Aircraft Noise

13

13.1 Introduction

The *Airports Act 1996* requires the Parafield Airport Master Plan 2024 to specify the following noise related matters:

- An Australian Noise Exposure Forecast (ANEF)
- Flight paths for the airport
- Parafield Airport's plans, developed following consultation with the operators that use the airport and relevant local government authorities, for managing aircraft noise in areas forecast to be subject to exposure above significant ANEF levels.

Aircraft noise is an unavoidable impact of aircraft operations.

Additional information is provided to ensure stakeholders are informed about aircraft noise management.

13.2 Overview

- Parafield Airport has a 'Fly Friendly' program that is voluntarily entered into by aircraft operators to manage aircraft noise exposure around the airport
- A new Australian Noise Exposure Forecast, which informs land use planning in the vicinity of the airport, has been technically endorsed by Airservices Australia
- Parafield Airport Limited (PAL) has a broad range of programs in place to manage aircraft noise exposure around the airport. These include:
- Working with Airservices, the air traffic navigation service provider, to implement aircraft noise management activities
- Working with aircraft operators to observe the 'Fly Friendly' program
- Noise abatement procedures
- Management of engine ground running activities
- Consulting and engaging with the local community
- Working closely with Commonwealth, South Australian and local governments
- Consulting with and educating aircraft operators who use the airport
- Investing in airport infrastructure to support new-generation quieter aircraft, such as electric and hybrid aircraft.

13.3
Aircraft Noise Management

13.3.1 Roles and Responsibilities

Roles and responsibilities regarding aircraft noise management are shared across a range of organisations, as shown in Table 13-1.

ORGANISATION	RESPONSIBILITY
Aircraft Operators	Aircraft operators purchase particular types of aircraft which are suitable for the type of operations they wish to fly or are currently flying.
Aircraft Noise Ombudsman	The Aircraft Noise Ombudsman oversees the handling of aircraft-noise enquiries and complaints by Airservices Australia and the Commonwealth Department of Defence.
Airservices Australia	Airservices Australia manages the airspace around Australia to maintain control over the movement of aircraft into, and out of, airports in Australia. Airservices also designs and manages the flight paths and manages aircraft noise complaints and enquiries through its Noise Complaints and Information Service (NCIS).
Civil Aviation Safety Authority (CASA)	CASA is responsible for regulation and ensuring safe operation of civil aviation in Australia. CASA is responsible for approving the use of new aircraft types in Australia.
International Civil Aviation Organization (ICAO)	ICAO is responsible for setting noise standards for manufacturers of new aircraft and developing policy on aircraft noise management.
Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA)	The DITRDCA develops and enforces the policy and regulatory framework for airports and the aviation industry and administers the *Airports Act 1996*.
South Australian Government	The State Government is responsible for developing land-use planning frameworks, implemented by local governments, to protect the airport from inappropriate (noise-sensitive) developments in the vicinity of the airport.
Local Government	Local government authorities are responsible for the consideration and approval of developments in proximity to the airport, including residential dwellings.
Parafield Airport Limited (PAL)	PAL is responsible for providing and maintaining aviation infrastructure at a high standard for aircraft movements and operations at the airport. PAL does not control aircraft noise. However, through direct engagement and through the Parafield Airport Consultative Committee and the Technical Working Group sub-committee, it implements aircraft noise management activities. PAL actively manages ground-based noise at the airport.
Parafield Airport Technical Working Group	The Parafield Technical Working Group sub-committee discusses aircraft-noise management and improvement opportunities.

Table 13-1: Responsibilities for Aircraft Noise Management

13.3.2 Aircraft Noise Mitigation

There is a broad range of programs in place to manage aircraft noise at Parafield Airport. These include:

- The Fly Friendly program
- Noise abatement procedures
- Consulting and engaging with the local community
- Working with the Commonwealth, South Australian and local governments to ensure a consistent approach, management and implementation of noise-mitigation measures
- Consulting with and educating aircraft operators that use the airport
- Investing in airport infrastructure to support efficient operations and new technology
- Supporting quieter aircraft technology.

13.3.2.1 Fly Friendly Program

PAL encourages all aircraft operators to adopt the Fly Friendly program. This program is voluntarily entered into by aircraft operators in order to manage aircraft noise exposure around the airport.

The Fly Friendly program is upheld by all flight training providers where possible. PAL ensures that any new flight training provider is briefed on the Fly Friendly program, and makes regular contact with all flight training providers to remind them of the program requirements.

The Fly Friendly program is periodically reviewed by the Parafield Airport Technical Working Group (see Section 5.4.2).

The current Fly Friendly program operating procedures are:

When safe to do so and/or under direction of Air Traffic Control, aircraft operators are to:

- **Climb to operating heights as soon as possible**
- **Maintain operating height**
- **Reduce engine power as soon as possible**
- **Follow the promulgated flight paths**
- **Avoid residential areas if and where practicable**
- **Do not fly wide circuits – keep as narrow as possible**
- **Use low-powered descent approaches from the training area to reduce noise.**

The latest version of the Fly Friendly program is available from the Parafield Airport website, parafieldairport.com.au.

13.3.2.2 Noise Abatement Procedures

To reduce the impacts of aircraft noise on the community, noise abatement procedures are implemented at many airports around Australia, including Parafield Airport. The use of noise abatement procedures, which include preferred runway use and preferred flight paths, are applied by Airservices Air Traffic Control subject to weather conditions and aircraft requirements. (Adelaide's seasonal wind patterns primarily influence the use of runways as aircraft take-off and land into wind for safety and performance reasons).

The noise abatement procedures for Parafield Airport set out the preferred runway use during specific period of the day.

Circuit training, which is repetitive touch down and take-off operations, is a vital part of the pilot training. Circuit training operations are currently permitted as outlined in Table 13-2.

DAY	TIME
Monday to Friday	7.00 am to 11.00 pm. It has been agreed that circuit training will, where possible, cease by 10.00 pm on weekdays, subject to operational requirements.
Saturday	7.00 am to 9.00 pm
Sunday	8.30 am to 9.00 pm (implemented mid-2011, previously 8.00 am)
Christmas Day	No circuit training
New Year's Day	No circuit training (implemented mid-2011)
Anzac Day	No circuit training before 9.00 am (implemented April 2013)
Remembrance Day	Avoid operations where possible over the Salisbury RSL between 10.55 am to 11.05 am (implemented August 2016)

Table 13-2: Permitted Circuit Operations Hours (January 2023)

The Parafield Airport Air Traffic Control tower is generally operational from 7.00 am to 7.00 pm Monday to Friday and 8.00 am to 6.00 pm Saturday and Sunday. Outside of Air Traffic Control tower operating hours, the preferred runway is 03L/21R (oriented north to south), depending on the prevailing wind conditions.

For circuit operations outside of daylight hours, circuits from runway 03L/21R are conducted to the west of the airport (left-hand circuits from runway 03L and right-hand circuits from runway 21R).

Parafield Airport's noise abatement procedures are published by Airservices and can be found in the En Route Supplement Australia pilot guide, available at airservicesaustralia.com/aip. Airservices conducts regular reviews to check the effectiveness of noise abatement procedures and to consider improvements.

13.3.2.3 Consultation with Local Communities

PAL continues to engage with local communities surrounding the airport through a range of committee and forums.

The Parafield Airport Consultative Committee, which includes local community representatives, is a forum where issues relating to the operations of the airport and potential effects on the local community can be raised. This includes topics such as aircraft ground-based noise, aviation developments and operational updates. Master planning (including the review of the ANEF) and aircraft flight path improvements or changes are also discussed, including presentations from local operators and Airservices.

Airservices has developed online systems to provide information to the community about nearby aircraft operations. WebTrak, available at airservicesaustralia.com/webtrak, provides information about individual flights for the past three months and allows users to submit aircraft noise enquiries and complaints. Aircraft operations for Parafield Airport can be viewed through the Adelaide area portal (noting that some operations for Parafield may not be displayed on WebTrak due to the technology on board the particular aircraft or the nature of the flight).

Aircraft in Your Neighbourhood, available at aircraftnoise.airservicesaustralia.com, provides information about runway use and flight paths for Parafield Airport specific to a person's selected location, including frequency of flights by hour of day and aircraft altitude.

13.3.2.4 Consultation with Commonwealth, State and Local governments

Representatives of the Commonwealth, South Australian and local governments participate in the Parafield Airport Consultative Committee and the Adelaide and Parafield Airport Planning Coordination Forum.

These regular meetings consider off-airport land-use planning including land use development suitability, aircraft noise and airspace protection.

In 2021, South Australia completed its modernisation of the state's planning system and implemented a single, comprehensive planning scheme, called the Planning and Design Code. The introduction of the Aircraft Noise Exposure Overlay within the Planning and Design Code, and corresponding spatial representation of the ANEF, has resulted in the implementation of policy which specifically addresses development of noise sensitive developments on land surrounding Parafield Airport that is subject to the 30 ANEF contour and greater.

13.3.2.5 Consultation with Aircraft Operators and Airservices Australia

PAL conducts regular consultative meetings with aircraft operators and Airservices to review the operation and efficiency of the airport and airfield infrastructure and discuss opportunities for aircraft noise improvements. Aircraft operators, including flying schools, are represented on the Parafield Airport Consultative Committee and the Parafield Airport Technical Working Group. Airservices participates in consultative meetings and reports on aircraft noise complaint trends and any investigations associated with the complaints.

13.3.2.6 Investing in Airport Infrastructure

PAL has a clear vision to develop Parafield Airport as an aviation training centre of excellence and a vibrant economic hub, recognised for its positive influence on the community and economy. As a major component of Australia's aviation training infrastructure, PAL has continued to develop aviation facilities that support efficient operations.

PAL has implemented an Engine Ground Running Procedure and guideline for the ground running (testing) of aircraft engines. Further information of the management of ground-based noise is provided in Section 14.

13.3.2.7 Supporting Quieter Aircraft Technology

Technological advancements in aircraft technology have reduced aircraft fuel consumption, air pollution, and noise emissions significantly over the past 30 years and is expected to continue into the future. Technology is also expected to evolve to change how pilot training is conducted.

Changes in the next 20 years could include the use of sustainable biofuel, electric-powered aircraft, the introduction of air taxis and growth in aircraft drones.

The aircraft industry has been designing and building quieter aircraft that now operate in Australia. This reduces aircraft noise exposure for residents under flight paths. PAL will continue to consult with the aircraft industry and operators with a mutual goal to encourage the uptake of quieter aircraft technology. The use of electric aircraft at Parafield Airport is discussed in Section 6.5.4.

13.4 Understanding Aircraft Noise

Under the Airports Act, PAL is not responsible for the noise generated from aircraft while landing, taking-off or taxiing. However, PAL does recognise the need for the airport to assist in managing aircraft noise for the surrounding communities by working closely with the aircraft operators (the generators of the noise) and Airservices (the airspace manager). The most effective means for reducing the impact of aircraft noise is through the effective long-term planning of land use for areas adjacent to the airport site. Other means include a combination of land use with alternative runway allocations and/or adopted flight path procedures, restrictions of aircraft movements by aircraft type, and the implementation of aircraft operational procedures aimed at achieving desired noise-abatement objectives.

The current trend in renewing aircraft fleets also has the advantage that newer aircraft types are generally quieter than existing or older aircraft. The Airports Act requires a Master Plan to include forecasts of noise levels resulting from the operation of the airport. The Commonwealth government has specified the use of the Aviation Environmental Design Tool software which produces the Australian Noise Exposure Forecast (ANEF) for an airport. The ANEF is applied by state and local government authorities to determine the suitability of land-use and proposed developments around an airport.

To inform the community of current and future noise exposure, Number-Above contours are prepared to identify the frequency of aircraft noise events above specified decibel thresholds.

13.4.1 Describing Aircraft Noise

Aircraft noise is generated both by the aircraft's engines and by air passing over its airframe. Different models and sizes of aircraft produce different types and loudness of noise. These characteristics depend on the type of engine (propeller or jet), aerodynamic noise (affected by how modern the aerodynamic design is) and how the aircraft is flying (its speed and weight characteristics; how it takes off and lands).

