The Airport Group ™

AIRSIDE • COMMERCIAL • LANDSIDE • AIRSPACE

Bundaberg Airport Master Plan 2016-2026

Prepared for Bundaberg Regional Council

May 2016

EXECUTIVE SUMMARY

Bundaberg is a crucial component of the overall success of the Wide-Bay Burnett Region. The Bundaberg Regional Council Local Government Area has a population of almost 94,000 (at 2013). The population is projected to reach 112,395 by 2026 and to 121,191 in 2036. Tourism and regional and local population growth are the major factors impacting the Bundaberg Regional Airport.

This master plan has a horizon of 10 years: 2016-2026. Numerous considerations have been included in preparing this master plan, including but not limited to:

- A review of the existing planning context, including:
  - An analysis of the current site, including existing aviation, airside, and landside context; and
  - An overview of the airport context.
- A review of the planning legislative context, including:
  - Federal, State, and Local Government policy and regulation; and
  - Environmental legislation.
- Production of passenger and aircraft growth forecasts;
- Swot analysis based on review and forecasts; and
- A vision for the Airport.

Based on the above factors, this master plan has been developed and comprises of:

- A land use plan incorporating current and future uses as well as other landside aspects;
- A facilities development plan identifying key upgrades required for the period of the master plan;
- An airport safeguarding plan describing the National Airport Safeguarding Framework and identifying relevant airspace protection considerations and a summary of the ANEF produced in conjunction with this master plan; and
- A high level implementation plan outlining key airside, landside, and airspace required upgrades and developments suggested for the short, medium, long and ultimate development timeframes.

Supporting Appendices are also included.

The master plan identifies no immediate need for significant airside infrastructure upgrades to support RPT services. The runway, taxiways, and aprons have sufficient capacity for the 10 year planning period of this master plan. However this infrastructure will require maintenance to ensure the infrastructures serviceability.

The development of an Emergency Services Precinct is proposed within the short term. When this Precinct is developed, investment in airside infrastructure to service it will be required.

Throughout the period of the master plan, the expansion of the General Aviation hangars is provided for through the continued adopting of the 2011 Mini Master Plan and the identification of a future expansion area.

Integrated landside/airside opportunities exist to the north of the terminal which should be explored in the short term. This development can utilise existing apron infrastructure in the short-medium term which is currently an under-utilised site in a prime location.

Commercial development opportunities at the airport should continue to be developed at the existing Bundaberg Aviation and Aerospace Precinct (BAAP) north of the terminal precinct. This is sufficient supply of industrial and commercial land for the planning period of this master plan. The BAAP also provides an opportunity for the development of an Emergency Services Precinct.

In addition to the opportunities within the 10 year planning period presented, this master plan presents an ultimate development plan for the Airport through the Land Use Plan.

BRC currently reviews passenger and aircraft movement figures monthly. TAG recommends this be continued to ensure relevance and feasibility of development and infrastructure capacity.

CONTENTS

List of Figures

List of Tables

List of Images

Reference Documents

- AAA Regional Airport Master Planning Guideline – March 2014
- Bundaberg Aerodrome Master Plan (Connell Wagner) – June 2005
- Bundaberg Airport Strategic Review (The Airport Group) – July 2012
- Technical Paper – Airfreight Strategic Plan (The Airport Group) – July 2012
- Technical Paper – Rental Car Strategy (The Airport Group) – July 2012
- Bundaberg Aviation and Aerospace Precinct Development Strategy (The Airport Group) – July 2014
- Bundaberg North Burnett (Destination Tourism Plan) (TEQ) – 2014-2020
- North Burnett Tourism Strategy (TEQ) – 2009
- Environmental Protection and Biodiversity Conservations Act 1999
- The Queensland Plan 2014
- State Planning Policy July 2014
- Sustainable Planning Act (2009)
- Governing for Growth: Economic Strategy and Action Plan 2014
- Economic Directions Statement: Queensland Airports 2013 – 2033
- Wide-Bay Burnett Regional Plan
- Bundaberg Regional Planning Scheme
- Long Term Asset Management Plan 2011-2021
- Bundaberg Regional Council Community Plan 2031
- Bundaberg Regional Council Corporate Plan 2014-2019
- Trade and Investment Queensland Regional Market Profile Wide Bay Burnett (2014)
- Wide Bay Burnett Economic Review – Department of State Development Queensland (2015)
- Bundaberg Regional Airport General Aviation 'Mini' Airport Master Plan Review (2011)
- Airport passenger and aircraft movement statistics
- Airport upgrade works 2009/10
- CASA Advisory Circulars and regulations
- Kensington Parkside – adjacent site plan
- National Airports Safeguarding Advisory Group Guidelines
- Air Traffic Forecasts
- Airport runway and Terminal design capacity

Abbreviations

AAA	Australian Airports Association
ABS	Australian Bureau of Statistics
ANEC	Australian Noise Exposure Concept
ANEF	Australian Noise Exposure Forecast
ANEI	Australian Noise Exposure Index
BCC	Bundaberg City Council
BRA	Bundaberg Regional Airport
BRC	Bundaberg Regional Council
CASA	Civil Aviation Safety Authority
CTAF	Common Traffic Advisory Frequency
GA	General Aviation
ILS	Instrument Landing System
LGA	Local Government Area
MOS	Manual of Standards
MTOW	Maximum Take Off Weight
OESR	Queensland Government Statisticians Office
OLS	Obstacle Limitation Surface
PAL	Pilot Activated Lighting
PANS-OPS	Precision Approach Navigation Surfaces – Operations
QLD	Queensland
RAAF	Royal Australian Air Force
RPT	Regular Passenger Transport
SPP	State Planning Policy
TEQ	Tourism and Events Queensland
TFI	Tourism Futures International
TAG	The Airport Group
VFR	Visual Flight Rules

Glossary

Aerodrome/ Airport	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.
Airside	The movement area of an Airport, adjacent terrain and buildings or portions thereof, access to which is controlled.
Apron	The part of an Airport used for the purpose of enabling the passenger to board, or disembark from aircraft; for loading cargo onto, or unloading cargo from, aircraft; and or for refuelling, parking or carrying out maintenance on aircraft.
Aviation Security	A Combination of measures and human and material resources intended to safeguard civil aviation against acts of unlawful interference.
Control Tower	A unit established to provide air traffic control service to Airport traffic
Landside	The area of an Airport and buildings to which the public normally has free access.
Manoeuvring Area	Those parts of an Airport used for the take-off landing and taxiing of aircraft, excluding aprons.
Movement Area	The part of an Airport used for the surface movement of aircraft, including manoeuvring areas and aprons.
Regular Public Transport Service	A service consisting of Regular Transport aircraft operations, as prescribed in the Civil Aviation Regulations
Runway-related Activities/ Facilities	Includes runways, taxiways, aprons, clearways, compass swing and engine run-up areas, glide path facilities, helicopter landing, parking, training and servicing, landing equipment, radar and all aircraft navigation aids.

INTRODUCTION

1.1 OVERVIEW OF THE AIRPORT

The Bundaberg Regional Airport (IATA Code BDB/ICAO Code YBUD) is located approximately 5km west of the City of Bundaberg in the Wide Bay-Burnett region of Queensland. The airport lies approximately 45km east of the Bruce Highway and fronts the Isis Highway. It is accessed from Airport Drive in the north-west and Commercial Street in the north-east. The airport is within the Bundaberg Regional Council area and is currently served by up to six daily passenger flights to and from Brisbane by Qantas (five times daily), and Virgin Australia (once daily).

1.2 PURPOSE AND OBJECTIVES OF THE MASTER PLAN

1.2.1 Purpose

The purpose of this master plan is to provide a planning framework for the long-term protection of the airport to ensure it has sufficient infrastructure to support forecast movements within the period of the master plan (10 years) and beyond.

1.2.2 Objectives

There are numerous on and off-airport planning objectives that will be addressed in this Master Plan.

On-airport (within the airport site itself), key planning objectives include:

- Maintaining the ability for aircraft to operate safely and unrestricted;
- Facilitating the ability for the airport to grow and expand in response to demand;
- Promoting the role of the airport and its significance as a community asset;
- Providing for the airport to increase revenue, including through non-aviation development;
- Safeguarding of the airport’s long-term plans;
- Ensuring compliance with relevant regulations; and
- Managing environmental and heritage constraints.

Off-airport planning is particularly critical when ensuring the long-term safeguarding of the airport to minimise the potential encroachment of incompatible activities and development in the vicinity of the airport. Off-airport planning objectives include:

- Aircraft noise impacts;
- Intrusions into the protected operational airspace of the airport;
- Distractions to pilots from lighting in the vicinity of the airport;
- Wildlife strikes;
- Building generated wind-shear and turbulence from nearby development;
- Public safety zones; and
- Impacts on navigational aids.

1.3 METHODOLOGY AND CONSULTATION

This master plan has been prepared to reflect the guidelines recommended by the Australian Airports Association Regional Airport Master Planning Guidelines (March 2014) where possible.

The master plan has considered several recent studies relevant to the airport as well as the region, including:

- AAA Regional Airport Master Planning Guideline – March 2014
- Bundaberg Aerodrome Master Plan (Connell Wagner) – June 2005
- Bundaberg Regional Airport General Aviation ‘Mini’ Airport Master Plan Review (2011)
- Long Term Asset Management Plan 2011-2021
- Bundaberg Regional Council Community Plan 2031
- Bundaberg Regional Council Corporate Plan 2014-2019

Other key reference documents are listed on Page vi of this document.

In addition to document review and analysis, TAG engaged with key stakeholders of the Airport (Table 1).

Stakeholder group	Description/interest
Bundaberg Regional Council	Owner/Operator
Airport operators and managers	Airport operator
BRC Councillors and Mayor	Community representatives
Qantas Airways	Airline operator
Virgin Australia	Airline operator
Avis	Rental car operator
Europcar	Rental car operator
Toll	Freight operator
Aeroclub	Airport user
RFDS	Airport user
CareFlight	Airport user
GA users (representative)	Airport user
CQU	University
Remax	Development Industry
Regional Development Australia	Industry body

Table 1: Stakeholder engagement

1.4 REPORT STRUCTURE

This master plan is structured in two main parts. **Part One** encompasses the background information, which includes:

- An overview of the **airport context** – including the historical background of the airport, the regional and socio-economic context, the planning, environmental, and economic regulatory context, the policy context, and consultation with key stakeholders.
- A description of the **current situation** – including the site ownership and description, the surrounding land characteristics, a description of the existing activities and facilities at the airport, including ground transport and utility services, and a description of the environmental value and concerns at the site.
- A SWOT analysis of the airport.
- Presentation of the airport vision and objectives, as identified in the master planning process.
- Identification of critical planning parameters for the future of the airport, including passenger and aircraft forecasts, airside infrastructure requirements, airspace protection requirements, and aircraft noise management.

Part Two provides the master plan for the airport. This includes:

- A land use plan which identifies precincts within the site and precinct development guidelines;
- A facilities development plan which describes upgrades required for airside and landside components based on the forecasts
- An airport safeguarding plan identifying the National Airports Safeguarding Framework, Airspace Protection Surface considerations, and a summary of the ANEF report produced for BRC; and
- An implementation plan, outlining airside, landside, and airspace protection development phases required to achieve the master plan objectives and be sufficiently prepared for forecast growth.

In addition, Appendices A through L provide further information as referenced within the document.

BACKGROUND INFORMATION

2.1 AIRPORT CONTEXT

2.1.1 Historical Background

Bundaberg Regional Airport (BRA) was officially opened (as the Hinkler Aerodrome) on 12 December 1931. The Municipality of Bundaberg invested around $20,000 in the airport (for clearing, grading, levelling, and fencing) between 1931 and 1940 when the aerodrome was taken over by the Royal Australian Air Force (RAAF).

The airport was considered to be an advanced operational base for strategic defence reasons. For this reason, its future was planned in accordance with possible operational needs and requirements for establishing Flying Training schools under the Empire Air Training Scheme. As a result, of the RAAF Expansion Plan (1942), a Flying Training School was realised.

In 1941, approval was given and the action was taken to further clear the site. In addition, the existing north-west/south-east runway was extended to 1098mx46m and the runway, as well as the taxiways, were resurfaced with gravel.

By 1944, the Japanese threat had declined and trainee intakes were greatly reduced. By October 1944 the airport became utilised as part of a courier run, operating daily services between Brisbane and Rockhampton.

Towards the end of World War II, it was anticipated there would be a significant increase of Dutch Forces in Australia. It was decided that BRA would be allotted to the Netherlands East Indies (NEI) authorities for use as their main base in Australia. By 1945, Dutch authorities stationed Mustangs, B25 Mitchel and Wirraway aircraft at BRA. The Dutch extended the runway to 1,311m in order to accommodate their aircraft. The strip was also sealed, in addition to 183m of approach runway, a cost which was borne by the Dutch authorities.

Following the end of World War II, The Department of Civil Aviation assumed control of the BRA on 31 July 1946. In 1980s, the Commonwealth transferred ownership of hundreds of their regional airports to the relevant Municipalities under the Aerodrome Local Ownership Plan. BRA was transferred to BRC (formally Bundaberg City Council (BCC) in June 1983.

Since BRC's ownership, significant landside and airside infrastructure upgrades have occurred. In 2009, the BRC upgraded the 14/32 runway, taxiway B, the RPT apron, the terminal and the car park. The RPT apron was extended in 2009 for 2 additional aircraft parking positions suitable for Code 4C aircraft - B737/A320. RPT Taxiways B and C were also upgraded to B737/A320 in 2009. RWY 14/32 was extended to 2000m and limited to 30m wide (old portion is 45m wide) and strengthened with an asphalt overlay to B737/A300 standard and grooved in 2008/09. RPT aircraft operations are currently up to 30,000 kg MAUW. In 2011, paid car parking was introduced and in February 2015 Taxiway D was resealed.

2.1.2 Regional Context

Bundaberg is located within the Wide-Bay Burnett (WBB) Region. The Region covers an area of about 50,000km^2 and has the largest population of any region of Queensland outside of South East Queensland. As of June 2014, the population of the WBB Region was 288,597 (DSDQ).

Historically, the Region's economy has been based on agriculture, timber, heavy manufacturing, mining and fishing. In more recent years, this has been supplemented by growth in horticulture, tourism, aviation, advanced manufacturing, aquaculture, food processing, marine, construction, and service industries (TIQ). The Department of State Development Queensland (DSDQ) reported that the GRP of the Region was $10.209 billion (2010-11). There were 21,512 businesses in the region (FYE 2014). The largest employing industries (as of June quarter 2015) were health care and social assistance (14.9%); retail trade (11.5%); and agriculture, forestry and fishing (11.2%) (DSDQ).

Tourism

Tourism contributed 9.5% to the Gross Regional Product (GRP) or $779 million in economic output to the Bundaberg North Burnett economy (FYE June 2013). Visitor numbers across the region have remained relatively static in real terms over the period from 2007-2013. However, an increase in tourism's economic contribution indicates a change in the economic base of the region and a diversification of the economy. It also places increased importance on the continued health and growth of the tourism sector within the broader region (TEQ).

Tourism and Events Queensland (TEQ) reported that there are regional differences in the relative importance of tourism among communities and council areas. The coastal towns and highway communities within the region of Childers, Bundaberg, Bargara and Woodgate have a stronger economic reliance on tourism. However, it is a consistent view across the whole region that continued focus on tourism development and visitation provides significant opportunities for all communities.

"Southern Great Barrier Reef" is a unifying marketing platform that links the regional tourism organisations of Bundaberg North Burnett, the Gladstone Region and Capricorn Region. There is cross-regional agreement that leveraging the strong consumer proposition of the "Southern Great Barrier Reef" provides individual regions with the best opportunity to grow visitation through collaboration and joint marketing. Bundaberg currently receives approximately 29% of total visitation to the Southern Great Barrier Reef area with a higher percentage of holiday (leisure) visitation.

Purpose of travel	Bundaberg visitor numbers	Southern Great Barrier Reef visitor numbers	Bundaberg as a percentage of Southern Great Barrier Reef
Holiday (leisure)	221,000	520,000	42%
Visiting Friends & Relatives	197,000	586,000	33%
Business	102,000	394,000	25%
Other	n/a	127,000n/a	
TOTAL	520,000	1,754,000	29%

Table 2: Bundaberg's proportion of Southern Great Barrier Reef visitors (TEQ, 2013)

The tourism industry in the Fraser Coast and Bundaberg directly contributed $335 million to the GRP and directly supported 5000 jobs in 2013-2014 (DSDQ).

Major projects, attractions, and land developments in Bundaberg.

Mon Repos Turtle Centre

The Mon Repos Regional Park is close to the city of Bundaberg and is considered to be the region's most significant tourism asset. It is the largest Loggerhead Turtle Rookery in the Pacific and has the largest concentration of nesting marine turtles on the eastern Australian mainland.

From November to March, it is a tourism draw card for the experience of seeing nesting and hatching turtles on the beach at night. The Mon Repos Turtle Centre is a hub for visitors and marine turtle conservation. The Mon Repos Turtle Centre attracts around 30,000 paying customers per annum. This does not include non-paying visitors and the Council believes this is a gross underestimation of the total number of visitors to Mon Repos.

The redevelopment of the Mon Repos Turtle Centre was identified in 2009/10 as one of the three major opportunities in the Bundaberg Region. In 2012, Mon Repos was formally identified as one of the tourism development opportunities in the Bundaberg North Burnett Destination Tourism Plan. A master plan for the Centre was developed, but has so far only been completed to stage one.

Bundaberg Port Gas Pipeline

In October 2015, the Palaszczuk Government announced it would increase funding to the Bundaberg Gas Pipeline from $11 million to almost $20 million in a bid to build the port into an economic hub for the Wide Bay region.

In early 2016, construction of the pipeline began. When fully-installed and operational, the piping will form the 28.5 km Bundaberg Port Gas Pipeline.

The multi-million dollar project is part of a development agreement between the Queensland Government and Australian Gas Networks (AGN) for the delivery and operation of the pipeline. The Queensland Government has estimated that the project’s construction is expected to create 45 jobs, including up to 15 local construction jobs.

Initial pipeline construction is expected to be completed in August 2016. The Bundaberg Port Gas Pipeline is expected to be operational in early 2017.

Knauf Plasterboard Plant

In January 2015, Knauf Australia announced it would be constructing a new plasterboard manufacturing facility at the Port of Bundaberg. The plant is expected to cost $70-$80m to construct and began construction in early 2016.

The project has been made possible by the Queensland Government’s commitment to fund the construction of a new 26km gas pipeline from Australian Gas Network’s Wide Bay gas transmission line at Bundaberg to Burnett Heads. This gas line will provide additional gas supply capacity for Knauf’s plasterboard manufacturing plant facility and other existing and new industrial users in the region.

The plant is expected to increase GDP by 2.12%. It is also a cornerstone investor in the Port of Bundaberg Industrial Precinct – facilitating further manufacturing investors to the area. Knauf is expected to import about 120,000 tonnes of gypsum through the port to feed its plant. The plant is expected to create up to 200 jobs during the construction of the plant and around 55 new positions when operational.

Expansion of the Tuan Wood Pellet Facility

Altus Renewables have commenced construction of their wood pellet storage facility adjacent the bulk sugar terminal. When shipped, the wood pellets co-use the existing conveyor and ship loading facilities operated by Qld Sugar Limited which increases their annual utilisation and helps spread costs across multiple commodities.

The Tuan wood pellet facility is well placed for expansion opportunities both through access to additional fibre from Hyne, raw material from alternative local wood processors and through the use of the QSL export facility at Bundaberg. The Tuan plant has been designed to allow capacity expansions up to 125,000 tonnes per annum with minimal capital requirements.

State Development Area

In January 2016, the Queensland Government announced an investigation into the possibility of a new State Development Area (SDA) around the Port of Bundaberg. The investigation land area is approximately 5,054 hectares and includes the Port of Bundaberg and land on the western side of the Burnett River. The Port of Bundaberg is the next port north of Brisbane and is the States only other east coast trading port that is outside the Great Barrier Reef World Heritage Area.

Relationship to other airports in the region

The BRA is located closest to the Hervey Bay Airport. Maryborough airport is located further south west of the Hervey Bay airport and Kingaroy Airport is located even further south west, inland from the Sunshine Coast. Hervey Bay is the only other airport in the Wide-Bay Burnett region which offers RPT services. The Sunshine Coast Airport is the nearest international airport. See Figure 1 for map.

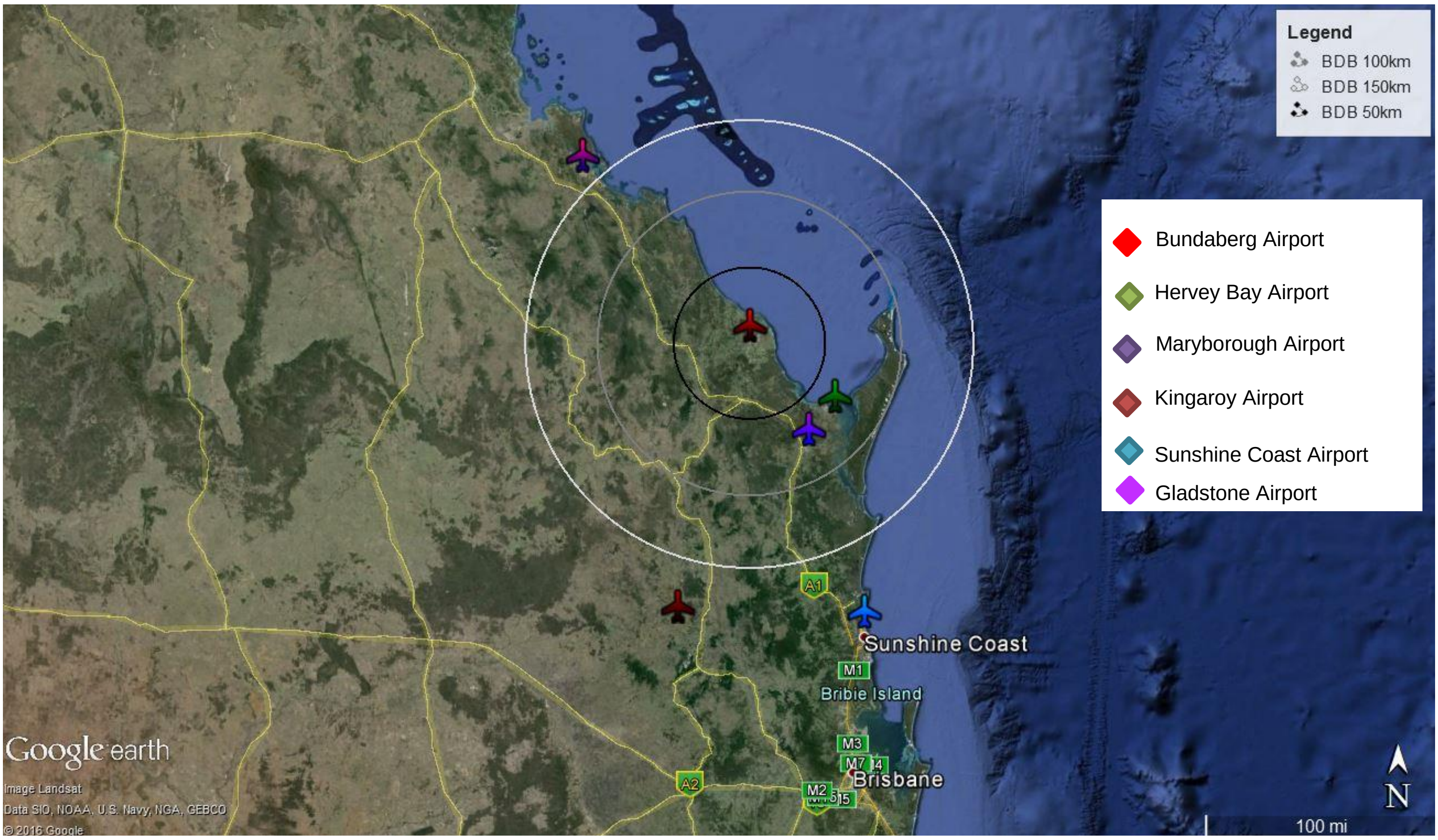


Figure 1: Relative location of other airports in the region

2.1.3 Socio-economic Context

The BRC Local Government Area (LGA) has a population of 93,976 (ABS, 2013). The population is projected to reach 112,395 by 2026 and to 121,191 in 2036 (OESR).The largest population group is within 55-64 years (13.9%), followed by the 45-54 age bracket (13.6%). The graph below depicts the estimated resident population brackets (ABS, 2013).

