

# Australian Super Hornet Annual Noise Report 2024



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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 Noise Flight Path and Monitoring System at the time. The system databases are to some extent dependent upon external sources and errors may occur. All care is taken in preparation of the report but its complete accuracy cannot be guaranteed. The Department of Defence and the Noise Flight Path and Monitoring System project contractors do not accept any legal liability for any losses arising from reliance upon data in this report which may be found to be inaccurate.*

*The Noise Flight Path and Monitoring System does not provide 'Aircraft noise levels' as defined in Australian Standard AS 2021:2015 Acoustics - Aircraft Noise Intrusion - Building Siting and Construction.*

### **LIMITATIONS IN FLIGHT DATA AVAILABILITY**

*Accurate determination of Australian Super Hornet movements remains limited due to the classification of Defence radar sensor data. The current NFPMS presents limited information for military flying operations and does not contain flight tracks for Australian Super Hornet aircraft. Noise spectral analysis is applied to recorded noise to identify an aircraft's type by its noise signature. The NFPMS does not currently monitor flight paths.*

### DEFINITIONS

| Metric            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| dB                | Decibel. The unit of Sound Pressure Level (SPL) expressed on a logarithmic scale.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| dB(A)             | The A-weighted SPL. A-weighting is a frequency dependent curve (or filter) which is applied to sound pressure microphone measurements to mimic the effects of human hearing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| ft                | Foot. Unit length of approximately 30 cm. 1000 ft is approximately 305 m.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| $L_{Amax}$        | The A-weighted maximum noise level. The highest noise level which occurs during the measurement period. Maximum noise levels in this report are reported using dB(A)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| $L_{Aeq,T}$       | The equivalent continuous A-weighted sound level (time averaged over period, T), commonly referred to as the average noise level. The 'equivalent noise level' ( $L_{Aeq}$ ) is the energy equivalent noise level measured in A-weighted decibels (dB(A)). It is a time-averaged sound level; a single-number value that expresses the time-varying sound level for the specified period as though it were a constant sound level with the same total sound energy as the time-varying level. Consequently the $L_{Aeq}$ is the constant noise level that if continued over the sample period would have the same energy as the actual varying, measured sound level. The time period needs to be specified and can be one hour, 24 hours or the operational hours of the base. |
| Movement          | A single departure (take-off) or a single arrival (landing) carried out by an aircraft. An aircraft that conducts a single take-off followed by a single landing conducts two movements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| nmi               | Nautical mile. Unit length of approximately 1852 m.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Number Above (NA) | The number of daily aircraft events that are higher than a given maximum noise level threshold in a day. For example, the term N70 means the number of aircraft noise events per day with a maximum noise level 70 dB(A) or greater. The NA contour for an airport represents the number of noise events occurring greater than a particular dB(A) level over a specified time period. As example, the N70 contour depicts the number of aircraft noise events above 70 dB(A) for an average day.                                                                                                                                                                                                                                                                               |

## EXECUTIVE SUMMARY

1. The 2024 Australian Super Hornet (ASH) Annual Noise Report monitors Air Force's compliance with the Super Hornet Noise Management Plan version 4.0. This report includes measured ASH noise levels around Royal Australian Air Force (RAAF) Base Amberley and compares with the 2009 Public Environment Report (PER) modelling and requirements of the Noise Management Plan version 4.0.
2. For the purpose of this report, 'Australian Super Hornet' (ASH) includes both the F/A-18F Super Hornet and EA-18G (Growler) aircraft, unless otherwise specified.
3. Due to changes in Defence's strategic posture, the noise and flight path monitoring system (NFPMS) has ceased receiving classified Defence radar sensor data. This has limited the ability to capture and present ASH flying operations in relation to the noise generated. Defence engaged a new contractor in 2022, and uses spectral analysis to identify platforms by their noise signature. This mitigates part of the lost data by allowing aircraft type to be matched to detected noise but does not provide for flight path tracking.
4. Enumeration of military fast jet movements were made through the analysis of data processed by the NFPMS. In 2024, 5627 Australian Super Hornet movements were identified compared to a forecast 7700 movements from the Noise Management Plan version 4.0. All military fast jet movements in 2024 were conducted on Runway 15/33. There were no military fast jet operations on the secondary runway 04/22.
5. Flying operations of the Australian Super Hornet was within the PER modelling forecast and the requirements of the Noise Management Plan.

## PURPOSE

6. The purpose of the 2024 Annual Australian Super Hornet Noise Report is to evaluate the impacts of Australian Super Hornet noise against the 2009 PER noise modelling and the Australian Super Hornet Noise Management Plan.
7. This report has been prepared to report publicly on the noise and flying operations of Australian Super Hornet at RAAF Base Amberley.

