REHBEIN Airport Consulting

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Mudgee Regional Airport | Master Plan 2015

For Mid-Western Regional Council

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GLOSSARY OF TERMS & ABBREVIATIONS

ACN (Aircraft Classification Number)	A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.
Aerodrome	A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.
AHIA	Australian Helicopter Industry Association
AIP ERSA	Airservices Australia Aeronautical Information Package En-Route Supplement Australia
ANEF	Australian Noise Exposure Forecast
ARC (Aerodrome Reference Code)	A code used to specify the standards for individual aerodrome facilities which are suitable for use by aeroplanes within a range of performances and sizes. The code is composed of two elements: the first is a number (from 1 to 4) related to the aeroplane reference field length and the second is a letter (from A to F) related to the aeroplane wingspan and outer main gear wheel span.
AREC	Australian Rural Education Centre
ARP	Aerodrome Reference Point
AVGAS	Aviation Gasoline
AWIS	Automatic Weather Information Service
AWS	Automated Weather Station
BNN	Backup Navaid Network
CAGR	Compound Annual Growth Rate
CAR	Civil Aviation Regulations
CASA (Civil Aviation Safety Authority)	The Australian federal government department responsible for setting and maintaining safety standards for civil aviation. CASA is responsible for the codification of international standards and recommended practices into Australian legislation and for the issue of licences for aviation personnel including pilots, amongst other responsibilities.
CASR (Civil Aviation Safety Regulation)	CASRs establish the regulatory framework (*Regulations*) within which all service providers must operate.
Council	Mid-Western Regional Council
DA	Development Application
FBO	Fixed Base Operator
General Aviation (GA)	The sector of the aviation industry that does not include regular public transport (RPT) airlines and military aviation.
ICAO	International Civil Aviation Organisation

IFR/IMC (Instrument Flight Rules/ Instrument Meteorological Conditions)	Refers to rules under which flight involving navigation requiring reference to radio navigational aids or instruments is carried out. Weather conditions below a certain minima are referred to as instrument meteorological conditions (IMC). IFR flight requires pilots to be qualified in the use of instrument navigation and to use radio navigational aids provided at airports.
INM	Integrated Noise Model
IWI	Illuminated Wind Indicator
LEP	Local Environmental Plan
LGA	Local Government Area
LIRL	Low Intensity Runway Lighting
MOS	Manual of Standards
MTOW	Maximum Take-off Weight
NASAG	National Airports Safeguarding Advisory Group
NASF	National Airports Safeguarding Framework
Navaid	Commonly-used abbreviation for 'radio navigational aid'
NDB (Non Directional Beacon)	A simple and common type of radio navigational aid which allows pilots to track to or from its location.
Non-precision instrument approach	An instrument approach and landing that uses lateral guidance but does not use vertical guidance.
OLS	Obstacle Limitation Surfaces
PAL	Pilot Activated Lighting
PANS-OPS	Procedures for Air Navigation Systems – Aircraft Operations
PAPI	Precision Approach Path Indicator
Pavement Classification Number (PCN)	A number expressing the bearing strength of a pavement for unrestricted operations by aircraft with ACN value less than or equal to PCN.
PSI	Unit of pressure or stress (pounds per square inch)
RESA (Runway End Safety Area)	Area provided at the end of a runway strip, to protect the aeroplane in the event of undershooting or overrunning the runway.
RFDS	Royal Flying Doctor Service
RFS	Rural Fire Service
RNAV/GNSS Approach	Area Navigation/Global Navigation Satellite System Approach. A form of instrument approach procedure using signals from orbiting satellites to determine an aircraft's precise position at a point in time.
RPT (Regular Public Transport)	Air services operated by airlines that are scheduled to occur on a regular basis at fixed times or frequencies and on fixed routes.
RWS (Runway Strip)	A defined area including the runway and stopway, intended to reduce risk of damage to aircraft running off a runway and to protect aircraft flying over it during take-off or landing operations.
VOR	Very High Frequency Omni Range
WI	Wind Indicator

1.0 INTRODUCTION

REHBEIN Airport Consulting was commissioned by Mid-Western Regional Council (Council) to prepare this Master Plan for Mudgee Regional Airport. The Master Plan establishes a framework for the future development of the airport and addresses the existing airport activities as well as opportunities for growth in aviation and aviation-related activities.

The Master Plan sets out short, medium and long-term proposals for aeronautical and non-aeronautical development within the airport land and identifies opportunities for adjacent airport-related development consistent with the Mid-Western Local Environmental Plan (LEP) 2012.

1.1 PURPOSE

Airport master planning is undertaken to enable best-management practises and sound land-use development in addressing diverse aviation and community interests. An Airport Master Plan is the primary strategic tool available to airport owners and operators and communicates the operator's intentions with respect to development of the airport. Its purpose is to set out a long-term framework for the development of all facilities within the airport that protects future development against the effects of current decisions.

Consistent with these strategic considerations, the *Airports Act 1996* summarises the aims of an Airport Master Plan as follows:

- Establishing strategic direction for the efficient and economic development of the airport over the planning period;
- Providing for the development of additional uses of the airport site;
- Indicating to the public the intended uses of the airport site; and
- Reducing potential conflicts between uses of the airport site, and to ensure that uses of the airport site are compatible with the areas surrounding the airport.

Although the *Airport Act 1996* does not have statutory application to Mudgee Regional Airport, this does not reduce the relevance of these four key aims.

1.2 OBJECTIVES

Council has identified several further specific objectives in commissioning this Master Plan, including the desire to:

- Support the existing airport activities as well as future growth;
- Incorporation of the existing sub-division;
- Incorporation of land recently acquired by Council adjacent to the airport site; and
- Understand the possible opportunities for future aviation-related activities and facilitate their growth.

The following three primary development objectives have been identified:

- Provide a clear and coherent plan to facilitate future airport development, which meets the needs of all current and future airport users in a balanced and equitable fashion;
- Encourage the expansion of aviation facilities to enhance and improve the economic return from the existing airport asset; and
- Protect the airport and its operation from incompatible development and activities external to the airport.

1.3 METHODOLOGY

The principal steps in the preparation of this Master Plan were as follows:

- To gain an understanding of the planning context for this Master Plan the following was undertaken:
  - Stakeholder consultation was undertaken to solicit the views issues and concerns of key stakeholders (discussed further in **Section 2.5**); and
  - Existing information, including Council planning and economic development documents, was reviewed.
- A review of existing infrastructure, facilities and activities at the airport was undertaken;
- Based on consultation with the stakeholders and consideration of the local economy, economic and business development opportunities for the airport were considered and reviewed;
- Based on these identified opportunities and consideration of relevant market trends, forecasts of future aviation activity for the purpose of planning adequate infrastructure requirements were prepared;
- Aeronautical infrastructure development proposals were set including apron and taxiway development as well as supporting services. In parallel, proposals for non-aeronautical commercial development, including new hangar sites and aviation-related development precincts, and landside access were developed. This provided the overall development concept for the airport;
- An implementation plan was then developed including a staged development plan formulated to provide guidance on the implementation of the proposals as well as indicative capital cost estimates; and
- The potential wider planning impacts of various airport safeguarding requirements were then considered through the development of future Obstacle Limitation Surfaces (OLS) as well as lighting restrictions and wildlife hazards which will help define land use and specific development surrounding the airport.

1.4 MASTER PLAN STRUCTURE

This Mudgee Regional Airport Master Plan 2015 is structured as follows:

- **Section 2.0** sets out the planning context to this Master Plan;
- **Section 3.0** describes the existing situation with regards to infrastructure and activities at the airport;
- **Section 4.0** identifies the key economic and business development opportunities for the Mudgee Regional Airport which are likely to influence future activity levels and infrastructure requirements, along with associated forecasts of future aviation activity;
- **Section 5.0** describes the proposed development concept in terms of aeronautical and non-aeronautical infrastucture;
- **Section 6.0** outlines an expected implementation plan and staging along with indicative costs for short-term development;
- **Section 7.0** discusses the airport safeguarding requirements to ensure future operational capability of Mudgee Regional Airport is adequately protected; and
- Supporting Figures A through H illustrating relevant aspects of the Master Plan as referenced within the document are included at **Appendix A**.

2.0 PLANNING CONTEXT

2.1 REGIONAL CHARACTERISTICS

2.1.1 GEOGRAPHY

The Mid-Western Region local government area is located in the Central Tablelands of New South Wales approximately 260 km north west of Sydney by road (approximately 3½ hours driving time) and 212 km by air.

The Region has a total area of approximately 9,000 square kilometres. The administrative centre of the Mid-Western Region is Mudgee which is located on the Castlereagh Highway. The highway runs approximately north-south through the region and provides access to Lithgow and the Blue Mountains to the south and Gulgong, Dunedoo and Dubbo to the north and north west.

The region has a cool to warm climate with an average daily maximum temperature of 31°C in January and 14°C in July. The average daily minimum temperature varies from 16°C to 1°C respectively.

2.1.2 ECONOMY

The economy of the Mid-Western region is driven by four main sectors based around agriculture, mining, tourism and viticulture.

Tourism

Almost 500,000 people visit the area each year for the local wine, food, sporting and cultural events. Over 600 local businesses in the region are either directly or indirectly involved in the tourism industry or related to tourism[1]. The Mudgee Region hosts more than 50 events annually that attract people to visit the area including the Mudgee Wine and Food Festival, the Rylstone Street Feast and the Henry Lawson Heritage Festival.

The Glen Willow Regional Sporting Complex has hosted a number of large sporting events including the Country Vs City Rugby League game and the Trans-Tasman AusTouch Football Series.

Mining

Mining is the fastest growing industry in the region and employs the largest number of people (approximately 14% in 2011). The Mudgee Region Economic and Business Profile[1] prepared by Council indicates that there are ongoing expansion plans for existing mines which will increase productivity and job opportunities in the region. In addition to this there are plans for the development of a further four mines in the wider area.

[1] Economic and Business Profile for the Mudgee Region, Mid-Western Regional Council

Agriculture

A wide range of agricultural products are produced on the Mudgee Region including crops, livestock and other livestock products such as wool. According to the Mudgee Region Economic and Business Profile document prepared by Council, approximately 38% of registered businesses in the region are part of the agricultural sector.

Viticulture

The Mudgee Region has a significant wine industry with around 2,300 hectares of vines. It has been one of the fastest growing premium wine producing regions in Australia, although in recent years grape production in the area has decreased to more sustainable levels as a result of a nationwide oversupply. There is now a focus on diversification, marketing and food and wine events such as the Pyrmont Uncorks Mudgee Festival to increase the profile of the region.

The wine industry also contributes to the tourism sector with over 40 cellar doors open to the public, providing visitors with an opportunity to sample the distinctive wines of the region, talk to winemakers and enjoy some complementary food.

2.1.3 POPULATION

The Mid-Western Region Local Government Area (LGA) had a population of almost 24,000 people in 2013[2]. Between 2009 and 2013 there has been an annual average population growth rate of 1.5%.

Significant population growth is expected in the Mudgee Region as a result of the growth of the coal mining industry in the local area. It is expected that the new positions created will be filled by new residents to the area who have the relevant skills. It is anticipated that the total population of the Mudgee Region including new major projects will exceed 26,000 people by 2020[3] and could be as high as 28,000.

2.2 ROLE AND HISTORY OF MUDGEE REGIONAL AIRPORT

Mudgee Regional Airport is owned and operated by Mid-Western Regional Council. The airport is located approximately 5 kilometres to the northeast of Mudgee on the north western side of Ulan Road and occupies an area of approximately 99 hectares. This includes the original airport land plus a further 4 hectares to the east of George Campbell Drive which Council has recently acquired with the intention of enabling some airport development. **Figure A** provides a location plan.

The airport is the primary aviation facility for the region, which encompasses an area in excess of 9,000 sq. km. FlyPelican has operated Regular Public Transport (RPT) services to Sydney using 19-seat Jetstream 32 aircraft since June 2015. A wide range of General Aviation (GA) aircraft also

[2] Australian Bureau of Statistics (ABS)
[3] Economic and Business Profile for the Mudgee Region, Mid-Western Regional Council

operate to and from the airport including private and commercial operators as well as the Royal Flying Doctor Service (RFDS) and the Rural Fire Services (RFS).

The airport operated under the Aerodrome Local Ownership Plan in partnership with the Commonwealth Government until the 1990s, when Council assumed full responsibility for management, operation and development. In 1998, a new passenger terminal was opened and Council is currently completing a $2m project to upgrade the car parking, terminal extension, apron expansion and an upgrade of runway lighting.

Council has recently purchased 4 hectares of land adjacent to the airport, east of George Campbell Drive (the current main airport access road) with the aim of facilitating additional aviation-related subdivision development.

2.3 MUDGEE AIRPORT MASTER PLAN 2005

A Master Plan for Mudgee Regional Airport was prepared in 2005. The Master Plan focused on the building area precinct which accommodates the passenger terminal, general aviation facilities and potential development areas. The objectives of the Master Plan were to provide a clear and coherent plan to facilitate future airport development which meets the needs of all users; encourage the expansion of aviation facilities to enhance and improve economic return from the existing airport assert; and protect the airport and its operation from incompatible development and activities external to the airport.

The Master Plan forecast passenger movement growth of 3-3.5% per annum resulting in around 30-36% increase in total passenger numbers on 2005 figures by 2014. A background growth rate of 1.5% per annum was assumed for fixed wing aircraft movements and 3% per annum for helicopter movements. An additional 7,654 of training movements were included in the forecast resulting in a total of 23,254 movements by 2014.

The general principles adopted in the Master Plan included a proposed development of an extension to the northern GA areas, forming Stage 1. Stage 2 included the proposed development at the new southern GA area following decommissioning and removal of the non-directional beacon (NDB).

2.4 PLANNING INTEGRATION

2.4.1 MID-WESTERN REGIONAL LOCAL ENVIRONMENTAL PLAN (LEP) 2012

The current statutory planning instrument which determines land use policy for the airport and surrounding area is the Mid-Western Regional Local Environmental Plan (LEP) 2012, which makes local environmental planning provision for land in the Mid-Western region. The LEP aims to:

- Promote growth and provide for a range of living opportunities throughout the region;
- Encourage proper management, development and conservation of resources within the region;

- Provide a secure future for agriculture by protecting agricultural land;
- Foster a sustainable and vibrant economy that supports and celebrates the region's rural, natural and heritage attributes;
- Protect the settings of Mudgee, Gulgong, Kandos and Rylstone;
- Match residential development opportunities with the availability of urban and community services and infrastructure; and
- Promote development that minimises the impact of salinity on infrastructure, buildings and landscape.

The LEP sets out land use zones for the region. The LEP identifies the land on which the airport is located as '*SP2 – Infrastructure*' which aims to provide for infrastructure and related uses, prevent development that is not compatible with or may detract from the provision of infrastructure. The land surrounding the airport is identified as 'RU4 – Primary Production Small Lots'. An area of land identified as '*R1 – General Residential*' is located to the south of the airport.

2.4.2 MID-WESTERN REGIONAL COMPREHENSIVE LAND USE STRATEGY 2010

The Mid-Western Regional Comprehensive Land Use Strategy was prepared in 2010 and provides a basis for identifying options for the region to meet long term urban and rural growth needs. The Strategy informs the Mid-Western Regional LEP. A key principle of the Strategy is to manage and protect transport infrastructure, including air, to ensure long-term sustainable economic growth across the region. This will ensure that the role of airports and air services in the growth of the region are acknowledged and protect their current and future operations from inappropriate development having regard for height limitations, noise impacts and surrounding development.

The Strategy includes Local Area Strategies for urban areas including the Mudgee Town Structure Plan. The Mudgee Town Structure Plan identifies opportunities for additional land uses directly surrounding the airport particularly for aviation-related uses directly linked to the airport. The Town Structure Plan guides rezoning of land and in order for any opportunities identified around the airport to be realised, land would need to be rezoned under the LEP2012. The plan also identified an area for the Australian Rural Education Centre (AREC) directly adjacent to the airport to the south.

2.4.3 LOT 63 PLANNING PROPOSAL (DP18063)

A planning proposal (DP18063) has been submitted to Council for the development of Lot 63 (55 George Campbell Drive) which is 16.7 hectares in size and is located directly adjacent to the airport site to the north. The site is currently zoned as '*RU4 – Primary Production Small Lots*' in the LEP. The proponent wishes to develop 24 rural residential lots with associated aircraft hangars directly adjacent to the airport with the potential for direct airside access to the taxiway and runway network at the airport. Such a development could provide for residential lots with aircraft hangars suitable for individuals with their own aircraft to live in. The objective of the proposal is not to rezone the

land in question but amend the applicable Lot Size map to 2 hectares to ensure this type of development is consistent with the LEP.

Council has also issued a development consent for a small strip of land (formerly a road reserve) along the northern boundary of the airport site on Lot 4 DP 561282 (owned in conjunction with Lot 63 - the site of the Planning Proposal). The consent is for the development and subdivision of 12 hangars with associated residential accommodation.

2.4.4 MID-WESTERN REGION ECONOMIC DEVELOPMENT STRATEGY – A 10 YEAR PLAN

The Mid-Western Regional Council's Economic Development Strategy has been prepared to outline the future economic direction for the region for the next 10 years. The strategy highlights Council's economic development mission which is to encourage a strong and diversified economy that delivers lifestyle benefits to the community through supporting business and investment activities that in turn generate opportunities for employment, income and sustainable economic growth. As part of the strategy, Council endeavours to support existing businesses who will be major contributors to net new job growth in the region.