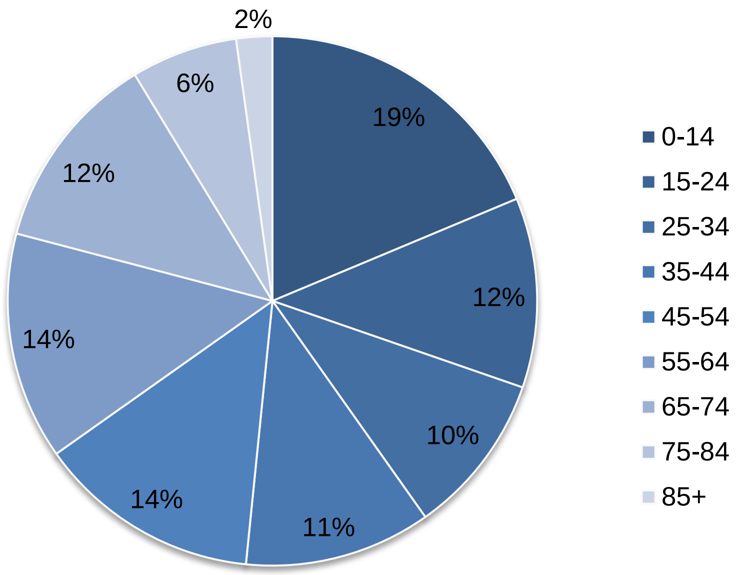


Figure 2: Estimated population age brackets (ABS, 2013)

The estimated Gross Regional Product (GRP) of the Bundaberg Region in 2013/14 was $4.0 billion. The dominant employment industry in the LGA is the health care and social assistance industry, contributing to 14.6% of employment in the region. The health care and social assistance industry contribute approximately $389.1 million (9.8%) of the total GRP for the Bundaberg Region. Retail trade is the second largest employment industry (12.8%) and the fifth largest contributor to GRP (6.9%). Agriculture, forestry, and fishing provide the third largest employment (9.4%) and second largest GRP contributor (9.7%). In September 2015, the unemployment rate in the BRC LGA was 11.1% (compared to 6.5% State average).

2.1.4 Regulatory Context

The development of BRA has been considered relative to Commonwealth, State and Local Government planning regimes. This Master Plan is to be viewed as complementing State and Local Government land use planning while ensuring the operational integrity and continued viability of the Airport.

The Airport site is assessable in accordance with Federal, State and Local Planning policies. Major Commonwealth agencies and legislation that control, support or have influence on the airport's operations are:

- Civil Aviation Safety Authority (CASA);
- Regulations administered by the DIRD;
- Australian Federal Police;
- Air Navigation Act 1920;
- Air Services Act 1995;
- Aviation Transport Security Act 2004;
- Environmental Protection and Biodiversity Conservation Act 1999;
- Endangered Species Protection Act 1992;
- Aboriginal and Torres Strait Islander Heritage Protection Act 1982;
- Australian Heritage Commission Act 1975; and
- Queensland Department of Environment and Heritage Protection.

A review of the State and Local Government planning policies as they relate to airports reveals the importance of airports to Queensland in terms of economic and commercial development. Discussion of the key documents follows.

Federal Regulation

Significant Federal environmental and aviation legislation is listed above, with some key policies elaborated here. There is no federal legislative planning policy directly pertaining to the BRA. All federal legislation is presumed to be integrated into State, Regional, and Local policy as per requirements.

The Airports Act 1996 (applicable only to federally leased airports) has been considered in developing the structure and content of this Master Plan.

Environmental Protection and Biodiversity Conservations Act 1999

The Environmental Protection and Biodiversity Conservations Act (EPBCA) 1999 is the Australian Government's key piece of environmental legislation which commenced 16 July 2000. The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as matters of national environmental significance. It is not likely the development at BRA will have national environmental significance but it is important to acknowledge the EPBCA nonetheless.

AirServices Australia (AsA)

AirServices Australia (AsA) is responsible for the airspace surrounding BRA. Within this airspace it provides aerodrome and approach control services to arriving and departing aircraft. AsA also provides services to aircraft transiting the designated control zone in which BRA is situated. These operations are conducted in accordance with published procedures, requirements and air traffic control clearances and instructions. AsA provides the industry with the rules for flying aircraft and handles noise complaints.

Airports (Protection of Airspace) Regulations 1996

The Federal Minister for Transport can protect the airspace surrounding an Airport in accordance with the directions provided in the *Airports (Protection of Airspace) Regulations 1996*. The object of these Regulations is to establish a system for the protection of airspace at, and around, airports in the interests of the safety, efficiency or regularity of existing or future air transport operations into or out of airports.

State regulation

The following regulations and plans are the most relevant planning, economic and environmental regulation within the BRA context.

The Queensland Plan 2014

The Queensland Plan was developed after extensive community engagement by the Queensland Government, resulting in over 80,000 contributions. The Queensland Plan was subsequently ratified in October 2014 to support long-term planning for the State which extends past the electoral cycle. It is a plan that provides a vision for the future of Queensland. It does not provide specific regulation regarding airport development but does require the overall vision to be implemented into Local Government strategic planning.

State Planning Policy July 2014

The Queensland Government State Planning Policy (SPP), released in July 2014, replaced previously separate SPPs. Within the SPP, Part D, and specifically “Planning for Infrastructure” relates to airports. Within Part D, section “Strategic airports and aviation facilities” identifies 26 strategic airports, including BRA. The purpose of this component of the SPP is to direct Local Governments when making or amending their planning scheme. Specifically, through the integration of regulations that will protect the strategic airports and facilitates development surrounding strategic airports as well as protecting aviation uses through correct OLS mapping.

In conjunction with the SPP there are Codes. For the airport, “SPP Code: Strategic airports and aviation facilities” is relevant. The purpose of the Code is to protect the safety, efficiency and operational integrity of strategic airports and aviation facilities. The code applies to the BRA as it has been identified to have strategic significance. The code applies to development applications for:

1. A material change of use of premises that will result in work encroaching into the operational airspace of a strategic airport and is at least 12 metres high;
2. Building work not associated with a material change of use mentioned in paragraph (1) that will result in work encroaching into the operational airspace of a strategic airports and is at least 12 metres;
3. A material change of use of premises or reconfiguring a lot where any part of the land is within the 20 ANEF contour for a strategic airport;
4. A material change of use of premises or reconfiguring a lot where any part of the land is within the public safety areas of a strategic airport;
5. A material change of use of premises where any part of the land is within the lighting area buffer zone of a strategic airport;
6. A material change of use of premises where any part of the land is within the wildlife hazard buffer zone of a strategic airport;
7. A material change of use of premises that will result in work encroaching into the building restricted area of an aviation facility; and
8. Building work not associated with a material change of use mentioned in paragraph (7) that will result in work encroaching into the building restricted area of an aviation facility.

The Code further prescribes Performance Outcomes and Acceptable Outcomes for development considering Emissions, Wildlife Hazards, Protection of Aviation Facilities, Public Safety Areas, and Aircraft Noise. In addition, the Code identifies High and Moderate Risk development types with regard to Wildlife Hazards. Furthermore, compatible and incompatible uses are prescribed for development on any site within ANEF contours. Lastly, desirable indoor sound levels for sensitive land uses are listed.

Within the SPP, Part D, and specifically “Planning for the environment and heritage” must be of consideration when developing at BRA.

State Planning Policy Mapping

The mapping tool operating in conjunction with the SPP provides broad classifications and considerations throughout the State. There are no major mapping layers which affect the BRA airport site. There are some agricultural areas adjoining the site and a minor intersecting watercourse with regulated vegetation in one corner of the site. There are no mapped flood hazards within the site, but there are small areas within the site and nearby that are designated as bushfire hazard areas and potential impact buffers. These environmental matters are further detailed in Section 2.2.8. Specifically for the airport safeguarding, the SPP Mapping tool identifies OLS, restriction zones, public safety areas, and buffer zones. Given the SPP statutory power, these should be considered when developing at the BRA.

Sustainable Planning Act 2009

The SPA is the overriding planning policy as dictated by the Queensland Government. The purpose of the SPA is to seek to achieve ecological sustainability by:

- Managing the process by which development takes place, including ensuring the process is accountable, effective and efficient and delivers sustainable outcomes;
- Managing the effects of development on the environment, including managing the use of premises; and
- Continuing the coordination and integration of planning at the local, regional and State levels.

All local government planning regulations produced after 2009 are derived from SPA.

Governing for Growth: Economic Strategy and Action Plan 2014

The Governing for Growth Plan provides the Queensland Government’s economic roadmap for the next 10 years. The Plan was developed concurrently with the Queensland Plan. Specifically for airports, the Plan refers to the Economic Directions Statement: Queensland Airports as an outcome of the Plan.

Economic Directions Statement: Queensland Airports 2013 – 2033

The Queensland Government produced the Economic Directions Statement and identified the critical role of airports in supporting Queensland’s economic growth. In particular, of the 191 airports operating in Queensland, 40 were identified as to have ‘strategic significance’ for economic growth. The BRA was identified to have strategic significance. In particular, the functions of the BRA identified as significant are: passenger movements, industrial precinct, significant airport expansion, other specialised activities and SPP.

Regional Regulation

Wide-Bay Burnett Regional Plan

The Wide-Bay Burnett Regional Plan was adopted in 2011 and remains applicable. The Plan refers to BRA as one of the two significant airports in the Region. Both Bundaberg and Hervey Bay airports are described as having the capacity to support commercial and non-commercial passenger operations, as well as opportunities for the redevelopment and expansion of existing airport activities. Specifically for BRA, the Regional Plan identifies the 2009/2010 upgrades to the airport provide opportunities for the establishment of aviation industry and related business close to the Airport.

Notably, the Regional Plan refers to previous versions of the SPP which are no longer in operation. It is expected that the Regional Plan will be updated to reflect the current SPPs in the future. In the meantime, given the statutory superiority of the SPP, it takes precedent over the Regional Plan where applicable.

2.1.5 Bundaberg Regional Planning Scheme

The Bundaberg Regional Council Planning Scheme 2015 and supporting Planning Scheme Policies were adopted on 13 October 2015 and commenced on Monday, 19 October 2015.

The planning scheme was made under the Sustainable Planning Act 2009 and sets a blueprint for the future growth and development of the Bundaberg Region.

The Bundaberg Regional Council Planning Scheme and associated Planning Scheme Policies replace the four planning schemes and associated planning scheme policies for the former local government areas of Bundaberg City, Burnett Shire, Isis Shire and Kolan Shire.

Airport and Aviation Facilities Overlay

The Planning Scheme includes 12 Overlays. The purpose of the Overlay Codes is to identify areas within the Planning scheme which have one of more of the following characteristics.

- There is a particular sensitivity to the effects of development;
- There is a constraint on land use or development outcomes;
- There is the presence of valuable resources;
- There are particular opportunities for development.

Overlays are mapped and included in either BRC mapping or SPP mapping. Specifically for the airport, the SPP Mapping tool identifies the airport as a “strategic airport and aviation facility”. As such, Overlay C (Airport and aviation facilities overlay) applies to any development within and around the airport site.

Development Application Process

If the development is considered an assessable development under both SPA and the Planning Scheme, a DA is required. The application must identify the level of assessment required and any applicable codes or overlays. Development applications (DA) in Queensland lodged on or after 18 December 2009 are assessed under the SPA through the IDAS system.

Specific and relevant application material is required for every application and must be considered carefully when submitting a DA. A thorough assessment of all relevant planning instruments and constraints on development should be investigated prior to DA submission.

Planning applications can be submitted online via Smart eDA. Smart eDA is a service developed by the State Government that allows for an application to be prepared and lodged electronically. If the state is the assessment manager, applicants must lodge through MyDAS.

Bundaberg Regional Council's PD Online service offers community members and the development industry the convenience of accessing information on development applications lodged with Council, including proposal documentation and status information on where an application is in the assessment process.

Aside from the standard forms provided by the State, Council has developed forms and checklists to be used for certain requests, including:

- Request for Concurrence Agency Assessment (including referral of building applications to Council as a concurrence agency);
- Request to Change a Development Approval (including a request to extend the period of approval).

Importantly, the new planning scheme does not affect existing lawful uses or current development approvals. For a period of 12 months from commencement of the new planning scheme, a person may request Council assess a proposed development under the provisions of the relevant superseded planning scheme.

Other relevant planning considerations

Australian Airports Association

The Australian Airports Association (AAA) is the national voice for Australian airports and represents the interests of over 260 airports and aerodromes across Australia. In 2013, the AAA commissioned the Regional Airport Master Planning Guideline to assist regional airport operators who often do not have the planning knowledge or resources typically available to the larger airports. This Master Plan largely reflects the 2014 revised version of these guidelines.

2.1.6 Previous and current master plans

Connell Wagner produced the most recent Bundaberg Aerodrome Master Plan in June 2005, with a timeframe of 15 years. This master plan aims to build on the Connell Wagner master plan where appropriate. Some significant projects which have as a result of this this master plan include:

- Extension of Runway 14/32;
- Upgrade of Taxiway B and C;
- Development of Taxiway G;
- GA hangers development;
- Development of car parking areas;
- Security facilities;
- New access road into the airport; and
- RPT Terminal upgrade.

A 'mini' GA master plan was produced by Auercon in 2011. The preferred Option of the master plan is Option A. This has been incorporate within this master plan.

2.2 CURRENT SITUATION

2.2.1 Ownership and management

The airport is owned and operated wholly by the Bundaberg Regional Council. The site is entirely within the BRC jurisdiction and has a freehold tenure.

2.2.2 Site description

The airport is located approximately 5km west of the City of Bundaberg in the Wide Bay-Burnett region of Queensland. The airport lies approximately 45km east of the Bruce Highway and 1km east of the Isis Highway. It is accessed from Airport Drive in the north-west and Commercial Street in the north-east.

The entire airport site (outlined in red in Figure 3 below) totals approximately 258.6ha (excluding roads). Some lots have been subdivided (as seen in purple), which make up approximately 11.9ha of the total site area.

Majority of the airport site is zoned as 'community facilities' (pale yellow) (247.4ha). Some lots have been subdivided and subsequently rezoned to 'industry' (purple) (11.2ha).

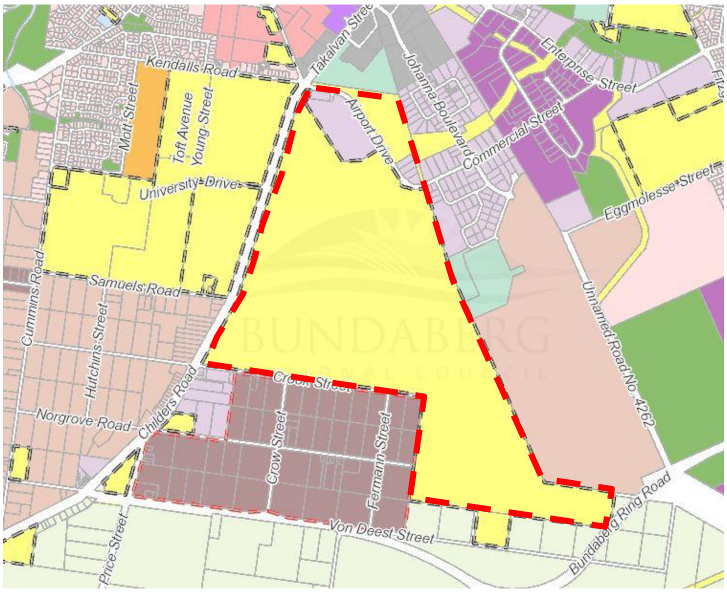


Figure 3: Bundaberg Airport Zoning
(BRC, 2015)

The purpose of the 'community facilities' zone is to provide for community related activities and facilities whether under public or private ownership. In addition, the purpose of the zone is to ensure that residents and visitors have convenient access to a wide range of community activities and facilities that service the social, educational, health, and cultural needs of the community.

The purpose, outcomes and criteria for assessment for the community facilities zone are documented within Section 6.2.14 of the new Planning Scheme.

The site is generally very flat, with a slight ridge through the centre.

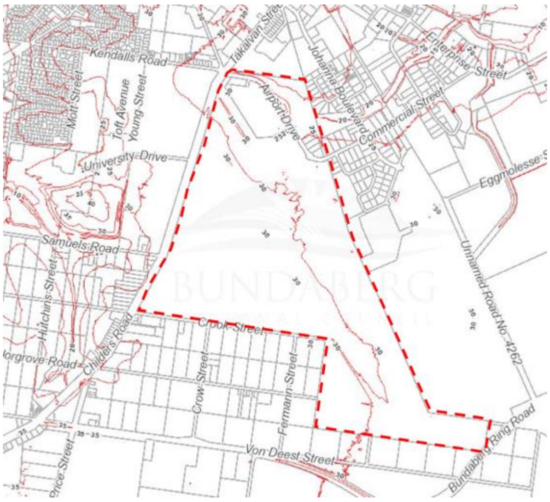


Figure 4: Bundaberg Airport 5m Contours
(BRC, 2015)

2.2.3 Surrounding land

There is limited residential land adjoining the airport. A small area of medium density residential adjoins the western side of the airport site. All other airport boundaries are adjoined by industrial, commercial, or sports and recreation zoning. Given the airports close location to the town centre, there are some residential areas further away from the airport site. The zoning in and around the airport is unlikely to create direct constraints on the airport.

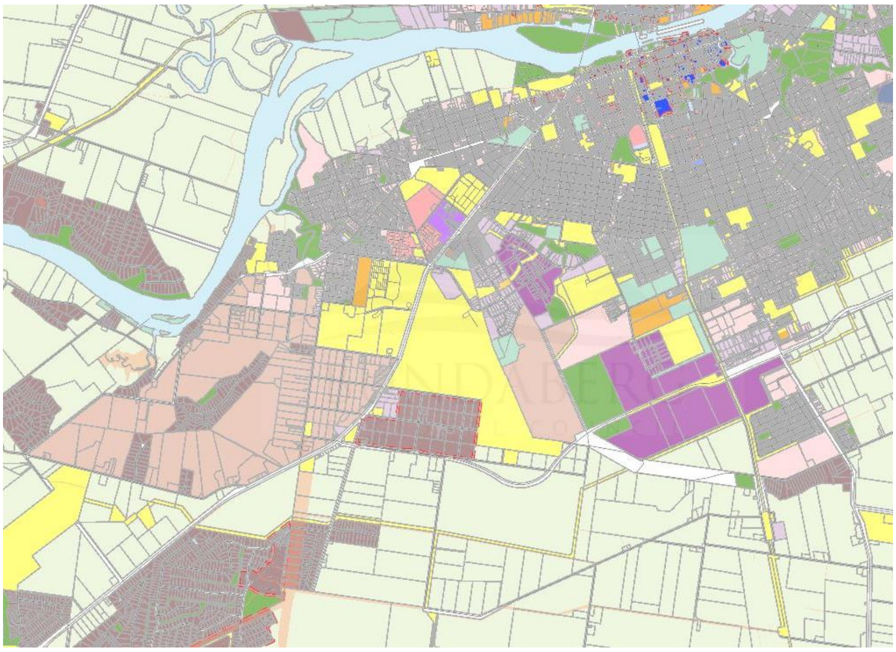


Figure 5: Zoning surrounding BRA
(BRC, 2015)

Existing development adjoining and/or near to the airport does not currently impact the airport significantly. Public Safety Zones impacting off-airport development may increase in the future if the runway is extended. This should be considered in future planning surrounding the Airport. For the timeframe of this master plan this is not expected to be a constraint.

The BRA is a largely flat and elevated site, particularly in comparison to the surrounding land. This provides the airport with a distinct advantage with regard to flooding. The airport site has historically not flooded when extreme flood events have occurred in Bundaberg (refer 2.2.8 for more information on environmental values).

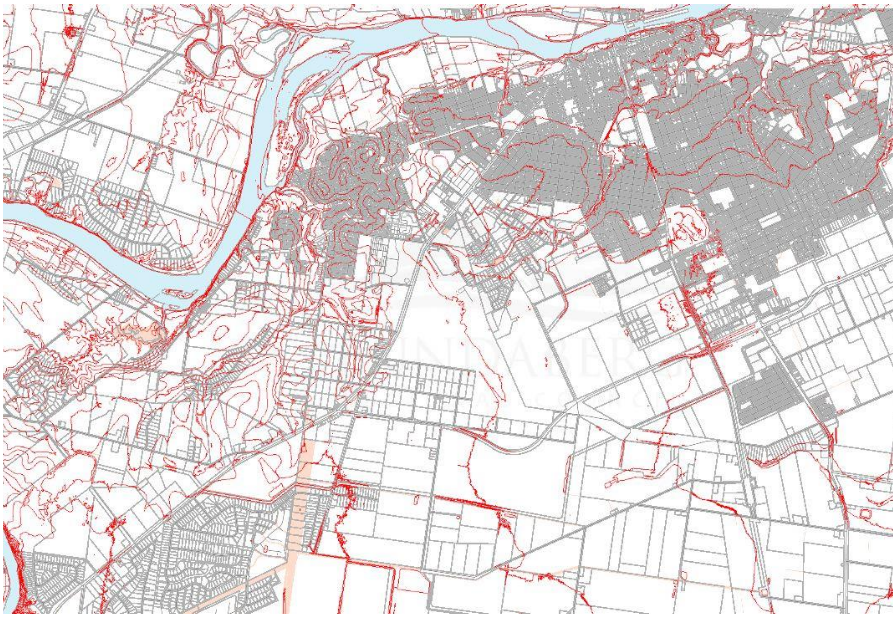


Figure 6: Contours surrounding BRA
(BRC, 2015)

2.2.4 Existing Activities

Non-aviation related

There are minimal non-aviation related activities at the BRA.

The BRC is currently developing an industrial/commercial subdivision at the Aviation and Aerospace Precinct. The Bundaberg Aviation and Aerospace Precinct (BAAP) is located in the north of the site (see Figure 3). The BAAP consists of 34 lots totalling approximately 10.9 hectares with an average lot size of 3195m^2. The development aims to capitalise on the existing industry base of the region and further encourage aviation-related development and knowledge transfer to the region. The proposed mixed use of allotments with Airport Drive and Loop Road frontages for others.

The development of this land will provide the region with employment, skill enhancement, business development, global opportunities and technological advancements; and further develop the existing aviation and aerospace supply chain. Construction and release of the land will be in stages to ensure expenditure is closely linked with sale revenue.

Aviation related

Passenger movements

The graph below depicts historical passenger movements from 1985 to 2015 based on data from the Department of Infrastructure and Regional Development.

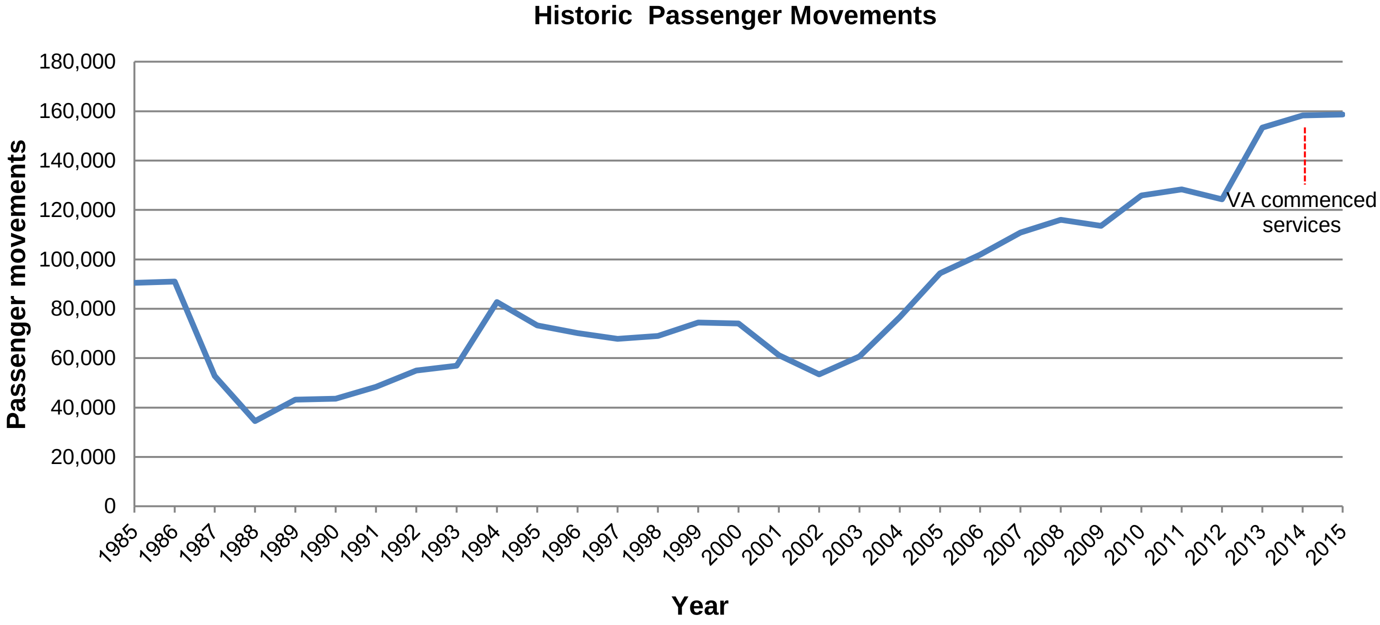


Figure 7: Historic passenger movements at BRA (DIRD)

Aircraft movements

The graph below depicts RPT aircraft movements from 1985 to 2015.