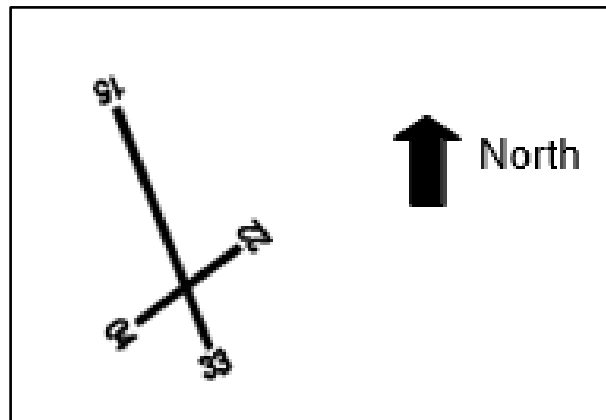
## BACKGROUND

8. The Australian Government announced in March 2007, the acquisition of 24 F/A-18F Super Hornets to replace the F-111 capability at RAAF Base Amberley.
9. In accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* a Public Environment Report (PER) was completed in December 2009. The PER addressed potential environmental impacts resulting from F/A-18F Super Hornet flying operations at RAAF Base Amberley.
10. In March 2010 the Minister for Environment Protection, Heritage and the Arts (the Environment Minister) approved Australian Super Hornet flying operations at RAAF Base Amberley subject to ten conditions, which was later varied to nine conditions in 2014.
11. Condition 1 required the RAAF to submit an Australian Super Hornet Noise Management Plan for approval by the Environment Minister.
12. Condition 2 required the Air Force to produce a Noise Monitoring and Complaints Handling Strategy which resulted in the installation of a Noise and Flight Paths Monitoring System (NFPMS) at RAAF Base Amberley. The purpose of the NFPMS at RAAF Base Amberley was to:
  - a. Identify noise levels associated with all military aircraft operations at the Base
  - b. Assist Defence to manage aircraft noise exposure over land in the vicinity of the Base
  - c. Provide information on aircraft noise levels to the public in a format that is easy to read and understand.
13. The Noise Monitoring and Complaints Handling Strategy required the drafting of an Annual Australian Super Hornet noise report. The reason for the report was to evaluate the accuracy of the noise modelling undertaken for the PER and monitor compliance with the Australian Super Hornet Noise Management Plan.
14. In 2016, updated noise modelling was conducted at RAAF Base Amberley in support of the 2029 Australian Noise Exposure Forecast process. All aircraft types operating from RAAF Base Amberley were incorporated.
15. From February 2017, 12 EA-18G Growler aircraft have operated from RAAF Base Amberley, alongside the 24 F/A-18F Super Hornet aircraft. The EA-18G Growler is a derivative of the F/A-18F Super Hornet and shares the same overall airframe design and engines.
16. In November 2020 an updated Noise Management Plan version 4.0 was published. This plan incorporated Australian Super Hornet noise management lessons identified over the period 2010 to 2020 as reflected in previous annual noise reports. This plan forecast 7700 annual Australian Super Hornet movements and forecast up to 960 additional movements by visiting military fast jets.

## AUSTRALIAN SUPER HORNET FLYING OPERATIONS

### RAAF BASE AMBERLEY RUNWAY ORIENTATION AND USE

17. Figure One shows the runway orientation at RAAF Base Amberley.



**Figure One: RAAF Base Amberley Runway Orientation**

18. Australian Super Hornet operations are conducted on Runway 15/33. Runway 04/22 is only used in exceptional circumstances, such as in an emergency, or when Runway 15/33 is obstructed.

19. Table One shows that in 2024, Australian Super Hornet operations utilised Runway 15/33, with no operations detected on Runway 04/22.

**Table One: Total Movements per Runway in 2024**

| Runway       | Arrivals    | Departures  | Circuits   | Total       | Usage       |
|--------------|-------------|-------------|------------|-------------|-------------|
| RWY 33       | 1128        | 940         | 66         | 2134        | 38%         |
| RWY 15       | 1590        | 1765        | 138        | 3493        | 62%         |
| RWY 22       | 0           | 0           | 0          | 0           | 0%          |
| RWY 04       | 0           | 0           | 0          | 0           | 0%          |
| <b>TOTAL</b> | <b>2718</b> | <b>2705</b> | <b>204</b> | <b>5627</b> | <b>100%</b> |

### DEPARTURE PATHS

20. Standard Australian Super Hornet departure flight paths are illustrated in Annex A.
21. Air Traffic procedures are published in the Flight Information Handbook Australia (FIHA) AD2 Supplement Amberley.
22. **Turn to the right after take-off runway 33.** The Noise Management Plan requires that departures from runway 33 to training airspace to the west, south and south east of Amberley turn to the west (left turn) to gain altitude before departing to the training airspace. Departures to the training airspace in the north east and east can turn right for departure after reaching the 11.1 km point on runway heading.
23. **Early turns after take-off runway 33.** The Noise Management Plan requires runway 33 departures to maintain runway heading (no turn) until reaching 7.4 km (4 nmi) to gain altitude before departing to the training airspace.

24. **Turn to the left after take-off runway 15.** The Noise Management Plan requires that runway 15 departures turn to the west (right turn) to gain altitude before departing to the training airspace.

### ARRIVAL PATHS

25. Planned Australian Super Hornet arrival flight paths are illustrated in Annexes B to D.

26. Initial and pitch procedures are the preferred flight paths in periods of clear visibility as they provide the most efficient and safe mechanism of recovery. The alternative approach types (visual or instrument) can result in increased noise levels in the community, as aircraft approaches are longer, and more time is spent flying at lower speeds.

27. In 2024, 80 percent of ASH arrivals were by the Initial and Pitch procedure, which compares with an estimate of 80 percent in the 2009 Public Environment Report and a revised estimate of 70 percent in the Noise Management Plan version 4.

28. The decision as to what type of approach is flown is based on a number of factors, including but not limited to weather conditions of the day, training requirements of the aircrew and/or Air Traffic Control (ATC) involved in the sortie, the serviceability status of the airfield's instrument approach aids and the operational requirements of the sortie.

### TRANSIT ROUTES

29. The transit route for Australian Super Hornet to the eastern training areas minimises the noise impact on the civilian population of Brisbane. Most transits to and from all areas are conducted above 15,000 ft above mean sea-level with transit below this level only conducted if instructed by ATC.

### ALTITUDE LIMITATIONS

30. The Noise Management Plan limits Australian Super Hornet aircraft to not flying below 450 m (1,500 ft) within 18.5 km (10 nmi) of RAAF Base Amberley, except when landing, taking off or in the circuit.

### ENGINE RUNS

31. The Noise Management Plan limits Australian Super Hornet routine flight-line engine runs to 80% power for a maximum of 60 minutes duration each, and only between 07:00 am and 10:00 pm. Outside of these hours routine flight-line engine runs must only occur for urgent operational outcomes. This requirement is promulgated in accordance with Base and 82WG standing instruction for stipulated curfew timings.