The strategy highlights that a number of key drivers will influence economic development in the region including employment, education, workforce skills, business development, investment, infrastructure, tourism and marketing.

With direct relevance to this Master Plan, the Economic Development Strategy highlights the Council's desire to provide infrastructure that accommodates economic growth and meets the commercial, industrial and retail needs of the region as well as providing an attractive business environment which provides adequate local infrastructure to ensure competitiveness of the region's economic activity. To ensure this occurs, the Strategy indicates that Council will promote the development of airport infrastructure at Mudgee Airport as an opportunity for business expansion in the aviation related industry. This Master Plan will assist Council to achieve this aim.

2.5 STAKEHOLDER ENGAGEMENT

2.5.1 STAKEHOLDER MEETINGS

Stakeholder consultation was undertaken to solicit the views issues and concerns of key stakeholders and airport users including Council representatives, airport tenants and users, and local businesses. Consultation was undertaken during a site visit to Mudgee by REHBEIN Airport Consulting personnel in June 2014 including separate meetings with Council representatives and external stakeholders. Discussion was largely focussed on the future infrastructure requirements and expansion potential of Mudgee Regional Airport. The stakeholders consulted are indicated in **Table 1**.

2.5.2 FEEDBACK SUMMARY

Feedback obtained during consultation included a range of concerns and issues and provided a valuable background to Mudgee Regional Airport's existing situation and future aspirations. The key themes relevant to this study are as follows:

- There are a number of drivers for the growth of activities at the airport including the local mining industry and hosting of cultural events;
- Difficulties in attracting and retaining RPT services from Mudgee Regional Airport to support the mining industry and other key industries including transporting medical specialists to the area;
- Council continues to work to identify a new RPT service operator and the Master Plan must assume that such services will re-commence in the future;
- Notwithstanding the current absence of passenger services, there is inadequate capacity in the existing passenger terminal for a 19-seat aircraft turnaround;
- Mudgee Regional Airport benefits from a very scenic location as well as being situated close to town. There are opportunities to take advantage of these strengths through greater promotion of the airport throughout the general aviation community;
- Development at the airport should be encouraged, creating a climate of aviation enthusiasm, although it is essential to maintain a high-quality environment in keeping with the surroundings;
- Council could consider reviewing its aeronautical charging structures and/or rates to encourage the desired development and aviation activity;
- There is a place for both residential and commercial development, but these should be kept separate and with strict controls on residential uses;
- Pavement strengthening for Gulfstream and other private jet aircraft is needed as there are opportunities here; and
- A number of opportunities for the expansion of aviation and aviation-related activities at the airport were identified, revolving generally around the concept of a 'best-in-State' industrial park focussed on aviation services. These opportunities are addressed in greater detail in **Section 4.0**.

Table 1: Stakeholder Consultation

Organisation	Representative Name	Position
Mid-Western Regional Council	Warwick Bennett	General Manager
	Julie Robertson	Economic Development Officer
	Sally Mullinger	Works Manager
	Andrew Drummond	Plant & Facilities – Aerodrome Manager
	Bob Husband	Aerodrome Reporting Officer
	Gary Bruce	Manager Statutory Planning
	Brad Cam	Director of Operations
	Brett Exelby	Director of Finance & Administration
Mudgee Aero Club	Rob Duffy	Secretary & Treasurer
	Peter Huish	Member
Commercial Helicopters	Kate Rogers Mark Rogers	Business Owners
Oz Choppers		
Airborne Avionics		
Mudgee Region Tourism Inc	Virginia Craney	Interim Tourism Manager
Observair	Brad Welch	Chief Pilot
Airwest Fight Training	Craig Cooke	Business Owner
Moolarben Coal	Scott Fittler	Community Relations Coordinator
Hertz	Karen Hurst	Mudgee Manager
Private individual	Dave Roberts	Hangar Owner
Private individual	Noel Dawson	Hangar Owner

2.6 REGULATORY CONTEXT

2.6.1 AVIATION SAFETY

The Civil Aviation Safety Authority (CASA) is the statutory authority that conducts the safety regulation of civil air operations in Australia including the regulation of certified and registered aerodromes. The CASA Manual of Standards Part 139 Aerodromes (CASA MOS Part 139) is made pursuant to Civil Aviation Safety Regulations (CASR) Part 139. CASR Part 139 sets out the regulatory regime for aerodromes used by aeroplanes conducting air transport operations.

CASA MOS Part 139 sets out the standards and operating procedures for certified, registered aerodromes and other aerodromes used in air transport operations. As a Certified Aerodrome under CASR Part 139, the existing facilities and any proposed future facilities included within this Master Plan for Mudgee Regional Airport must comply with the standards set out in CASA MOS Part 139.

2.6.2 AVIATION SECURITY

The Aviation Transport Security Act 2004 establishes a regulatory framework to safeguard against unlawful interference with aviation. To achieve this purpose, the Act establishes minimum security requirements for civil aviation in Australia by imposing obligations on airport operators. Existing and future facilities must comply with the Aviation Transport Security Regulations 2005 made under the Aviation Transport Security Act 2004.

Mudgee Regional Airport is a Security Controlled aerodrome and the specific requirements for aviation security applicable at Mudgee are set out in the airport's Transport Security Program.

There is currently no requirement to implement screening of passengers and checked baggage unless Regular Public Transport or open charter services are operated by aircraft with a maximum weight of more than 20,000kg.

3.0 EXISTING SITUATION

This chapter provides a brief description of the main infrastructure components and activities at Mudgee Regional Airport. **Figure B** shows the existing airport infrastructure.

3.1 EXISTING AIRPORT INFRASTRUCTURE

3.1.1 RUNWAYS

Mudgee Airport has a two-runway system aligned in the 04/22 and 16/34 directions.

Runway 04/22

Runway 04/22 is the main runway at Mudgee Regional Airport is 30m wide and has a total sealed length of 1,739 metres.

The runway strip associated with Runway 04/22 is 90 metres wide with a graded surface and extends 60 metres beyond the runway ends. This runway strip width permits use for Code 3C instrument non-precision operations, subject to landing minima adjustments, in accordance with CASA MOS Part 139 requirements. Typical Code 3C aeroplanes operating in Australia include the Saab 340, Bombardier Q400, and Fokker 50.

The published pavement classification number (PCN) is 12/F/C/580(84PSI)/U. The runway strength is suitable to accommodate typical 30-50 seat aircraft such as the Saab 340, Dash 8-100, Dash 8-300 or Embraer EMB120.

Turning nodes are provided at each runway end. An intermediate turning node is located approximately one-third in from Runway 04 threshold.

Runway End Safety Areas (RESAs) are in accordance with previous Australian standards whereby the length of the RESA is measured from the end of the runway. The current standards require the RESA to be measured from the end of the runway strip. CASA permits existing RESAs to remain in accordance with the previous standard until the runway is lengthened, when the current standard must be complied with.

Runway 16/34

Runway 16/34 is an unlit, unsealed runway 1,075 metres long and 30 metres wide located within a 90 metre wide runway strip. The runway strip extends 60 metres beyond each runway end. The runway meets the requirements for a Code 2C non-precision instrument runway in accordance with CASA MOS Part 139 (although no instrument approaches are currently published to this runway). The runway has a grass surface and is not rated in terms of bearing strength.

3.1.2 TAXIWAYS

There are several taxiways currently at Mudgee. These are indicated on **Figure B**. The taxiway designations used are those indicated in the Aeronautical Information Package – En-route Supplement Australia (AIP-ERSA).

Taxiway A

The primary taxiway (Taxiway A) has a sealed surface and is located approximately 350 metres from the Runway 22 threshold. It provides access to Runway 04/22 from the main apron adjacent to the passenger terminal. The taxiway is 15 metres wide and equipped with edge lighting and is suitable for Code C aircraft with a wheelbase of less than 18 metres.

Taxiway B

Taxiway B provides access to hangars immediately north of the passenger terminal.

Taxiway C

This grass taxiway connects Taxiway D and the terminal apron with the Runway 34 threshold.

Taxiway D

Taxiway D is an unlit sealed taxiway of variable width up to 15 metres but normally accommodates Code A aircraft accessing the hangar area and refuelling facility to the south of the passenger terminal.

Taxiway E

Taxiway E is an unlit sealed taxiway running north from the main apron area and serves hangar development to the north of the passenger terminal. The taxiway is has been constructed 15 metres wide but presently is suitable for Code B aircraft only to ensure adequate clearances to adjacent hangars. Several sealed taxiway connectors to the aprons associated with the hangar development in this area.

Council is in the process of extending Taxiway E to connect to the Runway 22 threshold.

Other

The open area between to the east of the NDB is utilised as an informal grass taxiway providing access to hangar development in the southern corner of the airport site occupied by an avionics business associated with Commercial Helicopters.

3.1.3 AIRCRAFT PARKING AREAS

Main Apron

The main apron fronting the passenger terminal is a sealed apron of approximately 1,500 square metres. A single Metroliner aircraft parking position is marked, incorporating a secondary keyhole marking for parking in the opposing direction when required to ensure aircraft facing into the wind.

Itinerant Parking Apron

A separate sealed apron area for itinerant GA aircraft is located to the southwest of the main apron and Taxiway A. Most of the depth of this apron lies within the Code C taxiway strip associated with Taxiway A, thereby limiting its operational usefulness. (Council has therefore recently expanded this apron to increase the ability for aircraft to park on the sealed surface without infringing the Taxiway A strip clearance.)

Southern GA Apron Areas

Sealed apron areas associated with the fuel facility and hangar development exist to the south of the passenger terminal

Light Aircraft Parking and Tie-Down Area

A marked light aircraft tie-down area is located on grassed areas of the aerodrome to the south of the main GA hangar area. The area caters for small GA aircraft less than 2,000kg and has capacity for approximately 10 aircraft.

Northern GA Area

There are a number of sealed aircraft parking areas adjacent to hangar developments to the north of the passenger terminal. Taxiway E and Taxiway B provide access to this area.

3.1.4 VISUAL AND NAVAGATIONAL AIDS

Markers and markings

Standard white gable markers define the runway strips for both runways. Runway 04/22 is provided with runway centreline, runway end, threshold, fixed distance, touchdown zone markings in accordance with CASA MOS Part 139. Taxi guideline markings are provided at taxiway entrances and turning nodes.

Wind indicators

The primary wind indicator and associated signal area is illuminated and located to the north of the main apron.

Aerodrome Lighting

Runway 04/22 is equipped with low intensity pilot activated runway edge lighting. The lights are installed at 90m spacing to the previous standard. However, Council has recently upgraded the runway lighting system to meet the current maximum spacing requirement of 60m and installed a Precision Approach Path Indicator (PAPI) light system to provide visual slope guidance for aircraft on approach.

Runway 16/34 is not equipped with lighting.

The main taxiway is equipped with blue edge lighting and the main apron is equipped with apron floodlighting suitable for small aircraft (below Code 3C).

Non-Directional Beacon

The Mudgee NDB is located on the airport to the south of the apron areas. The NDB is owned and operated by Airservices Australia. Its operation is planned to continue as the NDB is on Airservices' Backup Navaid Network (BNN).

The Mudgee Very High Frequency Omni Range (VOR) navaid is located 2 kilometres west of the airport terminal, outside of the current airport land boundary.

Automatic Weather Information Service

A Bureau of Meteorology Automatic Weather Information Service (AWIS) is provided at Mudgee Airport. The automated weather station (AWS) is located adjacent to the IWI and signal area.

3.1.5 INSTRUMENT APPROACH PROCEDURES

Approaches to the aerodrome in the instrument meteorological condition (IMC) require the use of procedures based on the NDB navigation aid or on satellite-based technology. Currently the following procedures are published for the airport:

- NDB Runway 22 Arrival;
- VOR-A; and
- RNAV (GNSS) Runway 22 Arrival

Instrument approaches to Runway 04 are not possible due to the high terrain to the south of the airport. High terrain prohibits circling to the south-east of the airport, and right hand circuits are required for Runways 16 and 22.

3.1.6 FUELING FACILITIES

Mudgee Aerodrome's fuelling facility is located adjacent to the Mudgee Aero Club, to the south of the passenger terminal. The facility is operated by a contractor and has above ground AVGAS and Jet A-1 fuel storage tanks under cover. Both fuel types are available through a bowser dispensing system using keycard access and there is an airside Jet A-1 above-ground fuel hydrant point adjacent to the main apron for larger aircraft. Access for road tankers is via Gate 2 adjacent to the Mudgee Aero Club.

3.1.7 SURFACE ACCESS

Surface access to the passenger terminal and GA areas is from George Campbell Drive which is a sealed two-lane road off Ulan Road. Access to the passenger terminal, main car park and hangar development to the south is via a sealed two-way road. Access to the hangar development to the north of the passenger terminal is also via a sealed two-way road with a turning area at its northern extremity.

The main car park provides 41 parking spaces plus 1 disabled space. Within the car park a total of four spaces are reserved for the car rental companies, Thrifty and Hertz.

A car park is also located between George Campbell Drive and the northern hangar development.

3.1.8 HANGAR DEVELOPMENT

Hangar development is located north and south of the main apron and passenger terminal area which are occupied by a variety of activities including private hangars (one with residential accommodation), the Rural Fire Service (RFS), commercial aviation and aviation-related businesses and Mudgee Aero Club. All facilities are either leased from, or are sited on land leased from Council.

Northern hangar area

A number of hangar facilities have been developed to the north of the passenger terminal. These include:

- An open-fronted hangar owned by Council and currently used primarily to store airport equipment. An area is also occupied by Airwest Flight Training;
- Three other hangars occupied by private individuals;
- Two larger hangars owned and occupied by an aerial firefighting contractor (R & M Aircraft); and
- A private hangar facility with pilot accommodation owned by Observe Air.

Southern hangar area

South of the terminal, in addition to the aviation fuel storage facilities, is the Mudgee Aero Club building and three (3) hangars.

Commercial Helicopters

A private helicopter operator (Commercial Helicopters) occupies three hangars and a number of associated facilities on a freehold site located in the south east corner of the airport. These facilities are located outside the airport boundary, although airside access is provided under arrangement with Council. The same proprietors also operate another helicopter business and an avionics business (Airborne Avionics) from the same facilities. These three businesses make extensive use of the Mudgee Regional Airport facilities.

3.1.9 UTILITIES AND CIVIL INFRASTRUCTURE

Electricity

Electricity is supplied to the terminal precinct and southern hangar area via overhead supply. A pad mounted sub-station has recently been installed at the southern end of George Campbell Drive, adjacent to the Commercial Helicopters property.

Water

The passenger terminal and building area are supplied from George Campbell Drive and reticulated to the particular facilities. A header tank is located near the airport entry gate.

Sewer

A sewer system is connected to the hangar developments and has recently been connected to the town system via a gravity sewer running from the Southern Hangar Area to a pump station adjacent to southern boundary of the airport.

Sewer is not connected to the terminal building, cottage or aero club, which all operate on septic systems.

3.2 HISTORICAL AVIATION ACTIVITY

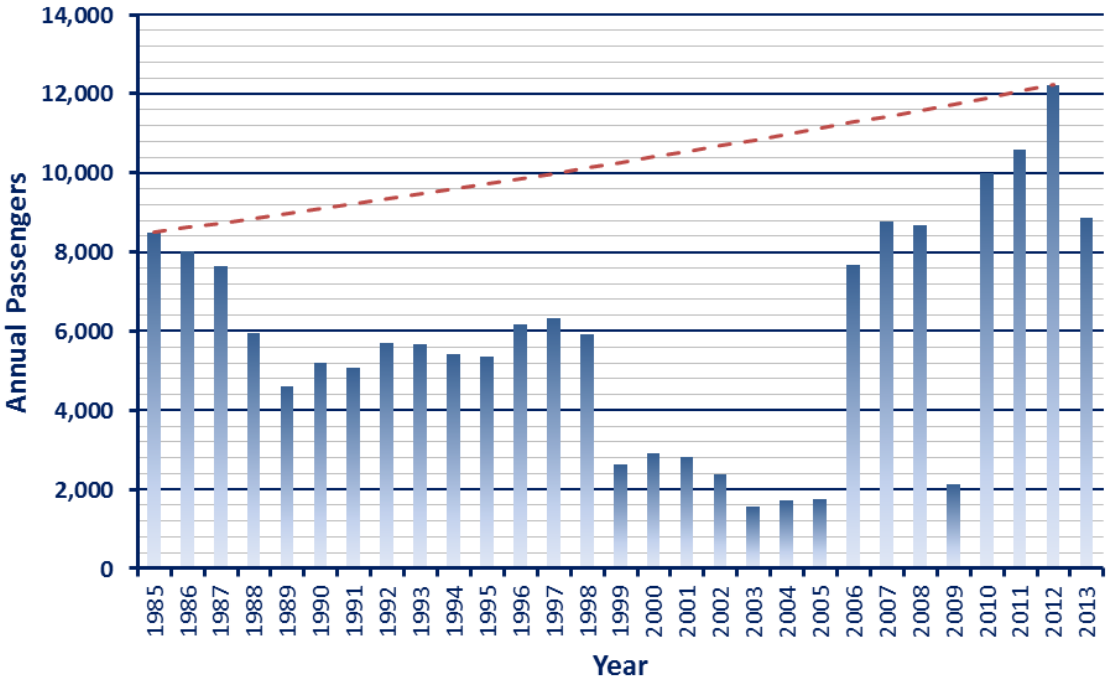
3.2.1 PASSENGER TRAFFIC

Figure 1 shows passenger numbers travelling on Regular Public Transport (RPT) services during the period 1985 to 2013. Overall passenger numbers have been extremely volatile over the period, varying from less than 2,000 to more than 12,000. It is likely that this variability is partly a result of the passenger demand being at a relatively low level where small schedule or aircraft type changes may make a big difference to the actual numbers of travelling passengers.

