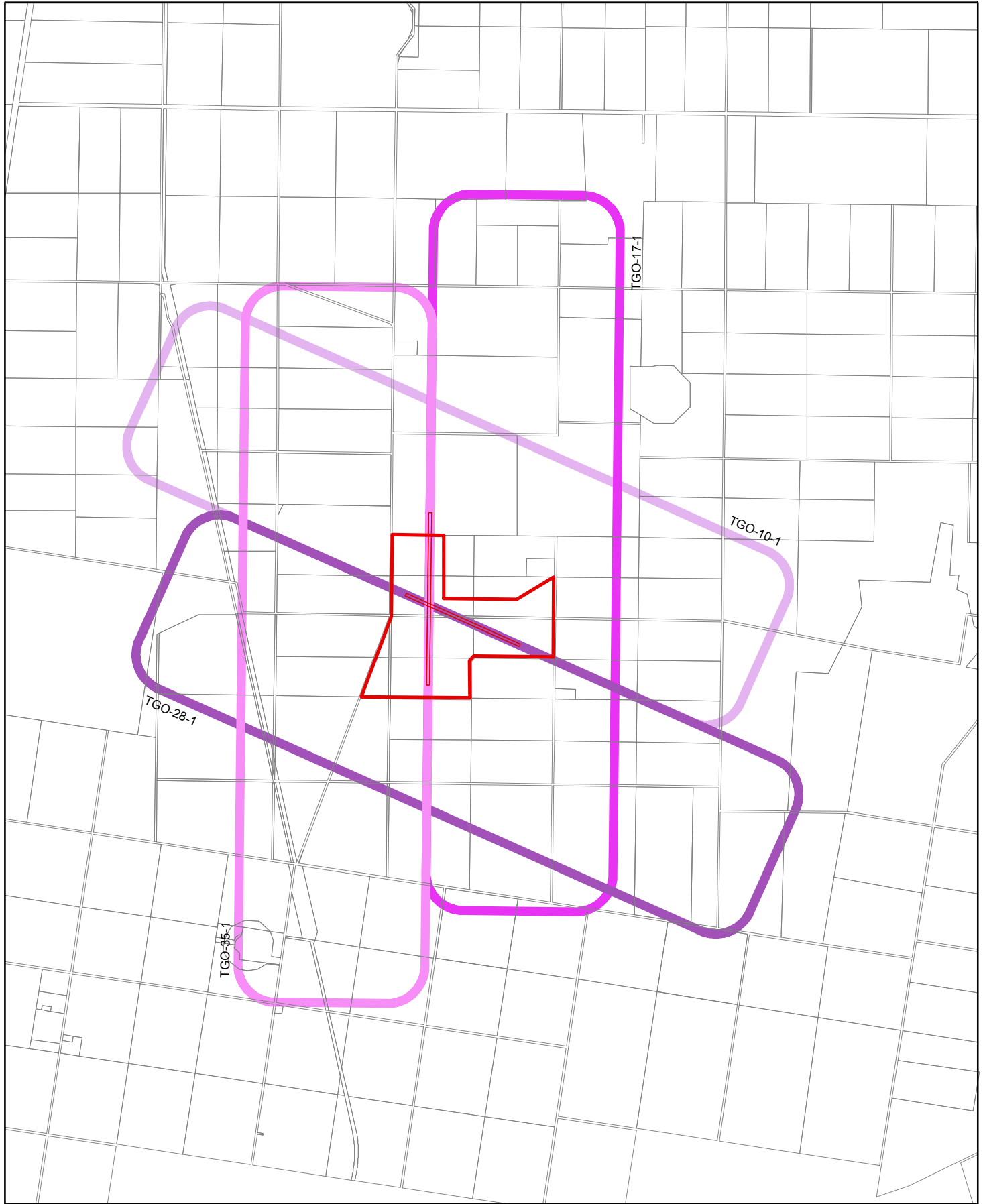
# Flight Tracks - Departures





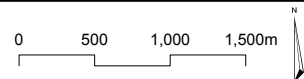
 Aerodrome Study Area  
 Departure Paths