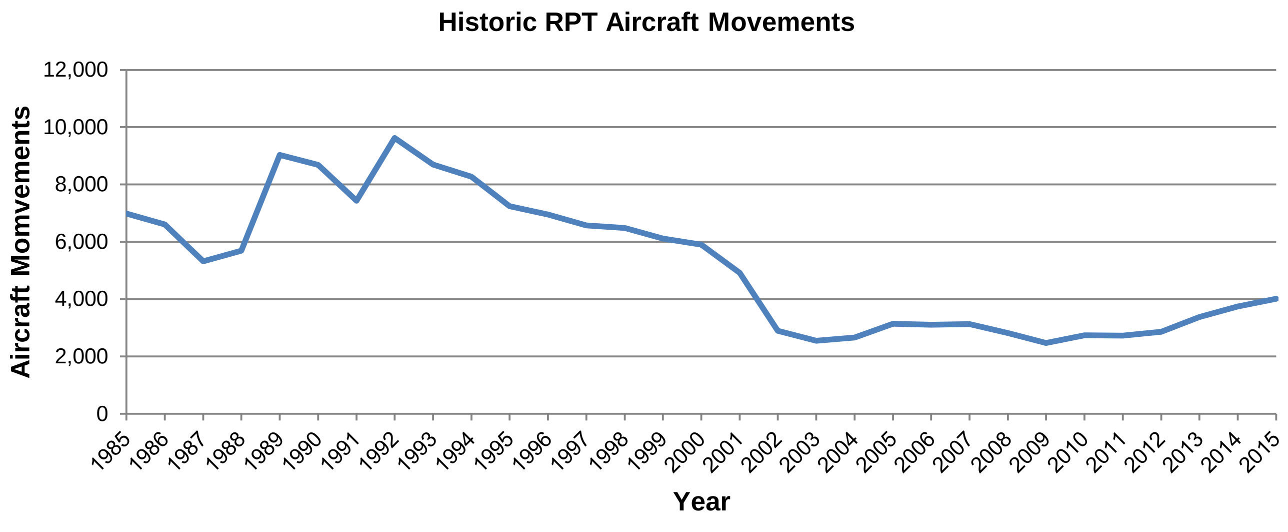
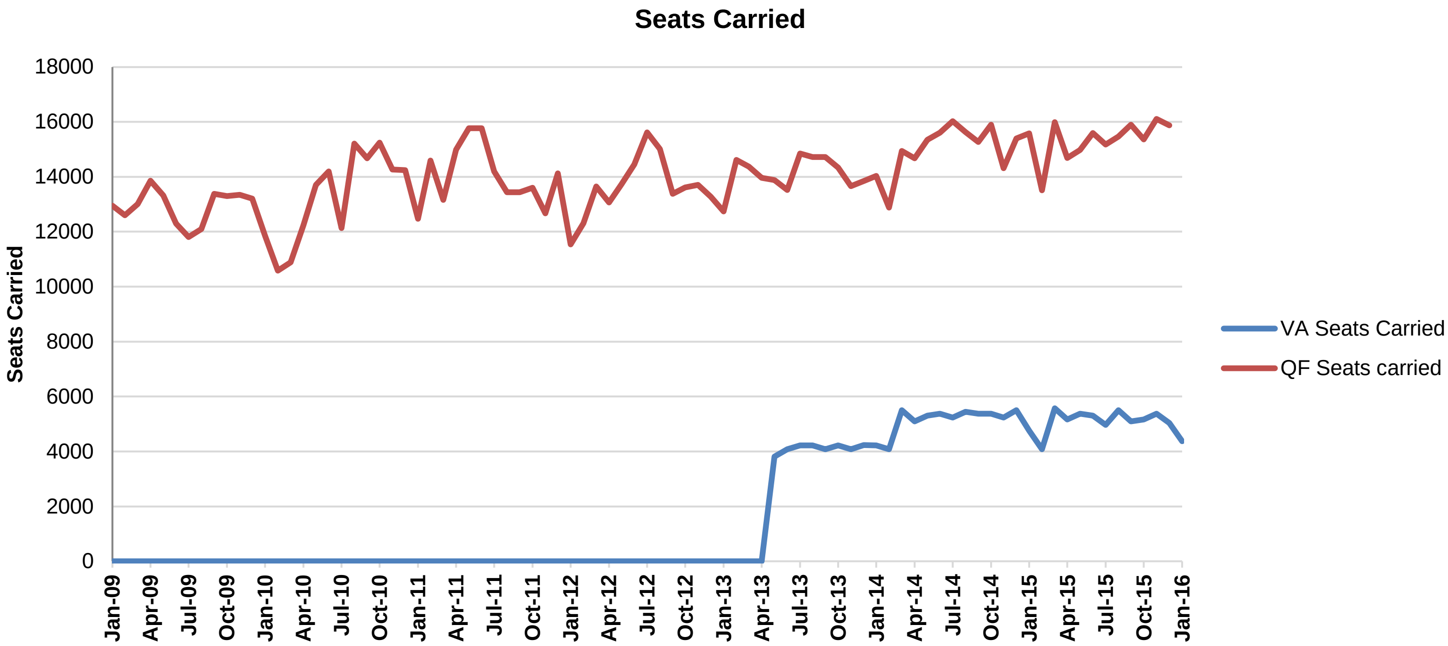


Figure 8: Historic RPT aircraft movements at BRA (DIRD)

Seats carried

The graph below depicts seats carried by Virgin Australia and Qantas from 2009-2015 (FYE). This represents the load factor of the airlines



Airline operations

The airport is currently served by up to six daily passenger flights to and from Brisbane by Qantas (five times daily), and Virgin Australia (once daily). The Figure below depicts the current standing times for Qantas (red) and Virgin (blue) at Bundaberg Airport. A full schedule of Qantas and Virgin flights (as of 8 April 2016) is presented in **Appendix A**.

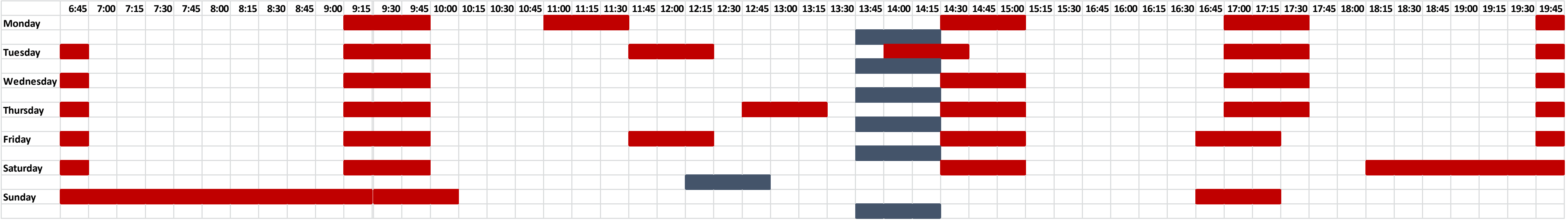


Figure 10: Aircraft standing times at BRA (as of 8 April 2016)

GA operations

The graph below depicts GA aircraft movements from 2003-2015 (FYE).

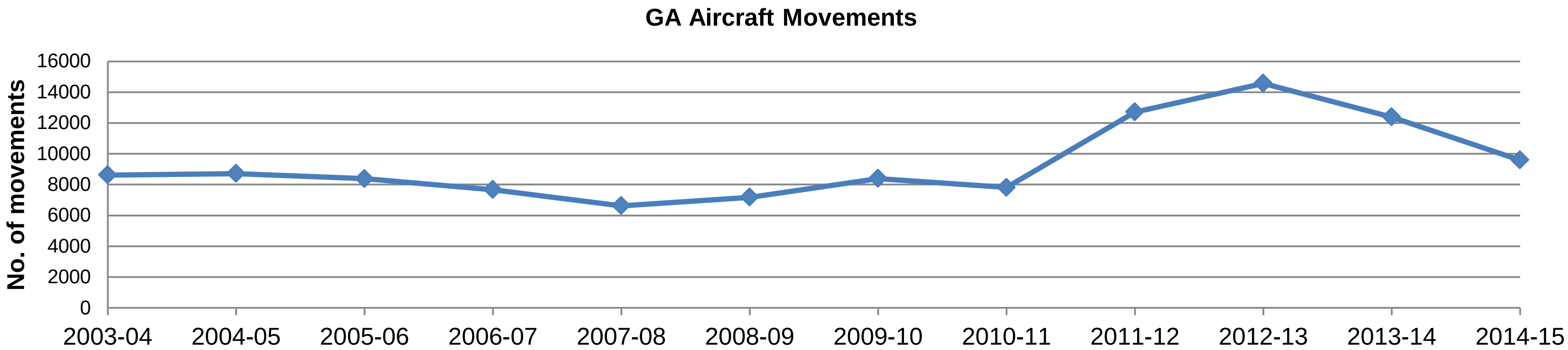


Figure 11: GA Aircraft Movements at BRA (data provided by BRC)

2.2.5 Existing Facilities

The following figure provides and overview of the existing landside facilities at the airport. This section details these further.

Figure 12: Existing landside facilities

Non-aviation related

Terminal

The airport is serviced by one terminal which was upgraded in 2009/2010. The entire terminal area accommodates departing and arriving passenger processing functions, including passenger check-in, security screening, passenger departure waiting lounge, arriving passenger bag claim, and supporting facilities such as car rentals and passenger amenities. Some key areas of the terminal are presented in the table below.

Section	Area
Departure lounge (excl. toilets and screening point)	180m^2
Toilets (departure lounge)	39m^2
Main terminal building public area	325m^2
Leased areas (off main terminal public area)	37m^2
Baggage claim hall	245m^2

Toilets and comms room (baggage claim hall)	$45m^2$
Check in hall (excl. CBS room)	$210m^2$
Offices off check in hall (inc. access hallway)	$95m^2$
Operations centre building	$84m^2$
CBS room	$77m^2$
Baggage makeup area (inc. covered and uncovered)	$163m^2$
Security screening area	$49m^2$
TOTAL	**$1549m^2$**

Table 3: Key terminal areas
(Based on Layout Plan provided by BRC)

The seating capacity of each area is as follows. The BRC intend to introduce baggage trolleys (8) which might reduce seating in check-in and baggage collection halls.

Terminal Area	Seating Capacity
Departure lounge	176
Terminal café area	62 + 44 at tables
Outdoor café area	41 at tables
Baggage collection hall	5
Check in hall	9
TOTAL	**337**

Figure 13: Terminal seating capacity

The terminal is made up of three main buildings connected by an outdoor walkway. A layout of the terminal is included in **Appendix B**. See images below for current presentation of the terminal area.

Image 1: Outdoor seating between baggage collection and check in area

Image 2: Front of terminal (landside)

Image 3: Front of terminal (airside)

Image 4: Arrivals hall and baggage claim area separated by outdoor walkway

Image 5: Check in area separated by outdoor walkway

Image 6: Security screening area

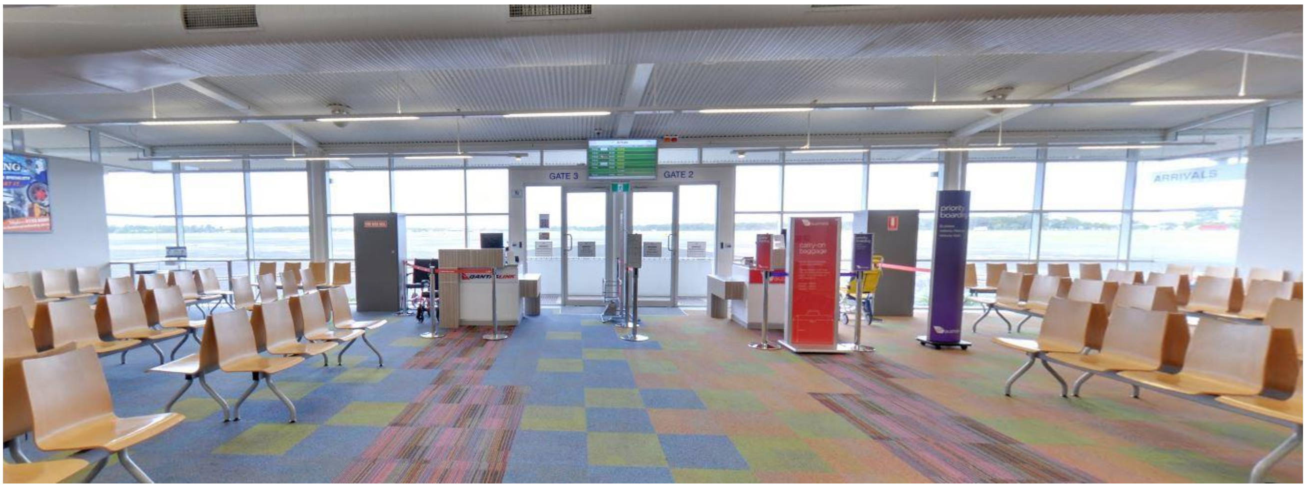


Image 7: Gates and departure lounge

Food and drink facilities

There is one cafe within the main terminal building, located prior to the passenger security screening point. There is a vending machine containing snack food in the departures area past security screening.

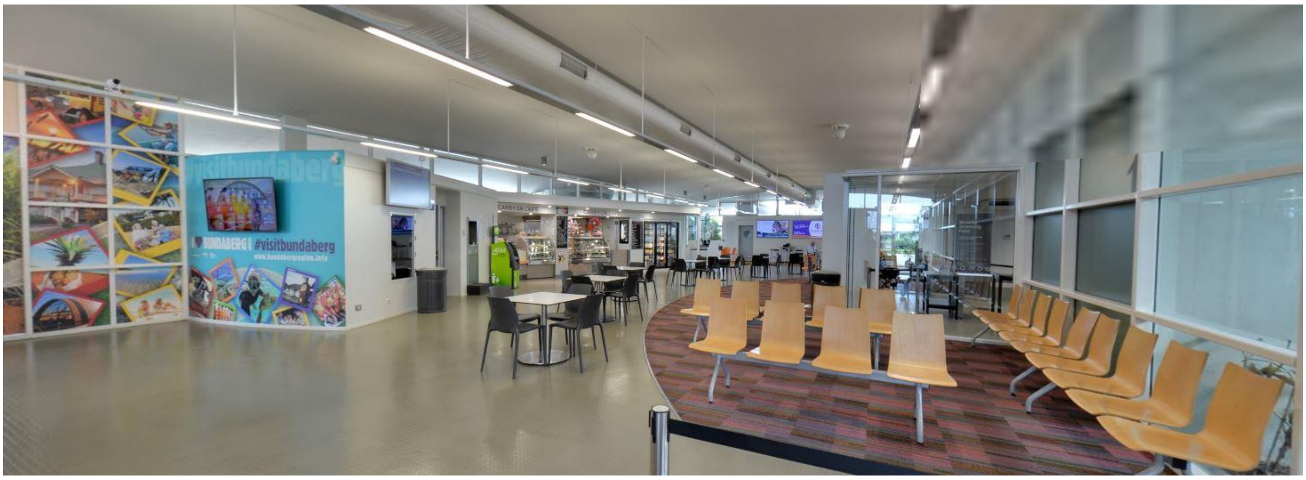


Image 8: Carry on cafe within terminal

Car Hire Facilities

In the baggage claim area there are five car rental car desks – Avis, Budget, Europcar, Hertz and Thrifty. Each company has permanent parking bays at the airport (detailed in 2.2.6).

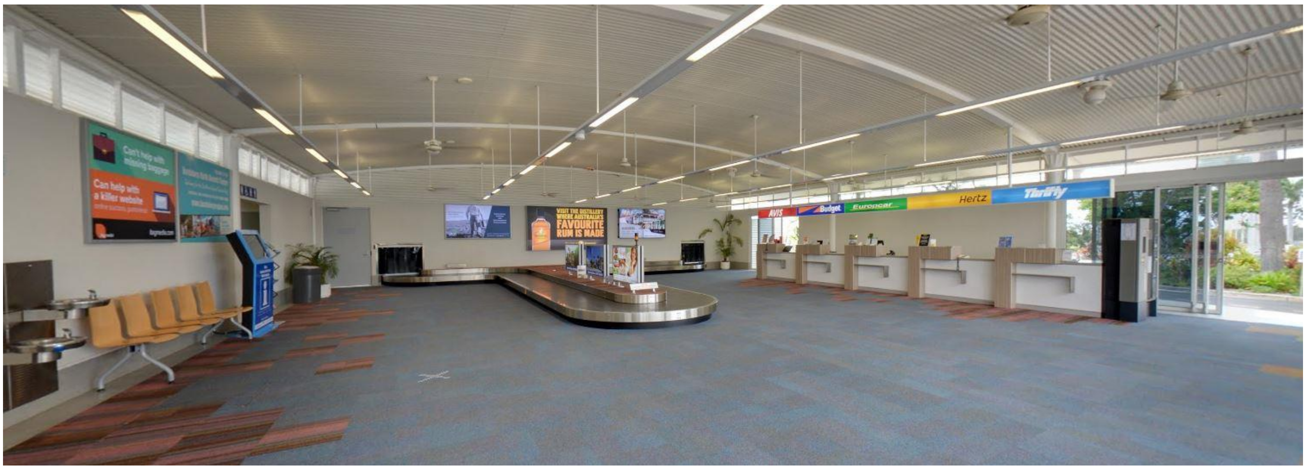


Image 9: Baggage claim and car hire facilities

Aviation related

Runways

The BRA has two runways - one main runway and one secondary runway. The table below summarises their characteristics. The Runway 14 threshold is displaced by 100m because of its proximity to the Isis Highway.

Item	14/32 Runway	07/25 Runway
Aerodrome Reference Code	3C	2
Runway Length	2000m	1128m
Runway Width	30m	30m
Surface	Asphalt	Unsealed/Grass
PCN Rating	45	Unrated
Runway Shoulder Width	7.5m (old RWY/3m on SE extension)	-

Runway Strip Width – Graded	150m	90m
Runway Strip Width – Total	150m	90m
RESA	90m	60m

Table 4: Runway Characteristics (ERSA, May 2016)

Take-off and landing distances available are as follows.

Item	Runway 14	Runway 32	Runway 07	Runway 25
TORA	2000m	2000m	1128m	1128m
TODA	2090m (1.89%)	2090 (3.83%)	1188m (3.26%)	1188m (2.95%)
ASDA	2000m	2000m	1128m	1128m
LDA	2000m	2000m	1128m	1128m

Table 5: Runway Takeoff and Landing Distances (ERSA, May 2016)

Supplementary take-off distances available are as follows.

	Runway 14	Runway 32	Runway 07	Runway 25
1.6%	1998m	1799m	816m	-
1.9%	-	1926m	970m	961m
2.2%	-	1974m	1037m	1057m
2.5%	-	2010m	1090m	1130m
3.3%	-	2072m	-	-
5.0%	-	-	-	-

Table 6: Supplementary take-off distances (May 2016)

Taxiways

There are two main RPT taxiways (B and C) that provide access from the RPT Apron to the 14/32 Runway and one Taxiway (D) from the GA area. Key characteristics of each taxiway are as follows.

	Taxiway B	Taxiway C	GA Taxiway (D)
Surface	Asphalt	Asphalt	Bitumen
Width	15m	15m	15m
Shoulder width	2m	2m	0m
Shoulder surface	Asphalt	Asphalt	-
Code	C	C	B

Figure 14: Taxiway characteristics

In addition to the above three taxiways, there are two grassed taxiways. Taxiway I provides access to the 07/25 runway to the east of 14/32 runway. The second Taxiway (D) is parallel to 07/25 and insects toward the western end 07/25. Both taxiways are suitable for aircraft below 5700kg in dry conditions.

Aprons, manoeuvring and parking

In total, there are 16 marked parking bays for RPT, Helicopter, and GA services.

The RPT Apron is Code C with an asphalt surface. See Figure 15, below, for current layout and dimensions.

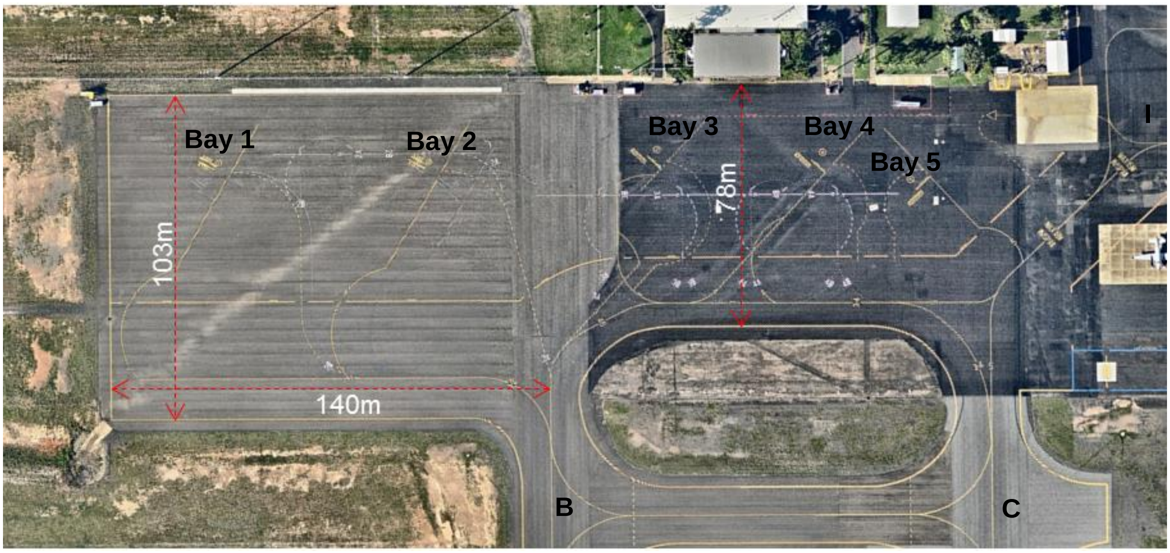


Figure 15: RPT Apron and parking bays
(Nearmaps, April 2015 imagery)

The capacity of the RPT apron parking area is as follows:

- RPT Bays 1 & 2: Max 737-800 / A320
- RPT Bays 3 & 4: Max Dash-8 Q400
- Bay 5: Max Dash-8 300

In addition, there are three concrete helicopter pads that accommodate two helicopters of 13m rotor dia and one for emergency services of 15m rotor dia. There are five tie down cables accommodation 10 GA aircraft, with space available to park another two aircraft in an ad hoc manner.

Figure 16: GA hangars, apron, and parking layout (April 2015)

Hangars

Currently, there are 19 GA hangars of various sizes and uses. The Figure above represents aerial imagery from 2015, with the most recent GA Hangar location indicated in grey. There is also one large hangar for

RFDS, CareFlight, and emergency services and a large multi user Hangar 161. In addition, there are three maintenance Hangars on the eastern side of the GA area housing Jabiru and Microair.

Aerodrome lighting

The table below depicts the current aerodrome lighting at BRA.

Runway	Taxiway	Apron
LIRL single stage	Centreline lighting on taxiway B and C only	Bays 1 and 2 – Metal Halide @ 20lux Bays 3 and 4 – LED @ 20lux Bay 5 – no bay-specific lighting

Figure 17: Current aerodrome lighting at BRA

As outlined in the GA Mini Master Plan Review (2011), night time GA operations are conducted by emergency authorities. As such, taxiways within the GA area are not lit. There is requirement to provide taxiway lighting for GA aircraft that operate under Visual Flight Rules (VFR).

PAPI lighting is also available.

Navigation aids

There is a non-directional beacon (NDB) operated by AirServices Australia. This has been relocated since the previous master plan (2005).

There is also an aerodrome rotating beacon at the BRA which is activated with runway lights.

2.2.6 Ground transport access

The Bruce Highway is approximately 50km west of the airport. The airport site is accessed by two roads – Airport Drive and Commercial Street. Airport Drive connects from the north of the site and is accessed off the Isis Highway, approximately 1km from the airport terminal. Commercial Street enters from the north east of the site and is a main connection into Bundaberg city centre.

There is an scheduled airport bus shuttle service. There is currently no public bus connection to the airport, the closest stop being the University located on the north-west of the airport site, without direct or nearby access to the terminal.

There are two car parking areas to the north of the terminal and one premium car parking area located directly at the front of the terminal. There is one pick-up/drop-off and taxi area which loops around the carpark to the landside frontage of the terminal. Figure 18 identifies these key areas.