Overall, there was an annual average growth rate of 1.4% from 1985 to 2012, although the period 2006 to 2012 has an annual average growth rate of 6.9%. 2013 passenger numbers do not represent a full year of airline services, as a result of the grounding and subsequent liquidation of Brindabella Airlines in November and December of that year.

A new RPT service to Sydney operated by FlyPelican using 19-seat Jetstream 31 aircraft commenced in June 2015. FlyPelican currently operates 11 weekly return services from Mudgee.

Figure 1: Historical Passenger Traffic 1985 – 2013



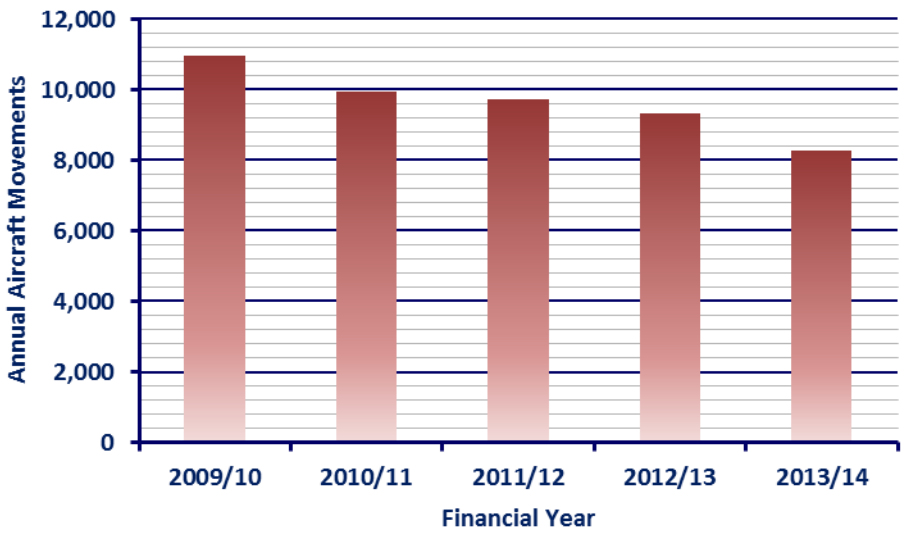
Source: BITRE

3.2.2 AIRCRAFT MOVEMENTS

Figure 2 displays total aircraft movements at Mudgee Regional Airport from 2009/10 to 2013/14. This shows there has been a declining trend in aircraft movements over the last five years. The annual average growth rate for this period is -6.8% for the total period, this includes 2013/14 when

RPT services ceased at the airport as a result of the liquidation of Brindabella Airlines in December 2013. FlyPelican has re-established these services from June 2015.

Figure 2: Historical Aircraft Movements 2009/10 to 2013/14



Source: Avdata

Figure 3 shows aircraft movements by activity for the full 12 months during 2012/13 when RPT services were still in operation. **Figure 4** shows the estimated proportion of movements by type of activity in 2014 (January to June data available only), based on aircraft movement data, following the cessation of RPT services in December 2013.

Figure 3: Aircraft Movements by Activity - 2012/13

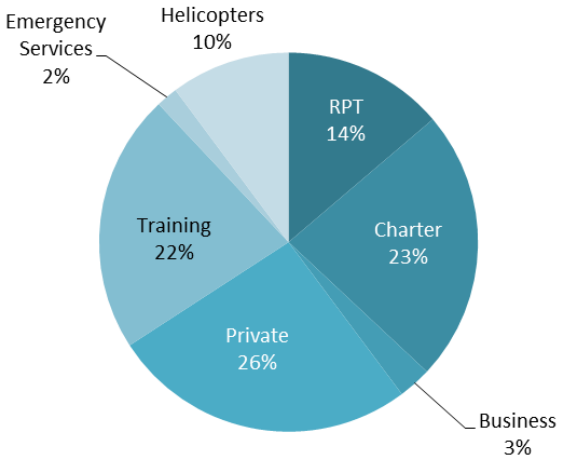
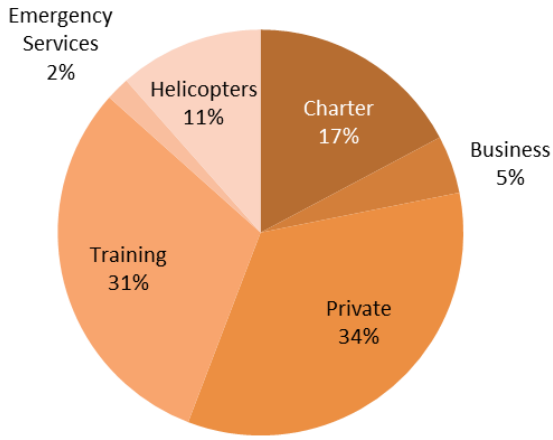


Figure 4: Aircraft Movements by Activity - January to June 2014



Private

In the first half of 2014, private operations are considered to account for approximately 34% of aircraft movements at the airport. This includes all recreational flying at the airport including all movements by aircraft based at the airport and movements by itinerant aircraft.

Training

It is estimated that training movements account for approximately 31% of all movements at the airport. This includes all based operations as well as itinerant training operations. This accounts for all training, stop and go and practice approaches recorded at the airport.

Charter

Charter operations account for approximately 17% of all movements at the airport. This includes all movements operated by aircraft that have been hired or are being used to carry passengers or goods.

Helicopter

Helicopter movements account for approximately 11% of all movements at the airport. This includes all movements by Commercial Helicopters who are based at the airport as well as all visiting helicopters.

Business

Business includes all movements that are related to business activities whether aviation-related or not. These account for approximately 5% of all movements.

Emergency

This category includes all movements undertaken by the Royal Flying Doctor Service and any other emergency service including the Police and RFS. This category accounts for approximately 2% of all movements at Mudgee Regional Airport.

RPT

Although not shown in **Figure 4**, prior to the cessation of RPT operations in December 2013, RPT movements accounted for approximately 14% of all movements at the airport. This included all operations by Brindabella Airlines, using the 19-seat Metroliner.

4.0 ECONOMIC AND BUSINESS DEVELOPMENT OPPORTUNITIES

To understand the possible opportunities for future aviation-related activities, feedback from the stakeholder consultation was combined with REHBEIN Airport Consulting's knowledge of key aviation industry trends and experience from a range of other regional airports, to understand existing and potential future economic and business opportunities for Mudgee Regional Airport.

Aviation and aviation-related opportunities were all considered with a view to facilitating the growth of the airport. The following paragraphs highlight the opportunities considered most feasible, although of course others may exist now or in the future. These opportunities are then considered in estimating potential future aviation activity at the airport as well as in the land use planning to ensure aviation-related opportunities can be accommodated.

4.1 AVIATION OPPORTUNITIES

4.1.1 PASSENGER SERVICES

The provision of RPT services provides valuable air links that support the local economy, particularly the mining industry and the attraction of a new operator to the Mudgee – Sydney route is a seen as key opportunity for the airport which Council has been pursuing throughout 2014 following the closure of Brindabella Airlines. FlyPelican re-established services in June 2015, offering a double-daily weekday return schedule from Sydney and one Sunday afternoon return service.

Potential also exists for triangulated services with Dubbo or, more likely, destinations further west like Cobar which also do not have passenger services at present. Whether there is sufficient demand to support RPT services on 30 – 50-seat aircraft is a question which would require more detailed specialist investigation. However the relative proximity of Mudgee by road to Sydney, as well as to regional RPT services in Dubbo, might mean that alternative forms of passenger service to RPT may be required to satisfy local demand growth above that served by FlyPelican or a similar 19-seat RPT operator.

Opportunity exists for new charter operators to base themselves at Mudgee Regional Airport. Such an operator could provide services that support the local industries including the demands of the local mining activities and supplement RPT services. Demand for charter operations may also come from the local tourism industry including transporting visitors to and around the region for the local food and wine attractions as well as the various sporting and cultural events that take place throughout the year.

Commercial Helicopters is an existing charter operator at Mudgee Regional Airport and provides helicopter services including agricultural aerial spraying, mining support, fire-fighting, aerial surveys and scenic flights.

4.1.2 FLIGHT TRAINING

Flying training can be broadly separated into that which is provided to private individuals, or academy-style commercial airline pilot training centres. Whilst there are variations within this spectrum, different sectors of the flying training industry have varying requirements which can be generally classified according to these two categories.

Like many regional locations in Australia, Mudgee's location and airspace are conducive to *ab initio* pilot training.

Commercial Pilot Academy

Flight training for commercial airlines is gravitating towards an academy model, focussed around high-intensity flying operations combined with intensive study. Academies generally seek to operate in the 100-200 students per year range to maximise efficiencies in what is becoming an extremely cost-competitive market. These academies usually accommodate around 100-150 cadets on site at any time, and require an integrated campus incorporating accommodation, education, training and maintenance facilities occupying several thousand square metres. Such academies generate high-intensity flying operations with large volumes of touch-and-go circuits needing to be completed as efficiently as possible. Such academies also need easy access to international gateways for cadets, educational linkages to provide basic English skills, and airport facilities which are compatible with high-levels of training. Ideally, such airports will be dedicated to flight training or at least prioritise this activity over other aviation uses.

As such, commercial pilot training is largely confined to the major metropolitan general aviation airports, with Bankstown Airport in Sydney and Camden Airport being major providers. Whilst some regional airports within Australia are attracting large commercial flight training facilities to locate on their site, these facilities have specific requirements in terms of the area of land and facilities that they require. Mudgee's location and weather are potential attractants, a lack of ready access to controlled airspace could be seen as a disadvantage.

Despite the unprecedented expected demand for commercial pilots within the Asia-Pacific region over the next 20 years, it is unlikely that Bankstown Airport will reach capacity before about 2040. During this period it is possible that some smaller flying schools serving recreational and private pilots may be displaced and there is also uncertainty regarding the impacts the proposed Western Sydney Airport at Badgerys Creek may have on operations. However, it is considered likely that major commercial pilot training is likely to remain consolidated at Bankstown.

Private flight training

Whilst the opportunities for pilot training schools of various types to establish at Mudgee Regional Airport are not to be ignored, it is also important to be realistic and target appropriate possibilities. Rather than major airline flight training academies, it is considered more likely that the congestion and demand for intensive flying training at the metropolitan airports, will presents opportunities for regional aerodromes to serve the pilot training needs of individuals in a less congested

environment and where a more personal service can be offered. Mudgee would appear to be ideally placed for this with conducive meteorological conditions, established tourism infrastructure, convenient and economical access by road to the major population centres in greater Sydney and plenty of other attractions in the area. Potential therefore exists for Mudgee Regional Airport to attract additional private flight training for individuals at the recreational, private pilot and commercial pilot levels.

4.1.3 RECREATIONAL FLYING

Potential exists for Mudgee Regional Airport to attract additional recreational flying movements, for similar reasons to those described above. This activity may either originate from Mudgee or recreational pilots may utilise the airport as a destination. It is anticipated that the airport could attract recreational flying that cannot be accommodated in the Sydney area due to capacity issues or attract some pilots away from the busy Sydney airspace to the more relaxed airspace at Mudgee. Recreational pilots may also be attracted to Mudgee by the attractive surrounding landscape, proximity of the airport to the town and the numerous tourist attractions, particularly those related to food and wine.

4.1.4 TOURISM-RELATED AVIATION

There are a number of opportunities which can be considered together under the term 'tourism-related' aviation. These include itinerant aircraft visitation, fixed base operators, charter and pleasure flights and skydiving. These are considered to be opportunities for growth as a result of Mudgee's characteristics as a tourism destination, with the potential for relevant aviation businesses to provide services for visitors.

Itinerant Aircraft and Fixed Base Operators

Somewhat distinct from a charter operator, although potentially part of the same business operation, a fixed base operator (FBO) offer servicing for itinerant private, corporate and charter aircraft. Catering more to business aircraft operators and high-end private aviators, in combination with the associated tourism draws to generate the itinerant aircraft demand it is likely that the need for a FBO would develop over time. Given the proximity of the airport to a number of vineyards, the opportunity to jointly market day-trips and weekend visits by air to Mudgee's wineries, with luxury accommodation, private travel, personalised winery tasting tours and the ability to carry purchases home, would seem to be viable.

Charter and Pleasure Flights

There is likely to be potential for growth in this sector in combination with increased tourism visitation in general.

Skydiving

Skydiving is, anecdotally, an apparent growth sector within the leisure aviation industry. Mudgee's locational advantage suggest that it might be considered viable for a skydive operator to establish at the airport. As an initial step there are skydive companies which 'fly-in' to regional destinations in

order to serve sporadic demand. However, again it is considered to be tourism-related demand rather than local residents that would take advantage.

4.1.5 AIRCRAFT MAINTENANCE, REPAIR AND OVERHAUL

As the number of aircraft based on the airport increases, and as the amenities available to visiting pilots increase, opportunities for the expansion of existing aircraft maintenance services will increase. As this grows, the viability of subsidiary specialist services such as avionics, aircraft interiors (seats & upholstery) and aircraft painting will also grow.

Similarly to pilot training, Mudgee offers accessibility to the Sydney GA market and the associated opportunities for maintenance companies to attract business from elsewhere.

4.1.6 RESIDENTIAL AIRPARK DEVELOPMENT

The demand for hangar accommodation combined with residence is becoming increasingly popular in Australia and can, in general, be considered an important growth sector. There is already one example of this type of development at Mudgee.

A number of factors contribute to the success of an airpark development, including resident demographics, facilities and safety standards. An important element is appropriate development controls to ensure quality.

There are several successful airparks within Australia and these include the Whitsunday Aviation Village Estate (WAVE), which would be considered the prime example of a high-quality development in a tourism-oriented location. An airpark is also under development at Rylstone, near Mudgee, which is of a similar nature to WAVE. Any airpark development at Mudgee Regional Airport should therefore be considered in light of the offer available at Rylstone.

Airparks appeal to a certain demographic, which generally includes aviation enthusiasts, charter businesses and holiday-makers. Key motivations for choosing to live in an airpark include sharing a common interest with like-minded people; a ready availability of aviation infrastructure; and the high level of security and convenience provided.

According to a study of airparks in the USA, the estates generally attract people aged over 50 who are semi-retired professionals, with significant assets and moderate to high disposable income. They also have time available to fly and maintain their own aircraft. This selective demographic may also be attracted to the investment potential of airparks because there are few parks and property values within them are high, relative to similar property. No such studies are available in relation to Australian airparks, although there is no reason to suggest the findings would be different.

At a minimum, airparks must adhere to the relevant Civil Aviation Safety Authority (CASA) guidelines in relation to infrastructure, technical support and resident-use amenity. It should be noted however that none of the existing airpark developments are at airports which also serve airline operations and therefore the requirements in relation to segregation and control of airpark

users with respect to safety and security have never been fully tested in Australia. Generally, resident access to the runway, taxiway and terminal areas has to be monitored and this requires a security system that can be accessed via a key pad or swipe card together with a limited number of taxiway connections to the airfield proper.

Lot size differs and depends on the location of the airpark, but general lot size falls between 800m^2 and 2,500m^2. The price of lots also varies, depending on the location and the facilities offered on site and the surrounding areas.

For a variety of reasons, long-leasehold arrangements provide greater power to ensure users comply with safety, security and general behavioural requirements. However, to encourage the investment needed to achieve a quality development freehold tenure may be necessary.

There is limited land within the existing Mudgee Regional Airport boundary to achieve anything approaching a true airpark concept and therefore it is recommended that any response to this type of opportunity be restricted to the adjacent Airport Related Development Opportunity lands.

4.2 AVIATION-RELATED COMMERCIAL DEVELOPMENT OPPORTUNITIES

The following points describe the potential opportunities for the development of aviation-related facilities at the airport, which Council may facilitate through the provision of appropriate airside and landside subdivision infrastructure:

- The construction of a Rural Fire Service (RFS) museum at the airport is currently being considered by the RFS. This will provide an additional tourist attraction for the aviation and general community in the Mudgee area;
- Provision of aircraft maintenance and avionics at the airport through the opening of an aircraft maintenance provider;
- To encourage tourism to the area, aircraft maintenance services could be provided as a ‘package’ coupling it with an overnight stay in Mudgee providing the opportunity for visitors to sample the local food and wine attractions on offer;
- Private airport storage to support the potential increase in private flight training and recreational flying at the airport;
- Development of hangars which can be leased to aviation businesses, providing an income stream for Council;
- Development of hangars with residential accommodation. Similar to the hangar that already exists and offers pilot accommodation, further hangars may be developed that allow people to permanently reside at the airport with direct access to the aircraft and the runways. Alternatively, short-stay tourist accommodation could be developed.
- Development of hangars with mixed non-aviation uses such as function facilities. These could provide facilities for businesses in the area by providing meeting rooms and other function facilities as well as support such activities as airshows and fly-ins;

- The existing landing fees are currently considered a deterrant to recreational and training flights, a reduction in landing fees at Mudgee Regional Airport would support the potential growth of these activities; and
- Potential exists to promote the area and airport to the recreational flying community by hosting fly-ins that allow visitors to sample the tourist attractions in the region as well as utilising the airport facilities.