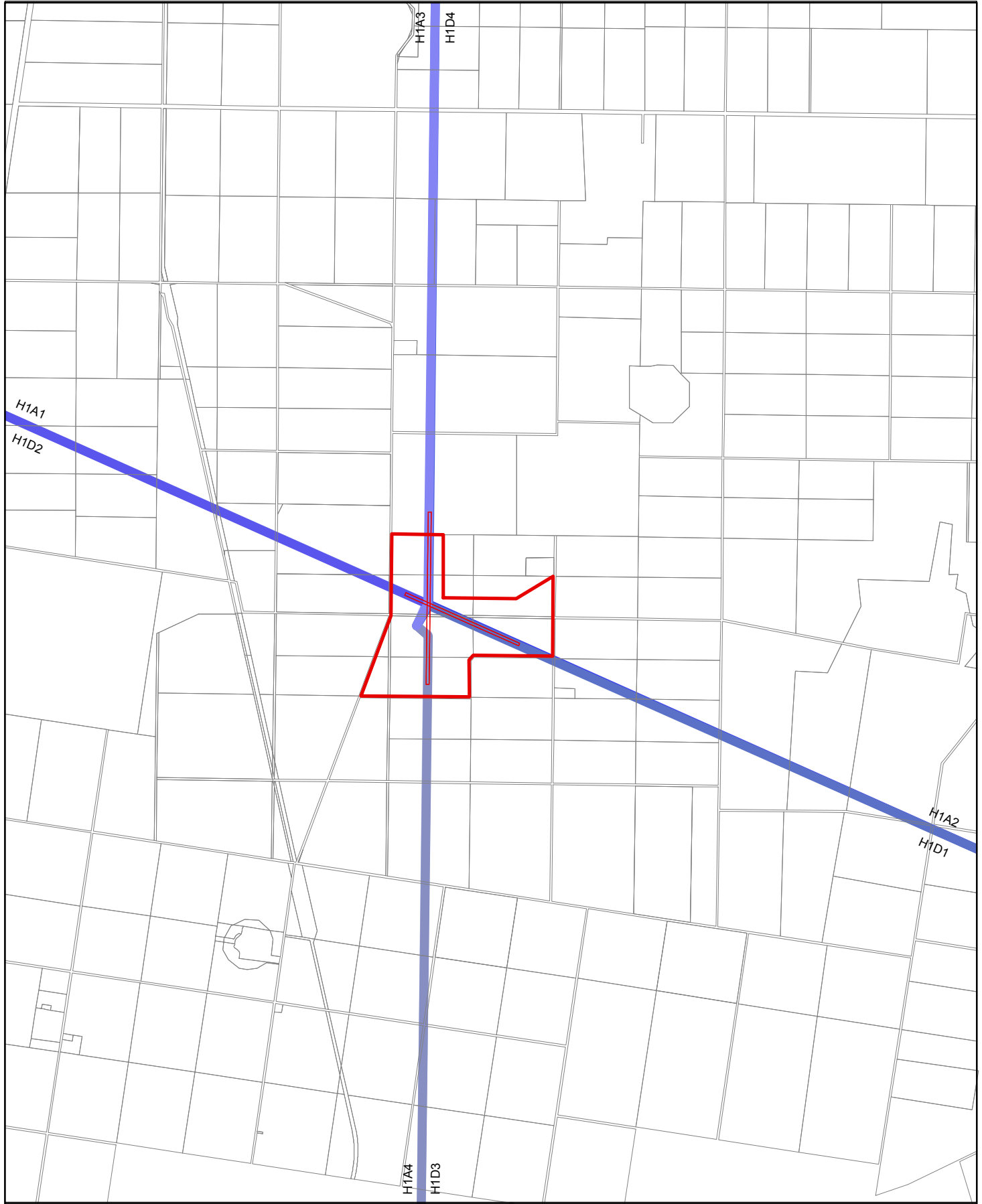
Hamilton Airport Australian Noise Exposure Forecast 2030  
Flight Tracks - Training Paths





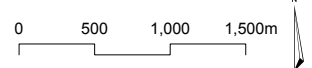
 Aerodrome Study Area  
 Flight Training