Aircraft noise is different to other forms of noise in that it occurs sporadically and from an elevated source. Other forms of noise such as background urban transport noise occur more frequently, with morning and evening peaks and at ground level.

Although aircraft noise is sporadic, it can occur at regular or frequent intervals, depending on the type of aircraft operations.

13.5 The Australian Noise Exposure Forecast (ANEF) System

The noise from aircraft increases closer to airports when aircraft descend prior to landing. At low levels, aircraft noise can be very loud but only for a short period of time. This makes traditional methods of measuring and reporting aircraft noise (such as average sound levels) unsuitable.

To address this, aircraft noise is measured and analysed in terms of frequency of occurrence, peak noise levels during an overflight, loudness levels, and duration of the noise event. These characteristics are integrated over longer periods of time to describe the aircraft noise exposure at locations around airports.

13.4.2 Noise Plots

The Commonwealth government has adopted a system for modelling current and forecast aircraft noise exposure around airports.

There are a range of different types of plots that display noise exposure, including:

- **ANEI (Australian Noise Exposure Index)**

An ANEI is a plot of defined noise exposure based on the *actual* historical operations of the airport and uses an analysis of actual aircraft types and movements over a 12-month period (usually a calendar year). An ANEI is primarily used to establish a base case from which an ANEF can be developed.

- **ANEF (Australian Noise Exposure Forecast)**

An ANEF is a plot of estimated noise exposure based on a *forecast* of aircraft movements and fleet mix for a defined future horizon. The ANEF provides an indication of the change in noise exposure over time and is used to inform land-use planning in areas surrounding the airport. An ANEF is required to be endorsed by Airservices for technical accuracy. An airport can only have one endorsed ANEF at any one time.

- **Number-Above contours**

Number-Above modelling is a frequency-based metric that provides maps of areas that are likely to experience a predicted number of average daily noise events above a specified decibel level from aircraft flying overhead.

The ANEF system is the aircraft noise exposure forecasting system currently adopted in Australia. The aircraft Noise Exposure Forecast (NEF) modelling was developed in the United States of America in the late 1960s and recognised internationally. It was modified in Australia to the ANEF in 1982.

The ANEF system provides a scientific measure of noise exposure from aircraft operations around airports. It provides guidance for land-use planning near the airport. Table 13-3 shows the land-use compatibility as recommended by Australian Standard AS2021:2015 (Acoustics – Aircraft noise intrusion – Building, siting and construction) in relation to the specific ANEF contours.

The ANEF computation is based on forecasts of traffic movements on an average day. Allocations of the forecast movements to runways and flight paths are on an average basis over a year and take into account the existing and forecast Air Traffic Control procedures at the airport because they nominate preferred runways and preferred flight paths for noise-abatement purposes.

The following factors are considered in calculating the ANEF:

- The intensity, duration, tonal content and spectrum of audible frequencies of the noise of aircraft take-offs and landings (the noise generated on the airport from ground running of aircraft engines or taxiing movements is not included for practical reasons)
- The forecast frequency of aircraft types and movements on the various flight paths
- The average daily distribution of aircraft take-offs and landing movements in both daytime (7.00am to 7.00pm) and night-time (7.00pm to 7.00am) hours
- The topography of the area surrounding the airport.

BUILDING TYPE	ACCEPTABLE	CONDITIONALLY ACCEPTABLE	UNACCEPTABLE
House, home unit, flat Caravan Park	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hotel. motet. hostel	Less than 25 ANEF	25-30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF (Note 1)	20-25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF (Note 1)	20-30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25-35 ANEF	Greater than 35 ANEF
Light Industrial	Less than 30 ANEF	30-40 ANEF	Greater than 40 ANEF
Other Industrial	Acceptable In all ANEF zones		

Table 13-3: AS2021 Table of Building Site Acceptability Based on ANEF Zones

Notes:

- (1) The actual location of the 20 ANEF contour is difficult to define accurately, mainly because of variation in aircraft flight paths. Because of this. the procedure of Clause 2.3.2 in AS2021: 2015 may be followed for building sites outside but near to the 20 ANEF contour
- (2) Within 20 ANEF to 25 ANEF, some people may find that the hand is not compatible with residential or educational use. Land- use authorities may consider that the incorporation of noise- control features in the construction of residences or schools is appropriate (see also Figure A1 of Appendix A in AS2021: 2015)
- There will be cases where a building of a particular type will contain spaces used for activities which would generally be found in a different type of building (e.g. an office in an industrial building). In these cases. Table 12-1 should be used to determine site acceptability but internal design noise levels within the specific spaces should be determined by Table 3.3 in AS2021: 2015
- This Standard does not recommend development in unacceptable areas. However, where the relevant planning authority determines that any development may be necessary within existing built-up areas designated as unacceptable, it is recommended that such development should achieve the required aircraft-noise reduction determined according to Clause 3.2 in AS2021: 2015. For residences. schools etc., the effect of aircraft noise on outdoor areas associated with the building should be considered.
- In no case should new development take place in greenfield sites deemed unacceptable because such development may impact airport operations

13.6
Noise Modelling

13.5.1 Calculation of the Australian Noise Exposure Forecast

The ANEF system combines noise level and frequency of operations to calculate the average noise level at any point along, and to the side of, the flight path using the following reasonably simple mathematical procedure.

Partial ANEFs are calculated for the frequency of night-time and day-time operations of each aircraft type and flight path. These calculations use a value of effective perceived noise level (EPNL) for each aircraft and take into account all known annoying aspects in the temporal, frequency spectrum and spatial domains. The EPNL is obtained by the algebraic addition of the maximum perceived noise level at any instant, corrected by noise tonal and duration factors. The EPNL unit is also used for the international certification of new aircraft. These partial ANEFs are computed for each significant type of noise intrusion.

The total ANEF at any point on the ground around the airport is composed of all individual noise exposures (summed logarithmically) produced by each aircraft type operating on each path over the period of a typical 24-hour day. These calculated values do not take account of any background noise levels such as road or rail activities which, particularly in ground transport corridors, could be much higher than aircraft noise.

13.5.2 Noise Threshold Levels

Within the area between the 20 to 25 ANEF contour, levels of noise are generally accepted to emerge as an environmental problem, and within the 25 ANEF contour the noise exposure becomes progressively more severe.

In the area outside the 20 ANEF contour, noise exposure may still be of concern for some individuals. The actual location of the 20 ANEF contour is difficult to accurately define. This is because variations in actual flight paths, operating techniques of pilots, meteorological conditions and topography all have a largely unpredictable effect on the position of the 20 ANEF contour for any given day. Aircraft noise elicits a wide range of individual responses and the reasons for the differences between individuals are largely socially based and complex to quantify. Research has indicated that community response to noise exposure is more predictable than an individual's response.

Modelling of aircraft noise exposure for Master Plan 2024 was carried out using the Aviation Environmental Design Tool (AEDT Version 3c) developed by the United States Federal Aviation Administration (FAA). This internationally recognised, computer-based noise simulation software calculates contours from an analysis of the contribution that defined aircraft and their operations have on the overall noise emissions from the airport. The resulting noise footprint can then be used to assess the relative noise exposure that different aircraft fleets and/or operational procedures have on the surrounding environs. The AEDT contains a database of current civil passenger and military aircraft along with their performance and typical noise characteristics.

13.6.1 Changes in Noise Modelling Software

The previous ANEF for Parafield Airport was modelled using the United States Federal Aviation Administration's (FAA) Integrated Noise Model (INM Version 7.0d). The INM software has since been replaced by the AEDT.

While the underlying calculation of noise exposure in the AEDT remains similar to INM, the AEDT improves the accuracy of noise modelling through updated aircraft performance and noise data, inclusion of helicopter taxiing operations, more precise modelling of lateral attenuation (noise to the side) for aircraft with fuselage mounted engines, and a new method for airport-specific weather data (temperature, atmospheric pressure, relative humidity, and wind) that reflects the best available science. As a result, even with the same inputs the ANEF contours will differ slightly between the INM and AEDT models.

13.6.2 Methodology

Aircraft noise exposure for Parafield Airport was modelled for two scenarios:

- 2022 actual movements (ANEI)
- 2043 forecast (ANEF)

The ANEF year of 2043 was selected as it reflects the 20-year planning horizon of this Master Plan 2024. A 20-year ANEF is also the standard ANEF forecast period. Longer-term future forecasts would have a number of variables that cannot be easily assessed at this stage, such as the future uptake of electric/hybrid aircraft (discussed in Section 6.5.4) and vertical take-off and landing (VTOL) aircraft (discussed in Section 8.5.7).

13.6.3 Flight Movements

The forecast number of flights operating from Parafield Airport in the future is discussed in Section 6. The noise modelling for Parafield Airport is based on the forecast for 2043 of 329,068 fixed wing movements and 13,278 helicopter movements.

13.6.4 Aircraft Mix

The fleet mix of aircraft operating from Parafield Airport twenty years or more into the future cannot be defined exactly. At best, the mix of aircraft using the airport in the future can only be inferred from current fleet mixes and discussions on the intentions of the flying schools, airlines and industry sources regarding future purchases and any expected retirement of aircraft in the 20-year period.

The aircraft fleet mix used for modelling is shown in Table 13-5. This forecast is generally reflective of the current fleet mix. The forecast movements comprise 95.7 per cent propeller aircraft, 0.5 per cent small jet aircraft, and 3.8 per cent helicopters. The predominant aircraft type is the Diamond DA40, which is a four-seat single-engine propeller aircraft that is used extensively for pilot training activities.

13.6.5 Runway Utilisation

Parafield Airport has a total of four runways, comprising two sets of parallel runways. During Air Traffic Control tower operating hours, Airservices air traffic controllers stipulate which runway direction is the operational runway. This is typically determined by the direction of the wind, as aircraft predominantly take off and land into the prevailing wind, but may also be influenced by operational or other requirements such as taxiing distance, destinations, runway availability and maintenance.

Runway direction at Parafield Airport for fixed wing aircraft is shown in Table 13-4. The forecast runway use for the ANEF has been determined through analysis of wind gust speed and direction data for the period 2013 to 2023 and application of Air Traffic Control operating rules and procedures.

RUNWAY DIRECTION	ANEF 2043	2022 ANEI	MASTER PLAN 2017
03	32.8%	32.8%	32.1%
21	54.4%	54.4%	63.0%
08	3.8%	3.8%	0.7%
26	9.0%	9.0%	4.2%

Table 13-4: Parafield Airport runway use comparison

13.6.6 Flight Paths

The Airports Act requires a Master Plan to include the current and future flight paths for an airport.

Aircraft generally fly along flight paths following navigational procedures which have been designed to guide the aircraft between waypoints either away from, or towards, an airport, and circuit paths that provide an orderly flow for take-offs and landings. The flight paths used are determined by the runway, the destination of the flight, and pilot or Air Traffic Control operational requirements.

The flight paths used for the Parafield Airport noise modelling were developed through a detailed analysis of radar flight track data provided by Airservices, which show the actual tracks that aircraft have flown. There is always some variation in the actual tracks flown by aircraft. To account for this variation, flight paths are illustrated as an indication of the spread of flight tracks. The flight path use is concentrated in the centre, where most aircraft are expected to fly.

There have been no changes to published flight paths since Master Plan 2017.