As businesses begin to locate at the airport, opportunities exist to exploit potential synergies between businesses and activities. For example, the establishment of a light aircraft maintenance business at the airport may attract other charter operators and private aviators to locate to the airport.

4.3 FUTURE AVIATION ACTIVITY FORECASTS

4.3.1 PASSENGER DEMAND

Airport infrastructure, particularly the passenger terminal and landside access facilities, need to be planned with sufficient capacity to accommodate future anticipated passenger levels. Passenger demand has therefore been considered to understand the future facilities required at the airport and to feed into the aircraft movement forecast.

Historical data presented in **Section 3.2.1** shows that passenger numbers at the airport have fluctuated considerably over the last 20 years. Based on the historical passenger data available it is estimated that there is a general baseline demand of approximately 10,000 – 12,000 passengers per annum at Mudgee.

The overall average compound annual growth rate (CAGR) for passenger numbers over the last 20 years is 1.4%. Taking into account the driving time to Sydney (and that from greater Sydney's main population centres to Mudgee) along with the competitive presence of Dubbo for regional air services, it is considered that this would represent a realistic base case for passenger growth even if local population growth exceeds expectations. As a high-growth scenario, an annual growth rate of 5% has been applied. This is consistent with the highest growth forecasts presently available for the Australian market, which is seen as maturing over the next 20 years.

The base scenario suggests annual passenger demand of between 13,000 and 16,000 passengers approximately by 2035, and the high-growth scenario results in a passenger traffic level of around 30,000 passengers by 2035.

In the absence of other significant, but currently unforeseen, external drivers in the local economy, passenger traffic in 2035 is expected to lie somewhere between the current situation and an annual throughput of 30,000 passengers.

4.3.2 FORECAST AIRCRAFT MOVEMENTS

Projections of annual aircraft movement numbers have been developed by segmenting aviation activity into its principal component sectors, each of which has differing drivers and prospects for growth at Mudgee Regional Airport. These sectors are:

- Passenger Transport;
- Charter;
- Business;
- Private;
- Training;
- Emergency Services; and
- Helicopters.

The potential for growth in aircraft movements at Mudgee is considerable, therefore a scenario-based approach has been used to forecast aircraft movements at the airport. The low-, medium- and high-growth scenarios for total aircraft movements are shown in **Figure 5**, with more than 60,000 movements in the high-growth scenario, more than 40,000 movements in the medium-growth scenario and 20,000 movements in the low-growth scenario by 2034.

The forecast aircraft movement growth in each market segment is discussed in the following paragraphs. **Figure 6** indicates how each segment is expected to contribute to the overall movement numbers in the medium-growth scenario, which is considered to represent a base case for airport facility planning purposes.

It should be emphasised that these forecasts have been developed for the purpose of ensuring that infrastructure planning makes adequate provision for the scale and nature of future airport facilities. They are not to be treated as predictions of actual growth, which will be dependent on a wide range of factors which include global, national and local economic conditions and the success of Council in promoting Mudgee Regional Airport as a place for aviation businesses to establish operations.

In particular, it should be noted that the medium- and high-growth scenarios assume that some or all, respectively, of the adjacent Airport Related Development Opportunity lands are developed by aviation businesses and contribute to the capacity requirements of the Mudgee Regional Airport movement area facilities. Whilst the movement numbers represented by the medium- and high-growth scenarios are certainly considered achievable through comparison with other successful and vibrant regional airports, they are contingent on Council realising development opportunities at and adjacent to the airport within the 20-year horizon of this Master Plan. Caution should therefore be exercised in using these forecasts for purposes beyond those for which they were developed. Even the low-growth scenario is considered unlikely to occur through latent demand alone – Council needs to work in parallel to generate the demand, through attraction of aviation and aviation-related businesses.

Figure 5: Forecast Aircraft Movements 2014 – 2034

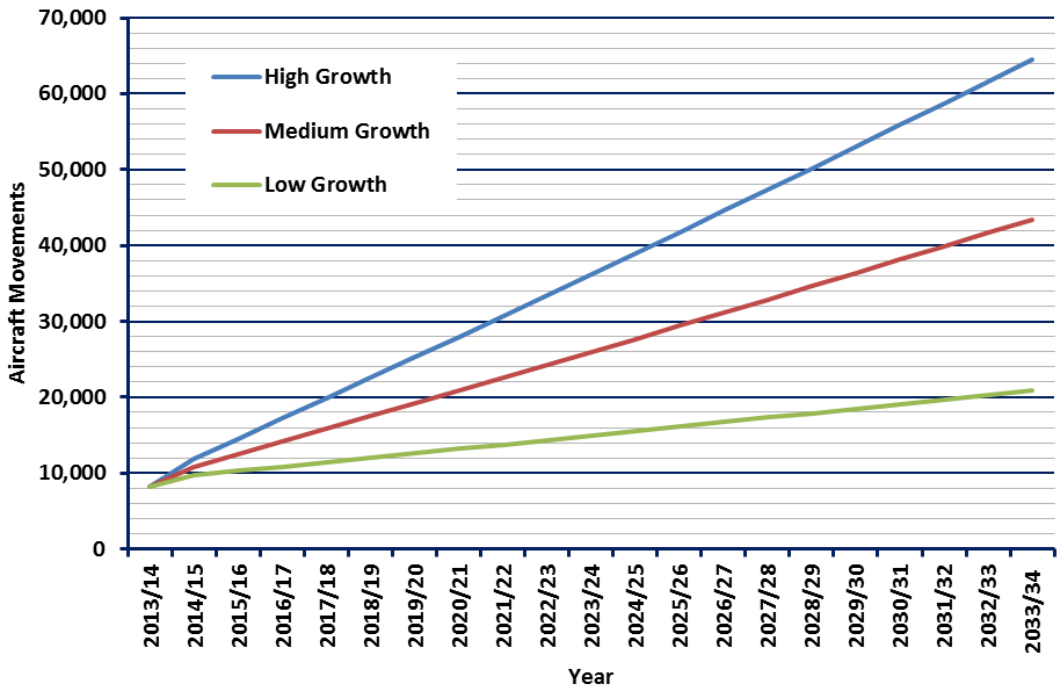
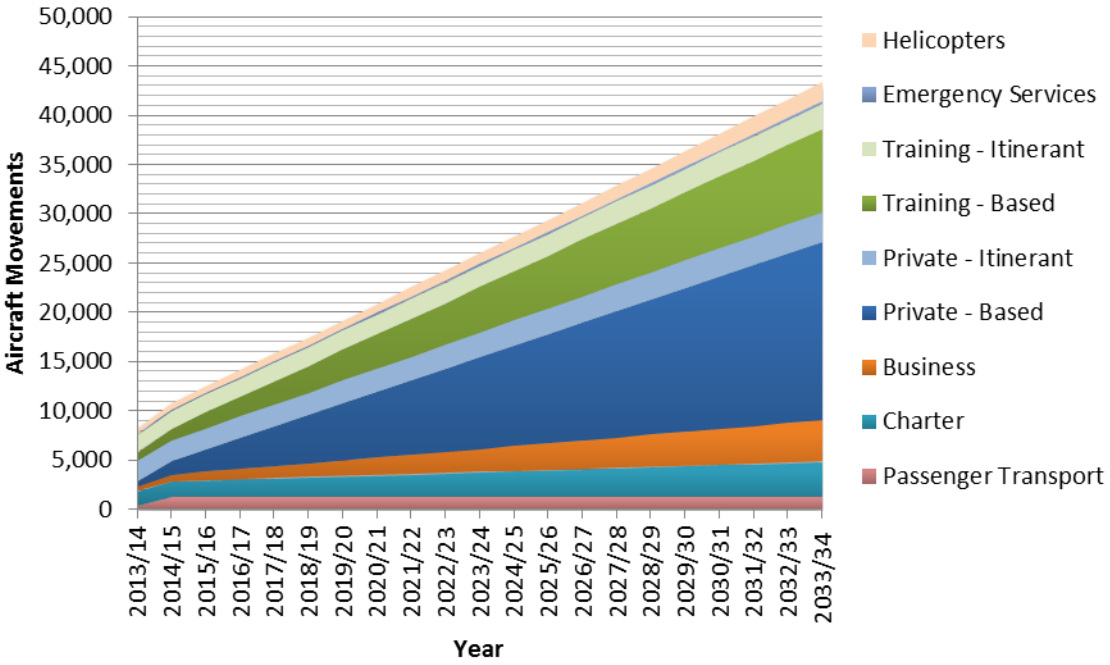


Figure 6: Forecast Aircraft Movements by Sector 2014 – 2034 (Medium-Growth)



Passenger Transport

All forecast scenarios assume that the estimated passenger demand set out in **Section 4.3.1** is met by charter, such as FlyPelican, or other passenger transport services, on a double-daily weekday return service (single-daily return at weekends) that may operate direct to Sydney or be part of a triangulated service with other regional airports in the vicinity. This results in approximately 1,250 movements per annum.

Charter

The forecast assumes that Mudgee Regional Airport will attract new charter operators to be based there, meeting the demands of the local economy for aircraft hire or the carriage of passengers and goods, this demand may be related to mining, tourism, agriculture or some other sector.

The high-growth scenario assumes that future development at the airport is significant and up to three charter companies may base themselves at the airport, in addition to the current levels of charter operation. This level of activity could generate around 4,500 movements per annum by 2034.

The medium-growth scenario assumes that charter activity at the airport will be less significant with approximately two charter operators at the airport generating around 3,500 movements per annum by 2034.

The low-growth scenario assumes that one charter operator may be based at the airport generating around 2,500 movements per annum by 2034.

Business

As well as the ongoing use of the airport by non-aviation related businesses with their own aircraft, the forecast assumes that Mudgee Regional Airport will attract new aviation-related businesses to locate there, meeting the demands of the local aviation community for services such as aircraft maintenance and avionics.

The high-growth scenario assumes that future development at the airport is significant with considerable growth in all segments, therefore resulting in an increased demand for aviation-related services. This could attract a number of new businesses to be based at the airport and is estimated to result in approximately 4,800 movements per annum by 2034.

The medium-growth scenario assumes that the increase in business activity at the airport is less steep and could generate around 4,000 movements per annum by 2034. The low-growth scenario assumes around 3,000 movements per annum by 2034.

Private

For forecasting purposes, private aircraft movements have been divided into two further sub-categories: Mudgee-based, and itinerant.

Mudgee-Based

Based private movements include all those generated at the airport by the existing and potential future development including activities such as private aircraft storage and residential airpark developments.

The high-growth scenario assumes that Mudgee attracts a number of private aircraft owners to base their aircraft at the airport away from the busy Sydney area. It is assumed that there is considerable development both within the airport and outside the airport boundary, including the residential Airpark for which a Development Application (DA) has already been received as well as further extensive development of a similar type. More than 29,000 based private movements would be expected to be generated by this level of development by 2034 in the high-growth scenario.

The medium-growth scenario assumes a lesser extent of development outside of the existing airport boundary. More than 18,000 based private movements are forecast by 2034 in the medium-growth scenario.

The low-growth scenario assumes that future development is retained within the existing airport boundary. More than 4,000 based private movements are forecast by 2034 in the low-growth scenario.

Itinerant

Itinerant private movements include aircraft that are visiting the airport only. Although GA movements have been decreasing at many airports, these forecasts assume that Mudgee's popularity as a destination airport, where visitors can enjoy the scenic views and its food and wine offerings, increases. The forecast therefore assumes that private itinerant visitation movements will increase by approximately 3% per annum in the high-growth scenario resulting in almost 3,800 itinerant private movements by 2034.

The medium-growth scenario assumes that growth in this area is less significant with 2% growth per annum resulting in approximately 3,100 movements by 2034.

The low-growth scenario assumes that the attraction of Mudgee is only sufficient to produce a 1% growth per annum, which is still in excess of contemporary GA growth rates at many locations, resulting in approximately 2,500 movements by 2034.

Training

Training aircraft movements have also been divided into based and itinerant movements for forecasting purposes.

Mudgee-Based

Based training includes all recreational training movements generated by recreational flight training schools at the airport itself. It is considered that Mudgee Regional Airport has the potential to attract a significant number of trainee pilots with multiple flight training providers. The high-growth scenario assumes approximately 35 students per year learn to fly at one or more flight training schools resulting in approximately 15,000 movements per annum.

The Medium-growth scenario assumes approximately 20 students per year learn to fly at one or more recreational flight training schools resulting in approximately 8,500 movements per annum. The low-growth scenario assumes approximately 10 students learn to fly at one or more recreational flight training schools resulting in approximately 4,000 movements per annum.

Itinerant

Itinerant training movements include aircraft that are visiting the airport only for training purposes. Similar to private itinerant movements, this scenario assumes that Mudgee's popularity as a destination airport, where visitors can enjoy the scenic views and relatively quiet and relaxed airspace away from Sydney, increases. The forecast therefore assumes that these movements will increase by approximately 3% per annum in the high-growth scenario. Approximately 3,100 itinerant training movements are forecast in the high-growth scenario by 2034.

The medium-growth scenario assumes that growth in this area is less significant with 2% growth per annum resulting in approximately 2,500 movements by 2034.

The low-growth scenario assumes that the attraction of Mudgee is less with 1% growth per annum resulting in approximately 2,100 movements by 2034.

Helicopters

There has been a general increase in helicopter activity in recent years throughout Australia, particularly as a result of resource activity but also more generally across the sector including emergency services. Overall helicopter registrations have increased at 6.5% per annum between 2008 and 2013 according to the Australian Helicopter Industry Association (AHIA). Given the established presence of helicopter businesses at Mudgee Regional Airport, growth prospects in this sector can be expected to be good.

The high-growth scenario therefore assumes that helicopter activity at the airport will grow at a slightly higher rate to recent helicopter registrations of 8% per year on average This would generate almost 2,650 helicopter movements per annum.

The medium-growth scenario assumes that demand for helicopter services at Mudgee Airport continues at the rate of recent national demand and uses a growth rate of 6.5% per annum, resulting in approximately 2,000 helicopter movements per annum.

The low-growth scenario assumes a lesser growth rate of 3% per annum which would generate just over 1,000 helicopter movements per annum.

Emergency Services

Population growth in the Mudgee area is likely to be the key driver behind emergency services movements at the airport, particularly for the RFDS. Therefore, the high growth scenario growth for this segment matches the population forecast growth of 3% to 2020/21 and 1.5% from 2021/22 to 2034. This results in almost 300 movements per annum by 2034.

The medium-growth scenario assumes that population growth is less and uses a growth rate of 2% to 2020/21 and 1% on to 2034, resulting in approximately 250 movements by 2034.

The low-growth scenario assumes a flat growth rate of 1% across all years to 2034, generating approximately 230 movements by 2034.

5.0 DEVELOPMENT CONCEPT

5.1 GENERAL PRINCIPLES

This section describes the overall development concept envisaged for Mudgee Regional Airport on the basis of its ultimate utilisation of available land. The concept presents what is considered to be the optimal strategic direction for the airport by identifying and determining the spatial allocation of land in a balanced manner.

Aeronautical infrastructure development is described in **Section 5.2** and non-aeronautical development in **Section 5.3**. Although each is described separately, they are inherently linked as it is the aviation-related commercial development which will largely influence the requirements for aeronautical infrastructure.

The development concept described in this section is based on an assessment of the likely ultimate aviation needs of Mudgee Regional Airport. Further discussion on logical staging of the development, in accordance with demand, is provided in **Section 6.1**.

5.2 AERONAUTICAL INFRASTRUCTURE

The proposed aeronautical development concept, covering airfield and terminal infrastructure requirements and development staging, has been prepared on the basis of satisfying a set of critical planning parameters. **Section 5.2.1** sets out the critical planning parameters upon which the aeronautical development proposals are based. This is followed by presentation of the proposals and development concepts for the runways, taxiways, aprons and passenger terminal.

Figure C, Figure D and **Figure E** set out the concepts described in this section in more detail.

5.2.1 DESIGN AIRCRAFT CHARACTERISTICS

CASA requires that aerodrome movement area infrastructure is designed to the standards applicable to the aircraft that the facilities are intended to serve. The relevant standards are set out in the CASA Manual of Standards Part 139 (MOS Part 139) and are based on an aerodrome reference code system established by the International Civil Aviation Organisation (ICAO), of which Australia is a signatory.

Aerodrome Reference Code

The dimensions, shape and layout of basic aerodrome facilities such as runways, taxiways and aprons are essentially determined by the performance capability and size of the aircraft that are intended to use them. The planning and design of these facilities therefore begins by identifying the most demanding or critical aircraft that will use them.

In Australia, like most countries, this is achieved by using the ICAO aerodrome reference code system. The reference code has two elements, a number and a letter, which are derived by grouping aircraft with similar performance capability and key physical dimensions. Thirteen aircraft

groupings, each with a unique code number and letter combination such as 1A, 2B, 3C and 4D have been identified.