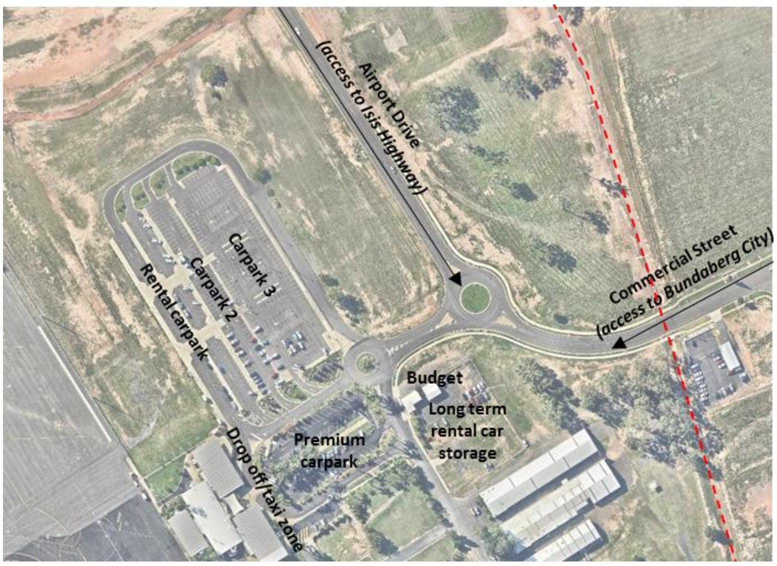


Figure 18: Ground transport overview

Carparks one and two are interconnected and contain 296 bays, of which 11 are for disabled drivers. The total area of these carparks is 16,100m^2. The premium carpark area contains 67 bays, 3 of which are reserved for disabled drivers. The area of the premium carpark is 4,000m^2.

The rental parking area contains 51 bays (Avis 26, Hertz 10, Budget 6, Thrifty 5, Europcar 4). There is also a shared car park (with no bay parking markings) to the east of the terminal, which is not fully leased (labelled ‘long term rental car park). The car park contains 39 leased bays (Avis 20, Hertz 10, Budget 3, Thrifty 2, Europcar 4). Total capacity for this area is 60 bays.

2.2.7 Utility Services

The airport is serviced by water, sewerage, electricity, and telecommunications reticulated from the city supply.

2.2.8 Environmental Values

Flood

Based on historical flood events and resulting data adopted by the State Government and BRC, there is no significant flood risk within the airport site. In the north of the site, the BRC mapping identifies a ‘Flood Hazard Area’ (localised DFE from Saltwater Creek) (see **Appendix C**). The SPP mapping tool does not identify any flood risk within the site (see **Appendix D).** Further investigation will be required when considering development options at the airport site with regard to specific sites and flood mitigation requirements.

Notably, there is a large bio retention area on the eastern side of Airport Drive with significant capacity for flood mitigation.

Flora and fauna

The SPP identifies one minor watercourse with regulated vegetation within the airport site (see **Appendix E**). The Department of Natural Resources and Mining vegetation management report for the airport site and surrounds identifies small areas in the south of the site which contain some remnant vegetation (of least concern) (fauna). In addition the report identifies a high risk area in the west of the site for protected plants (flora). See **Appendix F** for key maps taken from the report. Further investigation will be required when considering development options at the airport site with regard to specific species and protection laws. The SPP mapping identifies important agricultural areas adjoining the airport site (**see Appendix H**). The impact of any airport operations should consider these areas.

In accordance with ICAO Annex 14, BRA has developed a Wildlife Hazard Management Plan (WHMP) to define the risk that wildlife pose to safety for air traffic at the Airport and to set objectives, performance indicators and procedures in place for the systematic management of that risk.

Bushfire risk

The site is not directly at risk of bushfire hazards. The SPP maps identify minor ‘potential impact buffer’ areas in the south and east of the site (**see Appendix G**).

Hazardous substances

Fuel storage facilities on within the site are considered a hazardous substance and must be treated as such when considering development. The aircraft refuelling facilities are duly licensed and meet SAA Codes.

Soil

Based on mapping by the Queensland Government, the soil orders dominant within the airport site and surrounds are Calcarosols and Kandosols (see **Appendix I** for QLD soils map).

Calcarosols are lime-rich soils with sandy or loamy textures that may become more clayey with depth. They cover less than 0.5% of the state and occur in the arid western areas of Queensland; on calcium-rich sedimentary rocks, limestone and windborne deposits.

Kandosols are red, yellow and grey massive earths. They generally have a sandy to loamy-surface soil, grading to porous sandy-clay subsoils with low fertility and poor water-holding capacity. A wide range of crops can be grown on these soils where rainfall is higher or where irrigation is available.

Based on SPP Mapping, Queensland Globe data and BRC Mapping, there is no presence of acid sulphate soil in the airport site.

Air quality

There are no known air quality issues with the exception of occasional dust generation.

2.2.9 Heritage Values

There are no Queensland Heritage sites registered within or adjacent to the airport site by the Department of Environment and Heritage Protection. This includes the three categories of State Heritage Place, Archaeological Place, and Protected Areas.

In addition to the State Registry, the BRC has developed a Local Heritage Register. Within the Local Heritage Register, there is a listing of heritage significance located within the airport site (see **Appendix J** for map location). The report detailing the Bundaberg Airport WWII Features is included as **Appendix K**. It is not expected that this heritage site will affect development at the airport in the foreseeable future.

2.3 SWOT ANALYSIS

2.3.1 Strengths and advantages

- Minimal environmental constraints;
- Site already allocated for future expansion of the terminal;
- Adequate car parking areas for future growth of airport;
- Runway infrastructure is capable of handling forecast movements and aircraft design;
- Terminal is modern, adaptable design;
- Limited residential development nearby which minimises possible noise conflict;
- Strong existing tourism sector – Mon Repos Turtle Centre, access to the Southern Great Barrier Reef (by boat and plane), Bundaberg Rum distillery;
- Minimal short term need for significant financial investment in airport infrastructure (both landside and airside);
- Strong existing GA component;
- Existing regular daily services;
- Close proximity to Bundaberg CBD;
- Located within the centre of the Wide-Bay catchment area;
- Diverse uses of airport – RPT usage not reliant on one industry; and
- Provides gateway to Southern Great Barrier Reef.

2.3.2 Weaknesses and constraints

- Lack of public transport connectivity to airport;
- Current terminal configuration suffers congestion during delays;
- Lack of existing serviced land; and
- There is a shallow commercial property market in Bundaberg.

2.3.3 Opportunities and prospects

- Increase PAX volumes will likely drive airport revenue. i.e. landing fees, carpark revenue;
- Ample landside development opportunities;
- Large plasterboard manufacturing plant may impact airport usage;
- Large amounts of land within airport site which can be commercially developed in the future;
- Oil prices are one of the major airline costs. Long term oil price reduction will mean cheaper airfares;
- Tourism industry segment for the Southern Great Barrier Reef has great potential to grow;
- A weaker Australian dollar will likely stimulate domestic tourism travel; and
- The airport has prime airside land with apron frontage.

2.3.4 Threats and risks

- Strength and proximity of Hervey Bay (Fraser Coast) airport;
- Some adjoining residential development;
- Change in key fundamentals may dampen growth. i.e. exchange rate, seat capacity; and
- Any upgrade of the Bruce Highway or rail infrastructure going north and south could reduce travel times and cause a modal shift away from airport usage.

2.3.5 Summary of SWOT analysis

The existing airside infrastructure has sufficient capacity to provide for the planning period of this master plan. Aside from some maintenance, there is not expected to be significant outlays required for widening, lengthening, or strengthening the runways, taxiways, and/or aprons. Maintenance will be required to ensure continued serviceability of infrastructure. Any new construction of airside infrastructure will only be required once triggered by commercial development within the BAAP.

There is sufficient land which has been protected for future terminal expansion which will suffice for the ultimate development. There is a strong existing tourism market in Bundaberg and the airport does not rely on one industry for RPT movements (refer 2.1.3 for breakdown of employment distribution). This is a particular strength when compared to other regional airports given the current downturn in the mining industry in Australia. Given the airports current characteristics and capacity, the council has the ability to plan for the long term future of Bundaberg Regional Airport to grow with the region in a cost effective manner.

2.4 STRATEGIC VISION AND OBJECTIVES

The vision and objectives for the Airport reflects the Bundaberg Region 2031 vision and values:

- *A vibrant, inclusive, and caring community;*
- *A sustainable, well managed and healthy environment;*
- *A strong and sustainable economy; and*
- *A responsible, cohesive, sustainable, ethical, and accountable governance framework.*

2.4.1 Strategic vision

Bundaberg Regional Airport will continue in its role as a gateway for the Southern Great Barrier Reef. The airport will balance the needs of the airport users and the community, facilitate and support regional economic growth, and minimise its environmental impacts. Airport operations will be focused on long term financial sustainability, a consistently high level of safe airport operations, and innovative responses to environmental challenges. Management of the airport will provide for appropriate infrastructure that meets the region's current and future needs in the most cost effective and sustainable manner.

2.4.2 Objectives

- Cater for projected passenger and aircraft movement forecasts on both airside and landside;
- Continue to engage with key stakeholders, both internal and external to the airport;
- Establish innovative environmental protection measures;
- Efficiently develop existing land opportunities;
- Engage with industry to maximise benefits of future regional growth; and
- Maintain compliance safety standards required.

2.5 CRITICAL AIRPORT PLANNING PARAMETERS

2.5.1 Regular Passenger Transport Forecasts

During the preparation of scenarios Tourism Futures International (TFI) consulted with representatives of the Qantas and Virgin Groups. TFI also:

- Reviewed the traffic history available for BRA and other airports serving similar functions across Australia.
- Assess the significance of traffic drivers.
- Reviewed the general aviation and business environment and current airline schedules.
- Developed a number of models linking drivers and traffic.

In the process of model development TFI tested a number of variables to assist in explaining traffic behaviour at BDB. These are listed in Table 3.1. Note that Gross Regional Product (GRP) was not included in the modelling because it was not available for a long enough period.

Variable name	Description	Source
GDP	Australian real Gross Domestic Product (GDP) which represents the effect of tourist income and population	ABS
Queensland GSP	Queensland Gross State Product (GSP)	ABS
Fare	Full economy fare in real terms	BITRE
Best Fare	Best discount fare in real terms	BITRE
Cost	Domestic travel and holiday accommodation cost index	ABS
Exchange Rates	Australian and US exchange rate	Reserve Bank
Ansett Collapse	Dummy variable for Ansett demise, which has value of 1 for 2002 and zero elsewhere	As defined
Passengers per Aircraft Movement	Divided passengers by aircraft movements	BITRE
ASKs	Airline capacity in seat kilometres and number of seats respectively	BITRE, Qantas data book and Virgin annual reports

Table 7: Potential Explanatory Variables (TFI based on BITRE data)

The main quantitative influences on traffic growth are as follows:

- Economic factors – TFI found Queensland GSP is a major driver. A 1 percentage point movement in Queensland GSP leads to a 1.15 percentage point increase in BDB passengers.
- Fares - TFI used the BITRE best discount airfare as a proxy for fares. A 1 percentage point decrease in real (inflation-adjusted) fares leads to a 0.5 percentage point increase in BDB passengers.

Assumptions for movements in these factors drive the Central projections. Variations in the Central assumptions for these drivers are used to drive the High and Low projections. The likely growth path for airlines is as follows:

- Initially increase passenger seat factors. Passenger seat factors are assumed to increase from 63% in 2014/15 to 70% by 2025/26.
- Then increase frequency of services.

Aircraft projections assume a continuation of the turboprop aircraft currently used by Qantas and Virgin Groups over the forecast period.

2.5.2 Forecast summary

The Central, High, and Low passenger scenarios are summarised in the Figures below. The graphs also provide projections for RPT aircraft movements. Given the uncertainties associated with passenger demand, there is a need to review the outlook periodically and particularly prior to any specific infrastructure development and investment.

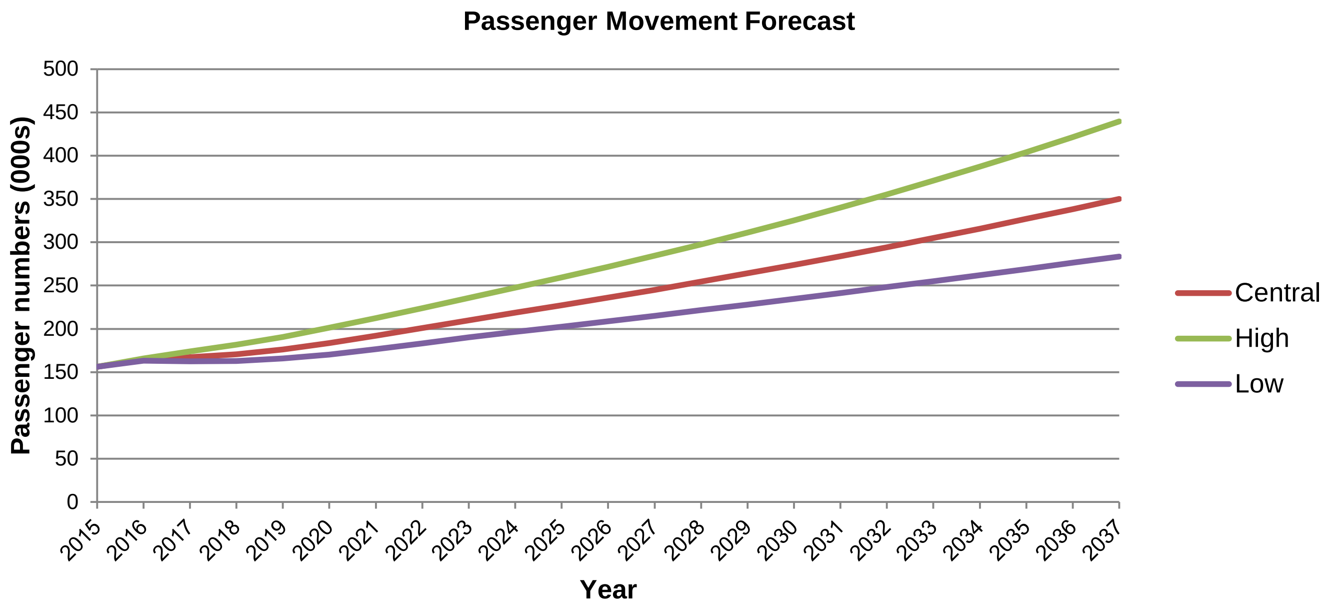


Figure 19: RPT Forecasts (TFI)

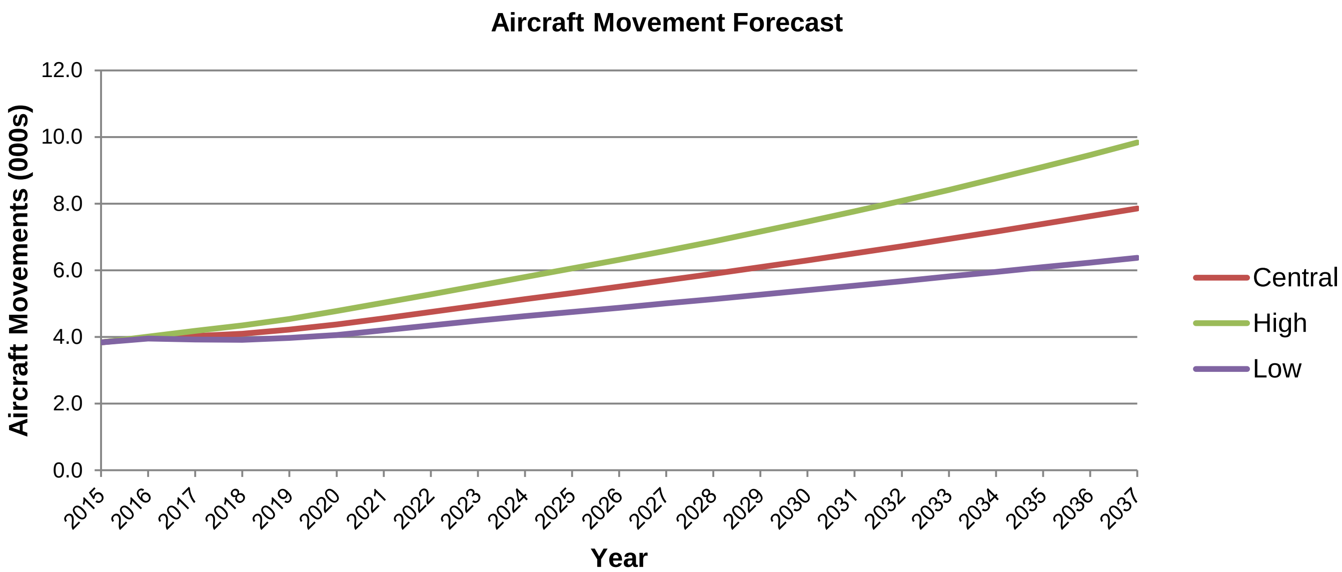


Figure 20: Movement Forecasts (TFI)

2.5.3 Freight

Existing freight to and from Bundaberg Regional Airport is either transported via smaller aircraft within the GA area, or in the hold of RPT aircraft through Qantas and Virgin Australia.

Australian Context

Within Australia, airfreight is less than 0.1% of volume but 21% of value. Within Australia, Sydney is Australia's largest import/export airport for freight as shown on Figure 21, below. Airfreight to and from Australia is predominately carried in RPT aircraft.

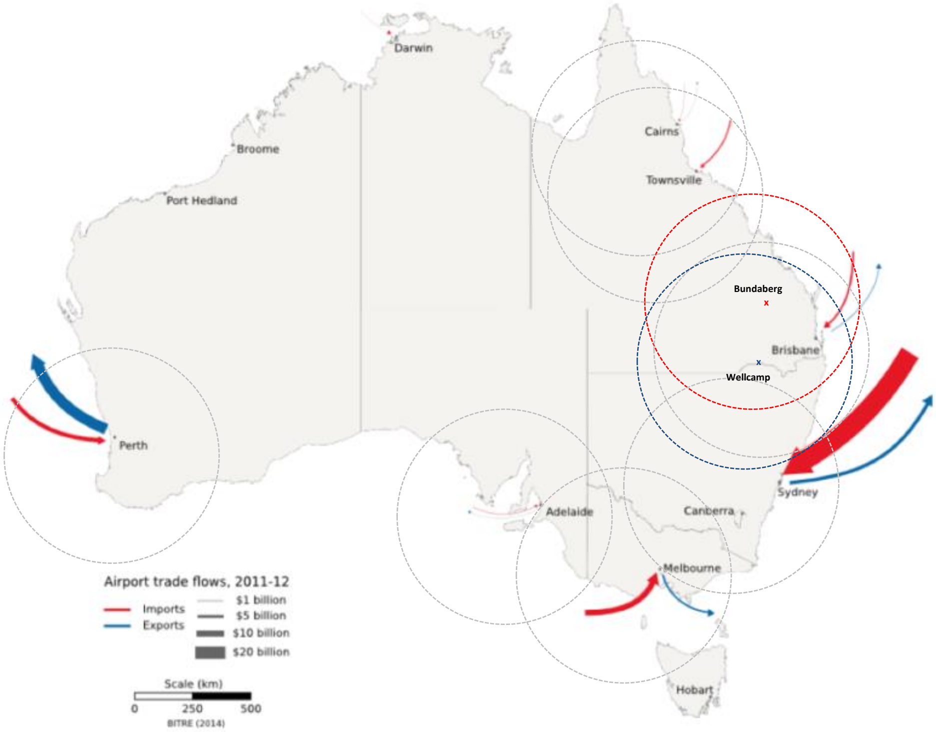


Figure 21: Freight hubs within Australia (500km radius indicated)

Full freighter service

There are minimal scheduled full freighter services into Australia. Brisbane Airport has no scheduled full freighter services but carries freight within the hold of passenger aircraft. Sydney airport has approximately 8,700 annual movements. The reason is the volume of regular passenger aircraft movements, the cost of airfreight and the competitive price and technology of sea freight. Scheduled full freighter services tend to operate between cities where there is a consistent transfer of high value goods between two destinations. Nonscheduled full freighter services are used for the transport of goods of high value or delivery is time critical such as moving livestock, perishable foods, etc.

TAG understands that a weekly full freighter service from Wellcamp to Hong Kong may also commence in late 2016.

Capacity and comparison

The most cost efficient and effective method for accessing domestic markets is achieved by road transport. Modern road freight with high technology cold storage trailers collecting at the farm gate and delivering directly to capital city produce markets is cheaper than air freight with far better quality control. Similarly, for accessing international markets it is more efficient and cheaper to move freight by road to a capital city airport such as Brisbane and Sydney and then use those airport's extensive international connections, assuming air freight is the most viable mode of transport.

	Bundaberg	Brisbane	Sydney
Pax (total) ***Forecast***	156,235 *326,918 (2035)*	17,000,000 (D) *4,500,000 (I)*	26,000,000 (D) *13,000,000 (I)*
Runway (l)	2,000m	3,500m	3,962m
Runway (w)	30m	45m	45m
Full freighter movements	0 scheduled	0 scheduled	8,500
Freight Throughput	3,000 tonnes (VA) 15,000 tonnes (QA)*	160,000 tonnes	700,000 tonnes

Table 8: Freight airport benchmarking (BRA, BAC, SAA)

Qantas freight movements depicted is only an estimation based on Virgin movements proportionate to RPT movements.

An analysis of freight facility requirements based on forecasts for BRA is provided in the Facilities Development Plan.

Aerodrome Reference Code System

One of the most important elements of the CASA Manual of Standards Part 139 (MOS) is the Aerodrome Reference Code system. In this regard the MOS states:

> *Australia has adopted the International Civil Aviation Organisation (ICAO) methodology of using a code system, known as the Aerodrome Reference Code, 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: element 1 is a number related to the aeroplane reference field length; and element 2 is a letter related to the aeroplane wingspan and outer main gear wheel span. A particular specification is related to the more appropriate of the two elements of the Code or to an appropriate combination of the two Code elements. The Code letter or number within an element selected for design purposes is related to the critical aeroplane characteristics for which the facility is provided. There could be more than one critical aeroplane, as the critical aeroplane for a particular facility, such as a runway, may not be the critical aeroplane for another facility, such as the taxiway.*

The CASR and MOS are the key documents to be referred to when designing an airport/aerodrome and the Aerodrome Reference Code system forms a critical starting point for the design process.

The Aerodrome Reference Code is based on the characteristics of an aircraft not the airport. Once the critical aircraft (or design aircraft) is determined then the aerodrome facilities are designed and built to meet those characteristics. The table below indicates the aircraft characteristics that determine the Aerodrome Reference Code.

Aerodrome Reference Code				
Code Element 1		**Code Element 2**		
Code number	**Aeroplane reference field length (ARFL)**	**Code letter**	**Wing span**	**Outer main gear wheel span**
1	Less than 800m	A	Up to but not including 15m	Up to but not including 4.5m
2	800m up to but not including 1200m	B	15m up to but not including 24m	4.5m up to but not including 6m
3	1200m up to but not including 1800m	C	24m up to but not including 36m	6m up to but not including 9m

4	1800m and over	D	36m up to but not including 52m	9m up to but not including 14m
		E	52m up to but not including 65m	9m up to but not including 14m
		F	65 up to but not including 80m	14m up to but not including 16m

Table 9: Aerodrome Reference Code
(MOS Part 139)

The Code number for element 1 of the Aerodrome Reference Code is determined from column 1 of the above table. The Code number corresponding to the highest value of the aeroplane reference field lengths for which the runway is intended must be selected.

"Aeroplane reference field length" is defined in the MOS as:

> *The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.*

As noted in the MOS Part 139:

> *The determination of the aeroplane reference field length is solely for the selection of a Code number and must not be confused with runway length requirements, which are influenced by other factors.*

The Code letter for element 2 of the Aerodrome Reference Code is determined from column 3 of the above table. The Code letter, which corresponds to the greatest wingspan, or the greatest outer main gear wheel span, whichever gives the more demanding Code letter of the aeroplanes for which the facility is intended must be selected.

Unless otherwise agreed by CASA, aerodrome operators are required to maintain the airport's runways and taxiways in accordance with the standards set out in the MOS Part 139 applicable to the Aerodrome Reference Code for that runway or taxiway.

2.5.4 Selected design aircraft

Determining runway length, width and strength for an airport needs to be based on the critical aircraft that are likely to use the airport in the future. Typically this is based on RPT aircraft. Notably, the design aircraft for the upgrades undertaken at BRA in 2009 was B737-800.

Table 10 shows the indicative characteristics of the aircraft design currently operating at BRA as well as that of the B737-800. (Please note this is for indicative purposes only. Specific values for particular aircraft should be obtained from the aircraft operator or the aircraft manufacturer).

Aircraft	Seats	ARFL (m) *	MTOW (kg) *	ACN *	CODE
Q-400	74	1354	29347	16.5	3C
Q-300	50	1122	18642	10	2C
ATR 72-600	68	1165	21566	12	3C
B737-800	180	2058	72000	40	4C

Table 10: Aircraft design characteristics
(Virgin fleet, Qantas fleet, AAA Guidelines)

* ARFL = Aeroplane reference field length

* MTOW = Maximum take-off weight
* ACN = Aircraft Classification number. The ACN is based on the aircraft's MTOW on a flexible pavement with a sub-grade rating of "B".

