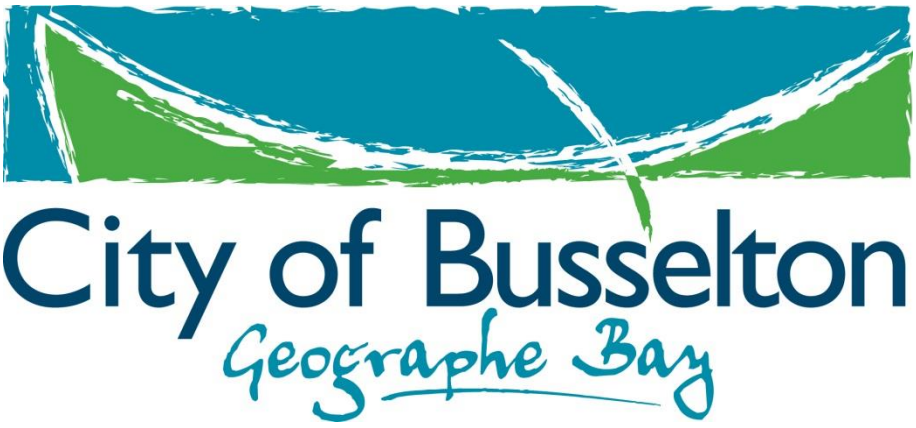

Airport Advisory Committee Agenda

23 March 2016

ALL INFORMATION AVAILABLE IN VARIOUS FORMATS ON REQUEST

CITY OF BUSSELTON

MEETING NOTICE AND AGENDA – 23 MARCH 2016

TO: **THE MAYOR AND COUNCILLORS**

NOTICE is given that a meeting of the Airport Advisory Committee will be held in the Meeting Room 1, Community Resource Centre, 21 Cammilleri Street, Busselton on Wednesday, 23 March 2016, commencing at 11.00am.

The attendance of Committee Members is respectfully requested.

MIKE ARCHER

CHIEF EXECUTIVE OFFICER

17 March 2016

CITY OF BUSSELTON

AGENDA FOR THE AIRPORT ADVISORY COMMITTEE MEETING TO BE HELD ON 23 MARCH 2016

TABLE OF CONTENTS

1. DECLARATION OF OPENING AND ANNOUNCEMENT OF VISITORS

2. ATTENDANCE

Apologies

Approved Leave of Absence

Nil

3. PUBLIC QUESTION TIME

4. DISCLOSURE OF INTERESTS

5. CONFIRMATION OF MINUTES

5.1 Minutes of the Airport Advisory Committee Meeting held on 26 February 2016

RECOMMENDATION

That the Minutes of the Airport Advisory Committee Meeting held 26 February 2016 be confirmed as a true and correct record.

6. REPORTS

6.1 BUSSELTON-MARGARET RIVER REGIONAL AIRPORT MASTER PLAN (2016-36)

SUBJECT INDEX:	Busselton-Margaret River Airport
STRATEGIC OBJECTIVE:	Infrastructure assets are well maintained and responsibly managed to provide for future generations.
BUSINESS UNIT:	Community Services; Commercial Services
ACTIVITY UNIT:	Commercial Services
REPORTING OFFICER:	Director, Community and Commercial Services - Naomi Searle
AUTHORISING OFFICER:	Director, Community and Commercial Services - Naomi Searle
VOTING REQUIREMENT:	Simple Majority
ATTACHMENTS:	Attachment A Busselton-Margaret River Regional Airport Master Plan (2016-36)

PRÉCIS

Following the submission of a comprehensive Business Case to the State Government, the City of Busselton was awarded $55.9m for the redevelopment of the Busselton-Margaret River Airport (BMRA).

As part of the overall project, a review of the key plans and studies completed as part of the Business Case was been undertaken, including the key informant to the overall project, the Busselton Regional Airport Master Plan (2011-31). Following the endorsement (C1512/366) of the BMRA Concept and Staging Plan as an informing document to the Master Plan in December 2015, this report presents the Busselton – Margaret River Airport Master Plan (2016-2036) and recommends that Council endorses the Plan as a guide for future planning.

BACKGROUND

In 2011 the City of Busselton completed the Busselton Regional Airport Master Plan (2011-2031) outlining future opportunities for growth and development. Since then, the City of Busselton has progressed a considerable number of studies in conjunction with the South West Development Commission (SWDC) resulting in the submission of a State Government Business Case to redevelop the Busselton Regional Airport (BRA). The Business Case considered three development options; stage 1 (current intrastate services), stage 2 (future domestic services), and stage 2a (future short haul international services).

In June 2015 the City was awarded funding of $55.9m to complete stage 2. In addition to this, in March 2016 a funding application was submitted to the Commonwealth Government's National Stronger Regions Fund to progress the project to international status.

Since the completion of the original Master Plan and Business Case, considerable progress has been made in delivering aspects of stage 1. In addition to this, a review of the Master Plan has been undertaken. The review follows Council's consideration and subsequent endorsement (C1512/366) of a 'Concept and Staging Plan' as a key informant to the revised Master Plan.

The purpose of the Master Plan is to establish the framework for the future planning and development of the redeveloped BMRA to ensure the region achieves its strategic objectives and capitalizes on the aeronautical and commercial opportunities provided by the airport, whilst also meeting State Government funding deliverables. The Master Plan is intended to establish the basis for more detailed studies of design, infrastructure planning, land use planning and environmental impacts required to achieve the strategic direction.

This report outlines the key aspects of the Master Plan (2016-36) and seeks Council's endorsement of the Plan as a guide for future planning.

STATUTORY ENVIRONMENT

The BMRA operates in accordance with the following; Aviation Transport Security Act 2004, Aviation Transport Security Regulations 2005, CASA MOS 139, the City of Busselton's Transport Security Plan, policies and procedures.

RELEVANT PLANS AND POLICIES

The Busselton Regional Airport Master Plan (2011- 2031) and Busselton Regional Airport Statement of Intent outline the vision for the BRA redevelopment and are relevant to this report.

