REHBEIN AIRPORT CONSULTING

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East Kimberley Regional Airport Master Plan

For Shire of Wyndham East Kimberley

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GLOSSARY OF TERMS AND ABBREVIATIONS

ACN (Aircraft Classification Number)	A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.
ASV	Annual Service Volume
Aerodrome	A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.
AFRU (Aerodrome Frequency Response Unit)	The AFRU is an electronic, ground based, aviation safety enhancement device, intended for use on the CTAF or MBZ frequency at non-controlled aerodromes.
AIP ERSA	Airservices Australia Aeronautical Information Package En-Route Supplement Australia
ANEF	Australian Noise Exposure Forecast
ARC (Aerodrome Reference Code)	A code used to specify the standards for individual aerodrome facilities which are suitable for use by aeroplanes within a range of performances and sizes. The code is composed of two elements: the first is a number (from 1 to 4) related to the aeroplane reference field length and the second is a letter (from A to F) related to the aeroplane wingspan and outer main gear wheel span.
ARP	Aerodrome Reference Point
ATC	Air Traffic Control
AWIS	Automatic Weather Information Service
BoM	Bureau of Meteorology
CAGR	Compound Annual Growth Rate
CASA (Civil Aviation Safety Authority)	The Australian federal government department responsible for setting and maintaining safety standards for civil aviation. CASA is responsible for the codification of international standards and recommended practices into Australian legislation and for the issue of licences for aviation personnel including pilots, amongst other responsibilities.
CASR (Civil Aviation Safety Regulation)	CASRs establish the regulatory framework (*Regulations*) within which all service providers must operate.
CTAF	Common Traffic Advisory Frequency
EKRA	East Kimberley Regional Airport
EOC	Emergency Operations Centre
FAA	Federal Aviation Administration (United States Department of Transportation)
General Aviation (GA)	The sector of the aviation industry that does not include regular public transport (RPT) airlines and military aviation.
GPS	Global Positioning System
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation

IFR/IMC (Instrument Flight Rules/ Instrument Meteorological Conditions)	Refers to rules under which flight involving navigation requiring reference to radio navigational aids or instruments is carried out. Weather conditions below a certain minima are referred to as instrument meteorological conditions (IMC). IFR flight requires pilots to be qualified in the use of instrument navigation and to use radio navigational aids provided at airports.
INM	Integrated Noise Model
IWI	Illuminated Wind Indicator
LIRL	Low Intensity Runway Lighting
LoS	Level of Service – a range of values or assessments of the ability of the terminal to meet demand
MOS	Manual of Standards
MTOW	Maximum Take-off Weight
Navaid	Commonly-used abbreviation for 'radio navigational aid'
NDB (Non Directional Beacon)	A simple and common type of radio navigational aid which allows pilots to track to or from its location.
Non-precision instrument approach	An instrument approach and landing that uses lateral guidance but does not use vertical guidance.
OLS	Obstacle Limitation Surfaces
PAL	Pilot Activated Lighting
Pavement Classification Number (PCN)	A number expressing the bearing strength of a pavement for unrestricted operations by aircraft with ACN value less than or equal to PCN.
Payload	The total weight of passengers and cargo that an aircraft can carry.
PSI	Unit of pressure or stress (pounds per square inch)
RESA (Runway End Safety Area)	Area provided at the end of a runway strip, to protect the aeroplane in the event of undershooting or overrunning the runway.
RFDS	Royal Flying Doctors Service
RNAV/GNSS Approach	Area Navigation/Global Navigation Satellite System Approach. A form of instrument approach procedure using signals from orbiting satellites to determine an aircraft's precise position at a point in time.
RPT (Regular Public Transport)	Air services operated by airlines that are scheduled to occur on a regular basis at fixed times or frequencies and on fixed routes.
Runway Strip	A defined area including the runway and stopway, intended to reduce risk of damage to aircraft running off a runway and to protect aircraft flying over it during take-off or landing operations.
SWEK	Shire of Wyndham East Kimberley
VOR/DME	Combined radio navigation station: VHF omnidirectional radio / Distance-based measuring equipment

VFR/VMC (Visual Flight Rules/ Visual Meteorological Conditions)	Refers to rules under which flight involving navigation solely by reference to visual cues (rather than requiring reference to radio navigational aids or instruments) is carried out. VFR flight is permissible only when meteorological conditions (cloud base and visibility) are above defined limits. Such conditions are referred to as visual meteorological conditions (VMC). VFR flight does not require pilots to be qualified in the use of instrument navigation, nor does it require expensive radio navigational aids to be provided at airports.
WI	Wind Indicator

EXECUTIVE SUMMARY

BACKGROUND

REHBEIN Airport Consulting was commissioned by the Shire of Wyndham East Kimberley (SWEK) to prepare an Airport Master Plan for East Kimberley Regional Airport (EKRA). The Master Plan provides a strategic framework for the future development of the airport and sets out the required infrastructure likely to be required to support the forecast demand of passenger and aircraft movements at the airport over the next 10 to 25 years. SWEK identified several specific objectives in commissioning this Master Plan, including the desire to:

- Provide for long-term sustainability;
- Cater for current and future growth;
- Balance between airport functions and surrounding land use;
- Facilitate additional aviation business and commercial development whilst still maintaining long-term control of airport land; and
- Protect land for aviation growth and expansion.

The methodology for completing the Master Plan included stakeholder consultation to solicit the views, issues and concerns of SWEK representatives, airlines, airport users, airport land owners and local businesses and organisations.

EXISTING FACILITIES

EKRA has a single sealed runway. Runway 12/30 is 1,829 metres long and 30 metres wide and sits within a 150 metre wide graded strip. The runway is therefore suitable for non-precision instrument approach operations by aircraft up to Code 3C. The annual Aerodrome Technical Inspection report undertaken in March 2011 indicates that the runway pavement is reaching the end of its serviceable life. According to EKRA officers, during the wet season serious pavement failures have occurred.

Access between the runway and the RPT apron is provided by Taxiway A which is 15 metres wide and suitable to accommodate Code C jet aircraft. Taxiway B provides access between the Runway 30 threshold and the RPT apron, this taxiway is also suitable to accommodate Code C jet aircraft. Taxiway C provides access across the north side of the RPT and east GA aprons. Although designated as a Taxiway, only Code C taxilane clearances are provided. A part parallel Code B taxiway, designated as Taxiway F, connects the threshold of Runway 12 to Taxiway A. Due to the pavement condition, this taxiway is limited to Code B aircraft up to 5,700kg.

The passenger terminal is served by a sealed RPT apron which accommodates three aircraft parking positions, these can accommodate up to Fokker 100 aircraft. GA aprons are located to the east and west of the RPT apron, these are mainly used for aircraft parking by the based charter operators and the Royal Flying Doctor's Service (RFDS).

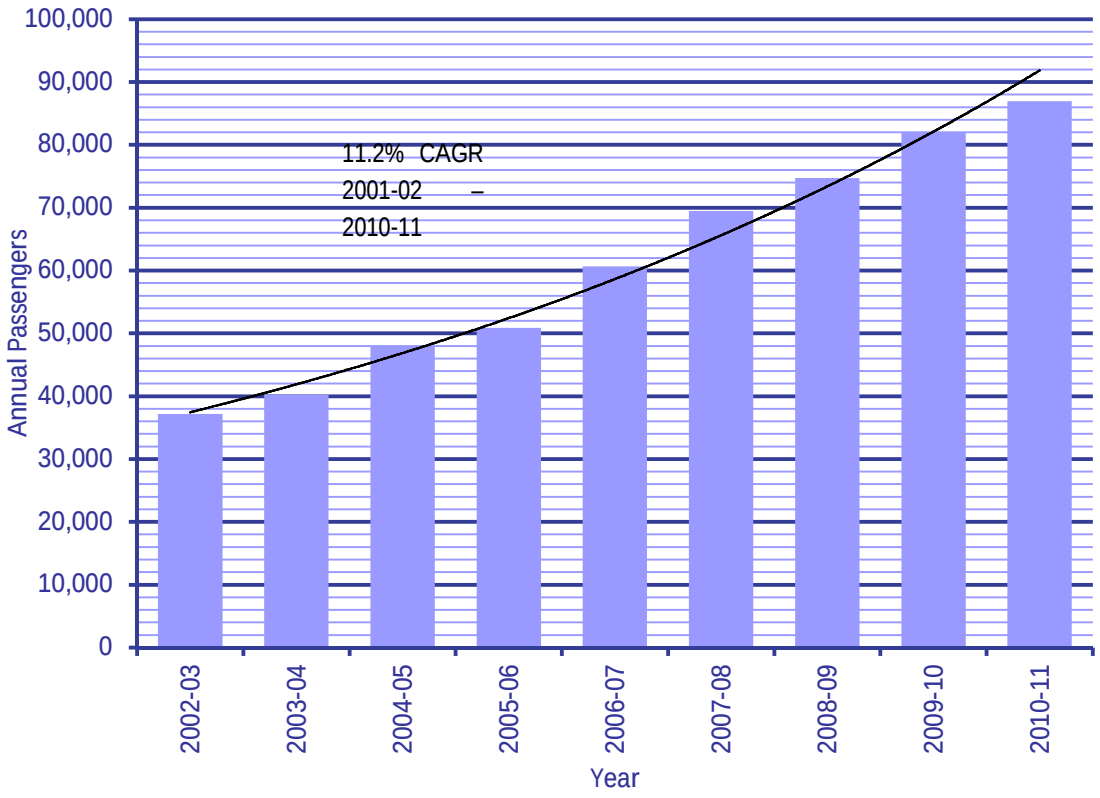
The passenger terminal has recently been redeveloped. The terminal is now a modern, high quality structure with a total footprint of approximately 2,000 m^2 excluding external waiting areas.

EKRA has a Non-Directional Beacon (NDB) and a VOR/DME. Jet A-1 and AVGAS facilities are also accommodated.

HISTORICAL AVIATION ACTIVITY

Figure I shows RPT passenger numbers during the period 2002-03 to 2010-11. Following the collapse of Ansett Australia in 2002, Airnorth began operations from EKRA. In 2002-03 EKRA saw approximately 37,000 passengers. Since this time, passenger traffic has been growing strongly to almost 87,000 passengers in 2010-11. The compound annual growth rate (CAGR) from 2001-02 to 2010-11 was 11.2%.

Figure I: Historical Passenger Traffic 2002-03 – 2010-11



Source BITRE/SWEK

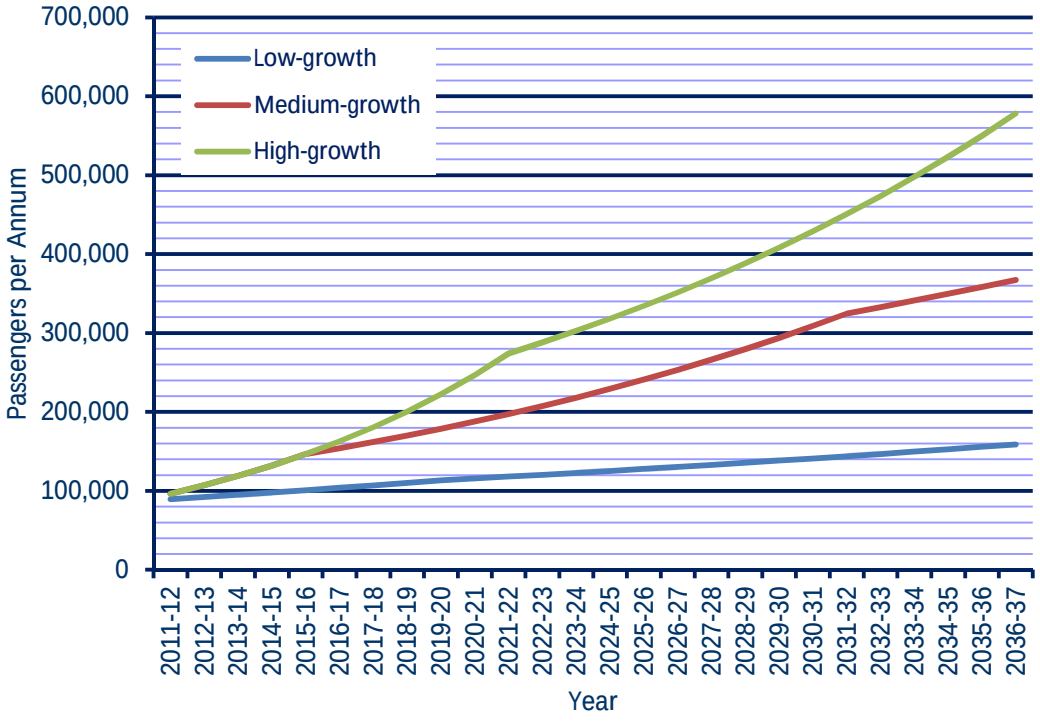
Annual passenger traffic data for the period 1985-86 to 2001-02 is also available. However, due to unknown recording methodologies at the time, this data cannot be directly compared with that for the period 2002-03 to 2010-11. Nevertheless, the CAGR for this period of 5.1% provides a good indication of the general level of growth of RPT passengers at EKRA during this time.

In 2011 there were approximately 26,500 aircraft movements. The compound annual growth in aircraft movement for the period 2002 to 2011 is 1.9%. Approximately 66% of all movements are charter movements, 13% are helicopter movements, 9% are RPT movements and 7% are private movements. The remainder are attributed to medical, training and business-related activities.

FORECAST AVIATION ACTIVITY

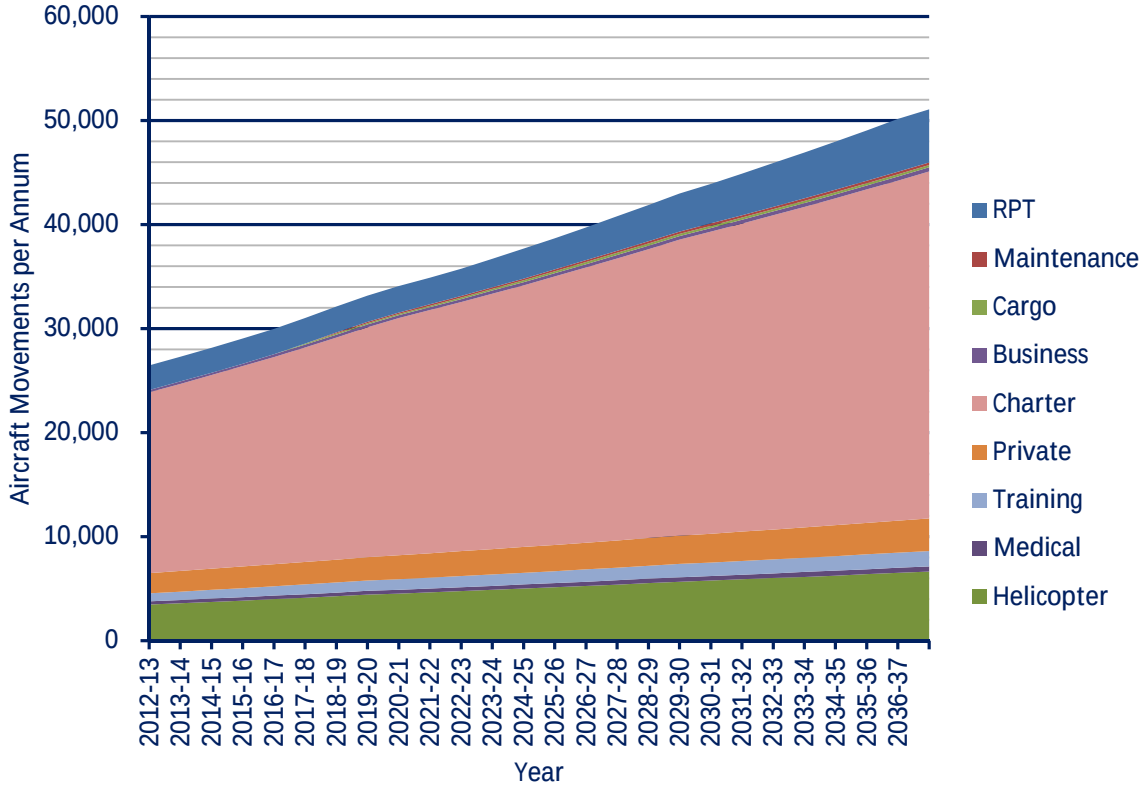
Passenger traffic has been forecast to provide a basis for future infrastructure requirements. High-, medium- and low-growth forecasts were developed based on key regional economic drivers and identified opportunities for additional services and larger aircraft. Figure II summarises the annual passenger forecasts from 2011-12 to 2036-37.

Figure II: Forecast Passenger Traffic 2011-12 to 2036-37



Projections of annual aircraft movements have been developed by segmenting aviation activity into the principal component sectors, each of which having different drivers and prospects for growth at EKRA. Figure III presents the forecast aircraft movements to 2036-37 by segment.

Figure III: Forecast Aircraft Movements 2011-12 to 2036-37



AERONAUTICAL DEVELOPMENT CONCEPT

RUNWAY DEVELOPMENT

The development of a longer runway at EKRA, to support future increases in aircraft size and range of destinations, forms a key development item of this Master Plan. The Master Plan safeguards for the development of a runway to support operations by narrow-body jet aircraft such as the A320-200 and Boeing 737-800 to all domestic destinations on RPT services, and possibly to destinations in south-east Asia.

Two runway development options are included within this Master Plan. Both have been included to ensure the required land is safeguarded for these purposes. Either option may be developed depending on the outcome of a number of factors which are as yet unknown.

Runway Option 1 involves the extension, widening and strengthening of the existing runway to 45 metres wide and 2,350 metres long. Depending on the exact condition of the existing pavement and subgrade, it is not clear whether the runway will be required to be closed to undertake the strengthening works. SWEK must keep the runway operational at all times during the day, therefore this option will not be selected if works are required which cannot be performed during overnight closures. Runway Option 1 will require the acquisition of an area of private land to the east of the Runway 30 threshold, as well as an area of Crown land to the north of the runway.

Runway Option 2 involves the development of a new runway, 2,500 metres long and 45 metres wide, located north of, but parallel, to the existing runway at an offset that would allow the runway to be constructed while the existing runway remains operational with only limited restrictions from construction work. Some land acquisition will be required to construct a runway on this alignment east of the existing threshold of Runway 30 and an area of Crown land to the north of the existing runway.

For both runway options a 300 metre wide runway strip is planned for to accommodate future possible Code 4C precision approach operations.

PASSENGER TERMINAL

The existing passenger terminal building has recently been expanded and upgraded to accommodate the simultaneous operations of up to two Boeing B737-800/Airbus A320-200 aircraft. It is estimated that the current terminal is likely to be able to accommodate potential demand up to around 2021-22 and will require upgrade or expansion when more than two aircraft of this size (or a combination of smaller aircraft), require simultaneous use of the terminal. By 2036/37, between 4,000m^2 and 4,500m^2 of terminal footprint is anticipated to be required.

AIRCRAFT PARKING

RPT and Charter

During Stage 1, with the highest traffic envisaged and the most demanding mix of aircraft in terms of apron space, the maximum number of RPT aircraft on the apron simultaneously is likely to be three including 150-160 seat jet aircraft such as the Airbus A320-200/Boeing 737-800. These three parking positions could be accommodated within the existing apron; however, the simultaneous operation of charter aircraft in addition to these RPT operations into EKRA is likely to require the expansion of the existing apron. Therefore an apron expansion of between approximately 2,800m^2 and 5,500m^2 to the west of the existing is anticipated in Stage 1. The existing RPT apron pavement will also require strengthening to accommodate the larger jet aircraft.

By 2036-37, with the highest traffic growth envisaged, the maximum number of aircraft parking positions required by RPT aircraft is four. It is anticipated that RPT apron expansion will continue to the west of the existing apron and will expand onto the eastern edge of the existing west GA apron. Beyond 2036-37, depending on passenger growth and actual aircraft mix, aircraft parking adjacent to the terminal building may not be sufficient and alternative areas for apron expansion will need to be sought. There is potential to develop the area directly to the north of the existing RPT apron to accommodate additional RPT or charter aircraft.

Private Jet Apron

It is proposed that in Stage 1 a dedicated private jet apron to the west of the RPT apron be developed. One aircraft parking position can be accommodated in this area up to the size of the Bombardier Global Express. Secondary parking positions could also be accommodated on the

apron for up to two smaller jet aircraft. This location would allow the private jet apron to be completely separate from the RPT apron, excluding it from security screening requirements. This location will also allow for convenient landside access. A small area of the west GA apron aircraft parking is likely to be impacted by the development of this apron. When this area is required for RPT apron expansion during Stage 2, private jet parking will need to be relocated to an alternative location, possibly to the north of the existing RPT apron or on the west GA apron.

East GA Apron

There is little scope for expansion of this apron. To increase the available aircraft parking for the potential future expansion plans of the based charter operators located in this area, parking for visiting GA aircraft will be relocated to the west GA apron when this is expanded. In the event of Runway Option 2 being developed there may be scope to expand the east GA apron on the northern side of Taxiway F.

West GA Apron

The west GA apron will be expanded to accommodate the relocated visiting aircraft parking as well as any additional GA parking that may be required by new operators that establish themselves within the aviation-related commercial precinct to the south and west of the existing west GA apron. Additional parking will also be included to replace that lost due to the development of a dedicated private jet apron on the eastern edge of the west GA apron. Initially, the existing apron can be expanded to the north towards the weather station. This would approximately double the size of the existing apron to approximately 30,000 m^2. The apron may also be extended to the northwest of the existing apron along the eastern edge of the proposed aviation-related commercial precinct. This area will be developed in sub-stages according to demand.

TAXIWAY SYSTEM

The Master Plan proposes the upgrade and extension of the parallel taxiway (Taxiway F) to provide access to a number of airport facilities and precincts. Taxiway F will be extended from Taxiway A to the threshold of Runway 30 to provide Code C taxiway access to the RPT, east GA and west GA aprons. The provision of Taxiway F in this area will provide an alternative to the use of Taxiway C and remove the current issue of GA traffic crossing the RPT apron. Taxiway F, between Taxiway A and Taxiway G, will require significant strengthening and even reconstruction, based on its current poor condition, to accommodate Code C aircraft and provide access to the proposed precincts in this area. Beyond Taxiway G, Taxiway F will ultimately be extended to the threshold of Runway 12 to accommodate Code B aircraft. Clearances for Code C aircraft will however be safeguarded, should this be required in the future.

Taxiway J will be constructed to provide Code B aircraft access to the west GA apron and the aviation-related precinct development in this area.

OTHER AIRFIELD FACILITIES

Bureau of Meteorology Weather Station

The Master Plan anticipates that the existing Bureau of Meteorology weather station may be required to be relocated to the north of the runway to make way for an extended west GA apron. However, it is not anticipated that this will be required in the early stages of this Master Plan.

Visual and Navigational Aids

Runway Option 2 will require the relocation of the Doppler VOR/DME. The Master Plan proposes that this facility be relocated to the north of the runway, within the airport boundary, on land that is currently leased. This location provides sufficient area for all required clearances.

There is no requirement to relocate the Non-Direction Beacon (NDB) from its current location, however the NDB will pose some limitations on the aviation-related commercial development proposed surrounding it. Therefore, there may be some benefit in the future to relocate the NDB to make maximum and most effective use of the land south of the runway available for commercial purposes. The NDB could also be relocated to the north side of the runway.

Both runway options will require the relocation of the wind indicators.

Fuel Facilities

The existing Shell and Air BP fuel facilities will not be impacted by the developments proposed in this Master Plan. However, an additional fuel facility may be required to be developed on the west GA apron, providing AVGAS and Jet A1 to the GA aircraft located in this area. This will reduce the requirement for aircraft to taxi between the two GA aprons to access fuel.

Airside Access

The existing airside access gates will remain largely unchanged. With the relocation of the visitor GA parking to the west GA apron and the private jet apron also located in the vicinity, airside access for visiting GA and business jet aircraft pilots and passengers will be via or adjacent to the existing automatic airside access gate to the west of the passenger terminal.

AIRCRAFT NOISE

The consideration of the impact of aircraft noise is an important factor in the development of Airport Master Plans. An Australian Noise Exposure Forecast (ANEF) has been prepared for the 25 year planning horizon of this Master Plan, 2036/37. An ANEF contour map has been produced, and has been submitted to Airservices Australia for technical endorsement, which should be incorporated into SWEK's local planning scheme to ensure compatible development is proposed in the vicinity of the airport and future airport operations are protected.

The ANEF system is the basis of *Australian Standard AS 2021-2000 Acoustics – Aircraft noise intrusion – Building siting and construction* (AS2021-2000). AS2021-2000 classifies the construction of new residential developments between 20 and 25 ANEF as conditionally

acceptable, however some people may find that this land is not compatible with residential or educational uses. The 25 ANEF contour for EKRA extends beyond the airport boundary to the southeast over land that is proposed to be acquired for airport use, as well to the north over uninhabited agricultural land. It also extends beyond the airport boundary to the northwest over the Ord River.

To assist the understanding of the community of the noise impact of the airport, 'Number above', or 'N' contours can also be developed. N60 and N70 contours have been produced as part of this Master Plan. The N60 contour map shows that the area immediately surrounding EKRA, is expected to experience 5 events of 60 Db(A) or greater during an average night (19:00 – 07:00). This area is largely unpopulated agricultural land. The N70 contour map shows that areas outside of the airport boundary are expected to experience up to 20 events over 70 Db(A) on an average day (over 24 hours). The majority of this land is undeveloped and uninhabited with the exception of an area of the western side of Kununurra town centre which is largely commercial development.

NON-AERONAUTICAL DEVELOPMENT CONCEPT

SWEK should consider carefully how the available land will be made available to developers. Council has the option to lease or sell freehold the individual sites. It should be considered that the lease of sites within the airport boundary is generally favourable on the basis that SWEK maintains long-term control of the land. Several sites held on freehold purchase basis may restrict future plans for the adjacent sites and could reduce the flexibility of the surrounding land. This has occurred, to a certain extent, in the east GA area, where there is no longer scope within this Master Plan to utilise this area for key aeronautical facilities such as the expansion of the RPT apron. Through projects at other regional airports, REHBEIN Airport Consulting has also witnessed regional council's difficulties in developing airports based on past decisions to sell land on a freehold basis.

Through stakeholder consultation, a range of aviation-related activities were identified as having potential for development at EKRA. These activities included private hangar storage, light aircraft maintenance, heavy aircraft maintenance, air cargo, support businesses for the mining or oil and gas industries and hotel accommodation, among others. Five potential land-use development types were identified and a number of precincts were located on the airport site for commercial development for these purposes.

The development of these land uses will require the significant upgrade of engineering services. The land use types are outlined below.

LAND-USE TYPE 1: AVIATION-RELATED COMMERCIAL DEVELOPMENT WITH AIRSIDE ACCESS

Land-use type 1 is proposed to accommodate aviation-related businesses that require airside access and therefore operate their own aircraft or have customers who require access via aircraft, such as light aircraft maintenance.

LAND-USE TYPE 2: AVIATION-RELATED COMMERCIAL DEVELOPMENT WITHOUT AIRSIDE ACCESS

Land-use type 2 is proposed to accommodate aviation-related businesses that do not require airside access. A variety of potential business types have an aviation connection and will benefit from a location at the airport. These businesses will either support the aeronautical activities at the airport; support the aviation-related businesses that own, operate or deal with aircraft; or gain some benefit from the proximity to the air services offered at the airport to transport people, equipment or component parts being manufactured or maintained.

LAND-USE TYPE 3: AIRCRAFT MAINTENANCE/ENGINEERING

Stakeholder consultation has indicated that there is potential demand for a heavy aircraft maintenance facility at Kununurra. Land-use type 3 would provide a dedicated area for this purpose with room for future expansion.

LAND-USE TYPE 4: AIR CARGO/FREIGHT

Land-use Type 4 is proposed to accommodate potential air cargo activities that may develop at the airport in the future.

LAND-USE TYPE 5: PRIVATE HANGARS

Precinct 5 is proposed to provide private hangar accommodation for private aviators wishing to store their aircraft at the airport.

DEPOT

The Master Plan proposes that, if required, the town depot can be located in the south east corner of the existing airport site.

LANDSIDE ACCESS

A detailed review of the existing airport access road markings is required to ensure that landside access is efficient and not confusing to the driver. The Master Plan proposes that both main access points from the Victoria Highway are maintained for access to the passenger terminal building. Alternatively, access points from the highway could be consolidated through the development of a roundabout at the entrance to the airport. This should be subject to a more specific traffic study to be undertaken by SWEK.

To reduce the crossover of traffic at the passenger terminal forecourt, all non-passenger terminal related traffic should use alternative accesses including Dusty Ranking Drive and Cyril Kleinig Drive. A new access from the highway, to the west of the existing access points (the existing speedway access), will be required to be upgraded/constructed to provide vehicular access to the private hangar precinct. Road access will also need to be developed to access the area to the north of the runway which may be used to accommodate the relocated VOR/DME, NDB and weather station as well as aviation-related commercial development.

The Master Plan sets out the anticipated car parking development required to support the forecast growth in traffic. Parking restrictions are proposed for short-stay parking, along with the development of secure and non-secure long-stay parking. It is proposed that a fee charged for the use of the long-stay car parks.

STAGED DEVELOPMENT PLAN & INDICATIVE DEVELOPMENT COSTS

Development staging of the proposed infrastructure development is subject to a range of external factors as well as demand. The Master Plan, whilst setting out the optimum long-term land-use arrangement for the airport site, incorporates flexibility to adjust the location and timing of particular developments as necessary to suit specific constraints. The Master Plan has set out the proposed airport development over the next 25 years in two stages, Stage 1, the next 10 years (to 2021/22), and Stage 2, to 2036/37. Appropriate trigger points have also been identified for each of the developments.

IMPLEMENTATION PLAN

In order to commence the implementation of this Master Plan it is important to understand that each infrastructure element needs to go through a development process including stages of planning, design and procurement.

An initial stage of planning is required, part of which is formed by this Master Plan which has highlighted the need for specific infrastructure developments. This should then be followed by a feasibility/planning study for each infrastructure development to undertake more detailed planning required prior to design.

Based on the aeronautical and non-aeronautical infrastructure development proposals set out by this Master Plan for Stage 1 (to 2021-22), Table II highlights the infrastructure developments that are considered to be most pertinent and should immediately continue through the infrastructure development process and more detailed planning/feasibility studies undertaken.

Table II: EKRA 2012/13 Planning Studies

Infrastructure Development	Planning Study Elements
Runway development to Code 4 capability	Existing runway pavements study followed by a detailed planning study for the selected runway option
Taxiway F Extension	Taxiway F extension planning study
West GA Area Development	West GA expansion and reorganisation to accommodate relocated GA visitor parking, private jet apron and to include the initial stages of development of Precinct 1A and 2A
Car Parking and Road Access	Secure and unsecure long-stay parking, implementation of short-stay parking restrictions as well as review of road access arrangements.

1.0 INTRODUCTION

REHBEIN Airport Consulting was commissioned by the Shire of Wyndham East Kimberley (SWEK) to prepare an Airport Master Plan for East Kimberley Regional Airport (EKRA).