The objective is to plan individual facilities for the critical aircraft likely to use them. Different facilities at the airport, such as those intended for RPT services and those intended solely for GA aircraft, are normally planned for their specific critical aircraft. On the other hand, common use facilities such as the primary runway and taxiway system will be planned for the most demanding aircraft envisaged to use the airport.

Pavement Strength

The strength of airfield pavements is classified using the ICAO Aircraft Classification Number/Pavement Classification Number (ACN/PCN) system. The ACN is calculated by the aircraft manufacturer for each aircraft, based on the damaging effect of the aircraft on different types of pavement. The ACN is dependent on both the maximum weight of the aircraft and the number, type and configuration of the landing gear. The ACN also includes a component related to the tyre pressure of the main gear, which can often become the critical parameter in relation to pavement strength.

Principal Aircraft Parameters

Table 2 summarises the principal relevant planning parameters that relate to aeronautical facilities for each of the key aircraft types that might conceivably use Mudgee Regional Airport in the future.

Table 2: Principal Design Aircraft Key Parameters

Aircraft Type	ICAO Aerodrome Reference Code	Wingspan (m)	MTOW (kg)	Typical Passenger Capacity (Pax)
Cessna 172	**1A**	10.9	1,160	N/A
Cessna 404	**1A**	14.1	3,810	N/A
Beech Super King Air 200	**1B**	16.6	5,670	8-10
Cessna 208 Caravan	**1B**	15.9	3,310	9 – 12
Cessna 441	**1B**	15.1	4,468	8 – 10
DHC6 Twin Otter	**1B**	19.8	5,670	19
Air Tractor AT-802A	**1B**	18.0	7,257	N/A
Pilatus PC-12	**2B**	16.2	4,740	N/A
Embraer EMB-110	**2B**	15.3	5,670	19
Cessna Citation I / II	**2B**	15.8	6,030	8
Bae Jetstream 32	**2B**	15.9	6,250	19
Beech 1900D	**2B**	16.6	7,530	19
Metro III	**2B**	17.4	6,580	19
Bombardier CL-600	**3B**	18.9	19,620	19
Dassault Falcon 900	**3B**	19.3	20,640	19

Aircraft Type	ICAO Aerodrome Reference Code	Wingspan (m)	MTOW (kg)	Typical Passenger Capacity (Pax)
Embraer E-145	**3B**	20.0	24,100	50
Dash 8-100, -200	**2C**	27.4	15,650	36
Dash 8-300	**2C**	27.4	18,645	50
Metro 23	**3C**	17.4	7,480	19
Saab 340	**3C**	21.4	13,155	34
Fokker F50	**3C**	29.0	20,820	55
ATR 72	**3C**	27.0	22,000	68
Dash 8- Q400	**3C**	28.4	29,260	74

Master Plan Design Aircraft

At the forecast passenger traffic levels, the largest aircraft size requirement envisaged during the next 20 years is for 19-36 seat aircraft types. These are encompassed by a 3C aerodrome reference code.

From a commercial GA perspective, the vast majority of opportunities are likely to be covered by aircraft in the 2B or 3B categories. However, there are sufficient possibilities which would require Code C accessible facilities to ensure that these are provided for within certain areas of the airport. These areas include the main apron, taxiway connection to the Runway 22 threshold, and selected development sites within the South East and South West Development Zones.

5.2.2 RUNWAYS AND RUNWAY STRIPS

No upgrade or extension of the runways is proposed and the Master Plan retains, generally, the existing runway and runway strip geometry and characteristics. These characteristics are adequate for the range of aviation and aviation-related opportunities described in **Section 4.0** in accordance with current CASA requirements.

Provision is made to safeguard a future increase in runway strip width for Runway 04/22 to 150m, through the addition of 30m flyover areas on each side of the existing 90m wide graded strip.

The areas required by the new RESA standards for Runway 04/22 are also indicated, although these are not a mandatory requirement at present. It is nonetheless recommended that Council considers acquiring the small areas of land required to implement the current RESA standards in the future, whenever it may be economical to do so, in order to minimise any risk that the length of runway would need to be reduced.

5.2.3 TAXIWAYS

Provision for a suitable taxiway system has been identified based on the ultimate development of the currently available land, whilst also facilitating potential connections to adjacent land which may

be used for airport-related opportunities. The future taxiway layout is indicated on **Figure C**, with further detail on **Figure D.**

The long-term objective for taxiway development is to establish a parallel taxiway arrangement wherever sufficient land exists. By ensuring that backtracking operations on runways are minimised, capacity of the runway system will be maximised allowing the greatest number of aircraft movements to occur as efficiently as possible.

In addition to the parallel taxiways, additional taxiways and taxilanes are proposed as required to serve to hangar development.

Development of the taxiway system, including the parallel taxiway components, can occur incrementally as demand grows and operational requirements dictate. As an initial stage, taxiways can be formalised on the natural surface for use when environmental conditions permit. As demand grows, taxiway links can be progressively sealed for all-weather use and strengthened for larger aircraft.

5.2.4 PASSENGER TERMINAL

The terminal in its current form would be adequate for charter or air taxi services by aircraft with less than 9 passenger seats. Council is planning a modest extension of the terminal building, which will be completed in 2015. It is considered this would be sufficient to remove the reported congestion associated with 19-seat aircraft turnarounds.

Given the prospects for re-establishing passenger services with greater than 19-seats at Mudgee, any requirement further for extension is considered unlikely within this Master Plan horizon. Nonetheless, an ultimate requirement for larger terminal facilities should not be ruled out. The characteristics of the airport site do not readily suggest any suitable alternative location for passenger terminal facilities, and the ultimate aeronautical development concept assumes that any aircraft of sufficient size to operate future regional airline services would be accommodated in the general vicinity of the existing terminal.

An expansion reserve for the passenger terminal building has therefore been identified to ensure that alternative uses do not preclude further augmentation or redevelopment of the terminal in its current location, should this ever be required. The reserve, indicated on **Figure E**, is adequate to enable a significant upgrade of the terminal, sufficient to handle larger charter operations or regular public transport services by up to 50-seat aircraft in comfort.

5.2.5 AIRCRAFT PARKING AREAS

Provision for apron parking is made in two main areas within the ultimate concept:

- Expansion of the itinerant aircraft stand-off apron and expansion to the north of the main apron. A long-term aircraft parking concept for this area is shown in **Figure E**; and
- Development of new apron parking in the south of the airport land adjacent to Commercial Helicopters.

All the proposed apron areas are accessible by Code C aircraft, but could be used for smaller aircraft.

5.2.6 OTHER AIRFIELD FACILITIES

Fuel Facility

The fuel facility is likely to remain adequate in the short to medium-term. The Master Plan proposed realignment of Taxiway D which will provide space for aircraft to taxi up to the fuel facility without infringing the taxiway strip.

NDB

Although users indicated that there is essentially no requirement to use the NDB in the presence of the VOR and satellite-based instrument procedures, Airservices (the owner of the NDB) requires it to remain to provide en-route backup navigation capability for the wider air traffic network.

The NDB currently restricts the development hangar sites within the South West Development Zone, and so any opportunity to relocate the NDB ought to be considered.

5.3 NON-AERONAUTICAL DEVELOPMENT

Airports with available land that is not required for future aeronautical infrastructure have the potential to generate diverse revenue streams and produce economic generators. Revenue raised through the use of this land can be used to pay for major investments and expenditure growth. The airport also has a wider economic benefit to the area. The airport and the businesses located there employ local people. Furthermore, airports also invest relatively large amounts to meet new requirements, maintain their infrastructure and expand capacity. These investments often comprise both local construction and equipment.

Council would like to continue to take advantage of the available land at the airport to develop aviation-related activities and businesses whilst not infringing on the aeronautical requirements of the airport.

In responding to the objectives of the Master Plan, as described in **Section 1.2**, the main features of the non-aeronautical development concept include provision for additional aircraft hangars. The term 'hangar' is a generic description encompassing those types of facilities requiring airside access and therefore by definition includes such things as aircraft maintenance facilities, flying training schools, charter and fixed-base operations which might address the aviation-related opportunities described in **Section 4.0**

5.3.1 KEY DEVELOPMENT CONSTRAINTS

There are three key constraints to development which it has been necessary to take explicit account of in the preparation of the development non-aeronautical concept set out below. These are:

- The Mudgee NDB is on Airservices Backup Navigation Network and will therefore continue to be in service for the foreseeable future. Airport development in the vicinity of the NDB will need to be compliant with NDB siting guidelines including building height limitations, until such time as the NDB is decommissioned or it can be relocated to an alternative location. The current location of the NDB means it prevents any development within a 60m radius of the antenna[4]. This limits the extent of subdivision development that is possible within the South East Development Zone. Development outside 60m may also need to be subjected to a technical assessment by Airservices;
- The protection of obstacle limitation surfaces applicable to a Code 3 instrument non-precision approach runway with 150m wide runway strip. This effectively limits further development to the north of the terminal; and
- The limited extent of land available within the existing airport land boundary outside the runway and runway strip areas.

5.3.2 PROPOSED DEVELOPMENT AREA

To accommodate the identified opportunities set out in **Section 4.0**, development has been identified based on their specific requirements, constraints, likelihood, timing, synergies with other activities at the airport and the available land.

- Terminal precinct;
- Northern development zone;
- South East development zone; and
- South West development zone.

The principal features of each precinct are discussed below.

Terminal Precinct

This precinct incorporates existing passenger terminal building and car park, along with future expansion reserve for both.

The expansion reserve for the passenger terminal building is adequate to enable a significant upgrade of the terminal, sufficient to handle larger charter operations or regular public transport services by up to 50-seat aircraft in comfort.

The car park expansion would accommodate an additional 40-50 spaces as described in **Section 5.3.3**.

[4] CASA MOS Part 139 v1.12 November 2014 para 11.1.13.1 stipulates that a radius of 150m from the NDB antenna should be kept clear of buildings exceeding 2.5m in any dimension. However, this requirement is generally proven to be conservative based on development at other airports. Airservices siting criteria for NDB state that development proposals between 60m and 300m radius from the centre of the NDB anteann that exceed an elevation angle of 5° from ground level at the centre of the antenna require assessment. This effectively permits buildings up to 5.25m high at a 60m radius without assessment and larger buildings subject to assessment.

Northern Development Zone

The northern development zone incorporates the existing development to the north of the terminal in the northern hangar area. Practically, further development in this zone is precluded through a lack of available land and OLS constraints.

Subject to possible development in the adjacent airport related development opportunity lands, some development or redevelopment along the current eastern boundary might be possible.

South East Development Zone

This precinct is envisaged as representing the development of a 'best in state' aviation industrial subdivision. Incorporating the three existing hangars in the Southern Hangar Area expansion is planned to the south and east, to occupy the land recently purchased by Council and ultimately becoming contiguous with the Commercial Helicopters development and the proposed RFS facility.

The key development concept features are:

- Realignment of George Campbell Drive to facilitate taxiway access to new hangar development lots, with associated new airport access on to Ulan Road;
- Ten (10) lots 40m wide by 55m deep approximately suitable for typical commercial operations utilising Code B aeroplanes;
- A further 8-10 lots of similar dimensions for future development once the NDB is decommissioned or relocated;
- Two (2) 50m wide by 80m deep lots with the option of around 8,000 sq m of adjacent licensed apron area to be used for access and parking of up to Code C aircraft; and
- A premium corner site currently identified for a non-aviation related Rural Fire Service heritage museum and administration facility.

South West Development Zone

An area suitable for further subdivision has been identified in the south western area of the current airport site. This area would require a new access road to be provided to enable development, together with engineering services for commercial operators. It is therefore envisaged that subdivision of this zone would not occur until the industrial lots in the South East Development Zone were exhausted.

However, as a location for private aircraft storage, where access could be provided by unsealed road and utilities are not essential, this zone could be developed earlier.

The key development concept features of this zone are:

- Six (6) lots approximately 40m wide by 70m deep, suitable for typical commercial operations using Code B and smaller Code C aeroplanes, with Code B/C taxiway access directly to Runway 04/22;

- Twelve (12) lots approximately 28m wide by 35m deep, suitable for typical commercial operations using Code A aeroplanes;
- Approximately 1.4 hectares available for un-subdivided construction of private hangars for light aircraft storage. Depending on the configuration of this area and the type of hangar construction, space for approximately 25-30 typical light aircraft hangars (Cessna 172) be available; and
- New access road connection to Ulan Road south of Commercial Helicopters.

5.3.3 LANDSIDE ACCESS

External Access

A new external access is proposed on Ulan Road to serve the realigned George Campbell Drive which would form the main access to the Terminal Precinct, Northern and South East development areas.

The existing George Campbell Drive intersection with Ulan Road would remain, to serve the proposed RFS site and the two aviation sites to the west.

A further access road would be required to access the South West Development Area.

Internal Access

A future one-way access loop serving the terminal and looping around the car park is proposed to facilitate any expansion of the terminal.

Road reserve widths of 20m have been allowed which would provide for two trafficable lanes, footpath areas, service corridors, limited parking, and strip landscaping. A width of 15m would strictly suffice for this, however an additional width of road reserve allows for less stringent set-back requirements to be imposed on the leasable areas, enables supplementary roadside parking if required and will assist in maintaining an open and feel to the development appropriate to the surrounding rural environment.

Car Parking

The area immediately east of the terminal and existing car park should be reserved for expansion of car parking requirements for the terminal precinct and nearby development. There is room for approximately 46 additional spaces with the option for 6-10 more along the southern edge of the terminal access road.

Within the proposed subdivision areas, it is envisaged that the general principle would be to require adequate parking to be provided as part of individual lot developments, an indicative lot layout shown has been sized accordingly. Supplementary parking areas could however be provided in convenient locations.

5.3.4 ENGINEERING SERVICES

It is assumed that there is sufficient capacity in the existing supply systems (water, electricity, sewer and telecommunication) at the airport boundary to service the new development areas. It is recommended that the Council undertake an assessment of these services to confirm the adequacy of these engineering services. The South East Development Area would take supply from junctions at appropriate locations along the realigned George Campbell Drive.

It is recommended that a conceptual master grading design be undertaken for the proposed South East Development Area to prove the land use concept and determine the indicative extent of any required earthworks and drainage systems.

5.4 OTHER LAND USE OPPORTUNITIES

Other than the proposed development areas discussed above, there are only limited opportunities within the airport boundary to identify possible higher order land use potential. There are, however, a number of areas adjacent to the airport boundary which have been identified within the LEP as potential airport related development opportunities. These areas are shown on **Figure C** and bound the eastern, northern and western perimeter of the airport.

Such areas would be suitable for a range of airport-related activities, which may or may not require access to the airfield proper. However, the Master Plan makes provision for taxiway access points to each potential area, subject to the establishment of a suitable access agreement. In particular, it is felt that given the nature of the surrounding land uses, and the lack of available space within the airport land for residential airpark style development, rural residential development with airport access would appear to be an ideal use for these lands. This would allow what is effectively a property development activity to occur on private land, by developers experienced in such matters, without undue risk to Council.

5.5 TENURE & OWNERSHIP OF AIRPORT SITES

A common difficulty at regional airports is the complaint that lease arrangements make it difficult for small aviation-related businesses to finance developments which would expand the range of aviation activities on airport land. Users often advocate the subdivision and freehold sale of airport land, with Council potentially retaining ownership of the land required for runways, taxiways, aprons and the passenger terminal area. This arrangement, however, is predicated on having confidence that there will never be a need for major redevelopment or reconfiguration of facilities within the airport site. Given the dynamic nature of the industry and ever-changing development opportunities, it is widely acknowledged that it is essential to retain as much flexibility as possible with respect to future requirements. The lease of sites within the airport boundary is generally favourable on the basis that Council maintains long-term control of the land, even if the lease periods are relatively long.

The current arrangement at Mudgee Airport where leasehold sites are offered is standard practice for airports throughout Australia, and fulfils the flexibility imperative described above. On the other hand it is acknowledged that it may prove difficult to arrange development finance for lease terms shorter than 20, or in some case 30 years.

Council should consider carefully how the available land will be made available to developers, particularly in the South East Development Zone. Although Council has the option to sell freehold some or all of the individual sites, this approach is not recommended. Several sites held on freehold purchase basis may restrict future plans for the adjacent sites and could reduce the flexibility of the surrounding land. Through projects at other regional airports, REHBEIN Airport Consulting has also witnessed regional council's difficulties in developing airports based on past decisions to sell land on a freehold basis.

It is recommended instead that Council adopt an extended lease arrangement. The standard leases offered by the Federal Airports Corporation (FAC) were for 25 years with 40 year tenure available for special developments and a number of regional airports are now considering 20 years as a minimum lease period, sometimes with extension options. Shorter lease terms may be negotiated by mutual agreement.

In the event that the ability to offer freehold land is considered absolutely essential to attract businesses or residential aviatiors and that the vision for development of Mudgee Regional Airport cannot be fulfilled without recourse to a freehold tenure, the adjacent Airport Related Development Opportunity lands offer the ideal mechanism for this scenario. Development could occur on land held privately, or Council could acquire the land, develop it, and then offer the freehold to aviation businesses. In both cases, the flexibility of land use within the existing airport land boundary would not be eroded.

