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Turquoise Coast Regional Airport Master Plan

For Shire of Dandaragan

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Revision	Date	Description	Author	Signature	Verifier	Signature	Approver	Signature
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1.0 INTRODUCTION

This Master Plan for Turquoise Coast Regional Airport has been prepared for the Shire of Dandaragan (the Shire) by REHBEIN Airport Consulting. The Master Plan is based on the outcomes of the Turquoise Coast Airport Site Options Assessment, which was undertaken as part of this study to determine the preferred site for the Turquoise Coast Regional Airport. As a result of the Site Options Assessment, the Master Plan safeguards for the future development of an airport on the easternmost portion of the land located on the corner of Jurien Road and Munbinea Road to the northeast of Jurien Bay.

The Master Plan's main purpose is to safeguard sufficient land to accommodate the necessary infrastructure for the airport, until such time as demand requires the airport to be developed. Actual development of the airport is not currently anticipated to occur within the next 10 years, and possibly not the next 20 years, based on current growth rate and foreseeable opportunities.

Nevertheless, this Turquoise Coast Regional Airport Master Plan provides the Shire with a framework for the ultimate development of the airport and a flexible development plan that can be implemented as demand requires. This recognises the fact that some or all of the facilities may be required earlier or later than presently foreseen if currently unidentified demand drivers occur at any time.

1.1 MASTER PLAN OBJECTIVES

Airport master planning is undertaken to enable best-management practices 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 being inclusive of the following:

- 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 *Airports Act 1996* does not have statutory application to Turquoise Coast Regional Airport, this does not reduce the relevance of these four key aims. The Shire has identified several further specific objectives in commissioning this Master Plan, including the desire to:

- Safeguard for improved aeronautical facilities to support the growth of Jurien Bay as a SuperTown and an increase in aviation activities within the Wheatbelt region;
- Understand the operational requirements and engineering issues related to the development of the new airport site;
- Understand land tenure issues of the new airport site; and
- Understand the environmental issues that will need to be considered as part of the development of the airport site.

1.2 METHODOLOGY

1.2.1 SITE OPTIONS ASSESSMENT

The methodology adopted for the Site Options Assessment, which is reported fully in REHBEIN Airport Consulting report *Turquoise Coast Regional Airport Site Options Assessment*, 16 April 2013 (Ref: B12383AR001Rev2), involved the following key steps:

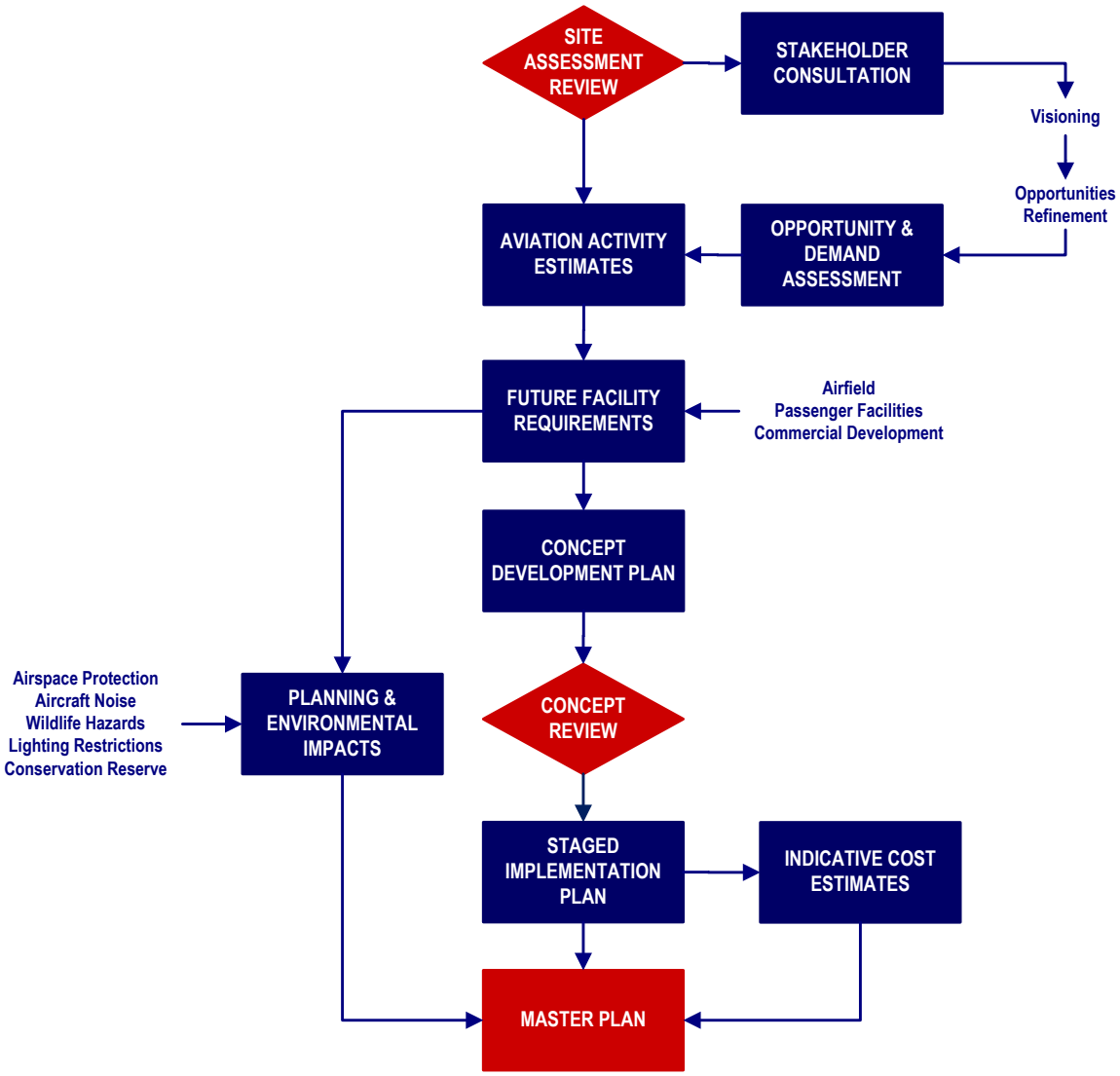
- The number, location and approximate extent of the candidate sites to be compared were confirmed, and a high-level on-site visual assessment of the nature of any existing facilities, landform, nearby terrain and obstacles was undertaken for each;
- The likely scale and nature of airport facilities and infrastructure required to serve anticipated future levels of aeronautical activity and associated aviation and non-aviation related commercial development was determined;
- A set of technical evaluation criteria covering aeronautical and non-aeronautical operational and commercial requirements was developed;
- Each of the potential sites was then assessed against the technical evaluation criteria using a multi-criteria analysis evaluation framework. To inform the assessment, information and data in relation to each criterion was gathered through a series of desktop studies and reference to the site visual assessments;
- Expected order-of-magnitude development costs were incorporated into the assessment to determine a relative cost/benefit score for each site, upon which the sites were ranked;

The preferred site was identified as that ranking most highly from the preceding assessment process.

1.2.2 MASTER PLAN

An overall methodology for the development of the Turquoise Coast Regional Airport Master Plan is illustrated in **Figure 1-1** below, which sets out the key steps in the process.

Figure 1-1: Master Plan Methodology



1.3 REPORT STRUCTURE

This report is structured as follows:

- **Section 2.0** sets out the planning context in which this Master Plan has been developed;
- **Section 3.0** provides an assessment of opportunities and potential demand;
- **Section 4.0** provides estimates of aviation activity upon which the infrastructure planning is based;
- **Section 5.0** details the overall development concept proposals;
- **Section 6.0** discusses issues relating to implementation, staged development and indicative costs for the development of key infrastructure elements; and
- **Section 7.0** details the land use planning and environmental safeguarding implications of the proposed airport development in accordance with the Master Plan concept.

2.0 PLANNING CONTEXT

2.1 JURIEN BAY

Jurien Bay is located on the Western Australian coast approximately 220 kilometres north of Perth and 195 kilometres south of Geraldton. Jurien Bay is the main town within the local government area of the Shire of Dandargan in the Wheatbelt region of Western Australia.

2.1.1 POPULATION

The Shire of Dandaragan has a total estimated resident population of 3,277[1]. Jurien Bay has a population of 1,500 residents[2]. Other main centres of population include Cervantes (545 residents), Badgingarra (333 residents) and Dandargan (401 residents). There are a large number of holiday homes resulting in a large fluctuation in population during the holiday periods. The population of Jurien Bay to Cervantes is estimated to triple in peak periods.

As set out in the Shire of Dandaragan Strategic Communtiy Plan, the Shire of Dandaragan is one of the few locations in the Wheatbelt with the potential to accommodate major long term population growth in line with the state government's State Planning Strategy and Directions 2031. The Indian Ocean Drive has significantly improved access to Jurien Bay and presents enhanced opportunities for the development of tourism in the region. Significant areas have already been approved for future urban development to support a population beyond the aspirational target of 20,000 by approximately 2030.

2.1.2 ECONOMY

In 2011, there was an estimated 1,500[1] people in employment in the Shire, with an unemployment rate of 4.1%[1]. The main industry in the Shire is agriculture, forestry and fishing (26.7% total employees). Other main industries include construction (10.6%), retail trade (7.8%), accommodation and food services (7.7%), education and training (7.1%) and mining (4.7%). Despite employing fewer people than some industries, mining (including metal ore mining) has the greatest productivity of all industries in the area in 2011.

The employment profile for the coastal towns within the Shire differs from the Shire as a whole. In Jurien Bay the major sectors of employment include construction, accommodation and food services, public administration and safety and retail trade. As identified by the Shire of Dandaragan Community Plan 2011 – 2021, this reflects its growing subregional service centre role.

Population led economic growth is expected within the area in the future which is anticipated to create a number of opportunities for the area including growth in demand for aged care, retiree, health and associated leisure services, growth in construction activity and level of associated

[1] Australian Bureau of Statistics (ABS)
[2] Shire of Dandaragan Strategic Community Plan 2011 - 2021

employment from population increase, growth in accommodation and food services and retail trade from tourism and growth in public administration. In addition, there is believed to be a growth in number of people working in the mining industry who have established their home base in the coastal area of the Shire and are driving and or flying to work on a shift basis.

2.2 SUPERTOWNS

Jurien Bay has been recognised as one of nine "SuperTowns" in regional Western Australia. SuperTowns is a Royalties for Regions initiative to encourage regional communities to plan and prepare for what is predicted to be a doubling of the State's population in the next 40 years.

The government considers that the towns that have been chosen as the inaugural SuperTowns can play an important role in decentralising the forecast population growth. The aim of SuperTowns is to prepare these nine communities to plan for the capacity to be an attractive choice for people wanting to live in regional towns as an alternative to Perth.

2.2.1 JURIEN BAY GROWTH PLAN

The Jurien Bay Growth Plan (September 2012) was prepared as part of the SuperTowns initiative to unlock the growth potential of Jurien Bay and the regional hinterland by examining constraints and identifying strategies for growth. The vision for Jurien Bay as a SuperTown is:

A Regional City of 20,000+ on the Turquoise Coast, which is based on continuously improving the wellness of the community and the economic development of the region, and protecting the unique and diverse environment that provides its natural setting.

The identification of vision and goals was aligned with the Shire's Strategic Community Plan. The extensive community consultation program undertaken as part of the Strategic Community Plan has provided the basis for identifying key projects to stimulate development in the short term and establish a path for future growth and development.

The Growth Plan recognises the potential increase in demand for aviation services in Jurien Bay as the population increases in the future. The Plan highlights that there has also been interest in developing airfield accommodation hangars aimed at meeting the recreation pilot demand for coastal holiday visitation. This demand is likely to increase as Jurien Bay grows and Jandakot airport reaches maximum usage.

The Growth Plan also recognises that it is also feasible that with the growth of the residential community in Jurien Bay, Fly-in Fly-out (FIFO) charter operations could occur, subject to the availability of workers suitable for company operations (Airport Assist, 2010). There is potential for Jurien Bay to become a desirable residential location for resource sector employees, requiring aviation infrastructure to suit.

2.2.2 SHIRE OF DANDARAGAN STRATEGIC COMMUNITY PLAN 2011 – 2021

The Shire of Dandaragan's Strategic Community Plan (SCP) 2011 – 2021 informed the development of the Jurien Bay Growth Plan. It has five key goals including:

- Strong economic base and enabling structures;
- Amenity and lifestyle;
- Focus on community;
- Natural environment; and
- Shire of Dandaragan organisation and its people.

The SCP recognises that the Shire of Dandaragan will develop the Turquoise Coast City from Cervantes in the south to Jurien Bay in the north. It will become the future coastal city north of Perth. The Turquoise Coast City will provide access to the ocean with over 100 kilometres of coastline, beaches and other spectacular natural assets of the region including the Nambung National Park and the Pinnacles, Jurien Bay Marine Park and Lesueur National Park. These natural assets will form the foundation of an integrated and ecofriendly tourism and lifestyle product that is internationally and nationally competitive.

The SCP recognises a population target of 20,000 people for the Turquoise Coast by approximately 2030.

One of the objectives identified to meet the key goal of a strong economic base and enabling structures within the SCP was to ensure timely provision of essential and strategic infrastructure to ensure investment and growth for the Shire is maximised. One of strategies for achieving this was identified as the need for land to be designated for the development of a regional airport between Jurien bay and Cervantes and a Master Plan to be developed for the selected site.

2.3 WHEATBELT DEVELOPMENT COMMISSION

In its **Strategic Plan 2009 – 2013** the Wheatbelt Development Commission recognised that a region wide approach is required for the aviation industry to flourish. With good to excellent airstrips throughout the region and growing congestion in the Perth Metropolitan Area, the Wheatbelt will continue to experience demand for runways, airspace and aviation training into the future.