1.1 OBJECTIVES

Airport master planning is undertaken to enable sound land use development. An Airport Master Plan is a key strategic tool that sets out a long-term framework for the development of all facilities within the airport and protects future development against the effects of current decisions.

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

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

Although the *Airports Act 1996* does not have statutory application to EKRA, this does not reduce the relevance of these four key aims. SWEK has identified several further specific objectives in commissioning this Airport Master Plan, including the desire to:

- Provide for long-term sustainability;
- Cater for current and future growth;
- Balance between airport functions and surrounding land use;
- Facilitate additional aviation business and commercial development whilst still maintaining long-term control of airport land; and
- Protect land for aviation growth and expansion.

The Master Plan provides a focussed framework for the development of the airport over the next ten years. However, to ensure that the development of the airport within this timeframe is sustainable and future development is not limited by development decisions, the Master Plan looks strategically beyond ten years, as far as 25 years, to ensure that anticipated long-term growth at the airport is safeguarded. At this stage SWEK considers the current airport site to be the appropriate long-term location of the airport. However, if in the future more valuable alternative uses are identified for the existing airport land in the long term, future Master Plans should consider the potential relocation of the airport to an alternate site.

The EKRA Master Plan must realistically represent future facilities that will satisfy projected air traffic demand and potential economic growth opportunities and must also ensure compatibility with user needs and regulatory obligations including safety and security.

Whilst this Master Plan sets out strategic infrastructure requirements for EKRA over the next 10 to 25 years, it is important to recognise that the Master Plan makes no assertion as to the commercial viability of any individual component. Suitable trigger points and anticipated timings for each element are identified; however each development should be subject to its own business case prior to any decision to proceed with capital expenditure.

1.2 METHODOLOGY

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

- Stakeholder Consultation was undertaken to solicit the views issues and concerns of key stakeholders including SWEK representatives, airlines, airport tenants and users, local businesses and organisations. Discussion was largely focussed on the future infrastructure requirements and expansion potential of EKRA. The potential for development of all types on airport land was also discussed. Consultation was undertaken in Kununurra as well as by telephone. A visit to Kununurra was made by REHBEIN Airport Consulting personnel in January 2012. Appendix A provides a stakeholder consultation schedule;
- Based on consultation with these key stakeholders and consideration of relevant market trends, future aviation activity forecasts were developed. Low, medium and high growth scenarios were developed and various possible aircraft schedules were developed exhibiting a range of aircraft types and frequencies for each scenario. This approach maximises the degree of flexibility offered by the development proposals included within this Master Plan. More detail on the forecasting and facilities analysis is provided in Sections 4.0 and 5.0;
- Based on selected future scenarios, aeronautical infrastructure development proposals were set out and a staged development plan formulated to provide guidance on the implementation of the proposals;
- Once the requirements for aeronautical infrastructure and the required supporting services were confirmed, proposals for non-aeronautical development at the airport were developed. These were also based on the results of the stakeholder consultation, desktop research of the local economy and experience at other airports;
- Noise and airspace assessments have also been undertaken to provide direction for land use planning on the land surrounding the airport. ANEF (Australian Noise Exposure Forecast) contours have been developed for EKRA to guide future development surrounding the airport. N60 and N70 contours have also been developed to assist the community to better understand the impacts of aircraft noise. Future Obstacle Limitation

Surfaces (OLS) were also developed which will also help define land use and specific development surrounding the airport; and

- Indicative capital cost estimates have also been developed to aid with the implementation of both the aeronautical and non-aeronautical proposals within this Master Plan.

1.3 REPORT STRUCTURE

This Master Plan report is structured as follows:

- Section 2.0 describes the master planning context;
- Section 3.0 describes the existing situation with respect to airport facilities;
- Section 4.0 discusses historical and forecast future aviation activity;
- Section 5.0 outlines the aeronautical development concept;
- Section 6.0 describes the existing and future airspace;
- Section 7.0 considers aircraft noise;
- Section 8.0 outlines the non-aeronautical development concept including commercial development, landside access and car parking;
- Section 9.0 provides indicative capital cost estimates for the proposals set out within this document; and
- Section 10.0 provides an implementation plan for the proposals set out within this Master Plan.

2.0 MASTER PLANNING CONTEXT

2.1 LOCATION

East Kimberley Regional Airport (EKRA) is located in the town of Kununurra within the Shire of Wyndham East Kimberley, Western Australia. Kununurra is situated on the Victoria Highway approximately 830 kilometres by road south-west of Darwin and approximately 3,200 kilometres by road north-east of Perth. Broome lies approximately 1,040 kilometres by road to the west of Kununurra.

Drawing B11337A001 at Appendix B shows a location plan of Kununurra and EKRA.

2.2 POPULATION

In 2011, SWEK was estimated to have a resident population of approximately 8,100[1]. The region has a relatively young median age of 30 years in comparison to the rest of Western Australia. It is estimated that indigenous people make up approximately half of the overall population.

In the 2006 census the town of Kununurra itself was recorded to have a population of 3,747[2] (place of usual residence), however, 5,618[2] people were recorded to be in Kununurra at the time. This accounts for the large transient population within Kununurra including tourists and short-term contract workers. This indicates that during the dry season (the busiest tourist period), approximately 39% of the Kununurra population are visitors. In 2006, it was also estimated that approximately 25%[2] of the visitor population were in Kununurra for work purposes.

In 2005, the Western Australian Planning Commission forecast a population annual average growth rate for SWEK itself of 2.3% to 2013, 2.1% for the period 2014 to 2018 and 1.9% for the period 2019 to 2028[2]. Overall, it is expected that the Kimberley region as a whole will be one of Australia's fastest growing regions with projected population forecast to grow by an average rate of between 2.4% and 2.9% to 2020[2].

2.3 ECONOMY

The economy of the area is dominated by the agricultural, resource, tourism and human services industries.

2.3.1 AGRICULTURE

The Ord-East Kimberley Expansion Project includes the release of 8,000 hectares of agricultural land, along with improvements to social, community and common-use infrastructure. The Development Package is being funded through a collaborative partnership between Australian and

[1] Australian Bureau of Statistics
[2] Kununurra Regional HotSpots Land Supply Update, November 2008, Western Australian Planning Commission

Western Australian Governments, involving a total investment of $415 million between 2009 and 2012 through the construction of the infrastructure[3].

The project area is located directly north of Kununurra. The land will be released and available for purchase to the national and international market. Current indications are that significant investment is likely to come from China with the most likely use for the land being to grow bulk commodity crops.

This expansion project is building upon the original Ord project which saw the construction of the Ord dam south of Kununurra to provide irrigation to allow land to be cultivated largely for growing commodity crops including sugar cane and intensive horticulture crops such as melons and pumpkins, as well as bananas and mangoes.

2.3.2 TOURISM

The East Kimberley region has a strong tourism industry and Kununurra forms a gateway and base for anyone wishing to access the region. The region exhibits a range of tourist attractions and activities which could largely be categorised within the 'soft' adventure tourism market.

The local natural landscape itself attracts many tourists including Lake Argyle, Purnululu National Park and Mitchell River National Park, among several other national parks in the area. Scenic aerial tours around the area, including many over the Bungle Bungles within Purnululu National Park, are operated from EKRA. The region is also a popular location for barramundi fishing and the local diamond industry also provides an attraction for tourists. In addition, the region boasts a number of remote stations that offer accommodation many of which provide luxury accommodation that attract high end tourist trips. The popular El Questro Wilderness Park is located close to Kununurra.

Much of the tourism activity within the area occurs during the dry season, with far fewer tourists during the quieter wet season. There is a desire within SWEK to increase tourism numbers during the wet season in the future. The East Kimberley region also wishes to align itself more with Darwin and tourism activities within the Northern territory and promote itself as part of the 'Top End' tourism market as well as that in Western Australia.

Total visitor nights in Western Australia overall are forecast to have a compound annual growth rate of approximately 1.8% to 2020[4]. No specific forecast data is available for the East Kimberley itself, however, anecdotal evidence suggests that there is a large untapped tourism market within the region and tourism is therefore expected to grow at a higher rate than that forecast for the rest of the state.

[3] Department of Regional Development and Lands, Government of Western Australia
[4] Tourism Forecasting Committee, Regional Forecast Tables, Forecast 2011 Issue 2

2.3.3 RESOURCES

Mining also provides a significant contribution to the economy of the area. The Argyle Diamond mine operated by Rio Tinto is located 110 kilometres south of Kununurra. The Argyle open pit mine was commissioned in 1985. The Argyle Diamond Mine operates 24 hours per day, 365 days per year. In 2005, the construction of an underground diamond mine at Argyle commenced, however in 2009 its development was slowed as a result of global market conditions. The completion of the underground mine is now expected in 2013, extending the life of the mine to approximately 2019.

Kimberley Metals Group (KMG) operates the Ridges Iron Ore Project which is located approximately 150 kilometres southwest of Kununurra adjacent to the Great Northern Highway. In excess of 67 million tonnes of combination magnetite and hematite has been identified for extraction. The project has a confirmed mine life of four years with potential for increased production through future exploration. KMG commenced shipping iron ore in July 2011 and is currently exporting in excess of 100,000 tonnes of iron ore to China. KMG try to recruit locally but employees are generally sourced from Darwin and Broome with other specialists travelling from the eastern states.

Other mining projects in the area include the Sorby Hills Lead-Silver Project, operated by KBL Mining Limited, which is located approximately 50 kilometres by road from Kununurra. It is currently at the pre-feasibility study stage but commencement of mining is anticipated from 2013. KML also operates, through a joint venture, the Manbarrum zinc-lead-silver project to the east of Sorby Hills over the border in the Northern Territory. Panoramic Resources operates the Savannah Nickel Project located 240 kilometres south of Kununurra which includes underground mining and a process plant.

2.4 EAST KIMBERLEY REGIONAL AIRPORT

The EKRA is owned and operated by the Shire of Wyndham East Kimberley. Regular Passenger Transport (RTP) services to and from the airport are operated by Airnorth and Skywest. Airnorth operate direct flights to Darwin and Broome throughout the year as well as direct flights to Perth on a seasonal basis. Airnorth also operate a charter service between Kununurra and Argyle on behalf of Rio Tinto. Skywest operate direct flights to Broome with onward connections to Perth throughout the year. They also offer direct flights to Darwin and Perth on a seasonal basis.

The EKRA is located approximately four kilometres (by road) west of the centre of Kununurra town centre. The airport is located on an area of land of approximately 275 hectares. Of this, SWEK owns 261.5 hectares and the remainder is held on a freehold or lease basis by other parties. The airport land is bordered to the south by the Victoria Highway reserve and a golf course. The remainder of the surrounding land is generally used for agricultural purposes, some of this is privately owned and some is held by the State of WA. The Ord River borders the airport to the south and west.

Access to the airport is via the Victoria Highway from Kununurra town centre to the east and other local centres such as Wyndham to the west.

Further details of the existing airport activities and facilities are described in Section 3.0.

2.5 PLANNING INTEGRATION

This Master Plan has been developed with due regard to the existing relevant planning initiatives and strategies for the region and town of Kununurra.

SWEK falls within Planning WA's Kimberley region. The Kimberley Planning Framework sets out the strategic direction for the future development of the region over the next 25 years. This framework is currently under development.

The Kununurra-Wyndham Area Development Strategy developed by Planning WA provides a planning framework to coordinate and promote planning and development. It also incorporates a structure plan for Kununurra.

The Kununurra Strategic Directions: Town Centre Development Concept Plan & Strategic Land Use Plan, July 2010, provides a defined vision for the Kununurra town centre and broader area, and identifies a structure to guide future investment and development in the area. The Strategic Directions plan encompasses the airport site and the land surrounding.

The Local Planning Strategy (LPS) is the principal guiding framework for the direction for the development of SWEK. The LPS sets out the SWEK's strategies and actions for transport, community development, economic development and governance. The LPS identifies the need for the development of a Master Plan for the airport. EKRA falls within the town planning scheme for Kununurra, namely, the Shire of Wyndham-East Kimberley Town Planning Scheme No 7 Kununurra and Environs.

The documents mentioned above not only provide inputs into this study, but equally this Master Plan feeds back into future planning decisions particularly with regard to the outcomes of the noise and airspace assessment of the proposals.

2.6 KEY CONSULTATION FEEDBACK

Feedback obtained during the stakeholder consultation included a wide range of issues which provided a valuable background to the EKRA existing situation and future aspirations. The key themes relevant to the development of this Master Plan are summarised as follows:

- Existing runway pavement strength;
- Runway length to accommodate larger jet aircraft;
- Car parking and access issues;
- Future terminal capacity;
- Additional parking for General Aviation (GA) aircraft;

- Private jet parking;
- Development of airport land for aviation-related uses;
- Additional hangar space; and
- Additional lots for expansion of existing businesses at the airport.

3.0 EXISTING FACILITIES AND ACTIVITIES

The following sections provide a brief description of the main infrastructure components and activities at East Kimberley Regional Airport. Drawing B11337A002 at Appendix B shows the existing airport infrastructure and land uses.

3.1 AIRFIELD FACILITIES

3.1.1 RUNWAY 12/30

Runway 12/30 is 1,829 metres long and 30 metres wide and is provided with 3 metre wide shoulders. The runway strip associated with Runway 12/30 has a width of 150 metres and a length of approximately 1,949 metres. The full 150m width is graded. The runway is therefore suitable for non-precision instrument approach operations by aircraft up to Code 3C.

The runway has a sealed surface and a published Pavement Classification Number (PCN) of 40/F/C/1200(174 PSI)/T. The published strength rating is believed to be derived from analysis based on testing that was undertaken during the dry season. Airport operations officers have indicated that during the wet season following periods of heavy rain, the runway pavement has very different characteristics and a lower sub-grade strength.

The annual Aerodrome Technical Inspection report undertaken in March 2011 indicates that the runway pavement is reaching the end of its serviceable life. The runway was originally built more than 40 years ago and shows signs of fatigue. In late 2011, SWEK undertook runway maintenance through the application of stone and an enrichment seal to the central 15 metres of the runway. According to the latest Aerodrome Technical Inspection, undertaken in March 2012, although the new seal is in good condition the pavement remains badly deformed and is below the expected smoothness of a runway surface in accordance with Chapter 10 MOS Part 139.

According to EKRA officers, during the wet season serious pavement failures have occurred.

3.1.2 TAXIWAYS

Taxiway A

Taxiway A provides the main access between the apron area and Runway 12/30. It has a sealed surface and is 15 metres wide with shoulders of 3 metres. This taxiway is suitable to accommodate Code C jet aircraft with a wheelbase of less than 18 metres. Taxiway A is lit.

This taxiway was reconstructed in 2008 and the Aerodrome Technical Inspection, March 2012, indicates that the pavement is in good condition with only minor deformation. However, the seal is also in good condition.

Taxiway B

Taxiway B provides access between the threshold of Runway 30 and the apron area. It has a sealed surface and is 15 metres wide with 3 metre wide shoulders. This taxiway is also suitable to accommodate Code C jet aircraft with a wheelbase of less than 18 metres.

According to the Aerodrome Technical Inspection, March 2012, there is some minor deformation and minor rutting on the wheel tracks. The seal is in good condition and the stone is held in well.

Taxiway C

Taxiway C provides access across the north side of the RPT and east GA aprons. Although designated as a Taxiway, only Code C taxilane clearances are provided. According to the Aerodrome Technical Inspection, March 2012, the pavement is in good condition.

Taxiway C follows the alignment of the old runway which has been disused for many years. An area of the disused runway to the east of the eastern GA apron and north of the fuel facilities is currently used as an engine run-up bay.

Taxiways D & E

Taxiways D and E provide Code B and Code A access respectively, from Taxiway C onto the east GA apron. Although designated as taxiways, only taxilane clearances are provided. According to the Aerodrome Technical Inspection, March 2011, both taxiways are in good condition and fit for service.

Taxiway F

Taxiway F is a parallel taxiway, providing access from the threshold of Runway 12 to Taxiway A. The taxiway is 10.5 metres wide with 3 metre shoulders. The section between Taxiway A and Taxiway G is in reasonable condition with only minor deformation. However, beyond Taxiway G, to the west, the wet ground conditions have caused the taxiway to deform resulting in an undulating surface. As a result of the ground conditions the taxiway is limited to Code B aircraft below 5,700kg.

Taxiway G

Taxiway G provides access between Taxiway F and the runway. It is 10.5 metres wide with shoulders of 3 metres. This taxiway is also limited for use by Code B aircraft below 5,700kg. Two engine-run-up bays/passing bays, incorporating a compass swing bay, are located adjacent to the intersection of Taxiway F and Taxiway G. According to the Aerodrome Technical Inspection, March 2012, the seal in the vicinity of the same intersection is in poor condition with large areas of deformation causing water to pond.

3.1.3 APRONS

RPT Apron

The RPT apron is located adjacent to the passenger terminal building. The sealed apron is approximately 75 metres deep by 165 metres wide. It accommodates three aircraft parking bays, two of which can accommodate up to a Fokker 100 aircraft and one that accommodates up to an Embraer E170 aircraft. According to the 2012 Aerodrome Technical Inspection, the apron is generally in a good condition bit would benefit from an enrichment seal.

East GA Apron

The east GA apron is sealed and is located to the east of the passenger terminal building. The apron was resealed in 2008 and is in good condition. Tie down parking is provided on this apron which is utilised by Shoal Air and Alligator Airways whose hangars front on to the apron. The two parking areas largely utilised by Shoal Air and Alligator Airways are both approximately 110 metres long by 10 metres deep and can accommodate a total of approximately 22 Code A aircraft. There is also a dedicated tie down parking area for visiting aircraft. The visiting aircraft parking area is approximately 100 metres long by 20 metres deep and can accommodate approximately 16 Code A aircraft. Apron taxilanes suitable for Code A aircraft provide access to these parking areas.

There is also an area of leased parking bays with tie down on the western edge of the eastern GA apron which is approximately 65m long by 20 metres deep. The northern most bay provides informal parking for any large visiting aircraft, such as private jets that cannot be accommodated or do not wish to park on the RPT apron. The remainder of this area can accommodate 3 to 4 Code A aircraft.

The eastern end of the east GA apron provides access to the Shell and Air BP fuelling facilities. Air BP has a 24 hour AVGAS dispenser on the eastern edge of the east GA area.

A parking position is also provided at the eastern end of this GA apron for a Pilatus PC-12 aircraft operated by the Royal Flying Doctor Service (RFDS), adjacent to the St John's patient transfer facility.

West GA Apron

The GA apron to the west of the passenger terminal building mainly provides aircraft parking for Slingair Heliwork whose hangars front on to the apron. The apron surface was resealed in 2008 and is in good condition.

The apron has two areas for aircraft parking, the largest being approximately 200 metres long by 10 metres deep and the other 150 metres wide by 9 metres deep accommodating a total of 21 Code A aircraft.

Apron taxilanes suitable for Code A aircraft provide access to these parking areas.

3.1.4 VISUAL AND NAVIGATIONAL AIDS

Markers, markings, signals and signs

The Runway 12/30 graded strip is marked with standard white gable markers in accordance with CASA requirements. Compliant pavement markings are provided and in good condition.

5,700kg aircraft weight limit markings are provided on Taxiway F, Taxiway G and the east GA apron.

Unserviceability markers are provided on the remainder of the disused runway to indicate that this runway is no longer serviceable and the area should not be used by aircraft.

There is one (primary) illuminated wind direction indicator (IWI) with a signal area located between the threshold of Runway 30 and the RPT apron. There is also a secondary illuminated wind direction indicator (WI) near the threshold of Runway 12.

Lighting

Runway 12/30 is equipped with Low Intensity Runway Lighting (LIRL) which is pilot activated (PAL). Standby power is available. Both runway ends are equipped with the visual approach slope indicator system T-VASIS.

Taxiway A is also lit with blue taxiway edge lights.

The RPT apron is floodlit. This lighting is considered insufficient for current operations by SWEK personnel.

Radio Navigational Aids

The airport has a non-directional beacon (NDB), located within the airport site, south of the runway and west of the main terminal area.

EKRA also has a Doppler VOR/DME radio navigational aid located on the north eastern side of the runway.

Both the NDB and VOR/DME are owned and operated by Airservices Australia.

3.1.5 AIR TRAFFIC MANAGEMENT

EKRA is an uncontrolled airport which operates without an air traffic control tower.

The established Common Traffic Area Frequency (CTAF) – Aerodrome Frequency Response Unit (ARFU) for the surrounding airspace requires all aircraft in the vicinity to broadcast their intentions over 127.0 MHz. Vehicles, machinery and taxiing aircraft should also broadcast their intentions whilst operating on movement areas.

3.1.6 FUELLING FACILITIES

Both Shell and Air BP have fuel installations at the airport. Both are located to the eastern side of the eastern GA apron. Air BP has recently developed a new fuel facility adjacent to the Shell fuel facility. Air BP provides a 24 hour Avgas dispensing facility as well as Jet A-1 via fuel trucks. Shell also provides AVGAS as well as Jet A-1.

There is a decommissioned Mobil fuel compound located landside, to the south of the Slingair Heliwork hangars. Fuel pipes still connect the decommissioned compound to the airside area, these are proposed to be filled with cement.

3.1.7 GSE STORAGE SHED

To the west of the passenger terminal is a shed used to store ground servicing equipment (GSE) as well as airline flight catering supplies.

3.2 PASSENGER TERMINAL

The existing passenger terminal building has recently been expanded and upgraded. The new terminal was opened in December 2011 and is designed to accommodate the simultaneous operations of up to two Boeing B737-800/Airbus A320-200 aircraft. It has a total of 1,680m^2 of internal areas and a footprint of 2,480m^2 including external areas. The current facility therefore provides more than adequate capacity for the existing Fokker 100/Embraer E170 operations.

The facilities within the passenger terminal include:

- A check-in hall of approximately 200m^2, located to the western end of the terminal with 6 check-in desks and one service desk. Each check-in desk has a single-stage injector linked to a baggage conveyor. An area is demarcated for the check-in queue;
- An outbound make-up area, including an enclosed room of approximately 100m^2 accommodating the checked baggage screening (CBS) machine and explosive trace detection (ETD) machine, and a covered baggage make-up area of approximately 270m^2 with an automated conveyance system;
- A covered baggage make-up area of 270m^2 with an automated baggage conveyance system;
- Offices including the ground handling agent (Northern Airport Services), airport manager, meeting room and two further offices totalling approximately 200m^2 ;
- A landside waiting area of approximately 300m^2 including a café and retail area plus an external patio area of approximately 45m^2;
- Five car hire desks currently occupied by Budget, Hertz, Thrifty and Avis with one currently unoccupied.
- Male and female toilets including shower facilities and a baby change room. Separate toilet facilities are provided for staff;

- A passenger security screening area of approximately 70m^2 including search room;
- A departure lounge of approximately 220m^2 incorporating a private lounge of approximately 30 m^2 plus male and female toilets;
- A baggage reclaim hall of approximately 250m^2 including a baggage reclaim conveyor/carousel of approximately 20 metres in length. A corridor intended for use by international passengers in the future but used as a store room in the interim is also included in this area; and
- An external baggage break-down delivery area of approximately 90m^2 .

3.3 GENERAL AVIATION USERS

3.3.1 ALLIGATOR AIRWAYS

Alligator Airways occupies three lots of land within the eastern GA area. Lots 304 and 305 are owned by Rob Kendrick and occupied by hangars and workshops. Lot 307 is owned by Morton and is currently undeveloped and unused.

Alligator Airways offers scenic flights and air tours of the remote attractions in the area including the Bungle Bungles, Ord River, Lake Argyle, Mitchell Falls and King George Falls among others. They also provide passenger charter services, air freight. Alligator Airways have approximately 16 aircraft based at EKRA, with a mix of single engine and twin engine piston aircraft. These aircraft are parked on the eastern GA apron. It was advised that during the busy dry season there is often insufficient aircraft parking particularly when there are several visiting aircraft.

3.3.2 SHOAL AIR

Shoal Air occupies two lots in the eastern GA area. Lot 308 is owned by K. Girardin and S. Irvine and accommodates a hangar, workshop and offices. Lot 306 is owned by S. Irvine and is currently undeveloped and unused.

Shoal Air provides passenger charters largely to remote aboriginal communities, scenic tours to the Bungle Bungles and other remote attractions in the area, air freight and remote air logistics, aerial surveys, aerial photography and search and rescue. Shoal Air have approximately 10 aircraft based at EKRA with a mix of single engine and twin engine piston aircraft. These aircraft are also parked on the eastern GA apron which can at times be congested.

3.3.3 SLINGAIR HELIWORK

Slingair Heliwork WA is a charter aviation company and is part of the Curry Kenny Aviation group. Slingair Heliwork occupies lots 319 and 320 in the western GA area of the airport and is the main user of the western GA apron. Lot 319 is owned by Slingair Pty Ltd and Lot 320 is owned by Curry Kenny Promotions Pty Ltd. It offers charters and scenic flights operated by both fixed-wing and helicopter services. EKRA is its base but it also operates from off-site locations during the peak tourist season.

Slingair Heliwork provides scenic air tours, charters, air safaris, helicopter flights and ground touring to destinations including the Bungle Bungles, Mitchell Falls, Broome, Lake Argyle, the Kimberley Coast and its surrounds. They also provide helicopter charter services that include passenger charter, mining company support, sling work, firefighting, emergency extraction, search and rescue, aerial geophysical work, low level survey, photography, scenic flights and tailor made itineraries. The company are also contracted to provide air services for mining companies, RFDS, the Australian Maritime Safety Authority, the Western Australia Department of the Attorney General, Department of Environment and Conservation (DEC) among others.

Slingair Heliwork has a fleet of 23 aircraft including a mix of single and twin engine aeroplanes plus 16 helicopters including Bell Longrangers, Bell 206B Jetrangers and Robinson R44s.

3.4 LANDSIDE ACCESS

Road Access

The main airport access is from the Victoria Highway via Laine Jones Drive. Laine Jones Drive provides a one-way loop via the passenger terminal and car parks and provides access back onto the Victoria Highway. Due to several changes to the access arrangements to cater for the upgrade of the terminal, access markings and signs can cause confusion. Therefore, the access arrangements require some consideration and rearrangement to suit the final layout which has been achieved following the completion of the upgraded passenger terminal.

Laine Jones Drive also extends to the west providing access to the developments in the western GA area and other facilities to the west.

Cyril Kleinig Drive provides direct access from the Victoria Highway to the Western GA area and other facilities to the west of the passenger terminal.

Dusty Rankin Drive provides direct access to the eastern GA area from the Victoria Highway. The road is currently in a relatively poor condition.

Car Parking

There are two main car parks adjacent to the passenger terminal. There are a total of 140 parking spaces in this area. Car rental companies have a number of spaces dedicated to them.

Car parking is reportedly at capacity during busy periods particularly in the dry season. Overflow parking takes place on the grass area to the west of the main car park. This is largely used informally by the car rental companies to store their vehicles.

There is also evidence that the car park is being used on a long-term basis with vehicles being left for periods ranging from a few days to a few months.

The existing shed, which is located directly to the west of the passenger terminal building, is currently leased to Northern Airport Services for staff parking.

Each of the general aviation users including Shoal Air, Alligator Airways and Slingair Heliwork has its own parking areas for customers. However, it was reported that during the busy dry season car parking demand is significantly over capacity.

Shoal Air has its own secured parking area for use by their customers. It was reported that there is significant demand for use of this secure parking area by people using the airport to fly on RPT services.

3.5 OTHER FACILITIES AND ACTIVITIES

The land within the airport site is a combination of freehold land and leased land. Most of the freehold and leasehold land is currently used for aviation-related activities with the exception an area of land to the north of the site which is currently leased and being used for agricultural activities.

3.5.1 PRIVATE HANGARS AND FACILITIES

There are several other private hangars on the airport site which are owned by other parties. These are summarised below:

- The hangar located on lot 309 is privately owned by Guerinoni Super Pty Ltd. It is leased to Australian Air Express and Budget and is used as a freight and car hire depot;
- Lot 303 is owned by NIOBE Holdings Pty Ltd and accommodates a private hangar/shed which is used for private storage;
- Lot 317 is owned by Marsarmatt Holdings Pty Ltd and has recently been developed as a Thrifty car hire depot;
- Lot 316 is owned by GM & SL Johns Pty Ltd and is currently undeveloped and unused;
- Lot 315 is owned by Lone Eagle WA Pty Ltd and accommodates a hangar. Lone Eagle WA provides agricultural helicopter and aerial services. Helicopters are operated from the site.
- Lot 314 is also owned by Lone Eagle WA Pty Ltd and is used in conjunction with Lot 315. It has been approved for pilot accommodation.

3.5.2 ST. JOHN'S AMBULANCE

A new patient transfer facility has recently been developed in the eastern GA area of the airport to support the operations of the RFDS. The facility is owned by SWEK but maintained and operated by St John's Ambulance. The facility occupies a building that sits within Lot 302.

3.5.3 AIRSERVICES AUSTRALIA

As well as the NDB and VOR/DME, Airservices Australia has a Satellite Ground Station (SGS) located at EKRA to the east of the terminal and car park area. This equipment is still in use and provides air ground communications on 122.4 MHz and site information on 131.55MHz.

3.5.4 DEPARTMENT OF DEFENCE

The Department of Defence has a radar beacon located at the airport to the south of the runway and east of Taxiway A. This beacon is part of the Jindalee Operational Radar Network (JORN). This facility is not necessarily related to airport operations. The current lease to the Department of Defence ends on 30 June 2022, with an option for a five year extension.

3.5.5 BUREAU OF METEOROLOGY

A Bureau of Meteorology (BOM) Automatic Weather Information Service (AWIS) is provided at EKRA. The weather station is located at the airport between Taxiway F and the western GA apron area. The station requires a clearance of at least 100m from all obstacles and also has some limitations on the height of obstacles within 100 to 200 metres.

3.5.6 POWER HOUSE

The power house is located south west of the passenger terminal and accommodates much of the plant for the runway lighting and navigational aids. It also accommodates standby generators and switching gear for the runway lighting, TVASIS and other airfield systems. The power house also accommodates the staff room for airport maintenance personnel as well as the weather reporting activities undertaken by SWEK on behalf of BOM based on the onsite weather station recordings.

This building is old and crowded and new facilities for the non-power-related usages are required.

3.5.7 OLD FLIGHT SERVICE BUILDING

The building located directly southeast of the passenger terminal building was once occupied by Airservices Australia and used as the Flight Service Building. This building is now vacant and plans exist to refurbish and redevelop this building for offices for commercial purposes.

3.5.8 AIRPORT DEPOT AND DOG POUND

To the west of the western GA apron is the airport depot which accommodates a storage area for materials and equipment as well as asphalt mixing area. This is the only place with asphalt mixing capabilities in the area.

The town dog pound is also located to the east of this area adjacent to the NDB hut.

3.5.9 SECURITY CONTROL AND AIRSIDE ACCESS

The airport is surrounded by a fence of approximately 1.2m in height. The fence is not a high security fence.

Airside access is provided through a number of gates on the southern side of the airport site. An automatic boom gate to the west of the passenger terminal building provides the main vehicular access to the airside area of the airport. Additional gates within close proximity to the passenger terminal building also exist. Further airside gates are located to the east, beyond the Runway 30 threshold and to the west, beyond the west GA apron.