The largest types of aircraft currently operating worldwide are Code F aircraft. The AAA advises that when planning an international airport it is appropriate to adopt the Code F design aircraft. However, for regional airports with existing or proposed RPT operations it is likely that a Code C design aircraft will suffice in most instances.

It is also necessary to consider aircraft length, which is not part of the ICAO classification system, in order to establish a design aircraft envelope for planning purposes, particularly for planning apron areas. Over time many aircraft types have stretched in length to provide greater carrying capacity.

2.5.5 Navigation Systems

An Instrument Approach Procedure is defined in the MOS 139 as *"the procedures to be followed by aircraft in letting down from cruising level and landing at an aerodrome. (A series of predetermined manoeuvres by reference to flight instruments for the orderly transfer of an aircraft from the beginning of the initial approach to a landing, or to a point from which a landing may be made)."*

There are two methods for executing instrument approach operations:
- A two-dimensional (2D) instrument approach operation, using lateral navigation guidance only; and
- A three-dimensional (3D) instrument approach operation, using both lateral and vertical navigation guidance.

Bundaberg Regional Airport is currently a non-precision approach (NPA) procedure aerodrome. This means it operates with an instrument approach procedure designed for 2D instrument approach operations.

One of the following types of runways intended for the operation of aircraft using instrument approach procedures:
- Non-precision approach runway. An instrument runway served by visual aids and a non-visual aid providing at least directional guidance adequate for a straight-in approach.
- Precision approach runway (CAT I, II, or III).

The runway at BRA is a NPA runway.

The navigation systems and approach procedures to be used at the airport are an important consideration. This is because under the MOS 139, certain standards vary depending upon whether the runway is NPA or PA runway. The impact the NPA runway has on development of airside infrastructure has been considered in the Facilities Development Plan.

2.5.6 Aircraft movement area

The heart of the airport is the aircraft movement area (or airside area). This area comprises of the runways, taxiways, and aprons. Once all other critical planning parameters have been assessed it is then possible to design the movement area.

Based on the RPT forecasts within the 10 year period of this master plan, the existing aircraft movement area infrastructure (described in section 2.2.5) is expected to be sufficient. Further information on the aircraft movement areas are described in the Facilities Development Plan.

2.5.7 Pavement strength

The pavement strength rating for a must be determined using the ACN - PCN pavement rating system described in Chapter 5 of the MOS. CASA does not specify a standard for runway bearing strength, however, the bearing strength must be such that it will not cause any safety problems to aircraft.

The PCN of Runway 14/32 is 45/F/C/1410(205PSI)/T Sealed.

2.5.8 Aviation support and landside facilities

Major aviation support facilities that need to be considered if the aircraft movement area and pavement strength are updated include:

- Control tower;
- Navigation aids;
- Aerodrome lighting;
- Meteorological facilities;
- Aircraft hangars;
- Cargo facilities;
- Rescue and firefighting facilities;
- Emergency small aircraft and helicopter facilities;
- Fuel facilities; and
- Access roads and car parks.

Each aviation support and landside facility will have particular requirements and they should be sited in an appropriate location for aircraft operations and airport user needs. The Facilities Development Plan (Section 3.2) describes the future requirements for these support facilities based on forecasts and regulatory requirements.

2.5.9 Passenger terminal

Passenger terminals consist of several distinct functional areas where core processing of departing or arriving passengers or baggage is conducted.

A number of approaches exist for estimating the relevant design loading on various elements. The common fundamental principle is that each of these processes can be analysed in terms of the number of users (passengers or bags) demanding 'service' over a period of time, the capacity of the facilities, and personnel to serve this demand.

At a conceptual level, the 'busy-hour rate' is often used to approximate the complex and often highly variable flow of passengers (and visitors) through a terminal. At relatively high overall flow rates, the busy-hour rate used in combination with an assumed dwell time can provide a reasonable representation of passenger demand. However, in cases where flows vary significantly over shorter time periods, this simplification can under-estimate the necessary space required to deliver a particular passenger perception of service quality. Furthermore, due to interactions between sequential processes, a single busy-hour rate does not necessary apply to all of the functional areas. For these reasons, in relation to Bundaberg Regional Airport, some additional consideration has been given to the current terminal capacity and a growth escalation applied, which is reflective of future passenger forecasting.

Previous planning work has identified several scenarios with numbers of assumed busy-hour passengers varying from 92 – 185 passengers in the peak hour. In order to validate the spatial planning, a notional future peak-period flight schedule has been developed. The schedule was based on the existing weekly flight schedule, with the number of flights increased under a central case, high case and low case scenario in order to deliver the long-term traffic projections of between approximately 297,000 and 450,000 annual passengers. The assumed peak hour demand (based on current aircraft type) on the terminal facilities are indicated in the Tables below.

Assumed Peak Hour Terminal Demand Low					
Aircraft Type	Number	Seats	LF	Pax	Year
ATR-72 & Q400	2	140	61%	85	2016
ATR-72 & Q400	2	140	63%	88	2026
ATR-72 & Q401	2	140	66%	92	2037

Table 11: Peak Hour Demand – Low

Assumed Peak Hour Terminal Demand Central					
Aircraft Type	Number	Seats	LF	Pax	Year
ATR-72 & Q400	2	140	61%	85	2016
ATR-72 & Q400	2	140	63%	88	2026
ATR-72 & Q401	3	210	66%	139	2037

Table 12: Peak Hour Demand – Central

Assumed Peak Hour Terminal Demand High					
Aircraft Type	Number	Seats	LF	Pax	Year
ATR-72 & Q400	2	140	61%	85	2016
ATR-72 & Q400	3	210	64%	134	2026
ATR-72 & Q401	4	280	66%	185	2037

Table 13: Peak Hour Demand - High

Forecasts for terminal expansion requirements are provided in the Facilities Development Plan (Section 0).

2.5.10 Security requirements

The table below depicts the security components installed at BRA and their lifespan information as suggested by the supplier. Within the 10 year planning period of this master plan, the passenger screening wands, explosive trace detection units, and the x-ray machine are recommended to be replaced. It is worth nothing that BRA purchased the x-ray and ETD machines second hand/refurbished and are no longer supported with spare parts so it is likely they will need to be replaced sooner than the recommended replacement year.

Item	Typical lifespan	Date installed	Replacement year
Passenger screening - walk through metal detector Smiths - 02PN20	**15**	Apr-12	**2027**
Passenger screening - 2 hand held wands PD140 SVRs	**10**	Jan-08	**2018**
Carry-on baggage screening - Smiths HiScan 6046si - upgraded to the dual view HiScan 6040aX	**10**	Mar-12	**2025**
Explosive Trace Detection - 2 x Smiths Ionscan 400B ETD (used/refurbished)	**8**	Mar-10	**2018**
CBS ETD Smiths Detection X-ray machine HS 10080 EDX2is	**10**	Nov-09	**2019**
Baggage handling system - BCS - arrivals and check-in	**20**	Dec-10	**2030**
Smiths provision of 2m roller beds	**15**	Dec-10	**2025**
Combined Test Piece ATSM 792 - 01e2	**10**	Apr-12	**2022**
Explosive Trace Detection - Smiths 500DT ETD	**15**	Apr-15	**2030**

Figure 22: Security component upgrade requirmeents (supplied by BRC)

International security processes will not be required in the foreseeable future.

2.5.11 Airspace Hazards and Protection Surfaces

Development on the Airport must be carried out and constructed in a manner that does not compromise the efficiency of navigation aids or the operational capability of aircraft using the Airport. In that regard all developments will be required to give due and proper consideration where applicable to the following issues:

- Navigation Aid infrastructure safety zones and signal direction;
- Minimising sun glare from reflective surfaces;
- Wind turbulence impacts during construction and of the finished facility;
- Height limitations in respect of OLS and PANS-OPS surfaces;
- Height limitations including dishes and aerials;

- Thermal plumes or misting from roof vents; and
- Lighting that may illuminate above the horizontal. Within the approach and take-off surfaces this is more critical.

The National Airports Safeguarding Framework includes guidelines which provide proponents of development and local government with further information about how to address risk to aviation safety posed by development.

Obstacle Limitation Surface (OLS)

OLS are a number of reference geometric surfaces in airspace that determine when an object may become an obstacle to aircraft manoeuvring in the vicinity of an Airport during circling, approach, or departure. They define protection requirements for the initial and final stages of a flight. During these manoeuvres visibility must be good enough for the pilot to see and maintain visual reference to the Airport and take responsibility for obstacle avoidance and separation from other aircraft.

The objective of OLS is to define a volume of airspace in proximity to an Airport which should ideally be kept free of obstacles that may endanger aircraft in visual operations or during the visual stages of an instrument flight. Even so, the intention is not to restrict or prohibit all obstacles but to ensure that either existing or potential obstacles are examined for their effect on aircraft operations and that their presence is properly taken into account.

As the OLS are pertinent to visual operations (both day and night) it may be sufficient to ensure that the obstacle is conspicuous to pilots, and this may simply require that it be marked and/or lit. Of course each new obstacle will in some way restrict the freedom of aircraft operations and inevitably contribute to flight path congestion and delays. If an obstacle is located in the approach and take-off areas pilots will need to make adjustments to their normal take-off and landing to guarantee obstacle clearance. This may mean using less than the full runway length operationally available and may result in significant operational penalties such as fewer passengers, or less cargo less fuel, or other operational restrictions.

The most stringent requirements apply on the extended centre line of a runway in the approach and take-off areas. Depending on the type of aircraft able to use the runway, the approach and take-off surfaces may extend 15 km from the runway strip end with the edge boundaries diverging wider with distance from the runway end. At either side of the runway strip and the approach surface are two OLS components called the transitional surfaces. These are intended to protect an aircraft which encounters severe cross winds during the final phase of the approach to land and may then drift sideways as the pilot decides to ‘go around’ for another attempt (missed approach).

There are two, or in some cases three, other surfaces which provide obstacle protection for aircraft circling to land – the inner horizontal surface, the conical surface and/or the outer horizontal surface. Depending on aircraft size and the type of activities catered for by the Airport, their combined effect may extend up to 5.5 km radius of the Airport.

The State Government SPP Online Mapping details the OLS for the airport (Appendix L). Mapping included for OLS in this report is intended as illustrative only. The BRC has also published two OLS plans, one based on current operations for CASA requirements and another which presents the maximum potential development of the site for future planning purposes.

Obstacles in the vicinity of an Airport, whether they be natural or constructed may seriously limit the scope of the Airport’s operations. Most people appreciate that tall structures and Airports are basically incompatible, but they tend to consider only the immediate approach and take-off areas and of structures that are a short distance away. While this is of primary concern, it is equally true that objects up to 56km from the Airport and apparently unrelated to the runway alignment can affect aircraft approaching or departing an Airport, particularly in poor weather conditions or in instances of ‘One Engine Inoperative’ (engine failure) departures or arrivals. OLS are used to define these airspace requirements and to assess the significance of an existing or proposed object.

PANS-OPS

The PANS-OPS surfaces are based on criteria released by the International Civil Aviation Organization (ICAO) in a document named “Procedures for Air Navigation Services –Aircraft Operations” Volume II (document 8168 –PANS-OPS). Aircraft flight paths are accommodated within those unpenetrated surfaces to clear obstacles by a safe margin. All Airports which have a scheduled or regular passenger service or those which allow for “all-weather” operations MUST have such flight paths (procedures).

Aircraft not only fly in fine weather conditions, but also in weather which limits the pilot’s ability to see obstacles or the Airport. In these conditions the pilot must rely on instruments in the cockpit to provide navigation. This is called Instrument Flight and there are rules (IFR) which mandate aircraft operations. Instrument Flight Procedures (IFP) are defined flight paths which guarantee the safety of aircraft operating without visual reference, and these are developed by BRA by AirSerivces Australia in accordance with the criteria in PANS-OPS. The surfaces created to this standard offer aircraft a minimum clearance from obstacles based on statistics, weather records and aircraft performance characteristics.

For larger ports, departure procedures are created to safeguard all weather departures and to facilitate Air Traffic Control information services. Large aircraft (greater than 5700kg) must also have a safe departure path in the case of an engine failure of the critical engine after take-off. Approach procedure paths guide a landing aircraft to align with the landing runway and generally position the aircraft at a height, orientation and 3D velocity from which the pilot can make a safe visual landing, or, if unsuccessful, will allow the pilot to go around climb to a safe height to consider the next option.

Manoeuvring to align with the runway can commence as far as 56km from Bundaberg Regional Airport and forms a horizontal plane which surrounds the Airport at a safe height. Through that surface, individual surfaces descending to the runway or climbing from the runway form channels of safe heights in 3D. Where flight paths cross, the lowest individual surface is ‘critical’ and will ‘cut’ through other surfaces. With many flight paths the resulting surface will be very complex. The modelling of such surfaces can either be as individual surfaces, which are then easier to interpret, or a combined critical surface model, which has complex interactions modelled as a series of contours and intersecting planes. The latter version, although more difficult to comprehend, allows for determination of a single critical height at any particular location.

The PANS-OPS surfaces protect aircraft in all-weather operations and specifically when the ambient conditions do not allow the pilot to see the runway or manoeuvre to avoid obstacles. Because of this limitation, NO intrusion is acceptable to the PANS-OPS surfaces under ANY condition.

Hazardous lighting

The source of light emissions in close proximity to the Airport is a potential source of concern to safe aircraft operations for two main reasons. Firstly, if bright lights, such as floodlights, emit too much light above the horizontal plane, there is the possibility that a pilot can be dazzled and momentarily be unable to read the flight deck instruments or recognise the runway light. Secondly, lights might create a pattern that looks similar to approach or runway lighting and this might cause confusion for a pilot unfamiliar with the Airport. Street lighting, security lighting and illuminated sports grounds are examples that require special consideration. The problem can often be corrected by providing suitable screening or shielding of each light source.

CASA has powers to impose requirements on developers of a controlled activity (artificial lighting) to deal with lights that could be considered to cause confusion, distraction or glare to pilots and potentially endanger safe aircraft operations by prevention of clear reception of instruments and air navigation lights.

It is preferable if the lighting design can take account of these issues in advance, rather than requiring modification or the extinguishment of the light source after installation is complete.

Local authorities’ planning schemes should recognise the potential hazard of inappropriate lighting by specifying appropriate performance standards for lighting installations in proximity to Airports.

Developers/designers will need to take advice upon the zones of restricted lighting at BRC in accordance with the guidelines issued by CASA -*Lighting in the Vicinity of Aerodromes - Advice to Designers*.

2.5.12 Aircraft noise contours

Australian Noise Exposure Forecast

An Australian Noise Exposure Forecast (ANEF) is a contour map showing the forecast of aircraft noise levels that are expected to exist around an airport in the future. The ANEF computation is based on forecasts of traffic movements on an average day. Allocations of the forecast movements to runways and flight paths are on an average basis and take into account the existing and forecast air traffic control procedures at the Airport which nominate preferred runways and preferred flight paths for noise abatement purposes.

The following factors of aircraft noise are taken into account in calculating the ANEF:

- The intensity, duration, tonal content and spectrum of audible frequencies of the noise of aircraft takeoffs, landings and reverse thrust after landing (the noise generated on the Airport from ground running of aircraft engines or taxiing movements is not included for practical reasons);
- The forecast frequency of aircraft types and movements on the various flight paths;
- The average daily distribution of aircraft takeoffs and landing movements in both daytime (7am to 7pm) and night time (7pm to 7am) hours; and
- The topography of the area surrounding the Airport.

Calculation of the ANEF

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

Partial ANEFs are calculated for the frequency of number of night-time and day-time operations of each aircraft type and flight path. These calculations use a value of Effective Perceived Noise Level (EPNL) for each aircraft and takes into account all known annoying aspects in the temporal, frequency spectrum and spatial domain. The EPNL level is obtained by the algebraic addition of the maximum perceived noise level at any instant corrected by noise tonal and duration factors.

The EPNL unit is also used for the international certification of new aircraft. These Partial ANEF values are computed for each significant type of noise intrusion. The total ANEF at any point on the ground around the Airport is composed of all individual noise exposures (summed logarithmically) produced by each aircraft type operating on each path over the period of one day.

These calculated values do not take account of any background noise levels from road or rail activities.

Noise threshold levels

The effects of noise can range from minor to very serious depending on the noise level, its duration and the subject's sensitivity. Noise, by definition being unwanted sound, elicits a wide range of individual responses in the vicinity of Airports and the reasons for the differences between individuals are largely socially-based and complex to quantify. Research has indicated however, that, unlike an individual's reaction, community response to noise impact issues is more predictable.

In the area outside the 20 ANEF contour it is generally accepted that noise exposure is not of significant concern, although there will be some individual exceptions. Within the area between the 20 to 25 ANEF contour, levels of noise are generally accepted to emerge as an environmental problem, and within the 25 ANEF contour the noise exposure becomes progressively more severe. Table 11.1 compares land use to acceptable ANEF contour levels.

It should be noted that the actual location of the 20 ANEF contour is difficult to accurately define. This is because variations in actual flight paths, pilot's operating techniques, meteorological conditions and topography, all have a largely unpredictable effect on the position of the 20 ANEF contour for any given day.

Recommendations relating to land use within the ANEF contours are contained in Australian Standard AS2021-2000 "Acoustics – Aircraft Noise Intrusion – Building Siting and Construction". These recommendations are summarised in Table 14 below. This is a summary only; airport operators should consult the Australian Standard for full details of the land use recommendations, and associated notes and conditions.

Building type	ANEF Zone of Site		
	Acceptable	Conditionally Acceptable	Unacceptable
Accommodation activity (except short–term accommodation, rooming accommodation), residential care facility	Less than 20 ANEF	20–25 ANEF	25–40 ANEF
Short-term accommodation, hotel, rooming accommodation	Less than 25 ANEF	25–30 ANEF	30–40 ANEF
Educational establishment, child care centre	Less than 20 ANEF	20–25 ANEF	25–40 ANEF
Hospital, health care service	Less than 20 ANEF	20–25 ANEF	25–40 ANEF
Community use, places of worship	Less than 20 ANEF	20–30 ANEF	3–40 ANEF
Office	Less than 25 ANEF	25–35 ANEF	35–40 ANEF

Table 14: Building Site Acceptability based on ANEF Zones (as of February 2015)

Notes:

1. The actual location of the 20 ANEF contour is difficult to define accurately, mainly because of variation in aircraft flight paths. Because of this, the procedure of Clause 2.3.2 in AS2021 –2000 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.

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 14 should be used to determine site acceptability, but internal design noise levels within the specific spaces should be determined by Table 3.3 in AS2021 –2000.

This Standard does not recommend development in unacceptable areas. However, where the relevant planning authority determines that any development may be necessary within existing built-up areas designated as unacceptable, it is recommended that such development should achieve the required ANR determined according to Clause 3.2 in AS2021 –2000. For residences, schools etc., the effect of aircraft noise on outdoor areas associated with the building should be considered.

In some instances, building applications may be approved in higher noise level areas but require noise mitigation through acoustic materials. This would be on a case by case basis at the discretion of the BRC.

In no case should new development take place in greenfield sites deemed unacceptable because such development may impact Airport operations.

2.5.13 Environmental and heritage sites

No significant environmental or heritage sites were identified within the airport site during the master planning process. However, there are some heritage buildings on site (see section 2.2.9) and some environmental planning aspects affecting the airport (see section 2.2). Although these are not considerable environmental and heritage sites and will likely have minimal effect on development of the airport, they must be considered.

2.5.14 Safety Areas

Public Safety Areas (PSA)

To protect the public from the risk of an incident of an aircraft undershooting or overshooting a runway, many national authorities define an area beyond the runway end in order to enhance the protection of people and property on the ground beyond the end of a runway. These areas are provided to prevent congregation of people in areas which might subject them to increased risk of death or injury in the event of an aircraft incident. Such areas are referred to as a Public Safety Area (PSA) in Queensland. Notably, these areas are also referred to as Public Safety Zones (PSZ), as is the case throughout this master plan. The SPP explains the justification of PSAs as:

> *"The probability of an accident occurring during any single aviation operation is very low. However, an analysis of aircraft accidents reported to the International Civil Aviation Organisation since 1970 suggests most accidents that do occur, occur immediately beyond the ends of a runway—up to 1000 metres before the runway during landing or up to 500 metres beyond the runway end on take-off. During this time the aircraft is aligned with the extended runway centreline and is relatively close to the ground. PSAs define the area in which development should be restricted in order to protect the safety of both aircraft passengers, property and people on the ground in the event of an aircraft accident during landing or take-off".*

Currently there is no national regulation requiring the provision of PSAs in Australia. The Queensland government has enacted legislation relating to the provision of PSAs around airports within the state. The SPP outlines that the Queensland Government acknowledges that there are alternative methodologies for determining the dimensions of a PSA. It is currently supporting NASAG in its work to develop a nationally consistent approach for managing safety at the end of runways at Australian airports. When this work is complete, the Queensland Government will seek to incorporate the endorsed approach into the SPP as appropriate.

A PSA forms the shape of an isosceles trapezoid 1000m x 350m closest to the runway end, tapering to a width of 250m furthest from the runway (see Figure 23). It lies beneath the approach or take-off path where the aircraft is closest to the ground at the end of the runway.

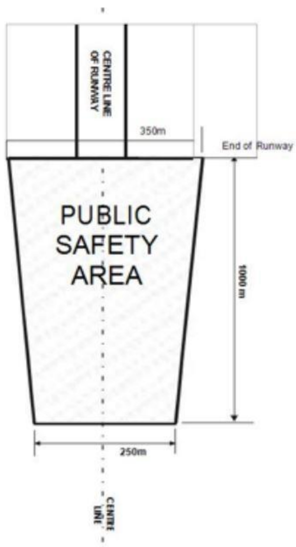


Figure 23: QLD Government PSA (SPP)

With regard to the BRA, the notional PSA at each end of the runway lies on land outside the boundary of the Airport. It is recommended that the BRA gives consideration to working with neighbouring land occupants to institute appropriate land use controls within the notional PSA at that end of the runway end to achieve the following.

Land uses recommended to be permitted under the PSA should be activities that do not attract the assembly of a large number of people, such as:

- Golf courses (not club houses);

- Agricultural operations (other than forestry or livestock);
- Plant and machinery buildings;
- Low occupancy warehousing;
- Car parking.

Land uses recommended to be discouraged, avoided or prohibited should be activities that may attract the assembly of large number of people or that have the potential to be highly hazardous in the event of an incident involving an aircraft, such as:

- Residences and public places of assembly (churches, schools, hospitals, office buildings, shopping malls etc.);
- Playgrounds, sports grounds; and
- Fuel storage facilities.

Further, the SPP dictates that local planning instruments should prohibited the following types of development in a PSA:

- Accommodation activities;
- The manufacture or bulk storage of flammable, explosive or noxious materials;
- Uses that attract large numbers of people (e.g. sports stadia, shopping centres, industrial and commercial uses involving large numbers of workers or customers);
- Institutional uses (e.g. education establishments, hospitals).

It should be noted that there are existing sports facilities and show grounds within the northern PSZ (PSA) of BRA.

Runway End Safety Area (RESA)

MOS 139, Chapter 7, describes the requirements for Runway End Safety Areas (RESA) within Australia. RESA must be provided at the end of a runway strip, to protect the aircraft in the event of undershooting or overrunning the runway, unless the runway‘s code number is 1 or 2 and it is not an instrument runway.

Previous Australian standard allows RESA to be measured from the end of the runway. RESA standards in this Section are in compliance with the current ICAO standards, including measuring RESA from the end of the runway strip. The new RESA standard shall apply to all new runways and existing runways when it is lengthened.

Operators of existing code 4 runways used by air transport jet aircraft conducting international operations must make provision to comply with the new RESA standards within five years of the promulgation of CASR Part 139.

Where it is not practicable to provide the full length of RESA, the provision may include an engineering solution to achieve the objective of RESA, which is to enhance aircraft deceleration. In the latter case, aerodrome operators will need to liaise with the relevant CASA office.

The minimum length of the RESA must be 90m where the associated runway is suitable for aircraft with a code number 3 or 4 and is used by air transport jet aircraft. In other cases, the minimum RESA length must be 60m. Notably, Bundaberg Regional Airport provides for a 90m RESA as required by CASA for the design standard aircraft B737-A320 (this permits the airport use by jet charter passenger aircraft).

The width of a RESA must not be less than twice the width of the associated runway.

3.1 LAND USE PLAN

3.1.1 Land Use Precincts Guidelines

The following precincts and guidelines have been developed in consultation with the BRC and other relevant stakeholders.

Unless otherwise agreed upon, all development within the Land Use Plan must abide by the relevant Local, State, and Federal regulation outlined within this document. All areas and access roads depicted are conceptual only. The relevant professional advice and designs must be received to ensure feasibility.