32. The Noise Management Plan limits Australian Super Hornet high power engine runs at the Engine Test Cell 3 (ETC-3) on Base. High power engine runs involve the running of engines at an average of 95% power for up to 30 minutes. This practice is limited to:

- a. a maximum of ten events per year unless approved by Senior Australian Defence Force Officer (SADFO) Amberley as a foreseeable variation, and
- b. to not take place between 10:00 pm and 7:00 am.

33. During 2024, three high power engine test events were automatically detected by the NFPMS between 07:00 am and 10:00 pm, and nil high power engine test events occurred outside of these hours.

### NUMBER AND TIMING OF AUSTRALIAN SUPER HORNET MOVEMENTS

34. In general, Australian Super Hornet operations occur on weekdays, with night flying when scheduled, typically occurring on Monday to Thursday nights.
35. Flying is forecast to occur over 46 weeks of the year with operations planned between 07:00 am and 11:00 pm, with no practice circuits flown after 10:00 pm.
36. The 2009 PER also forecast 20 percent of movements between 7:00 pm and 11:00 pm.
37. Weekend flying day or night, can occur in circumstances detailed in the Variations sections of the Noise Management Plan. Normally this is associated with operational requirements or events of public significance such as ANZAC day flypasts.
38. A ‘movement’ is a single take-off or landing by a single aircraft, hence one aircraft departing from and then returning to the airfield will generate two movements. Circuits conducted are counted as two movements.

### ANNUAL MOVEMENTS

39. The Noise Management Plan forecasts 7700 Australian Super Hornet movements from RAAF Base Amberley in 2024. A total of 5627 Australian Super Hornet movements were identified by the NFPMS in 2024.
40. Table Two displays the forecast movements per day compared to actual movements for the period 2019 to 2024. An ‘average flying day’ is the forecast annual movements divided across 230 flying days (46 weeks of flying, with five flying days per week).

**Table Two: Australian Super Hornet Annual Movement Data**

| Year                                | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|-------------------------------------|------|------|------|------|------|------|
| ASH Movements - forecast            | 6478 | 6478 | 7700 | 7700 | 7700 | 7700 |
| ASH Movements - actual              | 6039 | 5863 | 6821 | 6551 | 6136 | 5627 |
| Percentage of ASH movement forecast | 89%  | 87%  | 89%  | 85%  | 80%  | 73%  |
| Average Day movements - forecast    | 28   | 28   | 33   | 33   | 33   | 33   |
| Average Day movements - actual      | 26.3 | 25.5 | 29.7 | 28.5 | 26.7 | 24.5 |

### WEEKLY FLYING MOVEMENTS

41. In 2024 there were four weeks identified with no Australian Super Hornet movements, coinciding with the New Year period, and a further four weeks with less than 25 movements over the Mid-Year period.

42. Figure Two shows Australian Super Hornet movements by week in 2024.

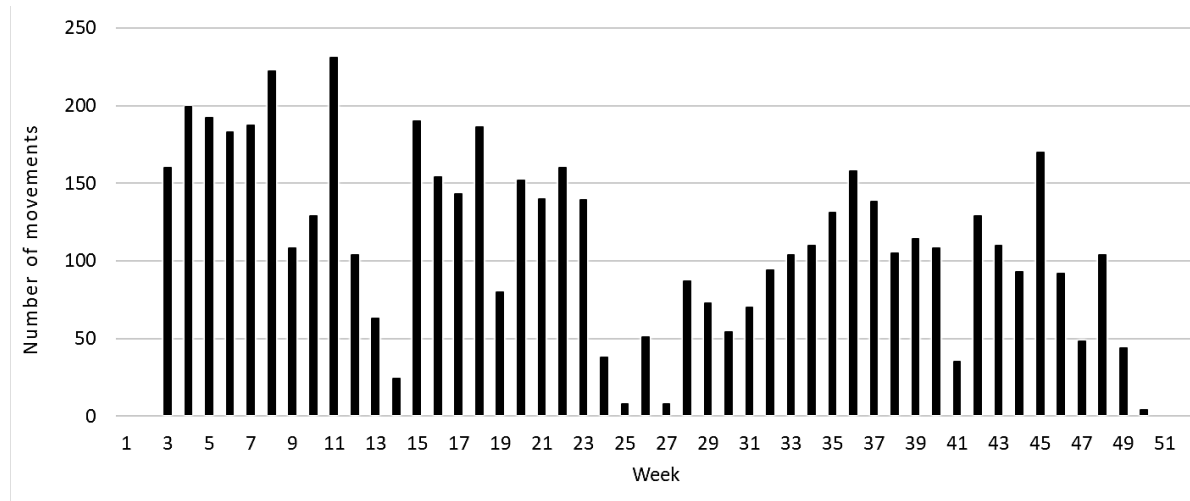


Figure Two: Australian Super Hornet Movements by Week

### DAILY FLYING MOVEMENTS

43. In 2024 there were a total of 20 movements identified by the NFPMS on Saturdays, and 6 movements on Sundays. In accordance with Base Instructions, all weekend movements were approved in accordance with the Amberley Base Aircraft Noise Management Plan and promulgated on the approved base flying program. The total number of annual movements by day are shown in Figure Three.