3.5.10 AIRPORT MANAGER'S HOUSE

A residential property occupied the airport manager is located within the airport, south of the passenger terminal building. SWEK no longer require this facility and propose to demolish the building.

3.6 ENGINEERING SERVICES AND INFRASTRUCTURE

3.6.1 ELECTRICITY

The passenger terminal and associated facilities as well as the hangars and other associated GA facility buildings are connected to the town electricity supply. Back-up power is also provided via generators located in the power house.

The electricity supply to the airport is reported to be at capacity, particularly since the completion of the new passenger terminal. An upgrade to the supply would need to be upgraded to allow further significant development of facilities to take place. SWEK are currently investigating the installation of a solar electrical system for the passenger terminal building.

3.6.2 WATER

The airport is supplied by the town water supply. Two water storage tanks are located to the east of the passenger terminal building. These are for fire fighting purposes.

3.6.3 SEWER

The airport has an on-site sceptic system with the tank located adjacent to the western side of the terminal.

3.6.4 COMMUNICATIONS

Telephone and internet connections are provided to the airport from the town network.

4.0 HISTORICAL AND FORECAST AVIATION ACTIVITY

4.1 HISTORICAL AVIATION ACTIVITY

4.1.1 PASSENGER TRAFFIC

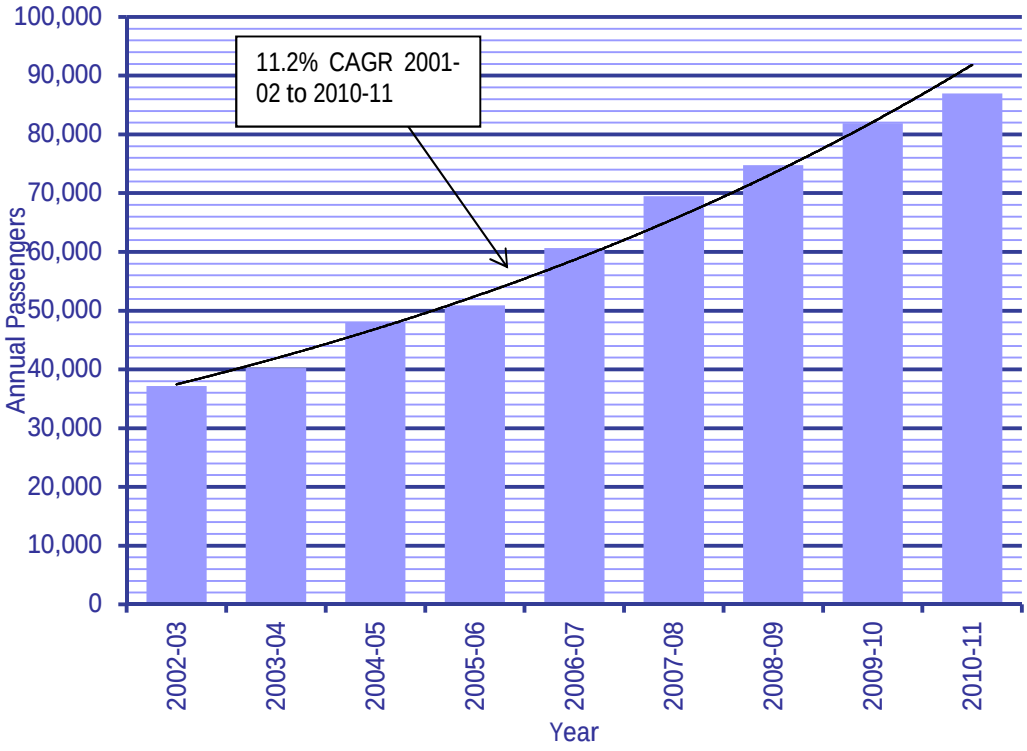
Figure 1 shows RPT passenger numbers during the period 2002-03 to 2010-11. Following the collapse of Ansett Australia in 2001, Airnorth began operations from EKRA. In 2002-03 EKRA saw approximately 37,000 passengers. Since this time, passenger traffic has been growing strongly to almost 87,000 passengers in 2010-11. The CAGR from 2001-02 to 2010-11 was 11.2%.

Figure 2 shows annual passenger traffic at EKRA from 1985-86 to 2001-02. This data has been separated from that for the following years to 2010-11 as it is unclear which passenger types have been included within this data. SWEK have advised that a likely explanation for the level of passengers shown in Figure 2 may be that charter passengers, as well as RPT passengers, have been included. It has been reported that, during 1993 – 1996, the Argyle Diamond mine was at its peak and using the airport daily for charter operations. It is believed that these charter passenger numbers have been included within the passenger data. Therefore data for these years cannot directly be compared with the data collected during the period from 2002-03 to 2010-11 which includes only RPT passengers.

Regardless of the total passenger numbers during this period, the passenger traffic patterns and fluctuations shown in Figure 2 between 1985-86 and 1995-96 provide a good indication of the general level of growth for RPT passengers at EKRA. For example, passenger numbers dropped significantly in 1989-90, coinciding with the pilots' dispute, a similar impact was felt at other Australian airports. The compound annual growth rate (CAGR) between 1985-86 and 1995-96 was 5.1%.

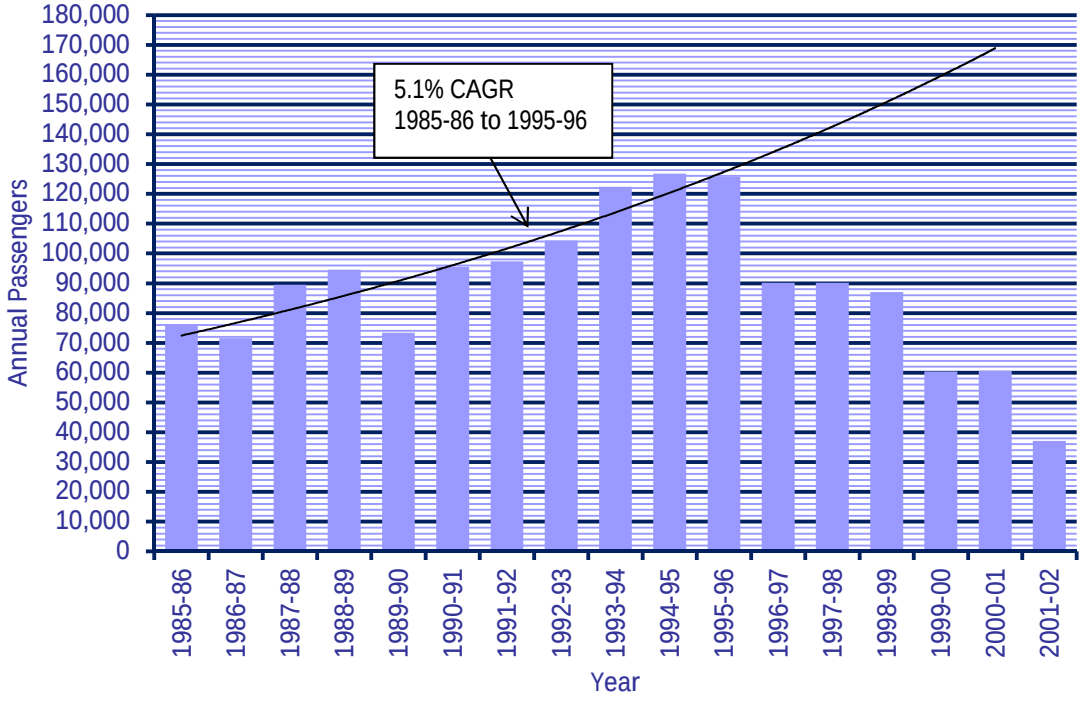
It has been indicated that the significant decline in passenger numbers between 1996-97 and 1999-00 was largely due to a decrease in charter activity by Argyle Diamonds. In 1998, Ansett Australia contracted Airnorth to take on some of the routes between Darwin, Kununurra and Broome with the E120 Brasilia aircraft which proved unpopular with the travelling public. Airnorth continued with the operations once Ansett collapsed in 2001. It should also be noted that changes in methods of data recording as well as key global economic events such as the September 11 attacks are likely to also have had an impact on passenger numbers during 2001-02.

Figure 1: Historical Passenger Traffic 2002-03 to 2010-11



Source: BITRE/SWEK

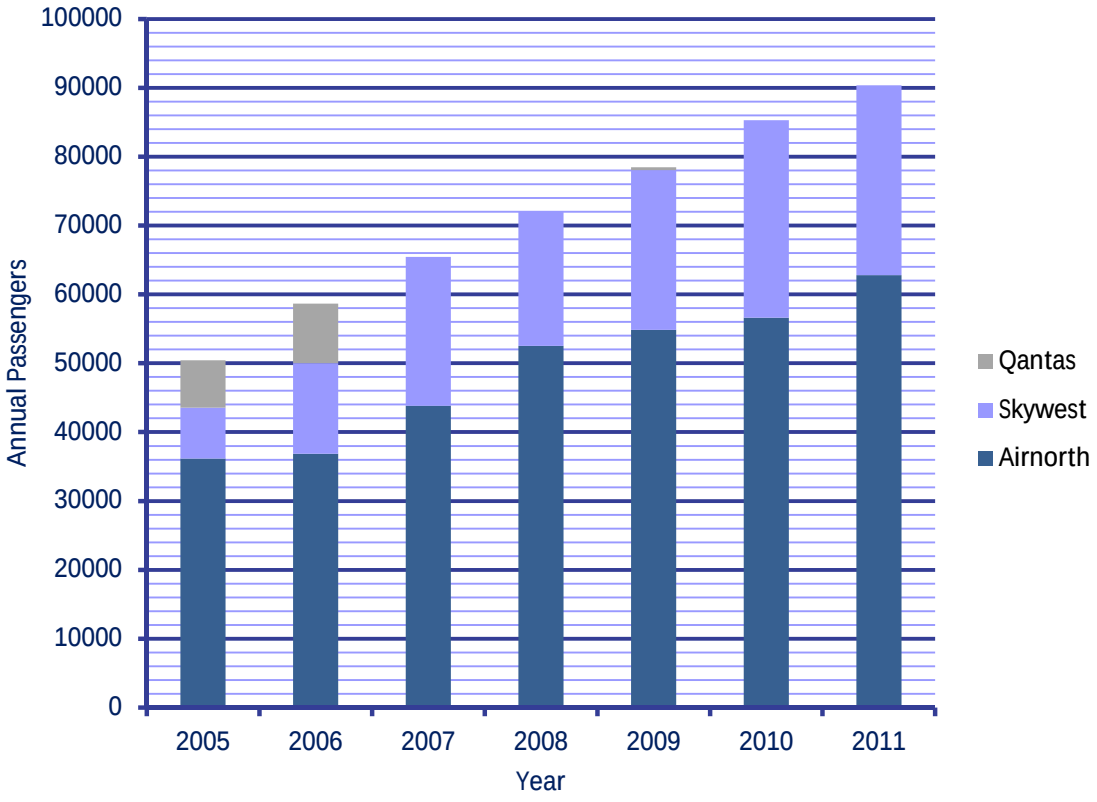
Figure 2: Historical Passenger Traffic 1985-86 to 2000-01



Source: BITRE

Figure 3 shows annual passenger numbers from 2005 to 2011 by airline. Airnorth, Skywest and Qantas have all operated RPT services into EKRA over the last 6 years. Qantas operated a weekly return service to Perth using a BAE 146 aircraft from 2004 to 2006, however Qantas no longer operates into Kununurra. Airnorth carries the majority of passengers with approximately 70% of the passengers over the last 3 years. Skywest carries the remaining 30%.

Figure 3: Historical Passenger Traffic by Airline 2005-2011

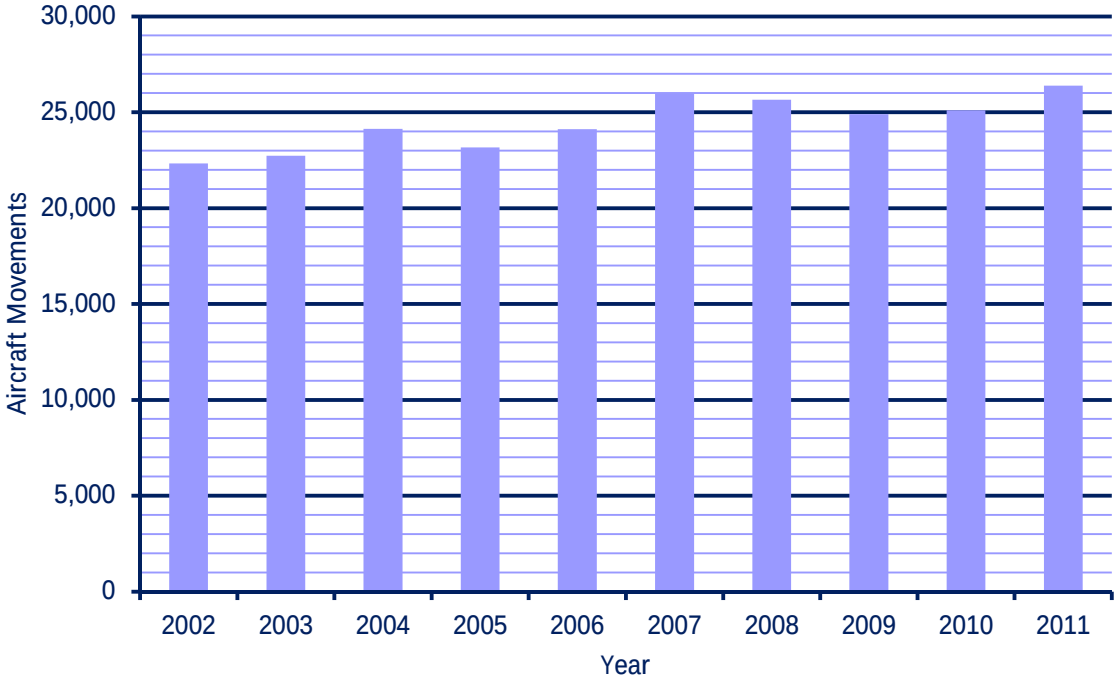


Source: Shire of Wyndham East Kimberley

4.1.2 AIRCRAFT MOVEMENTS

Figure 4 displays total number of aircraft movements at EKRA from 2002 to 2011. The CAGR for the period is 1.9% with almost 26,500 movements in 2011.

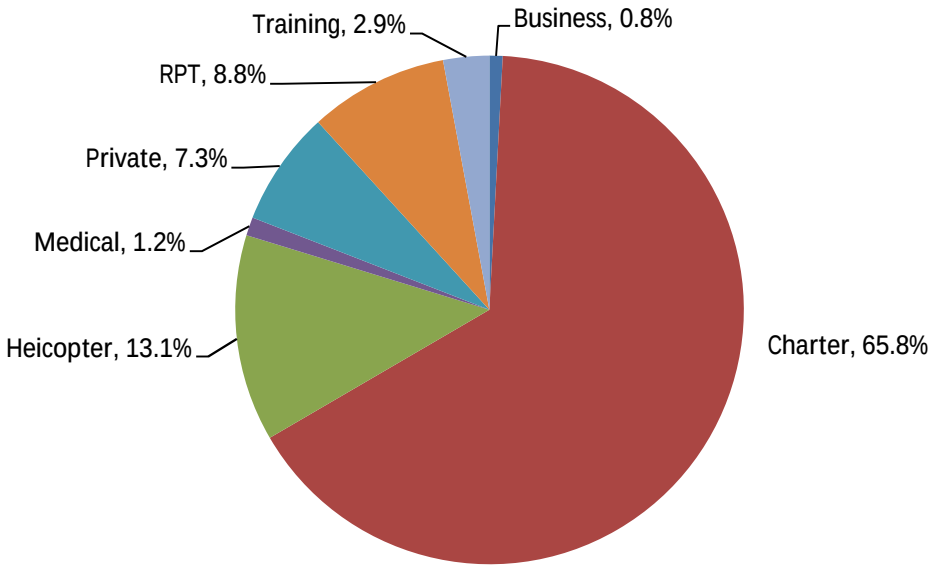
Figure 4: Aircraft Movements 2002 - 2011



Source: Avdata

Figure 5 shows the estimated proportion of movements by the type of activity, based on aircraft movement data for 2011.

Figure 5: 2011 Aircraft Movements by Activity



Charter

Charter operations are considered to contribute approximately 66% or two-thirds of all movements. Charter operations operated by Alligator Airways, Shoal Air and Slingair Heliwork (excluding helicopter movements) form the vast majority of these movements. These charter services comprise of a range of operations including those operated on behalf of Government agencies to aboriginal communities and a large number which are tourism-related, including scenic flights to local attractions including the Purnululu National Park, Lake Argyle and Mitchell Falls among others. These flights are operated with a range of single and twin piston engine aircraft.

Airnorth operate a charter service to Argyle on behalf of Rio Tinto. This currently operates three return services per weekday to Argyle using the Embraer EMB 120 Brasilia 30-seat, twin-turboprop aircraft.

Helicopter

Based on the data available, helicopter movements contribute approximately 13% of total aircraft movements at EKRA. The vast majority of these movements are attributed to the two helicopter operators based at the airport, Lone Eagle and Slingair Heliwork. The movements include charter scenic flights to local tourist attractions as well as agricultural-related aerial work, with a large number of operations conducted by Robinson R22 and Robinson R44 helicopters.

Regular Passenger Transport

Regular Passenger Transport (RPT) movements account for approximately 9% of all aircraft movements at EKRA. Airnorth and Skywest both currently operate RPT services into EKRA.

Airnorth currently operate daily return services direct to Darwin and Broome. Airnorth also operate a weekly return service to Perth on Saturdays. Airnorth operates the Embraer E170 aircraft on the majority of its flights as well as the occasional use of the Embraer EMB 120 Brasilia aircraft.

During the 2011 dry season Skywest operated services direct to Darwin and Broome. It operated two return services per week to both Darwin and Broome plus three one-way services per week to each of these destinations also. However, frequency varies depending on the season. It also provided a one-way service from Perth on a weekly basis. Perth can also be accessed via Broome. Skywest operates exclusively the Fokker 100 aircraft into Kununurra.

Private

Private operations contribute approximately 7% of all aircraft movements and include movements with smaller piston aircraft for varying private purposes.

Training

Training movements contribute approximately 3% of all aircraft movements. A large number of these training movements are undertaken by the base charter operators Alligator Airways, Shoal Air and Slingair Heliwork.

Medical

The Royal Flying Doctor Service (RFDS) uses the airport for medical transfers mainly using the single-engine Pilatus PC-12 aircraft. This currently contributes approximately 1% of the total movements.

Business

Business aviation movements account for approximately 1% of all aircraft movements at EKRA. This category includes movements by all business jet aircraft.

4.2 FORECAST AVIATION ACTIVITY

4.2.1 PASSENGER TRAFFIC

Airport infrastructure, particularly the passenger terminal and landside access facilities, needs to be planned with sufficient capacity to accommodate future anticipated passenger levels. Passenger traffic has therefore been forecast to provide a basis for these future facility requirements.

Future passenger numbers and growth rates are related to a variety of factors including travel demand, aircraft types and the resultant seat capacity, aircraft load factors, slot availability at destination airports, airline route economics and traffic growth at existing and potential destinations. Clearly, they are also impacted by a range of external economic system variables that are important to understand in relation to Kununurra.

The planning horizon considered for the EKRA passenger forecasts is 25 years (2036/37). Although, the primary aim of the Master Plan is to provide a strategic planning framework for the next 10 years, it is important to consider the period beyond 10 years to ensure long-term sustainability of the airport and land use planning decisions made at this stage do not prevent the future development of the airport infrastructure.

The key drivers considered to affect passenger numbers and growth rates at EKRA over the 25 year planning horizon are:

- The growth and development in local business activities, particularly in the agricultural land and resource industries;
- Growth and development of the tourism market; and
- Airline activity and business development potential.

The forecasting procedure adopted for this Master Plan included a review of the following:

- Economic conditions affecting SWEK, including the development of agricultural via the Ord-East Kimberley Expansion Project as well as resource activity in the area;
- Other economic development in the region particularly tourism but also government activities;

- Historical and forecast data on passenger movements, aircraft movements, seat capacity and inbound/outbound travel between Kununurra and the existing and future destinations;
- Historical and forecast data on passenger movements, aircraft movements, seat capacity and inbound/outbound travel at other Australian regional airports;
- Airbus and Boeing industry global market forecasts for Australia/New Zealand and the Oceania region as a whole; and
- Other information provided by SWEK.

Based on the drivers highlighted and the information reviewed, three overall growth scenarios have been developed to help determine the infrastructure requirements in the future. The passenger numbers have been forecast separately for each scenario based on assumed annual growth rates.

Low-Growth Scenario

The low-growth forecast assumes a scenario where economic development within the East Kimberley region experiences limited, if any, growth beyond that which is already in progress today. The scenario is based on an assumed compound annual growth rate (CAGR) of 3% to 2018-19. This is based on the population growth forecasts for the region during this period, which stand at 2.3% - 2.1%[5], plus some additional growth to account for the current on-going business and tourism activities in the area including existing agriculture activities and mining activities. This includes the Argyle Diamond mine which has an estimated mine life to 2019. This scenario assumes that all other mines in the region have a mine life no longer than 2019. The scenario also assumes that growth in tourism will remain low. It is reasonable to assume that passenger traffic will grow in line with population growth at a minimum with demand for travel from the resident population. Post 2018-19, the growth rate reduces to 2% in line with population growth only.

This scenario is intended to present the lowest level of growth realistically likely to occur.

Medium-Growth Scenario

The medium-growth forecast assumes that the growth rate experienced over the last nine years is as a result of the market recovering from the shocks that occurred prior to this period including the withdrawal of Argyle Diamond mine personnel from Kununurra which impacted RPT flights as well as charter flights, the September 11 terrorist attacks in 2001 and most significantly, the collapse of Ansett Australia in 2002. Based on this assumption, the medium growth scenario continues the growth trend of the last nine years (11% CAGR) to the point where passenger numbers catch up with those that would have been achieved through the continuation of the long-term growth trend experienced prior to these events. The year where this occurs is 2015-16. As discussed in Section 4.1.1, during the period 1985-86 to 1995-96 the CAGR was approximately 5.1%, if the market shocks had not occurred following this period it could be expected that this growth rate approximately formed the long-term growth trend for the airport. Therefore, this growth rate has

[5] Western Australia Tomorrow, Western Australia Planning Commission, 2005

been applied for the period 2016-17 to 2031-32. Following this period, to 2036-37, it is assumed that the passenger growth begins to tail off and further decreases to a rate of 2.5%.

This growth scenario takes into account passenger growth that may result from the potential increase in RPT services and an increase in aircraft size.

High-Growth Scenario

The high-growth scenario assumes the local economy continues to boom as it has been over the last nine years with significant passenger growth at a rate of 11% for the next ten years to 2021-22. This assumes that the activities mentioned in relation to the medium-growth scenario occur but the effects on passenger traffic have increased longevity. This has been based on the expectation that by 2021 there will be increased frequency to existing destinations, as well as new destinations including direct flights to some destinations in the eastern states. The scenario also includes the consideration that international services of some kind may be operated from Kununurra to a destination in South-East Asia.

From 2022-23 to 2036-37, it is assumed that passenger traffic grows at a rate of 5.1% which is based on the continuation of the long-term growth trend from 1985-86 to 1994-95.

It should be noted that there is no guarantee that such large passenger growth will be achieved in reality. However, this scenario is included to provide a worst-case scenario in terms of long-term land and infrastructure requirements and by planning for such a high level ensures that all potential outcomes can be accommodated. Figure 6 and Table 1 present projected annual passenger numbers for the High, Medium and Low passenger growth scenarios for the forecast period, 2011-12 to 2036-37.

Figure 6: Forecast Passenger Traffic 2011-12 to 2036-37

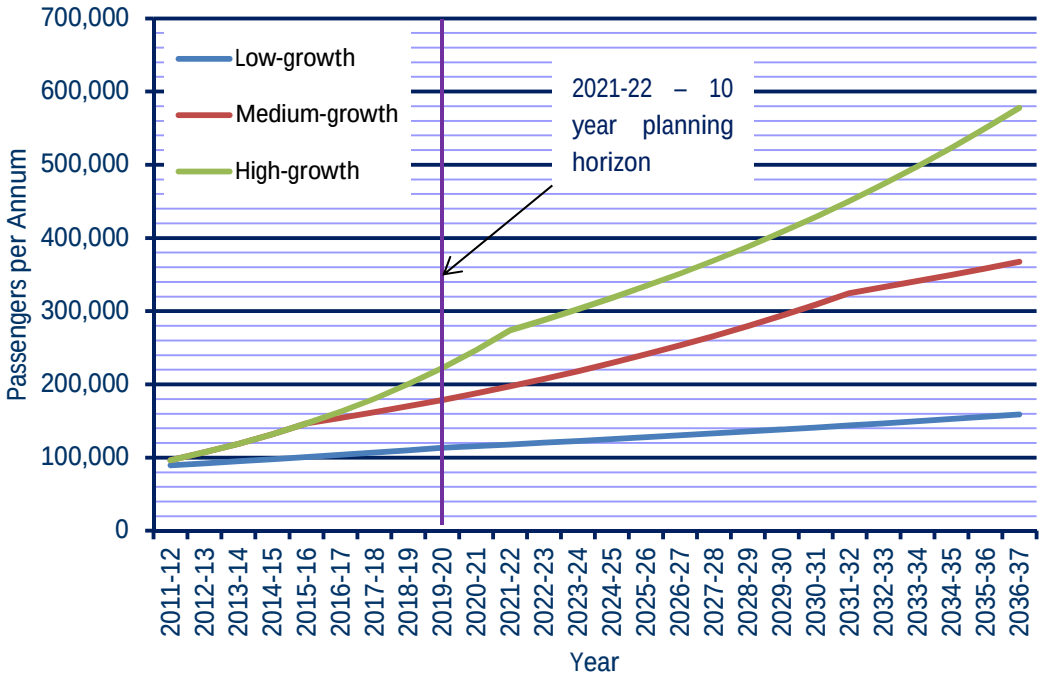


Table 1: Forecast Passenger Traffic 2011-12 to 2036-37 by Passenger Growth Scenario

Year	Low Growth	Medium Growth	High Growth
2009-10 (A)	81,933	81,933	81,933
2010-11 (A)	86,955	86,955	86,955
2011-12	89,564	96,520	96,520
2012-13	92,251	107,137	107,137
2013-14	95,018	118,922	118,922
2014-15	97,869	132,004	132,004
2015-16	100,805	146,524	146,524
2016-17	103,829	153,997	162,642
2017-18	106,944	161,851	180,533
2018-19	110,152	170,105	200,391
2019-20	113,457	178,781	222,434
2020-21	115,726	187,898	246,902
2021-22	118,040	197,481	274,061
2022-23	120,401	207,553	288,038

Year	Low Growth	Medium Growth	High Growth
2023-24	122,809	218,138	302,728
2024-25	125,265	229,263	318,167
2025-26	127,771	240,955	334,394
2026-27	130,326	253,244	351,448
2027-28	132,932	266,160	369,372
2028-29	135,591	279,734	388,210
2029-30	138,303	294,000	408,008
2030-31	141,069	308,994	428,817
2031-32	143,890	324,753	450,686
2032-33	146,768	332,872	473,671
2033-34	149,704	341,193	497,829
2034-35	152,698	349,723	523,218
2035-36	155,752	358,466	549,902
2036-37	158,867	367,428	577,947

[(A)] Actual passenger numbers provided by SWEK

4.2.2 AIRCRAFT MOVEMENTS

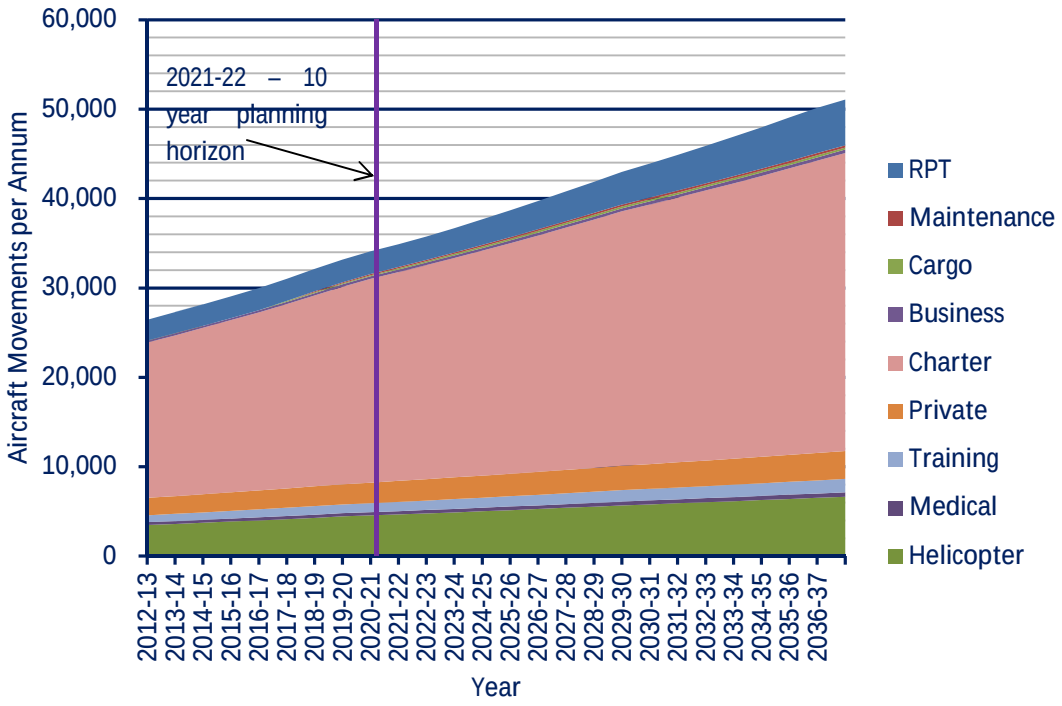
Projections of annual aircraft movement numbers have been developed by segmenting aviation activity into the principal component sectors, each of which has differing drivers and prospects for growth at SWEK. These sectors are:

- Regular Public Transport (RPT);
- Charter
- Business-related (corporate, agricultural, aerial work, etc.);
- Helicopters;
- Freight/Cargo;
- Aircraft maintenance;
- Private (including all recreational and other private operations);
- Training; and
- Medical.

The forecast aircraft movement growth in each segment is shown in Figure 7 and discussed overleaf. The forecast movements represent a high-growth scenario and totals approximately

50,000 movements per year by 2036-37. Figure 7 highlights the 10 year intermediary planning horizon.

Figure 7: Forecast Aircraft Movements 2012-13 to 2036-37



Regular Public Transport

Regular Public Transport (RPT) movements were estimated with reference to the forecast passenger numbers for the high-growth scenario, for which an assumed flight schedule offering a moderate level of frequency appropriate to that of the overall level of traffic, and with consideration of the assumed increase in aircraft size, was developed.