Bundaberg Aviation and Aerospace Precinct

The development area to the north of the terminal is an existing subdivided site which should remain unchanged in design, zoning and intention. This precinct is referred to as the Bundaberg Aviation and Aerospace Precinct (BAAP) and is zoned Industry under the current Bundaberg Regional Planning Scheme.

Refer to the Bundaberg Aviation and Aerospace Precinct Development Strategy (2014) for more detail on this precinct.

Future Commercial/Industrial Development Precinct

Land within the Future Commercial/Industrial Development Precinct should be utilized to support airport related uses as well as activities that may wish to be located at or near the airport for other reasons, or wish to take advantage of the location, exposure, and other attributes of the site.

Airport related activities include rental car storage areas, freight sheds, and aircraft maintenance facilities. Uses that may wish to be located at or near the airport for other reasons include offices for businesses that use the airport, general warehousing, retail fuel sales, road freight facilities. Other non-aviation related uses may include car dealerships, short term accommodation, and offices for airport related business.

Development within this area should align within the Council’s strategic intention for the Airport and broader region and would ideally be developed in collaboration with Airport managers and Council planning staff.

Community Facility Areas

The Community Facility Areas should be retained as per existing zoning of the Airport site. It is not expected that these areas of land will be needed for aviation and/or non-aviation uses within the period of this master plan. As such, these areas should be protected within the planning timeframe of this master plan to allow development to be concentrated within identified Precincts within the Airport site.

Any future development on these sites should be done so in collaboration with Council and must have a strong justification.

Bio Retention Area

The Bio Retention Area must remain unchanged for flood mitigation purposes.

Future Terminal Expansion Area

The Future Terminal Expansion Area allows for long term growth of the RPT terminal. The sizeable land allocated within this precinct will provide sufficient space for the long term development of the Airport.

Uses within this precinct should be restricted to terminal facilities and any regulatory required infrastructure provision to support this use.

Terminal design must abide by OLS contour restrictions imposed by Runway 14/32.

This precinct is consistent with that presented in The Airport Group – Technical Paper Rental Car Strategy (2014).

Future Freight Facility

This land is suitable for freight handling facilities or other uses that require apron frontage, good landside access, as well as sufficient parking area for freight trucks. In addition, it should provide for freight handling/movement devices to airside loading on GSE barrows.

Building design must abide by OLS contour restrictions imposed by Runway 14/32. In addition, the buildings should be designed in a way which complements the existing terminal.

Within the ultimate development of the Airport, further terminal expansion may be required outside the Future Terminal Expansion Area which could encroach into the Future Freight Facility Area. If this does occur, the Freight Facility could relocate to the BAAP.

Future Apron Expansion

The Future Apron Expansion Area will likely only be necessary in ultimate development of the Airport.

The development of this Apron expansion is contingent on development of Terminal Expansion, Freight Facility, and/or the need for an airside connection to the BAAP, namely the Emergency Services Precinct.

At the time of development, due consideration must be given to all regulatory restrictions for Apron Classification and design requirements.

Future Taxiway Expansion

The Future Taxiway Expansion Area allows for the long term development of taxiway infrastructure at the Airport.

The development of the Taxiway Expansion Area adjoining the Development Area is contingent on the need for a runway connection to the BAAP.

The parallel taxiway is considered an ultimate development design and is contingent on a significant increase in RPT movements and/or aircraft design requirements, or a significant increase in runway occupancy time by GA aircraft (back tracking), causing RPT aircraft delays.

At the time of development, due consideration must be given to all regulatory restrictions for airfield, runway, and taxiway classification and design requirements.

Future GA Hangars (Mini Master Plan)

The Future GA Hangars within this precinct are reflective of the GA Mini Master Plan (2011) produced by Aurecon, Option A.

Development of GA Hangars within this precinct must comply with BRA requirements and any relevant Local, State, and Federal legislation.

This precinct is expected to provide sufficient supply of GA Hangars for the planning period of this master plan.

Future GA Expansion Area

The Future GA Expansion Area identified within the Land Use Plan is intended as an optional further development area for GA Hangars once existing GA Master Plan allocation is exhausted.

The development of this precinct would be contingent of the Taxiway/Apron Expansion Areas for connection to the Runway 14/32.

For the ultimate development of the airport, an appropriate site within areas defined as ‘Future Development Area’ should be considered for further GA Hangar development.

Future Car Park Extension Area

The Future Car Park Extension Areas allocated in the Land Use Plan should be used to short and/or long term parking at the Airport.

The provision of secure parking may also be developed within these precincts.

This precinct is expected to provide sufficient car parking supply for the planning period of this master plan.

The Future Car Park Extension area is consistent with that presented in The Airport Group – Technical Paper Rental Car Strategy (2014).

Future Manufacturing Precinct/Potential Development Area

The Future Manufacturing Precinct encompasses existing manufacturing facilities at the Airport. It is envisaged that these manufacturing services will continue to utilise this area. If further manufacturing area is required, there is ample land within this precinct for further facilities.

If further manufacturing areas are not required, the land within this precinct may be used for both aviation and non-aviation related development.

Any development within this precinct must abide by OLS contour restrictions imposed by Runway 14/32.

Future Rental Car Storage

The precinct presented in this Land Use Plan is reflective of Option B of The Airport Group – Technical Paper Rental Car Strategy. Uses within this area could include car rental offices, wash down bays, and car storage facilities for car hire companies.

Future Short Term Rental Car Park Expansion

The purpose of Future Short Term Rental Car Park Expansion precinct is to allow for overflow of short term car rental car parks when existing car rental car parks located at the front of the terminal are at capacity.

Future Emergency Services Precinct

A Future Emergency Services Precinct would provide for uses by all Emergency Services as required. i.e. RFDS, CareFlight, Military, Firefighting, Police, etc. Response times for services must be considered when finalising the appropriate location for the Precinct.

An emergency services precinct would ideally have landside and airside access via secure access inside the hangar. In addition, recommend facilities to be included in such a facility include: conference/meeting/training rooms; patient transfer facilities; sufficient office space for each emergency services provider; and provision of sleeping and relaxation facilities for staff on shift (as required by law).

Development of an Emergency Services Precinct should be done in close collaboration with the future users of the precinct.

Future Ground Services Equipment Area

The Future Ground Services Equipment Area has been designated to allow for GSE requirements as and when required in future terminal expansion scenarios.

LEGEND

- BUNDABERG AIRPORT
- EXISTING RUNWAY RUNWAY STRIP
- EXISTING BUILDINGS
- EXISTING FUEL FACILITIES
- (A) EXISTING TERMINAL FACILITIES
- (B) EXISTING GA PRECINCT
- 1-A DEVELOPMENT AREA - BUNDABERG AIRPORT AND AVIATION PRECINCT
- 1-B DEVELOPMENT AREA - FUTURE COMMERCIAL/ INDUSTRIAL DEVELOPMENT PRECINCT
- (2) BIO RETENTION AREA
- (3) FUTURE TERMINAL EXPANSION AREA
- (4) FUTURE FREIGHT FACILITY
- (5) FUTURE APRON EXPANSION
- (6) FUTURE TAXIWAY EXPANSION
- (7) FUTURE GA HANGARS ('MINI' AIRPORT MASTER PLAN JULY 2011)
- (8) FUTURE CARPARK EXTENSION AREA
- (9) FUTURE MANUFACTURING PRECINCT / POTENTIAL DEVELOPMENT AREA
- (10) FUTURE RENTAL CAR STORAGE
- (11) FUTURE SHORT TERM RENTAL CAR PARK EXPANSION
- (12) FUTURE EMERGENCY SERVICES PRECINCT
- (13) FUTURE GROUND SERVICE EQUIPMENT AREA
- (14) FUTURE GA EXPANSION AREA

0 40 80 120 160 200
1:2000 FULL SIZE ON A1

No	DATE	DRAFTING CHECK	DESIGN REVIEW	REV'D P.MGR	APP'D P.DIR	AMENDMENT
1	20.05.16	HS	RM	RM	RM	DEVELOPMENT AREAS AMENDED
0	13.05.16	HS	RM	RM	RM	INITIAL ISSUE

The Airport Group
AIRSIDE • COMMERCIAL • LANDSIDE • AIRSPACE

THE AIRPORT GROUP
A.C.N. 162 255 898
8/441 Nudgee Road
Hendra QLD 4011 Australia
Telephone +617 3268 6300

CLIENT: BUNDABERG AERODROME
PROJECT: BUNDABERG AERODROME MASTER PLAN

DRAFTER	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
JL	HS	RM	RM
DESIGNED: HS	DESIGN REVIEW: RM		

TITLE: BUNDABERG AERODROME LAND USE PLAN

SCALE	TAG PROJECT No	DRAWING No	AMDT
AS SHOWN	TAG07150881	0881-YBUD-002	1

3.2 FACILITIES DEVELOPMENT PLAN

3.2.1 Movement area facilities

Runways

For the planning period of this master plan, there is no foreseeable lengthening, widening, or strengthening requirements for the runway infrastructure. However, maintenance activities will be required to ensure Runway 14/32 serviceability beyond the period of this master plan.

Currently Runway 14/32 is Code 3C compliant. In order to make Runway 14/32 Code 4C compliant for larger aircraft, it would need to be widened to 45m.

If the runway was widened to 45m, this would require an increased runway strip to 300m as set out in the MOS 139 6.2.18.2. The MOS dictates that in the case of a non-precision approach runway, the width of the runway strip, including the fly-over area, must not be less than that given in the Table below.

Aerodrome reference code	Overall runway strip width
1 or 2	90 m
3 (where the runway width is 30 m)	150 m
3 or 4 (where the runway width is 45 m or more)	300 m

Figure 24: Runway strip width for non-precision approach runways

If the runway was to be widened to the west of its current location (the most likely scenario), the 300m runway strip would encroach significantly on Taxiway G and also onto the apron parking bays 1 and 2 (see Figure 25, below).

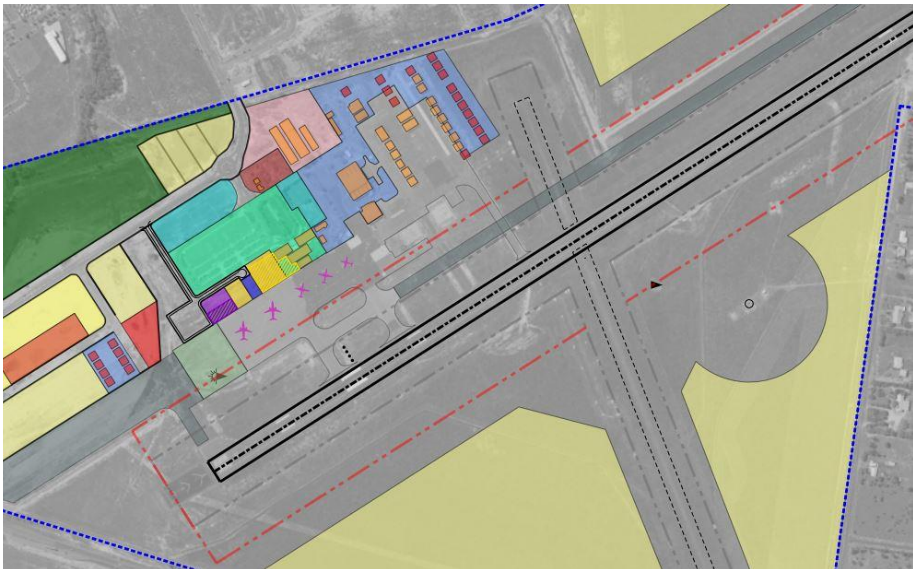


Figure 25: Indicative 300m runway strip alignment

The MOS 139 dictates that a runway strip must be free of fixed objects, other than visual aids for the guidance of aircraft or vehicles. MOS 139 6.2.18.4 states:

If an aerodrome operator wishes to provide a lesser runway strip width to that specified in the standards, the aerodrome operator must provide CASA with a safety case justifying why it is impracticable to meet the standard. The safety case must include documentary evidence that all relevant stakeholders have been consulted.

There is an option to extend the runway to 2,245m in the south of the airport site. An indicative OLS is provided in this master plan based on this runway extension (see Section 3.3.3). Additionally, PSAs and RESAs have been considered in the context of a runway extension to 2,245m.

Taxiways

Taxiway G is compliant with Code 4C at a non-precision approach runway (MOS 139 Section 6.3 dictates requirement for Code Compliance). The dimensions of the Taxiway G and alignment are presented in the Figure below.

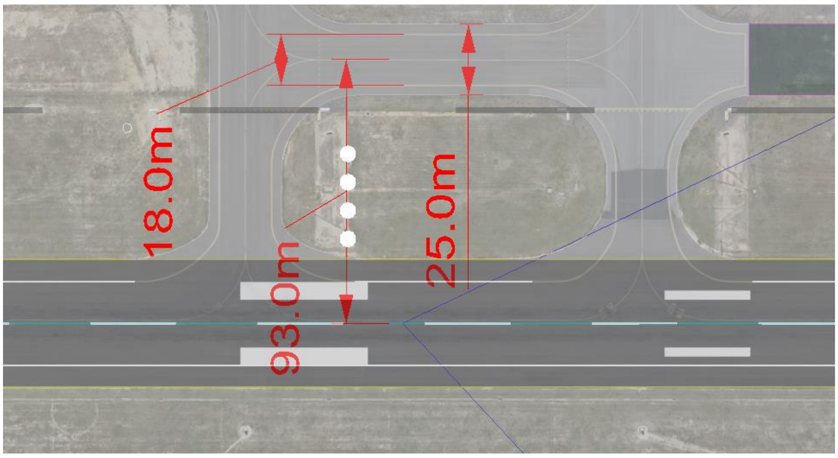


Figure 26: Taxiway G Code 4C Compliance

Although the Taxiway G is Code 4C compliant, the development of Runway 14/32 for Code 4C compliance remains an issue for the Airport.

For the purposes of ultimate development at the BRA, a **parallel taxiway** (continuation of Taxiway G) is presented in the Facilities Development Plan. Although this is not expected to be necessary within the master planning period, it has been included for the purposes of safeguarding. If and when this parallel taxiway is considered necessary the relevant MOS and CASR must be reviewed to ensure compliance.

Taxiway H was identified to be non-compliant in the Connell Wagner report of 2010. This is yet to be remedied and should be considered within the short term (0-5 years).

Aprons, aircraft parking areas

It is recommended that the Apron Bays 3,4, and 5 be resurfaced within the short term planning period. The existing apron and parking bays are in poor condition due to age and loss of shape. In addition, Apron Bays will likely require rejuvenation in 2020 after interim surface enrichment was conducted in 2014.

This has been identified as an issue by both the airport management staff and airlines.

Pavement strength

The published PCN at the Airport is 45/F/C/1410(205PSI)/T Sealed. The high value PCN only applies to Runway 14/32, Taxiway B, Taxiway C and RPT Apron Bays 1 and 2. The remainder is less PCN which was published prior to the upgrade.

The published PCN value is suitable for the aircraft that regularly use the runway. As the aircraft design currently used at BRA is expected to continue to be used in the long term, the existing runway pavement strength is expected to be sufficient within the master planning period.

3.2.2 Aviation support and landside facilities

Passenger terminal

As described by IATA, Level of Service can be considered as an assessment of the ability of supply to meet demand. Level of Service is measured as a range of values from A to F and can be applied to individual processes and the areas dedicated to them to accommodate passengers. This provides an indication of the conditions experienced by passengers subjected to each process and allows comparison between different processes and areas. Level of Service C is recommended as the minimum design objective by IATA and is described in the IATA Airport Development Manual as 'Good level of service. Conditions of stable flow, acceptable delays for short periods of time and adequate levels of comfort.'

Based on the conceptual design principles set out above, a minimum Level of Service C in relation to the long-term design loading is considered appropriate. This will provide a much higher level of service in the early years of service of the terminal, until actual traffic reaches the assumed design level. Spatial requirements for each functional area are defined by IATA with reference to the desired Level of Service and the number of design passengers.

The following Tables include a comparison of the peak hour passenger demand IATA Level of Service C assumptions against a more conservative current level of service spatial allocation escalated against the central, High and Low case growth forecasts. Under the 'peak hour' passenger approach, the terminal areas remain unchanged within the low case; grow by 44m^2 within the central case; and grow by 446m^2 within the high case scenario (Table 15).

	Level of Service C (m^2)	Pax PHD areas 2016	Pax PHD area 2026 Central	Pax PHD area 2026 High	Pax PHD 2026 Low	Pax PHD area 2037 Central	Pax PHD area 2037 High	Pax PHD area2037 Low
Departures lounge & hold areas	1.90	505	168	255	168	263	351	176
Baggage claim Hall	1.60	245	141	215	141	222	296	148
Check-in	1.40	210	123	188	123	194	259	129
Screening point area	1.20	49	106	161	106	166	222	111
CBS	1.11	77	98	149	98	154	205	102
Ops Cntr Blg	1.02	84	90	137	90	141	188	94
Toilet/wet areas	0.98	84	87	132	87	136	182	91
Totals		**1,254**	**812**	**1,238**	**812**	**1,276**	**1,702**	**851**

Table 15: Terminal forecasts areas based on IATA Level Service C

In comparison, using the current level of service growth approach the terminal areas grow by 95m^2 within the low case, 723m^2 within the central case and by 1,351m^2 within a high case scenario (Table 16).

	Areas per PH pax 2016	Pax PHD areas 2016	Pax PHD area 2026 Central	Pax PHD area 2026 High	Pax PHD AREA 2026 Low	Pax PHD area 2037 Central	Pax PHD area 2037 High	Pax PHD area2037 Low
Departures lounge & hold areas	6	505	522	795	522	820	1093	546
Baggage claim hall	3	245	253	386	253	398	530	265
Check-in	2	210	217	330	217	341	454	227
Screening point area	0.6	49	51	77	51	80	106	53
CBS	0.9	77	80	121	80	125	167	83
Ops Cntr Blg	1.0	84	87	132	87	136	182	91
Toilet/wet areas	1.0	84	87	132	87	136	182	91
Totals		**1,254**	**1,295**	**1,974**	**1,295**	**2,035**	**2,714**	**1,357**

Table 16: Terminal forecasts areas based on current service growth approach

In order to estimate spatial requirements for key functional areas, a number of other assumptions regarding the design operating day characteristics and service quality parameters need to be made. These assumptions have been established from experience in relation to other airports, the expected characteristics of traffic at Bundaberg Regional Airport, and the aspirations of the Council with respect to passenger comfort.

There is a relatively large degree of uncertainty in relation to several of these assumptions, many of which require large datasets to accurately determine. Several parameters are also subject to likely changes in technology and process requirements over the life of the terminal, the impacts of which are hard to predict with accuracy. The general approach in these situations has been to adopt assumptions which lead to slightly conservative estimation of space requirements, in order to preserve maximum flexibility for changes which can be expected to occur over time.

As an option for increase capacity within the existing terminal without significant investment, BRA may consider changing the terminal layout to allow for the security screening area to be located post check-in.

The terminal capacity analysis above has been produced as an estimate and if any expansion were to occur architectural drawings must be completed for accurate calculations. It has also been produced based on the Level of Service recommendations from IATA which are in the process of being upgraded. The IATA has revised its Level of Service approach (in 2014) to better reflect the global aviation perspective. One of the major changes within the Standard is the consideration of maximum waiting times in addition to space. For the purposes of this master plan, previous model of Level of Service is considered sufficient.

Aircraft hangars

Option A of the General Aviation ‘Mini’ Airport Master Plan Review (2011) should be adopted for GA future development (see Figure below). Based on existing take up rates of GA hangars at BRA, there remains capacity in this mini master plan for the planning period of this master plan. If more GA hangar areas are required, an area within the BAAP to the north of terminal has been identified (see Land Use Plan).

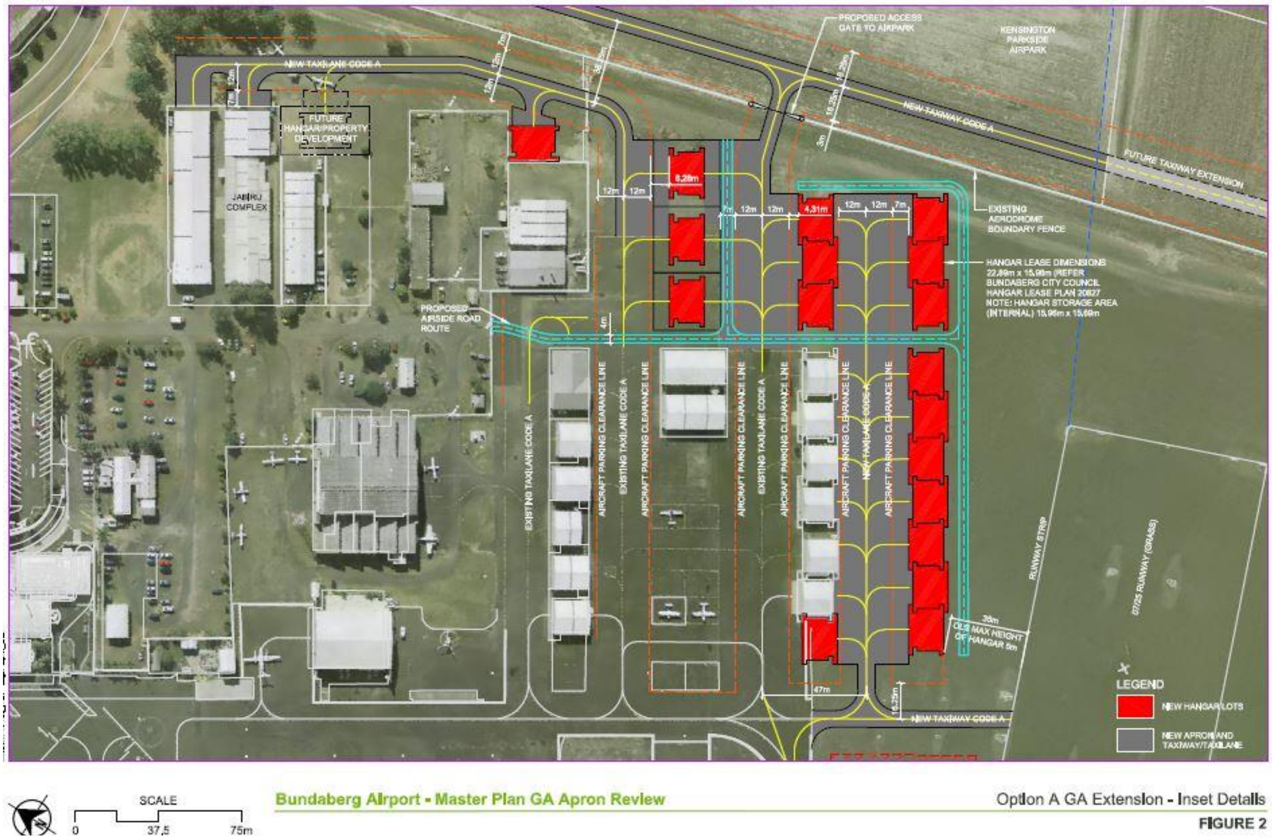


Figure 27: GA Mini Master Plan Option A (Aurecon)

Control tower

In Australia, there are two major types of airspace: controlled, and uncontrolled. Controlled airspace in Australia is actively monitored and managed by air traffic controllers. To enter controlled airspace, an aircraft must first gain a clearance from an air traffic controller.

MOS Part 172 specifies standards for designing and siting air traffic control towers.

Within the 10 year planning period for this master plan it is most unlikely that BRA will require a control tower.

Fuel facilities

Operational and management staff at BRA have indicated that the in ground fuel tanks may require replacement within the short-medium term.

If aviation related development is to occur on the western side of the airport site within the 'Future Development' zone, a fuelling facility would be required so that aircraft do not have to traverse the main runway to get to the current site.

Navigation Systems

As discussed in section 2.2.5, there is a non-directional beacon (NDB) operated by AirServices Australia. The NDB is planned to remain in service beyond the life of the master plan.

There is also precision approach path indicator (PAPI) on both ends of Runway 14/32.

There is also a rotating aerodrome beacon at the BRA which is activated with runway lights.

The BRA is expected to remain a NPA runway beyond the period of this master plan.

Aerodrome lighting

The current aerodrome lighting is sufficient for operations. However, the PAPI will be older than recommended used by date in 2022. To improve power conservation efforts, the current LED lights should be replaced with power saving lightbulbs when PAPI is replaced.

The runway and taxiway lighting is sufficient for operations but a future refurbishment should be replaced by LED lights for power conservation efforts.

As outlined in the GA Mini Master Plan Review (2011), it is assumed that all night time GA operations will be conducted by emergency authorities. As such, taxiways within the GA will not be lit.

Meteorological facilities

Bundaberg Regional Airport current has a Terminal Aerodrome Forecast (TAF) Cat B, METAR/SPECI. Within the 10 year planning period for this master plan it is unlikely that BRA will require upgrading of their meteorological facilities. For future planning of the airport, *Annex 3 to the Chicago Convention on International Civil Aviation – Meteorological Service for International Air Navigation* provides the standards and recommended practices for aviation meteorological services. These apply within Australia to both domestic and international aviation, with some registered differences.