FINANCIAL IMPLICATIONS

The State Government funding of $55.9m to deliver stage 2 has been incorporated into the City's 2015/16 adopted budget, and will form part of future budgets. The funding covers operational and capital costs associated with the project. Cost estimates (+/- 20%) have been prepared as part of the Master Planning process.

Due to the Business Case budget being prepared in 2013 variations between costings contained within the Business Case and the revised Master Plan were anticipated. However as part of the Master Planning process a review of future infrastructure and functional requirements and options has resulted in stage 2 cost estimates remaining within the set budget.

Long-term Financial Plan Implications

An operational financial model was developed as part of the State Government Business Case proposal which incorporated a 10-year financial plan. The model considered revenues and costs associated with the upgraded facility, including up-front and recurrent capital and ongoing operational expenditure. The model demonstrates that the upgraded facility will be self-sustainable, generating a modest profit into the future, to be transferred into the City's Airport Infrastructure Renewal and Replacement Reserve at the end of each financial year.

The Long Term Financial Plan (LTFP) is currently based on the 'here and now' scenario (stage 1), and will require updating to reflect the project, including ongoing operational and capital revenue and expenditure based on the stage 2 redevelopment. This work has commenced and will be incorporated into the next LTFP review. Further feasibility studies, forecasts and modeling will also be undertaken in due course on the opportunities associated with the potential development of landside aviation related industries on land surplus to the needs of the airport operations.

STRATEGIC COMMUNITY OBJECTIVES

The BMRA is consistent with following the City of Busselton's strategic Objectives:

Well Planned, Vibrant and Active Places:

- Infrastructure Assets that are well maintained and responsibly managed to provide for future generations;

- Connected City of Busselton Transport options that provide greater links within our district and increase capacity for community participation.

RISK ASSESSMENT

Whist a formal risk assessment is being developed as part of the overall development project, at a high level, and based on the Busselton Regional Airport Master Plan (2011-2031), a comprehensive risk assessment was undertaken as part of the development of the State Government business case proposal that identified and evaluated the effect of uncertainty on the project's objectives and deliverables, including risk mitigation strategies. The assessment considered the full project lifecycle, including pre and post project implementation mitigation strategies. Whilst there are risks assessed as both 'high' and 'medium', it was considered by business case steering committee members that the risks are manageable and were therefore accepted as part of the business case proposal. Below outlines the risks assessed as 'high';

Risk	*Controls*	*Consequence*	*Likelihood*	*Risk Level*
Passenger demand (competition from other leisure destinations and whether direct access is required)	Ensure attractive route schedules Ensure competitive ticket pricing Effective airport and destination marketing and positioning including iconic Margaret River brand	Major	Possible	High
Sustainable and long term airline operating at BRA	Industry and government support is required to underwrite the route Potential to regulate the route to protect the first airline entrant in commencement years Seek agreement to guarantee the route during underwriting period	Major	Possible	High
Projected aeronautical revenue not realised	Letter of intent, in-principle agreement from commercial airlines to operate from the BRA Effective airport and destination marketing	Major	Possible	High

CONSULTATION

A significant amount of consultation was undertaken as part of the development of the Business Case proposal, which was overseen by a State Government appointed steering committee comprising of representatives from; SWDC, Department of Transport, Department of Treasury, Tourism WA and the City of Busselton. Following the announcement of the State Government funding, a Project Governance Committee was established to oversee the overall deliverables of the project and associated funding. Committee members include; SWDC, Department of Transport, Department of Treasury, Tourism WA, City of Busselton, and the Department of Regional Development as observers.

Throughout the development of the Master Plan (2016-36) a number of stakeholders were consulted with including; Department of Fire and Emergency Services, Department of Parks and Wildlife, Royal Flying Doctors Service, McDermotts Aviation, Busselton Aero Club, Satterley Property Group,

Busselton Water, Water Corporation, Western Power, Office of Environmental Protection Agency, Cristal Mining, and regular users of Airport. Further to this, the Master Plan (2016-36) has been presented to the Project Government Committee through the submission of a Project Definition Plan (PDP), which reflects the deliverables outlined within State funding agreements.

OFFICER COMMENT

The first key deliverable in the BMRA Development Project was the preparation of a Project Definition Plan (PDP), which upon approval from the State Government appointed Project Governance Committee provides the basis to commence the delivery phase of the project. The PDP provides the level of definition required for the next step, the preparation of detailed documentation to progress a public tender process to deliver the project. Using the Business Case as a base for the project parameters, the PDP confirms the scope, cost, schedule and risks associated with investing in the project.

The following key elements of the project are included in the PDP:

- Project Scope outlining the project objectives and key deliverables;
- The **Busselton-Margaret River Regional Airport (BMRRA) Master Plan (2016-36)**, including future staging of development works and their impact on the project;
- Project Delivery outlining the critical success factors, constraints, considerations, land assembly, site infrastructure and functional requirements;
- Construction programme outlining the staging, project schedule and approvals;
- Cost Schedule and transitional requirements to operations;
- Procurement and Financing outlining how the project will be procured reflective of the market environment;
- Project Management and Reporting summarising project processes and methodologies; and
- Governance arrangements, operational approvals and probity.

The approved PDP will become the reference point for all future decisions during the design, construction and commissioning of the redeveloped BMRRA.

As part of the development of the PDP, a review of the BRA Master Plan (2011-31) was undertaken as the initial step in defining the scope of the Development Project to enable interstate services (stage 2). In June 2015 Aviation Projects was commissioned to undertake the review and to provide costings based on the staged upgrade options identified as part of the Business Case proposal.

Through this review three key constraints were identified within the BRA Master Plan (2011-31), including;

- a lack of opportunity for future expansion to service larger code 4E or 4F aircraft due to the inability to expand the apron parking bays to the north;
- the reliance on the undergrounding of overhead power lines for airside pavement infrastructure places increased pressures on the project budget and timeframes; and

- the entrance into the main terminal precinct behind the adjacent industrial estate conflicts with the sense of place and experience that is aimed at visitors arriving and departing the internationally recognised 'Margaret River Region'.