The Plan highlights the suitability of the region for development of aviation training due to its clear airspace close to controlled airspace and optimum flying weather. The Commission supports private Industry training companies wishing to invest in the region, with a preference towards collaborative behaviour, both spatial and organisational.

The Commission's role is to provide facilitation services and to encourage collaborative behaviour between organisations with quality, strategically situated airstrips.

Fly in fly out (FIFO) workers are congregating in the region and the notion of workers commuting from the Wheatbelt to mining locations is a reality. Some live in the Avon Arc and make the easy drive to Perth airport. There is potential for other Wheatbelt locations, especially Jurien Bay, to become desirable residential locations for mining workers, requiring aviation infrastructure to suit.

In their final report, the **Wheatbelt Aviation Strategy Ministerial Taskforce** found that there appears to be a lack of forward planning and policy development surrounding Western Australia's general aviation and pilot training industries that is stagnating further development of the industry

and contributing to the loss of significant economic opportunities for the State. The significant level of aviation activity currently occurring in Jurien Bay and the Wheatbelt in general, a diversity of facilities and optimal flying conditions present a sound infrastructure base for future development of general aviation and pilot training capabilities.

2.4 LOCAL PLANNING SCHEME

Local Planning Scheme No.7 is the current planning scheme for the Shire of Dandaragan. The general objectives of the scheme are to control and regulate the use of land in order to improve the welfare of the residents and visitors to townsites within the Shire, reinforce the existing pattern of land use, to provide for and regulate tourist development and establish criteria and development standards applicable to various land uses.

The selected site for future airport development at the intersection of Jurien Road and Munbinea Road is currently zoned as 'Rural'.

2.5 WA STATE AVIATION STRATEGY (DRAFT)

In August 2013 the WA state government released the draft Western Australian State Aviation Strategy for public comment. The draft State Aviation Strategy is aimed at supporting the economic and social development of WA through the provision of safe, affordable, efficient and effective aviation services and infrastructure. It seeks to respond to current deficiencies in the State's aviation infrastructure, airport governance and levels of aviation service competition.

The draft strategy proposes a suite of actions whereby the State will work in partnership with airports, regional shire councils, airlines and the resources and energy sector to ensure adequate services continue to meet our demands. The draft strategy is designed to provide a sound framework for policy setting, and future planning and investment in Western Australian international and domestic air services and airport infrastructure. Specifically, the draft State Aviation Strategy proposals include the Government taking steps to:

- improve infrastructure planning and development at local government owned regional airports;
- encourage private sector investment in, and management of, regional airports to improve their effectiveness and efficiency;
- foster the development of tourism through improved aviation services; and
- encourage competition on intrastate air routes and seek to reduce the high cost of intrastate airfares.

Although the period for public comment closed in December 2013, as yet no final State Aviation Strategy has been released.

2.6 REGULATORY CONTEXT

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 Manual of Standards (MOS) - Part 139 Aerodromes is made in 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. The MOS sets out the standards and operating procedures for certified, registered aerodromes and other aerodromes used in air transport operations. Any proposed future facilities included within this Master Plan for the Turquoise Coast Regional Airport must comply with the MOS.

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. The existing facilities and any proposed future facilities must comply with the Aviation Transport Security Regulations 2005 made under the Aviation Transport Security Act 2004.

2.7 EXISTING JURIEN BAY AERODROME

The existing Jurien Bay Aerodrome site is located at the heart of the Jurien Bay townsite. It is bounded to the north by Coalseam Road, and to the west and south by Airstrip Road. The airport has a sealed runway which is approximately 1,200 metre long by 20 metres wide, providing a Code 1 facility. The runway was upgraded in 2005. A sealed area for general aviation parking is provided as well as parking for the Royal Flying Doctor Service (RFDS) aircraft which is located adjacent to the RFDS passenger transfer facility. Five hangars are located on the airfield accommodating private aircraft storage as well as the Jurien Bay Sky Divers. Water tanks used by the Department of Environment and Conservation (DEC) for fire-bombing purposes are also located at the airport.

The majority of activity at the airport is largely recreational including sky diving and scenic flights. The Royal Flying Doctor Service (RFDS) also operate to the aerodrome as well as accommodating flight training, corporate and government use and for emergency services such as water bombing for fire fighting purposes. There is no Regular Passenger Transport (RPT) service to or from Jurien Bay airport.

The existing airport site was assessed as part of the site selection study, and scored comparatively similar to the selected site with regard to cost/benefit. However, the site was not selected for future airport development for a number of technical reasons, including having a maximum runway length of 1,550 metres, providing the worst-case scenario with respect to noise and limited potential for certain types of development including intensive pilot training or residential air park development.

2.8 SELECTED SITE

Figure 1 at **Appendix A** provides a location plan of the selected site. The site is located on the corner of Jurien Road and Munbinea Road, approximately 16 kilometres by road from Jurien Bay town centre.

The land is currently owned by Ardross Estates and zoned as 'Rural' in the Shire of Dandaragan Local Planning Scheme No. 7.

The land is generally flat and slopes gradually to the east, becoming more undulating further to the west. The site has been mostly cleared. Although mostly sandy in nature, there is evidence of areas of clay subgrade and high water table over northern and eastern parts of the site, which is reportedly problematic during the wetter winter months.

A ridge line runs approximately north-south on the opposite side of Munbinea Road,

2.9 PLANNING HORIZON

Development of the Turquoise Coast Regional Airport is not considered likely within the next 10 years, and potentially may not commence within the next 20 years. Therefore, in order to ensure sufficient safeguarding of land is by this Master Plan a planning horizon to 2050 has been selected.

2.10 STAKEHOLDER ENGAGEMENT

Consultation and engagement with key existing aerodrome stakeholders has been undertaken as part of the development of this Master Plan. This includes individual meetings during the site options assessment with the following:

- Skydive Jurien Bay
- Jurien Bay Chamber of Commerce; and
- Department of Environment and Conservation (DEC).

In addition, a public meeting was held on 10 July 2013 presenting the outcomes of the Site Options Assessment which was attended by a number of aerodrome users and local residents.

3.0 OPPORTUNITY & DEMAND ASSESSMENT

3.1 VISIONING

The Shire's strategic objectives and direction for the Turquoise Coast Regional Airport includes the development of airport infrastructure that will:

- Support the growth of Jurien Bay as a SuperTown
- Provide facilities to accommodate aviation activity growth in the Wheatbelt region
- Attract and encourage investment and growth to help ensure a strong economic base for the Shire

3.2 OPPORTUNITIES

Based on this vision the broad types of opportunities that have potential to develop at the future Turquoise Coast Airport have been identified.

A process of opportunity identification and refinement has been undertaken. Potential opportunities for the future Turquoise Coast Airport have been identified through a number of methods including:

- Discussion with stakeholders (as part of the site selection study); and
- Additional desktop research including the review of any data provided by the Shire, or gathered by other means, that will provide an understanding of the existing and potential future economy and demographics within the Wheatbelt region

All reasonably possible opportunities have been considered to ensure that the potential benefits of these are not dismissed without thoughtful review. The following sub-sections outline those opportunities which offer the greatest potential for the airport, are compatible with development at the airport, and which are worthy of more detailed consideration.

3.2.1 FIFO CHARTER SERVICES

As highlighted in the Wheatbelt development commission strategic plan, FIFO workers are congregating in the region and the notion of workers commuting from the Wheatbelt to mining locations is a reality. There is potential for other Wheatbelt locations, especially Jurien Bay, to become desirable residential locations for mining workers, requiring aviation infrastructure to suit.

Based on similar FIFO charter operations within WA, services of this nature may be operated to/from the Turquoise Coast Regional Airport by a 100-seat jet aircraft such as the Fokker 100 or potentially the Boeing 717. An alternative arrangement may include the operation of smaller turboprop aircraft, such as the ATR 72 (72 seats) and Dash 8-300 (50 seats), to transport FIFO workers to a hub airport for distribution on to other aircraft to other destinations.

3.2.2 REGULAR PASSENGER TRANSPORT

There are currently no RPT services to/from Jurien Bay Airport, however with significant population growth as targeted by the SuperTown initiative it is considered plausible that some RPT services

may operate from the future airport. These services may also develop as a result of growth in the economy through the expansion and development of businesses as well as through an increase in tourism in the area.

Recent upgrades to the Indian Ocean Drive have resulted in a drive time of approximately 2 hours 20 minutes between Perth and Jurien Bay. Due to the relative proximity of Perth, significant passenger numbers may not result. However, it may be possible that flights are operated to Jurien Bay on a multi-stop route that goes on to other destinations further north. Such operations are likely to be operated by 30 to 50 seat turboprop aircraft such as the Dash 8-300, Jetstream 41, Saab 340 or similar. There is also the possibility of niche services on turboprop aircraft of similar, or smaller, types, to other regional destinations.

A further possibility, although considered to be less likely, is the attraction of services by low-cost carriers as an alternative to Perth Airport, directly serving tourism development along the coast. These services would only be operated by Code 4C aircraft such as Boeing 737-800 and Airbus A320. Whilst considered unlikely, even in the very long term, it is prudent to provide facilities which could potentially accommodate such operations if necessary in the future.

3.2.3 COMMERCIAL FLIGHT TRAINING

As discussed in **Section 2.3**, the Wheatbelt Development Commission Strategic Plan 2009 – 2013 highlights the suitability of the Wheatbelt region for development of aviation training due to its clear airspace close to controlled airspace and optimum flying weather. On this basis, for the purposes of master planning the future Turquoise Coast Regional Airport, it is reasonable to assume that there is potential for the establishment of a commercial flight training school at the airport in the future.

Based on other similar flight schools in the country, such a facility could be designed to accommodate up to 80 students at one time. The flight training facility would include all facilities required by the students including aircraft storage, class rooms, accommodation and social areas. It could be expected that both single and twin engine training is undertaken at the facility. International flight training companies may be attracted to locate at a facility such as the proposed Turquoise Coast Airport.

3.2.4 EMERGENCY SERVICES

The existing Jurien Bay Aerodrome is utilised by the Royal Flying Doctor Service (RFDS) on a regular basis and accommodates a dedicated patient transfer facility. RFDS operations can be expected to grow in the future particularly with the significant increases in population that may occur as a result of the SuperTown initiative.

The existing Jurien Bay Aerodrome is also utilised by fire-bombing aircraft as required. This usage can be expected to continue at the proposed new Turquoise Coast Regional Airport.

Population growth may also demand an increase in visitation and use by other emergency services, such as a base for aeromedical helicopter services, or use by police aircraft.

3.2.5 AVIATION BUSINESSES

Skydive Jurien Bay

The majority of aircraft movement at the existing Jurien Bay Aerodrome are undertaken by Skydive Jurien Bay. The company is based in Jurien Bay and stores its aircraft at the aerodrome. This business has seen recent growth which is likely to continue into the future. Proposed developments to support tourism in the area may also assist in growing this business further, as well as attracting other similar business, which will increase the number of aircraft movements that may be operated from the future airport.

Tourism

Increase in tourism in the area also has the potential to develop other aviation opportunities such as sight-seeing charters, gliders and private flying training that may also be operated from the future airport.

Charter and Fixed Base Operators

Potential demand for charter operations to/from Jurien Bay through either tourism, business or general population growth, has the potential to attract charter operators to be based at the airport and fixed base operators to accommodate and service visiting private and charter aircraft.

3.2.6 AVIATION-RELATED BUSINESS

With an increase in general aviation activity through charter and potentially private operations there is potential for the airport to attract aviation support businesses such as aircraft maintenance. These in turn have the effect of attracting additional commercial and private operators to base themselves at the airport to take advantage of the services provided.

3.2.7 PRIVATE AND RECREATIONAL AVIATION

Through general population growth, the airport has the potential to attract private operators to base themselves at the airport. The potential establishment of an aero club or other organisation that provides recreational flight training will also encourage additional recreational training movements as well as attract private operators to locate at the aerodrome. An opportunity to train and base aircraft outside of Perth airspace may become more and more attractive to private operators as Perth and Jandakot airports become busier in the future.

3.2.8 RESIDENTIAL 'AIR-PARK'

As seen at other airports, there appears to be some demand from the private aviation sector for residential sites at airports on which a residence can be developed alongside aircraft storage. These sites require aircraft access to the runways. This is an opportunity that has the potential to develop at the Turquoise Coast Regional Airport.

3.2.9 NON-AVIATION COMMERCIAL ACTIVITIES

Trends at other regional airports have shown that airport owners and operators, largely local Government, are taking advantage of available land at airport sites for non-aviation uses, such as commercial business and industrial parks. This practise assists with the financial sustainability of the airport by providing an additional revenue source to the airport operator. There is potential for any available airport land at the new airport to be utilised in such a manner. Generally, this land is located away from the aviation facilities and must accommodate activities and development that will not limit aviation activities or the future development of the airport in any manner.

4.0 AVIATION ACTIVITY ESTIMATES

4.1 HISTORICAL ACTIVITY

From April 2011 to March 2012, there were 2,457 aircraft movements at the existing Jurien Bay Aerodrome, based on data collected by the Shire. Analysis of this data showed that 70% of all movements were undertaken by Skydive Jurien Bay.

78% of all movements were attributable to commercial operators, approximately 20% were private movements and a further 2% were emergency service movements. The airport is currently utilised by the RFDS for patient transfers as well as fire-fighting aircraft including fixed and rotary-wing.

There are currently no RPT or large charter operations at the airport.