Freight facilities

Airport freight requirements

Freight handling at an airport usually dictates the following facilities: freight terminal (fronting airside), freight forwarding/receiving facilities fronting landside, and warehouse and distribution facilities.

There is relationship between building areas required to process freight at each point, which can be transposed into land demand. From a master planning perspective, we have adopted the high end of the PAX forecast to determine the maximum freight capacity at BRA during the planning period. Assuming 100% capacity utilisation at the airport via freight throughput we have estimated the relative building area required and consequential land area demand.

Freight Forecast

The following forecast has been developed based on the mean freight capacity of all current aircraft design (Q400, Q300, and ATR-72). It is meant for indicative purposes only.

	PAX	Movements	Air Freight capacity (T)
2015	156,235	3,836	6,052
2020	183,439	4,372	6,898
2025	227,250	5,320	8,393
2030	288,061	6,299	9,938
2035	326,918	7,389	11,657

Table 17: Indicative freight forecasts (TAG)

Whilst there is a considerable capacity for RPT held freight, this is not reflective of current demand. Based on discussions with relevant stakeholders, it is not expected that freight movements through the airport will significantly grow during the period of the master plan. However it is important to acknowledge the future requirements based on forecasts for long term future planning and safeguarding of the airport.

The Land Use Plan proposes a designated freight handling facility be established to the north of the existing terminal building, within the “Future Terminal Expansion Precinct”. Refer to the Land Use Plan for proposed location.

This facility would encourage freight providers to relocate to the airport and stimulate commercial development at the airport site. It is expected that by the time the ‘Future Terminal Expansion Area’ would be required for terminal expansion; the BAAP to the north would provide a viable location to relocate the freight handling facilities to.

Emergency Services

Within the short term, Emergency Services could be relocated to a dedicated Emergency Services Precinct to the north of terminal, located within the BAAP. Refer to the Land Use Plan for proposed location.

Ideally, such a facility would have landside and airside access via secure access inside the hangar. In addition to providing a new base for RFDS and CareFlight, a new facility could also provide a small base for paramedics, fire services, police, Queensland AirWing, and the military.

3.2.3 Other facilities

Access roads

If a freight facility is developed adjoining the ‘Terminal Expansion Area’, a separate access road will need to be developed. Such a road would not only provide interim access for freight facilities, but also would provide access for future terminal expansion if and when it is required. Advice for the best method of managing this ground transport expansion should be sought from the relevant professionals.

It is recommended that in 2022 kerb gutter drainage on footpaths is provided.

Car parks

There is no definitive guideline as to how many car parks should be provided at airports in Australia.

The Airports Council International (ACI) produced a 'best practice' report for parking facilities worldwide. The report describes that car parks can be split into four categories, depending on their location, the duration of the stay and whether or not additional services are offered:

1. **Terminal short-term**
   Car park is within walking distance of the terminal and intended for short stays.
2. **Terminal long-term**
   Parking lot is located near the terminal and meant for longer stays.
3. **Off-site long-term long-term**
   Car park is located off-site and only accessible by shuttle bus. This is usually the cheapest option.
4. **High-end**
   Recently, airports have begun offering additional services (besides Valet parking) to increase revenues and attract more passengers into their car parks. Additional services include dedicated spaces closest to the terminal and parking reservation systems for which business passengers are generally willing to pay a premium.

The parking mix depends on the passenger profile, airport size, available space, alternate means of transportation to go to the airport (public transport), connection rate and airport's commercial strategy. The aim is to find the mix which generates the most revenues and meets passengers' needs and budgets.

At regional airports, the peak hour passenger movements and extent of car rental facilities have a strong influence on the car parking requirements.

In planning for the future car park planning for BRA, the following documents have been reviewed:

- Strategic Airports and Aviation Facilities (State Planning Policy)
- Airports Act 1996
- AAA Regional Airport Master Planning Guideline
- Airports Council International Best Practice Report for Car Parking
- AS/NZS 2890.1:2004 Parking facilities - Off-street car parking
- Bundaberg Regional Council Planning Scheme

Based on these reports, the table below presents a comparison of an incremental increase based on current car parks, as well as the findings of the ACI (average 558 car parks per 1m passengers) to calculate an approximate car park forecast.

	PAX	No. of parks. (incremental increase)	Area (m^2)	ACI Report	ACI Area (m^2)
2016	156,235	377	20,100	87	2,179
2020	183,439	430	22,909	102	2,559
2025	227,250	523	27,876	127	3,170
2030	288,061	619	33,006	161	4,018
2035	326,918	726	38,717	182	4,561

Figure 28: Car parking capacity forecast comparison

The existing car parks at BRA are expected to be sufficient for the planning period of this master plan. There is ample land adjoining the existing car park for further expansion which has been identified in the Facilities Development Plan. Development of further paid car parking as well as new secure parking strategies should be considered by BRA as a means of increasing non-aviation related revenue.

Car parking expansion requirements at BRA should be reviewed regularly to ensure demand is met based on RPT passenger and aircraft movements. The master plan has allowed for two future car parking areas, totalling 15,343m^2.

Non-aviation/commercial development

Based on stakeholder engagement with real estate and development professionals in the region, the BAAP to the north of the airport will provide enough supply of commercial and industrial land to meet 10 year demand.

For safeguarding purposes, the master plan has identified extensive possible future development area within the airport site. These areas provide the opportunity for BRA to increase non-aviation related revenue. See Land Use Plan for location/s and guidelines for uses.

The demand from users that may wish to be located at or near the airport is influenced by the scale and type of activity at the airport as well as the scale and type of regional activity, including the regional business profile, population size and growth, and government activity.

LEGEND

- BUNDABERG AIRPORT
- EXISTING RUNWAY RUNWAY STRIP
- EXISTING BUILDINGS
- EXISTING FUEL FACILITIES
- EXISTING TERMINAL FACILITIES
- EXISTING GA PRECINCT
- DEVELOPMENT AREA - COMMERCIAL FACILITIES
- DEVELOPMENT AREA - BUNDABERG AIRPORT AND AVIATION PRECINCT
- DEVELOPMENT AREA - FUTURE COMMERCIAL/ INDUSTRIAL DEVELOPMENT PRECINCT
- BIO RETENTION AREA
- FUTURE TERMINAL EXPANSION AREA
- FUTURE FREIGHT FACILITY
- FUTURE APRON EXPANSION
- FUTURE TAXIWAY EXPANSION
- FUTURE GA EXPANSION AREA
- FUTURE GA HANGARS ('MINI' AIRPORT MASTER PLAN JULY 2011)
- FUTURE CARPARK EXTENSION AREA
- FUTURE MANUFACTURING PRECINCT / POTENTIAL DEVELOPMENT AREA
- FUTURE RENTAL CAR STORAGE
- FUTURE SHORT TERM RENTAL CAR PARK EXPANSION
- POTENTIAL FUTURE RUNWAY EXTENSION (BASED ON CURRENT AERODROME BOUNDARY)
- FUTURE EMERGENCY SERVICES PRECINCT
- FUTURE GROUND SERVICE EQUIPMENT AREA
- PAPI APPROACH LIGHTS
- WIND DIRECTION INDICATOR (LIT)
- WIND DIRECTION INDICATOR (UNLIT)

0 100 200 300 400 500
1:5000 FULL SIZE ON A1

No	DATE	DRAFTING CHECK	DESIGN REVIEW	REV'D P.MGR	APP'D P.DIR	AMENDMENT
1	20.05.16	HS	RM	RM	RM	DEVELOPMENT AREAS AMENDED
0	13.05.16	HS	RM	RM	RM	INITIAL ISSUE

The Airport Group™
AIRSIDE • COMMERCIAL • LANDSIDE • AIRSPACE

THE AIRPORT GROUP
A.C.N. 162 255 898
8/441 Nudgee Road
Hendra QLD 4011 Australia
Telephone +617 3268 6300

CLIENT: BUNDABERG AERODROME
PROJECT: BUNDABERG AERODROME MASTER PLAN

DRAFTER	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
JL	HS	RM	RM
DESIGNED: HS	DESIGN REVIEW: RM		

TITLE
BUNDABERG AERODROME FACILITIES DEVELOPMENT PLAN

SCALE	TAG PROJECT No	DRAWING No	AMDT
AS SHOWN	TAG07150881	0881-YBUD-001	1

3.3 AIRPORT SAFEGUARDING PLAN

3.3.1 National Airports Safeguarding Framework

The National Airports Safeguarding Framework provides guidance on planning requirements for development that affects aviation operations. This includes building activity around airports that might penetrate operational airspace and/or affect navigational procedures for aircraft.

The Framework was developed by the National Airports Safeguarding Advisory Group, which includes representatives from Commonwealth Infrastructure and Defence departments and aviation agencies; state and territory planning and transport departments, and the Australian Local Government Association. The Framework applies at all airports in Australia and affects planning and development around airports, including development activity that might penetrate operational airspace and/or affect navigational procedures for aircraft.

The Australian Government recognises that responsibility for land use planning rests primarily with state, territory and local governments, but that a national approach can assist in improving planning outcomes on and near airports and under flight paths.

The aim of the Framework is to:

- Improve safety outcomes by ensuring aviation safety requirements are recognised in land use planning decisions;
- Improve community amenity by minimising noise sensitive developments near airports, including through the use of additional noise metrics; and
- Improve aircraft noise-disclosure mechanisms.

The Framework is intended to provide guidance to state, local and territory governments which can in turn be used to guide assessment and approvals for land use and development on and around identified airports.

The Framework consists of:

- Principles for National Airports Safeguarding Framework;
- Guideline A: Managing Aircraft Noise;
- Guideline B: Managing Building-Generated Windshear;
- Guideline C: Managing Wildlife Strike Risk;
- Guideline D: Managing Wind Turbine Risk to Aircraft;
- Guideline E: Managing Pilot Lighting Distraction; and
- Guideline F: Managing Protected Airspace Intrusion.

As the Framework applies to all airports in Australia, it is critical that it I considered when planning for and operating BRA.

3.3.2 Aircraft Noise Contours

ANEF and ANEI reports are being produced for Bundaberg Regional Council and will be provided as a supplementary document.

3.3.3 Airspace Protection Surfaces

The OLS and PANS-OPS must be considered when developing at the airport. The OLS will restrict any development nearby to the airport. The level of restriction depends on the proximity and elevation of the site relative to the OLS contours.

An indicative OLS drawing has been produced based on runway lengthening to 2,245m.

The table below summarises the restrictions to a building height that would be put in place if this OLS were to be formalised and adopted.

OLS Contour	Building site ground level	Building height restriction
40	30.78	9.22m
50	30.78	19.22m
60	30.78	29.22m
70	30.78	39.22m

If runway infrastructure is not altered, the existing OLS (developed by AirServices in 2014) for BRA would remain relevant.

LEGEND

- BUNDABERG AIRPORT
- EXISTING RUNWAY RUNWAY STRIP
- EXISTING BUILDINGS
- EXISTING FUEL FACILITIES
- EXISTING TERMINAL FACILITIES
- EXISTING GA PRECINCT
- DEVELOPMENT AREA - COMMERCIAL FACILITIES
- DEVELOPMENT AREA - BUNDABERG AIRPORT AND AVIATION PRECINCT
- DEVELOPMENT AREA - FUTURE COMMERCIAL/ INDUSTRIAL DEVELOPMENT PRECINCT
- BIO RETENTION AREA
- FUTURE TERMINAL EXPANSION AREA
- FUTURE FREIGHT FACILITY
- FUTURE APRON EXPANSION
- FUTURE TAXIWAY EXPANSION
- FUTURE GA EXPANSION AREA
- FUTURE GA HANGARS ('MINI' AIRPORT MASTER PLAN JULY 2011)
- FUTURE CARPARK EXTENSION AREA
- FUTURE MANUFACTURING PRECINCT / POTENTIAL DEVELOPMENT AREA
- FUTURE RENTAL CAR STORAGE
- FUTURE SHORT TERM RENTAL CAR PARK EXPANSION
- POTENTIAL FUTURE RUNWAY EXTENSION (BASED ON CURRENT AERODROME BOUNDARY)
- FUTURE EMERGENCY SERVICES PRECINCT
- FUTURE GROUND SERVICE EQUIPMENT AREA
- PAPI APPROACH LIGHTS
- WIND DIRECTION INDICATOR (LIT)
- WIND DIRECTION INDICATOR (UNLIT)

0 100 200 300 400 500

1:5000 FULL SIZE ON A1

No	DATE	DRAFTING CHECK	DESIGN REVIEW	REV'D P.MGR	APP'D P.DIR	AMENDMENT
1	20.05.16	HS	RM	RM	RM	DEVELOPMENT AREAS AMENDED
0	13.05.16	HS	RM	RM	RM	INITIAL ISSUE

The Airport Group

AIRSIDE • COMMERCIAL • LANDSIDE • AIRSPACE

THE AIRPORT GROUP
A.C.N. 162 255 898
8/441 Nudgee Road
Hendra QLD 4011 Australia
Telephone +617 3268 6300

CLIENT: BUNDABERG AERODROME

PROJECT: BUNDABERG AERODROME MASTER PLAN

DRAFTER	DRAFTING CHECK	REVIEWED PROJECT MANAGER	APPROVED PROJECT DIRECTOR
JL	HS	RM	RM
DESIGNED: HS	DESIGN REVIEW: RM		

TITLE

BUNDABERG AERODROME
INDICATIVE OLS 10m CONTOURS
14/32 RUNWAY STRIP WIDTH (150m)

SCALE	TAG PROJECT No	DRAWING No	AMDT
AS SHOWN	TAG07150881	0881-YBUD-004	1

3.4 IMPLEMENTATION PLAN

The development of infrastructure upgrades is primarily driven by forecasts. Should the demand not eventuate as forecast, the implementation phases and upgrade triggers will need to be revised and may shift. The implementation phase timeframes are:

- Short Term: 0 – 5 years;
- Medium Term: 5 – 10 years; and
- Long Term: 10+ years.

Short Term
Airside
• Expansion of GA hangar area as per Mini Master Plan • Upgrade of non-compliant Taxiway H (as per Connell Wagner report 2010) • Resurfacing of Apron Bays 3, 4, and 5 • Development of either Apron extension or Taxiway extension to provide access to BAAP (triggered by Emergency Services Precinct development)
Landside
• Relocation of emergency services precinct to BAAP (refer Land Use Plan) • Development of freight offices and transfer facilities on site north of terminal with airside/landside access (refer Land Use Plan) • Develop separate access road for freight facility and future terminal expansion area • Relocation of long term car hire parking facilities to BAAP (refer Land Use Plan)
Medium Term
Airside
• Continued expansion of GA hangar area as per Mini Master Plan (until capacity reached) • If GA area at capacity – begin development of GA hangar in site identified within Land Use Plan. • Rejuvenation of Apron Bays 1 and 2 • Upgrade of PAPI System
Landside
• Layout reconfiguration of terminal to increase capacity within current building • Development of additional short term rental car parking area • Development of secure parking concession when demand identified • Continued development of remaining BAAP sites
Long Term
Airside
• Development of GA hangar in site identified within BAAP (refer Land Use Plan)
Landside
• Extension of terminal as required to north of current site • Continued development of remaining BAAP sites
Ultimate Development
Airside
• Develop Parallel Taxiway G • Extension of apron to provide access for aviation precinct (If not already) • Extension of taxiway to provide direct runway access from BAAP (If not already) • Extension of runway to 2,245m (max allowable in current site)
Landside
• Development of BAAP • Development of terminal to full extent of site north of existing terminal • Expansion of carpark into area adjoining current carpark

A: AIRLINE SCHEDULE

QA: Brisbane - Bundaberg

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
BNE	8:25	8:25	8:25	8:25	8:25	8:25	8:40
BDB	9:20	9:20	9:20	9:20	9:20	9:20	9:35
BNE	10:15	10:50		12:00	10:50		
BDB	11:10	11:45		12:55	11:45		
BNE	13:40	13:05	13:40	13:40	13:40	13:40	
BDB	14:35	14:00	14:35	14:35	14:35	14:35	
BNE	16:05	16:05	16:05	16:05	15:55	17:20	15:55
BDB	17:00	17:00	17:00	17:00	16:50	18:15	16:50
BNE	18:50	18:50	18:50	18:50	18:50		
BDB	19:45	19:45	19:45	19:45	19:45		

QA: Bundaberg - Brisbane

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
BDB		6:45	6:45	6:45	6:45	6:45	9:20
BNE		7:40	7:40	7:40	7:40	7:40	10:15
BDB	9:45	9:45	9:45	9:45	9:45	9:45	10:00
BNE	10:40	10:40	10:40	10:40	10:40	10:40	10:55
BDB	11:35	12:10		13:15	12:10		
BNE	12:30	13:05		14:05	13:05		
BDB	15:00	14:25	15:00	14:55	15:00	15:00	17:15
BNE	15:55	15:20	15:55	15:55	15:55	15:55	18:10
BDB	17:25	17:25	17:25	17:20	17:15		
BNE	18:20	18:20	18:20	18:20	18:10		

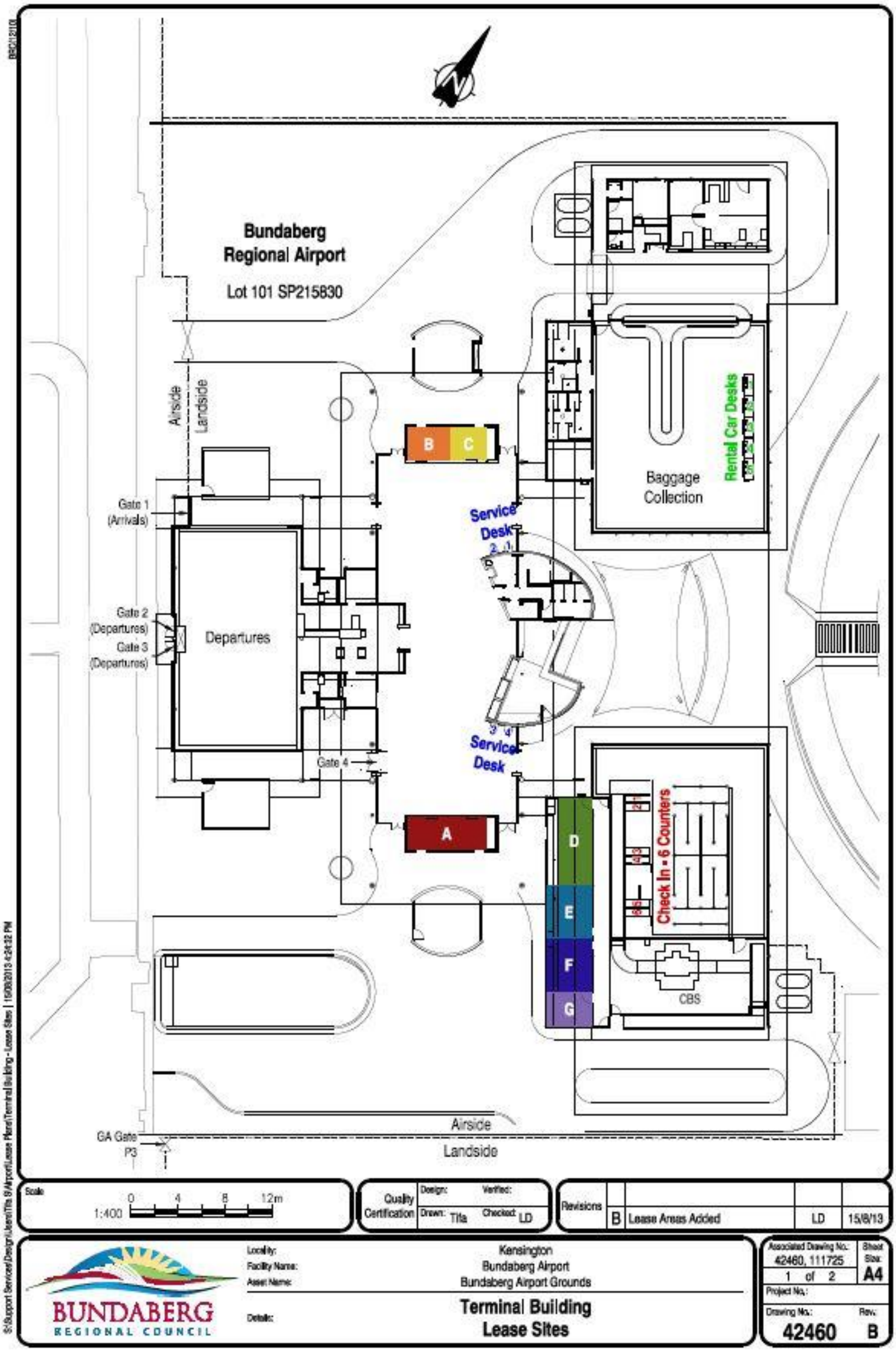
VA: Brisbane - Bundaberg

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
BNE	12:55	12:55	12:55	12:55	12:55	11:15	12:55
BDB	13:55	13:55	13:55	13:55	13:55	12:15	13:55

VA: Bundaberg - Brisbane

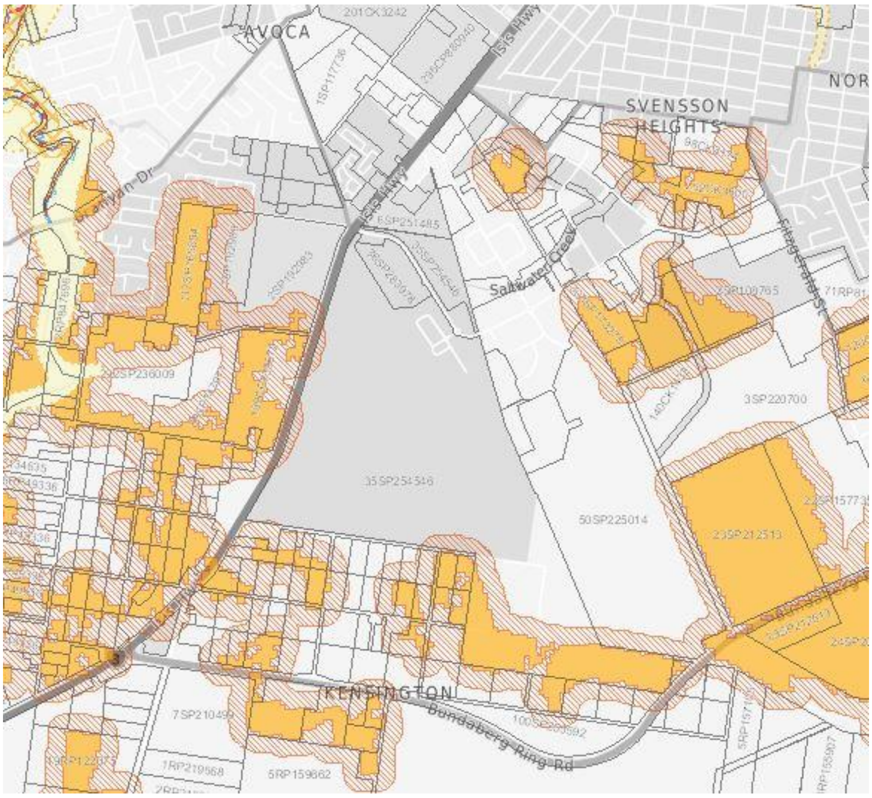
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
BDB	14:25	14:25	14:25	14:25	14:25	12:45	14:25
BNE	15:25	15:25	15:25	15:25	15:25	1:45	15:25