AEDT CODE	COMMON AIRCRAFT TYPES	ANNUAL MOVEMENTS 2043
Small turbo-propeller (non-jet) aircraft		
BE30	Beechcraft King Air 200	53
BEC58P	Beechcraft Baron, Cessna 337	1,625
C441	Cessna 441	11
CNA172	Cessna 172, Cessna 175	34,176
CNA182	Cessna 182	2,739
CNA20T	Cessna 206	1,237
COMSEP	Cirrus SR22	267
DA40	Diamond DA40	240,263
GASEPF	Cessna 152, Piper PA28/28R/PA38, Diamond DA20	15,671
GASEPV	Tobago, Cessna 210, Air Tractor AT-802, Vans RV6/RV7, Beechcraft Bonanza	7,379
PA30	Piper PA-30, Diamond DA42	21,550
PA31	Piper PA31 Chieftain	106
PA42	Cessna 208	143
T42	Beechcraft Baron, Fletcher FU-24	2,170
Small jet aircraft		
LEAR35	Learjet 35 Business Jet	1,500
MU3001	Cessna Citation V560	32
T37B	Marchetti S-211	77
Helicopters		
B206B3	Bell 206	578
B427	Eurocopter EC35, Airbus H135	198
B429	Sikorsky H-60, Kawasaki BK117	114
EC130	Eurocopter AS50/AS55/EC130, Aerospatiale Gazelle	941
R22	Robinson R22	8
R44	Robinson R44	5,754
SC300C	Hughes 269A	5,408
TOTAL		**342,000**

Table 13-5: 2043 forecast movements by aircraft type

13.6.6.1 Arrivals and Departures

Flight paths are three-dimensional corridors designed to separate arriving aircraft from departing aircraft. Flight paths are designed for pilots operating by either visual flight rules (where the pilot is guided by visual references on the ground) or instrument flight rules (where the pilot is guided by on-board and on-ground navigation systems). Aircraft will fly differently within the shown flight paths for a range of reasons, such as aircraft type and speed, pilot skills, and whether the pilot is flying under visual or instrument flight rules.

Parafield Airport has arrival procedures for specific on-board navigation aids and ground-based aids located at the airport. There is a Very High Frequency Omni-directional Range (VOR) procedure that utilises an on-ground short-range radio navigation aid which emits radio signals for pilots to determine their position. Runway 21R has an arrival procedure based on the Non-Directional Beacon (NDB), which is a radio-based aid located at the airport, as well as a Required Navigation Procedure (RNP) that utilises on-board global navigation satellite systems to provide guidance to pilots. The VOR, NDB and RNP procedures are not available to be used for training purposes.

The general location of Parafield Airport's arrival and departure flight paths are provided in Figures 13.1 to 13.9.

13.6.6.2 Circuits

The circuit path is a flight path pattern that ensures the orderly take-off and landing flow of aircraft operations at an airport. Circuit path parameters are based on CASA guidelines which dictate the circuit shape, location and proximity to the runway.

Figures 13.10 to 13.12 show the typical circuit paths for fixed wing aircraft and helicopters operating at Parafield Airport.

Circuit training, which is repetitive touchdown and take-off operations, is an essential part of pilot training in both daylight and night-time hours and is the most common use of the circuit paths at Parafield Airport. As described in Section 13.3.2.2, circuit training is voluntarily restricted to specific hours as part of Parafield Airport's Fly Friendly program. The actual circuits that are flown may vary for many reasons including, but not limited to, the following:

- Aircraft and engine performance characteristics
- Pilot skill and performance
- Differing turning circles and cruise speeds of aircraft (like those of motor vehicles)
- Weather conditions, such as air temperature, atmospheric pressure, and wind direction and strength
- Amount of traffic in the circuit and the need to maintain safe separation
- Training requirement to fly different circuits and landing techniques which involve varying angles of descent
- Instructions from Air Traffic Control, for example altering the flight path to allow for other circuit traffic or traffic departing from or arriving at Parafield Airport.

13.6.6.3 Fixed Wing Circuits

The parallel runways at Parafield Airport enable two circuits to operate at once. When the main runways (03R/21L and 03L/21R, oriented approximately north to south) are in use, aircraft will operate to the east and west of the airport. When the secondary runways (08R/26L and 08L/26R, oriented approximately east to west) are in use, aircraft will operate to the north and south of the airport.

A typical circuit for fixed-wing aircraft involves:

- Take off into the wind and commence climb
- Turn cross wind at 500 feet or more above ground level and continue climb
- Level at 1,000 feet and turn downwind
- Turn base (cross wind) and commence descent
- Turn final and land (touch-and-go or full stop landing).

The actual locations that pilots make their turns are relative to the runway being used and the operating performance of the aircraft, rather than a specific reference point on the ground. As an example, the exact location of an aircraft when it reaches 500 feet for the first turn will vary due to factors such as aircraft type and performance, weather conditions, and pilot technique. The actual circuit path flown is also influenced by Air Traffic Control requirements and other aircraft in the circuit.

13.6.6.4 Helicopter Circuits

Helicopter circuits at Parafield Airport have been developed in liaison between the helicopter flight training school and Airservices Australia, following CASA guidelines. The helicopter circuit paths are designed to be inside of the fixed-wing circuit path and reduce overflight of residential areas as much as practicable. Helicopters continue to climb after take-off until levelling out at 800 feet above ground level. Current procedures permit a maximum of three helicopters to operate in the circuit path at the same time.

13.6.6.5 Night Circuits

Night flying is an essential component required to achieve pilot qualifications. Circuits can only be conducted at night from runway 03L/21R as this is the only runway with lighting at Parafield Airport. This means night circuits will only be flown to the west of the airport in the typical circuit pattern.