Incorporating input from key stakeholders to assess and determine infrastructure demand drivers, service delivery requirements, current infrastructure constraints, and future infrastructure development opportunities, the revised BMRA Master Plan (2016 - 2036) (Attachment A) identifies the entire infrastructure (critical or otherwise) that is pertinent to sustainable airport growth, and clearly confirms the parameters for the stage 2 BMRA Development Project.

Stage 2
The completion of the BMRA Development Project (stage 2) will provide for new alternate direct transport access into and out of the South West Region. This will be achieved by the BMRRA being upgraded to service, at a minimum, A320/B737 Code 4C narrow body aircraft using instrument non-precision approaches, to enable domestic Regular Public Transport (RPT) and charter services to east coast destinations, as well as other aviation activities.

Stage 2AEO
Following the completion of stage 2, and during the 20 year planning horizon, various aviation-related enterprise opportunities are expected to arise. These opportunities will rely on infrastructure available within the scope and according to the design aircraft of the other stages.

Stage 2A
Stage 2A will provide access for narrow body code 4C aircraft to international destinations such as Singapore, Kuala Lumpur and Denpasar, and longer range domestic destinations such as Brisbane.

Stage 3
Stage 3 will see Code 4E wide body aircraft (A330/B787) using category I precision approaches, conducing domestic and international RPT and charter operations, as well as other aviation activities.

Stage 4
In addition to the potential for the BMRA to act as an A380 alternate or emergency diversion airport, the Master Plan considers spatial requirements applicable to permanent operations of Code 4F aircraft (B747-800F).

Reflective of the Business Case, and State Government funding agreements, the revised Master Plan provides for the completion of stage 2 which incorporates the following deliverables:

- runway lengthening to 2340m;
- runway widening to 45m;
- runway strengthening to 44 Pavement Classification Number (PCN);
- construction of 2 new apron bays and connecting taxi-way;
- construction of a new terminal building to facilitate up to 350 passengers;
- new entry road/statement and internal road network;
- site-wide services upgrade including the creation of services corridors and easements;
- refuelling options for larger aircraft such as Jet A1 fuel facilities and refuelling tankers;

- construction of an additional 600 car parking bays;
- acquisition of land to facilitate runway lengthening; and
- flexible design which accommodates future master planned phases.

The PDP incorporating the revised Master Plan has been submitted to the Project Governance Committee for approval, which is expected to be received by the end of March 2016. On this basis the revised Master Plan is presented for formal endorsement of Council as a guide for future planning.

CONCLUSION

Whilst the parameters for the initial stages of the revised Master Plan was confirmed through the State Government Business Case and subsequent funding commitment of $55.9m, a review of the Plan was deemed necessary to confirm the scope of the Development Project and provide up to date costings. Whilst the functional requirements and deliverables have not deviated from the previous Master Plan (2011-31) or Business Case, the layout and staging of the Plan has been amended to cater for future needs. As a key guiding document for future development, it is recommended that the Council endorses the Master Plan (2016-36) as a guide for future planning.

OPTIONS

The Council could choose not to endorse the Master Plan, however it must be noted that State Government funding is tied to the deliverables outlined in stage 2 and any change to this may jeopardize current funding arrangements.

TIMELINE FOR IMPLEMENTATION OF OFFICER RECOMMENDATION

Upon Council endorsement the Master Plan (2016-36) will be finalized immediately.

OFFICER RECOMMENDATION

That the Council endorses the Busselton – Margaret River Airport Master Plan (2016-2036) as a guide for future planning.

MASTER PLAN 2016-2036

BUSSELTON-MARGARET RIVER REGIONAL AIRPORT

Prepared for City of Busselton

AVIATION PROJECTS

AVIATION PROJECTS

DOCUMENT CONTROL

Document Title: Busselton-Margaret River Regional Airport Master Plan 2016-2036

Reference: YBLN11-07

Release Date: 10 February 2016

Prepared by: L Hodgson

Reviewed by: K Tonkin

Released by: K Tonkin

Revision History: Final for Release

Revision History

Version	Description	Transmitted	Reviewed by	Date
0.1	First Draft	18 January 2016	City of Busselton	02 February 2016
0.2	Final Draft	05 February 2016	City of Busselton	10 February 2016
1.0	Final for release	10 February 2016		

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AVIATION PROJECTS

TABLE OF CONTENTS

AVIATION PROJECTS

AVIATION PROJECTS

AVIATION PROJECTS

LIST OF TABLES

AVIATION PROJECTS

LIST OF FIGURES

AVIATION PROJECTS

EXECUTIVE SUMMARY

Busselton-Margaret River Regional Airport (BMRRA) is located 6.5 km south east of the centre of the City of Busselton. The 1800 m long runway can support jet aircraft such as the 100 seat Fokker F100 which can be used for regular public transport (RPT) and fly-in fly-out (FIFO) and other charter services.

The airport was built in 1997 and is required to be operated in accordance with the requirements set out in Ministerial Statement 399, issued by the then Minister for the Environment.

In December 2010 Shire of Busselton (now City of Busselton) gave in-principle support to expansion of the existing airport. The proposed expansion is intended to service the south west region of Western Australia with flights in and out of the eastern states and international destinations.

In June 2015, WA Government approved funding for the works required to upgrade the airport in order to support non-stop services between BMRRA and east coast destinations such as Sydney and Melbourne. These works were scoped as Stage 2 in the associated business case.

This Master Plan has been prepared to establish and update the framework for the future planning and development of BMRRA to ensure it meets the City's strategic objectives.

Strategic objectives

The Council of the City of Busselton holds a vision for BMRRA as the South West Regional Airport to deliver quality air transport outcomes for the benefit of the residents of the City and the South West. Achievement of these outcomes involves:

- taking a balanced approach;
- protecting the environment;
- viability for the community;
- economic benefits;
- social benefits;
- governance; and
- community involvement.

Purpose

The purpose of the Master Plan is to establish a framework for the future planning and development of BMRRA to ensure the region achieves its strategic objectives and capitalises on the aeronautical and commercial opportunities provided by the airport.