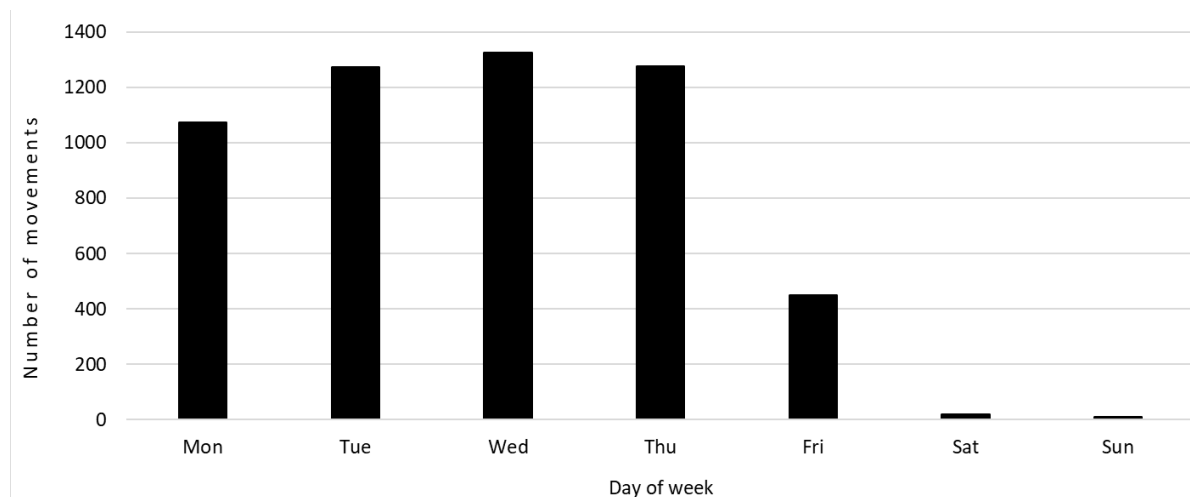


Figure Three: Australian Super Hornet Movements by Day

### HOURLY FLYING MOVEMENTS

44. The Noise Management Plan forecast that all operations would occur between 07:00 am and 11:00 pm, with no practice circuits flown after 10:00pm. The 2009 PER forecast 20% of movements between 7:00 pm and 11:00 pm.

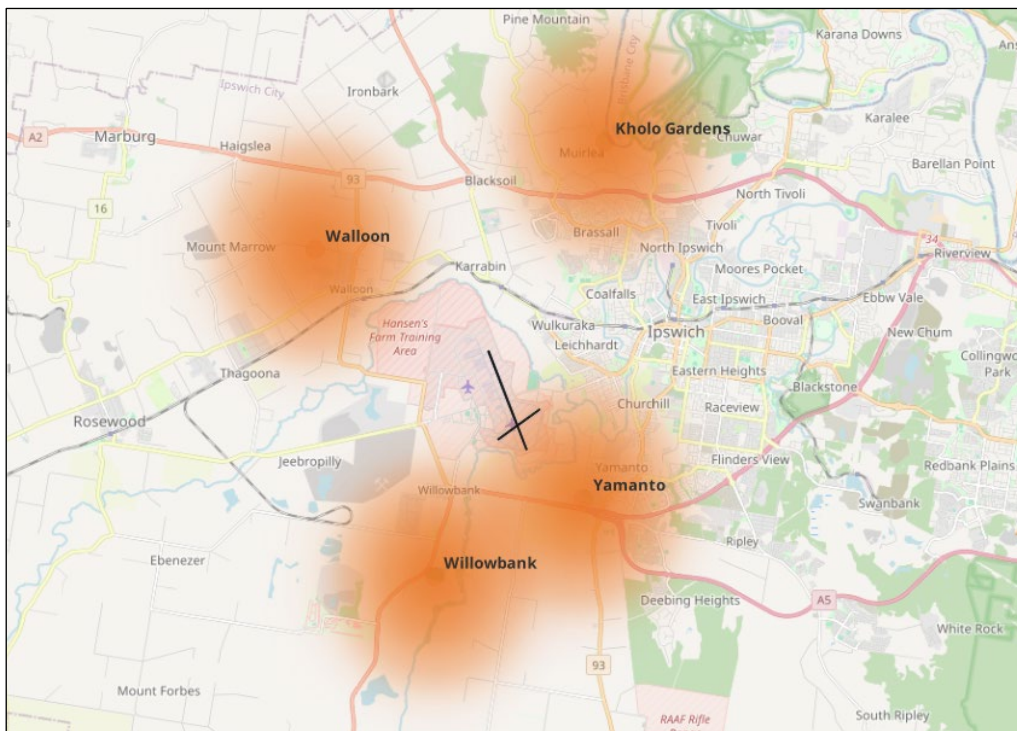
45. In 2024, there were six movements identified operating outside the planned flying period, 7:00 am to 11:00 pm. There were no circuits flown after 10:00 pm in 2024.
46. The Noise Management Plan states that Australian Super Hornet night flying (activity between 7:00 pm and 7:00 am), when scheduled, will typically occur on Monday to Thursday night. In 2024, all night flying activities occurred on Monday to Thursday evenings.
47. Movements after 7:00 pm were 5.7% compared to the 20% forecast.

### **EVALUATION OF AUSTRALIAN SUPER HORNET NOISE LEVELS**

48. Noise Contour Maps were produced to show geographical boundaries for the specified numbers of movements per average flying day, that are expected to exceed a nominated noise threshold in dB(A). The number above metric represents these impacts, though predicting the number of times aircraft noise (all platforms) may reach a nominated decibel level on an average flying day. Maps for N70, N85 and N100 are in Annex E through Annex G.

### **NOISE MONITORING TERMINAL LOCATIONS**

49. The NFPMS consists of Noise Monitoring Terminals (NMT) located strategically around RAAF Base Amberley, refer Figure Four.
50. The NMTs record noise data continuously, 24 hours per day, measuring aircraft and ambient noise levels. The noise data presented in this report is that of actual, measured data collected at the NMTs.
51. In 2024, NMTs were located at Willowbank, Kholo Botanical Gardens and Walloon. A fourth NMT was sited at Yamanto until October 2023, when it was removed due to the redevelopment of the site. The NMT was relocated to a new site in Yamanto in July 2024.



**Figure Four: Noise Monitoring Terminal Locations**

### N70 AND N85 NOISE EVENTS

52. N70 and N85 noise event data per forecast flying day<sup>1</sup> for the four NMTS from 2019 to 2024 is shown in Table Three.

53. Note one: the noise monitor at Yamanto ceased monitoring operations in October 2023, and was relocated to a new site in July 2024, therefore reducing the sample size of recorded noise events in 2023 and 2024.