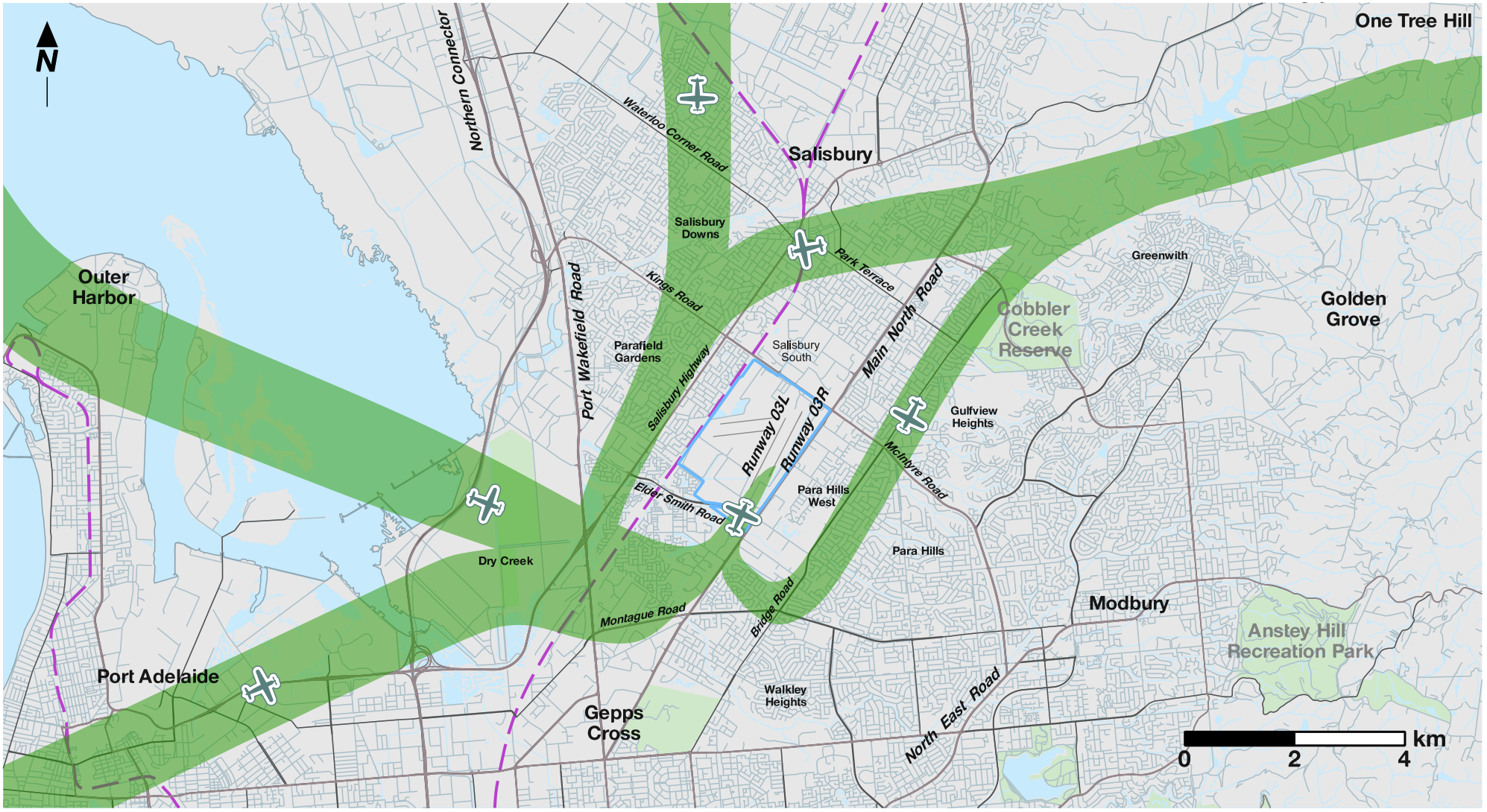


Figure 13.1: Arrival flight paths for Parafield Airport – runway direction 03

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

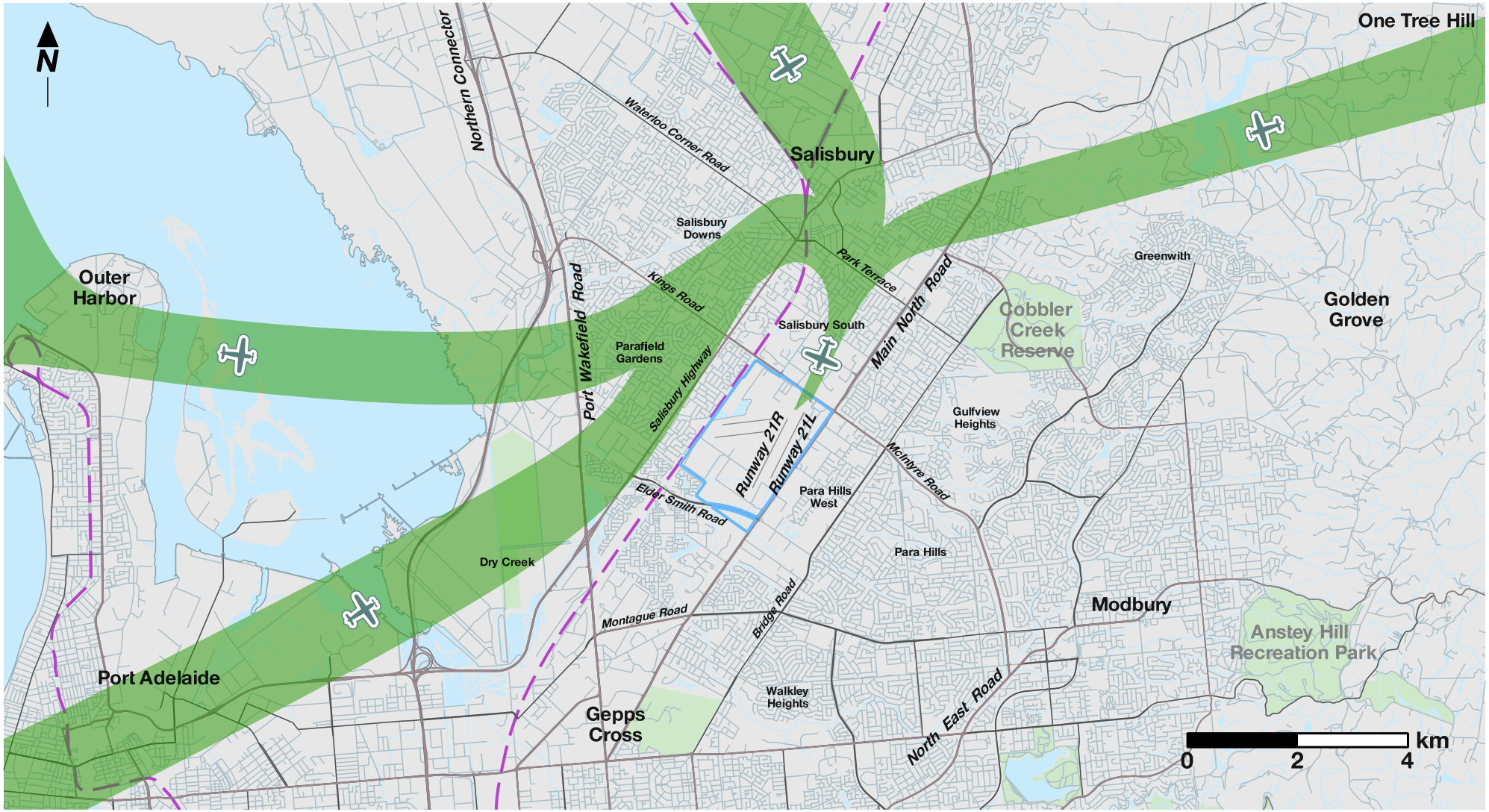
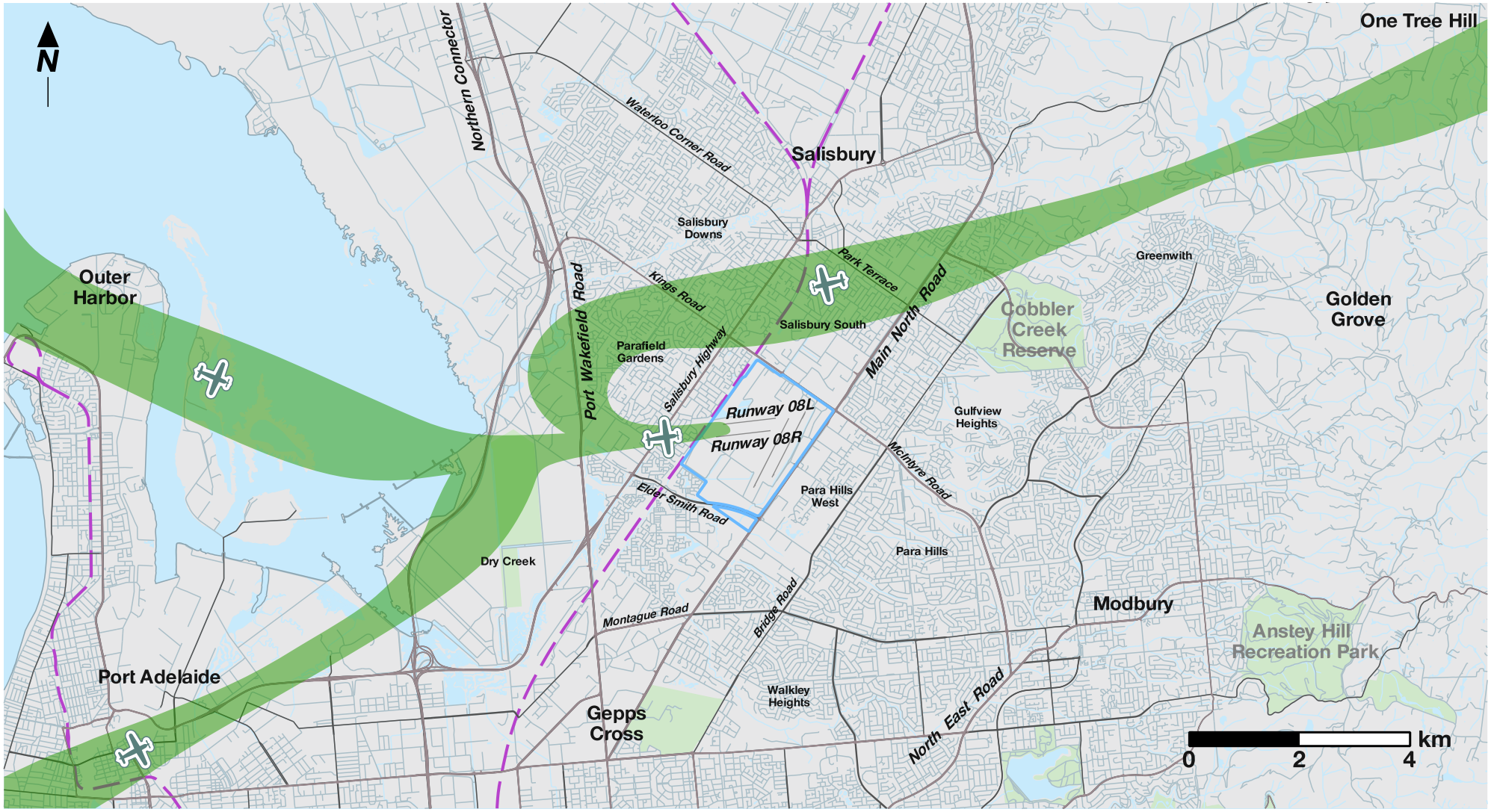


Figure 13.2: Arrival flight paths for Parafield Airport – runway direction 21

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.



LEGEND

- Railway
- Airport Boundary
- Major Transport Routes
- Drainage/Water Body
- Parks, Forests and Reserves
- Flight Direction - Arrival
- Flight Path - Arrival