By 2021-22, passenger numbers are estimated to be 247,000 in the high-growth scenario. These passengers are estimated to be served by approximately 2,600 RPT aircraft movements undertaken primarily by 76-seat Embraer E170 and 100 seat Fokker 100 aircraft with a few services operated by larger 150 to 160 seat jet aircraft, such as the Airbus A320 or Boeing 737-800. This is considered to represent a reasonable estimate of likely RPT operations in 2020-21 if traffic reaches the anticipated levels. However, if the passenger numbers were to be carried on a mix of aircraft offering a greater frequency of services movements would be higher, and could be as high as 4,500 per annum.

By 2036-37, for the projected 577,000 passengers in the high-growth scenario, approximately 5,100 annual RPT movements by 2036-37 is envisaged. It is expected that these would be operated by predominantly 150-160 seat jet aircraft with some operations serviced by 70-100 seat jet aircraft. This is considered to represent a reasonable estimate of likely RPT operations in 2036-

37 if traffic reaches the anticipated levels. However, if the passenger numbers were to be carried on a mix of aircraft offering a greater frequency of services, movements would be higher and could be as high as 6,900 per annum.

Charter

Based on current aircraft movement information, the vast majority of charter operations at EKRA are undertaken by the based charter operators Alligator Airways, Shoal Air and Slingair Heliwork. A significant proportion of these operations are scenic flights, many of which are operated during the dry season when tourism numbers peak. On this basis, the projected growth in charter aircraft movements has been forecast based on total visitor night tourism forecasts for Western Australia[6]. The growth rate stated for the period to 2018-19 (1.8%) was almost doubled to 3.5% to account for the East Kimberley's tourism potential that is currently largely untapped. This figure also includes anticipated growth in charter movements related to resource FIFO operations and Government-related charters. Beyond this period, the growth rate reduces to 2.5% for the period 2019-20 to 2028-29, and to 2% for the period 2028-29 to 2036-37, as tourism and resource industry growth steadies.

Business

The growth rates used to forecast business movements at EKRA to 2036-37 have been based on a number of drivers. This category includes movements by business jets. Therefore the growth of this category has been linked to the anticipated growth in business and particularly mining in the area. Population growth forecasts take into consideration the overall growth of the area and are linked to the anticipated growth in the economy. Therefore, business related movements have been forecast with a consideration of the local population forecast plus additional growth to take account of the anticipated growth in the areas of mining and other business activities. Therefore, the forecast population growth rates were increased by approximately 30% to account for this resulting in a growth rate of 3% for the period to 2018-19, 2.3% for the period 2019-20 to 2028-29 and 1.7% for the period 2029-30 to 2036-37.

Helicopters

The majority of the helicopter operations at EKRA are charter operations and a significant proportion of those are estimated to be tourism-related, therefore, the growth rates assumed for helicopter movement forecasts to 2036-37 are the same as those used to forecast the charter movements, as described above. The growth rates used are 3.5% to 2018 and 2% - 2.5% to 2036-37.

[6] Tourism Forecasting Committee, Western Australia Regional forecasts tables compound annual growth rates, 2011 Issue 2

Air Cargo

Based on the stakeholder consultation, the potential for the operation of air cargo services has been considered. The Ord-East Kimberley Expansion Project may result in the operation of cargo services from EKRA to carry fresh produce to Asia. The support for this suggestion has been mixed and the feasibility of this opportunity is dependent on a number of uncertain factors. However, this Master Plan aims to safeguard land for the development of infrastructure in the future and on the basis of considering a worst-case scenario, a small number of air cargo movements have been included within the forecasts. In the absence of any information on the level of operations, for the purposes of forecasting, it has been assumed that there will be approximately four cargo movements per week (assuming the use of Boeing 737-400/700) by 2036-37.

Maintenance

Stakeholder consultation has indicated that there is a potential opportunity for the development of a maintenance facility for one of the airlines currently operating into Kununurra. It is difficult to accurately predict at this stage the nature of maintenance activity that may be undertaken here, however, it has been assumed that the maintenance facility would accommodate jet aircraft up to 160-190 seats. It has been assumed, for the purposes of the forecasts, that the maintenance facility may accommodate third party heavy maintenance and will contribute up to approximately five movements per week by 2036-37.

Private

It is assumed that the large majority of the current private operations at EKRA are operated by local people with aircraft or the ability to hire an aircraft. Therefore, private aircraft movements have been forecast to 2036-37 based on the population forecast growth rates for the local area, 2.1% - 2.3% to 2018 and 1.7% - 1.9% to 2036-37[5].

Training

In 2011 it is estimated that the majority of training movements at EKRA were undertaken by the based charter operators Alligator Airways, Shoal Air and Slingair Heliwork for internal training purposes. Although training movements are not directly related to tourism trends, the majority of the general movements undertaken by these operators are tourism-related. On the basis that the based charter operators will need to acquire more aircraft and more flight crew to service the increased tourism demand, it has been assumed that training movements will grow at the same rate as charter movements. Specifically, 3.5% to 2018 and 2% - 2.5% to 2036-37.

Medical

As with private aviation, aeromedical movements, operated by the RFDS, are generally driven by population growth for the local area. Therefore, growth rates used to forecast medical-related operations to 2036-37 are also 2.1% - 2.3% to 2018 and 1.7% - 1.9% to 2036-37[7].

[7] Western Australia Tomorrow, Western Australia Planning Commission, 2005.

5.0 AERONAUTICAL DEVELOPMENT CONCEPT

The proposed aeronautical development concept, covering airfield and terminal infrastructure requirements and development staging, has been prepared on the basis of satisfying a set of critical planning parameters. Section 5.1 sets out the critical planning parameters upon which the aeronautical development proposals are based. This is followed by presentation of the proposals and development concepts for the runways, taxiways and passenger terminal in Sections 5.2 through 5.7. Drawings B11337A003A to B11337A005 set out the concepts described in this section and can be found in Appendix B. With the exception of the runway and associated taxiway development, all other development shown in Drawings B11337A003A and B11337A003B is the same.

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. Therefore, 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, a scenario-based approach was adopted which considered the potential impacts of varying combinations of passenger traffic and operating aircraft size/frequency in order to plan for the worst case scenario in terms of infrastructure development.

5.1.1 PLANNING SCENARIO ANALYSIS

Likely aircraft types, operating frequencies and schedules were determined through discussion with SWEK and the incumbent RPT airlines, Airnorth and Skywest, together with reference to other industry knowledge and the application of a general understanding of airline operations to determine nominal future flight schedules for a range of different scenarios.

The key airline operational scenarios encapsulated in the base schedules are:

- High-Frequency operations utilising generally the smallest aircraft types appropriate to the level of traffic, to the greatest number of destinations considered viable and offering the highest frequency of service considered viable to each destination;
- Low-Frequency operations utilising generally the largest aircraft types appropriate to the level of traffic, serving only the existing destinations and offering the lowest frequency of service to those destinations; and
- Medium-Frequency operations utilising aircraft types of intermediate size to serve traffic to existing destinations, and in some cases the most likely additional destinations, on a moderate frequency to each destination.

Each operational scenario can be applied to either of the three passenger growth scenarios developed in Section4.2. This combination gives a possible nine planning scenarios at each future year (providing a possible total 225 scenarios over the 25 year period). Clearly, many of these scenarios overlap, in terms of critical facility requirements. A total of eight key planning scenarios were selected with the objective of covering the worst-case situation in terms of facility requirements at 2021-22 (10 years) and 2036-37 (25 years), together with analysis of intermediate years to assist in the determination of likely trigger points for the implementation of new or expanded infrastructure. Considered as a whole, these traffic scenarios represent the widest practical range of potential traffic levels and related services frequencies.

For each scenario a base schedule detailing the typical weekly airline operations including airline, origin/destination, scheduled arrival/departure time and operating aircraft type was developed. These nominal schedules with peak aircraft load factors were used to determine the maximum number of passengers in the terminal at one time and maximum concurrent aircraft parking requirements.

5.1.2 TERMINAL AND AIRCRAFT PARKING REQUIREMENTS

The planning scenario analysis was used to determine the maximum number of passengers in each key element of the passenger terminal. The maximum number and mix of RPT aircraft on the apron at any one time was also identified at key years. This provided the critical planning parameters for the passenger terminal, RPT apron and the components of the runway and taxiway systems used by RPT aircraft. It is also anticipated that there will be a continuation of charter passenger operations with increasing FIFO operations into the airport which will also require the use of the passenger terminal.

The RPT and large charter/FIFO requirements are summarised in Table 2.

Table 2: Key RPT Planning Parameters

	Key Terminal Design Parameters (No. of Passengers*)	Max. Apron Parking Requirements (No. of aircraft)				
		RPT			Charter	
Scenario	Max. Total	F100	E190	A320-200/ B737-800	F100	Total
Stage 1 (2021-22)	750	1	1	1	1	4
Stage 2 (2036-37)	1000	1	1	2	1	5

**Includes both arriving and departing passengers*

Functional space requirements for the terminal were then developed by reference to the International Air Transport Association (IATA) *Airport Development Reference Manual* (9th Edition) for a Level of Service C. Level of Service C represents a good balance between passenger comfort and space efficiency and is generally adopted as the appropriate level for planning purposes. It

should be noted that design parameters for passenger and checked baggage security screening, where considered to be required, have been based on current Commonwealth requirements and experience at other regional airports in Australia.

Retail Space

An allowance for retail space has been included appropriate to an airport terminal of the current and anticipated size at EKRA. This allowance was based on benchmarking of retail areas at some typical Australian and overseas regional airports and based on industry best practice.

5.1.3 DESIGN AIRCRAFT CHARACTERISTICS

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 an ICAO reference code system. The reference code has two elements, a number and a letter, which are derived by grouping aircraft with similar performance capability and key physical dimensions. Thirteen aircraft groupings, each with a unique code number and letter combination such as 1A, 2B, 3C and 4D have been identified.

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

Pavement Strength

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

Principal Aircraft Parameters

Table 3 summarises the principal relevant planning parameters that relate to aeronautical facilities for each of the key aircraft types that might conceivably use EKRA in the future.

Table 3: 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
Beech Super King Air 200	16.6	4.5	5,670	1B	< 5,700 kg	N/A
Pilatus PC-12	16.2	4.3	4,740	2B	< 5,700 kg	N/A
Bombardier Dash 8-100	25.9	7.5	15,650	2C	8	37
Embraer EMB-120 Brasilia	19.8	6.4	11,500	3C	6	30
Bombardier Global Express	28.7	7.6	44,500	3C	28	19
ATR 72	27.0	7.7	22,000	3C	12	66
Embraer E-170	26.0	9.7	37,200	3C	19	78
Fokker 100	28.0	8.5	45,810	3C	24	107
Embraer E-190	28.7	10.5	46,990	4C	28	106
Airbus A320-200	33.9	11.8	73,500	4C	37	150
Boeing B737-800	35.8	12.6	70,535	4C	40	175

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

5.2 RUNWAY CAPACITY

The capacity of the proposed Runway 12/30 configuration has been considered. The number of annual movements forecast for 2036/37 is 51,050, based on experience from other airports the existing runway configuration will provide more than sufficient capacity for the next 25 years and beyond.

5.3 RUNWAY LENGTH, WIDTH AND STRENGTH

The development of a longer runway at EKRA to support future increases in aircraft size and range of destinations, forms a key development item of this Master Plan. Based on the information gathered during stakeholder consultation, the Master Plan should safeguard for the development of a runway to support operations by narrow-body jet aircraft such as the A320-200 and Boeing 737-800 to all domestic destinations on RPT services and possibly to destinations in south-east Asia.

The Master Plan process has assessed several potential runway development options to identify the concept that allows for the maximum runway length anticipated to be required whilst at the same time avoiding disruption to existing facilities. It is also paramount that the construction of runway facilities at EKRA does not impact upon operations and the existing runway can remain operational throughout.

Two runway development options are included within this Master Plan. Both have certain characteristics that may make them more viable to develop depending on the potential funding that may become available. Both have been included to ensure the required land is safeguarded for these purposes and either option can be developed depending on the outcome of a number of factors which are as yet unknown.

5.3.1 RUNWAY OPTION 1 (EXISTING RUNWAY)

To accommodate the anticipated operations, the existing runway will require strengthening, widening and extending as described below and shown on Drawing B11337A003A at Appendix B.

Length

Available land exists between the threshold of Runway 12 and the Ord River to the northwest to accommodate a runway extension. Due to the characteristics of the terrain in this area, only a limited section of the total land area is likely to be suitable to accommodate the extension of the runway due to the considerable quantities of fill that would be required. Therefore the maximum possible runway extension that can be achieved is approximately 520 metres. This results in a total runway length of approximately 2,350 metres. This runway length would support operations by Code 4C, 150 to 160 seat jet aircraft such as the Boeing 737-800 and A320-200 to destinations on the east coast of Australia. Some limited destinations in South-east Asia, such as Denpasar or Singapore may also be possible, however some limitations on payload may be required.

A runway turning node should be constructed at the Runway 12 threshold, prior to Taxiway F being fully upgraded to accommodate Code C aircraft, to allow Code C aircraft to turn.

Width

The runway extension would be required to be constructed with a width of 45 metres together with the widening of the existing pavement to accommodate Code 4C aircraft.

Pavement Strength

As described in Section 3.1.1, the condition and strength of the existing runway is poor, particularly during the wet season. To accommodate larger aircraft strengthening will be required. Depending on the exact condition of the existing pavement and subgrade, it is not clear whether the runway will be required to be closed to undertake the strengthening works. If it proves possible to undertake the strengthening through an asphalt overlay, then this can easily be undertaken in overnight shifts, allowing the runway to remain operational during the day. However, if more substantial reconstruction work is required during the day, this will require the closure of the runway. SWEK must keep the runway operational at all times, therefore this option will not be selected if works are required which cannot be performed during overnight closures. A more detailed engineering assessment of the existing runway is required to ascertain the nature of

strengthening works that will be required, and therefore whether the future use of the existing runway to accommodate larger aircraft is feasible.

Depending on the time-frame for the development of this runway option and the full strengthening works, interim pavement maintenance will be required to ensure the pavement continues to be useable for operations in the short-term.

The runway extension pavement should be constructed with a pavement classification number (PCN) of 40 (assuming a flexible pavement and Category B subgrade) that is suitable to accommodate Code 4C aircraft including the Boeing 737-800 and Airbus A320-200.

Runway Strip and Runway End Safety Areas

A runway strip of 300 metres can be accommodated which will allow for the operation of precision approach operations by Code 4C aircraft. No land acquisition is required to accommodate any part of the runway, runway strip or runway end safety areas (RESAs). The northern edge of a 300 metre wide runway strip coincides with the existing airport boundary at the north-western end of the runway. The transitional surface in this area will also require any objects to sit beneath the 1:7 slope that will extend upwards from the edge of the runway strip. To ensure the 300 metre wide runway strip is not compromised and the perimeter fence does not penetrate the transitional surface it would be prudent for SWEK to acquire the section of land that currently sits on the north-western side of the runway from the State of WA.

Runway Lighting

New runway lighting should be implemented with the extension of the runway. It is anticipated that the existing runway lighting on the existing runway will also be upgraded at this time.

The existing T-VASIS approach path indicator system is located as such that it will require relocation when the runway is extended and widened. Due to the age of this technology a new Precision Approach Path Indicator (PAPI) system should be installed at each runway end.

5.3.2 RUNWAY OPTION 2 (NEW RUNWAY)

Due to the likely limitations on the development of the existing runway in terms of both maximum length and the potential impact on existing operations, the option of developing a new runway located north of, but parallel, to the existing runway has been included within the Master Plan. The proposed runway location has been selected through the assessment of a range of other possible runway alignments. Due to the characteristics of the surrounding terrain, the existing 12/30 alignment is the only one that has the realistic potential to accommodate operations by larger aircraft to destinations further afield than are currently served. The proposed runway centreline can be accommodated at a minimum distance of approximately 105 metres from the existing runway centreline. This offset would allow for the runway to be constructed while the existing runway remains operational with only limited restrictions from construction work, which could largely be completed during the day. Some land acquisition will be required to construct a runway on this

alignment, however the majority of the works remain within the existing airport boundary as shown in Drawing B11337A003B at Appendix B.

Length

With consideration of the terrain to the northwest and the Victoria Highway to the southeast, the maximum runway length that can be accommodated is approximately 2,500 metres. This length will accommodate unrestricted operations by 150-160 jet aircraft such as the Boeing 737-800 and Airbus A320-200 to all domestic destinations as well as to destinations within south-east Asia including Singapore, Kuala Lumpur and Denpasar. Some destinations in southern China may also be within reach however, some limitations on payload may need to be applied.

The runway will be required to be constructed with a width of 45 metres to accommodate Code 4C aircraft.

Pavement Strength

The runway pavement should be constructed with a pavement classification number (PCN) of 40 (assuming a flexible pavement and Category B subgrade) that is suitable to accommodate Code 4C aircraft including the Boeing 737-800 and Airbus A320-200.

Runway Strip and Runway End Safety Areas

A 300 metre wide runway strip should also be provided to allow for the operation of Code 4 instrument approach operations. Some land acquisition is required to accommodate the runway strip on the north side of the runway, towards the Runway 12 threshold. The land that would be required is currently Crown land and negotiations with the State would be required to ensure that this land can be acquired. Negotiations with the State are currently ongoing regarding the acquisition of an area of land on the south side of the runway. Based on the outcomes of these to date, the acquisition of the piece of land to the north is anticipated to be possible.

The edge of the runway strip lies directly adjacent to the area of freehold land to the north of the Crown land, towards the Runway 12 threshold. The existing trees directly adjacent to the runway strip will be required to be limited to a height of approximately 1.5 metres at the location closest to the runway strip to accommodate the transitional surface which slopes upwards from the edge runway strip at a grade of 1:7. SWEK can either negotiate this requirement with the land owner or alternatively acquire the area of freehold land that will be affected to ensure the land use in this area is maintained under their control. On the basis that this land is currently planted with sandalwood trees, which can grow to a height of up to 5 metres, a portion of land 1,150 metres long by 50 metres wide would need to be acquired.

To accommodate the maximum possible runway length at the Runway 30 end, some land acquisition will be required to the south east of the runway to accommodate the runway strip and RESA. This area is private land and also directly adjacent to an existing structure. This structure will be an obstacle within the approach and take-off climb surfaces of Runway 12/30 and if not

removed will limit the available runway length to approximately 2,400m (assuming an approximate height of 6 metres of the structure). It is therefore recommended that SWEK acquire this area of land and arrange for removal of the structure in due course to ensure the maximum runway length is available. Ownership by SWEK will ensure that control is maintained of the development on this land that could become obstacles.

Runway Lighting

All new runway lighting will be installed on the new runway. A PAPI system should also be provided at each runway end.

5.4 PASSENGER TERMINAL FACILITIES

5.4.1 CAPACITY OF EXISTING FACILITIES

On the basis of the scenario planning and the design criteria for the new terminal, in general the terminal is likely to be adequate for approximately the next 10 years, until 2021/22 in a high growth scenario with both low (the design criteria) and high frequency RPT operations. The low frequency scenario is expected to include the simultaneous accommodation of two aircraft up to Boeing 737-800/Airbus A320-200 (as used for the design criteria for the existing terminal building). The high frequency scenario anticipates simultaneous operations of three aircraft including an Embraer E-170, a Fokker 100 (or other aircraft of similar size) plus an A320-200/Boeing 737-800.

However, in addition to the RPT services outlined above, there is also potential for FIFO or other charter services to be operated out of EKRA. These operations could feasibly be conducted with progressively larger aircraft, up to 100 seats. If FIFO operations were to coincide with RPT operations, the existing passenger terminal will reach capacity sooner. To accommodate this additional capacity, there is potential for some reconfiguration works within the terminal, such as increasing the size of the departure lounge by expanding it into the existing landside waiting area, including the area currently occupied by the café and the covered outdoor area.

The best estimate therefore is that in general the current terminal is likely to be able to accommodate potential demand up to around 2021-22 and will require upgrade or expansion when more than two aircraft of A320-200 or a Boeing 737-800 size (or a combination of smaller aircraft), require simultaneous use of the terminal. The frequent operation of an international service may also require significant expansion to the terminal with the development of a dedicated international departure lounge with areas to accommodate the requirements for customs, immigration and quarantine.

However, to ensure that the more immediate operational requirements of the passenger terminal continue to operate effectively, SWEK should liaise with terminal stakeholders including the ground handling agent, Northern Airport Services, as well as car hire companies. Minor reconfiguration of the terminal may be required in the near future to accommodate the needs of these stakeholders. .

5.4.2 FUTURE TERMINAL REQUIREMENTS

The future terminal space requirements were estimated by application of the design parameters established from the planning scenario analysis and summarised in Table 2 in Section 5.1.2. The overall space requirements in Stages 1 and 2 are summarised in Table 4.

Table 4: Estimated Future Terminal Spatial Requirements

Element	Functional Space (m^2)	Retail Space (m^2)	Total (m^2)
Stage 1 (2021-22)	2,300	100	2,400
Stage 2 (2036-37)	4,000	200	4,200

The methodology adopted to determine the space requirements in Table 4 leads to a conservative estimate of overall footprint, which is considered reasonable to plan and safeguard for, but which may not all be required. Ultimately between 4,000m^2 and 4,500m^2 of terminal footprint is anticipated in 2036-37. This would be sufficient to handle the highest traffic growth forecast with the most demanding combination of aircraft sizes and frequencies envisaged.

When required this Master Plan proposes that terminal expansion should occur to the west of the existing building as indicated on Drawing B11337A005 at Appendix B. This will require the relocation of the existing shed that is currently leased for parking to Northern Airport Services staff as well as the existing tug shed.

It is also anticipated that a separate cargo area may be required within or directly adjacent to the passenger terminal to handle cargo carried in the holds of passenger aircraft. In the short term this could be accommodated within the shed to the west of the terminal currently used for car parking by Northern Airport Services. As the terminal expands into this area, a new facility should be constructed, either as part of the new terminal facility or as a separate building to the west of the terminal building.

A significant increase in the area required to store GSE will also be required, this should also be located to the west of the existing baggage make-up area with the redevelopment of the existing tug shed of a sufficient size to accommodate any GSE. Any airline support services such as the storage of catering supplies can also be continued to be accommodated within the same facility.

5.5 AIRCRAFT PARKING

5.5.1 EXISTING RPT APRON

The existing RPT apron has sufficient capacity to accommodate RPT operations until approximately 2021-22 depending on passenger growth and the actual mix of aircraft. However, considering the likelihood of an increase in charter operations with increasingly larger aircraft, it is anticipated that an apron extension may be required prior to 2021-22, again depending on the

growth and respective operating schedules of both RPT and charter operations as well as the actual aircraft mix.

5.5.2 FUTURE RPT APRON REQUIREMENTS

Stage 1

The planning scenario analysis indicates that by 2021/20, with the highest traffic envisaged and the most demanding mix of aircraft in terms of apron space, the maximum number of RPT aircraft on the apron simultaneously is likely to be three in the high frequency scenario and two aircraft in the low frequency scenario. The high frequency scenario will prove most demanding in terms of apron space, requiring simultaneous parking for two Embraer E-190/Fokker 100 (or other aircraft of similar capacity), and one Airbus A320/Boeing 737-800 (or other aircraft of similar capacity). These three parking positions could be accommodated within the existing apron; however, the operation of charter aircraft in addition to these RPT operations into EKRA is likely to require the expansion of the existing apron. It is estimated that an additional parking position for a Fokker 100, or other aircraft of similar size, will need to be accommodated. Therefore an apron expansion of approximately 2,800m^2 to the west of the existing is proposed in Stage 1. However, to provide additional flexibility by enabling the accommodation of a larger aircraft at this position, such as a B737-800, this expansion could be up to 5,500 m^2.

The existing RPT apron pavement will need to be strengthened to accommodate the larger aircraft mentioned above including the Airbus A320 and Boeing 737-800 prior to the accommodation of these aircraft on the apron. Flood lighting should be installed with the development of the extended apron. The existing RPT apron flood lighting should be upgraded or replaced at this time.

Stage 2

By 2036-37, the planning scenario analysis indicates that, with the highest traffic growth envisaged, the maximum number of aircraft parking positions required by RPT aircraft is four in the high frequency scenario and three in low frequency scenario. The high frequency scenario will prove most demanding in terms of apron space. Aircraft that are likely to be operated will continue to be similar to those anticipated to be used in Stage 1.

It is anticipated that RPT apron expansion will continue to the west and will incorporate the proposed Stage 1 private jet apron, which is discussed further in Section 5.5.3 and shown on Drawing B11337A005 at Appendix B.

Beyond 2036-37, depending on passenger growth and actual aircraft mix, aircraft parking adjacent to the terminal building may not be sufficient and alternative areas for apron expansion will need to be sought. There is potential to develop the area directly to the north of the existing RPT apron to accommodate additional RPT or charter aircraft as shown on Drawing B11337A004 at Appendix B, these parking positions would be remote and appropriate arrangements would need to be made to provide safe pedestrian/vehicle access between the aircraft and passenger terminal building.

5.5.3 PRIVATE JET APRON

There is currently a relatively frequent use of EKRA by private business jets, particularly in the dry season. There is however no dedicated parking for these types of aircraft and the operators generally like to avoid the use of the RPT apron so that the requirement for security screening is avoided. It is proposed that in Stage 1 a dedicated private jet apron to the west of the RPT apron be developed with a single parking position for an aircraft up to the size of the Bombardier Global Express. Secondary parking positions for smaller, Code B, private jet aircraft will also be accommodated on this apron. It is proposed that this apron is located as far west as possible, adjacent to the Slingair Heliwork hangars, to allow space for the expansion of the RPT apron. Part of the private apron will extend over the south east corner of the existing west GA apron area. It is also anticipated that the private jet apron will be developed over the area of land which is currently identified as Lot 318. Although this is currently still under the ownership of SWEK, plans exist to sell this lot for private development. It is recommended that any such plans should not proceed to ensure that the development of the private jet apron is not impeded.

This location allows the private jet apron to be completely separate to the RPT apron for as long as possible to ensure segregation of operations for security screening purposes. Flood lighting should be installed on the new private jet apron to allow night operations. Landside access can be provided to the apron via the existing automatic gate.

When this area is required for RPT apron expansion during Stage 2, private jet parking will need to be relocated to another location on the airport, potentially the additional apron area to the north of the existing RPT apron as shown in Drawing B11337A005 at Appendix B. Due to the extensive nature of the aircraft movement area and the limited amount of available land, in Stage 2 it is likely that the private jet apron will need to be subject to security screening requirements.

5.5.4 EAST GA APRON

Evidence suggests that during busy periods the east GA apron is at capacity with the area designated for visiting aircraft also being used by the based charter operators. Due to the location of the apron between the Air BP and Shell fuel facilities to the east and the RPT apron to the west there is little scope for expansion of this apron.

To increase the available aircraft parking for the potential future expansion plans of the based charter operators located in this area, parking for visiting GA aircraft should be relocated to the west GA apron when this is expanded. Any new GA development or operations should also be located on the west GA apron where additional capacity will be available following its expansion.

The RFDS aircraft parking position located to the east of the apron should remain at this location, adjacent to the St. John's Ambulance patient transfer facility.

The construction of parallel taxiway (Taxiway F) between the Runway 30 threshold and Taxiway A to prevent a requirement for aircraft to use Taxiway C will reduce the current issue of GA traffic crossing the RPT apron. All aircraft on the east GA apron will be required to use Taxiway B or

Taxiway F to access the runway and any facilities to the west of the RPT apron. Taxiway C will become redundant and the area currently occupied by this taxiway can be integrated into the east GA apron and the space utilised as a taxilane and additional parking. Some reconfiguration of the existing taxilanes and parking positions may be required to maximise the area as a whole. Access prevention on to the RPT apron from the east GA apron should be managed through the development of an appropriate operational procedure.

In the event of Runway Option 2 being developed there may be scope to expand the east GA apron on the northern side of Taxiway F.

5.5.5 WEST GA APRON

Indicative evidence suggests that the west GA apron is at capacity during busy periods. Due to the limited potential for expansion of the east GA apron, the west GA apron should be expanded to accommodate the relocated visiting aircraft parking as well as any additional GA parking that may be required by new operators that establish themselves within the aviation-related commercial precinct to the south and west of the existing west GA apron.

The apron should be expanded to accommodate both Code A and Code B aircraft to accommodate the future expansion of Slingair Heliwork and other possible new operations. In Stage 1, the Master Plan proposes that a dedicated private jet apron be developed on the eastern edge of the west GA apron. Some GA aircraft parking will be lost due to this development. Therefore, sufficient additional capacity should be constructed as part of the west GA apron expansion in Stage 1 to make up for this.

Initially, the existing apron can be expanded to the north towards the weather station, however remaining at a distance that still provides 100 metres clearance. This would approximately double the size of the existing apron to approximately 30,000 m^2 including aircraft parking and taxilanes. Some reconfiguration of the existing taxilanes and parking positions will be required to ensure the area created by the expansion is maximised. It is proposed that landside access for visiting GA aircraft pilots and passengers will be via the existing automatic Gate 10.

To accommodate demand for GA parking resulting from the development of the aviation-related commercial precinct and the potential development of a fuel facility in this area, the apron can also be extended to the northwest of the existing apron along the eastern edge of the proposed aviation-related commercial precinct. The apron can extend as far as the proposed aircraft maintenance precinct and Taxiway F to the northwest. This area can be developed in sub-stages according to demand.

As additional GA aircraft parking is required in Stage 2, the BoM weather station could be relocated and the west GA apron can expand further to the north, up to Taxiway F.

It is anticipated that once Taxiway F is extended between the Runway 30 threshold and Taxiway A, all aircraft utilising the west GA apron should have no requirement to utilise Taxiway C to access the east GA apron including the fuel facilities.

5.6 TAXIWAY SYSTEM

The taxiway system is required to link the runways with the aircraft parking areas and support facilities on the aerodrome. An effective taxiway network is critical in maximising the operational capacity of the airfield. However, taxiway capacity is difficult to define precisely, or in the same way as it is for runways. Instead, it is necessary to rely largely on experience, drawn from the operation of other airports, as to what constitutes an effective taxiway network.

Development of the taxiway network is discussed in the following sections. Where taxiway development will differ depending on the runway option selected this is highlighted.

5.6.1 TAXIWAY A

The existing main taxiway (Taxiway A) links Runway 12/30 with the RPT apron and the west GA apron and currently accommodates Code C aircraft. It is not anticipated that this taxiway will require future widening, however the pavement strength should be upgraded when the RPT apron pavement is upgraded to accommodate Airbus A320-200/Boeing 737-800 aircraft.

If Runway Option 2 is selected, Taxiway A will require an extension of approximately 100 metres from the existing runway to the new runway.

5.6.2 TAXIWAY B

Taxiway B currently connects the Runway 30 threshold to Taxiway C and can accommodate Code C aircraft. The Master Plan proposes that the taxiway pavement is strengthened to accommodate Airbus A320-200/Boeing 737-800 aircraft to provide access between Runway 30 threshold and Taxiway F.