The Master Plan follows a successful submission of a business case to upgrade the BMRRA, to facilitate interstate services, to the State Government. The Plan is intended to establish the basis for more detailed

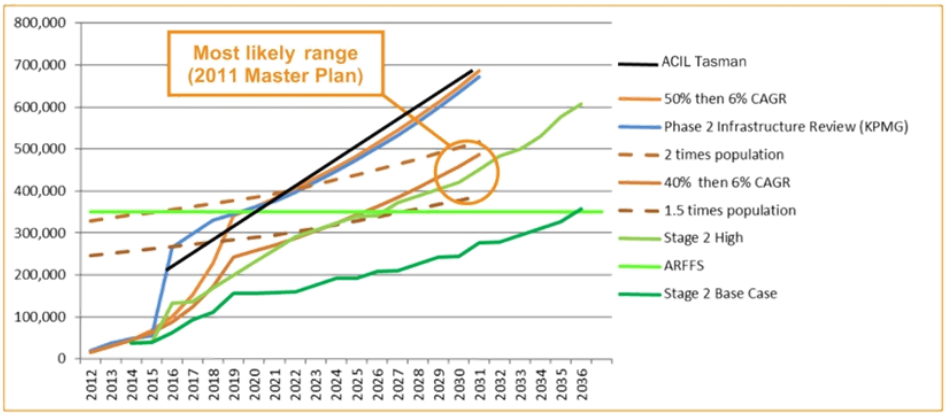
AVIATION PROJECTS

studies of design, infrastructure planning, land use planning and environmental impacts required to achieve the strategic direction.

Aviation demand forecasts

A number of demand forecasts were prepared during the progressive development of the Busselton Regional Airport Upgrade Project Business Case. The various forecasts, along with a representative set of scenarios used for sensitivity testing were analysed by AEC Group in the development of financial and feasibility models as described in *Busselton Regional Airport Financial Modelling Outcomes, South West Development Commission*, 27 February 2014.

The figure below illustrates the range of passenger demand forecast results arising from earlier work. Option 2 (stage 2 base) was selected as the basis for the business case. According to the Stage 2 Base Case, at the 20 year planning horizon, it is expected that BMRRA will support approximately 350 000 passenger movements.



Passenger movement demand forecast sensitivities

Several sensitivities exist in this analysis:

- Actual demand is unquantified since there have been no RPT services at BMRRA for several years; and
- The date of introduction of east coast services is dependent upon demand and the commissioning date of the upgraded runway capable of supporting the applicable aircraft operations.

Other broader factors influencing passenger demand include:

- international recognition of the Margaret River Wine Region brand;
- the South West region's proximity to South East Asia;
- positioning of Busselton as the 'Events Capital';

- the strategic location of Busselton within the South West region;
- the current economic environment and desire to diversify the economic base of the region;
- investment in public and private infrastructure such as the Busselton Foreshore project and other commercial opportunities including development of the lots adjacent to BMRRA as a light industrial precinct; and
- constraints at Perth Airport.

Development stages

Three stages of development contemplated in this master plan are outlined below:

Stage 1 – Code 3C intrastate

Stage 1 incorporates current operations, up to code 3C, instrument non-precision approaches, RPT and charter services, as well as other aviation activities.

Aircraft potentially operating during this stage include ATR42, ATR72, Bae146, F50, F100 and Dash 8.

Stage 1 ends when the Stage 2 upgrade project is complete.

Stage 2 – Code 4C Domestic

Stage 2 will see A320/B737 code 4C narrow body jets using instrument non-precision approaches, conducting domestic RPT and charter services to east coast destinations, as well as other aviation activities. Aerodrome Rescue and Fire Fighting services will be required when passenger movements exceed 350 000 in the previous financial year.

Under the funding agreement, the BMRRA Development Project is required to deliver the following elements of infrastructure:

- upgrade the airport to code 4C standard – certificate of compliance issued by CASA;
- runway extended to 2340 m x 45 m;
- two apron parking bays (A320 / B737 standard) and connecting taxiway;
- passenger terminal capable of handling up to 350 passengers;
- new 600 bay carpark; and
- supporting services requirements such as; connection to water services, onsite waste treatment plant, undergrounding of overhead powerlines, telecoms, drainage, etc.

AVIATION PROJECTS

Stage 2 – Aviation Enterprise Opportunities (AEO)

Following the completion of Stage 2, and during the 20 year planning horizon, various aviation-related enterprise opportunities are expected to arise. Representative opportunities are incorporated in the overall concept plan to identify spatial planning requirements.

Stage 2A – Code 4C International

Stage 2A will see narrow body code 4C jets flying to international destinations. Aerodrome Rescue and Fire Fighting services will be required regardless of the number of passenger movements, and an air traffic control tower may be required.

Stage 3

Stage 3 will see up to A330/B787 code 4E wide body jets using category I precision approaches, conducting domestic and international RPT and charter operations, as well as other aviation activities.

Stage 4

In addition to the potential for BMRRA to act as an A380 alternate or emergency diversion airport, the master plan considers spatial requirements applicable to the permanent operation of a code 4F aircraft such as the B747-800F conducting freight operations.

Development concept

The 2011 Master Plan proposed two options for the location of the new passenger terminal and associated infrastructure. The preferred option was to locate the passenger terminal precinct to the south of the current terminal. It was thought that this location was less constrained and provided the best solution for future expansion of the terminal and parking apron facilities, and that there was adequate room for development of car parking and other road transport infrastructure.

Aviation Projects subsequently undertook a review of infrastructure costs in *Infrastructure Cost Estimate Peer Review – Phase 2 - Busselton Regional Airport*, v1.0, 22 August 2013. In the course of this review, it was concluded that Stage 2 development could be delivered at a slightly reduced cost if the new passenger terminal and associated infrastructure was located to the north of the existing terminal precinct, subject to the cost of undergrounding the high voltage power lines. The siting of the passenger terminal in this location was not subject to future proofing for code F aircraft.