Figure 13.3: Arrival flight paths for Parafield Airport – runway direction 08

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

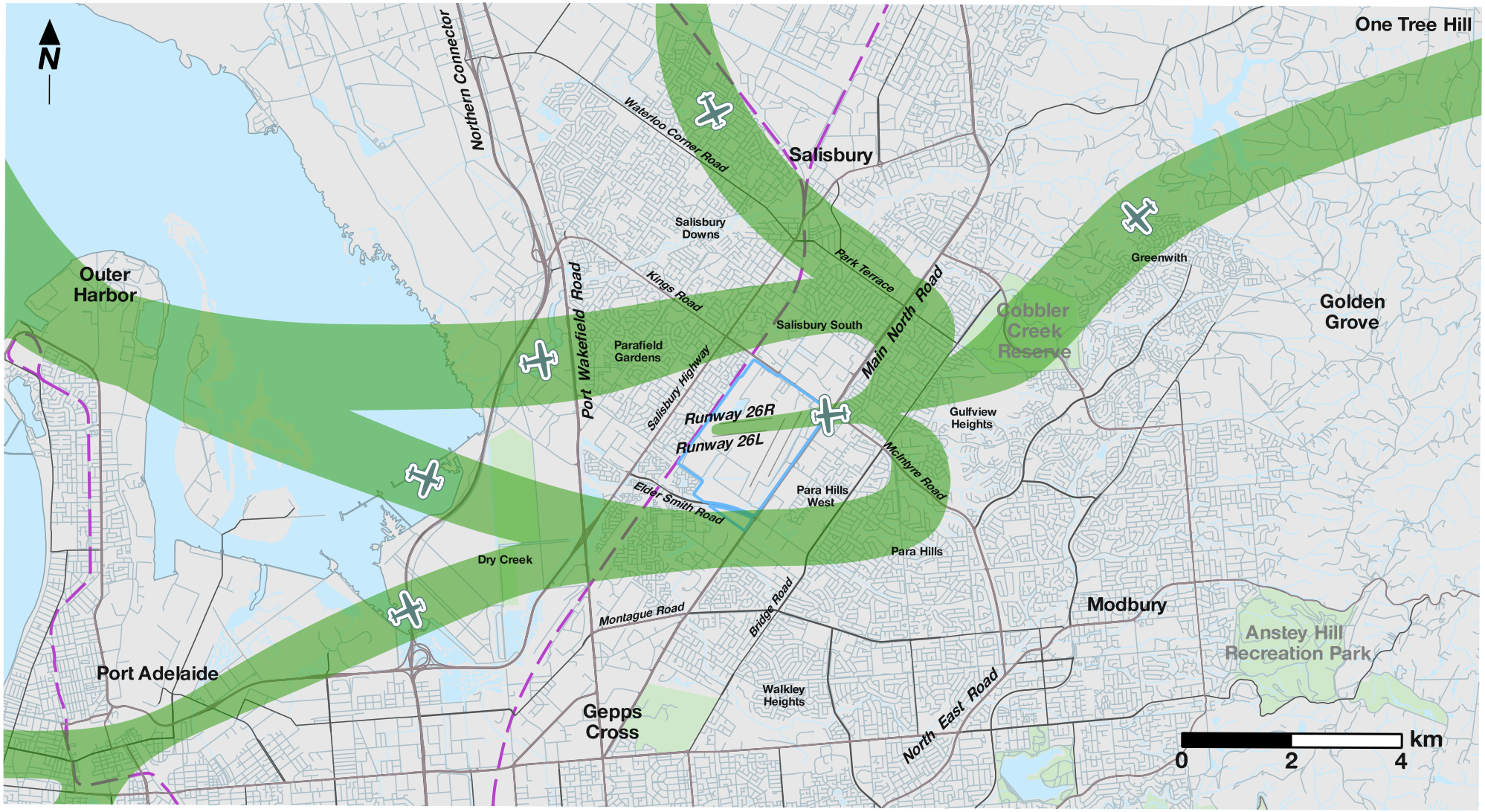


Figure 13.4: Arrival flight paths for Parafield Airport – runway direction 26

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

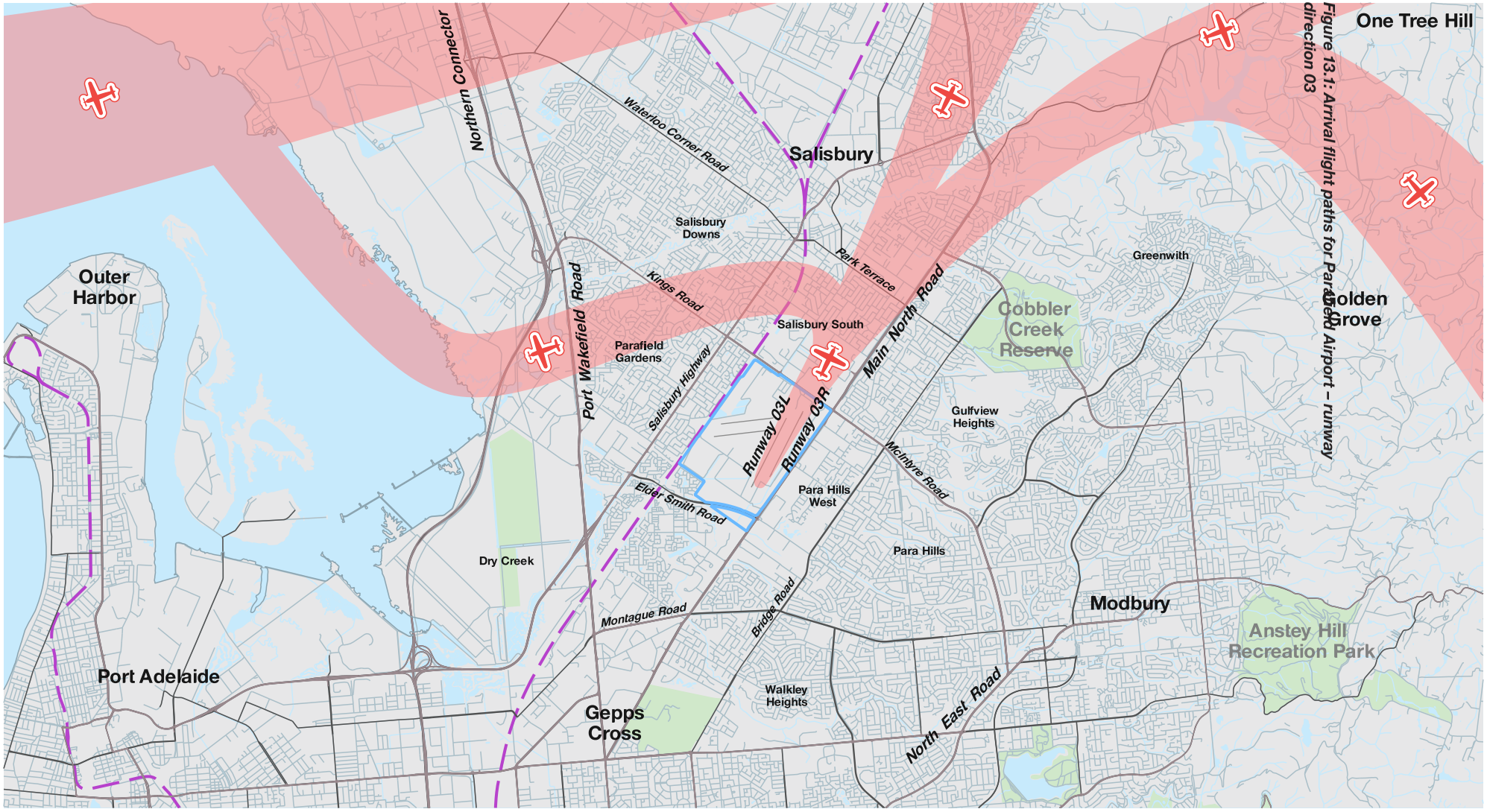


Figure 13.5: Departure flight paths for Parafield Airport – runway direction 03

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

Figure 13.1: Arrival flight paths for Parafield Airport – runway direction 03

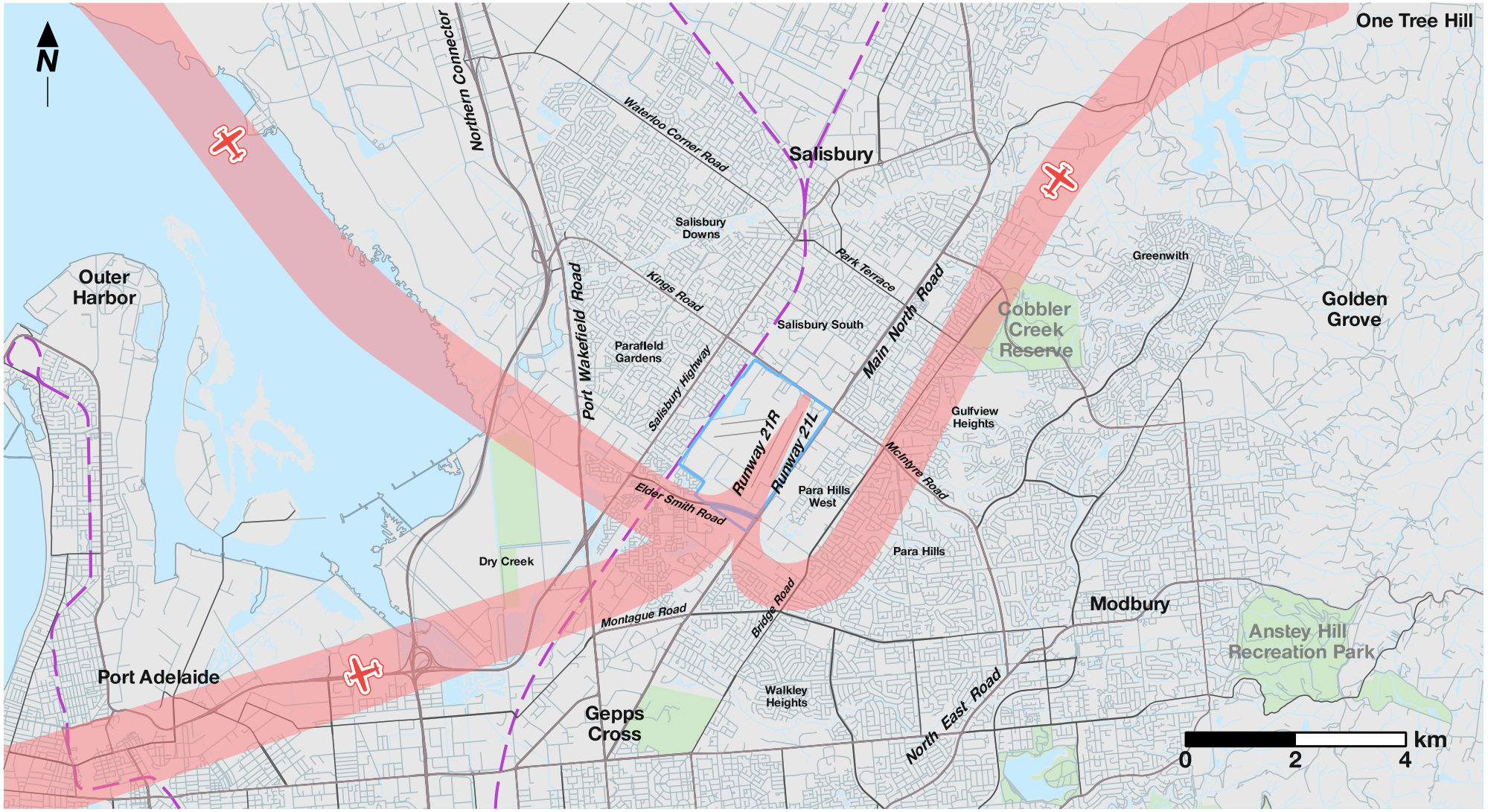
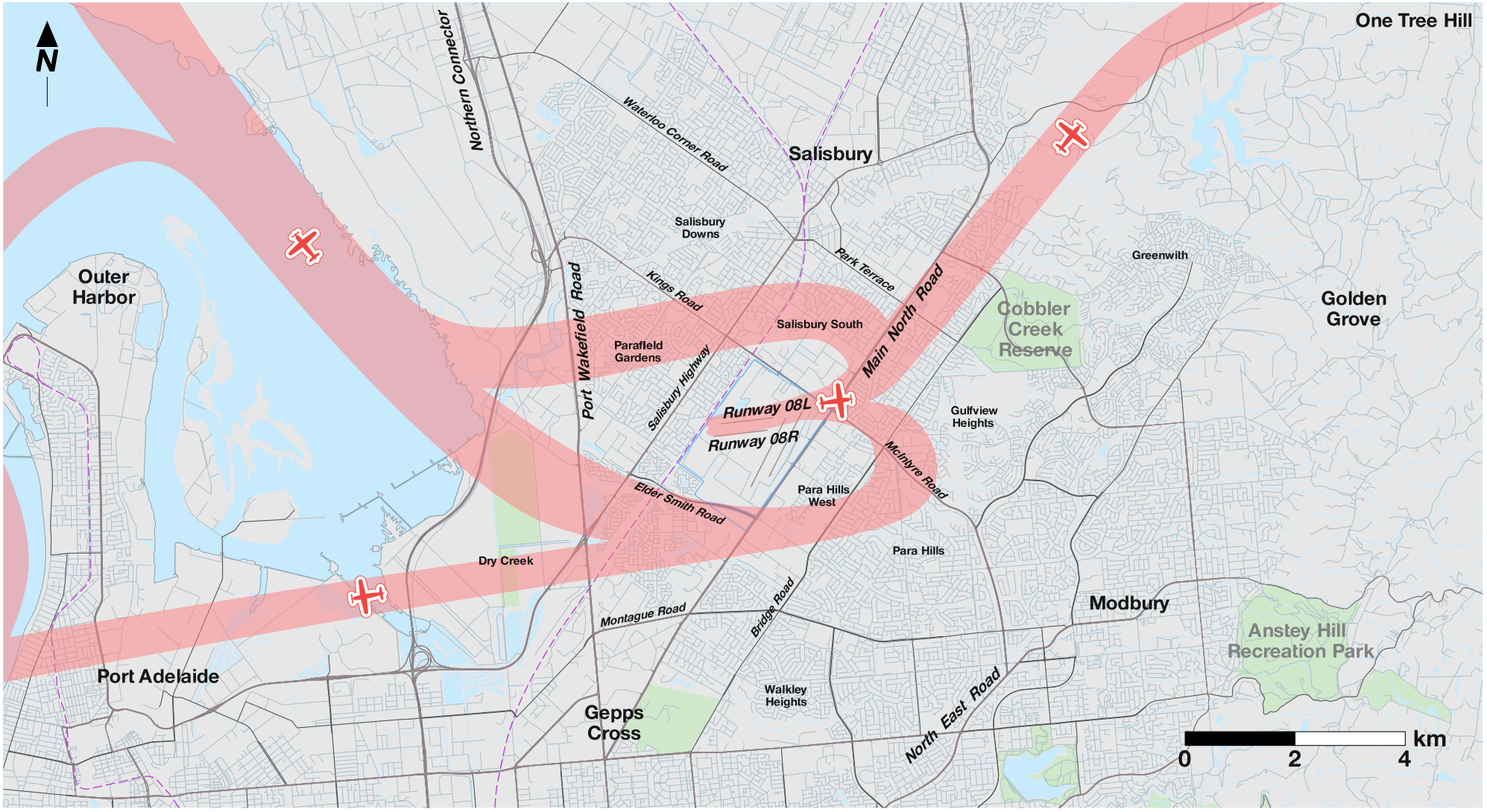


Figure 13.6: Departure flight paths for Parafield Airport – runway direction 21

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.



LEGEND

- Railway
- Airport Boundary
- Major Transport Routes
- Drainage/Water Body
- Parks, Forests and Reserves
- Flight Direction - Departure
- Flight Path - Departure