If Runway Option 2 is selected, the existing Taxiway B will be redundant. It is anticipated that a new taxiway connection to the Runway 30 threshold will be required from the new Taxiway F, which has been designated as Taxiway B for the purposes of this Master Plan.

5.6.3 TAXIWAY C

Taxiway C currently connects Taxiway B to the west GA apron and the RPT apron. When Taxiway F is extended southeast from Taxiway A, Taxiway C should then be integrated into the east GA apron and utilised as a taxilane and parking area as required.

5.6.4 TAXIWAY F

The requirement for a parallel taxiway is based on a number of operational considerations including aircraft mix, traffic peaking, traffic volume and the number of taxiway exits, among other things. A full detailed assessment has not been undertaken within this Master Plan however, a full parallel taxiway is typically needed when the normal peak demand is expected to exceed around 20 movements per hour. Based on a 16-hour operating day and assumed average hourly demand of 0.5 times the peak hourly demand, this equates to an approximate annual total of around 60,000 movements. As forecast annual aircraft movements for 2036-37 is considerably less than this, a full

parallel taxiway is not considered necessary within the period of this Master Plan. However, an extended Taxiway F provides Code B and Code C aircraft access to the commercial development precincts located adjacent to it, therefore, parallel taxiway development has been included within this Master Plan. In light of there currently being sufficient space to accommodate a full length Code C parallel taxiway, the area and clearances required for this should be safeguarded for the future development of the airport.

Runway Option 1

Existing Taxiway F forms a partial parallel taxiway between the Runway 12 threshold and Taxiway A. Separation between Taxiway F and the centreline of existing Runway 12/30 is approximately 157 metres, approximately 11 metres less than the minimum separation required for Code 4C precision approach operations. Use of Taxiway F is currently limited to Code B aircraft below 5,700kg due to the poor condition of the pavement in this area. Based on this it is anticipated that Taxiway F will require significant strengthening and even reconstruction to ensure this taxiway is fully operational. At this time the taxiway centreline should be realigned to the south to allow Code 4C precision approach operations to be undertaken on Runway 12/30, should they be required in the future.

This Master Plan proposes that Taxiway F will provide access to the proposed Aircraft Maintenance Precinct, Air Cargo Precinct, Aviation-related Commercial Precinct and the Private Hangar Precinct. Therefore, Taxiway F should be upgraded to accommodate Code C aircraft between Taxiway A and the end of the north western end of the Air Cargo Precinct. Beyond this to the Runway 12 threshold land should be safeguarded to accommodate a full length Code C parallel taxiway. However, in the first instance this section of Taxiway F may only need to be constructed to accommodate Code B aircraft.

The existing connector between Taxiway F and the Runway 12 threshold should be maintained and strengthened to accommodate Code B aircraft. This has been redesignated as Taxiway H for the purpose of this Master Plan.

The Master Plan also proposes that Taxiway F be extended from Taxiway A to Taxiway B. This will provide taxiway access between Runway 30, the east GA area and the west GA area without the requirement for aircraft to use Taxiway C. This will aid the current issues experienced from the cross-over of aircraft on the RPT apron. This section of Taxiway F should be constructed to accommodate Code C aircraft as this will provide the main access for RPT aircraft to the Runway 30 threshold. Some rearrangement of the east GA apron will be required as this section of Taxiway F and the associated strip will encroach on to the apron slightly, however, no existing marked parking areas will be affected.

Runway Option 2

The Master Plan proposes that the parallel taxiway for Runway Option 2 be retained along the same alignment as that proposed for the Runway Option 1 parallel taxiway. Although this results in

a greater than required clearance from the runway centreline for precision approach operations, it ensures that development along the parallel taxiway can commence prior to a runway option being selected.

The development for Taxiway F will be as described for the development of Runway Option 1 with the exception of further extensions at both ends to provide full parallel taxiway access. At the Runway 30 threshold, beyond existing Taxiway B, Taxiway F will follow the alignment of the disused runway before turning to connect with the runway threshold. This section should also be constructed to accommodate Code C aircraft to avoid the requirement for a runway turning node.

5.6.5 TAXIWAY G

Taxiway G currently connects Runway 12/30 to Taxiway F and can accommodate Code B aircraft, however it is currently limited to aircraft of a maximum of 5,700kg. For both runway options, with the upgrade of the existing section of Taxiway F, Taxiway G should also be upgraded and strengthened to accommodate Code C aircraft and provide access to the Aircraft Maintenance Precinct and Air Cargo Precinct. For Runway Option 1, Taxiway G will also require extension of approximately 80 metres from the existing runway to the new Runway 12/30.

5.6.6 TAXIWAY H

The existing Taxiway F connection to the Runway 12 threshold should be strengthened to accommodate Code B aircraft and in Runway Option 2, will be required to be extended by approximately 70 metres from the edge of the existing runway to the new runway. For the purposes of this Master Plan this has been designated as Taxiway H. This taxiway will provide Code B aircraft access between the runway and Precinct 1B (aviation-related commercial development) and Precinct 5 (private hangars).

5.6.7 TAXIWAY I

A new taxiway connection between the extended Taxiway F and the Runway 12 threshold will be required to be constructed. For the purposes of this Master Plan this has been designated as Taxiway I.

5.6.8 TAXIWAY J

Taxiway J is proposed to connect Taxiway F to the new Aviation-related Commercial Precinct to the west and the west GA apron. The taxiway should be constructed to accommodate Code B aircraft and will be required when significant development within the Aviation-related Commercial Precinct occurs

5.7 OTHER AIRFIELD FACILITIES

5.7.1 AERDROME RESCUE AND FIRE FIGHTING SERVICES

It is anticipated that EKRA will accommodate a sufficient number of aircraft movements during Stage 2 to require aerodrome rescue and fire fighting services (ARFFS). An ARFFS facility with a

minimum of two vehicles will be required. Drawing B11337A004 at Appendix B indicates the proposed location which should provide response times in line with CASA requirements.

5.7.2 BUREAU OF METEOROLOGY WEATHER STATION

For both runway options, it is anticipated that the existing weather station could remain in its current location for some time. The weather station will continue to require at least 100 metre clearance from all obstacles and it is anticipated that this can be achieved for up to the next 10 years. The weather station also has some limitations on obstacle heights within 100 to 200 metres radius. The existing Slingair Heliwork hangars fall within this radius currently (within approximately 200m) therefore it is not anticipated that development within the Aviation-related Commercial Precinct to the west will need to be limited as this is located more than 200 metres from the weather station (within approximately 220 metres). However, the exact requirements for this area should be confirmed with BoM when further planning for this area commences. When the west GA apron requires expansion north, the weather station will likely require relocation to accommodate this as development will infringe on the required 100 metre clearance. The Master Plan proposes that the weather station be relocated to the north of the runway as indicated on Drawing B11337A004 at Appendix B.

5.7.3 VISUAL AND NAVIGATIONAL AIDS

Runway Option 1

It is not anticipated that the existing Doppler VOR/DME will be required to be relocated even with the accommodation of a 300 metre wide runway strip to accommodate Code 4 precision approach operations. Objects with a height greater than 4 metres should not be located within 150 metre clearance of the facility. There will however be some limitations on any future commercial development that may happen in this area beyond 150 metres radius.

The Master Plan does not anticipate a requirement to relocate the NDB from its current location on the south of the runway. There will be some limit to the aviation-related commercial development proposed surrounding the NDB in this area, however this is not anticipated to have a major impact on development. However, there may be some benefit in the future to relocate the NDB to make maximum and most effective use of the land south of the runway available for commercial purposes, the NDB could be relocated to the north side of the runway along with the weather station. It should be noted however that it is not likely that the co-location of the NDB and the VOR/DME facilities would be possible and the required obstacle clearance of each will still need to be maintained. However, it will be possible to achieve some overlap of the object clearance areas for each facility, there will therefore be some benefit in locating these facilities near each other.

Runway Option 2

The development of Runway Option 2 will require the relocation of the VOR/DME from its current location. The Master Plan proposes that it is relocated to an alternative location on the north of the runway as indicated on Drawing B11337A003B at Appendix B. This location will accommodate

the object clearance requirements for this facility, which includes a 150 metres radius clearance of obstacles of more than 4 metres in height. The Doppler VOR also has some limitations on obstacle heights beyond 150 metres to 300 metres which will also be required to be adhered to in relation to any future commercial development of this land.

As with Runway Option 1, there is no requirement to relocate the NDB from its current location on the south of the runway. However, there may be some benefit in the future to relocate the NDB to make maximum and most effective use of the land south of the runway available for commercial purposes, the NDB could be relocated to the north side of the runway along with the VOR/DME and weather station. Although, again, the obstacle clearance requirements will need to be maintained for each of the facilities (weather station, NDB and VOR/DME), it will be possible to overlap the areas that will be required to kept clear of obstacles to a certain extent, therefore there will be some benefit in locating these facilities near each other. As shown on Drawing B11337A004 at Appendix B, the NDB, weather station and VOR/DME are proposed to be located to an area as far north as possible to ensure the maximum amount of land is left available adjacent to the runway allowing airside access for the proposed future aviation-related commercial development.

Both runway options will require the relocation of the existing wind indicators due to the extension of Taxiway F and the runway and runway strip proposals. For Runway Option 2, the wind indicator required to be located in the vicinity of the Runway 30 threshold may need to be located on the right-hand side (as pilots approach the runway) as insufficient land exists on the left-hand side.

5.7.4 FUEL FACILITIES

It is not anticipated that expansion of the existing lease/freehold areas, currently occupied by Air BP and Shell, located adjacent to Runway end 30, will be required within the next 25 years. Discussion with these fuel providers indicated that sufficient space currently exists within these areas for any expansion of their facilities that may be required.

However, with regard to the future development and expansion of the western GA area, described in Section 3.1.3 and the development of the aviation-related commercial precincts with airside access also to the west, an additional fuel facility (both AVGAS and Jet A1) may be required to the west of the RPT apron to serve aircraft in this area. This will reduce the requirement for aircraft to taxi between the two areas to access fuel. A location on the western edge of the proposed Aviation-related Commercial Precinct has been identified within this Master Plan for this fuel facility and is shown in Drawings B11337A003A and B11337A003B at Appendix B. An appropriate area of aircraft apron will also be required to be developed adjacent to this if the west GA apron has not been extended to this point when the fuel facility is required.

5.7.5 AIRSIDE ACCESS

The existing airside access gates can remain largely unchanged. Depending on the runway option selected and the construction of new airside security fence, airside access and the inclusion of new

gates should be considered carefully at the time depending on the location of the development and the easiest access points.

The Master Plan proposes that the existing automatic Gate 10 should be used to access the private jet apron and visiting GA aircraft on the west GA apron. Pedestrian access should be provided between the visiting GA aircraft parking and Gate 10, along the western edge of the proposed private jet apron. The existing airside gate, providing access to the existing visiting GA aircraft parking on the east GA apron, will no longer be required for this purpose and will be dedicated to providing airside access for depot activities such as mowing.

5.7.6 SECURITY CONTROL

Fencing and Gates

Security fencing and the existing airside gates should be maintained to ensure functionality. Security control at the airport should be maintained and developed in accordance with the approved Transport Security Program as required by the Aviation Transport Security Act 2004 and Aviation Transport Security Regulations 2005.

Areas of the existing airside fence have been identified as inadequate by incumbent airlines. These airlines have implemented their own measures to mitigate against the risks which they consider are presented by the current fence particularly when RPT aircraft remain at the airport overnight. However, to ensure that EKRA complies with the security requirements and is as attractive to new airlines and the incumbent airlines as possible, the security fencing and gates should be upgraded where required.

For Runway Option 1, although no land acquisition is required to accommodate any part of the runway, runway strip or runway end safety areas (RESAs), the northern edge of the 300 metre wide runway strip lies adjacent to the existing airport boundary at the north-western end of the runway. A perimeter fence will also need to be accommodated and should be located at sufficient distance from the edge of the runway strip to remain beneath the transitional surface. To achieve this, the fence will be required to be located within land currently owned by the State. This area of land should be acquired to ensure this can be accommodated and the land is protected from any incompatible future development.

Passenger and Checked Baggage Screening

Passenger and checked baggage screening is currently carried out at EKRA as required by the existing regulations. The current process also meets the requirements for aircraft greater than 20,000kg Maximum Take-Off Weight (MTOW) operating RPT air services which will come into force on 1 July 2012, as set out in the ATSRs. The recently upgraded passenger terminal includes the necessary process and equipment to undertake this screening. It is anticipated that the security requirements will continue into the future and are likely to become more stringent with smaller aircraft requiring screening. The overall terminal footprint estimated to be required in the future includes the requirement to screen all aircraft using the RPT apron regardless of their size.

5.8 STAGED DEVELOPMENT PLAN

The anticipated staging of the proposed aeronautical development concept described in the preceding sections is summarised in the following sub-sections. Development staging is subject to a range of external factors as well as demand. The timing and location of developments as set out below will need to be subject to periodic review and adjustment as a result of these factors. The Master Plan, whilst setting out the optimum long-term land-use arrangement for the airport site, incorporates flexibility to adjust the location and timing of particular developments as necessary to suit specific constraints.

5.8.1 STAGE 1 – 10 YEAR PLAN (2021-22)

The key components of the aeronautical concept proposed in Stage 1 are summarised in Table 5. Expected trigger points for implementation of each component are also indicated. On the basis of the anticipated growth and development in aeronautical activities current at the time of the preparation of this Master Plan, Stage 1 development is expected to occur sometime time between 2012 and 2022. Actual development timeframes will depend on a number of factors including the preparation of detailed business cases for each element. Section 10.0 of this report provides details surrounding the recommended implementation plan for the proposed Stage 1 developments.

Table 5: Proposed Stage 1 Development

Proposed Development	Anticipated Trigger
Runway development to Code 4 capability (Runway Option 1 to the maximum length of 2,350 metres) (Runway Option 2 development to at least 2,500 metres)	Operation of A320 / B737 aircraft
Taxiway F extension between Taxiways A and B (Code C) including either: -Runway Option 1: Strengthening of Taxiway B; or -Runway Option 2: Development of a new Taxiway B together with extensions from other existing taxiways.	Immediate
West GA apron expansion including development of Taxiway J	Relocation of visitor GA aircraft parking and development of Precinct 1A (aviation-related development)
Private Jet Apron Development (approx. 2,500 m^2)	Immediate
RPT Apron Expansion (approx. 2,500 m^2)	Operation of more than two simultaneous aircraft of A320 or B737 size plus a simultaneous large charter operation
Upgrade existing Taxiway F and G between Taxiway A and the runway (Code C)	Precinct 3 and 4 development (Aircraft maintenance and air freight development)
Pavement strengthening for existing RPT apron and Taxiway A to B737 / A320 capability	Operation of A320 or B737 aircraft
Passenger terminal expansion/reconfiguration (Total Area: 2,000 m^2 to 2500 m^2)	Operation of more than two simultaneous aircraft of A320 or B737 size

Proposed Development	Anticipated Trigger
Upgrade Taxiway F between Taxiway G and Private Hangar Precinct (Code C)	Development of Precincts 1B and 5 (Aviation-related and private hangar development)

5.8.2 STAGE 2 – 25 YEAR PLAN (2036-37)

The key components of the aeronautical development concept proposed in Stage 2 are summarised in Table 6. Expected trigger points for implementation of each component are also indicated. On the basis of the anticipated growth and development in aeronautical activities current at the time of preparation of this Master Plan, Stage 2 development is expected to occur at some point between 2022 and 2037. Actual development timeframes will depend on a number of factors including the preparation of business cases for each element.

Table 6: Proposed Stage 2 Development

Proposed Development	Anticipated Trigger
Full Taxiway F development	Further development of Precinct 5 (Private hangars)
RPT Apron Expansion (approx.. 5,000 to 7,000 m^2)	Simultaneous operation of additional B737-800/A320-200 aircraft
Passenger terminal expansion (Total Area: 4,000 m^2 to 4500 m^2)	Operation of additional B737-800/A320-200 aircraft
West GA apron expansion (approx. 150,000 m^2)	Future development of Precinct 1A/Increased GA Activity
Private Jet Apron Expansion /Relocation (5,000 m^2)	As required/Expansion of RPT apron on to private jet apron

6.0 AIRSPACE

6.1 SURROUNDING TERRAIN

The airport elevation is approximately 44 metres (145 feet) AHD. The airport site is relatively flat. The elevation at the threshold of Runway 12 is 43 metres and at Runway 30 threshold it is 44 metres.

The terrain surrounding the airport site penetrates the existing Obstacle Limitation Surfaces (OLS) at several locations. To the northeast, approximately 3.5 kilometres from the airport, the inner horizontal and conical obstacle limitation surfaces (See Section 6.2) are penetrated by a ridge. Kelly's Knob is a significant feature of this section of the terrain at approximately 148 metres AHD, located within the inner horizontal. A hazard beacon is located on top of Kelly's Knob.

To the south east, approximately 6 kilometres from the airport, another ridge running approximately north south along the eastern edge of the Ord River penetrates the conical surface. Approximately, 3.4 kilometres to the west of the airport, terrain also penetrates both the inner horizontal and conical OLS surfaces. A lit mast is located within this area at a height of 112 metres.

As well as the two lit masts mentioned above there is also one located approximately 3.2 kilometres from the aerodrome to the north east, at a height of 132 metres.

6.2 OBSTACLE LIMITATION SURFACES

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

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

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

6.2.1 EXISTING OLS

Runway 12/30 is a Code 3 non-precision instrument runway with a width of 30 metres within a 150 metre wide runway strip. Obstacle limitation surfaces protect take-off and landing and visual circling for this runway. The existing OLS applicable to current operations at EKRA is shown in Drawing B11337A006 in Appendix B.

As mentioned in Section 6.1 the inner horizontal and conical surfaces are penetrated by terrain in a number of locations as well as the lit masts located at the following locations and with the following heights, as included within the AIP ERSA:

- 195 metres (639 feet), 65 degrees and 4000 metres from the ARP;
- 132 metres (433 feet), 57 degrees and 3200 metres from the ARP; and
- 112 metres (368 feet), 265 degrees and 3400 metres from the ARP.

6.2.2 FUTURE OLS

With respect to the future OLS, both runway options, including the extension of the existing and the construction of a new runway, will be very similar in terms of the impact of the OLS as they are both on the same alignment and the new runway centreline is located just 105 metres from the existing runway. However, provision is made for the development of Runway Option 1 with respect to the OLS. Therefore provision has been made for an extension to Runway 12/30, with a total length of 2,350 metres capable of accommodating Code 4 precision approach operations. The future OLS is shown in B11337A007 in Appendix B. Once a runway option has been selected the future OLS may need to be revisited.

The existing structure currently located approximately 315m southeast of the existing Runway 30 threshold will penetrate the approach and take-off climb surfaces of both runway options. This structure will require removal to allow the development of either of the runway options. The areas beneath the approach and take-off climb surfaces, as indicated on Drawing B11337A007, are proposed remain development free to protect the OLS surfaces within this area.

The terrain that currently penetrates the inner horizontal and conical surface to the north east, south east and west of the airport will continue to do so, however, these penetrations are not likely to unduly effect operations by the anticipated larger aircraft including the B737-800 or A320-200.

6.3 INSTRUMENT PROCEDURES

6.3.1 EXISTING PROCEDURES

Current published instrument approach procedures for Kununurra include Distance Measuring Equipment (DME) or Global Positioning System (GPS) Arrivals; a VHF Omni-directional Range (VOR) approach to runway 30; a VOR or Non-Directional Beacon (NDB) approach to circling minima; and Area Navigation (RNAV) non-precision runway approaches based on the Global Navigation Satellite System (GNSS). Published approach minimum descent altitudes (MDA) may be reduced by 100 feet if an accurate altimeter setting is available. The published approach procedures are authorised for use by category A, B C and D aircraft except for the NDB-A or VOR-A procedure and the DME of GPS Arrival procedures which are not available to category D aircraft.

DME or GPS Arrivals are published for inbound tracks of 209 degrees magnetic from waypoint JULUP and Darwin, 070 degrees magnetic from Gibb River, and 113 degrees magnetic from Wyndham. These procedures provide the approach minima set out in Table 7.

Table 7: Existing Procedure Approach Minima

Arrival Track	Minima Cat A & B		Minima Cat C	
	MDA (ft)	Visibility (km)	MDA (ft)	Visibility (km)
209 ºM JULUP – Kununurra	1260	2.4	1290	4.0
070 ºM Gibb River – Kununurra	1720	2.4	1720	4.0
113 ºM Wyndham – Kununurra	1570	2.4	1570	4.0

Two sectors are also published for DME or GPS arrival procedures. The northern sector includes inbound tracks from the north of Kununurra between 110 degrees magnetic clockwise to 290 degrees magnetic, while the southern sector covers inbound tracks south of Kununurra from 290 degrees magnetic clockwise to 110 degrees magnetic. Circling MDA for both sectors is 1,850 feet and minimum visibility 2.4 kilometres for category A and B aircraft, and 1,850 feet and 4 kilometres for category C aircraft.

The VOR RWY 30 procedure provides a straight-in approach to runway 30 with MDA 750 feet and 3.4 kilometres visibility for category A, B, C and D aircraft.

The Non-Directional Beacon (NDB) – A or VOR-A approach procedure provides for descent to circling minima of 1190 feet and 2.4 km visibility for category A and B aircraft; and 1290 feet and 4.0 km visibility for category C aircraft.

The RNAV (GNSS) RWY 12 and 30 procedures provide a straight-in approach MDA of 750 feet with minimum visibility 3.4 km for category A and B aircraft, 4.0 km for category C aircraft and 5.0 km for category D aircraft.

The published approach procedures are adequate for transient weather conditions such as the passage of frontal weather where cloud ceiling and visibility are reduced for relatively short periods. However, the operational benefit of these procedures is limited where reduced ceiling and visibility conditions persist for longer periods.

6.3.2 FUTURE PROCEDURES

No specific allowance has been made within this Master Plan for the development of new instrument procedures. However, extension of the existing runway or the construction of a new parallel runway will require review or redesign of all published instrument approach procedures. In order to ensure that future development in the vicinity of the airport does not introduce unacceptable constraints on future instrument procedures that may include precision approaches, it is recommended that suitable future PANS-OPS (Procedures for Air Navigation Services - Aircraft Operations protection surfaces) be developed. Proposed developments can then be reviewed against these surfaces as well as the OLS to ensure future airport operations remain protected.

7.0 AIRCRAFT NOISE

The consideration of the impact of aircraft noise is an important factor in the development of individual Airport Master Plans. An understanding of the noise impact on land adjoining the airport provides valuable information to local government authorities for planning of adjacent land uses. A thorough understanding of both existing and future noise impacts from airport operations is essential to the development of compatible land use zoning in planning schemes around airports. It is also important for the general public to be able to understand possible future noise impacts in a wider sense, to assist individuals in making their own assessment for their acceptability.

The provision, in this section of the Master Plan, of information on projected noise impacts for EKRA, is intended to enable Council to make informed decisions for the development and implementation of future Airport Master Plans and Local Environmental Plans to ensure that:

- Sensitive receptors are located in areas of acceptable aircraft noise;
- The amenity of other surrounding developments is not adversely affected by aircraft noise; and
- Airport operations are protected, in the long-term, from stakeholder conflicts due to the encroachment of inappropriate development into noise affected zones.

7.1 THE ANEF SYSTEM

The principal means of assessment of potential aircraft noise exposure at a given site in Australia is based on the Australian Noise Exposure Forecast (ANEF) system. The ANEF system was developed in the early 1980s based on a social survey of the reaction of people around several Australian airports to noise from aircraft. The ANEF combines the effects of the intensity, duration and number of noise events as well as incorporating a penalty for events at night which is illustrated by contours.

The ANEF is intended to be used to guide the long-term decisions of land-use planners about types of compatible development in areas that may be subject to significant levels of aircraft noise in the future. Additionally, the ANEF system is the basis of *Australian Standard AS 2021-2000 Acoustics – Aircraft noise intrusion – Building siting and construction* (AS2021-2000) which provides guidance on the protection of new buildings against aircraft noise intrusion and on the acoustical adequacy of existing buildings in areas near aerodromes.

Although the ANEF system is considered suitable for land-use planning purposes it is not without limitations. The ANEF system is a ‘one size fits all’ approach to land use planning. The ANEF criteria for acceptable land use are the same whether the land is in the vicinity of a major international airport or a small regional aerodrome without jet aircraft. The system does not take into consideration local conditions, for example an airport on a Greenfield site is treated as one which has already been developed.

The ANEF is a complex metric which combines the effects of loudness, duration and frequency of noise events to develop a measure of the cumulative noise dose. Although a technically complete measure of noise impacts, it does not illustrate noise in a way to which the non-expert can easily relate. Nevertheless, the ANEF remains the only aircraft noise metric for which land use planning guidelines and requirements (as set out in AS2021:2000) have been developed .

7.2 NOISE MODELLING SOFTWARE

7.2.1 INTEGRATED NOISE MODEL

The ANEF noise contours for EKRA were prepared using the Integrated Noise Model (INM) version 7.0(b). The INM software has been developed and progressively refined by the United States Federal Aviation Administration to enable the estimation of noise impacts around airports resulting from aircraft operations.

The INM calculates noise impacts by applying standard or user defined aircraft flight profiles, performance data and noise curves to the specific runway configuration and flight tracks. Under the ANEF system, the time of day at which operations take place is also factored into the noise computation. This allows for varying sensitivity in people's reaction to noise.

In interpreting the output of the model it should be noted that:

- Aircraft movements are allocated as a day or night operation, defined as being the hours between 7.00 am to 7.00 pm and 7.00 pm to 7.00 am respectively;
- The number of approach and departure operations modelled relate directly to the actual number of approach and departure movements; and
- The INM requires touch and go (TGO) training to be modelled as a circuit, the initial take-off coupled with the final landing, in conjunction with a number of TGO operations (i.e. each INM circuit or TGO corresponds to two aircraft movements).

The model has been constructed to produce the Australian Noise Exposure Forecast (ANEF) metric defined in AS2021:2000.

INM only considers noise from aircraft taking off, landing and in-flight. Ground-based noise, such as that from taxiing aircraft or engine run-ups or that from ground vehicles or equipment is not included in the model, and therefore cannot be represented in the ANEF. Individual developments which have the potential to generate significant ground-based noise, such as engine run-up facilities or the development of a new RPT terminal and apron, should incorporate further, more detailed, studies to provide an assessment of the noise impacts of these proposals. Airport operational matters influencing noise from ground-based sources should be managed in consultation with local residents through a community consultation strategy.

7.2.2 TNIP

The Transparent Noise Information Package (TNIP) has been produced by the Department of Infrastructure, Transport, Regional Development and Local Government (DITRDLG) to enable

aircraft noise disclosure information to be rapidly produced for individual airports. The software takes data outputs from INM (discussed in Section 7.2.1) to produce a range of flight path and aircraft movement based noise descriptors or to produce and manipulate conventional noise contours. The 'Number Above' noise contours are produced using TNIP.

7.3 AUSTRALIAN NOISE EXPOSURE FORECAST

The ANEF is a contour map based on forecast aircraft movements and is the only contour map under the ANEF system which is intended to have status in land-use planning decisions.

The ANEF has been prepared based on the forecast number of movements to 2036-37 as presented in Section 4.2.2. Overall, the 2036-37 forecast has been estimated to reach approximately 50,000 movements per annum.

As it is currently unknown which runway development option will be selected a composite ANEF has been developed, in agreement with Airservices Australia, to represent a worst case scenario. To develop the composite ANEF noise contours for the longer Runway Option 2 were produced and then duplicated for Runway Option 1. Both were then merged together.

The EKRA ANEF contours developed as part of this Master Plan and shown in Drawing B11337A008 included at Appendix B. The EKRA 2036-37 composite ANEF noise contours were endorsed for technical accuracy by Airservices Australia in the manner of endorsement approved by the Minister for Infrastructure, Transport, Regional Development and Local Government on the 20 December 2012.

The ANEF shows the significant contours including the 20, 25 and 30 ANEF. In terms of the ANEF contours that are significant under AS2021-2000:

- The 30 ANEF contour extends beyond the airport boundary in the following places:
  - To the south and south east, largely over land that is proposed to be acquired by this Master Plan for airport use;
  - To the north over agricultural land which is currently uninhabited; and
  - To the northwest, over a small southerly corner of a section of land identified for rural residential development in the Kununurra Strategic Directions (KSD) plan.
- The 25 ANEF contour extends beyond the airport boundary in the following places:
  - To the south and southwest, largely over land that is proposed to be acquired by this Master Plan for airport use;
  - The south easterly tip of the contour extends beyond the main irrigation channel and slightly onto land that is currently occupied by the existing waste water treatment plant and identified for mixed business and future urban development in the KSD plan;
  - The contour also extends beyond the airport boundary to the north of the runway over currently uninhabited land;

  - To the northwest over a small southerly corner of a section of land identified for rural residential development in the Kununurra Strategic Directions (KSD) plan; and
  - To the west, the contour also extends beyond the airport boundary over foreshore reserve land and the Ord River itself.
- The 20 ANEF contour extends beyond the airport boundary in the following places:
  - To the south of the airport over land on the south of the highway, over the existing golf course and further to the east over land which accommodates an existing bore field, and is identified for potential tourism/residential purposes in the KSD plan;
  - To the east, beyond the main irrigation channel and onto land that is currently occupied by the existing waste water treatment plant and identified for mixed business and future urban development in the KSD plan;
  - To the north over currently uninhabited land;
  - To the northwest (but east of the Ord River) over land that is proposed as rural residential development and foreshore reserve in the KSD plan; and
  - To the west over currently uninhabited land on the west side of the river which is also proposed as rural residential development in the Kununurra Future Directions plan.

AS2021-2000 classifies the construction of residential development between 25 and 30 ANEF to be unacceptable, however, the development of hotels, motels and other short-term residential facilities are classified as conditionally acceptable. For construction of new residential developments between 20 and 25 ANEF, AS2021-2000 classifies it as conditionally acceptable, however some people may find that this land is not compatible with residential or educational uses. 'Conditionally Acceptable' means that the relevant aircraft and the required noise reduction should be determined and the aircraft noise attenuation to be expected from the proposed construction should be in accordance with the construction guidelines set out in the document.

Council should incorporate the ANEF contours into their local planning scheme to ensure future development is aligned with airport's forecast development.

7.4 N60 AND N70 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 over flights 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.

'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 recently recommended by Department of Infrastructure, Transport, Regional Development and Local Government (previously the Department of Transport and Regional Services) in a discussion paper entitled *Guidance Material for Selecting and Providing Aircraft Noise Information*.

The Western Australia Environmental Protection Agency recognises this and 'number above' noise contours (N60 and N70 contours) are generally requested by them in relation to any potential rezoning of surrounding land. They have also proven to be a good way to produce a 'whole of airport' picture of single event aircraft noise patterns which is easy for the general public to understand.

N70 and N60 maps for EKRA have therefore been produced based on the 2036/37 forecast traffic, as set out in Section 4.2.2 and both Runway Option 1 and Runway Option 2. N70 noise contour maps for Runway Option 1 and Runway Option 2 are shown in Drawing B11337A009A and Drawing B11337A009B included in Appendix B respectively. N60 noise contour maps for Runway Option 1 and Runway Option 2 are shown in Drawing B11337A010A and Drawing B11337A010B included in Appendix B respectively.