**Table Three: N70 and N85 Noise Event Data from 2019 to 2024**

| <b>N70</b>          | <b>Estimated events per day</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> | <b>2023</b> | <b>2024</b> |
|---------------------|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Willowbank Cemetery | 15 to less than 20              | 10.9        | 10.5        | 12.6        | 12.5        | 5.5         | 4.2         |
| Kholo Gardens       | 5 to less than 10               | 0.6         | 0.2         | 0.2         | 0.5         | 1.6         | 0.0         |
| Walloon             | 15 to less than 20              | 3.9         | 3.9         | 4.4         | 5.1         | 5.8         | 0.6         |
| Yamanto             | 15 to less than 20              | 15.6        | 18.1        | 20.1        | 19.7        | 11.1        | 4.2         |
| <b>N85</b>          | <b>Estimated events per day</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> | <b>2023</b> | <b>2024</b> |
| Willowbank Cemetery | less than 5                     | 1.6         | 1.6         | 1.7         | 2.1         | 1.5         | 1.5         |
| Kholo Gardens       | less than 5                     | 0.0         | 0.0         | 0.0         | 0.01        | 0.0         | 0.0         |
| Walloon             | less than 5                     | 0.4         | 0.3         | 0.4         | 0.3         | 0.5         | 0.3         |
| Yamanto             | 10 to less than 15              | 5.7         | 6.3         | 7.6         | 8.0         | 5.6         | 2.9         |

54. Table Three demonstrates that the 2024 N70 and N85 event numbers are below that forecast.

### N100 NOISE EVENTS

55. The 2009 PER forecast on average less than five events exceeding 100 dB(A) per flying day at each noise terminal. The N100 noise event data per flying day is shown in Table Four.

**Table Four: N100 Noise Event Data from 2019 to 2024**

| <b>N100</b>         | <b>Estimated events per day</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> | <b>2023</b> | <b>2024</b> |
|---------------------|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Willowbank Cemetery | less than 5                     | 0.00        | 0.00        | 0.01        | 0.00        | 0.02        | 0.01        |
| Kholo Gardens       | less than 5                     | nil         | nil         | nil         | nil         | nil         | nil         |
| Walloon             | less than 5                     | 0.00        | 0.01        | 0.01        | 0.00        | 0.01        | nil         |
| Yamanto             | less than 5                     | 0.02        | 0.07        | 0.03        | 0.04        | 0.05        | 0.03        |

56. Table Four shows actual daily N100 noise events at the noise terminals to be well below the estimate of 'less than 5' events per day.

57. A review of the LAmx charts in the PER show that some terminals are relatively close to the 100 dB(A) contour and therefore noise events at a level 100 dB(A) or higher may occur, and typically under conditions favourable for noise propagation.

<sup>1</sup> Total annual noise events divided by 230 flying days (46 weeks at 5 days a week)

58. The total number of events in 2024 at a noise level 100 dB(A) or higher is shown in Table Five. The data shows that there were very few noise events exceeding 100 dB(A) in 2023.

**Table Five: N100 Noise Event Data per year from 2019 to 2024**

| N100 annual         | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---------------------|------|------|------|------|------|------|
| Willowbank Cemetery | 1    | 1    | 2    | 1    | 5    | 2    |
| Kholo Gardens       | 0    | 0    | 0    | 0    | 0    | 0    |
| Walloon PS          | 1    | 2    | 2    | 1    | 2    | 0    |
| Yamanto COC         | 5    | 15   | 7    | 9    | 11   | 8    |