Following approval of funding for the Stage 2 Development Project, and in the course of preparing this master plan, City of Busselton specified a requirement to future proof the site for code F aircraft such as the B747-800F. This led to a review of the site for the passenger terminal and overall siting outcomes, resulting in a decision to locate the passenger terminal precinct to the south of the existing precinct as per the original 2011 Master Plan, and to protect a full length code F parallel taxiway. These considerations are the main determinants of the remainder of the development concept

AVIATION PROJECTS

Master Plan

The Master Plan is characterised by progressive upgrades in four distinct stages according to aircraft types and operations as outlined below.

The triggers and dependencies of the elements of Stages 1, 2, 2 AEO and 2A are provided in Table 13 and Table 14. Timings are indicative and subject to further feasibility assessment, funding, approvals, design and construction of necessary infrastructure, as well as negotiation with applicable aircraft operators. Development of Stages 3 and 4 are beyond the 20 year planning horizon and subject to demand and government consideration.

Stage 1 – ongoing to the end of 2017

Charter (and potentially RPT) operations from the current facility by aircraft such as ATR42, ATR72, Bae146, F50, F100 and Dash 8:

- interim expansion of passenger terminal facilities to accommodate F50/F100 RPT operations (complete);
- provision of passenger screening (complete but not currently required);
- development and implementation of a Transport Security Program which will require definition and fencing of the airside/landside boundary (complete);
- provision of a Jet A1 fuel facility (deferred to Stage 2);
- expansion of car parking facilities according to demand (complete);
- construction of an additional aircraft parking bay (complete); and
- land acquisition in preparation for future stages - preferably the maximum envelope rather than the minimum requirement (deferred to Stage 2).

Stage 2 – construction complete by end of 2017

Infrastructure required for the introduction of narrow body code 4C jet aircraft such as A320, B737:

- strengthening, widening to 45 m and extension to 2340 m (TODA 2400 m) of runway 03/21;
- construction of a two bay parking apron and connecting taxiway;
- construction of a new passenger terminal capable of handling 350 passengers at one time;
- expansion of car parking facilities, including hire cars, buses etc to at least 600 new spaces; and
- supporting services requirements such as; connection to water services, onsite waste treatment plant, undergrounding of overhead powerlines, telecoms, drainage, etc.

Stage 2 AEO – as demand arises

Infrastructure anticipated as a result of potential aviation enterprise opportunities includes:

- expansion of the existing apron near the existing Aero Club;

AVIATION PROJECTS

- construction of a code B parking apron and taxiway;
- development of code B hangar precinct sites (includes provision for RFDS transfer station and avgas facility);
- expansion of the existing parking apron to facilitate development of code C hangars; and
- construction of new roads to connect these developments to the internal road network.

Stage 2A – as demand by international carriers dictate

International narrow body code 4C jet RPT such as A320, B737:

- Extension of the runway to 2460 m (TODA 2520 m);
- provision of 240 m RESA at each runway end;
- Installation of additional precision approach path indicator lights at each runway end;
- expansion of the passenger terminal to provide international passenger facilities; and
- provision of ARFFS and ATC if/when required.

End of 20 year planning horizon

Stage 3 – subject to demand

Wide body code 4E jet RPT operations such as A330, B787:

- extension of runway 03/21, initially at the northern end, to a length of approximately 2700 m, within the RESA footprint, 45 m wide with 7.5 m shoulders;
- construction of 23 m wide taxiways with 10.5 m shoulders;
- if extending the current runway, construction of a parallel taxiway to near the threshold of the current runway (subject to land ownership constraints and the little wedge of Lot 203) designed around Code E separation requirements;
- extension of the parking apron;
- expansion of the passenger terminal; and
- provision of hydrant refuelling.

Stage 4 – subject to demand

International freight and/or alternate aerodrome for large wide body or code F aircraft such as the A380 or B747-800:

- Upgrade runway/taxiway and pavement to Code F requirements; and
- Provide other facilities as required to support the scope of operations.

AVIATION PROJECTS

Precinct plan

A number of precincts have been identified for the purpose of characterising the likely developments appropriate for each area of the aerodrome site, based on upon function. These precincts, along with the ultimate development and other planning considerations are described below and shown in **Annexure 1**

Aeronautical Business Park

The Aeronautical Business Park is identified as a land bank, providing a zone for aeronautical business opportunities.

The precinct is located within prime access to the Vasse Highway / Airport entry and in close proximity to the Terminal. As such, front of house land uses would be encouraged in this zone.

Aeronautical Operations Precinct

The Aeronautical Operations Precincts is defined by the airside / landside secure separation. All aspects of this precinct are incremental to the operations of the Airport.

Terminal Precinct

The Terminal Precinct is on axis with the Vasse Highway entrance to the site. The terminal building is located within the view corridor of the arrivals sequence; reinforcing the use of the site.

The arrivals / departure sequence features regional landscapes as a buffer between the airport and surrounding infrastructure to heighten the visitors' experience of the Terminal Precinct.

Aviation Logistics Precinct

The Aviation Logistics Precinct is located to the north of the Terminal Precinct and houses predominantly landside operational requirements and support facilities for the Airport. This precinct is also land banked to enable planned growth for the Airport proper.

Light Aviation Precinct

The Light Aviation Precinct is located in close proximity to the existing terminal building. This precinct seeks to re-purpose the current uses on the northern most parcel of the site proper.

There is opportunity for integration with adjacent developments off-site.

Helicopter Operations Precinct

The Helicopter Operations Precinct is currently located on a parcel of land that is still under negotiation. The following document identifies options for the resolution of this precinct both within the staging and design options. This precinct will principally house all rotary wing operations.

AVIATION PROJECTS

Environmental and land use planning issues

The following environmental issues have been explored and documented for the purpose of further investigation as applicable:

- Conditions relating to noise;
- Noise Modelling;
- Waterbirds of the Vasse-Wonnerup Wetlands;
- Fauna assessment;
- Aircraft flight path optimisation to reduce noise impacts;
- Obstacle limitation surfaces;
- Flooding and stormwater drainage; and
- Other development control measures.