Figure 13.7: Departure flight paths for Parafield Airport – runway direction 08

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

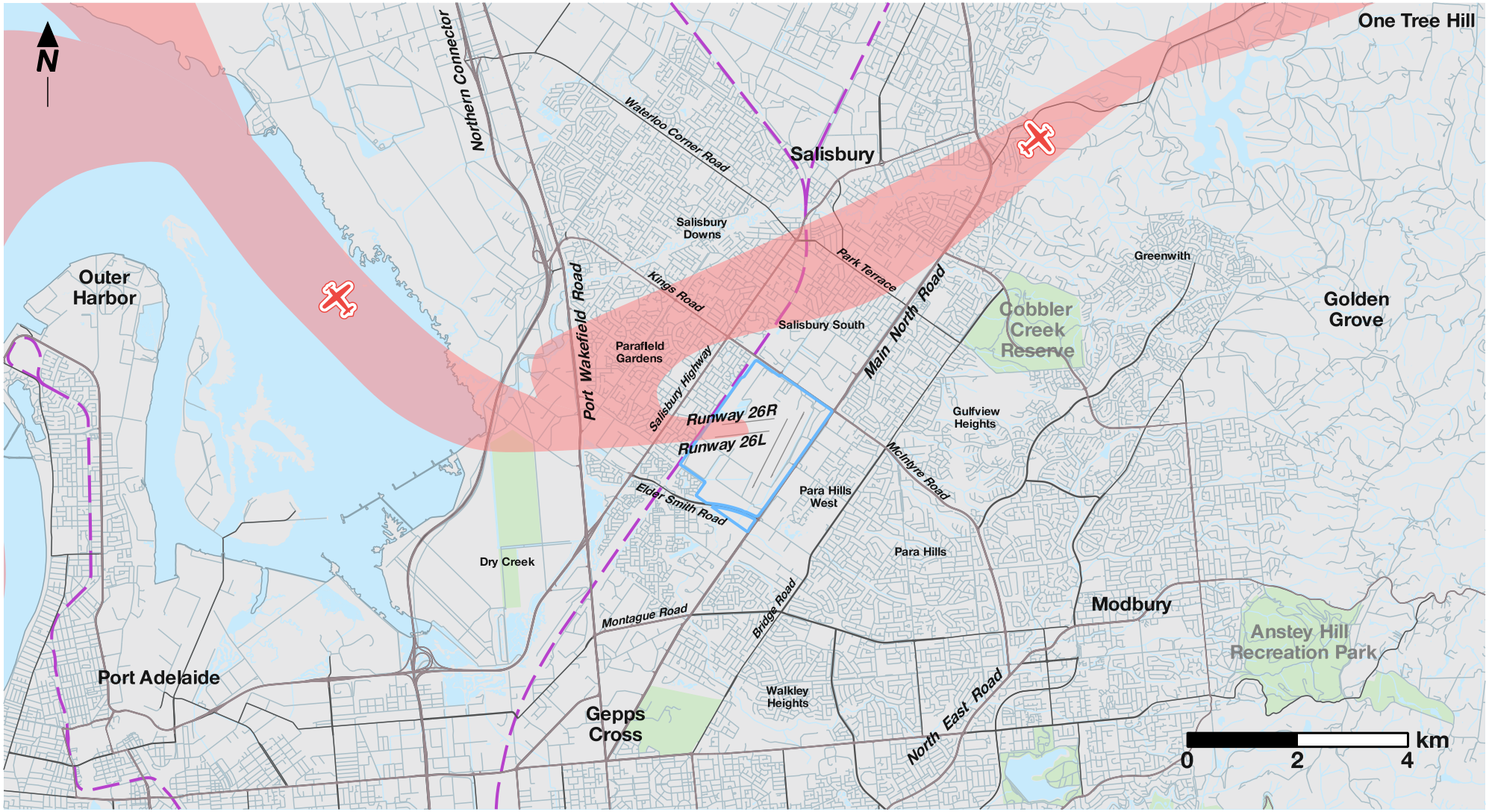


Figure 13.8: Departure flight paths for Parafield Airport – runway direction 26

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

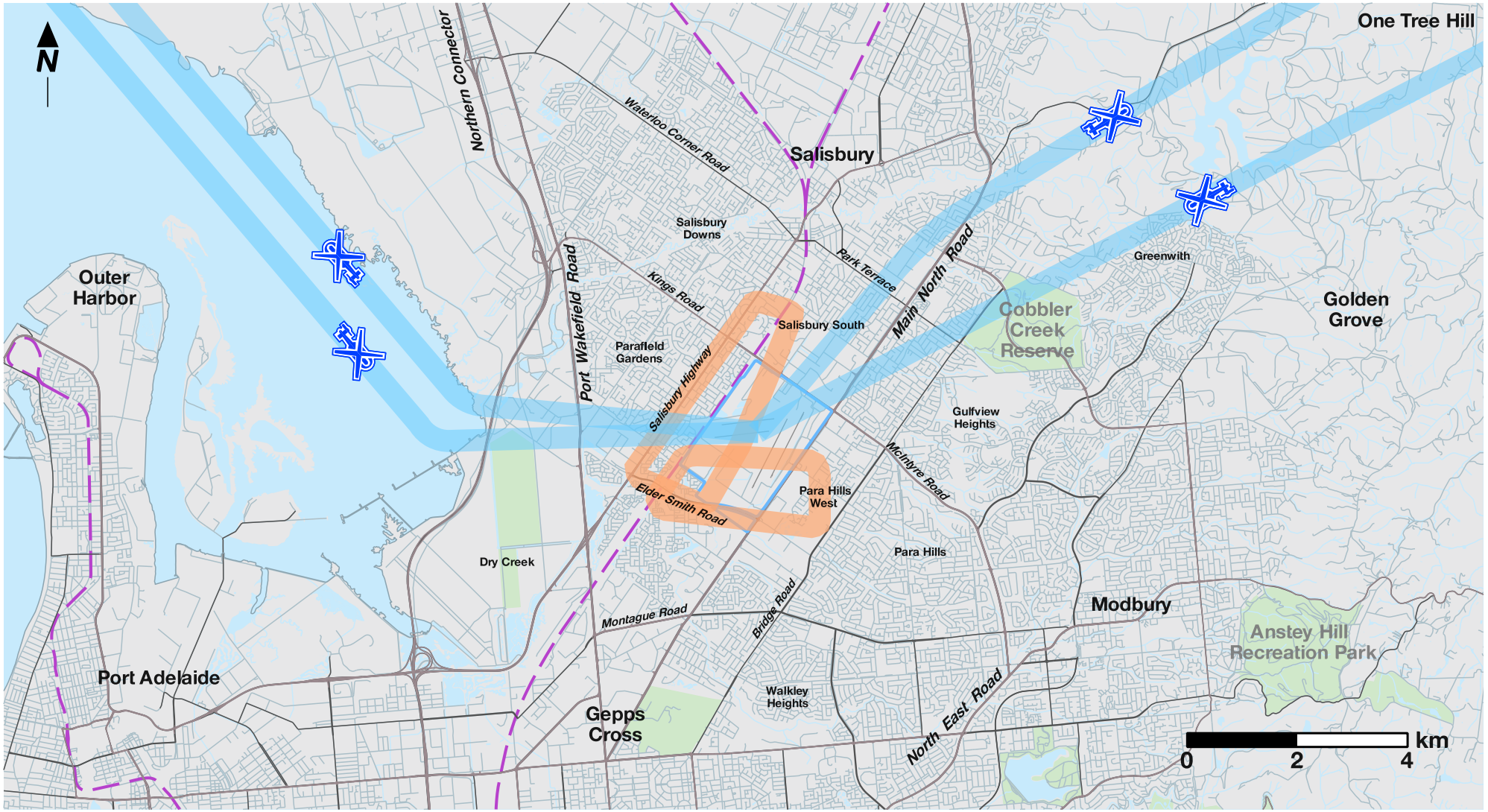


Figure 13.9: Helicopter flight paths and circuit paths for Parafield Airport

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

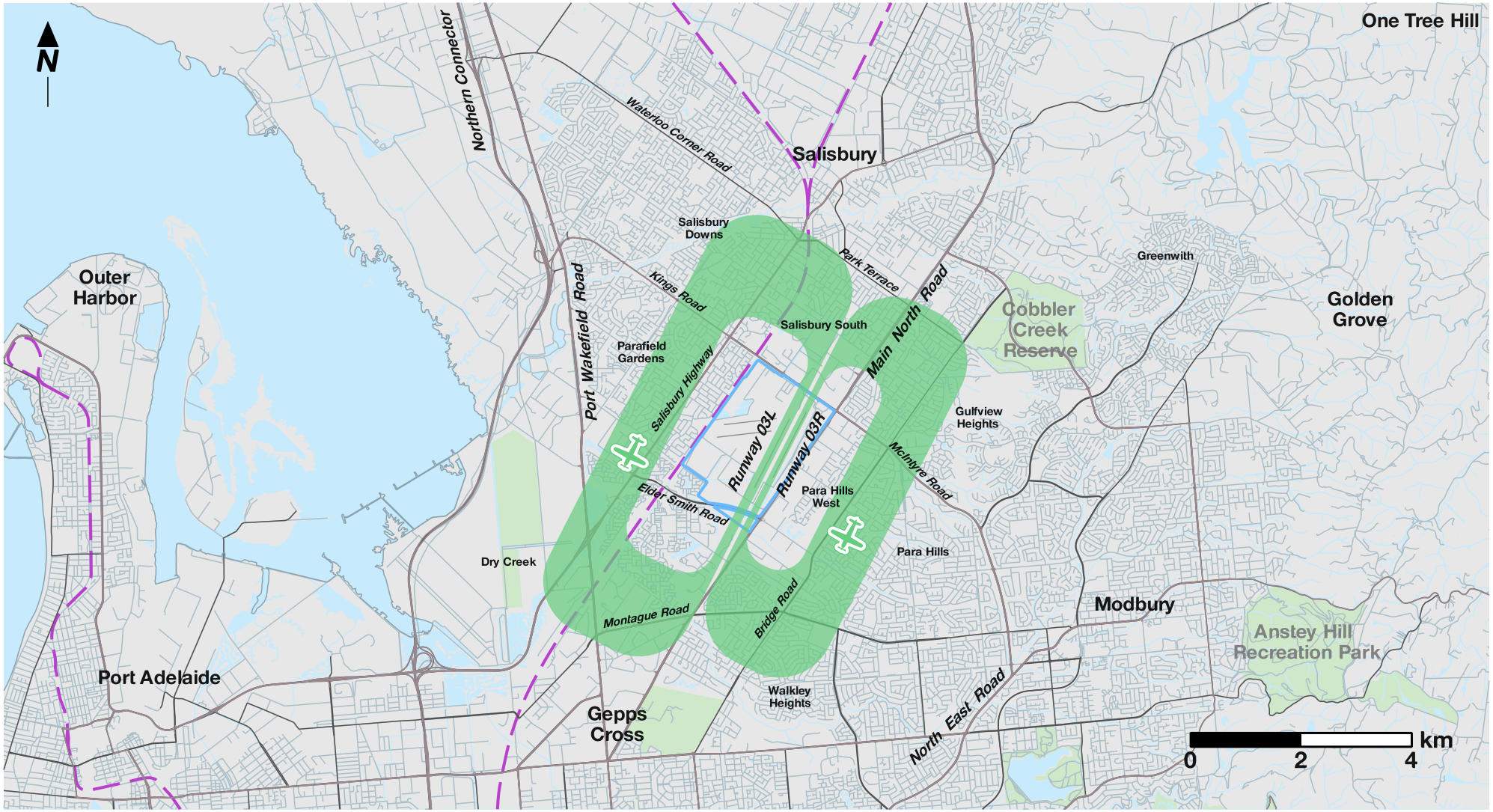


Figure 13.10: Circuit flight paths for Parafield Airport – runway direction 03

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

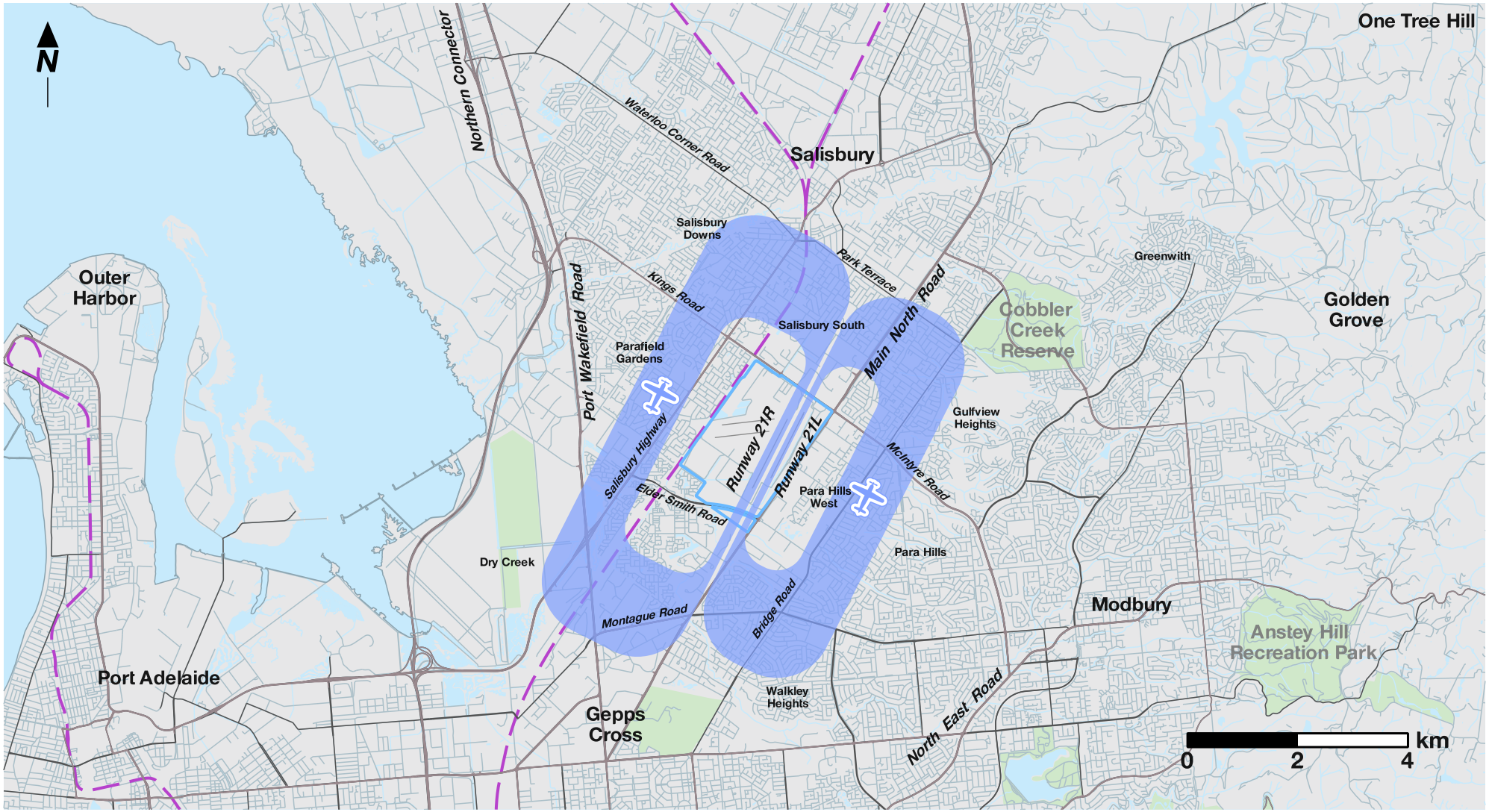


Figure 13.11: Circuit flight paths for Parafield Airport – runway direction 21

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

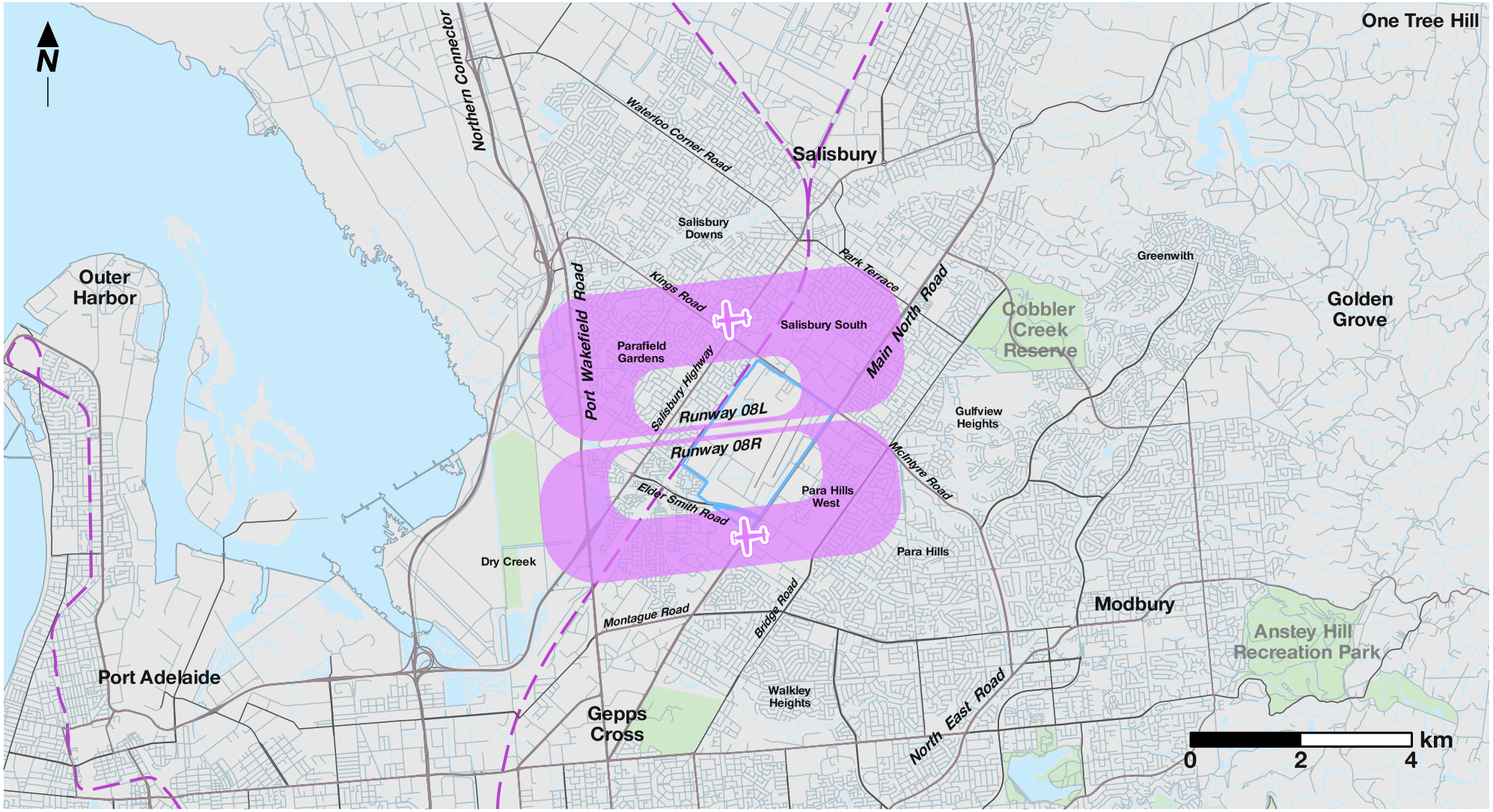


Figure 13.12: Circuit flight paths for Parafield Airport – runway direction 08

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

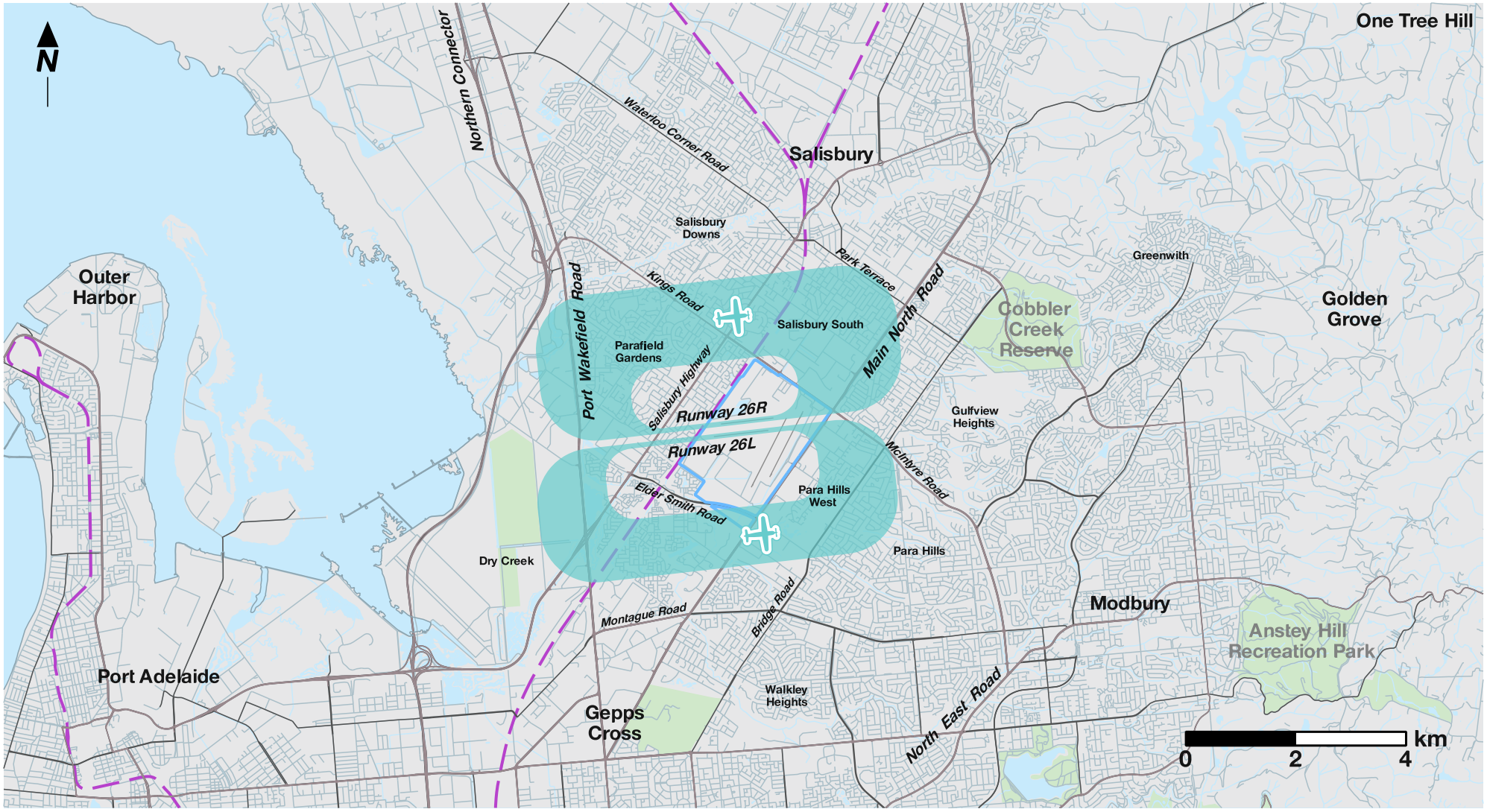


Figure 13.13: Circuit flight paths for Parafield Airport – runway direction 26

These flight corridors represent the concentration of aircraft movements on a typical day and show where the majority of aircraft will fly. There may be variations and aircraft may depart from these corridors.

13.7
Noise Modelling Outputs

13.7.1 Australian Noise Exposure Index (ANEI)

The ANEI for 2022 is shown in Figure 13.15. This is based on the actual numbers and types of aircraft that operated at Parafield Airport in calendar year 2022.

13.7.2 Australian Noise Exposure Forecast (ANEF)

The ANEF has been modelled for the year 2043, which represents the 20-year planning period of this Master Plan. It is based on a scaling of the forecast numbers and types of aircraft used. This also includes known future aircraft types that are likely to fly into or out of Parafield.

The ANEF is used, in conjunction with Australian Standard 2021:2015 Acoustics – Aircraft Noise Intrusion – Building Siting and Construction, by state and local governments for land-use planning purposes around airports, particularly in relation to development suitability and sound-insulation requirements.

The ANEF for 2043 is shown in Figure 13.16.

13.7.3 Frequency-Based Noise Charts