4.2 FORECAST AIRCRAFT MOVEMENTS

Developing forecasts of aviation activity is subject to a large number of variables which make this exercise challenging even when large amounts of good quality historical data are available. In cases where step changes in demand are expected, such as for Turquoise Coast Regional Airport, then forecasts are at best, tentative and should be treated with appropriate caution.

Nevertheless, projections of annual aircraft movement numbers have been developed by segmenting aviation activity into the principal component sectors, each of which has differing potential drivers and prospects for growth at the new Turquoise Coast Regional Airport. These sectors are:

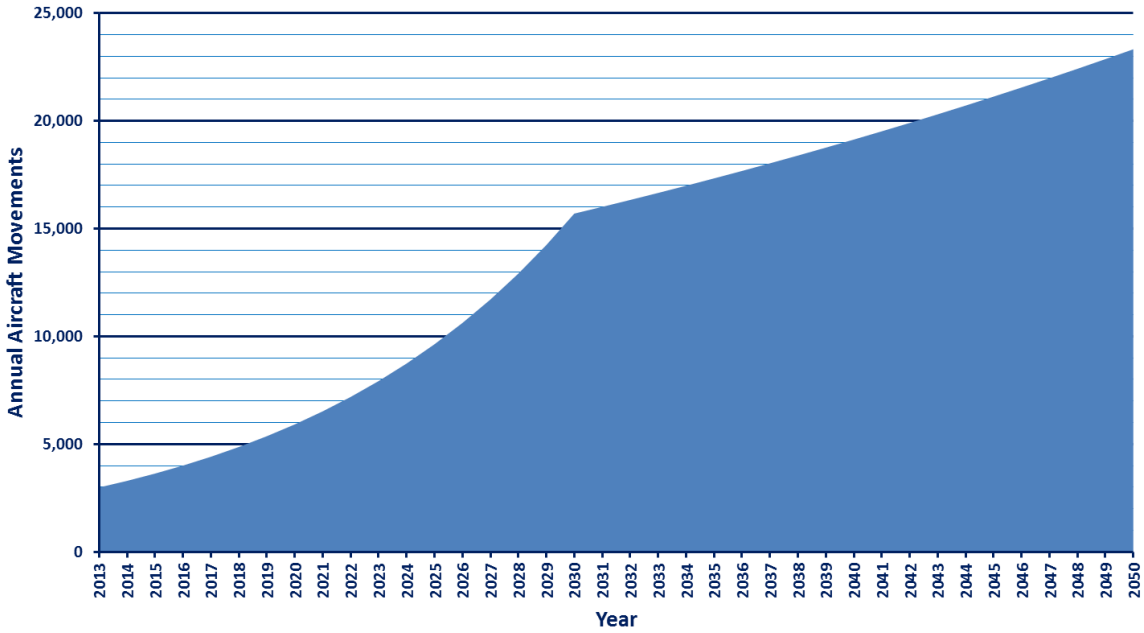
- Training;
- Large charter/Regular Public Transport (RPT);
- Other Charter;
- Private;
- Emergency;
- Business/Corporate; and
- Helicopters.

The forecast movements represent a potential high-growth scenario to 2050 and total approximately 23,300 movements per year as shown in **Chart 1**. This represents an overall growth rate of 6% per annum from 2011 to 2050. This is a relatively high growth rate, but considered reasonable based on the low starting point, the anticipated population growth, and the potential for attraction and expansion of a range of aviation activities through the opening of the new airport which cannot currently be accommodated at the current aerodrome.

It is anticipated that with the development of the new airport a higher growth rate of 10% per annum may be achieved to 2030 as a result of the significant growth of Jurien Bay overall as a Super Town and the attainment of a population of 20,000. Growth in the first half of this period is

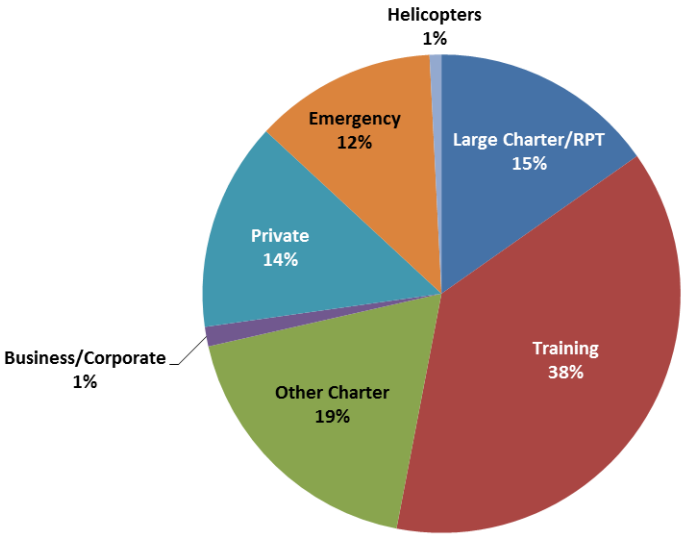
likely to be lower until the new airport is developed, however some sectors will continue to grow at the existing Jurien Bay Aerodrome. After 2030, or the point where overall growth in the town begins to slow, it is anticipated that aircraft movement growth may decrease to around 2% per annum as shown from 2030 to 2050 in **Chart 1**.

Chart 1: Estimated Aircraft Movement Demand 2011 to 2050



The growth of overall aircraft movements and individual sectors will depend on the exact timing of the development of the new airport which in turn depends on the economic and population growth of Jurien Bay itself. The approximate proportion of aircraft movements in each industry segment by 2050 is shown in **Chart 2** and discussed in the following paragraphs.

Chart 2: 2050 Estimated Aircraft Movements by Category



Large Charter/RPT

It is anticipated that demand for RPT and/or FIFO large charter services from the Turquoise Coast will likely drive the initial development of the new airport as the likely aircraft to operate these services cannot be accommodated at the existing aerodrome. The growth of this sector will therefore not commence until the new airport has been developed. Large Charter or RPT movements have been forecast based on the potential schedules and routes that may be operated by 2050. A total of 3,556 movements per annum have been forecast which represents 15% of all aircraft movements.

It is anticipated that there could potentially be up to 100-seat jet aircraft operating directly to mine sites/areas in North Western Australia and/or smaller turboprop aircraft operating feeder flights or multi-stop routes to other airports that accommodate larger aircraft for FIFO operations direct to mine sites.

RPT operations may also develop in the form of multi-stop routes to/from Perth and on to destinations to the north such as Geraldton, Karratha and Port Hedland.

Training

Training movements have been forecast based on the establishment of a commercial flight training school at the new airport. The forecasts assume that by 2030, a flight training school with capacity to accommodate up to 40 students will be established at the airport with further growth of this school to up to 60 students by 2050. This is expected to result in around 8,000 movements per year.

The forecast of training movements also accounts for any private training that may take place at the airport by an Aero Club or other providers, however this is likely to be relatively low number of movements compared with commercial pilot training.

Other Charter

Other charter operations, which are in addition to the large charter aircraft that are assumed to operate for the purposes of transporting mining workers to mine sites or areas, have also been forecast and include non-FIFO charter operations, skydiving and other aviation businesses that may locate at the new airport. A total of 4,302 other charter movements are forecast by 2050 which is anticipated to include a significant proportion of skydiving movements, assuming this business relocates and continues to grow at the new airport or maybe made up of a number of other charter activity movements. This results in approximately 19% of total aircraft movements and represents an annual growth rate of 2% between 2012 and 2050.

Private

Private aircraft movements are likely to result largely from private aviation activities of people living within the Jurien Bay area. Private movements have therefore been assumed to be linked to the forecast growth in population and have been forecast to 3,290 per annum by 2050. This results in an overall annual growth rate of 7%. This is based on the forecast increase in the population of

Jurien Bay to 20,000 people by 2030, in line with the SuperTown targets, resulting in a growth rate of approximately 10% per annum between 2011 and 2030. The movement forecast then includes further growth of private aircraft movements at a reduced rate of 2% between 2030 and 2050 to represent the potential slowing in the population growth in Jurien Bay over this period once the SuperTown target has been reached.

Emergency

Emergency service aircraft operations include both Royal Flying Doctor Service (RFDS) and fire-bombing activity movements. RFDS movements are assumed to be driven by population growth assuming a growth rate of approximately 10% by 2030 and a reduced growth rate of 2% between 2030 and 2050. Fire-bombing operations have been grown at a slightly lower rate considering the increase in activity and development in the area that may contribute to additional fire-bombing needs during the season. Overall it is forecast that there could be approximately 2,873 emergency service movements at the airport by 2050. This represents an overall annual growth rate of 5% between 2011 and 2050 and a 12% proportion of all movements.

Business/Corporate

It is considered that business/corporate movements will be driven by the growth in economic activity within Jurien Bay to 2050. Due to the relatively low levels of business/corporate movements currently at the airport, these have been grown at a high rate to replicate the potential for significant economic growth within the area as a result of the SuperTown initiative. Overall, business/corporate movements are forecast to result in 309 movements per annum by 2050, representing an annual growth rate of 16% between 2011 and 2050. This equates to a proportion of 1% of all forecast movements.

Helicopters

Future helicopter movements are anticipated to be largely related to fire-bombing activities as well as some private helicopter movements in the future. A total of 187 helicopter movements are forecast at the airport by 2050. Similar to the emergency service forecast this represents an annual growth rate of 5% between 2011 and 2050 and a 1% proportion of all movements.

4.3 PASSENGER TRAFFIC

The methodology adopted to plan the scale of future infrastructure requirements is largely based on key planning parameters such as the maximum number of aircraft utilising the aerodrome simultaneously, rather than overall passenger numbers. However, forecasts of overall passenger traffic and aircraft movements are useful for gaining an understanding of likely future activity levels and provide an indication of future utilisation levels of the airport.

Future passenger numbers and growth rates are dependent on a variety of factors. The local drivers affecting passenger numbers and growth rates at the new Turquoise Coast Regional Airport are:

- Jurien Bay population increase driven by the SuperTown initiative; and
- Economic growth with the Jurien Bay area also driven by the SuperTown initiative;

Based on the lack of RPT or significant passenger charter activity at the existing Jurien Bay Aerodrome and the long-term planning horizon being considered for the development of the new Turquoise Coast Regional Airport, it is extremely difficult to estimate future passenger demand with any level of confidence.

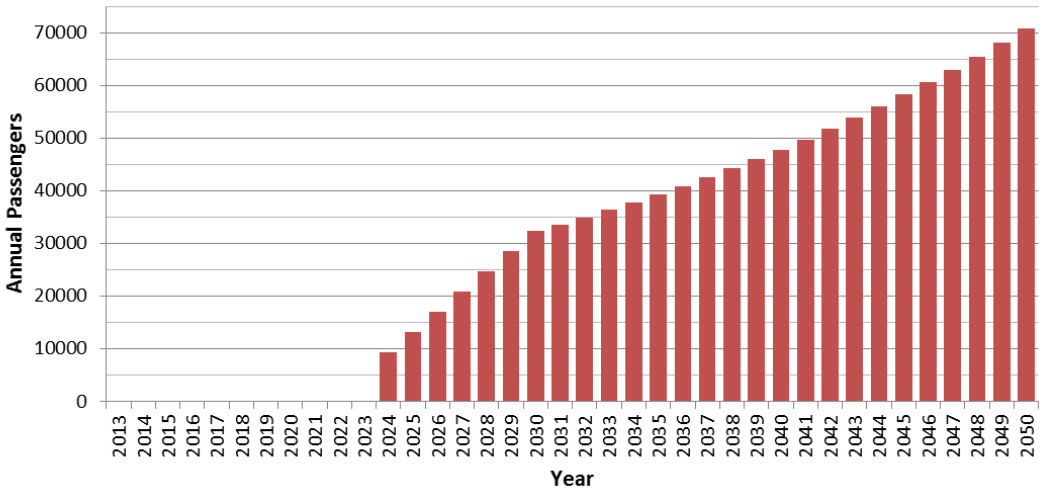
However, passenger numbers have been developed to represent a level of activity that could potentially be achieved sometime in the future. Although the planning horizon has been set at 2050, the exact timing of the achievement of these forecasts is extremely variable and may never be achieved if the SuperTown targets are not attained. However, the forecasts do represent a best guess as to the potential for the new airport in the future.

The establishment of a high-growth passenger forecast is considered appropriate for the purpose of this Master Plan in safeguarding for the future development of the new Turquoise Coast Regional Airport.

The high-growth forecast therefore assumes the growth of Jurien Bay is in line with the targets set out as part of the SuperTown initiative with approximately 20,000 population by around 2030. It assumes that the new airport is developed by 2024 at the latest and RPT and/or large charter operations are established at this stage. The scenario assumes significant growth in RPT/large charter operations to 2030 of a sufficient level to support a baseline level of FIFO activity at twice-weekly 100-seat return services, and potentially the establishment of a niche or commuter RPT service from Jurien Bay.

Beyond 2030, growth over the subsequent 20 years to 2050 of 4% per year has been applied, which is consistent with global air traffic growth trends and those observed over the long term for similar regional airports. This results in a total of approximately 71,000 annual passengers by 2050 as indicated in **Chart 3**.

Chart 3: Estimated Annual Passenger Traffic to 2050



5.0 DEVELOPMENT CONCEPT

The following sub-sections describe the critical planning parameters used to develop the aeronautical infrastructure development concept for the proposed Turquoise Coast Regional Airport, as well as each element of the aeronautical and non-aeronautical infrastructure proposed. **Figure 2** at **Appendix B** illustrates these infrastructure items.

5.1 CRITICAL PLANNING PARAMETERS

Whilst the forecasts of overall passenger traffic and aircraft movements described in **Section 4.0** are useful for gaining an understanding of likely future activity levels, they are of only limited value as inputs to the planning of individual aeronautical facilities. Accordingly, more specific key planning parameters have been developed consistent with these overall forecasts.