Drawing B11337A009A and Drawing B11337A009B show that areas outside of the airport boundary are expected to experience up to 20 events over 70 Db(A) on an average day (over 24 hours). The majority of this land is currently undeveloped and uninhabited with the exception of an area of the western side of Kununurra town centre which is largely occupied by commercial development. The KSD plan however, proposes a range of land uses for this area including potential residential, medium-density residential, tourism and mixed business. Some consideration should be given to this development in relation to this contour plan.

The single contours on Drawing B11337A010A and Drawing B11337A010B show that the area within each contour, immediately surrounding EKRA, is expected to experience 5 events of 60 Db(A) or greater during an average night (19:00 – 07:00). This area is currently largely undeveloped and unpopulated land, however, the KSD plan proposes a range of land uses including, rural residential and tourism-related which should be given some consideration in relation to this contour.

8.0 NON-AERONAUTICAL DEVELOPMENT CONCEPT

EKRA is a key gateway to the East Kimberley, in terms of business, transportation and tourism. The airport is an essential asset providing key links to Perth, Broome and Darwin and provides aeronautical infrastructure for emergency operators, private aviators and based charter operators that serve a large number of tourists as well as Government departments. The airport has significant areas of land available and has the potential to be an even more important contributor to the economic development, community growth and vitality of the area.

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

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

8.1 KEY BUSINESS ACTIVITIES

During consultation with key stakeholders the following business activities were identified as those that may have the potential to develop at EKRA:

- Aircraft-related businesses including fixed-wing and rotary aircraft maintenance;
- Other businesses with aviation connections including the use of the airport to transport key, high-value components and equipment such as oil and gas equipment servicing;
- Heavy aircraft maintenance/engineering base;
- Private hangar space;
- Air cargo/freight of fresh produce and other commodities;
- Hotel/accommodation on airport for visiting workers such as contractors and consultants;

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

8.2 PROPOSED LAND-USE AND PRECINCTS

Based on the key business activities, a number of development land-use types have been identified. Five development land-use types have been identified, these are:

- Land-use Type 1: Aviation-related commercial development with airside access;

- Land-use Type 2: Aviation-related commercial development without airside access;
- Land-use Type 3: Aircraft Maintenance/Engineering;
- Land-use Type 4: Air Cargo/Freight; and
- Land-use Type 5: Private hangars.

To accommodate the proposed development types, a number of precincts have been identified based on their specific requirements, likelihood, timing, synergies with other activities at the airport and the available land. A total of eleven potential development precincts have been identified within the existing airport boundary. These are:

- Precincts 1A, 1B, 1C and 1D: Aviation-related Commercial Precincts (with airside access);
- Precincts 2A, 2B; 2C and 2D: Aviation-related Commercial Precincts (without airside access);
- Precinct 3: Aircraft Maintenance/Engineering Precinct;
- Precinct 4: Air Cargo/Freight Precinct; and
- Precinct 5: Private Hangar Precinct.

The precincts and proposed land-uses within each are indicated in Drawings B11337A003A /B11337A003B and B11337A004 at Appendix B. With the exception of the runway development all other proposed development is the same in Drawings B11337A003A and B11337A003B

The proposed precincts and land-uses are those that have been identified during the preparation of this Master Plan, through the stakeholder consultation process, considering both the major demand sectors. Demand for particular land uses is the key factor which will determine the extent to which the proposed development may occur.

SWEK should consider carefully how the available land will be made available to developers. Council has the option to lease or sell freehold the individual sites. It should be considered that the lease of sites within the airport boundary is generally favourable on the basis that SWEK maintains long-term control of the land. Several sites held on freehold purchase basis may restrict future plans for the adjacent sites and could reduce the flexibility of the surrounding land. This has occurred, to a certain extent, in the east GA area, where there is no longer scope within this Master Plan to utilise this area for key aeronautical facilities such as the expansion of the RPT apron. Through projects at other regional airports, REHBEIN Airport Consulting has also witnessed regional council's difficulties in developing airports based on past decisions to sell land on a freehold basis.

Whilst the likely desirability to users of a freehold tenure is acknowledged, many of the same benefits in terms of security of tenure and ability to obtain finance can be achieved through a long-leasehold arrangement. SWEK should give careful consideration to the future implications of providing freehold tenure and especially the effective sterilisation of land that may result from a haphazard allocation of freehold sites.

The development of the precincts in an orderly and attractive manner is important in establishing the potential synergies between businesses that locate at the airport and which may in turn attract other businesses to locate there. The building types within each of the precincts should be suitable for the activities that are intended to be undertaken there. For example, the aviation-related commercial precinct with airside access should see the development of suitable aircraft hangars with attached workshops or offices. These structures should be of a suitable quality and standard. SWEK should therefore consider developing a set of guidelines for building and construction on airport land to ensure development undertaken by third parties is of an appropriate standard and quality required by Council.

8.2.1 PRECINCTS 1A TO 1D: AVIATION-RELATED COMMERCIAL PRECINCTS WITH AIRSIDE ACCESS

Precincts 1A to 1D have been identified for the development of aviation-related commercial development and due to their proximity to the airside facilities have been identified as being able to accommodate airside taxiway access to each site within each of the precincts. This key characteristic will drive the type of business or activity which should be developed within these precincts. The development on each of the sites should be specifically aircraft-related and the taxiway access used for airside access by aircraft either accommodated on that site, such as a charter operator or a business with its own aircraft, or by aircraft that require the services provided by the business located on that site, such as aircraft maintenance.

Evidence for the stakeholder consultation suggests that there is potential demand for the expansion of existing charter operations and the attraction of new businesses, such as aircraft maintenance that would be attracted to develop within these precincts. The development of such businesses within these sites will contribute to the attraction of the airport for other similar and supporting businesses.

Precinct 1A

Precinct 1A includes the existing west GA area currently occupied by Sling Heliwork's facilities. The Master Plan proposes that Precinct 1 is developed before any of the other precincts with airside access are developed. Airside access should be provided by taxilanes that accommodate Code B aircraft which will provide access to the taxiway network and Runway 12/30.

The size of the subdivided lots should be based on demand and a range of lot sizes should be considered to increase the attractiveness of the location to a range of business types. The lots should however be of sufficient size to accommodate a hangar/workshop and apron suitable for Code A and some Code B aircraft.

It is anticipated that the subdivision of lots extends west from the existing development as indicated on Drawing B11337A003 at Appendix B. The existing Department of Defence (DoD) lease areas lie within the area that this precinct is proposed to expand into. The DoD lease is due to expire in 2022. It is recommended that the DoD lease is not extended beyond this and the DoD facility

removed to allow expansion of Precinct 1A, subject to actual demand for commercial lots at the time. It is not anticipated that this area will be required until towards the end of Stage 1, which is approximately 2021-22.

Road access to this precinct would be via the existing Cyril Kleinig Drive.

Precinct 1B

Precinct 1B consists of the existing east GA area which currently accommodates Alligator Airways, Shoal Air and the St. John's Ambulance Patient Transfer Facility, among other activities. The majority of the existing lots within this precinct are held on a freehold basis and SWEK does not have any control over the activities that are undertaken here. All available lots have been sold but two remain undeveloped. Stakeholder consultation indicated that the current owners wish to develop the lots for aviation purposes and one of these maybe leased to another charter helicopter operator. There is no land available for any additional lots.

Stakeholder consultation indicated that there is insufficient car parking for the customers of the business in this area during the busiest periods. The area between the southern-most edge of the lots and the highway reserve could be formalised into a car parking area to provide additional capacity. SWEK will need to determine its stance on the provision of parking infrastructure for freehold businesses. Access to this precinct should be via the most easterly connector road between the highway and Dusty Rankin Drive to separate GA-related traffic from passenger terminal traffic.

Precinct 1C

Precinct 1C is located adjacent to existing Taxiway F. It provides a prime location for any aviation-related business requiring airside access. Airside access to this precinct is proposed to be provided by an upgraded Taxiway F which should accommodate Code B aircraft. The lots should be of sufficient size to accommodate a hangar/workshop and apron suitable for Code A and some Code B aircraft.

Road access to this precinct could initially be via Cyril Kleinig Drive and the internal access roads developed as part of Precinct 1A. At a later date, when demand exists, the existing unsealed road that provides access to the speedway and western areas of the airfield, could be upgraded to provide an additional access point to this area.

Precinct 1D

Precinct 1D is located on the north side of the runway. This area should be developed once capacity within Precincts 1A, 1B and 1C has been exhausted due to the significant works required to provide access to this area. This area may not be required within the next 25 years, however the land should be safeguarded for the future. The development of Runway Option 2 will have a slightly different impact on the extents of this precinct due to the accommodation of the relocated VOR/DME.

8.2.2 PRECINCTS 2A TO 2D: AVIATION-RELATED COMMERCIAL PRECINCTS WITHOUT AIRSIDE ACCESS

Precincts 2A to 2D have been identified for the development of aviation-related commercial development without airside access. Due to the location and nature of the land in this area, it is not possible to provide airside access. However, a variety of business types exist that have an aviation connection and will benefit from a location at the airport. These businesses will either support the aeronautical activities at the airport, support the aviation-related businesses that own, operate or deal with aircraft or gain some benefit from the proximity to the air services from the airport that can be used to transport people, equipment or component parts being manufactured or maintained.

Evidence for the stakeholder consultation suggests that there is potential demand for the development of businesses that support the mining industry in the local area and the off-shore oil and gas activities through the maintenance and provision of component parts that are highly time-sensitive and valuable. There is also potential for businesses that supply or support the activities in the aircraft maintenance and air cargo/freight precincts which are discussed later in this section.

Precinct 2A

Precinct 2A includes the existing subdivision to the west of the passenger terminal area. This currently accommodates a range of activities and it is anticipated that the subdivision will continue eastwards encompassing the existing site of the decommissioned Mobil facility once the remaining equipment has been removed. Lot sizes should be developed as demand requires but sufficient area should be provided to accommodate a workshop and associated facilities. It is anticipated that parking will also need to be accommodated within each of the subdivision lots. However, if this is not the case SWEK should consider the provision of a dedicated car park or designated on-road parking within the precincts to ensure access roads are not blocked by parked cars. One of the subdivided lots could be identified for parking. This precinct will be accessed via Cyril Kleinig Drive

Precinct 2B

Precinct 2B is located to the west of Precinct 1A and south of Runway 12/30. Its location south of Precinct 1C and the Air Cargo/Freight and Aircraft Maintenance Precincts means that airside access is not possible. It is anticipated that this precinct would be developed once capacity has been exhausted in Precinct 2A. It is anticipated that the DoD facility currently located within this area will be removed prior to demand for development in this area.

Road access to this precinct could initially be via Cyril Kleinig Drive and the internal access roads developed as part of Precinct 1A. At a later date, when demand exists, the existing unsealed road that provides access to the speedway and western areas of the airfield, could be upgraded to provide an additional access point to this area.

Precinct 2C

Negotiations have already begun to acquire the area of land identified as Precinct 2C from the State of WA. This land has both the advantage of its location at the airport as well as the commercial benefits of the passing traffic. Due to its easy access to the town centre and the airport services, this precinct may provide a suitable location for the development of a hotel or other type of accommodation. Evidence suggests that there is a shortage of accommodation for visiting workers to Kununurra including contractors and consultants. Although this is not specifically aviation-related there are synergies in locating this type of development at the airport, particularly in that a large proportion of those people staying within this accommodation will arrive and depart Kununurra via the airport.

This location would also lend itself to the development of a fuel station due to its proximity to the highway. The number of rental cars picked up and dropped off at the airport is expected to increase with passenger traffic growth resulting in increased demand for such a facility.

Access to this precinct will also be via Cyril Kleinig Drive or directly from the highway depending on the type of development and its access requirements.

Precinct 2D

Precinct 2D is currently outside of the airport boundary within an area of Crown land. Although there is no current indication for the demand for this land it should be safeguarded now for potential aviation or non-aviation related development that could be sited at this location.

8.2.3 PRECINCT 3: AIRCRAFT MAINTENANCE PRECINCT

Precinct 3 has been identified in the location as indicated in Drawing B11337A003A and Drawing B11337A003B at Appendix B to provide efficient and easy access to the runway and other airport facilities for heavy aircraft maintenance activities that may develop at the airport. Stakeholder consultation has indicated that there is potential demand for a heavy aircraft maintenance facility from Skywest. Precinct 3 would provide a dedicated area for this purpose with room for expansion parallel to the runway. Sufficient area exists within the area identified for Precinct 3 in Stage 1 for at least two maintenance hangars (approximately 68 metres by 60 metres each), east of the Department of Defence lease areas, capable of accommodating a A320-200 or Boeing 737-800 aircraft. In Stage 2, if demand existed for additional hangar space, the Department of Defence lease areas would need to be removed or alternatively development can occur on the north western side of the lease areas, identified as Precinct 4: Air Cargo/Freight Precinct. The use of Precinct 3 could be interchangeable with Precinct 4 depending on demand. It is anticipated that the DoD facility currently located within this area will be removed prior to demand for development within this area.

Road access to this precinct would be via Cyril Kleinig Road and the internal access roads developed to access Precinct 1A. If development occurs within Precinct 3 prior to the full

development of Precinct 1A, the appropriate road access will need to be developed through the area identified for Precinct 1A.

8.2.4 PRECINCT 4: AIR FREIGHT PRECINCT

Precinct 4 has also been located to provide efficient and easy access to the runway and other airport facilities for aircraft operating dedicated air freight operations.

The far north west of this precinct can be developed prior to the removal of the Department of Defence lease areas. Depending on demand for each of the activities, the use of Precinct 3 could be interchangeable with Precinct 4 depending on demand.

Road access will also be provided via Cyril Kleinig Road and later by the existing unsealed speedway access road.

8.2.5 PRECINCT 5: PRIVATE HANGAR PRECINCT

Precinct 5 is proposed to provide private hangar accommodation for private aviators wishing to store their aircraft at the airport. This specific location has been identified for this development as it does not have some of the more attractive features that will stimulate demand from commercial activities such as proximity to other airport facilities and highway access. Private aviators do not generally possess these specific demands and Precinct 5 provides efficient airside access to Runway 12/30.

Road access to Precinct 5 will need to be via the existing unsealed road that provides access to the speedway and the western airfield areas. This road would not necessarily need to be sealed in the first instance, just upgraded to ensure access can be maintained during the wet season. Once suitable demand exists the road could be sealed.

8.2.6 DEPARTMENT OF DEFENCE LEASE AREAS

Although unlikely to be required within the next 5 to 10 years, the Department of Defence radar beacon facility will require relocation in the future to accommodate expansion of the aviation-related commercial precinct and aircraft maintenance precinct. The existing DoD lease expires in 2022. It is recommended that the actual demand for commercial development in the area at the time is reviewed and if required the lease should not be extended. There is no known specific requirement for the radar beacon to be located at the airport. As negotiations with the Department of Defence regarding the potential relocation of this equipment in the future may take some time, these discussion should commence on the adoption of this Master Plan,

8.2.7 DEPOT

Airport Depot

It is anticipated that the existing depot facility currently located within the powerhouse should be relocated to its own facility. The old Flight Service Building located to the southeast of the passenger terminal building is proposed to be redeveloped for other purposes including offices.

This building would provide sufficient accommodation for an airport maintenance personnel staff room and Bureau of Meteorology weather recording facilities. A storage area for frequently used depot equipment, such as mowers, could also be located adjacent to the building. This location is located in close proximity to airside and provides convenient airside access. More heavy duty machinery that is less frequently used should be located at an alternative location, possibly co-located with the town depot at another site on the airport.

Town Maintenance Depot

The potential for the relocation of the town depot to the airport site is being considered by SWEK. It is considered that some benefits could be gained through the co-location of the town and airport depots. The nature and size of the land required for the town depot does not lend itself for location on airport land, which could otherwise be developed for aviation-specific purposes. An area of available land does however exist to the far west of the airport site and could accommodate the depot if required, this is indicated on Drawing B11337A003A and Drawing B11337A003B at Appendix B.

SWEK need to investigate and give further consideration to this proposal, to fully understand the potential of this proposal in terms of integrating equipment and personnel.

8.2.8 AIRSERVICES AUSTRALIA SATELLITE GROUND STATION

It is anticipated that the existing Airservices Australia Satellite Ground Station (SGS) equipment will continue to be required and will remain in its current location. Opportunity may exist to condense the lease area to the maximum that is required by Airservices Australia for this equipment and the surrounding area could more usefully be used for car parking.

8.2.9 POWER HOUSE

The relocation of the depot facilities currently located at the Power House to the old Flight Services Building will allow for the existing powerhouse equipment to remain in its current location but for the building to be consolidated and the surrounding structure reduced to only that necessarily required. This will allow for this area to be used for car parking as required in the future.

8.2.10 OLD FLIGHT SERVICES BUILDING

Plans to refurbish and develop the old Flight Services Building for commercial purposes should go ahead. Some of the building should be retained for a staff room for airport maintenance employees and the BoM measurement activities that are currently undertaken in the power house. The offices should be leased as they may be required at a later date to accommodate other airport-related activities administration activities if capacity does not exist within the passenger terminal building.

An area outside the building should also be retained for the construction of a small shed to accommodate the airport depot equipment including that used for mowing. This location provides ease of access to airside via an airside gate in this location.

8.2.11 ENGINEERING SERVICES

Electricity

The electricity supply to the airport will need to have sufficient capacity to support the airfield systems, passenger terminal and non-aeronautical development proposed. Indications show that the existing electricity supply is not sufficient for current activities and therefore will certainly require upgrade within Stage 1. The exact timing of this upgrade will largely be driven by the rate of development within the non-aeronautical precincts. It is suggested that all airport facilities and development located on the airport site is connected to the town electricity supply.

The existing switching gear and generators can be retained within the existing powerhouse following consolidation of this building.

Sewer

The development of the passenger terminal in Stage 2 will require the relocation of the septic system to an alternative location which is suggested to be to the west of the passenger terminal building. The sceptic system will also require upgrade to accommodate the increased capacity of the airport terminal. The potential for the terminal to be connected to the sewer system should also be investigated.

A toilet dump should also be developed for the use of overnight RPT and charter aircraft using the airport. No facilities are currently available for these aircraft during the night.

Suitable septic systems should also be developed for the non-aeronautical development precincts.

8.3 LANDSIDE ACCESS AND CAR PARKING

8.3.1 ACCESS ROADS

The recent redevelopment of the passenger terminal and the previous construction of a new car park has resulted in a confusing access road layout. A detailed review of the existing airport access and car park road markings is required to ensure that landside access is efficient and not confusing to the driver. As the car parking is developed at the airport, the access roads should be upgraded and rearranged accordingly.

The Master Plan proposes that both arms of Laine Jones Drive, which provide the main access points from the Victoria Highway, are maintained to provide dedicated access to the passenger terminal building and the car parks. A one-way system should be maintained with the western most access point used as entrance only and the eastern most access road used as exit only. Access to and from Laine Jones Drive could be consolidated and minimised through the development of a roundabout at the entrance to the airport from the highway. This should be subject to a more specific traffic study to be undertaken by SWEK.

The existing road that connects both arms of Laine Jones Drive, that lies between the northernmost car parking area and the southernmost car parking area, should be used to provide access to

either side of Laine Jones Drive, within the one-way system, to allow access to the secure long-stay car park and an exit route for vehicles parked to the south west of the passenger terminal. This limits the need for vehicles to use the passenger terminal forecourt area.

To further reduce crossover of traffic at the passenger terminal forecourt, all non-passenger terminal traffic should use alternative accesses. All traffic accessing the east GA area should do so via Dusty Rankin Drive and access this using the most easterly access point from the highway, near the fuel facilities. All traffic accessing the west GA area should do so via Cyril Kleinig Drive to the west of main access roads. Each of the access points should be effectively signposted from the highway and the appropriate line markings implemented.

It is proposed that Cyril Kleinig Drive will provide the main access to the proposed aviation-related precinct to the west of the existing west GA apron. As development expands within this western area and the development of the precincts expand west, including the development of the private hangar precinct, it is proposed that the existing unsealed road that provides access to the speedway as well as the west of the airfield should be upgraded to provide access to these areas.

Access to the relocated VOR/DME (if Runway Option 2 is selected), NDB, weather station and aviation-related development on the north side of the runway is proposed to be via an upgrade to the existing unsealed road that runs along the alignment of the drainage channel to the northeast of the airport site. This is located on private property and negotiations will need to be started to understand the possibility for the development of this access road prior to beginning the process of relocating any of the facilities. The road will initially only be of sufficient quality to provide airport personnel access to the VOR/DME, NDB and weather station. When development commences within Precinct 1D, the road will need to be upgraded to provide suitable access to the commercial activities located in this area.

8.3.2 PASSENGER TERMINAL FORECOURT

The Master Plan proposes that a dedicated area for passenger pick-up and set-down is developed on the passenger terminal building forecourt. The existing one-way road that runs parallel to the passenger terminal building currently serves this purpose and can continue to do so however the arrangement should be formalised with dedicated areas marked for buses, taxis and general vehicles. This pick-up/set-down lane should be further expanded as the terminal building expands to the west.

8.3.3 CAR PARKING

Car park development is proposed to be accommodated in the area to the south of the passenger terminal building with expansion to the east and west.

Rental cars

Demand for rental cars is expected to increase as passenger numbers increase. It is proposed that during Stage 1 the car parking area closest to the passenger terminal building will continue to

accommodate some rental car parking for pick-up and drop-off. It is recommended that approximately 30 spaces be dedicated to rental vehicle parking, approximately half of the spaces currently available within this car parking area. If additional parking is required for rental vehicles, it is recommended that these vehicles be parked within the non-secure, long-stay car park which is described later in this section, and be subject to the parking fees charged within this car park.

In Stage 2, additional rental parking is likely to be required, additional spaces can be dedicated to rental cars within the car parking area closest to the terminal. However, if SWEK wishes to maintain some of this area as short-stay parking then additional rental vehicle parking can be provided in the unsecure long-term car park (explained in more detail later in this section). There is more than adequate space within this area to accommodate both passenger and rental car parking. It is estimated that in addition to the 30 spaces adjacent to the passenger terminal, another 50-100 rental car spaced may be required in this area. SWEK should clearly define their stance on the long-term accommodation of rental vehicles at the airport. However, long-term storage of rental vehicles at the airport should not be encouraged and rental vehicles companies should lease alternative areas within the commercial precincts or outside of the airport boundary for this purpose.

Short and Long-Stay Parking

As well as the development of the physical infrastructure for parking SWEK need to develop a parking strategy for the airport. The strategy should include the parking products that they wish to offer at the airport along with an effective pricing strategy to ensure that the parking is used as it is intended. The Master Plan proposes that restricted short-stay, secure long-stay, non-secure long-stay parking, rental car and staff parking all be accommodated within defined areas at the airport. The following paragraphs discuss the physical requirements of this parking, however the operational strategy for these developments should be considered carefully prior to implementation.

Based on the high-growth scenario forecast passenger numbers it is anticipated that up to a total of 250 short and long-stay car parking spaces (excluding rental and staff) may be required by 2021-22 and up to approximately 450 spaces (excluding rental and staff) by 2036-37. The development of dedicated long-stay parking will release some capacity in the existing car park for short-stay parking. Until SWEK develops its parking strategy and the parking developments are in place it is difficult to provide the exact timing for the development of additional parking capacity. This should be reviewed once the parking strategy has been set.

Short-Stay Parking

To accommodate parking over the next 10 years, the area between the passenger terminal and the highway should be allocated as short-stay parking, with the exception of the dedicated rental vehicle spaces. Additional, short-stay parking can later be developed within the existing highway reserve, subject to the development of the town bypass and the degrading of the highway. If additional short-stay parking is required prior to the development of the bypass, short-stay car

parking can be accommodated to the southwest of the passenger terminal building on the area adjacent to the existing power house (following consolidation of this facility). In total, this will provide approximately 150 short-stay car parking spaces. Additional short-stay car parking demand beyond 2021-22 to 2036-37 can also be provided in the area surrounding the power house and the Airservices Australia SGS (following consolidation of the current lease area). These areas together with the area developed in Stage 1 can provide more than sufficient parking spaces to meet short-stay parking demand over the next 25 years. It is proposed that all short-stay parking is to have a time-limit of approximately 2 hours, and this should be enforced to ensure the effectiveness of this parking measure.

Long-Stay Parking

Based on current usage of the existing car parks, there appears to be an existing demand for long-term car parking also. Activities at other airports and stakeholder consultation also indicate that there is a demand for a secure long-stay car park. It is proposed that parking within this area should be offered at a fee. The Master Plan proposes that the secure car park be located to the south east of the passenger terminal building on the existing grassed area and the existing aerodrome manager's house, which is proposed to be removed. This car park will be fenced, with an automatic boom gate, CCTV and lighting. The fee will be charged through a ticketing system. For regular users an annual parking pass system could be established. It is proposed that approximately 25 to 50 secure, long-stay parking spaces be developed initially with potential to expand the car park at this location to accommodate up to approximately 90 spaces. This is likely to provide adequate capacity during Stage 1 and possibly into Stage 2. If additional capacity is required, an additional secure, long-stay car park could be developed to the southwest of the passenger terminal, south of the existing power house.

An unsecure, long-stay parking facility should also be provided for those passengers that do not desire a secure parking arrangement. A fee could also be charged for this area of parking if this fits with SWEK's parking strategy. The fee charged should be relative to that charged for the secure, long-stay car park to ensure the two parking products are differentiated. It is proposed that this fee be charged through the use of a ticket machine and checks undertaken to enforce this. For regular users an annual parking pass system could be established. The Master Plan proposes that this non-secure long-stay car park is located to the south west of the passenger terminal building between Laine Jones Drive and the power house. It is anticipated that 25 - 50 spaces could be developed immediately with expansion up to 100 spaces in the next 10 years. During Stage 2 this facility can be expanded to the west as required. If additional short-stay parking is required prior to the development of the bypass and the ability to construct additional short-stay parking in the highway reserve, some of this unsecure, long-stay parking could be relocated further west to accommodate short-stay parking at this location due to its close proximity to the passenger terminal.

Staff Car Parking

The area located between the old Flight Services Building and the airport manager's house would provide a convenient airport staff car park and parking for the new activities to be undertaken within the old Flight Services Building. As the airport grows and staff numbers increase, a new staff car park will need to be developed southwest of the passenger terminal.

8.4 STAGED DEVELOPMENT PLAN

The optimum staging of the non-aeronautical development is in part linked to the proposed aeronautical development concept staging plan described in Section 5.8.

8.4.1 STAGE 1 (2021-22)

Stage 1 should include the development of infrastructure to accommodate opportunities which are considered likely and which also represent low to moderate development costs.

Stage 1 non-aeronautical development should therefore be concentrated to the east of the passenger terminal building continuing east from the existing development (east of Lots 321, 315, 314 and 313) within Precincts 1A and 2A. Anecdotal evidence suggests that there is demand for expansion of existing facilities of some of the base charter operators and other businesses as well as other commercial demand which could locate in this area.

Stage 1 may also include the development of the Precinct 3, the Aircraft Maintenance Precinct, depending on demand. Anecdotal evidence also suggests that there may also be some demand for development within Precinct 5, the Private Hangar Precinct, within Stage 1.

Stage 1 should also include a car parking review with the development of an airport parking strategy. Based on this the relevant car parks should be developed and access roads upgraded and rearranged accordingly.

Section 10.0 of this report provides details surrounding the recommended implementation plan and next steps for some of the proposed Stage 1 developments.

8.4.2 STAGE 2 (2036-37)

Stage 2 should see the development of infrastructure to accommodate opportunities that are considered less certain than those included in Stage 1 and which have a moderate to high cost.

Stage 2 of the non-aeronautical development will include expansion of aviation-related commercial development with airside access within Precinct 1A, if capacity remains, or into Precinct 1C. Due to the likely considerable infrastructure developmental costs required to provide access to the north of the runway, Precinct 1D should only be developed when capacity on the south of the runway has been exhausted and demand exists, this may be beyond 2036/37.

Stage 2 will also include expansion of aviation-related commercial development without airside access within Precinct 2A, if capacity remains, or into Precinct 2B and 2C. Precinct 2D should only

be developed when capacity on the south of the runway has been exhausted and demand exists, this may be beyond 2036/37.

Precinct 3, the Aircraft Maintenance Precinct and Precinct 5, the Private Hangar Precinct should be expanded as required. Precinct 4, the Air Cargo/Freight Precinct, should also be developed as and when demand exists.

Table 8 provides a summary of the non-aeronautical development proposals within each stage together with anticipated trigger points.

Table 8: Non-Aeronautical Development Staging

Proposed Development	Anticipated Trigger
STAGE 1 (2021-22)	
Precincts 1A– Aviation-related Commercial with airside access	Immediate
Precinct 2A – Aviation-related Commercial without airside access	Immediate
Precinct 3 – Aircraft Maintenance	Demonstrated demand from interested parties
Long-stay parking (secure and non-secure)	Immediate*
Short-stay Parking Expansion	Parking strategy development and capacity issues within existing short-stay parking*
Existing Access Roads Review/Upgrade	Immediate
Precinct 5 - Private Hangar Precinct	On demand
STAGE 2 (2036-37)	
Precincts 1C– Aviation-related Commercial with airside access	Maximum capacity within Precinct 1A
Precinct 2B – Aviation-related Commercial without airside access	Maximum capacity within Precinct 2A
Precinct 3 expansion – Aircraft Maintenance	Demonstrated demand from interested parties
Precinct 4 – Air Freight & High Service Business	Demonstrated demand from interested parties
Precinct 5 expansion – Private Hangars	Demonstrated demand from interested parties
Car Park Development	On demand

*Car parking demand is a product of a number variable including the parking products offered, pricing strategies and the unique context of the airport and its passengers. Therefore, it is difficult to highlight precise trigger points for development. SWEK should develop an airport parking strategy which includes parking products and pricing. This will help to define trigger points for future development of parking at the airport.

9.0 FINANCIAL PLAN

Indicative order of magnitude costs have been developed for all capital works proposed by this Master Plan in Stage 1 and Stage 2.

9.1 INDICATIVE DEVELOPMENT COSTS

The costs have been developed based on REHBEIN Airport Consulting's experience from similar projects at other regional airports as well as unit rates provided in Rawlinson's Australian Construction Handbook 2011. All costs have been adjusted for inflation as appropriate, as well as the impact of the remote regional location with a 1.55 multiplier on Perth rates.

9.1.1 COST ESTIMATES

The indicative costs for each stage of development are presented in Table 9. Costs associated with either Runway Option 1 or 2 have been indicated as such, all other costs apply to both runway options.