The Commonwealth government has recognised the limitations of the ANEF system for communicating aircraft noise exposure to the community and has recommended additional metrics to describe current and future aircraft noise exposure.

A widely used metric is the Number-Above modelling. This displays the number of aircraft noise events greater than a specified decibel level that can be expected on an average day.. The typical noise levels considered are 60 and 70 decibels (dBA) as recommended by the National Airports Safeguarding Framework (NASF) Guideline A – Measures for Managing Impacts of Aircraft Noise. An outdoor noise level of 60 dBA is approximately 50 dBA indoors, with windows open to a normal extent, which is the approximate noise level that could cause sleep disturbance. An outdoor noise level of 70 dBA corresponds to a 60 dBA noise level indoors, which can disturb conversation or other indoor activities such as watching television.

Typical noise levels are shown in Figure 13.14. Two to three decibels is the minimum change in sound level that most people can audibly detect, while every 10 dBA increase in sound level is perceived as a doubling of loudness and every 10 dBA decrease is perceived as a halving of loudness

The NASF Guideline A (see Section 12.4) applies criteria for 100 average daily events above 60 dBA (referred to as N60=100) and 20 average daily events above 70 dBA (N70=20). These criteria have been adopted for this Master Plan 2024. These contours for 2022 are shown in Figure 13.17 and the forecast contours for 2043 are shown in Figure 13.18.

An outdoor noise level of 60 dBA is approximately 50 dBA indoors, with windows open to a normal extent, which is the approximate noise level that could cause sleep disturbance. An outdoor noise level of 70 dBA corresponds to a 60 dBA noise level indoors, which can disturb conversation or other indoor activities such as watching television.

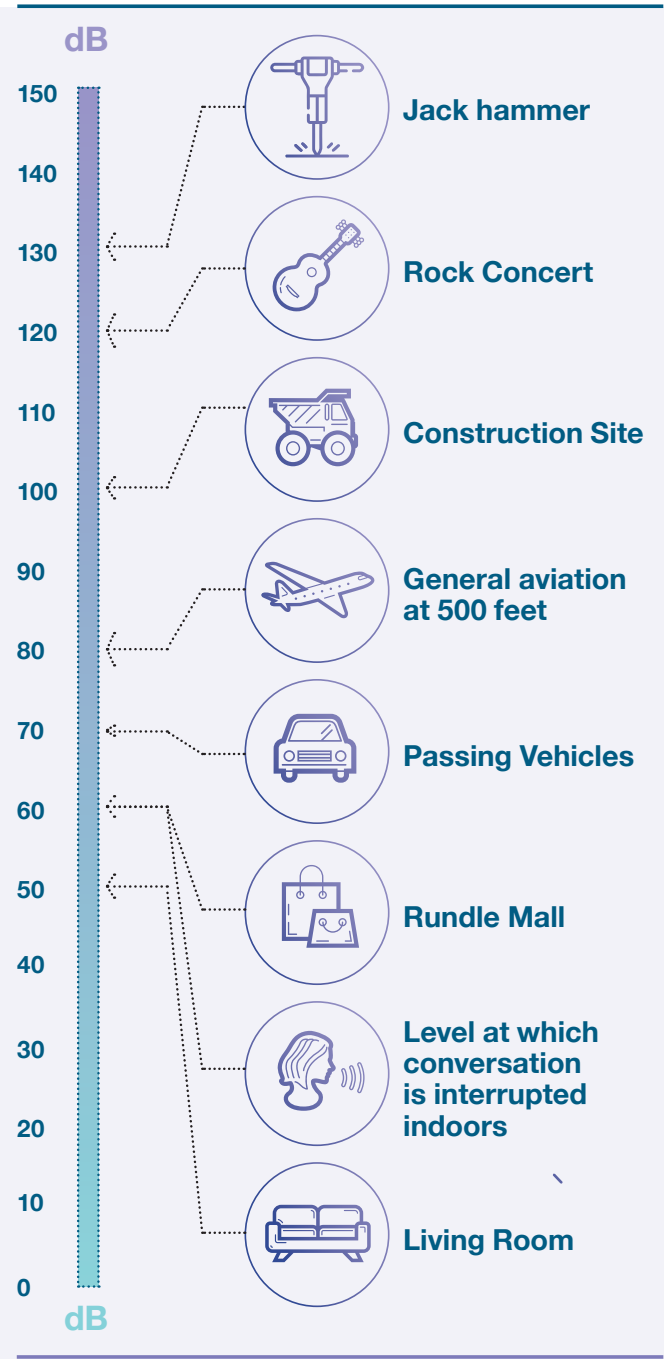


Figure 13.14: Example Noise Levels (in decibels)

13.7.4 Assessment of Changes to Noise Exposure

The ANEI chart shown in Figure 13.15 provides an estimate of the current position of the noise contours around the airport. These contours can be used as a baseline guide in the assessment of future proposed changes to the noise contours in the ANEF chart.