6.0 IMPLEMENTATION PLAN

6.1 DEVELOPMENT STAGING

For the purpose of this Master Plan, developments have been divided into three stages by expected timing, as follows:

- Short-term: Expected to be required within the next five years (ie before 2020). Planning and budgeting for these developments should occur now;
- Medium-term: Expected to be required some time between 5 and 20 years (ie between 2020 and 2035). The timing of these developments is subject to a number of factors which make it difficult to predict the exact timeframe. The need and expected timing of these should be reviewed further during the next 5-yearly Master Plan review process, when it is anticipated that some of these developments will move into the 'short-term' category; and
- Long-term (or ultimate): developments which to comply with sound planning practices should nevertheless continue to be safeguarded for implementation subject to demand, or for which there are existing constraints with unknown removal timeframes.

6.1.1 SHORT-TERM DEVELOPMENT

Short-term development anticipated before 2020 is indicated on **Figure E**. The key elements are as follows.

Airside works

- Expansion of the stand-off itinerant large aircraft parking apron (Council has completed this item during the Master Plan preparation period);
- Realignment and extension of Taxiway D as a sealed Code B taxiway to provide access to the first stage of the South East Development Zone;
- Extension of Taxiway E to Runway 04/22 as a sealed Code B taxiway;
- Formalisation of an extension to Taxiway A as a sealed Code B taxiway to provide access to the businesses in the south eastern corner of the airport;
- Provision of additional grassed light aircraft tie-down parking area south of Taxiway D; and
- Subject to development in the adjacent Airport Related Development Opportunity land to the north, provision of Code A taxiway access to this land linking the Runway 22 threshold and Runway 16/34.

Landside Works

- Realignment of George Campbell Drive and diversion of associated engineering services;
- Provision of internal subdivision access road for the first stage of the South East Development Zone; and

- Provision of services reticulation for the first ten (10) lots in the South East Development Zone.

6.1.2 MEDIUM-TERM DEVELOPMENT

Medium term development comprises the remainder of the development on **Figure C**, other than that which is noted as 'Future Development'. The key components are presented here in, very approximately, the order they are anticipated to be required at the time of preparation of this Master Plan.

- Further expansion of the stand-off itinerant parking apron and redevelopment of the main apron towards Runway 04/22;
- Construction of Code C taxiway access between the Runway 22 threshold and Taxiway A;
- Extension of sealed Code B taxiway access to serve an additional three (3) lots within the South East Development Zone;
- Upgrade of Taxiway A to Code C standards to serve Commercial Helicopters and adjacent commercial lots; and
- Development of taxiway access to the South West Development Area, along with a new road access passing to the south of Commercial Helicopters.

6.1.3 ULTIMATE DEVELOPMENT

The ultimate development concept is that reflected in **Figure C**. In addition to the medium-term development envisaged prior to 2035, the Master Plan provides for the following at some stage in the future:

- Expansion of the South East Development Zone subdivision to encompass the area vacated by the existing NDB;
- Parallel taxiways to both sides of Runway 16/34;
- Provision of sealed apron parking adjacent the airport boundary to the south of the Runway 34 threshold; and
- Taxiway access connections to adjacent Airport Related Development Opportunity land areas.

6.2 INDICATIVE COSTS

Indicative costs have been developed for the key elements envisaged in the short term development have been prepared. Given there is considerable uncertainty over the need for, and required timing of, any of the other developments within the development concept, costs for medium and long-term developments are not appropriate at this stage. The indicative costs for short-term development items are summarised in **Table 3**.

Table 3: Short-term Development Indicative Costs

Item	Qty	Rate	Cost
Airfield Works			
Itinerant Apron Extension (Code C)	3,300 m^2	\$150 / m^2	**complete**
Taxiway D Realignment & Extension (Code B)	4,500 m^2	\$140 / m^2	**$630,000**
Taxiway E Extension (Code B)	1,800 m^2	\$140 / m^2	**$260,000**
Taxiway A Extension (Code B)	3,400 m^2	\$140 / m^2	**$480,000**
Code A Taxiway between Rwy 22 threshold & Rwy 16/34	3,600 m^2	\$120 / m^2	**$510,000**
Landside Access			
George Campbell Drive Realignment	5,300 m^2	125 / m^2	**$1,100,000**
New Intersection with Ulan Road	1 item	\$500,000	**$500,000**
Internal Subdivision Access Road	1,100 m^2	\$100 / m^2	**$110,000**
Utilities Reticulation			
George Campbell Drive:			
Stormwater Drainage	600 L.m	\$750 / L.m	**$450,000**
Diversion – Water 150 dia upvc main	600 L.m	\$200 / L.m	**$120,000**
Diversion – Electrical	600 L.m	\$825 / L.m	**$500,000**
Diversion – Telecommunications	600 L.m	\$330 / L.m	**$200,000**
Internal Subdivision:			
Stormwater Drainage	130 L.m	\$625 / L.m	**$90,000**
Sewer 150dia uPVC Gravity Main	130 L.m	\$250 / L.m	**$40,000**
Water 150dia uPVC main	130 L.m	\$200 / L.m	**$30,000**
Electrical	130 L.m	\$825 / L.m	**$110,000**
Telecommunications	130 L.m	\$330 / L.m	**$50,000**

A range of assumptions and exclusions were made in order to produce the indicative development costs, there are as follows:

- Costs are based on assumptions made in the absence of detailed feature and level survey and/or geotechnical investigation;
- Airfield development costs includes allowances for earthworks, pavement, stormwater drainage and taxiway edge lighting;
- Costs included for the development of the subdivision do not include ground improvements or servicing within lots or the construction of hangars, it is anticipated that this will be carried out by the lessee/owners. Costs for engineering services (power, water,

telecommunications, sewer and stormwater drainage) to the lot boundary, taxiway access (where relevant) and landside access to the subdivided sites have been considered only;

- Engineering services for the new subdivided sites will be connected to the existing services at the airport site;
- Upgrades to the power, water and sewer connections to the airport site have not been considered;
- GST has not been included;
- An allowance of 15% for preliminaries and 30% for design contingency has been made; and
- No allowance for construction contingency has been made.

7.0 AIRPORT SAFEGUARDING

Adequate protection of the basic capability to undertake aircraft operations in accordance with prescribed safety standards and regulatory requirements, and in an efficient and economic manner, is imperative to the future realisation of aeronautical opportunities at Mudgee Regional Airport.

It is important to protect the airport from encroachment of incompatible surrounding land uses, to ensure continued operations whilst protecting the amenity of surrounding properties.

In order to adequately protect for the potential future aircraft operations at Mudgee Regional Airport envisaged by this Master Plan, safeguarding of a number of aspects will be required through appropriate planning and development restrictions and monitoring processes.

Council should give consideration as to how best to address and incorporate each of the issues discussed below into its planning policy.

7.1 NATIONAL AIRPORTS SAFEGUARDING FRAMEWORK

The National Airports Safeguarding Framework (NASF) is a national land use planning framework that aims to:

- Improve community amenity by minimising aircraft noise-sensitive developments near airports including through the use of additional noise metrics and improved noise-disclosure mechanisms; and
- Improve safety outcomes by ensuring aviation safety requirements are recognised in land use planning decisions through guidelines being adopted by jurisdictions on various safety-related issues.

The NASF was developed by the National Airports Safeguarding Advisory Group (NASAG), comprising of Commonwealth, State and Territory Government planning and transport officials, the Australian Government Department of Defence, the Civil Aviation Safety Authority (CASA), Airservices Australia and the Australian Local Government Association (ALGA).

The NASF was agreed to by Commonwealth, State and Territory Ministers at the Standing Council on Transport and Infrastructure meeting on 18 May 2012. The agreement represents a collective commitment from governments to ensure that an appropriate balance is maintained between the social, economic and environmental needs of the community and the effective use of airport sites. NASF applies to all airports in Australia.

The NASF currently consists of a set of seven principles and six guidelines, as follows:

- **Principle 1:** The safety, efficiency and operational integrity of airports should be protected by all governments, recognising their economic, defence and social significance
- **Principle 2:** Airports, governments and local communities should share responsibility to ensure that airport planning is integrated with local and regional planning
- **Principle 3:** Governments at all levels should align land use planning and building requirements in the vicinity of airports
- **Principle 4**: Land use planning processes should balance and protect both airport/aviation operations and community safety and amenity expectations
- **Principle 5**: Governments will protect operational airspace around airports in the interests of both aviation and community safety
- **Principle 6:** Strategic and statutory planning frameworks should address aircraft noise by applying a comprehensive suite of noise measures
- **Principle 7:** Airports should work with governments to provide comprehensive and understandable information to local communities on their operations concerning noise impacts and airspace requirements.

- **Guideline A**: *Measures for Managing Impacts of Aircraft Noise*
- **Guideline B**: *Managing the Risk of Building Generated Windshear and Turbulence at Airports*
- **Guideline C**: *Managing the Risk of Wildlife Strikes in the Vicinity of Airports*
- **Guideline D**: *Managing the Risk of Wind Turbine Farms as Physical Obstacles to Air Navigation*
- **Guideline E**: *Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports*
- **Guideline F**: *Managing the Risk of Intrusions into the Protected Airspace of Airports.*

The full NASF principles and guidelines can be found on the Department of Infrastructure and Regional Development's website at:
www.infrastructure.gov.au/aviation/environmental/airport_safeguarding/nasf

These safeguarding aspects are discussed in the following sub-sections with reference to Mudgee Regional Airport.

7.2 AIRCRAFT NOISE

7.2.1 AUSTRALIAN NOISE EXPOSURE FORECAST

Restrictions on airport operations as a result of annoyance caused by exposure to aircraft noise can significantly limit the ability of an airport to facilitate aviation related business and employment. The Australian Noise Exposure Forecast (ANEF) system is one metric used for conveying the levels of aircraft noise exposure in the vicinity of airports. It is the only system which currently has statutory meaning for land use planning, through Australian Standard AS2021-2015, *Acoustics: Aircraft Noise Intrusion – Building Siting and Construction.*

The ANEF is constructed using the Integrated Noise Model (INM) to generate contours of equal noise exposure level. It is normal to show contours of 20,25,30,35 and 40 ANEF units. It is based upon the:

- Intensity, duration, content and spectrum of the sound;
- Forecast aircraft types and movements on various flight paths; and
- Average daily distribution of aircraft take-offs and landing.

In accordance with the safeguarding principles and manner of endorsement for ANEFs[5], aircraft noise forecasts should represent the future expected state of aircraft noise exposure in the vicinity of an airport. The ANEF can be prepared for a specific forecast year, or to represent the anticipated aircraft operations associated with the ultimate development of the airport.

Council does not currently have an endorsed ANEF. Australian Noise Exposure Concepts were included in the 2005 Master Plan. However, it is recommended that these be updated to reflect this Airport Master Plan and an ANEF then be subsequently endorsed for incorporation into the LEP.

7.2.2 N-ABOVE CONTOURS

The NASF Guideline A – *Measures for Managing the Impacts of Aircraft Noise* recognises that the 20 ANEF and 25 ANEF zones within which residential developments are restricted under AS2021, do not capture all high noise affected areas around an airport. AS2021 itself recognises that the ANEF contours are not necessarily an indicator of the full spread of noise impacts, particularly for residents newly exposed to aircraft noise.

N-above contours have been developed and are now being applied by strategic planners to complement the ANEF metric and provide an additional communication and planning tool. N-above contours indicate the number of aircraft noise events equal to or greater than a specified noise level expected to occur on an average day.

Where there is no major existing or approved development, there is scope to plan ahead to take account of potential noise disturbance and in particular to minimise the zoning of noise-exposed land for residential development.

For this reason, NASF Guideline A recommends that existing and future development need to be treated differently, with rezoning of greenfield to permit noise sensitive uses only undertaken subject to the following approach:

- There should be no new designations or zoning changes that would provide for noise sensitive developments within a 20 ANEF where that land was previously rural or for non-urban purposes. Zoning for noise–sensitive development should be avoided where ultimate capacity or long range noise modelling for the airport indicates either:
  - 20 or more daily events greater than 70 dB(A);
  - 50 or more daily events of greater than 65 dB(A); or

[5] All ANEFs are endorsed for technical accuracy by Airservices Australia, to ensure that the modelling assumptions adopted in INM appropriately reflect the parameters associated with aircraft operations, that consultation with relevant stakeholders including local and state government agencies has been undertaken, and that the forecast movements do not exceed the capacity of the future proposed airport infrastructure (ie runways).

- 100 events or more daily events of greater than 60 dB(A).

7.3 BUILDING GENERATED WINDSHEAR AND TURBULENCE

Buildings of a certain size and dimensions, when sited near to runway ends, can sometimes generate windshear and turbulence effects which can pose a safety risk to aircraft. The effect depends on a number of factors and NASF Guideline B sets out:

- empirically determined criteria for windshear and turbulence;
- generic guidance on mitigating risks from proposed buildings;
- a methodology for assessment of proposed buildings;
- options, where required, for subsequent detailed modelling of wind effects; and
- options to mitigate wind effects of existing buildings where required.

The assessment envelopes for building generated windshear and turbulence associated with NASF Guideline B cover an area 1,200m or closer perpendicular to the runway centreline and extend 900m along the extended centreline of the runway prior to the runway threshold and 500m along the runway. Within these areas, NASF recommends that any proposed buildings be evaluated to confirm there will be no unacceptable impacts on the safety of aircraft operations.

7.4 WILDLIFE HAZARDS

Birds (and other wildlife) on or around airfields should be regarded as a potential hazard to aircraft safety. The majority of aircraft collisions with birds occur near the airfield during take-off, landing and associated phases. Birds may be ingested into aircraft jet engines or otherwise cause damage that may impact on the pilot's ability to manoeuvre the aircraft.

The prevention of bird strike requires careful consideration during master planning phase to identify potential land uses that may attract birds. Master planning considerations include the land use inside the boundaries of the airport and the surrounding land uses that should be avoided to reduce the risk of bird strike. It is essential that the Council planners incorporate this into future Local Environmental Plans to minimise the wildlife threat to future aircraft operations associated with land use.

Land use and the environment surrounding aerodromes can attract birds and bats. Waterways, agriculture, landfills and even golf courses often provide attractants that contribute to transit issues where birds and bats traverse the airfield while moving between nesting areas and feeding or foraging sites. Development near airfields that provides refuge, feeding or breeding opportunities for large numbers of birds or bats contributes to an increased risk of bird strike.

Figure H identifies land uses that have the potential to increase bird and bat strike potential and provides guidance on buffer zones within which certain activities around Mudgee Regional Airport should be controlled. This guidance is based on NASF Guideline C. Within these buffers it is recommended that some activities are excluded whilst others have control measures. Appropriate

land use development restrictions within these boundaries should be implemented by Council to adequately protect the safety of future aircraft operations.

Current land uses within the buffer zones should be reviewed, including agricultural land use, to identify any existing non-compatible land uses that increase bird strike risk. Consultation with land-owners and operators of non-compatible land uses may identify suitable management practices to reduce the bird presence. Existing infrastructure associated with incompatible land uses will not require relocation but management practices may require enhancement if bird and wildlife hazards from these and similar become an issue.

While consideration of land uses within and adjoining the airport is essential for decreasing bird strike risk, operational procedures and control measures are applied to reduce the existing threat of birds. Targeted maintenance and management activities are necessary to reduce habitat or food sources that attract birds.

7.5 LIGHTING DISTRACTION AND GLARE

NASF Guideline E *Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports* and Section 9.21 of CASA MOS Part 139 provide advice with regard to the design and provision of lighting systems for use at or in the vicinity of an aerodrome, with the intention of minimising the potential hazard to aircraft operations from the lighting. Anyone proposing to install a lighting system within the vicinity of the aerodrome should be made aware of the requirements by the airport operator.

CASA has the power, through regulation 94 of the Civil Aviation Regulations 1988 (CAR 1988), to require lights which may cause confusion, distraction or glare to pilots in the air, to be extinguished or modified. Ground lights may cause confusion or distraction as a result of their colour, position, pattern or intensity of light omission above the horizontal plane. The advice provided by CASA is applicable to lighting installations within a 6 kilometre radius of the airport. The lights within this radius fall into a category most likely to be subjected to the provisions of Regulation 94 of CAR 1988. Within the 6km radius, a primary area exists which is divided into four light control zones labelled A. B, C and D. These zones reflect the degree of interference ground lights can cause as a pilot approaches to land. **Figure G** shows the primary area and zones in relation to Mudgee Regional Airport within which limits on intensity of light emissions (at 3 degrees above the horizontal plane) should be maintained. The emission intensity limits are also shown on the plan, expressed in candela (the common candle emits light at an intensity of roughly one candela) and are as follows:

- Zone A: 0 candela (cd);
- Zone B: 50 cd;
- Zone C: 150 cd; and
- Zone D: 450 cd

7.6 AIRSPACE PROTECTION

7.6.1 OBSTACLE LIMITATION SURFACES

Obstacles on or in the vicinity of an aerodrome, whether natural features or man-made structures, may prevent its optimal utilisation by aircraft through:

- Reducing the runway distances available for take-off or landing;
- Reducing the authorised take-off and landing weights for some aircraft;
- Restricting certain types of aircraft; and/or
- Limiting the range of weather conditions in which aircraft can operate.

The shape and dimensions of the OLS for an airport are determined on a case by case basis and needs to be assessed by CASA to determine its operational impact. No structure located on an airport should be allowed to exceed the vertical limits of the OLS unless required to do so to serve its operational purpose.