To determine the key planning parameters, which include terminal sizing requirements and aircraft parking capacity, the potential impacts of future passenger traffic and operating aircraft size/frequency were considered in order to plan for the worst case scenario in terms of infrastructure development.

Likely aircraft types, operating frequencies and schedules were determined through consideration of the likely opportunities for the development of RPT and/or charter services at the airport with reference to other industry knowledge and the application of a general understanding of these operations. This enabled an understanding of the likely operations in the future considering a range of frequencies and aircraft sizes that could provide the forecast passenger numbers provided in **Section 4.0**. This ensures that the most demanding scenario in terms of infrastructure requirements is safeguarded for.

5.1.1 ICAO 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 a reference code system developed by the International Civil Aviation Organisation. The reference code has two elements, a number and a letter, which are derived by grouping aircraft with similar performance capabilities 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 aerodrome, 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 anticipated to use the aerodrome.

5.1.2 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 potential 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. The PCN is a number expressing the bearing strength of a pavement for unrestricted operations by aircraft with ACN value less than or equal to the PCN.

5.1.3 DESIGN AIRCRAFT PARAMETERS

Table 1 summarises the principal relevant planning parameters that relate to aeronautical facilities for each of the key aircraft types that might use the Turquoise Coast Regional Airport in the future.

Table 1: Principal Design Aircraft Key Parameters

Aircraft Type	Wingspan (m)	Tail Height (m)	MTOW (kg)	ICAO Aerodrome Reference Code	ACN (1)	Typical Passenger Capacity (Pax)
Cessna 172	10.9	2.7	1,160	1A	< 5,700 kg	N/A
Cessna 310	11.3	3.3	2,495	1A	< 5,700 kg	N/A
Cessna 208	15.9	4.7	3,310	1B	< 5,700 kg	N/A
Pilatus PC-12	16.2	4.3	4,740	2B	< 5,700 kg	N/A
Beech King Air 200	16.6	4.5	5,670	1B	3	9
Beech King Air 350	17.7	4.4	6,804	1B	3	12
Air Tractor AT-802A	18.0	3.4	7,257	1B	6	N/A
Hawker 850XP	16.5	5.5	12,701	3B	13	8
Cessna 550	15.8	6	6,033	2C	5.9	10
Jetstream 31	15.9	5.3	6,950	3C	4	19
Saab 340	21.4	7.0	12,371	3C	7	34
Bombardier Dash 8-300	27.4	7.5	18,642	2C	9	50
Fokker 100	28.1	8.5	45,810	3C	27	106
Boeing 717-200	28.5	8.9	54,900	3C	33	117
Boeing 737-800	35.7	12.5	174,200	4C	46	175

(1) For flexible pavement on an assumed medium (category B) sub-grade

5.2 AERONAUTICAL INFRASTRUCTURE

As a result of the early planning stage of the airport, and the potentially lengthy timeframe that may occur before the airport is developed, aeronautical infrastructure requirements have been assessed at a high level determining only relatively broad conceptual requirements at this stage. Due to the level of uncertainty over such a timeframe, the Master Plan focusses on identifying infrastructure requirements that will appropriately safeguard the identified land for future development. Further detail with regards to the individual infrastructure elements should be considered once the airport development process progresses further.

The following sub-sections set out the anticipated required infrastructure in conceptual terms. The overall ultimate development airport layout is illustrated in **Figure 2** at **Appendix A**.

5.2.1 RUNWAYS

Runway Configuration

A single runway, supported by suitable airspace design and taxiway infrastructure, is considered to have adequate capacity for the anticipated level of operations at the Turquoise Coast Regional Airport. However, due to the prevailing winds, in order to achieve adequate levels of usability with respect to the critical aeroplane types, two runways in complementary orientations are considered necessary.

An analysis of prevailing wind was undertaken to determine the runway configuration that provides acceptable useability whilst also taking into consideration the limitations placed by the surrounding terrain on aircraft movements in certain directions, and the need to maximise the achievable runway length within the available site. The selected runway configuration of 18/36 for the main runway and 09/27 for the cross runway was determined as the most appropriate configuration, and avoids approach and departures over the ridge located to the east of the airport site. Details of the proposed runway thresholds and alignments are given in **Table 2**.

Table 2: Proposed Runway Bearings, Threshold Coordinates and Elevations

Runway Threshold	E	N	Elevation (mAHD)	Bearing (True)	Bearing (Magnetic)*
09	323451.137	6650314.411	53.3	90.0°	91.2°
27	324451.137	6650314.411	55.5		
18	323511.256	6651699.141	60.5	175.1°	176.3°
36	323662.774	6649905.530	52.5		

* Magnetic declination of 1.21° W estimated as at April 2014

Based on historical wind speed and direction data for Bureau of Meteorology weather station 009131 Jurien Bay, covering the period 21 October 1969 through 20 April 2011, the selected runway configuration provides an estimated useability factor of 96.7% for a 10 knot crosswind limit,

which is consistent with the ICAO recommendation of minimum 95% useability. The main runway, 18/36, has an estimated useability of 97.3% for a 20 knot crosswind limit.

It should be noted that the data is only available for Jurien Bay approximately 12km away, and wind patterns may be different at the proposed site. Furthermore, data is only available every three hours throughout the day, and prior to October 1987 there are records only for 0900 and 1500 hours. The accuracy of the useability assessment is dependent on the comprehensiveness of the data on which it is based.

Runway Length & Width

The length and width of a runway, in combination with the characteristics of the runway strip in which it is located, determine the categorisation of the runway in terms of aerodrome reference code and the type of operations that may be accommodated in accordance with CASA Manual of Standards Part 139.

The following provision for runways is considered appropriate based on the mix of potential aviation activity which may occur at the airport:

- Runway 18/36 should be a Code 3C instrument non-precision runway capable for use by jet aircraft with over 100 seats. Pavement should be 1,800m long and 30m wide, with 3m sealed shoulders each side. To cater for potential future upgrade to Code 4C operations, the runway should be located within a 300m wide by 1,920m long runway strip of which the central 150m should be graded;
- Runway 09/27 should be a Code 2B instrument non-precision runway. The pavement should be 1,000m long and 23m wide. The runway should be located within a 90m wide by 1,120m long graded runway strip.

As with all aeronautical infrastructure, the runways may be developed in a staged manner, to a lesser standard initially and progressively upgraded, provided that the appropriate safeguards are maintained to accommodate the ultimate development if and when required.

Runway End Safety Areas

CASA Manual of Standards Part 139 requires runway end safety areas (RESAs) to be provided at the ends of runway except where the runway is a Code 1 non-instrument runway. RESAs are required to be a minimum of 60m long and twice the width of the associated runway. Allowance has been made for 60m x 60m RESAs to be provided at each of both runways.

If Runway 18/36 is ever extended to accommodate Code 4 aircraft and widened to 45m, the RESA at the northern end will need to be extended to a minimum of 90m x 90m.

Pavement Strength

The critical design aircraft for Runway 18/36 will be the Boeing 717-200, for 09/27 it will be the Air Tractor AT-802A or Beech King Air 350.

In the absence of geotechnical investigation, assumptions have had to be made regarding the subgrade strength condition in determining the appropriate Pavement Classification Number (PCN). Based on the understanding that the subgrade is mostly of a sandy nature, a subgrade CBR of 8% has been assumed. Although there are some areas where the subgrade is more clay, it is assumed that these areas will be treated during construction to provide an equivalent CBR of 8% of better. A CBR of 8% corresponds to a subgrade strength category of B (medium). The PCN of a B717-200 on a category B subgrade is 33, and the main runway, taxiway and apron pavement should be designed to accommodate this.

5.2.2 TAXIWAYS

An effective taxiway system linking all of the major operational areas of the airport is essential to safe and efficient operations. The overall taxiway network proposed is indicated on **Figure 2** at **Appendix A**.

Full parallel taxiways are proposed to both sides of each runway, along with entry/exit taxiways at relevant points to each runway. Taxiways have been located in accordance with the clearances associated with the code letter of the critical aeroplanes ultimately expected to use them. Development of taxiways will be staged according to operational need. The proposed taxiway links are summarised in **Table 3**.

Table 3: Proposed Taxiway Network

Taxiway	Description	Ultimate Code Letter
TWY A	Western Parallel taxiway to Runway 18/36	**C**
TWY A1 – TWY A6	Links from Taxiway A to Runway 18/36	**C**
TWY B	Northern parallel taxiway to Runway 09/27	**B**
TWY C	Eastern parallel taxiway to Runway 18/36	**B**
TWY D	Northern parallel taxiway to Runway 09/27	**B**

5.2.3 PASSENGER TERMINAL PRECINCT

The estimated RPT and charter requirements at the establishment of passenger services in 2030 and over the planning horizon to 2050 are indicated in **Table 4**.

Table 4: Passenger Terminal Requirements

Requirement	2030	2050
Maximum No of Passengers in Terminal (Departing & Arriving)	168	238
Aircraft Parking Positions	1 x Fokker F100 1 x Fokker F50	1 x Boeing 717-200 1 x ATR72-600 or Dash8-Q400

Because any terminal building would normally be constructed to a size sufficient to accommodate the 20-year growth projection at opening, and because the relative space requirements for the expected traffic at 2030 and 2050 are quite similar, it is anticipated that the initial development of passenger terminal and apron facilities would be sufficient to accommodate the 2050 requirements.

Overall space requirements for a future terminal facility capable of accommodating a B717-200, plus a turbo-prop aircraft have been estimated at around 1,500 – 2,000m^2. This would include facilities for passenger and checked baggage screening if necessary. An apron area capable of parking a B717-200 and up to a 70-seat turboprop aircraft such as the Dash 8-Q400.

Expansion of the passenger terminal and associated facilities due to unforeseen growth in passenger operations is often constrained by adjacent development. Because of the uncertain nature of air traffic beyond 2050, and even within the planning horizon of this Master Plan, additional space should be safeguarded adjacent to the passenger terminal to accommodate expansion of the facilities in the future, consistent with the ultimate potential to accommodate Code 4C operations by jet aircraft up to Boeing 737-800 or Airbus A320 size. Suitable expansion reserves on either side of the initial passenger terminal development are shown on **Figure 2** at **Appendix A**. These zones should be safeguarded and specifically reserved for the future development of passenger terminal building, adjacent airside and landside operational facilities, passenger apron, car parking and other essential infrastructure to support passenger operations.

5.2.4 FUEL STORAGE

Fuel storage facilities need to be located conveniently for all users. This often represents a compromise. In many cases, at larger airports, separate facilities for Jet A-1 fuel, used by commercial operators, are provided to those for AvGas which is predominantly used by smaller aircraft. However, at Turquoise Coast it may be feasible to operate a single facility which combines both fuel types and allows for tanker refuelling of Jet A-1 and a self-service AvGas dispensing bowser. The appropriate arrangement will depend on the exact mix of operations and the need may change as activity at the airport grows.

No specific locations for fuel facilities have been identified on the ultimate development plan. However a location within the southern commercial aviation precinct, or within the passenger terminal expansion reserve adjacent to the southern commercial aviation precinct, would be appropriate for bulk storage of Jet A-1 fuel. If there is a large amount of private aviation, provision of a separate self-service AvGas facility in the vicinity of the Aero Club would be appropriate.

5.2.5 ENGINE RUN-UP BAY

An engine run-up facility is likely to be required in order to allow aircraft operators to conduct necessary pre-flight engine checks and for any aircraft maintenance operators to conduct testing following maintenance activities.

Provision for an engine run-up bay for aircraft up to Code B is made adjacent to the Runway 09 threshold. This location is convenient for the majority of users who are likely to require regular engine run-ups such as the DEC, pilot training academy and Skydive Jurien Bay.

Code C aircraft, should they require engine run-ups, can undertake these at a suitable location on the taxiway system as these are not expected to be as frequent.

Should there be a large number of maintenance operators that require to undertake extended engine runs then an additional facility, with appropriate noise shielding, could be located on a more remote part of the aerodrome to ensure the noise impacts of this activity are managed in the most appropriate manner.

5.2.6 HELICOPTER FACILITIES

Although, in general, it is desirable to separate rotary- and fixed-wing operations as much as possible, due to the low number of helicopter movements anticipated no specific provision for a dedicated helicopter precinct has been made within the Master Plan.

If helicopter demand proves to be much greater than expected, with several dedicated helicopter operators wishing to establish at the airport, then consideration could be given to consolidating these users within in part of the northern commercial aviation precinct.

5.2.7 NAVIGATIONAL AIDS

Wind Direction Indicators

Illuminated Wind Direction Indicators (IWI) will be required at each end of Runway 18/36 as indicated on **Figure 2** at **Appendix A**. A wind indicator (not necessarily illuminated unless the runway is provided with lighting) will also be required at the eastern end of Runway 09/27.

Additional wind indicators may be required in the vicinity of the passenger apron and the Runway 09 threshold, depending on the visibility of the above indicators to pilots.

DVOR/DME

By the time Turquoise Coast Regional Airport is developed, it is anticipated that current trends towards satellite-based aircraft navigation technology will have made the need for ground-based navigation aids obsolete. However, should it be required, a location should be safeguarded for the installation of a DVOR/DME facility. A suitable location, which has low value for other uses and which preserves the applicable clearances to surrounding structures, to the east of Runway 18/36 and south of Runway 09/27, is indicated on **Figure 2** at **Appendix A**.

5.3 COMMERCIAL DEVELOPMENT

5.3.1 COMMERCIAL AVIATION PRECINCT

The commercial aviation precinct is divided into two sections – Southern and Northern – located on each side of the passenger terminal precinct.