Table 9: Indicative Development Cost Estimates

Proposed Development STAGE 1	Indicative Cost ($ million)
Runway Option 1: Extend (to 2,350m), widen (to 45m) and strengthen existing runway (including PAPI and lighting)	17.0
Runway Option 2: New runway (2,500m long by 45m wide) (including PAPI and lighting)	26.3
Pavement strengthening for RPT apron and Taxiway A to A320-2/B737-8 capability	2.9
RPT apron expansion of 2,800m2	0.6
West GA apron expansion of 23,500m2	3.6
Private jet apron (2,650m2)	0.4
Upgrade of existing Taxiways F & G to code C and Taxiway F extension between Taxiway A and B	5.2
Taxiway J (Code B)	0.5
Runway Option 1: Taxiway B strengthening	0.5
Runway Option 2: Taxiway extensions & strengthening	1.3
Passenger terminal upgrade/reconfiguration	1.5
Short-stay parking expansion (approx. 80 spaces)	0.4
Secure long-stay parking (approx. 100 spaces)	0.7
West access road upgrade	0.4
Precinct 1A - Aviation-related commercial with airside access	6.2

Proposed Development	
Precinct 2A - Aviation-related commercial without airside access including access roads and services	1.4
Precinct 3 - Aircraft maintenance including access roads and services	0.4
Precinct 5 - Private hangars including access road and services	2.0
STAGE 2	Indicative Cost ($ million)
RPT apron expansion of 7,000m2	1.4
West GA apron expansion of 57,500m2	8.9
Private jet apron expansion of 5,500m2	1.1
Runway Option 1: Taxiway F extension to Runway 12 end	1.8
Runway Option 2: Taxiway F extension to Runway 12 end	2.1
Terminal expansion (2,150m2)	6.5
Short-stay parking expansion (100 spaces)	0.5
Secure long-stay parking expansion (100 spaces)	0.6
Precinct 1B - Aviation-related commercial with airside access	0.7
Precinct 2B - Aviation-related commercial without airside access including access roads and services	0.4
Precinct 3 expansion- Aircraft maintenance including access roads and services	0.4
Precinct 4 - Cargo	0.4
Precinct 5 expansion - Private hangars	0.6

9.1.2 ASSUMPTIONS AND EXCLUSIONS

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

- No detailed survey information is available;
- Land acquisition costs have not been included within these cost estimations;
- Development costs for the site identified for the town depot have not been included;
- Costs included for the development of the commercial precincts do not include ground improvements, it is anticipated that this will be carried out by the lessee/owners. Costs for services and access to the subdivided sites have been considered only. However, SWEK may want to consider undertaking the ground work depending on the commercial model being followed;

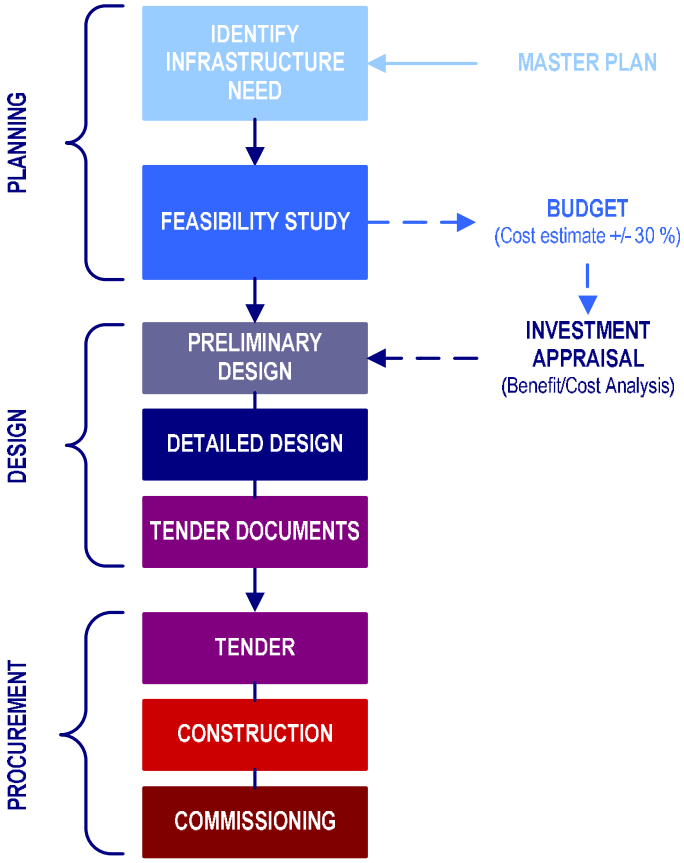
- It has been assumed that the lessees/owners of subdivided sites within the precincts will provide their own septic tank;
- Services for the new subdivided sites will be connected to the existing services near to the passenger terminal area;
- Relocation costs of the Department of Defence radar beacon has not been included;
- GST has not been included; and
- No allowance for design and management costs or construction contingency has been made.

10.0 IMPLEMENTATION PLAN

In order to commence the implementation of this Master Plan it is important to understand the process which will need to be completed. Figure 8 sets out conceptually the infrastructure development process that each development proposed in Section 5.0 and Section 8.0 will need to go through to support the potential future growth of EKRA.

This section discusses the process in more detail in relation to Stage 1 and particularly the developments that are considered to be most pertinent to the development of EKRA. These developments should be first to continue through the infrastructure development process.

Figure 8: Infrastructure Development Process



10.1 FEASIBILITY

Based on the aeronautical and non-aeronautical infrastructure development proposals set out by this Master Plan for Stage 1 (to 2021-22), Table 10 highlights the infrastructure developments that are considered to be most pertinent and should immediately continue through the infrastructure development process and more detailed planning/feasibility studies undertaken.

Table 10: EKRA 2012/13 Feasibility Studies

Infrastructure Development	Feasibility Study Elements
Runway development to Code 4 capability	Existing runway pavements study followed by a detailed planning study for the selected runway option
Taxiway F Extension	Taxiway F extension planning study
West GA Area Development	West GA expansion and reorganisation to accommodate relocated GA visitor parking, private jet apron and to include the initial stages of development of Precinct 1A and 2A
Car Parking and Access Roads Upgrade	Airport car parking strategy followed by more detailed estimations of car park space requirements. Access roads should be upgraded in line with the car parking developments with investigation into the requirement for a roundabout at the airport entrance.

An initial stage of planning is required, part of which is formed by this Master Plan which has highlighted the need for these specific infrastructure developments. This now needs to be followed by a feasibility study for each infrastructure development, to include more detailed planning required prior to design and achieve more accurate cost estimates for investment appraisal purposes. The following sections and Table 10 outline the feasibility studies identified to be undertaken following endorsement of the Master Plan. It is anticipated that this 'Feasibility' stage will take approximately one year to complete based on the number of studies, their inter-relation and complexity.

10.1.1 RUNWAY DEVELOPMENT

Two runway development options have been included within this Master Plan to ensure that operations at EKRA are not significantly impacted by runway development works in the future. The next stage of planning should include further detailed engineering assessment of the existing runway pavement to understand whether the development of Runway Option 1 is feasible without significantly impacting operations. The additional benefits of Runway Option 2, the development of a new runway, in terms of the additional runway length that can be achieved also needs to be considered carefully against the estimated additional cost.

It should be noted that for either runway options, the full runway length recommended to accommodate 150-160 seat jet aircraft does not necessarily need to be constructed immediately. For example, if the development of the existing runway is selected, the poor condition of the existing runway pavement may necessitate the upgrade of the existing pavement immediately. This can be done without the extension without the extension which can be developed at a later date when demand requires it or funding allows it. Alternatively, for the development of a new runway may only be constructed to replace the existing runway, at a similar length, due to the poor pavement condition. Extensions can be undertaken at a later date when demand requires or when funding allows.

10.1.2 TAXIWAY F EXTENSION AND UPGRADE

Once a runway option has been selected for future feasibility/planning studies, planning can commence of the extension and upgrade of Taxiway F.

10.1.3 WEST GA AREA DEVELOPMENT

To accommodate the relocation of the visitor GA parking the west GA apron will require extension and reorganisation of the existing parking and taxiways to ensure best use is being made of the available space. At the same time the west GA area should be reviewed as a whole and planning undertaken for the private jet apron and the initial stages of development of Precincts 1A and 2A to ensure that any developments, such as taxiway location, are in line with future proposals for this entire area.

10.1.4 CAR PARKING AND ACCESS ROADS

An airport parking strategy should be developed and followed by a planning study for the airport car parking and access road arrangements. This project is relatively unrelated to any of the other planning studies proposed. This study should explore and plan in detail the requirements for long-term, secure and unsecure parking as well as short-term parking arrangements, including those for hire vehicles, and access roads.

10.1.5 OTHERS

The remaining infrastructure elements identified for development within Stage 1, highlighted in Sections 5.0 and 8.0, can continue with the planning phase in later years, as funding allows or as operations require. The trigger points can be used as guidance for development of these elements.

10.2 DESIGN

Once the planning phase has been completed, the most critical of the infrastructure elements can be identified to move into the next stage of the infrastructure development process. Depending on funding available, all or some of the infrastructure developments included in Table 10 can commence the design process. This will begin with a preliminary design, followed by a detailed design and finalised through the development of the tender documentation to allow the projects to be put out to tender. It is anticipated that this stage will take one to two years to complete and is likely to commence in 2013-14 at the earliest for the most pertinent infrastructure development projects.

10.3 PROCUREMENT

Procurement includes tendering the project and awarding the contract for construction to the winning bidder. The infrastructure is then constructed and commissioned. It is likely that the earliest this stage could commence for any of those infrastructure developments included in Table 10 is 2014-15. The length of this stage will depend on the size and complexity of the project.

10.4 MASTER PLAN REVIEW

It should be noted that this Master Plan sets out the anticipated infrastructure required over the next 10 to 25 years based on current activities and knowledge. As the commercial and capacity context of the airport is constantly changing, this Master Plan should be reviewed at regular intervals. Master Plans are generally reviewed every 5 years or following any major change in key drivers for airport growth.

APPENDIX A

STAKEHOLDER CONSULTATION SCHEDULE

REHBEIN Airport Consulting

Organisation	Name	Title	Date	Location
Shire of Wyndham East Kimberley	Gary Gaffney	Chief Executive Officer	19 January 2012/21 February 2012	Kununurra
	Cr John Moulden	Shire President	19 January 2012/21 February 2012	Kununurra
	Kevin Hanmagan	Director Infrastructure	19 January 2012	Kununurra
	Nick Kearns	Director Development Services	19 January 2012/21 February 2012	Kununurra
	Jo-Anne Ellis	Director Corporate Services	21 February 2012	Kununurra
	Katya Tripp	Strategic Planner	19 January 2012/21 February 2012	Kununurra
	Jennifer Ninyette	Senior Planning Officer	19 January 2012	Kununurra
	Rick Spry	Airport Manager	21 February 2012	Kununurra
	Brian Sargeant	Airport Operations Officer	19 January 2012/21 February 2012	Kununurra
	Janet Takarangi	Economic Development Officer	19 January 2012/22 February 2012	Kununurra
	Peter Kerp	Manager Engineering Services	19 January 2012	Kununurra
Kununurra Chamber of Commerce	Brad Williams	President/ Kimberley First National Real Estate Owner	19 January 2012	Remote
Kununurra Visitors Centre	Nadia Donnelly	General Manager	31 January 2012	Remote
Department of Regional Development and Lands	Peter Stubbs	Director, Ord East Kimberley Expansion, Dept. of Regional Development and Lands	12 January 2012	Remote
Airnorth	David Ranger	Commercial Manager	6 February 2012	Remote
Skywest Airlines	Alan Stuart	Executive General Manager, Commercial	27 January 2012	Remote
Shoal Air	Steve Irvine	Managing Director	19 January 2012	Kununurra
Alligator Airways	Rob Kendrick	Managing Director	19 January 2012	Kununurra
Slingair Heliwork WA	Paul Cripps	Operations Coordinator	20 January 2012	Kununurra
	Brett Hill	Chief Pilot	20 January 2012	Kununurra
	Sonja Mitchell	Acting General Manager Slingair	14 February 2012	Remote
Avis	Leigh-Anne Adams	Branch Manager	20 January 2012	Kununurra

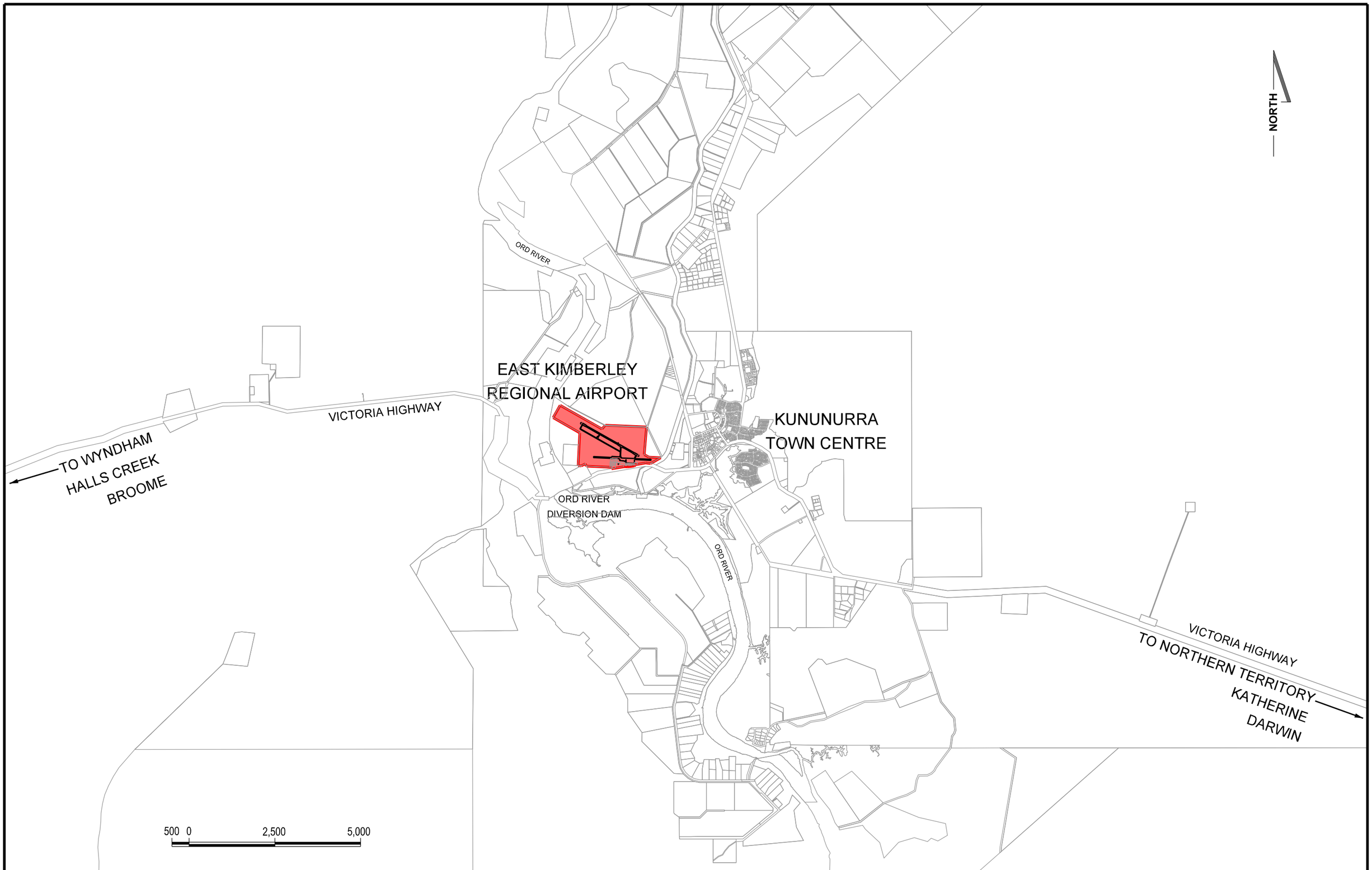
REHBEIN Airport Consulting

Organisation	Name	Title	Date	Location
Budget	Sue Stubbs	Branch Manager	20 January 2012	Kununurra
Thrifty	Nina Mehlmer & Brett Fargher	Branch Managers	20 January 2012	Kununurra
Kimberley Metals Limited, Sorby Hills Project	Ed Newman	Project Manager	31 January 2012	Remote
Kimberley Metals Group, Ridges Iron Ore Project	David Gallagher	Chief Financial Officer	21 February 2012	Remote
Northern Airport Services	Frank Rodriguez	Managing Director	30 January 2012	Remote
Shell	Peter Devenish	Site Manager	08 February 2012	Remote
Air BP	Gordon Tomkin	Site Manager	08 February 2012	Remote
Lone Eagle Aviation Services	Lance Conley	Owner/Manager	08 February 2012	Remote
Lockheed Martin (Department of Defence)	Paul Semple	Site Management Contractor	01 February 2012	Remote
State of WA	Cody Rampant	Acting Project Officer	31 January 2012	Remote
Airservices Australia	Richard Holding	Site Manager	01 February 2012	Remote
Melon Farm NT Pty Ltd (Thrifty Car Hire)	Rick Paul	Manager	08 February 2012	Remote

REHBEIN Airport Consulting

APPENDIX B

DRAWINGS



No.	Date	By	Amendment	Checked
2	30/08/12	JSS	FINAL	BJH
1	31/05/12	JSS	DRAFT	BJH
0	08/05/12	JSS	DRAFT	BJH

REHBEIN Airport Consulting
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Project: EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Title: LOCALITY PLAN

Client: *SHIRE OF WYNDHAM EAST KIMBERLEY*

Draftsperson: JSS	Checked:	Sheet Size: A3	Drawing No.: B11337A001
Designer: JSS	Approved: BJH		
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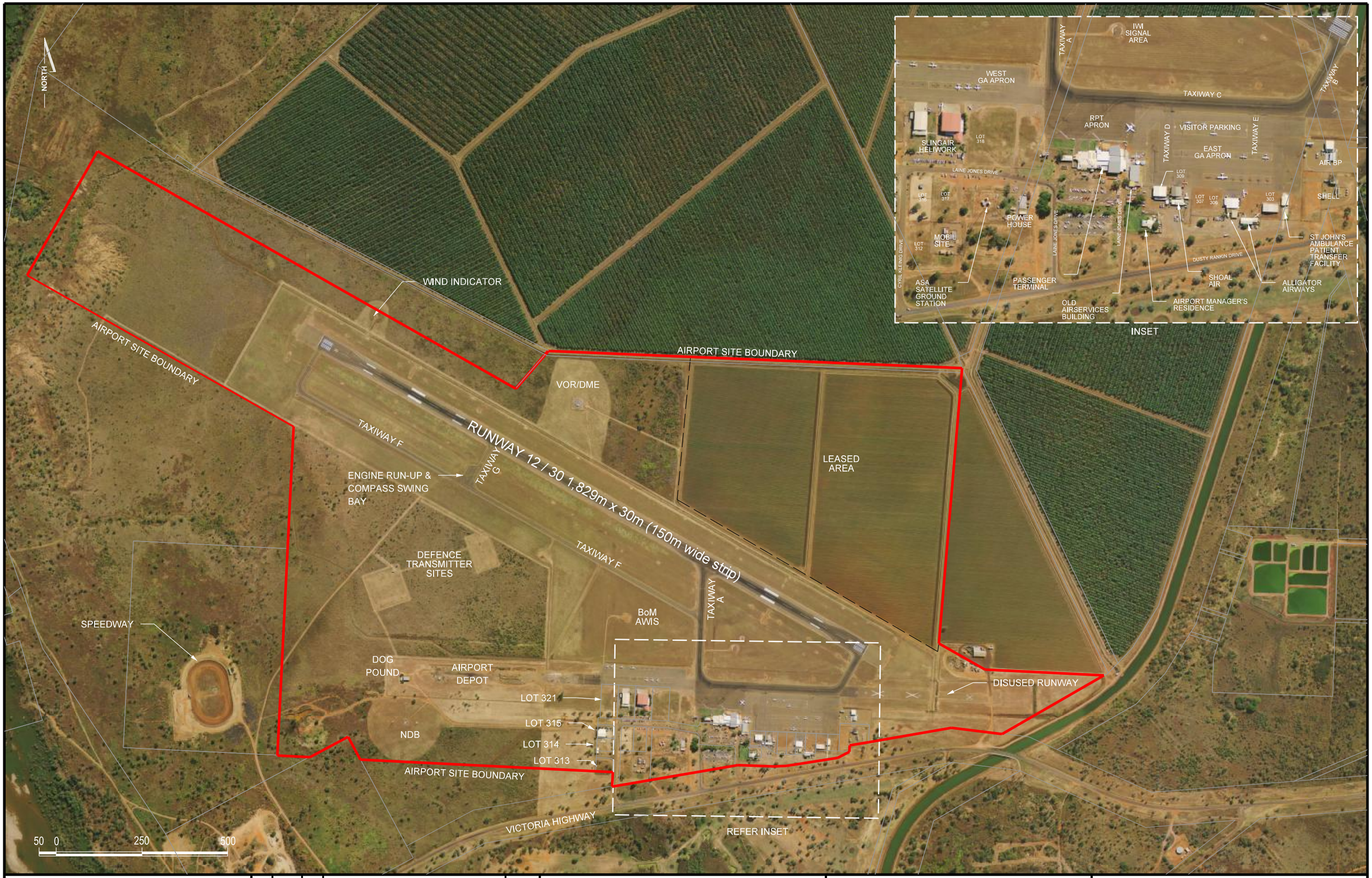

No.	Date	By	Amendment	Checked
2	30/08/12	JSS	FINAL	BJH
1	31/05/12	JSS	DRAFT	BJH
0	11/04/12	JSS	DRAFT	BJH

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Project: EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Title: EXISTING FACILITIES

Client: *SHIRE OF WYNDHAM EAST KIMBERLEY*

Draftsperson: JSS	Checked: BJH	Sheet Size: A3	Drawing No.: B11337A002
Designer: JSS	Approved: BJH		
Scale: 1:5000	Date: 30/08/12	0	1 2

RELOCATED WIND INIDCATOR

CROWN LAND TO BE ACQUIRED

RUNWAY OPTION 1:
RUNWAY WIDENING TO 45m

VOR/DME REMAINS AT EXISTING SITE

520m RUNWAY EXTENSION

TAXIWAY H

PROPOSED TAXIWAY F UPGRADE TO CODE C

RUNWAY 12/30 2,350m x 45m (300m wide strip)

TAXIWAY G

RELOCATED WIND INDICATOR

PROPOSED TAXIWAY F EXTENSTION

PROPOSED WEST ROAD ACCESS

REMOVAL OF DEPARTMENT OF DEFENCE TRANSMITTERS

WEST GA APRON FURTHER EXPANSION

TAXIWAY F

TAXIWAY C

BoM AWIS

TAXIWAY A

TAXIWAY F

TAXIWAY B

REMOVAL OF EXISTING STRUCTURE REQUIRED (PRIVATE LAND TO BE ACQUIRED)

PRECINCT 1A

NDB

WEST FUEL FACILITY

VICTORIA HIGHWAY

WEST GA APRON EXPANSION TO ACCOMODATE VISITOR GA PARKING

PROPOSED PRIVATE JET APRON

PROPOSED RPT APRON EXPANSION

PRECINCT 1B

NORTH

45m 0m 225m 450m

LEGEND

- PROPOSED RUNWAY OPTION 1 DEVELOPMENT
- PROPOSED NEW APRON AND TAXIWAYS
- PRECINCT 1: AVIATION-RELATED COMMERCIAL PRECINCT WITH AIRSIDE ACCESS
- PRECINCT 2: AVIATION-RELATED COMMERCIAL WITHOUT AIRSIDE ACCESS
- PRECINCT 3: AIRCRAFT MAINTENANCE
- PRECINCT 5: PRIVATE HANAGARS
- SHORT-STAY CAR PARKING
- LONG-STAY CAR PARKING
- DEPOT
- ACCESS ROADS
- RUNWAY & TAXIWAY STRIPS
- PROPOSED LAND ACQUISITION
- OLS PROTECTION

No.	Date	By	Amendment	Checked
1	30/08/12	JSS	FINAL	BJH
0	20/07/12	JSS	DRAFT	BJH

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Project: EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Title: PROPOSED DEVELOPMENT CONCEPT STAGE 1 - RUNWAY OPTION 1 2012 - 2022

Client: SHIRE OF WYNDHAM EAST KIMBERLEY

Draftsperson: JSS	Checked: BJH	Sheet Size: A3	Drawing No.: B11337A003A
Designer: JSS	Approved: BJH		
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RELOCATED WIND INDICATOR

CROWN LAND TO BE ACQUIRED

PRIVATE LAND TO BE ACQUIRED

NORTH

RELOCATED VOR/DME (150m CLEARANCE)

ACCESS TO RELOCATED VOR/DME VIA EXISTING UNSEALED ROAD

TAXIWAY H

RUNWAY 12 / 30 2,500m x 45m (300m wide strip)

PROPOSED TAXIWAY F UPGRADE TO CODE C

EXISTING RUNWAY TO BE DECOMMISSIONED

TAXIWAY G

PROPOSED TAXIWAY F EXTENSTION

RELOCATED WIND INDICATOR

REMOVAL OF EXISTING STRUCTURE REQUIRED (PRIVATE LAND TO BE ACQUIRED)

PROPOSED WEST ROAD ACCESS

REMOVAL OF DEPARTMENT OF DEFENCE TRANSMITTERS

WEST GA APRON FURTHER EXPANSION

TAXIWAY F

TAXIWAY D

BoM AWIS

TAXIWAY A

TAXIWAY F

TAXIWAY B

PRECINCT 1A

NDB

VICTORIA HIGHWAY

WEST FUEL FACILITY

WEST GA APRON EXPANSION TO ACCOMODATE VISITOR GA PARKING

PROPOSED PRIVATE JET APRON

PROPOSED RPT APRON EXPANSION

PRECINCT 1B

45m 0m 225m 450m

LEGEND

- PROPOSED RUNWAY OPTION 2 DEVELOPMENT
- PROPOSED NEW APRON AND TAXIWAYS
- PRECINCT 1: AVIATION-RELATED COMMERCIAL PRECINCT WITH AIRSIDE ACCESS
- PRECINCT 2: AVIATION-RELATED COMMERCIAL WITHOUT AIRSIDE ACCESS
- PRECINCT 3: AIRCRAFT MAINTENANCE
- PRECINCT 5: PRIVATE HANAGARS
- SHORT-STAY CAR PARKING
- LONG-STAY CAR PARKING
- DEPOT
- ACCESS ROADS
- RUNWAY & TAXIWAY STRIPS
- PROPOSED LAND ACQUISITION
- OLS PROTECTION

No.	Date	By	Amendment	Checked
1	30/08/12	JSS	FINAL	BJH
0	20/07/12	JSS	DRAFT	BJH

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Project: EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Title: PROPOSED DEVELOPMENT CONCEPT STAGE 1 - RUNWAY OPTION 2 2012 - 2022

Client: SHIRE OF WYNDHAM EAST KIMBERLEY

Draftsperson: JSS	Checked: BJH	Sheet Size: A3	Drawing No.: B11337A003B
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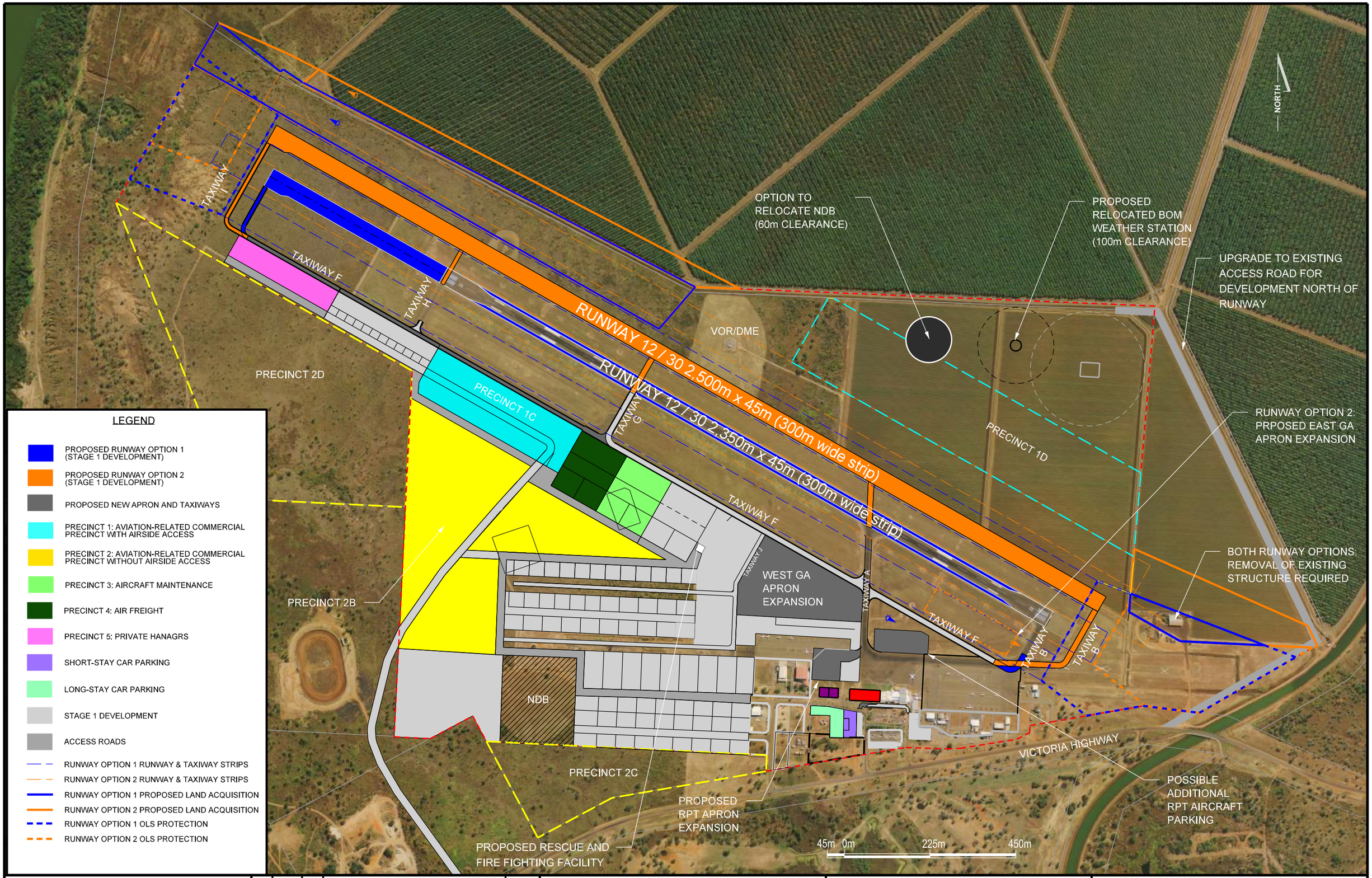