The Master Plan does not propose any changes to either of the runways, therefore the existing OLS will remain relevant. An OLS plan based on meeting fully the relevant requirements of CASA MOS Part 139 can be found on **Figure F** and should be incorporated into the Mid-Western Regional LEP.

To enable future upgrades to the perimeter fencing at the north-eastern corner of the airport, which may be required to meet aviation security regulations or more general security requirements, Council must take account of the impacts on the obstacle limitation surfaces. In order to avoid reducing the available runway length, additional land will be required to allow the fence to remain below the OLS. It is recommended that Council take steps to identify the land required and seek to acquire it as the opportunity may arise.

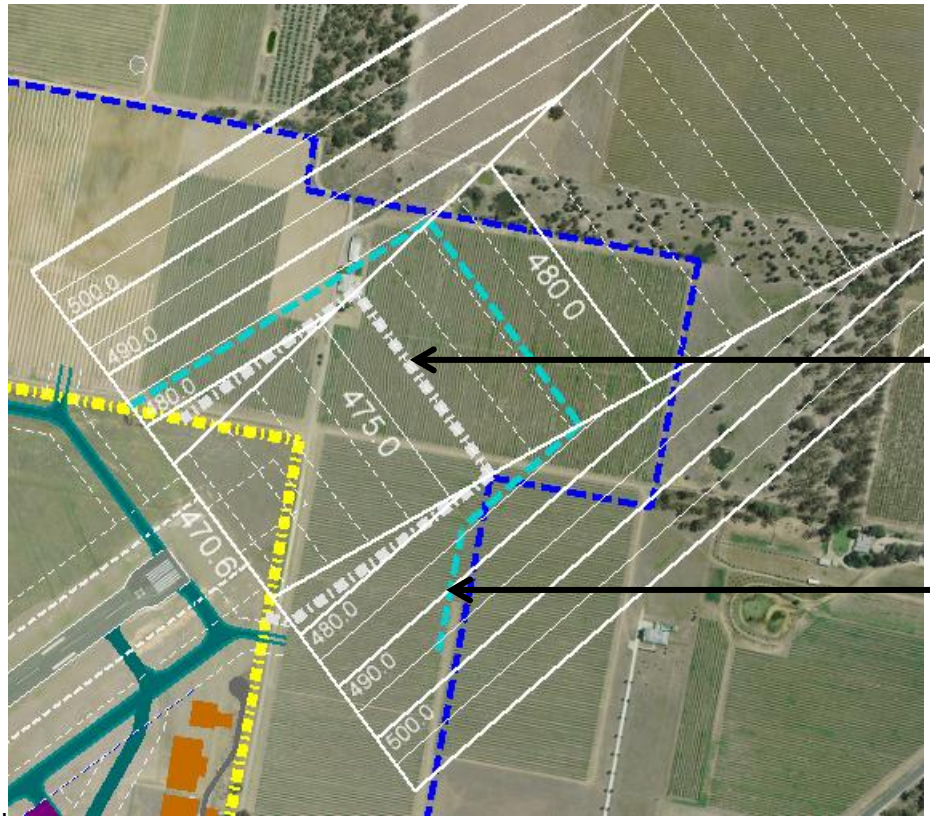
Similarly, the arrangements for access to the airport related opportunity land immediately north of the current airport boundary need to be considered in order to ensure adequate clearance to the OLS for transient vehicles in the vicinity of the runway end.

Figure 7 below indicates how the perimeter fence and vehicle access locations would be constrained by the OLS. The permissible geometry of both should be subject to a detailed assessment taking into account any changes to the proposed ground levels in the area prior to any physical works.

7.6.2 PANS-OPS SURFACES

Council should be aware that as the airport operator, it has responsibility under the CASRs Part 139 and Part 173 to ensure the Procedures for Air Navigation Systems – Aircraft Operations (PANS-OPS) protection surfaces are monitored and maintained free from any intruding obstacles.

Figure 7: Indicative Constraints on Perimeter Fence and Vehicle Access Locations



APPENDIX A

MASTER PLAN FIGURES

Project:	MUDGEE REGIONAL AIRPORT MASTER PLAN 2015
Client:	MID-WESTERN REGIONAL COUNCIL
Title:	**LOCATION PLAN**

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Rev	Date
1	07 08 15
0	13 02 15

Figure No: FIGURE **A**

Scale: 1:25000 A3 (Sheet Size)

File Ref: B14024

NORTH

MUDGEE REGIONAL AIRPORT

RUNWAY 16 / 34
1075m x 30m

RUNWAY 04 / 22
1739m x 30m

AIRPORT BOUNDARY

(RWS 90m)

REFER INSET

DRIVE

LAWSON

HENRY

ROAD

MOUNT PLEASANT LANE

COMMERCIAL HELICOPTERS

ULAN

EDGELL LANE

OBSERVE AIR (Hangar Home)

R&M AIRCRAFT

R&M AIRCRAFT

NORTHERN HANGAR AREA

MTCE SHED

AIRPORT BOUNDARY

SIGNAL AREA

AWS

IWI

TWY A

TWY E

TWY B

COUNCIL HANGAR

RESIDENCE

TERMINAL

CAR PARK

MAIN APRON

ITINERANT PARKING APRON

TWY D

FUEL

AERO CLUB

SOUTHERN HANGAR AREA

TWY C

LIGHT AIRCRAFT PARKING & TIE-DOWN

TWY D

NDB

CAMPBELL DRIVE

GEORGE

INSET

SCALE 1:2500

Project: MUDGEE REGIONAL AIRPORT MASTER PLAN 2015

Client: MID-WESTERN REGIONAL COUNCIL

Title: **EXISTING AIRPORT FACILITIES**

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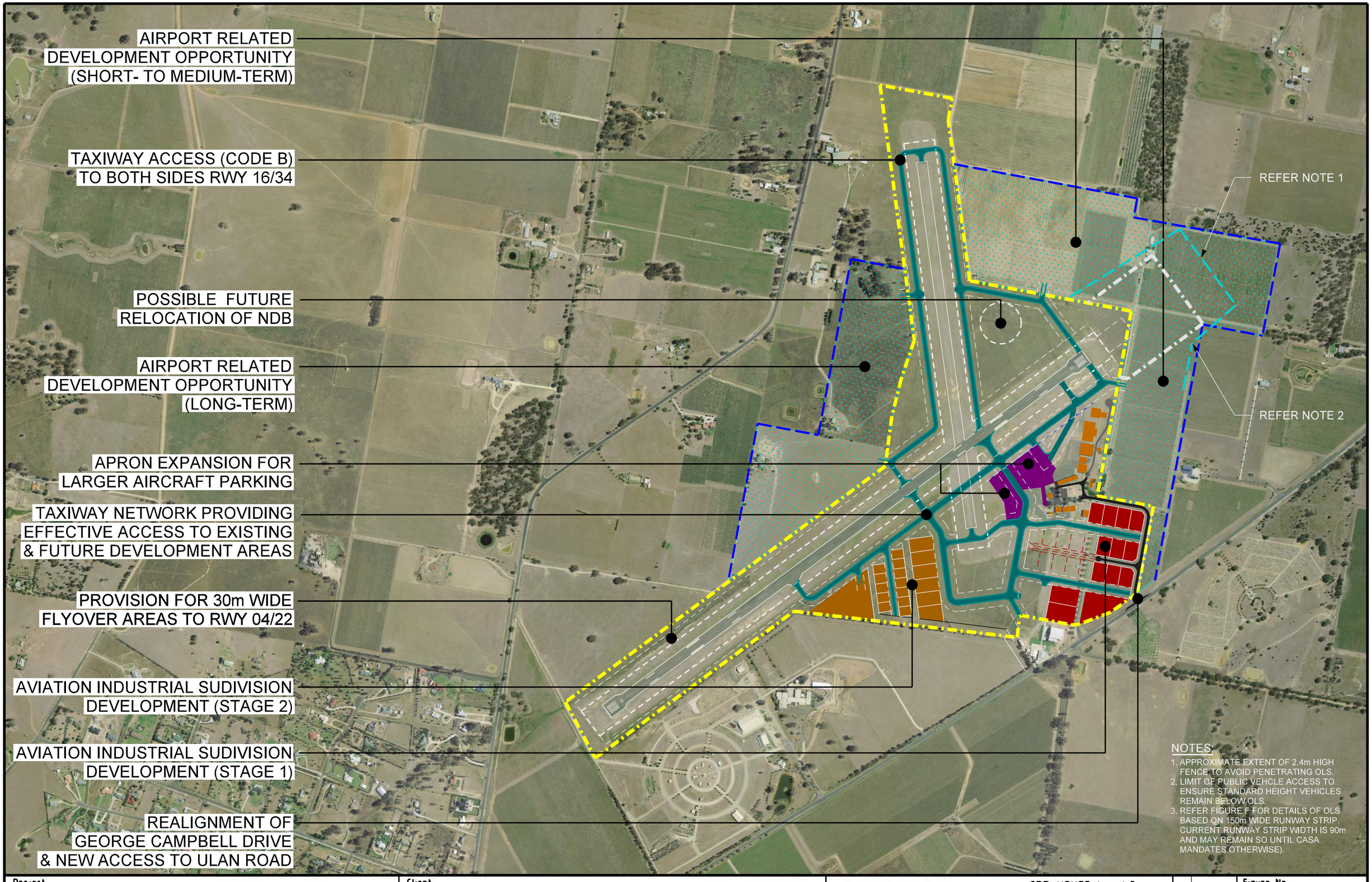
Figure No: FIGURE **B**

Scale: 1:10000 | A3 Sheet Size

File Ref: B14024



NOTES:

1. APPROXIMATE EXTENT OF 2.4m HIGH FENCE TO AVOID PENETRATING OLS.
2. LIMIT OF PUBLIC VEHCLE ACCESS TO ENSURE STANDARD HEIGHT VEHICLES REMAIN BELOW OLS.
3. REFER FIGURE F FOR DETAILS OF OLS BASED ON 150m WIDE RUNWAY STRIP. CURRENT RUNWAY STRIP WIDTH IS 90m AND MAY REMAIN SO UNTIL CASA MANDATES OTHERWISE).

Project: MUDGEE REGIONAL AIRPORT MASTER PLAN 2015

Client: MID-WESTERN REGIONAL COUNCIL

Title: **ULTIMATE DEVELOPMENT CONCEPT**

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Figure No: FIGURE **C**

Scale 1:10000 | A3 Sheet Size

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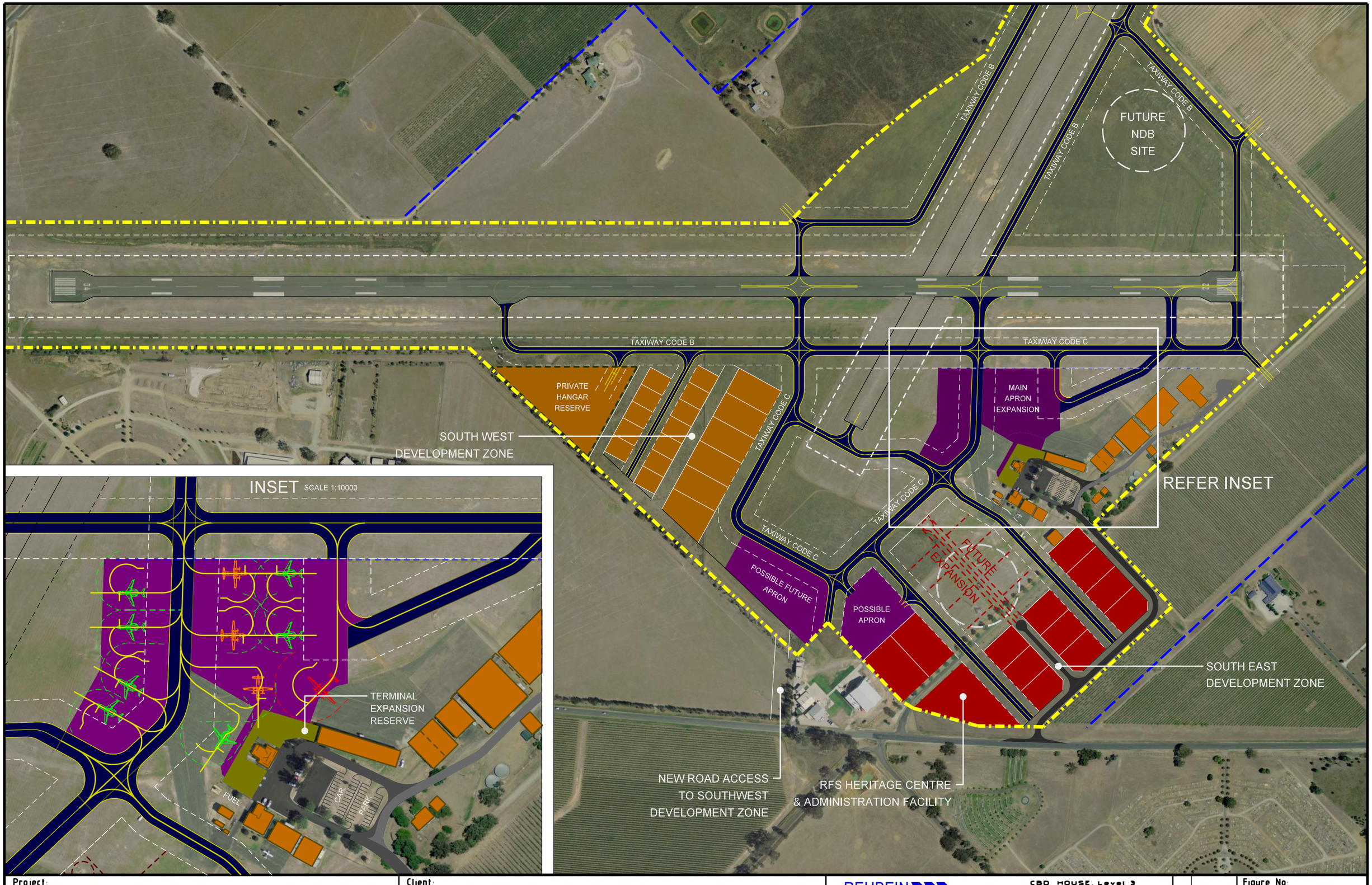

Project: MUDGEE REGIONAL AIRPORT
MASTER PLAN 2015

Client: MID-WESTERN REGIONAL COUNCIL

Title: **DEVELOPMENT AREA LAYOUT**

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Figure No: FIGURE **D**

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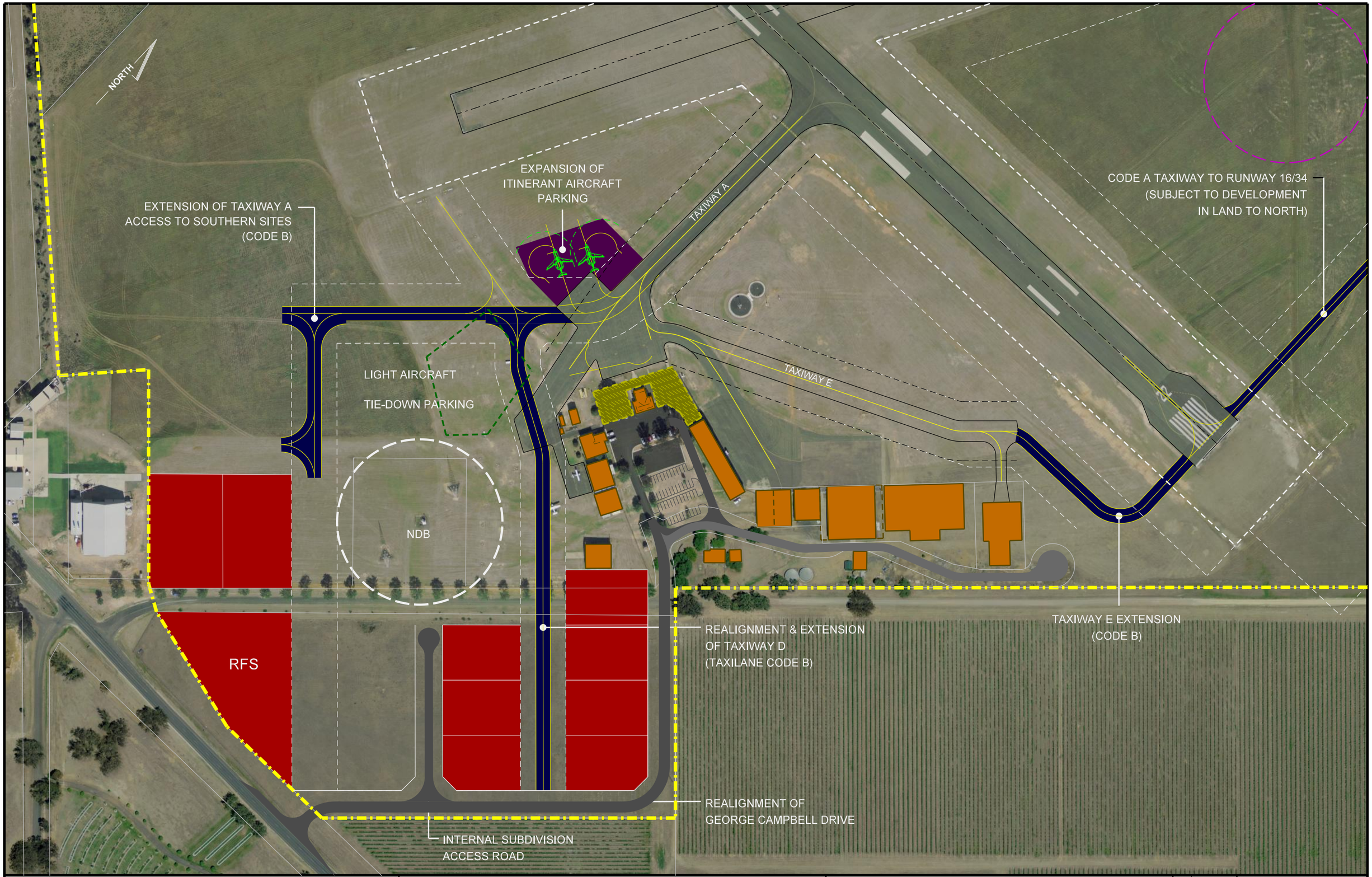
File Ref: B14024