The southern section is expected to be operationally attractive to users with the greatest requirement for use of Runway 09/27. These include Department of Environment and Conservation fire-bombing aircraft, a commercial pilot training academy and Skydive Jurien Bay as well as light aircraft maintenance businesses and agricultural operators. It may also be suitable for an RFDS patient transfer facility.

The northern section would be suited to charter and freight operators, aircraft maintenance, repair and overhaul (MRO) businesses, an FBO for visiting business and corporate aircraft, the RFDS, and tourism operators.

5.3.2 PRIVATE AVIATION PRECINCT

A precinct for the construction of private hangar facilities has been identified to the south of Runway 09/27. This location is convenient for the use of both runways. It is easily accessible from the southern commercial aviation precinct and, if necessary, can be serviced with utility connections relatively cost-effectively from there.

Up to 36, 20m x 20m hangar lots, each with landside road access and Code A taxiway, can be accommodated and there is opportunity for further expansion to the south if required. Aero Club facilities, should they be required, would also be appropriate in this precinct together with general light aircraft tie-down parking.

5.3.3 RESIDENTIAL AIRPARK RESERVE

A zone to the east of Runway 18/36 has been identified as the most suitable for residential airpark development. This area of the site is the least suited to development of heavy aviation facilities due to its proximity to the lower-lying areas of the site. This has associated implications in relation to the poorer subgrade which make heavy duty pavements less economical. Its proximity to the conservation reserve will also increase the amenity of this area for residential purposes.

Road access to this area could be provided via Munbinea Road.

5.3.4 NON-AVIATION PRECINCT

Land has been identified for a range of relevant, aviation and non-aviation related activities to the east of the commercial aviation precincts.

Appropriate activities here will depend on the mix of aviation activities as well as the associated planning for other industrial and commercial land within the Turquoise Coast city. However, possible activities within this precinct might include: long-term car parking; rental car storage and servicing facilities; freight and logistics handling; materials storage and warehousing; convenience food, beverage and retailing to serve airport users; short–term accommodation associated with airport use; pilot training academy classrooms and simulator facilities; airport operations and/or Shire depot or workshop; or light industrial uses which would derive a value-adding proposition from co-location with airport operations.

5.4 ACCESS ROADS

Access road reserves are indicated on the ultimate development concept to accommodate roads, footpaths, drainage and utilities infrastructure.

The main access is indicated as being off Jurien Road, as this is serving the majority of high-traffic development and is the most convenient location for the majority of traffic which is expected to travel to and from Jurien Bay.

A secondary access to serve the residential airpark development and conservation reserve would be formed off Munbinea Road.

6.0 IMPLEMENTATION PLAN

6.1 STAGED DEVELOPMENT PLAN

The ultimate development concept indicated in **Figure 2** at **Appendix A** sets out the overall development across the whole of the site in order to provide a framework within which individual developments can take place. It is, naturally, expected that these developments will occur over a number of years, if not decades.

The timing of individual developments is hard to predict and the sequencing may vary depending on whether initial development is driven by a requirement for passenger services, which are not possible at the existing Jurien Bay aerodrome, or through an excess of demand over supply for facilities and land at the existing aerodrome (for example, an opportunity to develop a pilot training academy).

Therefore, consideration has been given to what might constitute an initial set of infrastructure and facilities. These are indicated on **Figure 3** at **Appendix A**.

6.1.1 AERONAUTICAL FACILITIES

Initially, the development of Runway 09/27 to its full length and width would address current concerns regarding the availability of the existing aerodrome for fire-bombing operations in strong easterly wind conditions. This runway would not necessarily need to be sealed immediately, as the primary user DEC tends to operate in the summer months which are relatively dry. A natural surface, or unsealed gravel runway would be sufficient.

In combination with a 1,400m long by 23m wide sealed Runway 18/36, this would give a level of aeronautical capability approximately equivalent to that provided by the existing Jurien Bay aerodrome. However, due to the cross runway configuration and the less severe obstacle environment the Turquoise Coast Regional Airport would bring benefits to operators compared with the existing facility even at this initial level of infrastructure.

Subsequently, it is anticipated that upgrade of Runway 18/36 to Code 3C through extension to 1,800m and widening to 30m will occur when passenger services become a realistic opportunity. Development of the passenger terminal precinct will of course occur in conjunction with this upgrade. Development of taxiways would occur according to operational need.

6.1.2 COMMERCIAL DEVELOPMENT

It is anticipated that the southern section of the commercial aviation precinct will be developed first, as this is considered to be the most operationally beneficial location for the significant users most likely to drive demand during the early stages of the airport development. These key users are expected to include Department of Environment and Conservation, Skydive Jurien Bay and a commercial pilot training academy. For this reason, it is proposed that the commercial aviation sites closest to Runway 09/27 are reserved for these users only.

In addition, provision for Aero Club facilities and an initial release of lots for private hangars is envisaged as part of the initial development.

Both commercial and private aviation precincts would then be developed progressively according to demand.

6.2 INDICATIVE COST ESTIMATES

Preliminary estimates of construction cost have been developed to give an indication of the initial and ultimate development of key infrastructure elements. These costs are summarised in **Table 5**.

Table 5: Indicative Development Costs

Element	Initial Development	Ultimate Development	Difference
Runway 18/36 (incl Taxiways A2-A4)	$6.5 million	$3.3 million	$3.2 million
Runway 09/27	$1.2 million	$3.5 million	$2.3 million
Taxiway A	$1.9 million	$4.9 million	$3.0 million
Taxiway B	$0.3 million	$1.2 million	$0.9 million
Taxiways E/F	$0.9 million	$0.9 million	nil
Private Aviation Precinct Taxiways	$1.5 million	$2.2 million	$0.7 million
Landside Works – Access Roads & Utilities	$10.4 million	$19.6 million	$9.1 million
Passenger Terminal, Apron and Car Park	nil	$15.4 million	$15.3 million
TOTAL	**$22.6 million**	**$61.0 million**	**$37.4 million**

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

- Runway development costs includes allowances for earthworks, pavement and runway lighting;
- Volumes have been estimated by reference to available contour data obtained from Landgate only. No feature and level survey has been obtained;
- No geotechnical investigation has been undertaken. In the absence of this information, the subgrade is assumed to be generally of a sandy nature with a CBR of 8%, except towards the north-east corner of the site. An allowance for sub-grade improvement with select fill has been made at the rate of 30% of total area in Stage 1 and 50% in Stage 2;
- Costs included for the development of the private and commercial aviation precincts do not include ground improvements 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), taxiway access (where relevant) and landside access to the subdivided sites have been considered only;

- It is assumed that engineering services will be available from on-site facilities or from mains supply along the Jurien Road. Costs to bring services to the airport entrance are not included, nor are the costs of any upgrades to the existing network capacity;
- GST has not been included;
- An allowance of 15% for preliminaries and 10% for construction contingency has been made; and
- No allowance for design or management costs has been made.

7.0 PLANNING & ENVIRONMENTAL IMPACTS

7.1 AIRSPACE PROTECTION

7.1.1 AIRSPACE PROTECTION LEGISLATION

The safety, efficiency and regularity of aircraft operations require airspace to be largely free of obstacles which may make it unsuitable for the conduct of visual and instrument flights.

The Commonwealth provides for the protection of airspace around certain airports, through Part 12 of *the Airports Act 1996* and the *Airports (Protection of Airspace) Regulations*. Although this legislation is primarily designed to apply to Federal Airports it may be extended to other airports by seeking a declaration in the schedules to the regulations.

This Turquoise Coast Master Plan adopts the Airports Act 1996 definitions of 'prescribed airspace' for the Turquoise Coast Regional Airport to ensure consistency with the latest Commonwealth practice.

7.1.2 PRESCRIBED AIRSPACE COMPONENTS AND PURPOSE

Prescribed airspace protected under the *Airports Act 1996* is defined as;

- The airspace above any part of either an Obstacle Limitation Surface (OLS) or a PANS-OPS surface for the airport; and
- Airspace declared in a declaration, under Regulation 5, relating to the airport.

In practical terms the OLS component will provide a sufficient level of airspace protection for the Turquoise Coast Regional Airport. The OLS for an airport describes the airspace boundaries for flight in proximity to an airport which should ideally be kept free of obstacles that may endanger in visual operations or during the visual stages of an instrument flight. The OLS elements are defined in the International Civil Aviation Organization (ICAO) Annex 14 and in Chapter 7 of the CASA Manual of Standards Part 139. The OLS are used to define when objects are to be considered as obstacles and assessed for their impact on aircraft operations in visual flight. CASA may permit an obstacle to penetrate the OLS but will normally require it to be marked and/or lit to make it conspicuous to pilots.

Obstacle assessment or accountability requirements for instrument flight are prescribed by ICAO in document 8166-OPS/611: Procedures for Air Navigation Services – Aircraft Operation. These PANS-OPS surfaces define the absolute upper limit required of new structures so that the procedure designer can guarantee that an aircraft will have required minimum vertical clearance when flying in instrument conditions. In these situations the pilot may be relying entirely on the information derived from cockpit instruments and may have no external reference to the ground, to obstacles or other aircraft.

If a new building or structure penetrates a PANS-OPS surface the procedures designer will need to adjust the PANS-OPS surface vertically to compensate, and in doing so raise the minimum safe altitude for that segment of the instrument flight. As a result, structures in the vicinity of an airport may prevent a pilot from descending below cloud and landing at the airport.

7.1.3 OBSTACLE LIMITATION SURFACES

In keeping with **Section 5.2.1** the OLS for the Turquoise Coast Regional Airport includes provision for non-precision instrument approaches for all four runway directions.

The OLS parameters are based on the requirements for non-precision instrument operations by reference code 4C design aircraft for Runway 18/36 and non-precision instrument operations by reference code 2B aircraft for Runway 09/27. The runway strip width adopted for the OLS are those appropriate to these types of operations – 300 metres for Runway 18/36 and 90 metres for Runway 09/27.

The OLS includes provision for Runway 18/36 to be extended by 200 metres to the south in the longer term in order to preserve this option from being negated by intervening development.

The ultimate Turquoise Coast OLS plan is included as **Figure 5** at **Appendix A**. Prevention of new obstacles from penetrating these surfaces should adequately protect the airport development options identified in the Master Plan.

It is noted that the ridge to the northeast will penetrate parts of the inner horizontal, conical and outer horizontal surfaces. As discussed above, penetrations of the OLS in this manner are generally permissible, provided appropriate mitigations are in place. In this case, obstacle lighting will need to be installed at relevant points on the penetrating terrain. This lighting will need to be maintained by the aerodrome operator.

7.1.4 PANS-OPS SURFACES

PANS-OPS airspace can be identified to protect both existing and future instrument flight procedures. The relevant PANS-OPS protections surfaces have not been identified in this Master Plan. Establishment of these surfaces can only be undertaken once instrument approach procedures have been design in accordance with the relevant criteria. The procedure designs will need to take account of all existing obstacles including the surrounding terrain.

7.2 AIRCRAFT NOISE

7.2.1 THE ANEF SYSTEM

The effect of aircraft noise can range from minor to serious depending on its level, duration, frequency, content and the sensitivity of the person affected. The Australian Noise Exposure Forecast (ANEF) system is one method of noise assessment and displays noise exposure levels in the vicinity of the airport.

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 a composite measure of noise exposure 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.

The ANEF is used to provide guidance for land use planning. **Table** indicates the suitability of various land uses in ANEF zones near an airport. Higher values, especially above 25 ANEF are considered incompatible with residential use. Areas below 20 ANEF are suitable for residential development. Housing should only be permitted in the 20-25 ANEF zone with the incorporation of suitable noise reductions features. **Table 6** is an extract from Australian Standards AS2021-1994, *Acoustics: Aircraft Noise Intrusion – Building Siting and Construction.*

Table 6: Land Use Compatibility advice for areas in the vicinity of Australian Airports

Building Type	ANEF Zone		
	Acceptable	Conditionally Acceptable	Unacceptable
House. Home unit , flat, caravan park	<20 ANEF	20-25 ANEF (Note 2)	>25 ANEF
Hotel, motel, hostel	<25 ANEF (Note 1)	25-30 ANEF (Note 2)	>30 ANEF
School, university	<20 ANEF (Note 1)	20-25 ANEF (Note 2)	>25 ANEF
Hospital, nursing home	<20 ANEF (Note 1)	20-25 ANEF (Note 1)	>25 ANEF
Public building	<20 ANEF	20-30 ANEF	>30ANEF
Commercial building	<25 ANEF	25-30 ANEF	>35 ANEF
Light industrial	<30 ANEF	30-40 ANEF	>40 ANEF
Other industrial	Acceptable in all ANEF zones		

Notes:

1. The actual location of the 20 ANEF contour is difficult to define accurately, mainly because in variation of aircraft flight paths. Because of this the procedure of Clause 2.3.2 of the Standard may be followed for building sites outside but near to the 20 ANEF contour.
2. Within 20 ANEF and 25 ANEF, some people may find that the land is not compatible with residential or educational use. Land use authorities may consider that the incorporation of noise control features in the construction of residences is appropriate.
3. There will be cases where a building of a particular type will contain spaces used for activities which would generally be found in a different type of building (e.g. an office in an industrial building). In these cases Table 2.1 of the Standard should be used to determine site acceptability, but internal design noise levels within the specific spaces should be determined by Table 3.3 of the Standard.