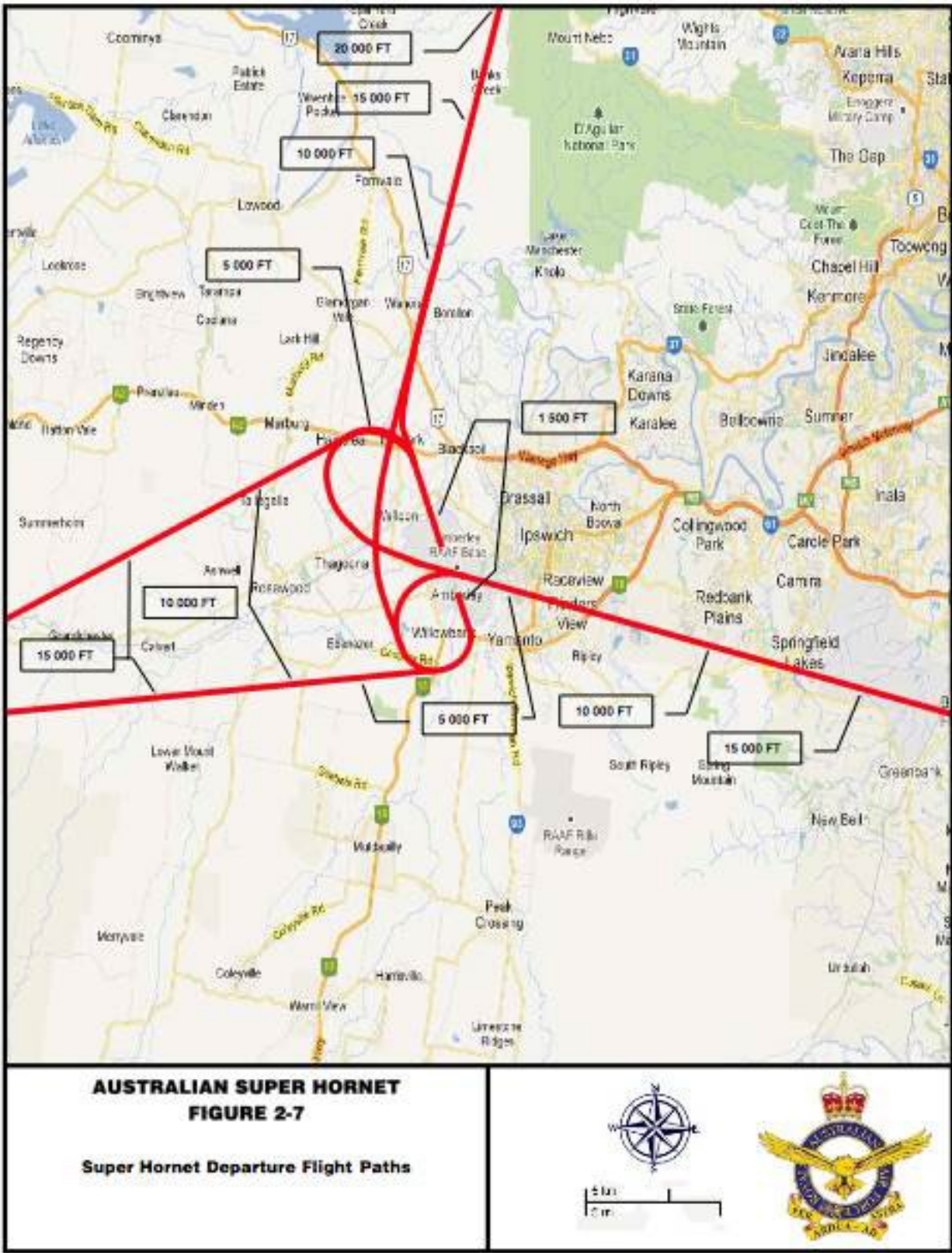
## CONCLUSION

59. The 2024 Australian Super Hornet Annual Noise Report evaluated the impacts of Australian Super Hornet noise against the Australian Super Hornet Noise Management Plan and noise exposure modelling undertaken as part of the 2009 Public Environment Report process.

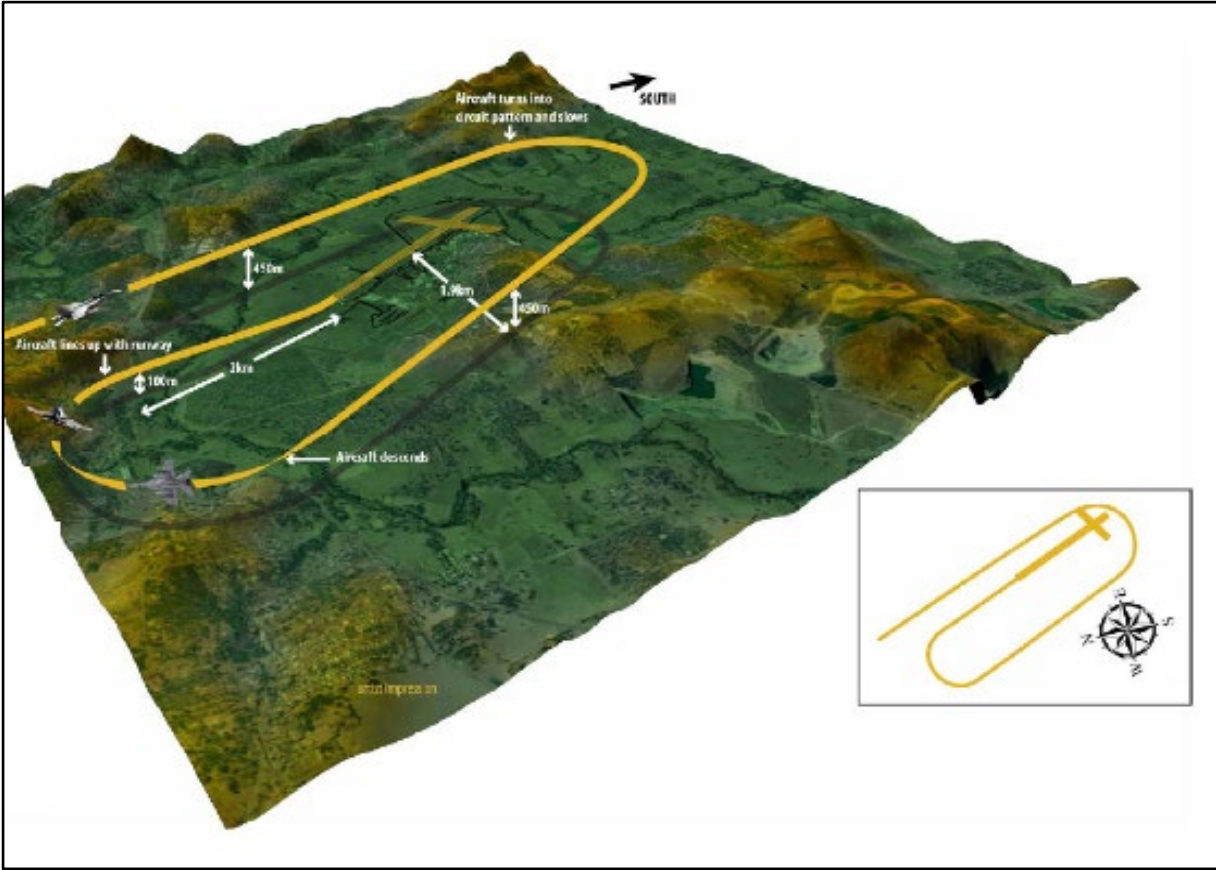
60. Data was drawn from the NFPMS installed at RAAF Base Amberley. Changes in data availability to the NFPMS has limited its ability to record flight paths, and impacted on the ability to publically display Australian Super Hornet flight paths.

61. The report identifies that planned periods of respite from flying operations were achieved, with no flying over the New Year period and reduced flying over the Mid-Year period. The annual movement numbers in 2024 were below the requirements of the Australian Super Hornet Noise Management Plan.