Project: MUDGEE REGIONAL AIRPORT MASTER PLAN 2015

Client: MID-WESTERN REGIONAL COUNCIL

Title: **SHORT-TERM DEVELOPMENT (2015 - 2020)**

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Figure No: FIGURE **E**

Scale: 1:2500 | A3 Sheet Size

File Ref: B14024

RUNWAY CLASSIFICATION / CODE		
RUNWAY	APPROCH	TAKE OFF
04	CODE 3 INSTRUMENT NON-PRECISION	CODE 3
22	CODE 3 INSTRUMENT NON-PRECISION	CODE 3
16	CODE 2 NON-INSTRUMENT	CODE 2
34	CODE 2 NON-INSTRUMENT	CODE 2

NOTES:
1. ALL DIMENSIONS AND DISTANCES ARE IN METRES
2. ELEVATIONS BASED ON AUSTRALIAN HEIGHT DATUM (AHD)
3. HP DENOTES HORIZONTAL PLANE

APPROACH SURFACES										
RUNWAY	ELEVATION AT INNER EDGE	LENGTH OF INNER EDGE	DISTANCE FROM THRESHOLD	DIVERGENCE EACH SIDE	FIRST SECTION LENGTH	SLOPE	SECOND SECTION LENGTH	SLOPE	HORIZONTAL SECTION LENGTH	TOTAL LENGTH
04	459.0	150	60	15%	3000	3.33%	3600	2.5%	8400	15000
22	470.6	150	60	15%	3000	3.33%	3600	2.5%	8400	15000
16	470.9	80	60	10%	2500	4%				
34	465.7	80	60	10%	2500	4%				

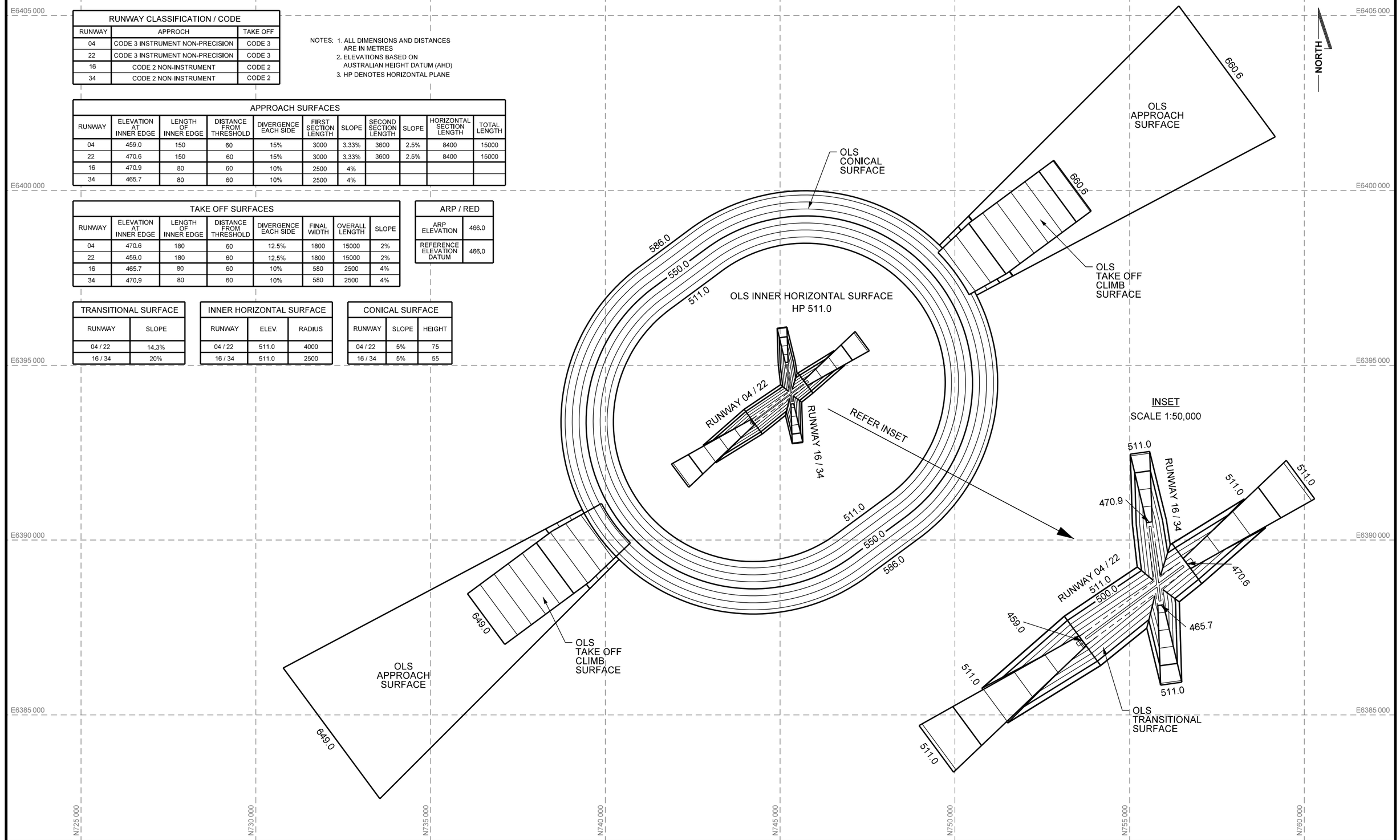
TAKE OFF SURFACES							
RUNWAY	ELEVATION AT INNER EDGE	LENGTH OF INNER EDGE	DISTANCE FROM THRESHOLD	DIVERGENCE EACH SIDE	FINAL WIDTH	OVERALL LENGTH	SLOPE
04	470.6	180	60	12.5%	1800	15000	2%
22	459.0	180	60	12.5%	1800	15000	2%
16	465.7	80	60	10%	580	2500	4%
34	470.9	80	60	10%	580	2500	4%

ARP / RED	
ARP ELEVATION	466.0
REFERENCE ELEVATION DATUM	466.0

TRANSITIONAL SURFACE	
RUNWAY	SLOPE
04 / 22	14.3%
16 / 34	20%

INNER HORIZONTAL SURFACE		
RUNWAY	ELEV.	RADIUS
04 / 22	511.0	4000
16 / 34	511.0	2500

CONICAL SURFACE		
RUNWAY	SLOPE	HEIGHT
04 / 22	5%	75
16 / 34	5%	55



Project: MUDGEE REGIONAL AIRPORT MASTER PLAN 2015

Client: MID-WESTERN REGIONAL COUNCIL

Title: **OBSTACLE LIMITATION SURFACES**

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Figure No: FIGURE F

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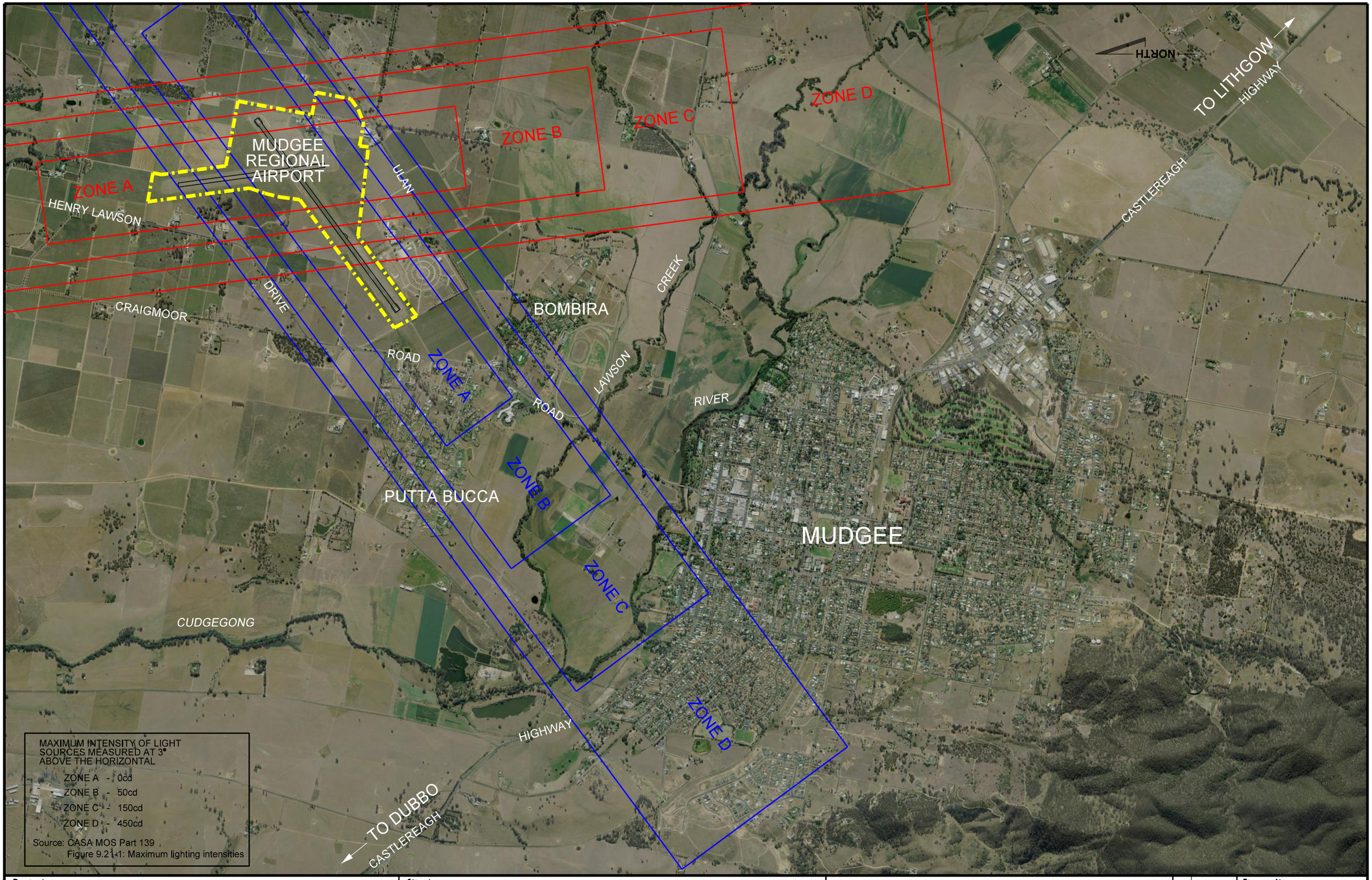

Project: MUDGEE REGIONAL AIRPORT MASTER PLAN 2015

Client: MID-WESTERN REGIONAL COUNCIL

Title: **LIGHTING RESTRICTIONS**

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Figure No: FIGURE G

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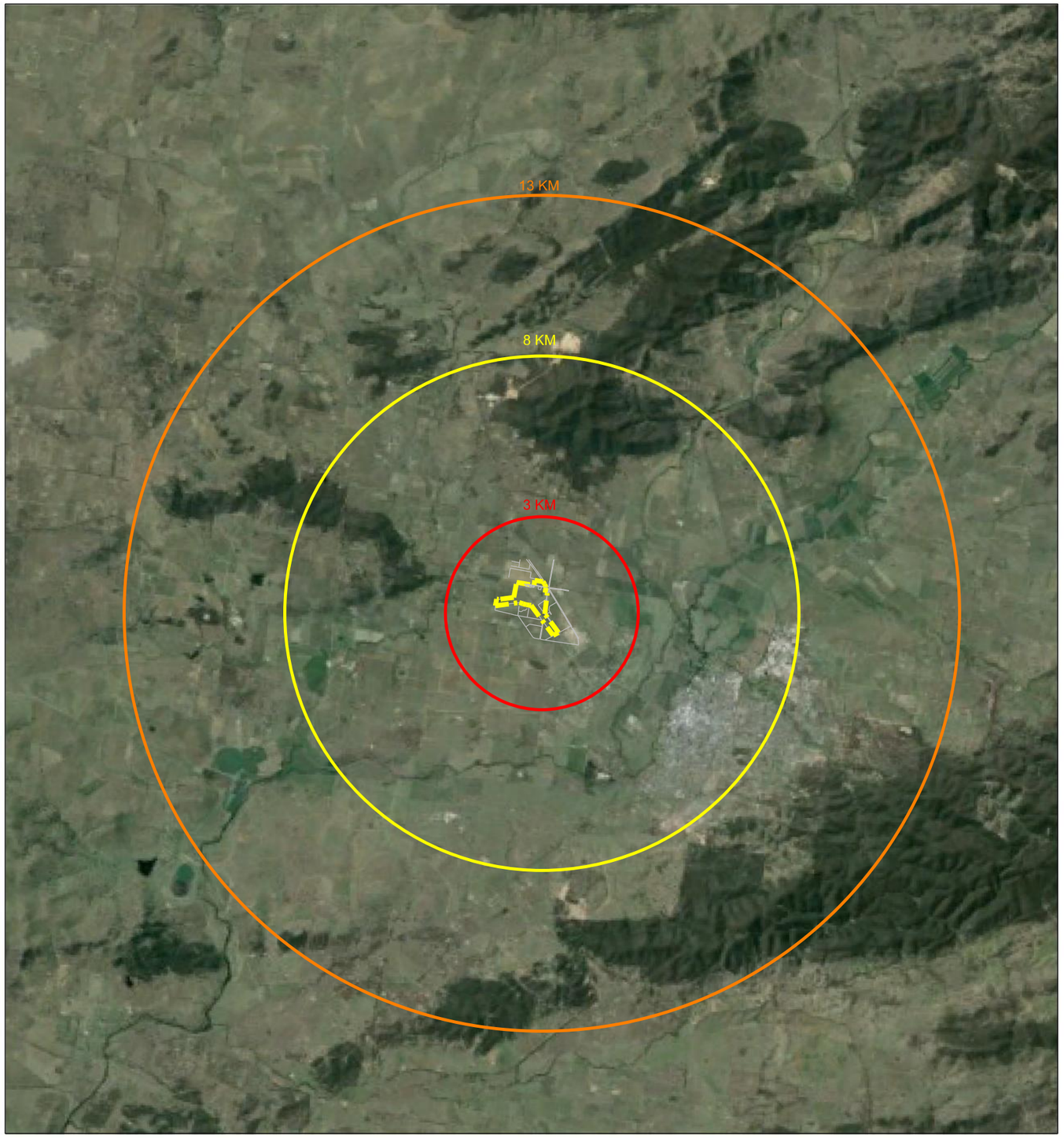

NORTH

PLANNING ASSESSMENT CRITERIA FOR BIRD AND BAT STRIKE POTENTIAL	
LAND USE CATEGORY	DESCRIPTION
Group A	Putrescible waste disposal site
Group B	Sewerage treatment facilities
	Commercial fish processing
	Bird sanctuaries and fauna reserves
	Artificial water body (including water mgt structures such as detention basins or wetlands and dams or enclosed tanks)
	Aquaculture
	Turf farming
	Animal farming with potential to attract birds/bats
	Fruit farming
	Food processing plants
Group C	Race Tracks
	Fairgrounds
	Outdoor theatres
	Drive-in Restaurants
	Sports Grounds
	NB: Group classifications have been adopted from the Queensland State Planning Policy 1/02: Development in the Vicinity of Certain Airports and Aviation Facilities
	Artificial water bodies may include:
	a) Water management structures, such as detention basins and constructed wetlands
	b) Large agricultural dams and non-enclosed tanks.

PLANNING RECOMMENDATIONS TO LIMIT BIRD AND BAT STRIKE		
LAND USE CATEGORY	RECOMMENDATION	DESIGN RESPONSE RECOMMENDATION
Group A	Should be avoided within 13 km of the runway	Recommend no development
Group B	Should be avoided within 3 km of the runway and where located between 3 km and 8 km of the runway, should include measures to discourage wildlife	Potential food/waste sources are covered/collected so that they are not accessible.
		For fruit, animal farming and turf production, wildlife deterrence measures are used (e.g. bird scarers or netting)
		Artificial water body Artificial water body design shall minimise habitat opportunities for birds (e.g. careful selection of landscaping, water body edge treatments, etc)
Group C	Where located within 15 km of the runway, should include measures to manage waste disposal	Potential food/waste sources are covered/ collected so that they are not accessible to wildlife
NB: There is no requirement to remove or change existing land uses within the above categories.		

Project: MUDGEE REGIONAL AIRPORT MASTER PLAN 2015

Client: MID-WESTERN REGIONAL COUNCIL

Title: **WILDLIFE HAZARDS**

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Figure No: FIGURE **H**

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