Staging considerations

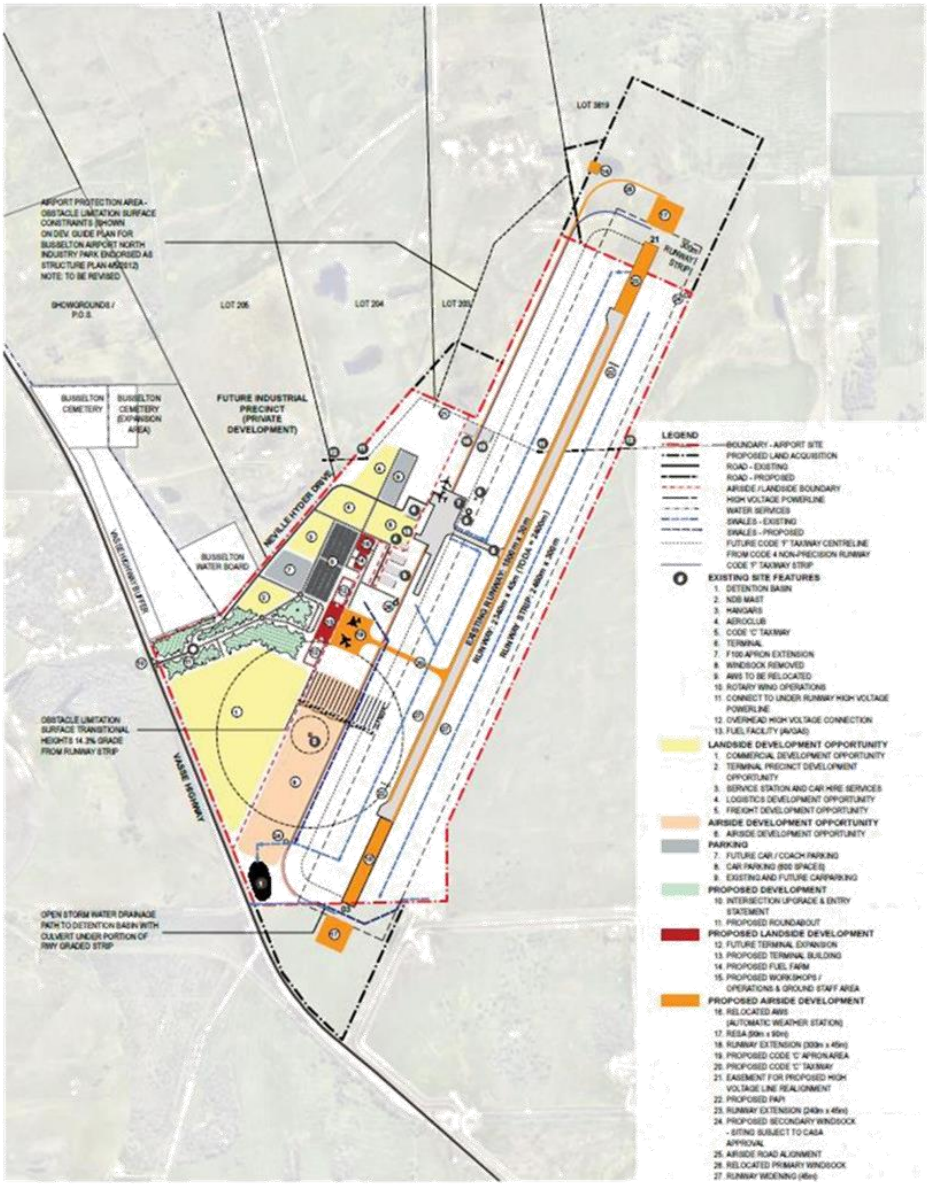
Staging of development over the course of the master planning horizon and beyond will be influenced by a number of general considerations outlined below.

Demand - Demand forecasts were prepared in support of the Busselton Regional Airport Upgrade Project Business Case. They relied upon the best known information at the time, but are subject to a number of uncertainties outlined herein.

Code E and A380 alternate for Perth Airport – Given the significant cost of infrastructure that would be required to provide an alternate aerodrome for Perth Airport's code E and A380 operations, the issue should be addressed to State and Commonwealth Government agencies so that its place in the future planning of BMRRA can be ascertained.