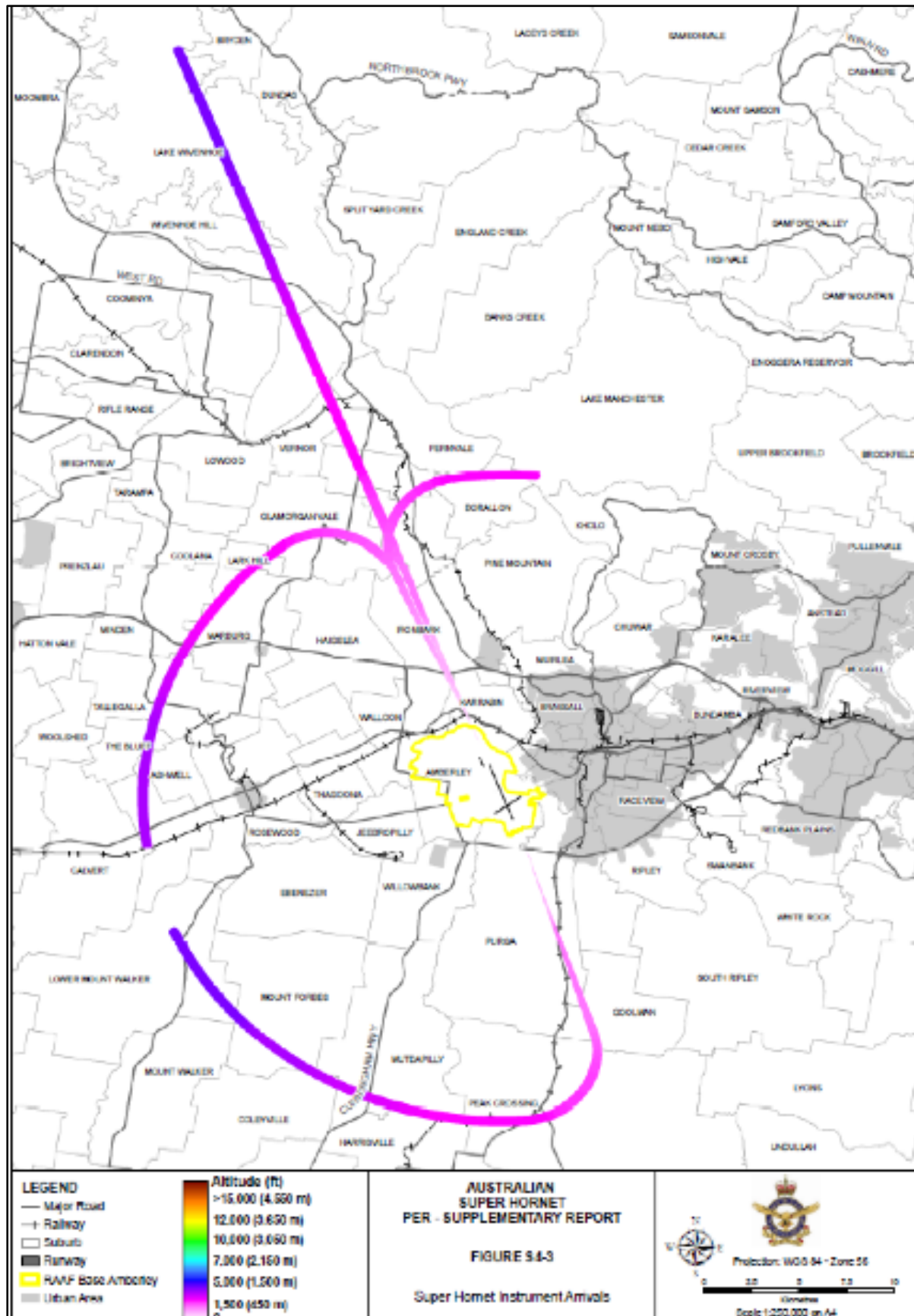
ANNEX A – AUSTRALIAN SUPER HORNET DEPARTURE FLIGHT PATHS



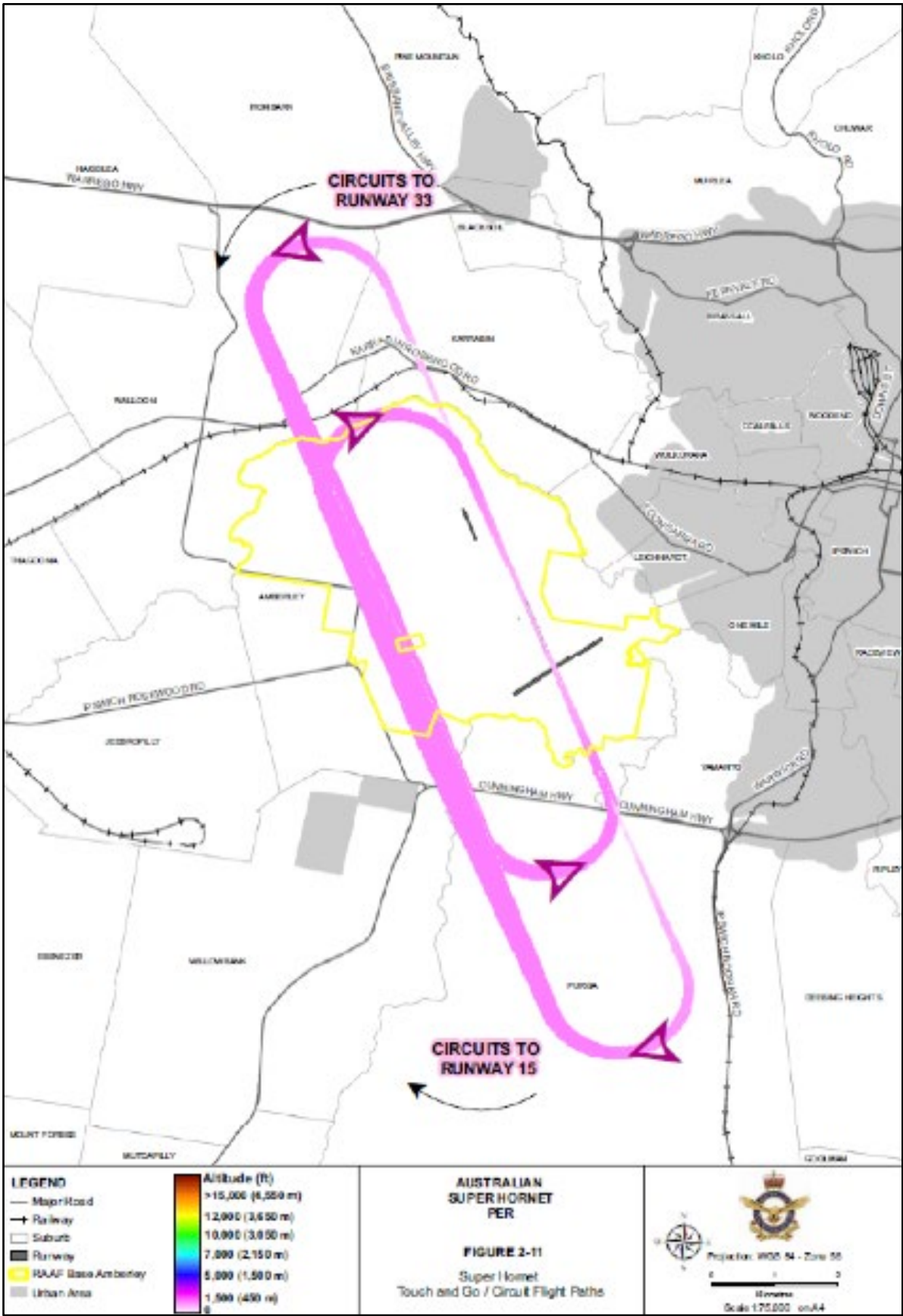
ANNEX B – AUSTRALIAN SUPER HORNET INITIAL AND PITCH ARRIVAL FLIGHT PATHS



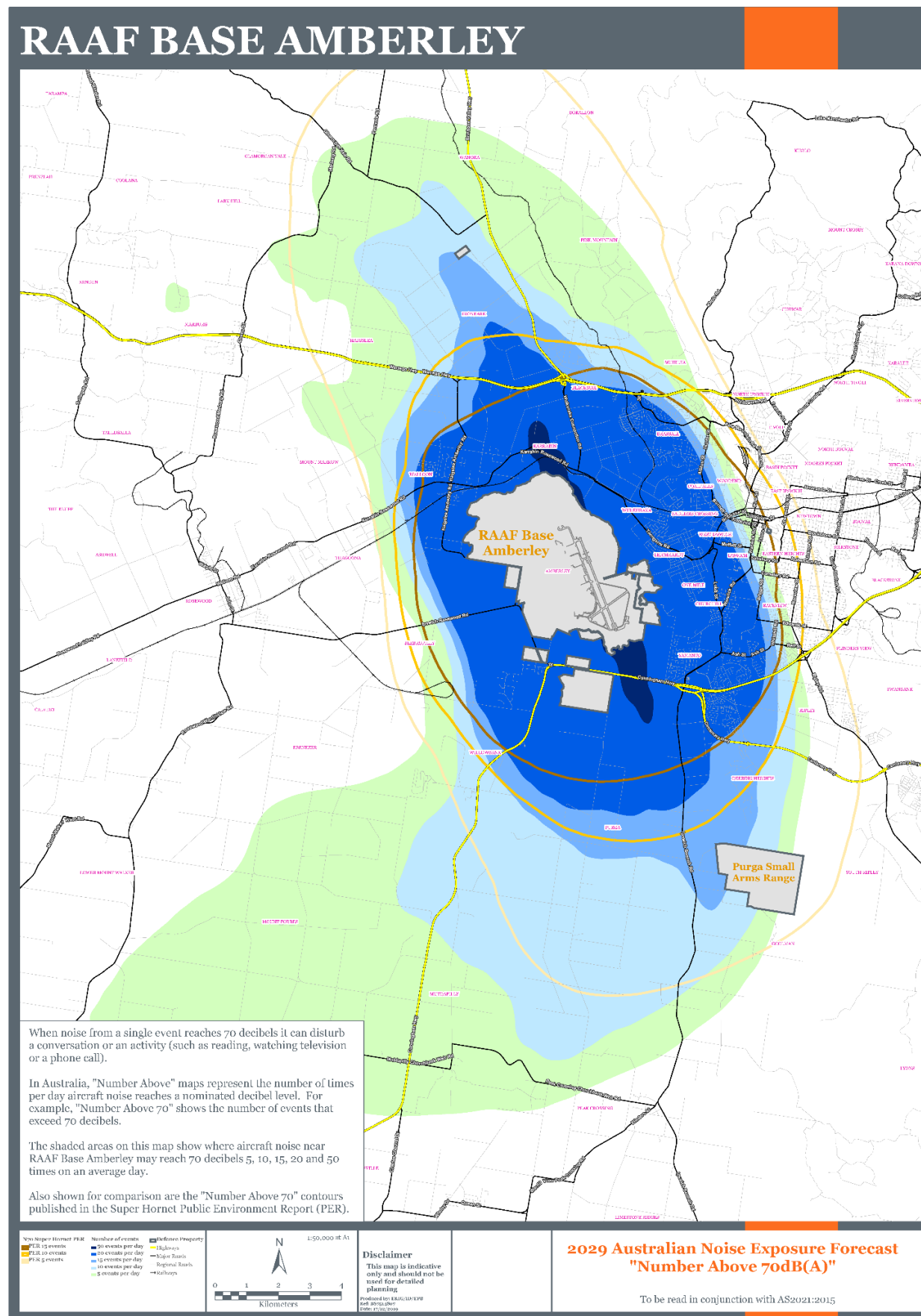
## ANNEX C – AUSTRALIAN SUPER HORNET INSTRUMENT ARRIVAL FLIGHT PATHS



ANNEX D – AUSTRALIAN SUPER HORNET CIRCUIT PATTERN



ANNEX E - NUMBER ABOVE 70 dB(A) MAP, RAAF BASE AMBERLEY, 2029 ANEF





ANNEX G - NUMBER ABOVE 100 dB(A) MAP, RAAF BASE AMBERLEY, 2029 ANEF