# Flight Tracks - Helicopter Paths



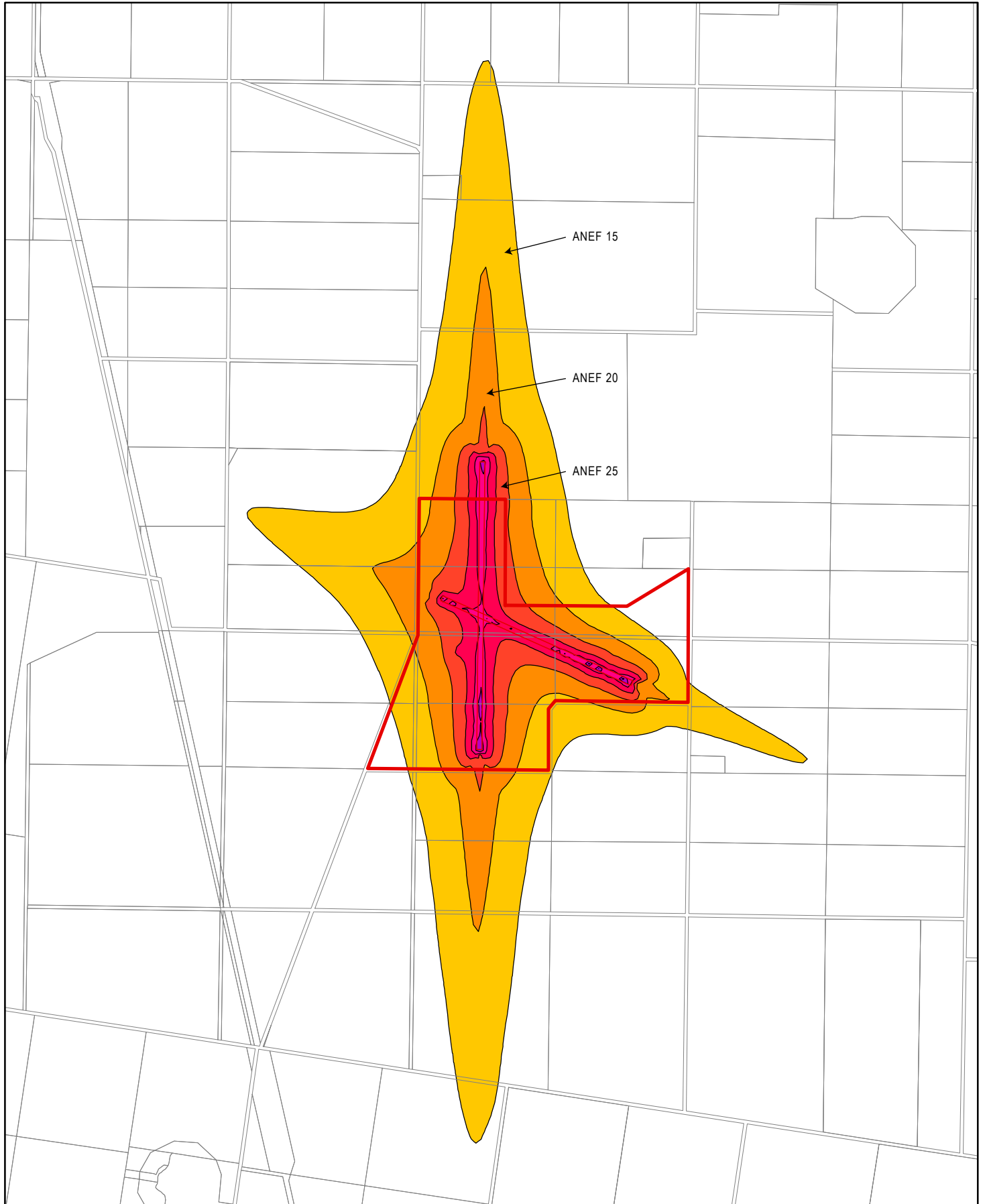
 Aerodrome Study Area  
 Helicopter Paths













**Appendix 2**  
**ANEF Contours**

Hamilton Airport  
Australian Noise Exposure Forecast 2030



-  Aerodrome Study Area
-  ANEF 15
-  ANEF 20
-  ANEF 25
-  ANEF 30
-  ANEF 35
-  ANEF 40
-  ANEF 45

0 500 1,000 1,500m