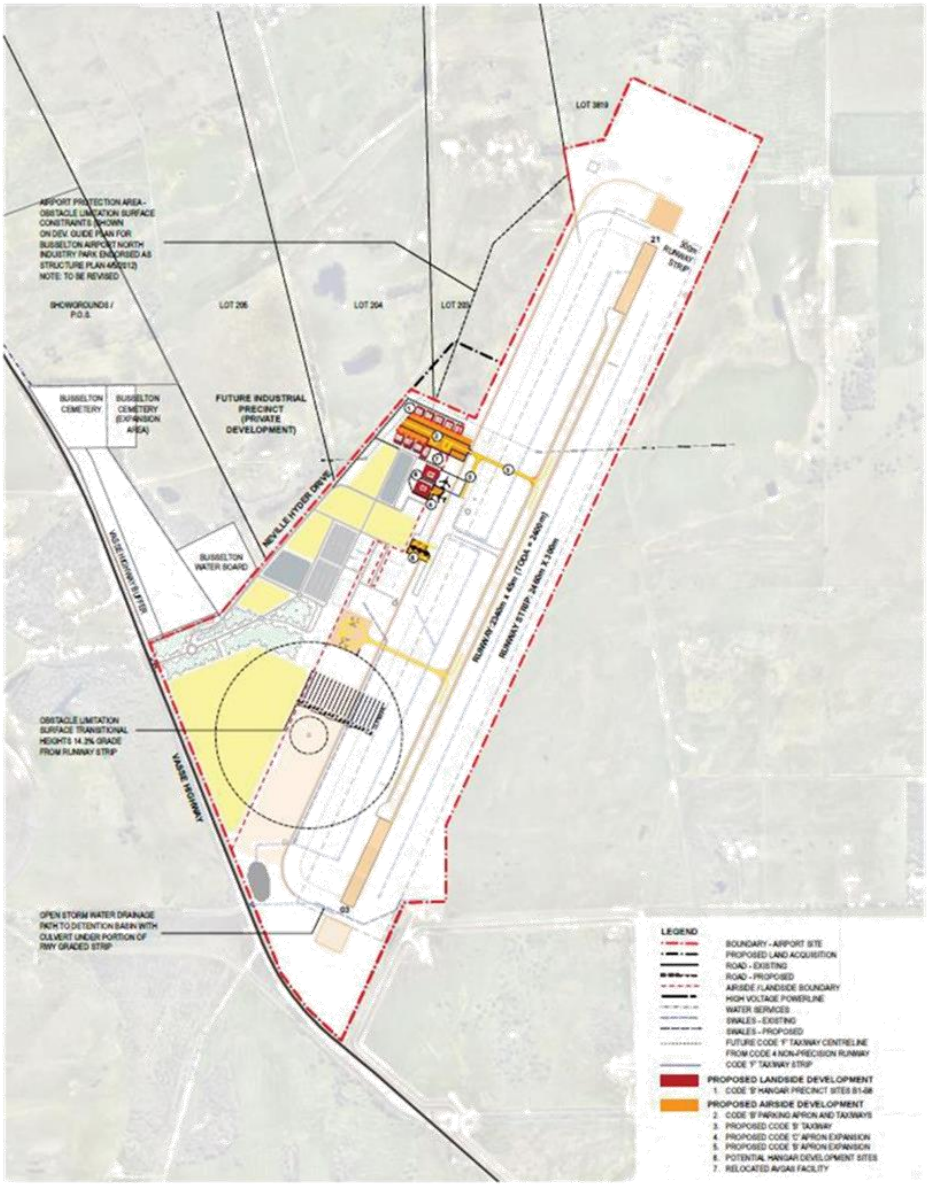
Funding – Each stage of the master plan will require significant capital expenditure. The availability of capital funding will influence the viability and/or timing of each stage.

AVIATION PROJECTS



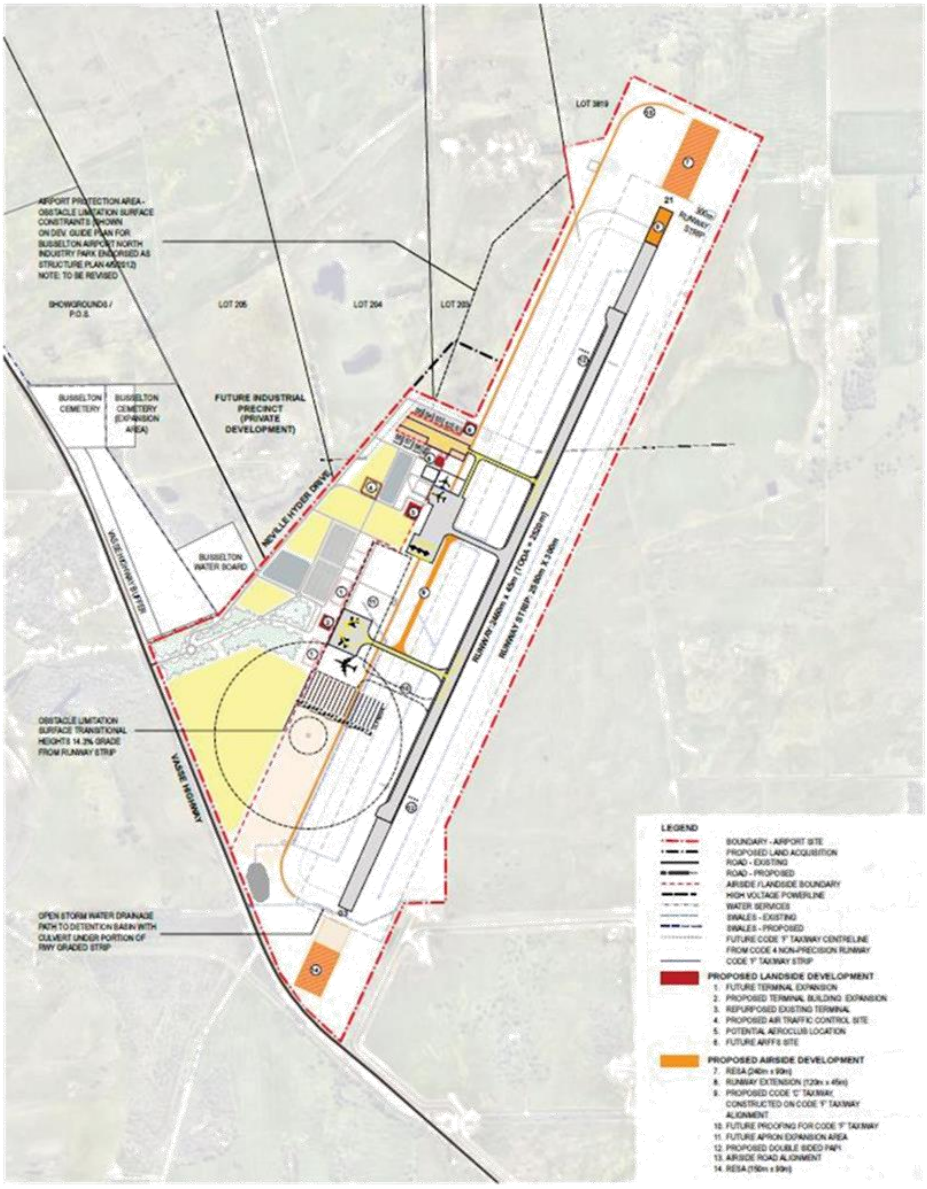
Stage 2 Master Plan

AVIATION PROJECTS



Stage 2 AEO Master Plan

AVIATION PROJECTS



Stage 2A Master Plan

AVIATION PROJECTS

1. PLANNING CONTEXT

1.1. Introduction

Busselton-Margaret River Regional Airport (BMRRA) is located 6.5 km south east of the centre of the City of Busselton. The 1800 m long runway can support jet aircraft such as the 100 seat Fokker F100 which can be used for regular public transport (RPT) and fly-in fly-out (FIFO) and other charter services.