7.2.2 AUSTRALIAN NOISE EXPOSURE CONCEPT

The noise exposure associated with forecast airport operations has been assessed through the development of an Australian Noise Exposure Concept (ANEC). The ANEC is based on estimated 2050 activity levels of 23,329 movements. A number of operational assumptions have had to be made which cannot truly be validated until operations at the new airport commence. However, the key assumptions include:

- Training circuits and other light single-engine aircraft movements (predominantly skydiving) will be split equally between each runway;
- Fire-bombing operations will occur on Runway 09/27 whenever this runway is available (approximately 70% of the time)
- Movements on Runway 09/27 will occur equally in each direction;
- Movements on Runway 17/35 will be distributed 70% / 30% respectively;
- 90% of all movements occur between 07:00 and 19:00; and
- Assumptions about flight paths are as described in **Section 7.2.5** below.

7.2.3 ANEF CONTOURS

The resulting ANEF contour footprint is presented in **Figure 5** at **Appendix A**. The ANEC shows the significant contours including the 20, 25, 30 and 35 ANEF. In terms of the ANEF contours that are significant under AS2021-2000:

- The 35 ANEF contour remains largely within the runway strip;
- The 25 and 30 ANEF contours remain within the airport boundary close to the runway;
- The 20 ANEF contour extends slightly beyond the airport site, across Jurien Road and into the adjacent lot to the north, and into the adjacent lot to the south.

7.2.4 NUMBER-ABOVE CONTOURS

The ANEF system is generally recognised as being the most technically complete description of aircraft noise in use in the Australian context and the ANEF is the only metric recognised under AS2021:2000. However, it is also widely recognised that the ANEF system is not easily translated into the important factors which affect how individuals react to aircraft noise: the number of overflights and the loudness of individual events. This is due to the way the ANEF combines the effects of loudness, duration and frequency of noise events to develop a measure of the cumulative noise dose. The Australian Government recognises this and has been encouraging airports to include other information about noise in their Master Plans.

Use of 'Number Above' contours has therefore gained popularity recently to complement the ANEF system. Number above, or 'N', contours illustrate the average number of events per day louder than a certain sound level. In the case of the N60, this level is 60 dB(A). The single event level of 60 dB(A) is specified in Australian Standard AS2021:2000 as the indoor design sound level for

normal domestic areas in dwellings and 70 dB(A) is the noise level at which conversation is disturbed within a house with the windows open.

Contours such as the N60s and N70s assist the community to better understand the impacts of aircraft noise by giving individuals the ability to interpret aircraft noise based on actual counts of aircraft with a noise profile greater than a certain level over a range of flight paths. The provision of 'Number Above' contours has been recommended by Department of Infrastructure and Regional Development (previously the Department of Transport and Regional Services) in a discussion paper entitled *Guidance Material for Selecting and Providing Aircraft Noise Information*. More recently, the National Airports Safeguarding Framework (NASF) provides guidance within *NASF Guideline A Measures for Managing Impacts of Aircraft Noise*.

In response to these recommendations N60 and N70 maps for the Turquoise Coast Regional Airport based on the 2050 forecasted level of traffic have been produced and are shown in **Figure 6** and **Figure 7** respectively at **Appendix A**.

7.2.5 FLIGHT PATHS

The standard traffic pattern for normal operations in the vicinity of an airport includes left-hand circuits, however due to the high terrain to the east, in the case of Turquoise Coast, circuits will probably need to be confined to the west of the airport. This means that non-standard right-hand circuits will need to occur when operating on Runway 18.

Significant further work is required in order to confirm the exact flight paths that will operate outside the standard traffic pattern. At this early stage, arrival tracks for aircraft have been standardised based on straight-in approaches only as the majority of arriving aircraft will be well-established on final approach by around 10km from the runway. Departures have been assumed to be either a straight-out departure, or a traffic pattern to the west of the airport as described above, depending on the expected origin/destination of the flight and runway in operation.

Training circuit movements by light aircraft have been modelled as a standard circuit in accordance with the traffic pattern.

7.3 WILDLIFE HAZARD MANAGEMENT

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 Shire of Dandaragan planners incorporate this into

future Local Planning Schemes 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 8 at **Appendix A** 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 the proposed Turquoise Coast Regional Airport site should be controlled. 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 the Shire 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.

7.4 LIGHTING RESTRICTIONS

Section 9.21 of the MOS Part 139 provides 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 emission 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 designated A. B, C and D. These zones reflect the degree of interference ground lights can cause as a pilot approaches to land. **Figure 9** at **Appendix A** shows the primary area and zones in relation to the proposed Turquoise Coast 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.

Lighting restriction zones in relation to both runways are shown, even though it is not necessarily intended that Runway 09/29 be lit, in in order to preserve this option should it be required.

8.0 RECOMMENDATIONS

The REHBEIN Airport Consulting report *Turquoise Coast Regional Airport Site Options Assessment*, 16 April 2013 confirms the selected site at the corner of Jurien Road and Munbinea Road as the most suitable of the identified options for a future Turquoise Coast Regional Airport suitable to serve a range of general aviation and passenger transport operations. The preferred site is considered to be technically superior to the alternatives against a range of aeronautical and non-aeronautical criteria applicable to a modern airport, as well as likely to be the most cost-effective to develop.

Due to the expected development timeframes for the airport, which are very long-term in nature, the exact mix of operational requirements that the airport must accommodate is not yet known, and may not be known for some years to come. The Master Plan for the Turquoise Coast Regional Airport must therefore incorporate flexibility to adapt appropriately to the reality of demand as it eventuates.

This Master Plan report sets out a framework for the physical development of the preferred site which allows flexibility for the implementation of facilities in a staged manner to suit the extent and nature of demand as it occurs. A number of safeguarding measures are identified in **Section 7.0** and it is recommended that these be incorporated within subsequent revisions of the Local Planning Scheme to adequately preserve the capability of the selected site to accommodate the operations associated with the Turquoise Coast Regional Airport.

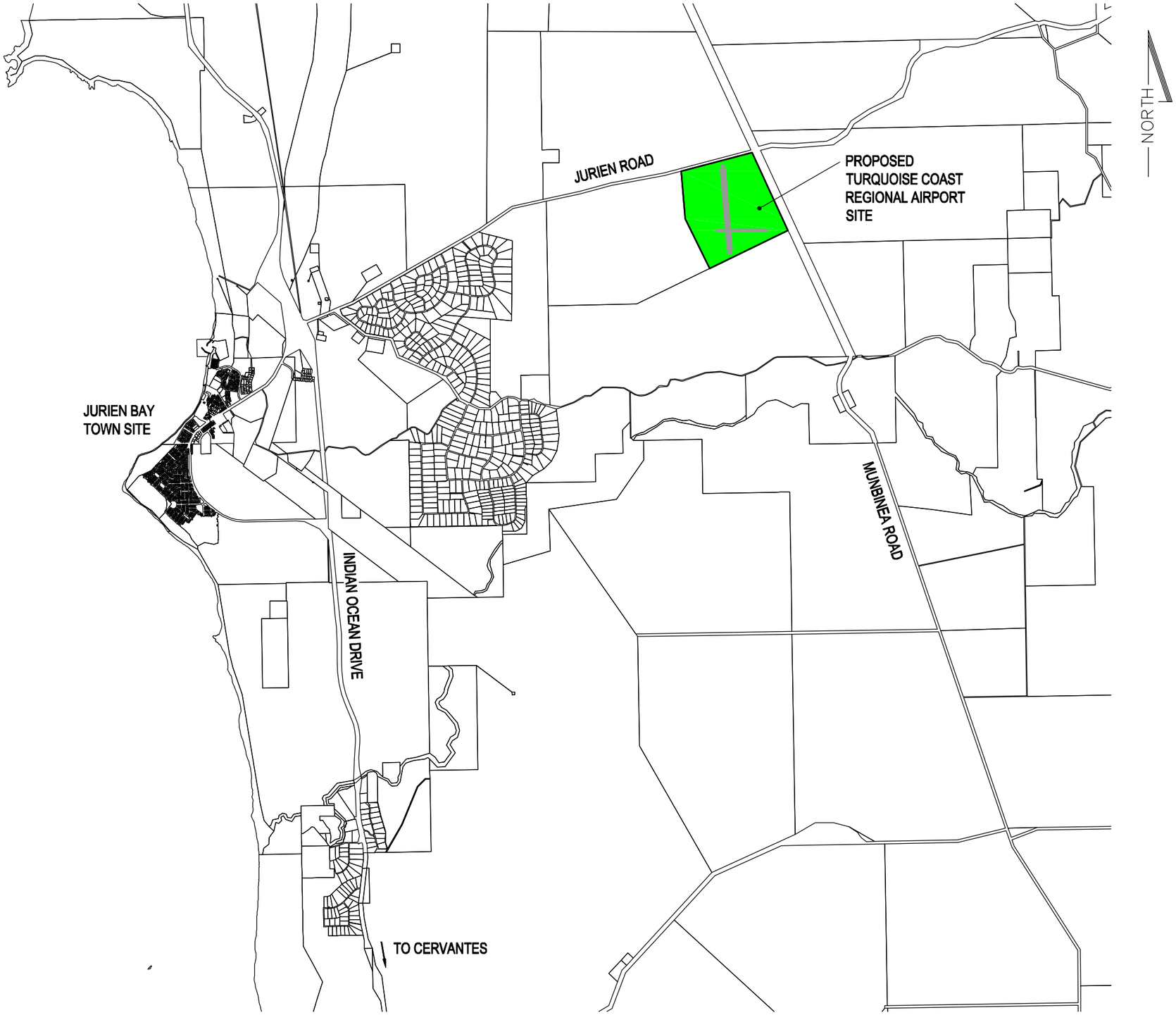
Nevertheless, there remain some potential issues with the site that have been identified during the process to date. These should be further investigated during the next stage of detailed planning and design to ensure they are adequately addressed prior to the acquisition of the required land. In particular, these include:

- Potential hazards from bird populations which reportedly exist on and adjacent to the site. It is recommended that a detailed study be undertaken by a qualified ornithologist to identify likely bird behaviour, the potential risk that might be posed to aircraft operations at the airport, and appropriate mitigation and management measures to minimise this risk;
- Appropriate physical investigation of the proposed development areas to confirm design requirements for infrastructure including aircraft pavements, access roads and development sites; and
- Further detailed investigations into environmental attributes of the site, including flora and fauna, cultural and heritage considerations, stormwater flow and quality management to confirm the acceptability of development on the site.

It is inevitable that the Master Plan will need to be reviewed at regular intervals to ensure the detailed proposals continue to reflect the changing needs of the Turquoise Coast and this should include careful consideration prior to the initiation of any major development.

APPENDIX A

FIGURES



FINAL
16 Jun, 2014 - 11:23am

Project:
TURQUOISE COAST REGIONAL AIRPORT MASTER PLAN

Client:
SHIRE OF DANDARAGAN

Title:
SITE LOCATION PLAN

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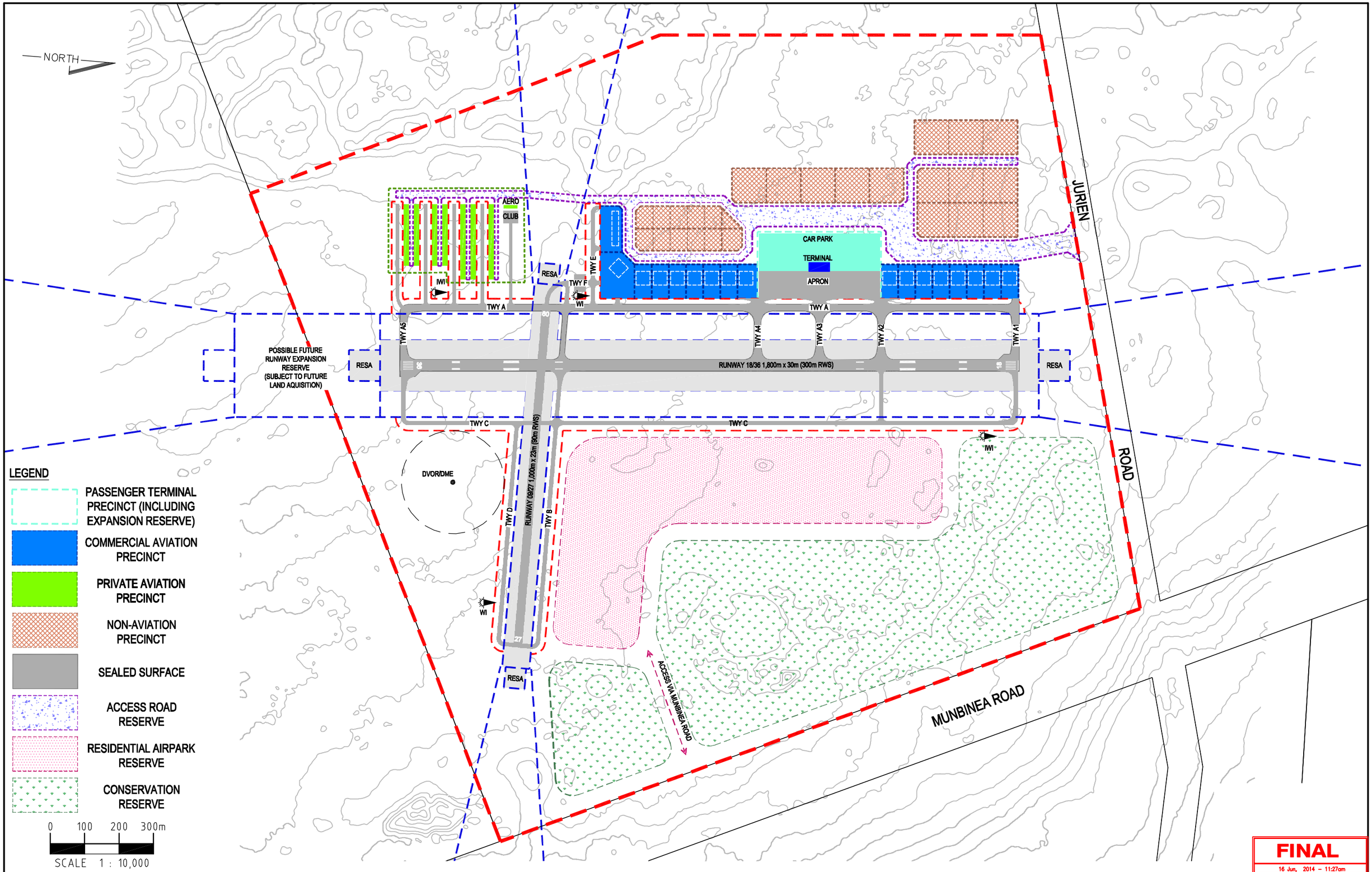
Drawn: MJ | Checked: BJH | Approved: BH