The location of the ANEF 20 contour for the 2043 ANEF is similar to the previous 2037 ANEF as well as the 2022 ANEI. In comparison to the 2037 ANEF, the 2043 ANEF has retracted slightly to the north and south and extended to the east and west.

These changes are attributed to updates to:

- requirement to use new noise modelling software (discussed in section 13.6.1)
- runway use allocation (discussed in section 13.6.5)
- aircraft types and number of movements of each aircraft type in line with updated forecasts
- future helipad location

The Airports Act considers the ANEF 30 contour and above to be significant ANEF levels.

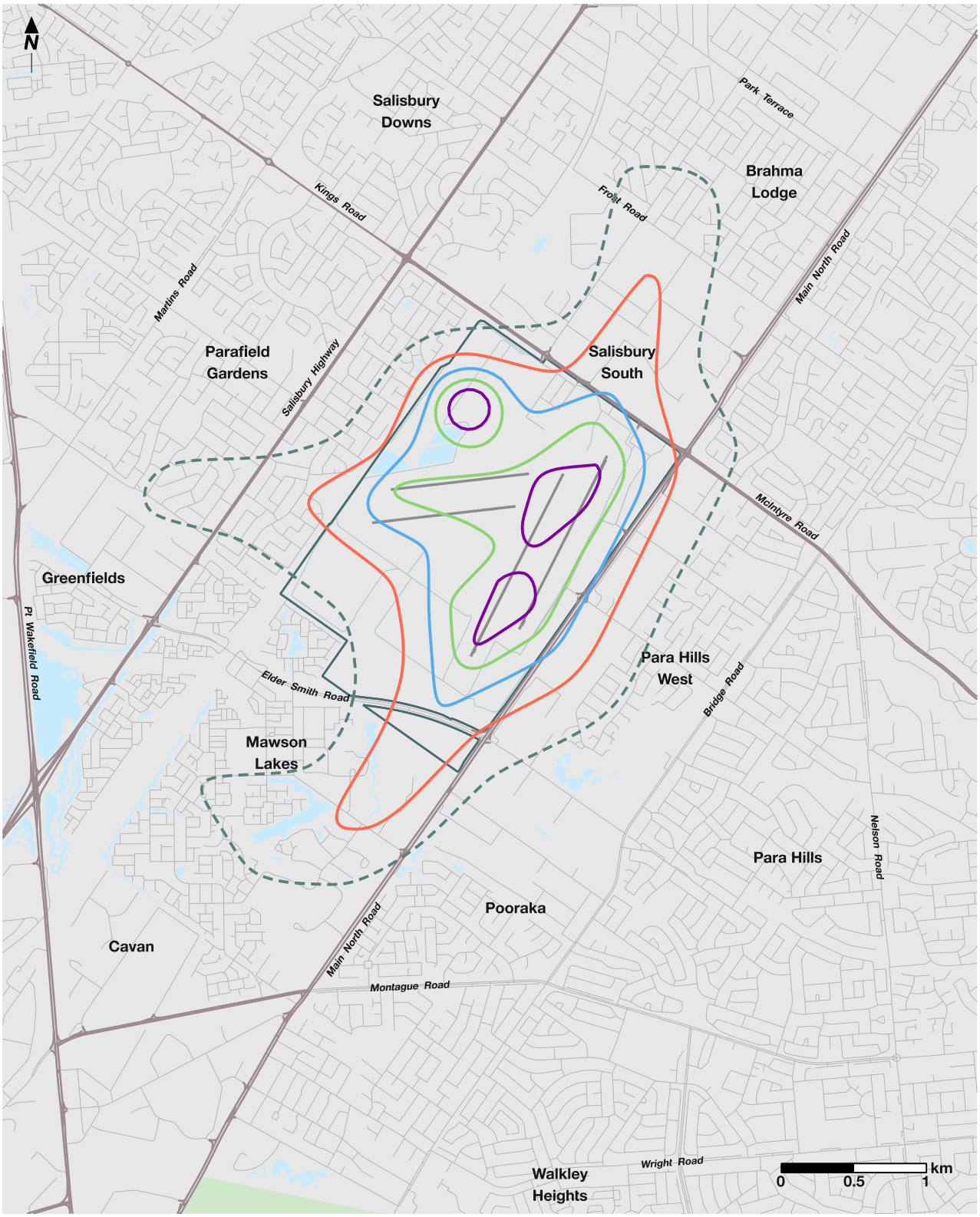
There are no residential dwellings located within the 2043 ANEF 30 or 35 contours.

The ANEF 35 contour is within the airport site and the majority of the ANEF 30 contour is within the airport site. There are a range of buildings on the airport within these contours, including the general aviation hangars located along Anderson Drive, Parafield Airport Heritage Centre, District Outlet Centre, HomeCo (Officeworks, Supercheap Auto, Tradezone and Tool Kit Depot), Parafield Service Centre and the Rivergum Homes Display Village.

The ANEF 30 contour includes three small areas that fall outside of the airport site. The area to the north includes a section of Kings Road, vacant/undeveloped land, a mechanic workshop and a dog day care facility. The area to the east includes a portion of Main North Road and commercial facilities for a petrol station, storage units, automotive wreckers and parts suppliers, and equipment sales. The area to the south incorporates a section of Elder Smith Road and approximately one hectare of the Mawson Lakes Golf Course.

Section 13.5 describes the building site acceptability based on ANEF zones that is specified in Australian Standard AS 2021:2015. Commercial buildings are conditionally acceptable within 25 to 35 ANEF zones, light industrial is conditionally acceptable within 30 to 40 ANEF contours and other industrial uses are acceptable in all ANEF zones.

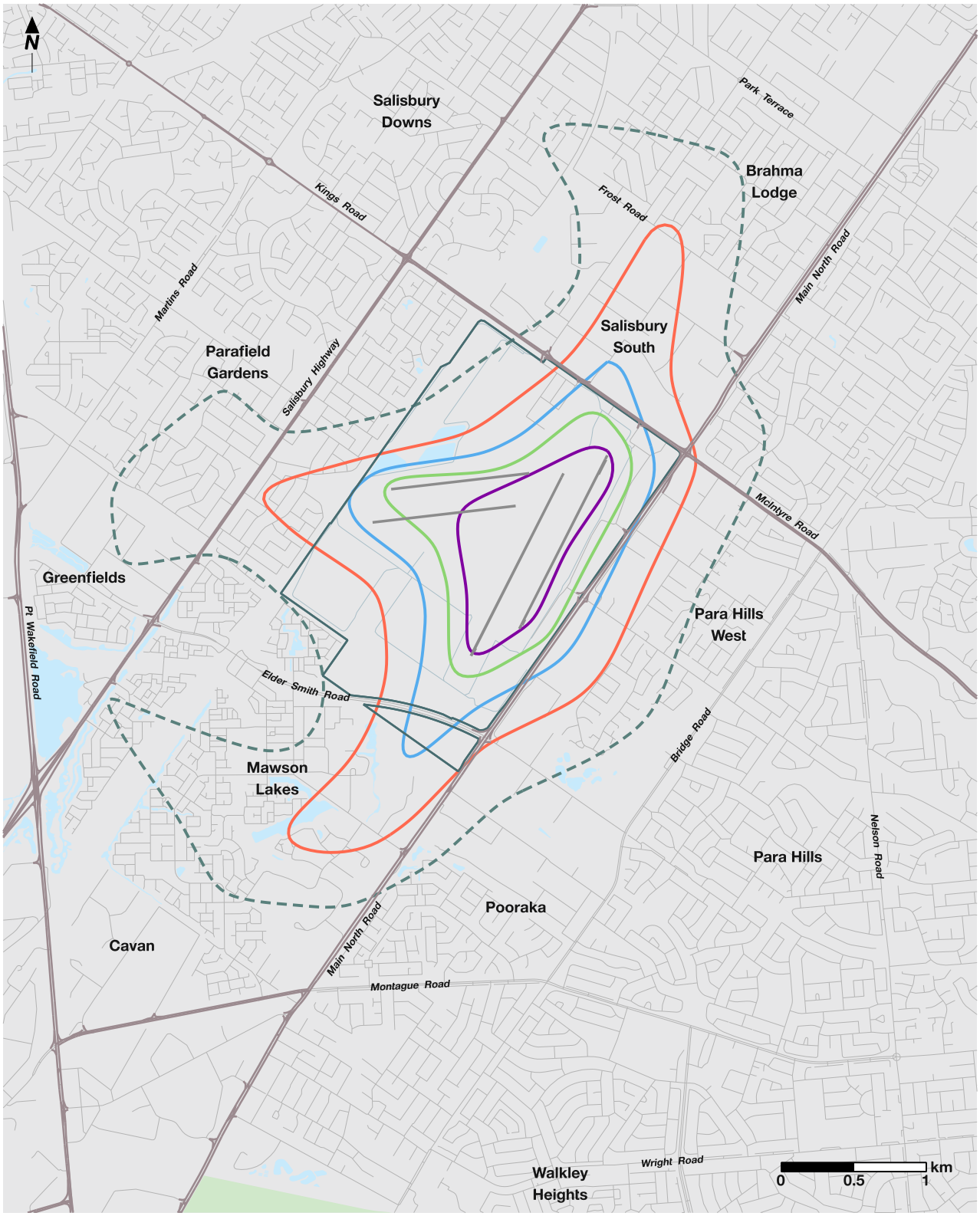
The Airports Act requires a master plan to include the plans, developed in consultation with aircraft operators and local government bodies in the vicinity of the airport, for managing aircraft noise exposure in areas forecast to be above the significant ANEF levels. Section 13.3 describes the noise management activities in place for Parafield Airport. PAL continues to work with all levels of government, aircraft operators and community to manage aircraft noise exposure, with particular focus on areas within the ANEF 30 and above contours.



LEGEND

- Airport Boundary
- Runways
- Drainage/Water Body
- Local Roads
- Arterial Roads
- Airside Boundary
- ANEI 40
- ANEI 35
- ANEI 30
- ANEI 25
- ANEI 20

Figure 13.15: Australian Noise Exposure Index 2022



LEGEND

- Airport Boundary
- Runways
- Drainage/Water Body
- Local Roads
- Arterial Roads
- Airside Boundary
- ANEF 40
- ANEF 35
- ANEF 30
- ANEF 25
- ANEF 20

Figure 13.16: Australian Noise Exposure Forecast 2043

LEGEND

- Airport Boundary
- Arterial Roads
- Drainage/Water Body
- Parks, Forests and Reserves
- Runways
- Local Roads
- N60=100
- N60=200
- N70=100

Figure 13.17: Parafield Airport Number-Above contours - 2022

LEGEND

- Airport Boundary
- Arterial Roads
- Drainage/Water Body
- Parks, Forests and Reserves
- Runways
- Local Roads
- N60=100
- N60=200
- N70=100

Figure 13.18: Parafield Airport Number-Above contours – 2043 Forecast