LEGEND

- PROPOSED RUNWAY OPTION 1 (STAGE 1 DEVELOPMENT)
- PROPOSED RUNWAY OPTION 2 (STAGE 1 DEVELOPMENT)
- PROPOSED NEW APRON AND TAXIWAYS
- PRECINCT 1: AVIATION-RELATED COMMERCIAL PRECINCT WITH AIRSIDE ACCESS
- PRECINCT 2: AVIATION-RELATED COMMERCIAL PRECINCT WITHOUT AIRSIDE ACCESS
- PRECINCT 3: AIRCRAFT MAINTENANCE
- PRECINCT 4: AIR FREIGHT
- PRECINCT 5: PRIVATE HANAGRS
- SHORT-STAY CAR PARKING
- LONG-STAY CAR PARKING
- STAGE 1 DEVELOPMENT
- ACCESS ROADS
- RUNWAY OPTION 1 RUNWAY & TAXIWAY STRIPS
- RUNWAY OPTION 2 RUNWAY & TAXIWAY STRIPS
- RUNWAY OPTION 1 PROPOSED LAND ACQUISITION
- RUNWAY OPTION 2 PROPOSED LAND ACQUISITION
- RUNWAY OPTION 1 OLS PROTECTION
- RUNWAY OPTION 2 OLS PROTECTION

No.	Date	By	Amendment	Checked
4	30/08/12	JSS	FINAL	BJH
3	20/07/12	JSS	FINAL DRAFT	BJH
2	31/05/12	JSS	FINAL DRAFT	BJH
1	29/05/12	JSS	FINAL DRAFT	BJH
0	08/05/12	JSS	DRAFT	BJH

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Project: EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Title: PROPOSED DEVELOPMENT CONCEPT STAGE 2 2022 - 2037

Client: SHIRE OF WYNDHAM EAST KIMBERLEY

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No.	Date	By	Amendment	Checked
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0	08/05/12	JSS	DRAFT	BJH

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Project: EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Title: PASSENGER TERMINAL AREA CONCEPT

Client: ***SHIRE OF WYNDHAM EAST KIMBERLEY***

Draftsperson: JSS	Checked: BJH
Designer: JSS	Approved: BJH
Scale: SCALE	Date: 30/08/12

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0	08.05.12	CMF	DRAFT ISSUE	TAB

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Project: EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Title: EXISTING OBSTACLE LIMITATION SURFACE

Client: *SHIRE OF WYNDHAM EAST KIMBERLEY*

Draftsperson: CMF	Checked: TAB	Sheet Size: A1	Drawing No.: B11337-A-006
Designer: CMF	Approved: BJH		
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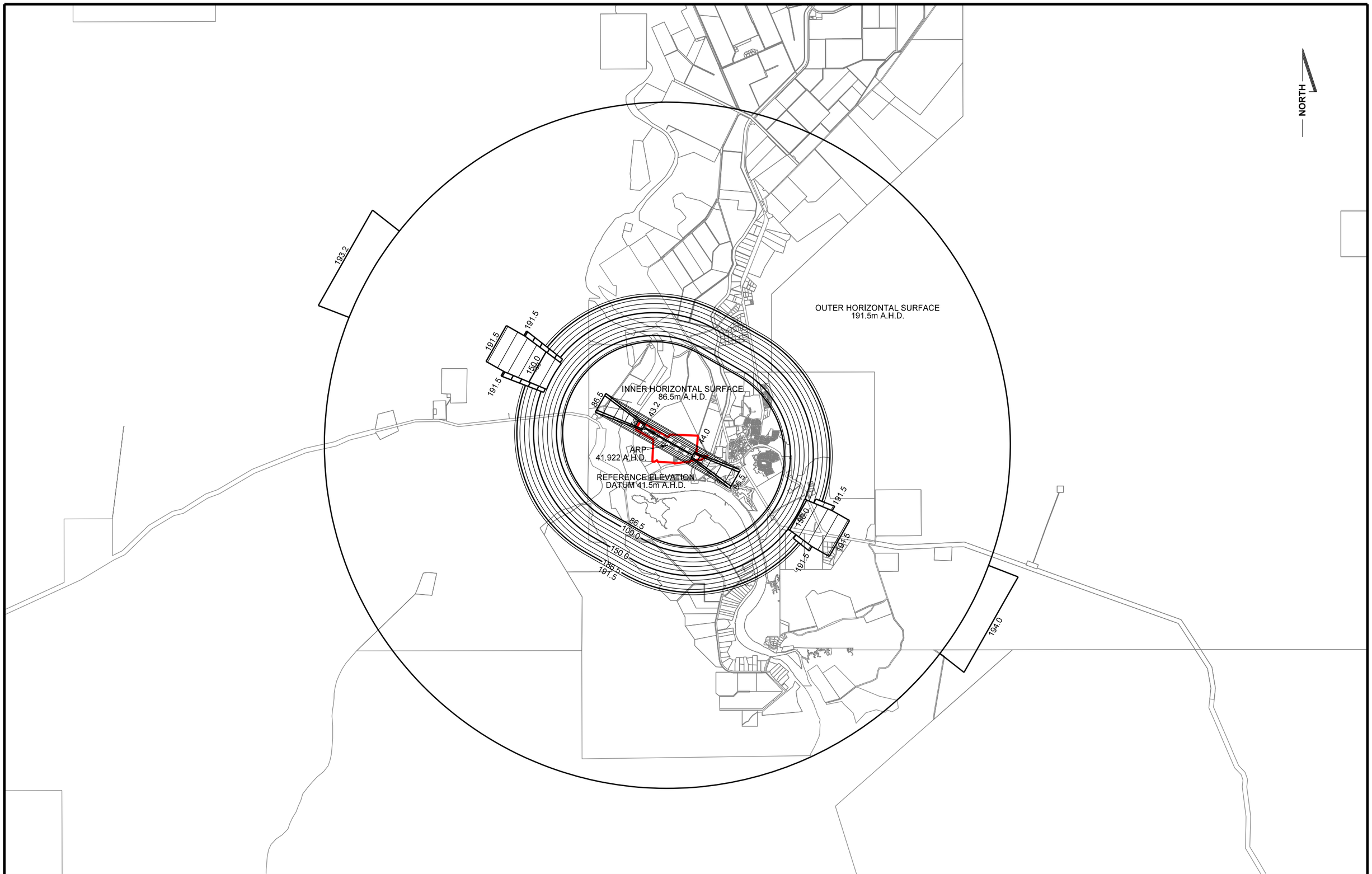

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0	08.05.12	CMF	DRAFT ISSUE	TAB

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Project: EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Title: FUTURE OBSTACLE LIMITATION SURFACE

Client: *SHIRE OF WYNDHAM EAST KIMBERLEY*

Draftsperson: CMF	Checked: TAB	Sheet Size: A1	Drawing No.: B11337-A-007
Designer: CMF	Approved: BJH		
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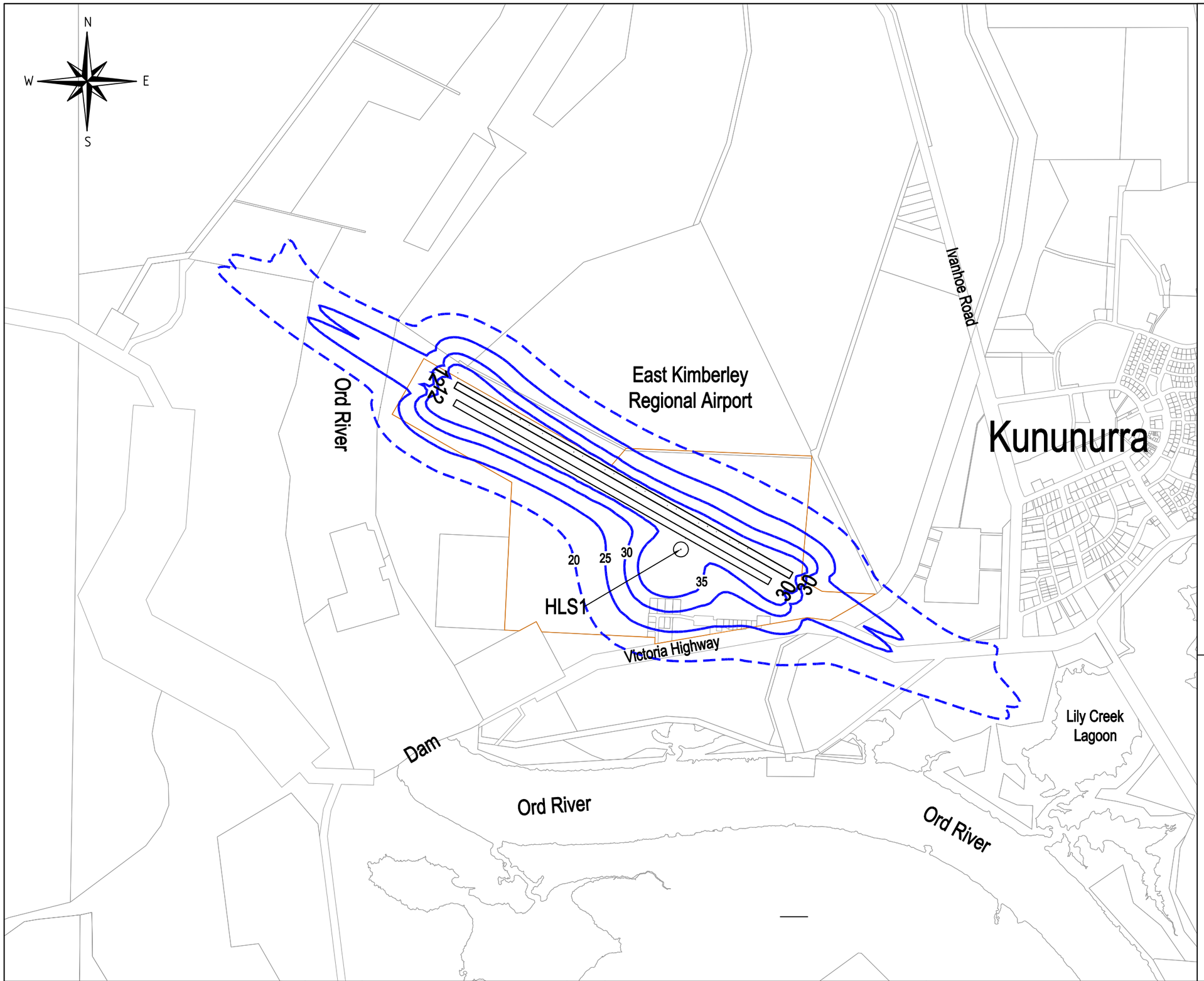


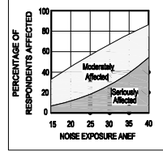
LAND USE COMPATIBILITY ADVICE FOR AREAS IN THE VICINITY OF AUSTRALIAN AIRPORTS

Shall be read in conjunction with AS 2021 - 2000
Acoustics - Aircraft noise intrusion - Building siting and construction

Building Type	ANEF zone of site		
	Acceptable	Conditionally acceptable	Unacceptable
Home, home unit, flat, caravan park	Less than 20 ANEF (note 1)	20 to 25 ANEF (note 2)	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF (note 1)	20 to 25 ANEF (note 2)	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF (note 1)	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF (note 1)	20 to 30 ANEF	Greater than 30 ANEF
Commercial building	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 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 of variation in 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 to 25 ANEF, some people may find that the land is not compatible with residential or educational uses. Land use authorities may consider that the incorporation of noise control features in the construction of residences or schools is appropriate. (See Exposure - Response graph below)
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.
4. The Standard does not recommend development in unacceptable areas. However, where the relevant planning authority determines that any development may be necessary within existing built-up areas designated as unacceptable, it is recommended that such development should achieve the required ANR determined according to Clause 3.2 of the Standard. For residences, schools, etc., the effect of aircraft noise on outdoor areas associated with the buildings should be considered.
5. In no case should new development take place in greenfield sites deemed unacceptable because such development may impact airport operations.

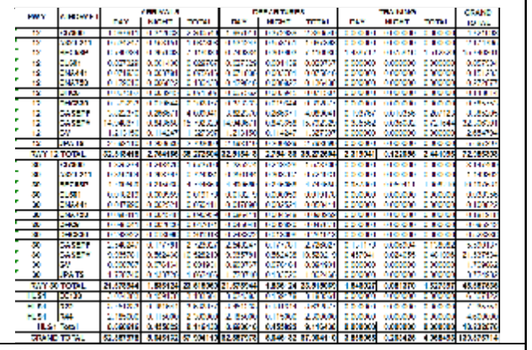


PERCENTAGE OF PEOPLE SERIOUSLY & MODERATELY AFFECTED BY AIRCRAFT NOISE

This graph shows that a proportion of the community will still be SERIOUSLY and MODERATELY affected by aircraft noise when the noise exposure is below 20 ANEF

Over flight of aircraft will still occur in areas outside the 20 ANEF

Source: Australian Standard AS 2021-2000



GENERAL NOTE:
1. ANEF CONTOURS ARE COMPOSITE BASED ON MULTIPLE RUNWAY DEVELOPMENT OPTIONS PRESENTED IN THE EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN TO REPRESENT A WORST CASE SCENARIO. IF A NEW RUNWAY IS CONSTRUCTED THAN THE EXISTING RUNWAY WILL BE CLOSED.
2. WHERE FIGURES HAVE BEEN ROUNDED DISCREPANCIES MAY OCCUR BETWEEN TOTALS AND THE SUMS OF COMPONENT ITEMS.
3. TERRAIN WAS INCLUDED IN THE MODEL.

AERODROME DATA

LOCATION IDENTIFIER: YPKU (WAC 3108)	
MAGNETIC VARIATION - 3° EAST	
ELEVATION - 145 FEET	
AERODROME REFERENCE POINT	
LATITUDE - S 15° 46.7'	COORDINATE SYSTEM AGD84
LONGITUDE - E 128° 42.4'	

INM SOFTWARE:
VERSION: FAA INM v7.0c
DATE OF RUN:
10 SEPTEMBER 2012

0 100 200 300 400
SCALE 1 : 12,500 @ A1

No.	Date	By	Amendment	Checked
3	13/12/2012	MMW	FINAL - Endorsement block changed & 20 ANEF contour dashed	BJH
2	18/09/2012	MMW	FINAL	BJH
1	11/04/2012	MMW	DRAFT	BJH
0	04/04/2012	MMW	DRAFT	BJH

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Project:
EAST KIMBERLEY REGIONAL AIRPORT
AUSTRALIAN NOISE EXPOSURE FORECAST (ANEF)

Title:
EAST KIMBERLEY REGIONAL AIRPORT 2036/37 ANEF

Client: *SHIRE OF WYNDHAM EAST KIMBERLEY*

Draftsperson:	Checked:	Sheet Size	Drawing No.
MMW	JSS	A1	B11337A008
Designer: MMW	Approved: BJH		
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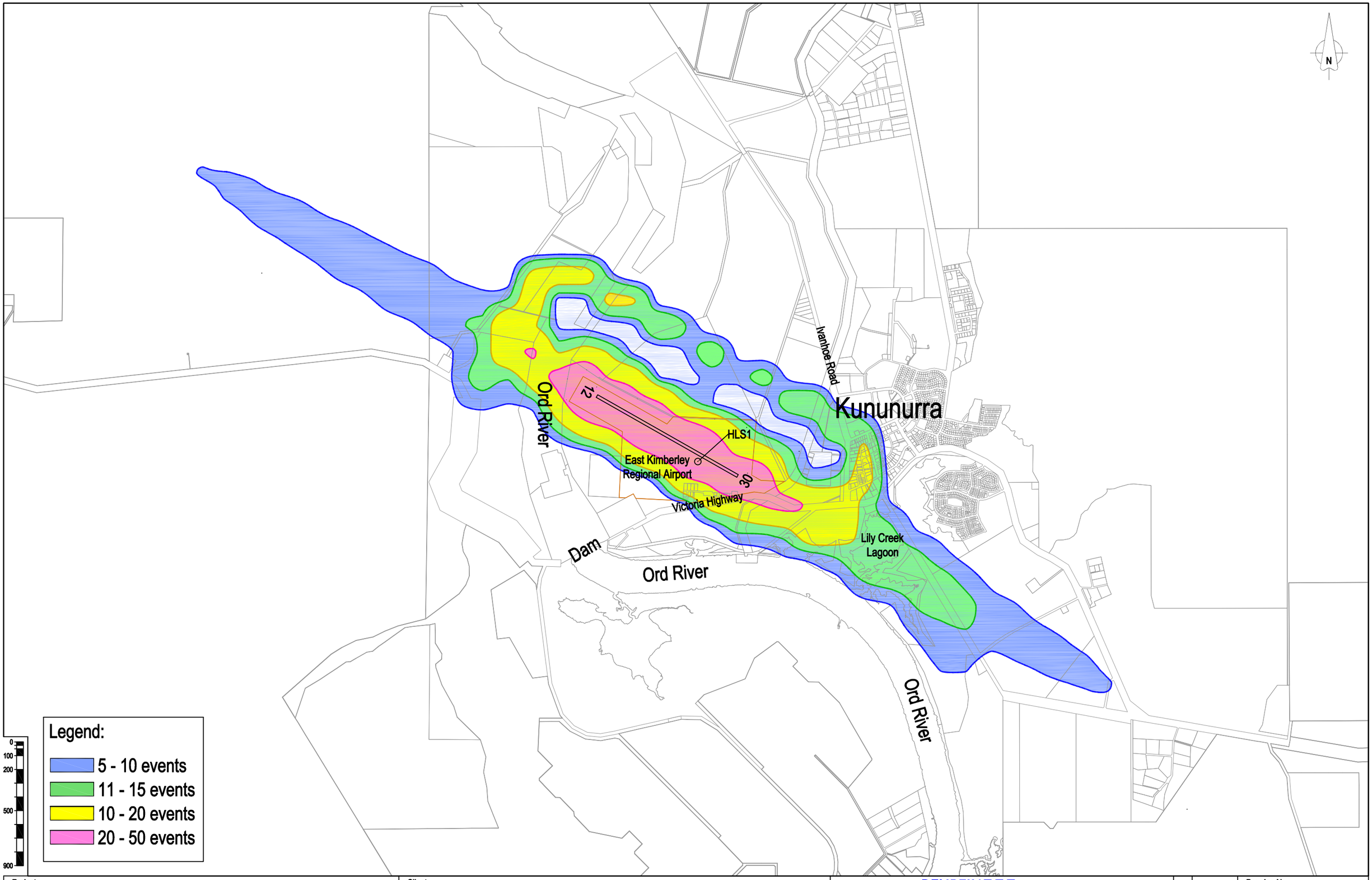

Project:

EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Client:

SHIRE OF WYNDHAM EAST KIMBERLEY

Title:

RUNWAY OPTION 1 (EXISTING RUNWAY)
2036/37 N70 NOISE CONTOURS (24 HRS)

REHBEIN Airport Consulting
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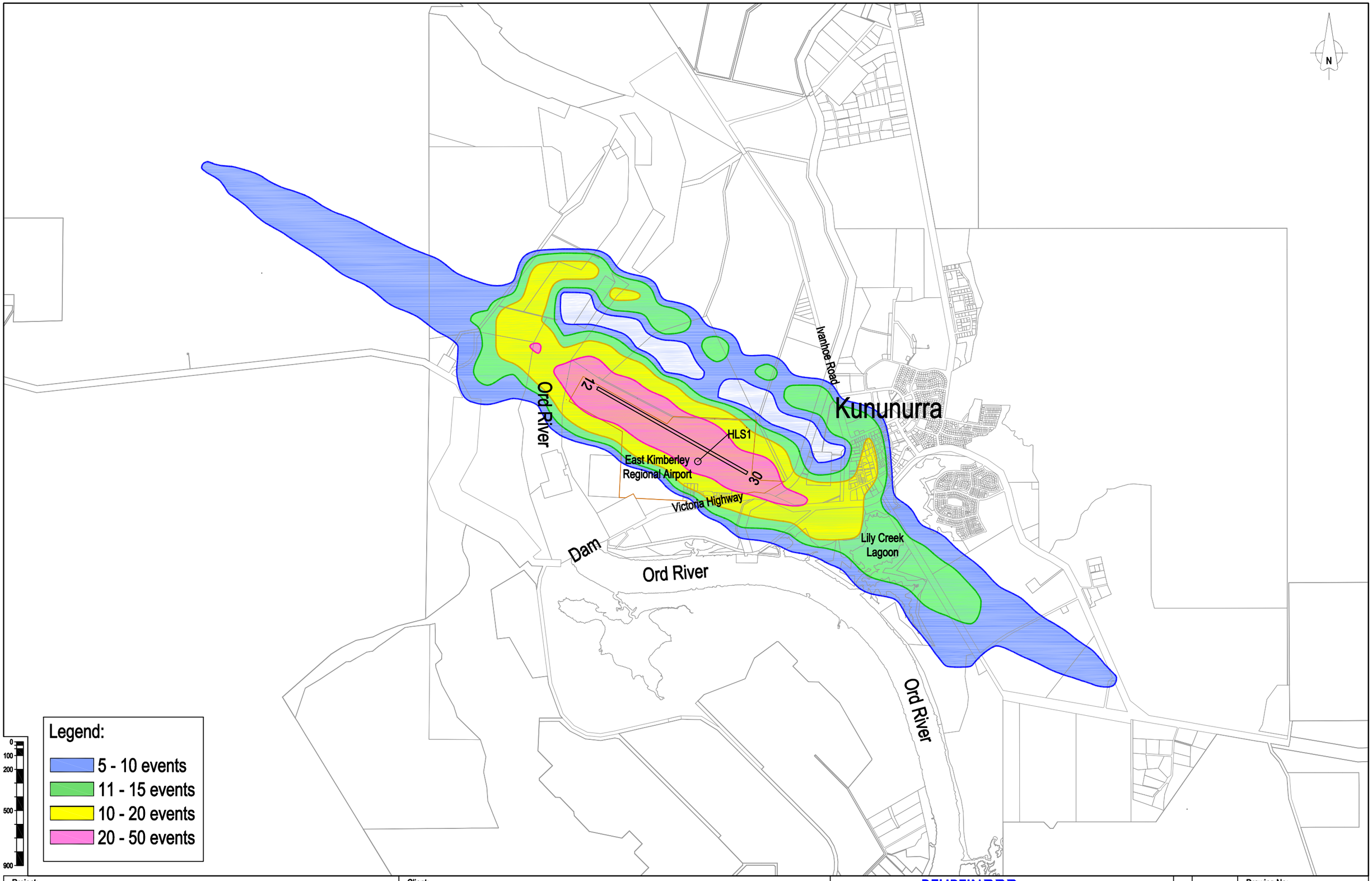
Drawn:	Checked:	Approved:	Rev.	Date
MMW	JSS	BJH	0	17/10/2012

Drawing No: B11337A009A

Scale: 1:50,000 @ A3 — A3

File Ref: B11337A009AR0 — Sheet Size



Project:

EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Client: SHIRE OF WYNDHAM EAST KIMBERLEY

Title: RUNWAY OPTION 2 (NEW RUNWAY) 2036/37 N70 NOISE CONTOURS (24 HRS)

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Drawn: MMW | Checked: JSS | Approved: BJH

Rev.	Date
0	17/10/2012

Drawing No: B11337A009B

Scale: 1:50,000 @ A3 | Sheet Size: A3

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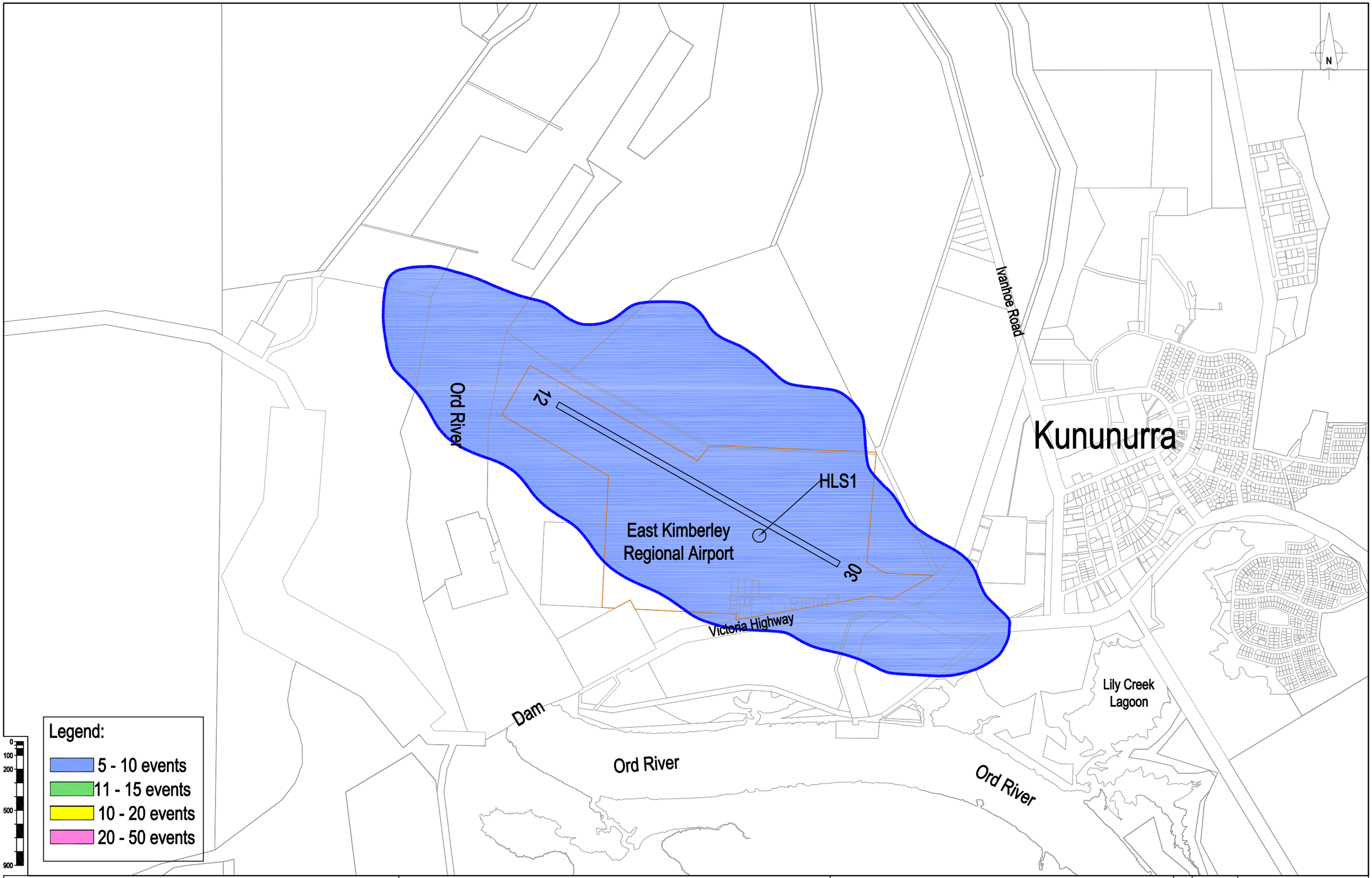

Project:

EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Client:

SHIRE OF WYNDHAM EAST KIMBERLEY

Title:

RUNWAY OPTION 1 (EXISTING RUNWAY)
2036/37 N60 NOISE CONTOURS (19:00 - 07:00)

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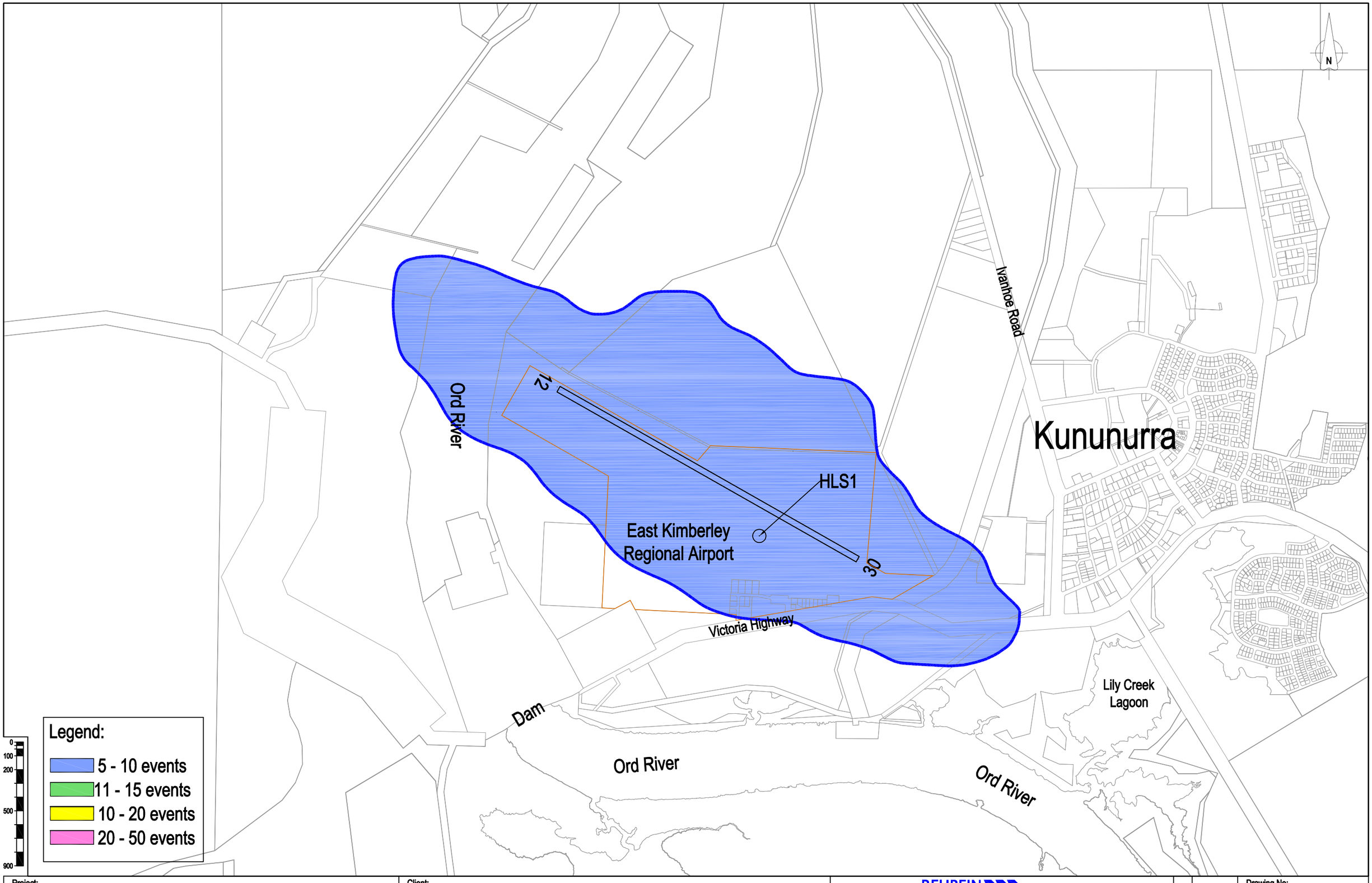
Drawn:	Checked:	Approved:	Rev.	Date
MMW	JSS	BJH	0	17/10/2012

Drawing No: B11337A010A

Scale: 1:25,000 @ A3 (A3)

File Ref: B11337A010AR0



Project:

EAST KIMBERLEY REGIONAL AIRPORT MASTER PLAN

Client:
SHIRE OF WYNDHAM EAST KIMBERLEY

Title:
RUNWAY OPTION 2 (NEW RUNWAY)
2036/37 N60 NOISE CONTOURS (19:00 - 07:00)

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