Rev	Date
1	16/06/14
0	17/04/14

Figure No: FIGURE 1

Scale: 1:100,000 A3 (Sheet Size)

File Ref: B12383-F01



FINAL
16 Jun, 2014 - 11:27am

Project:
TURQUOISE COAST REGIONAL AIRPORT MASTER PLAN

Client:
SHIRE OF DANDARAGAN

Title:
ULTIMATE DEVELOPMENT PLAN

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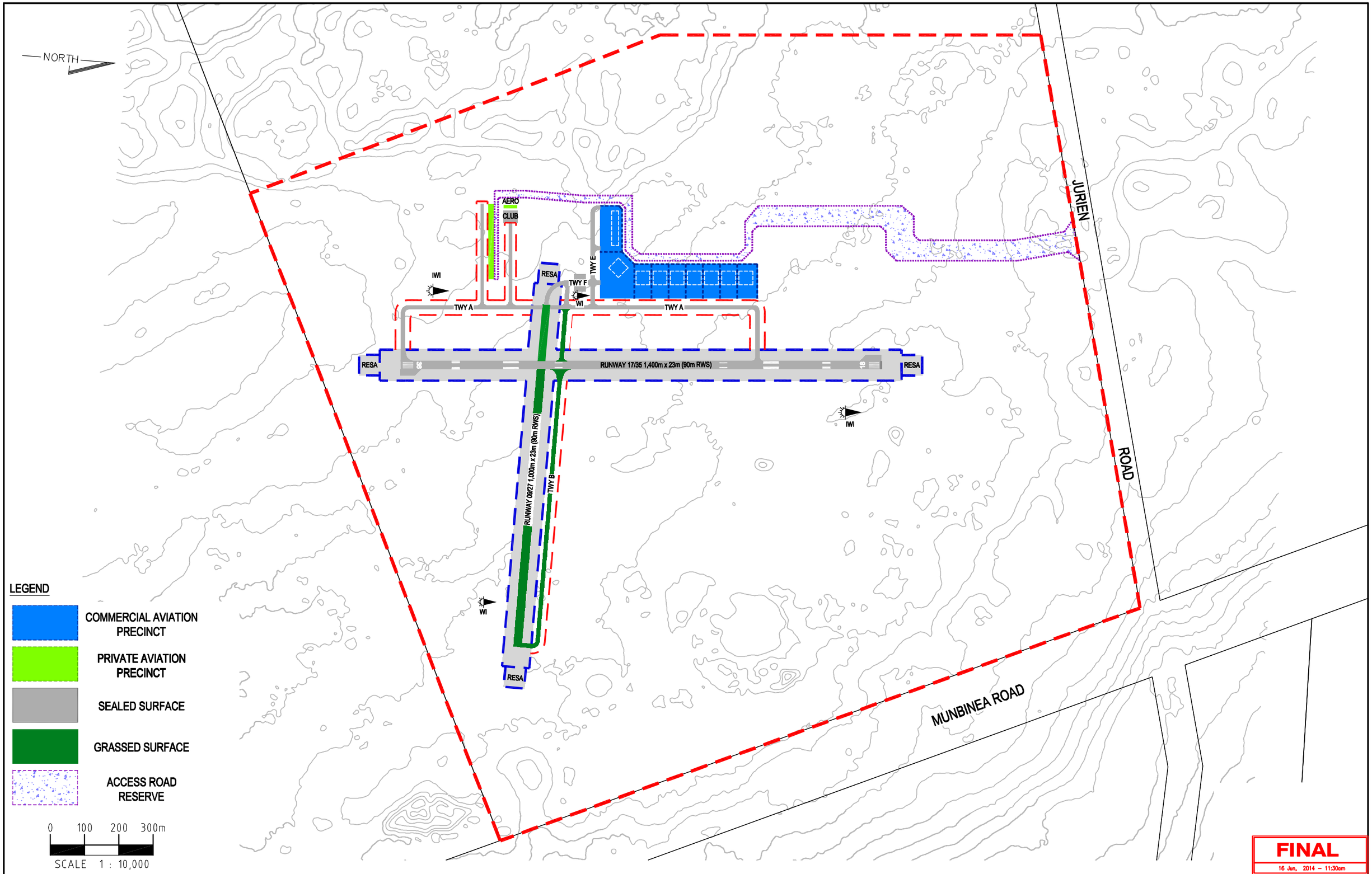
Figure No: FIGURE 2

Scale: 1:10,000 | A3 Sheet Size

File Ref: B12383-F02



FINAL
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Project:
TURQUOISE COAST REGIONAL AIRPORT MASTER PLAN

Client:
SHIRE OF DANDARAGAN

Title:
INITIAL DEVELOPMENT PLAN

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2	16/06/14
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0	17/04/14

Figure No:
FIGURE 3

Scale: 1:10,000
A3 Sheet Size

File Ref: B12383-F03

RUNWAY CLASSIFICATION/CODE		
DIRECTION	APPROACH	TAKE-OFF
17	INSTRUMENT PRECISION CODE 4	CODE 4
35	INSTRUMENT PRECISION CODE 4	CODE 4
09	INSTRUMENT NON-PRECISION CODE 2	CODE 2
27	INSTRUMENT NON-PRECISION CODE 2	CODE 2

ARP/RED	
ARP ELEVATION	
REFERENCE ELEVATION DATUM	55.0

OUTER HORIZONTAL SURFACE		
	HEIGHT	RADIUS
ARP	205	15000

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

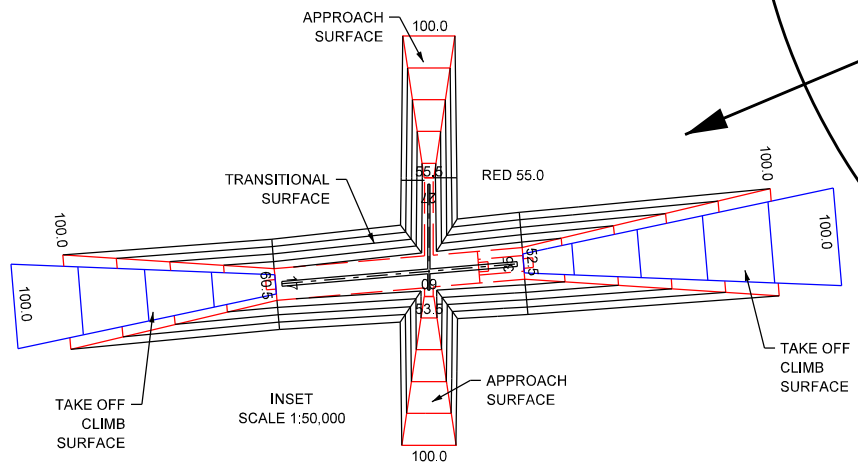
APPROACH SURFACES										
DIRECTION	ELEVATION AT INNER EDGE	LENGTH OF INNER EDGE	DISTANCE FROM THRESHOLD	DIVERGENCE EACH SIDE	FIRST SECTION LENGTH	SLOPE	SECOND SECTION LENGTH	SLOPE	HORIZONTAL SECTION LENGTH	TOTAL LENGTH
17	60.5	300	60	15%	3000	2%	3600	2.5%	8400	15000
35	52.5	300	60	15%	3000	2%	3600	2.5%	8400	15000
09	53.3	90	60	15%	2500	3.33%	–	–	–	2500
27	55.5	90	60	15%	2500	3.33%	–	–	–	2500

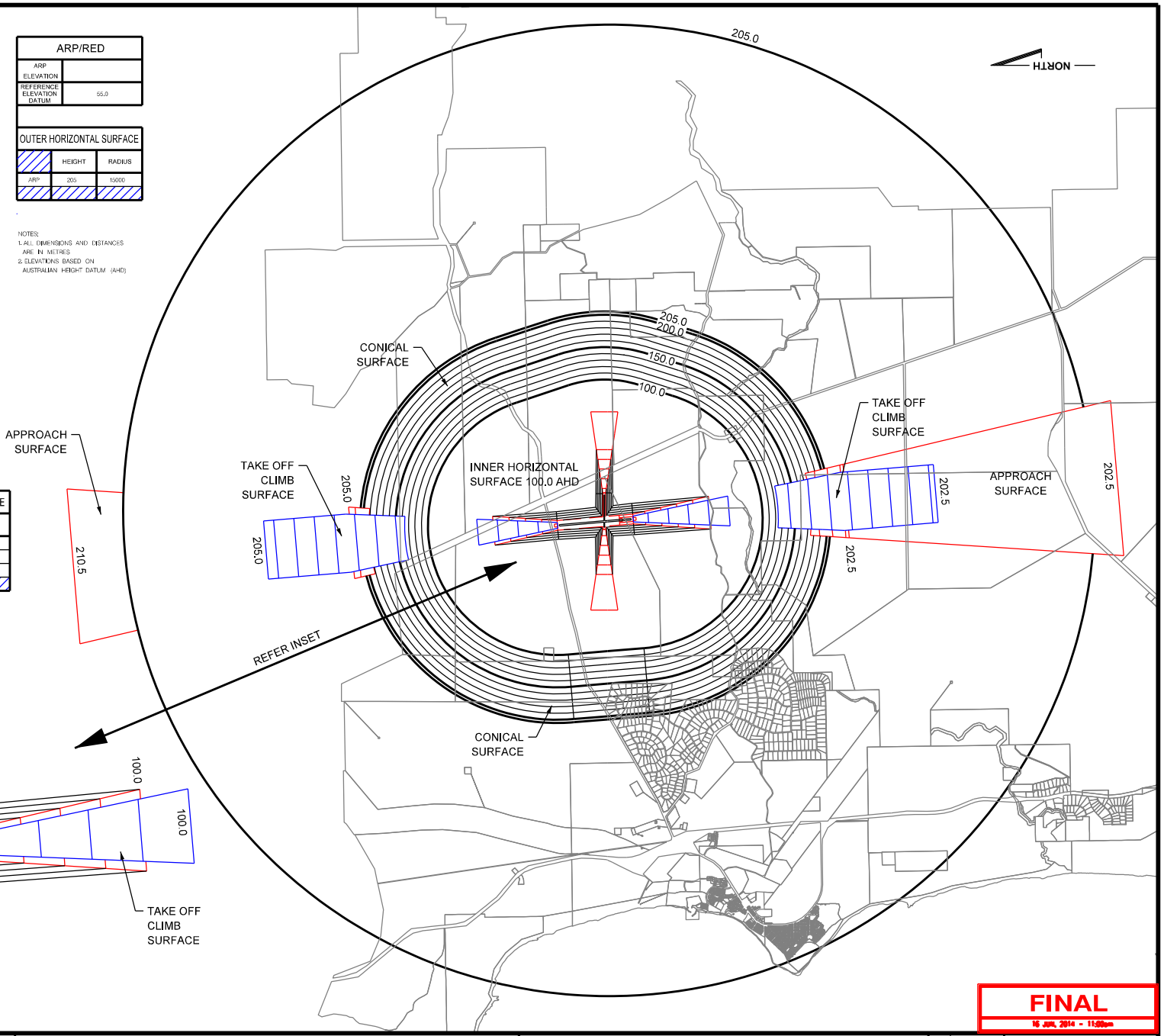
TAKE-OFF CLIMB SURFACES							
RUNWAY	ELEVATION AT INNER EDGE	LENGTH OF INNER EDGE	DISTANCE FROM THRESHOLD	DIVERGENCE EACH SIDE	FINAL WIDTH	OVERALL LENGTH	SLOPE
17	52.5	180	60	12.5%	1800	15000	1.6%
35	60.5	180	60	12.5%	1800	15000	1.6%
09	55.5	80	60	10%	580	2500	4%
27	53.3	80	60	10%	580	2500	4%