APPENDIX B: TERMINAL LAYOUT

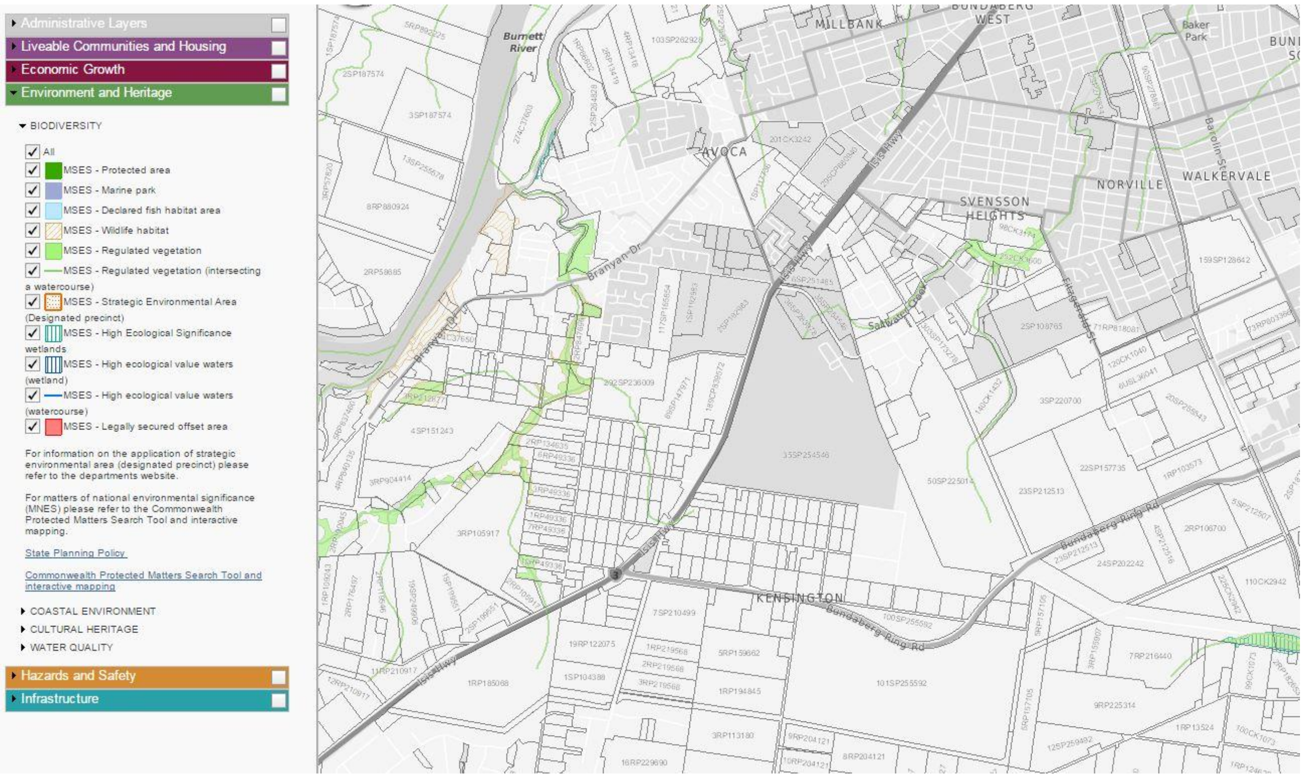


APPENDIX C: BRC FLOOD MAPPING

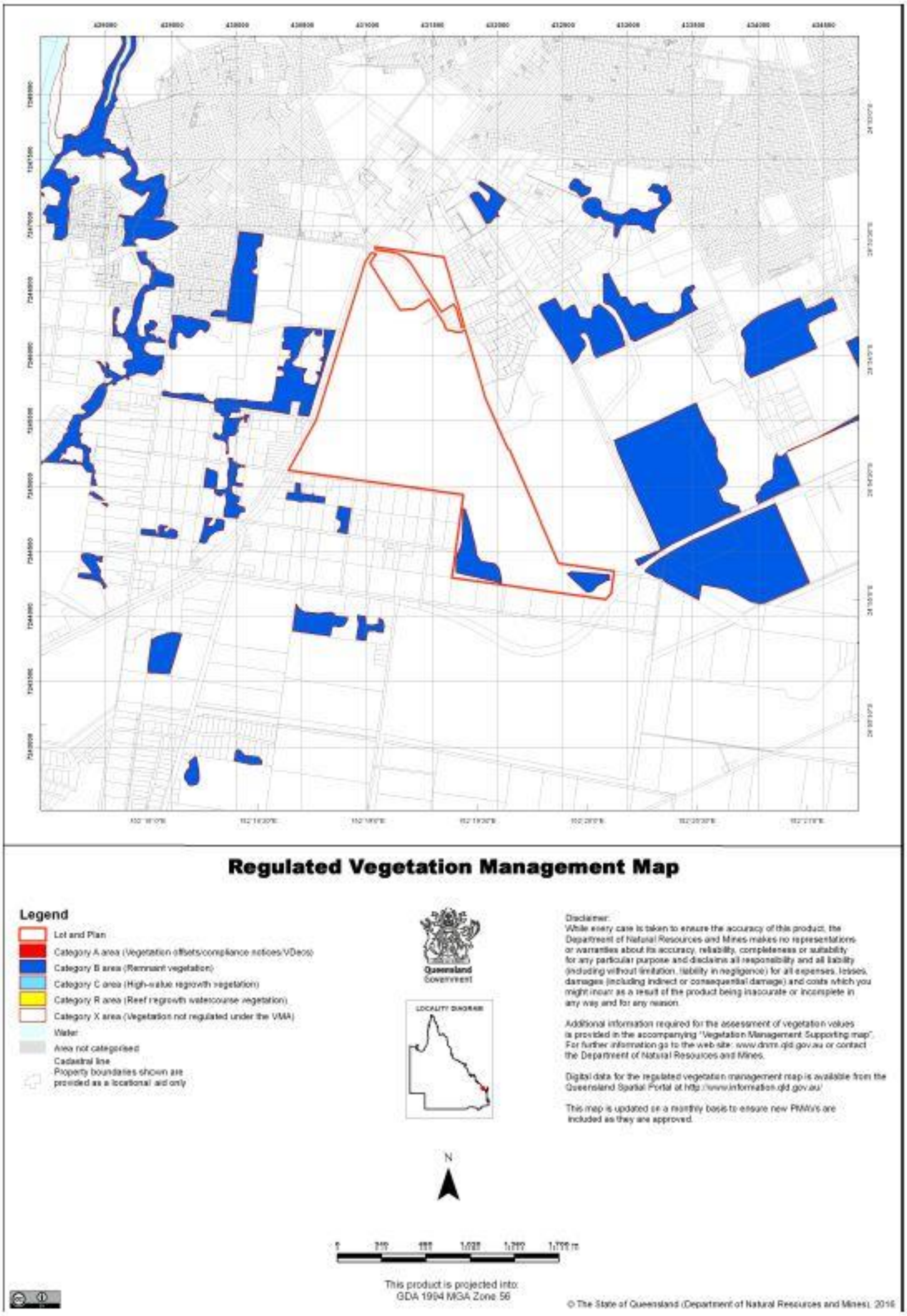
APPENDIX D: BRC FLOOD MAPPING

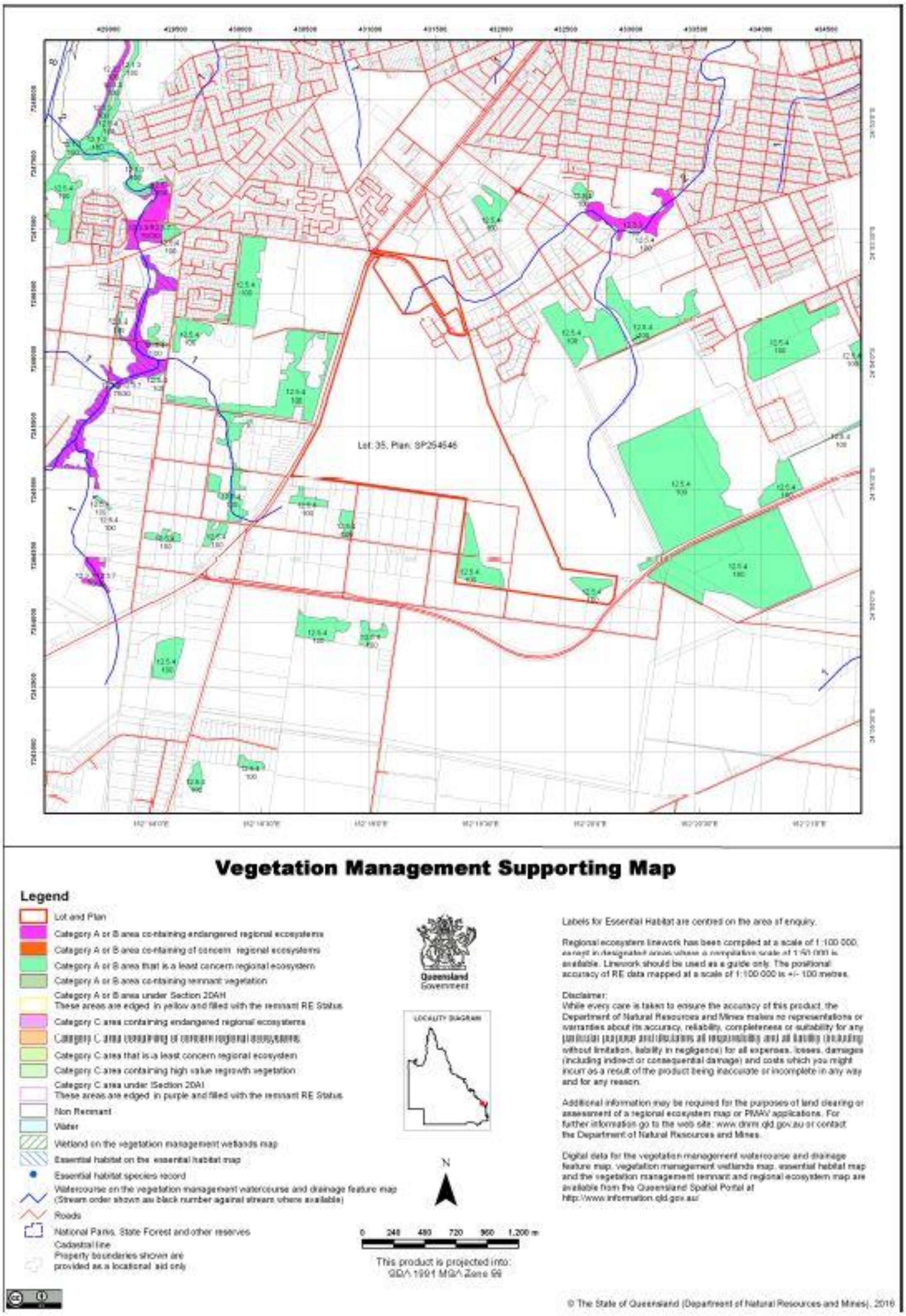


APPENDIX E: SPP WATERCOURSE ENVIRON MAP

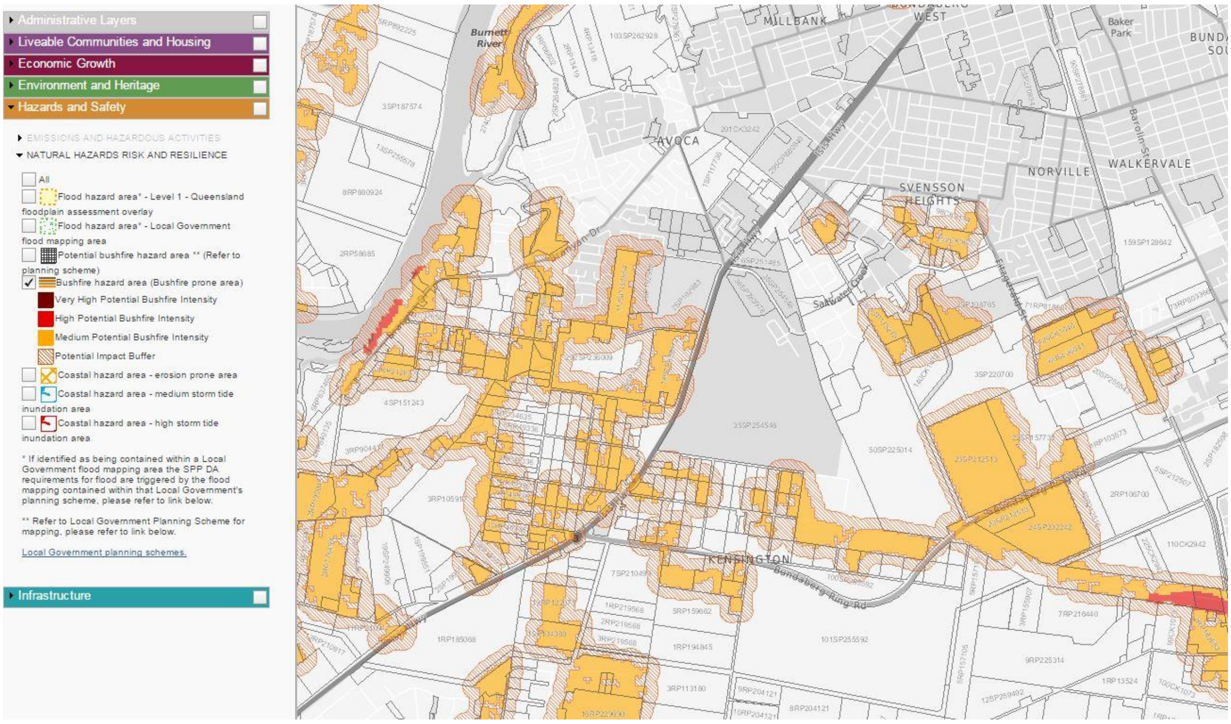


APPENDIX F: DNRM VEGETATION MAPPING



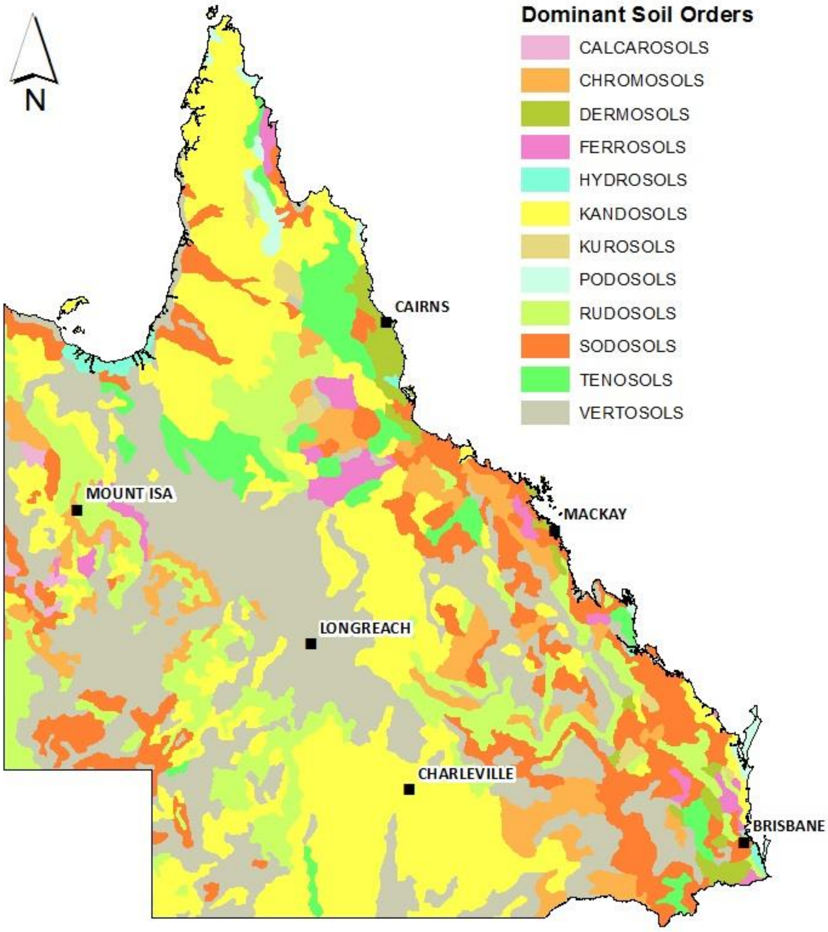

Lot: 35, Plan: SP254546
Vegetation Management Supporting Map
Legend
Lot and Plan
Category A or B area containing endangered regional ecosystems
Category A or B area containing of concern regional ecosystems
Category A or B area that is a least concern regional ecosystem
Category A or B area containing remnant vegetation
Category A or B area under Section 20AH
These areas are edged in yellow and filled with the remnant RE Status
Category C area containing endangered regional ecosystems
Category C area that is a least concern regional ecosystem
Category C area containing high value regrowth vegetation
Category C area under Section 20AI
These areas are edged in purple and filled with the remnant RE Status
Non Remnant
Water
Wetland on the vegetation management wetlands map
Essential habitat on the essential habitat map
Essential habitat species record
Watercourse on the vegetation management watercourse and drainage feature map
(Stream order shown as black number against stream where available)
Roads
National Parks, State Forest and other reserves
Cadastral line
Property boundaries shown are
provided as a locational aid only
Queensland Government
LOCALITY DIAGRAM
N
0 240 480 720 960 1,200 m
This product is projected into:
GDA 1994 MGA Zone 56
Labels for Essential Habitat are centred on the area of enquiry.
Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.
Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.
Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.
Digital data for the vegetation management watercourse and drainage feature map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at
http://www.information.qld.gov.au/
© The State of Queensland (Department of Natural Resources and Mines), 2016

APPENDIX G: SPP BUSHFIRE MAP



APPENDIX H: SPP AGRICULTURAL MAPPING

APPENDIX I: QUEENSLAND DOMINANT SOILS MAP



APPENDIX J: BRC HERITAGE MAPPING

APPENDIX K: BRC LOCAL HERITAGE REGISTRY REPORT

Bundaberg Airport WWII Features

Other Names	N/A	
Street Address	2 Childers Road	Kensington
Title Details/ GPS Coordinates	10SP225014, 1SP216542, 1SP225014, 1SP254546, 20SP261848, 21SP261848, 31SP254546, 32SP254546, 33SP254546, 34SP254546, 35SP254546, 9SP225014	

Historical Context

Bundaberg was established in the late 1860s. The Burnett River was identified by John Charles Burnett (after which was it named) during his exploration of the Wide Bay and Burnett regions in 1847. Pastoral stations were established throughout the Wide Bay and Burnett in the late 1840s through to the 1860s, including stations such as Gin Gin, Walla, Bingera, Electra, Monduran and Tantitha. The stations were initially stocked with sheep, but progressively were replaced with cattle. When prices were low, or there was an oversupply of stock (particularly in the 1860s), the cattle were rendered to produce tallow. A boiling down works was established in Baffle Creek to render the stock from the stations. John and Gavin Steuart secured a contract to provide the works with timber for tallow casks. The Steuarts established a camp in North Bundaberg in 1866 and erected a sawmill in the following year. Interest in the settlement grew rapidly and a town was surveyed on the southern bank of the Burnett River in 1868 on the site of the present day city.

Timber was the industry that acted as a catalyst for the creation of a European settlement. However, it was sugar that came to define the history of Bundaberg and the surrounding region. Sugar cane was planted in the 1870s and the first commercial sugar mill, located at Millbank (west of the city on the southern bank of the Burnett), began operating in 1872. The industry was thriving by the 1880s, with major mills such as Millaquin and Fairymead processing cane juice from cane plantations and farms with their own juice mills and located throughout the region, but particularly in land formerly occupied by the Woongarra, Bingera and Gooburrum scrubs. From its early years, the industry relied on South Sea Islander labour (referred to as 'Kanakas' at the time) and later workers from Sri Lanka (then Ceylon). The importance of Bundaberg was further strengthened when it became the port for the Mount Perry copper mine, with a railway from Mount Perry to North Bundaberg constructed in 1884 (although a rudimentary road existed from the early 1870s). A rum distillery was established at Millaquin sugar mill in 1888, later known as the Bundaberg Rum Distillery. Bundaberg also developed a foundry and engineering industry to support the sugar and juice mills, and the copper mines at Mount Perry. The first local government, the Bundaberg Divisional Board, was gazetted in 1880.

The Bundaberg Airport was established in the 1930s as part of an unemployment relief scheme. The airport's first official name was 'Hinkler Airport' after the famous Bundaberg aviator, Bert Hinkler, who was the first person to make a solo flight between Britain and Australia, in 1928. The airport was officially opened in 1931 and it quickly grew to be an important civil airport.

The airport became an important Royal Australian Air Force (RAAF) facility during World War II. It functioned as a base for the Empire Air Training Scheme (EATS), one of 36 similar bases across Australia. The first training schools were established at the airport in 1942 and the Allied Works Council constructed purpose-built facilities including aircraft hangers, workshops, accommodation, aircraft hideouts (hard surfaced areas located away from the main buildings for the dispersal of aircraft if the base was under attack) and defence structures including machine gun pits and mine charges laid in trenches along runways.

The airport reverted to civilian use in 1946. The RAAF planned to dispose of most of the buildings the Allied Works Council had constructed during the war. The disposal was to occur in five stages, but the fifth stage did not proceed and a number of facilities selected for removal in this phase remain on site: these include the former Quarters, Station Headquarters (incomplete), Garage (incomplete), Workshop and Store, and Inflammables Store. There are also concrete slabs associated with former structures, including Bellman Hangers, and early drainage infrastructure. Some of the defensive sites may also remain, including possible machine gun pits and sections of blast wall embankments.

Physical Description

Bundaberg Airport occupies a large cleared site to the east of the Isis Highway (Childers Road) in the suburb of Kensington, southwest of the Bundaberg CBD. The area containing surviving World War II structures and archaeological remains associated with defence use of the site is located to the northeast of the runway and the extent and location are based on a World War II site plan.

The most dominant remaining structure is the hangar and workshop building a short distance southeast of the airport terminal. The hangar/workshop is a 22-23m clear span hardwood timber Pratt truss hangar, with bolts and shear connectors and is likely to have been constructed of green timber. Internally, the main body of the clear-span hangar consists of an open space with concrete floors. Long, narrow rectangular windows are arranged along the length of the hangar, directly below the roof line. The main space is characterised by the intricate timber truss system which forms the framework of the hangar. The hangar comprises 11 timber trusses columns, approximately 2 metres apart forming 10 bays. The building is still used as a hangar and aviation workshop. Next to the hangar is the former inflammables store, a small rectangular gable-roofed building clad in vertical corrugated iron sheets with corrugated asbestos cement roof sheeting and metal ventilation ducts on the roof. The building closely resembles other surviving World War II buildings at

Bundaberg Airport WWII Features

the site that were recently removed such as the Hinkler Flight School and Bundaberg Aero club buildings and currently houses the electricity sub-station for the airport, including electrical boxes and a back-up generator. A former garage, located towards the southeast, consists of a flat roofed timber framed building, externally clad in vertical corrugated iron sheets. The doors are clad with modern steel sheeting of in-set wide panels and the flat roof with corrugated iron. Internally, the garage is divided into 12 bays by cross-bracing only and includes an office and other lockable storage areas at its western end, which are still utilised for their original purpose. The floors of the western bays are of concrete and include an inspection pit, whereas the eastern bays have a dirt floor. There are several built-in timber cabinets and workshop shelves, which are potentially from World War II. The former Motor Transport (MT) Garage is still used as a vehicle service and maintenance area but represents only around one third of the original World War II structure, with only the foundations of the eastern portion of the building surviving.

Archaeological resources identified in a previous study include:
- The airside area west of the hangar/workshop building incorporates surviving sections of at least 6 Bellman Hangar slabs and the footprints of at least 3 flight line buildings.
- The runway and taxiway – present day location of runways and taxiways generally correspond with those used during World War II.
- Airport Defences including a possible machine gun pit, consisting of a circular, excavated pit measuring approximately 4 metres in diameter and 1.5 to 2 metres in depth situated southeast of the southern end of the runway (24.914045°, 152.327774°- GDA 84).
- Former Hutted Accommodation Area including remnant pathways and roadways (for example the main access road to the airport follows the same path utilised during World War II).
- The Parade Ground area.
- Drainage Systems including drainage channels to the northeast of the runway and terminal as well as cast iron grid covered concrete gutters within the airside area.

Integrity	Fair	**Condition**	Fair
Statutory Listings	No statutory listings		
Non-Statutory Listings	No non-statutory listings		
Inspection Date	21/10/2014 and 14/1/2009		

References

Converge Heritage + Community, Bundaberg Airport Preliminary Heritage Assessment, Report for Bundaberg Regional Council, 2009.

Janette Nolan, Bundaberg: History and people, Brisbane, University of Queensland Press, 1978.

John Kerr, Southern Sugar Saga: A history of the sugar industry in the Bundaberg district, Bundaberg, Bundaberg Sugar Company Limited, 1983.

JY Walker, History of Bundaberg: Typical Queensland agricultural settlement, Bundaberg, WC Aiken, 1890.

Neville Rackemann, Bundaberg: From pioneers to prosperity, Bundaberg, Bundaberg City Council, 1992.

Heritage Significance

Criteria	Definition
B	*The place demonstrates rare, uncommon or endangered aspects of the region's cultural heritage.*
Statement	The Bundaberg Airport WWII Features demonstrate an endangered aspect of the region's history, as many of the features located in the airport and associated with its use during World War II have been removed. Bundaberg was not heavily utilised during World War II, so features associated with its involvement are also uncommon.
C	*The place has potential to yield information that will contribute to an understanding of the region's history.*
Statement	The Bundaberg Airport WWII Features has the potential to yield information that will contribute to an understanding of the region's history, particularly archaeological and landscape features relating to the airport's use during World War II and how these reflect the nature of activities undertaken there and the importance of these activities relative to Bundaberg's role during the war.
D	*The place is important in demonstrating the principal characteristics of a particular class of cultural places important to the region.*
Statement	The Bundaberg Airport WWII Features are important in demonstrating the principal characteristics of World War II era buildings, particularly the standardised design of buildings constructed by the Allied Works Council during the war.

Location Map

Hangar and workshop building.

Side elevation of workshop.

Former inflammables store.

APPENDIX L: SPP OLS MAPPING