TRANSITIONAL SURFACES	
RUNWAY	SLOPE
17/35	14.3%
09/27	20%

CONICAL SURFACE		
RUNWAY	SLOPE	HEIGHT
17/35	5%	100
09/27	5%	60

INNER HORIZONTAL SURFACE		
RUNWAY	ELEV.	RADIUS
17/35	100.0	4000
09/27	100.0	3500





FINAL
16 JUN, 2014 - 11:00am

Project: TURQUOISE COAST REGIONAL AIRPORT MASTER PLAN

Client: SHIRE OF DANDARAGAN

Title: OBSTACLE LIMITATION SURFACES

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Figure No: FIGURE 4

Scale: 1:125,000 A3

File Ref: B12383

NORTH

JURIEN ROAD

MUNBINEA ROAD

20
25
30
35
40

0 100 200 300m

SCALE 1 : 10,000

FINAL
16 Jun, 2014 - 11:33am

Project:
TURQUOISE COAST REGIONAL AIRPORT
MASTER PLAN

Client:
SHIRE OF DANDARAGAN

Title:
AUSTRALIAN NOISE EXPOSURE CONCEPT
ANEF CONTOUR PLAN

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0	17/04/14

Drawn: LT | Checked: JSS | Approved: BJH

Figure No:
FIGURE 5

Scale: 1:10,000 A3 Sheet Size

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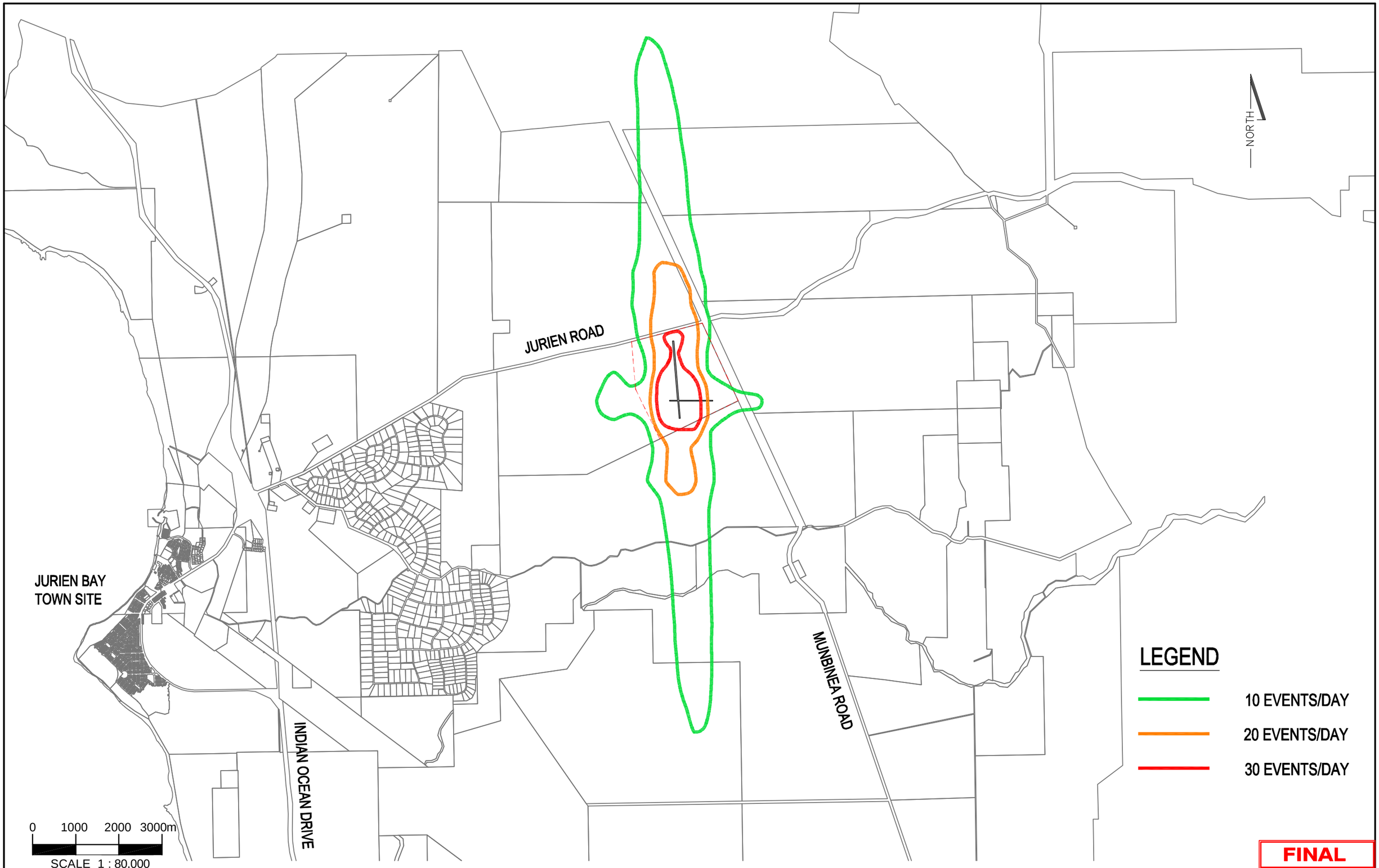

FINAL
16 Jun, 2014 - 11:35am

Project:
TURQUOISE COAST REGIONAL AIRPORT
MASTER PLAN

Client:
SHIRE OF DANDARAGAN

Title:
N60 CONTOURS

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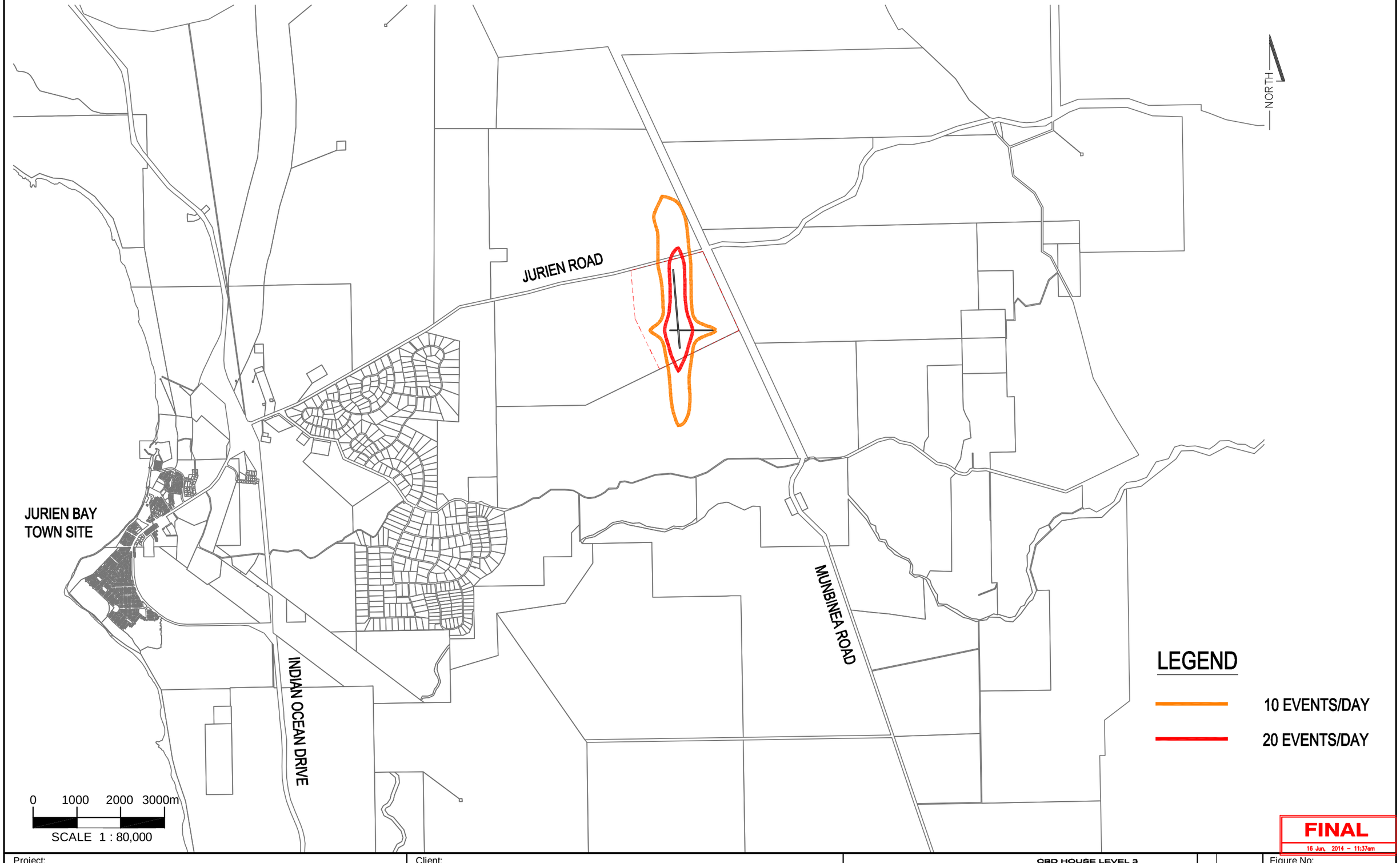
Figure No:
FIGURE 6

Scale: 1:80,000 A3
File Ref: B12383-F06 Sheet Size



FINAL
16 Jun, 2014 - 11:37am

Project:
TURQUOISE COAST REGIONAL AIRPORT
MASTER PLAN

Client:
SHIRE OF DANDARAGAN

Title:
N70 CONTOURS

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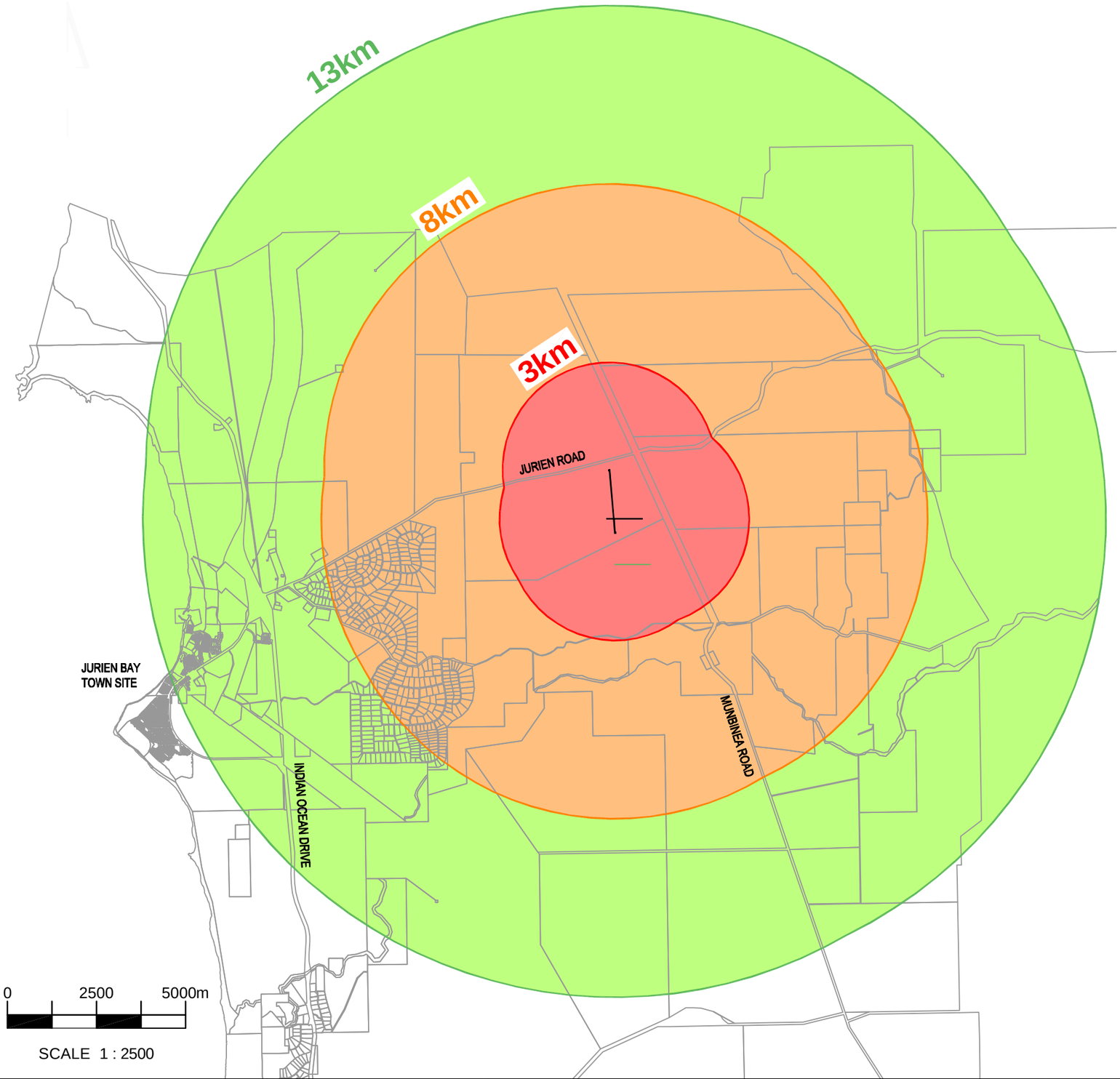
0	17/04/14

Drawn: LT | Checked: JSS | Approved: BJH

Figure No:
FIGURE 7

Scale: 1:80,000 A3
File Ref: B12383-F07 Sheet Size



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 3 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.

FINAL
16 Jun, 2014 – 11:40am

Project:
TURQUOISE COAST REGIONAL AIRPORT
MASTER PLAN

Client:
SHIRE OF DANDARAGAN

Title:
BIRD & WILDLIFE HAZARDS

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0	17/04/14

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Figure No: FIGURE 8

Scale: 1:125,000 A3

File Ref: B12383-F08 Sheet Size

MAXIMUM INTENSITY OF LIGHT SOURCES MEASURED AT 3° ABOVE THE HORIZONTAL	
ZONE A	0 cd
ZONE B	50 cd
ZONE C	150 cd
ZONE D	450 cd

*cd = Candela (the common candle emits light at an intensity of roughly one candela).

1500m
4500m
1200m
3000m
900m
2000m
600m
1000m

JURIEN ROAD

MUNBINEA ROAD

A
B
C
D

1500m
1200m
900m
600m

4500m
3000m
2000m
1000m

6km RADIUS - LIGHTS WITHIN THIS AREA ARE SUBJECT TO THE PROVISIONS OF REGULATION 94 CAR 1988.

0 1000 2000 3000m

SCALE 1 : 50000

FINAL
16 Jun, 2014 - 11:42am

Project:
TURQUOISE COAST REGIONAL AIRPORT
MASTER PLAN

Client:
SHIRE OF DANDARAGAN

Title:
N60 CONTOURS

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Figure No: FIGURE 9

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