The airport was built in 1997 and is required to be operated in accordance with the requirements set out in Ministerial Statement 399, issued by the then Minister for the Environment.

In December 2010 Shire of Busselton (now City of Busselton) gave in-principle support to expansion of the existing airport. The proposed expansion is intended to service the south west region of Western Australia with flights in and out of the eastern states and international destinations.

In June 2015, WA Government approved funding for the works required to upgrade the airport in order to support non-stop services between BMRRA and east coast destinations such as Sydney and Melbourne. These works were scoped as Stage 2 in the associated business case.

This Master Plan has been prepared to establish and update the framework for the future planning and development of BMRRA to ensure it meets the City's strategic objectives.

The location of BMRRA (circled) with respect to the City of Busselton is shown in Figure 1 (source: Google Earth).

Figure 1 Busselton township and Busselton-Margaret River Regional Airport

AVIATION PROJECTS

1.2. Regional planning context

The South West region of Western Australia encompasses 12 local government areas and three sub-regions of Bunbury Wellington, Vasse and Warren Blackwood as shown in Figure 2 (image from South West Regional Blueprint, December 2014).

BMRRA is centrally located on the western coastal boundary and is the only jet airport servicing the region.

Figure 2 South west region of Western Australia

AVIATION PROJECTS

1.3. Economic significance

BMRRA is viewed as an important driver of economic development for the South West Region of WA.

The South West Regional Planning and Infrastructure Framework March 2014 (draft), published by the Department of Planning on behalf of the Western Australian Planning Commission, identifies upgrade of the BMRRA as an economic project of regional significance. The objective of the project is to upgrade BMRRA to international standards, which will benefit to the region and subregion as a result of increased tourism, FIFO activities and freight services.

Further aspects of regional development related to the airport upgrade are outlined in Table 1.

Table 1 South West Regional Planning and Infrastructure Framework March 2014 - aspects relating to BMRRA

Area of Impact	*Project*
Economy – Tourism	Busselton Foreshore. Performing Arts Centre in Busselton. Convention Centre in Busselton.
Air Transport	BMRRA Expansion.

The project is considered important because of the following considerations:

- Aviation has a key role in regional tourism, trade and mining;
- The lack of a South West aviation strategy has produced localised development with limited connection of strategic aviation requirements between locations;
- Busselton is well placed to provide a regional entry point for national and international jet services; and
- This project will complement work to assist the upgrades of Bunbury and Manjimup airports as general aviation sites in the north and south of the region respectively. Development will result in improved tourism opportunities, provision of a South West muster point for fly-in, fly-out operations, improved safety and access to international export markets.

The following benefits are expected to accrue from the project:

- increased number of visitors to the region;
- safer fly-in, fly-out employment opportunities;
- increased national and international awareness of the region as a tourist destination;
- improved access to the eastern states for business and leisure opportunities;
- the opportunity for direct flights to and from Asia; and
- new trade opportunities, including air freight.

AVIATION PROJECTS

The South West Development Commission (SWDC), in its South West Action Statement, identifies a number of projects that can contribute more broadly to the region's development and in so doing help contribute to State and national objectives. Increasing the capacity of BMRRA to handle direct national and international flights and FIFO operations is identified as one of these regionally significant projects.

The South West Development Commission Strategic Plan 2010 – 2025 identifies a modern, competitive transport network as a Strategic Priority in order to achieve its mission to develop the region's economy and enhance those qualities which make the South West the best place to live, work and invest. Air transport outcomes are established for the three five-year blocks commencing 2010, as outlined in Table 2.

Table 2 SWDC Strategic Plan 2010-2025 - aspects relating to BMRRA

Horizon	*Outcomes*
2010-2015	• Detailed design and fatal flaw analysis has commenced with the Shire of Busselton (now City of Busselton) to maximise the use of Busselton's regional airport facility.
2015-2020	• Aviation infrastructure is being developed at key airports. • An Eastern States' passenger service from BMRRA is being promoted.
2020-2025	• The South West has an integrated aviation transport network supporting commercial and recreational aviation sectors. • BMRRA is used for both national and international air services.

In the SWDC Annual Report 2014-15, titled *Destination2050*, it was noted that the State Government committed $59.7 million towards the expansion of BMRRA. The expansion project is underscored for its potential to unlock critical economic and business opportunities.

1.4. Tourism WA

Tourism WA is the State Government agency responsible for promoting Western Australia as an extraordinary holiday destination. Its focus is on marketing the State; developing, attracting and promoting major sporting, cultural and business events; and developing significant tourism infrastructure and projects.

In its Strategic Plan 2010/11, national and international aviation access to the Margaret River region is listed as one of four key priorities for development of tourism infrastructure.

1.5. City of Busselton Strategic Community Plan 2013

The City of Busselton Strategic Community Plan 2013 Key Goal Area 4 is a well connected City that provides for safe, accessible and efficient transport and communications systems to and within the district.

Council strategies to support achievement of these community objectives include:

- Continue with expansion plans for the BMRRA, including lobbying for State and Federal government funding; and

AVIATION PROJECTS

- Work with airlines and the mining industry to provide accessible networks to the east coast of Australia, northern WA and neighbouring South East Asia.

1.6. Statement of Intent

The Council of the City of Busselton approved the current version of the Statement of Intent for BMRRA (version 3) on 12 November 2014, and amended it in November 2015 to reflect the Premier of Western Australia's announcement of the new name for the airport. The content of Policy No 124 is copied below.

1.6.1. Vision for the Facility

The Council of the City of Busselton holds a vision for the Busselton-Margaret River Regional Airport (BMRRA) as the South West Regional Airport to deliver quality air transport outcomes for the benefit of the residents of the City and the South West.

1.6.2. A Balanced Approach

The airport will be developed in a manner that respects residential amenity, recognising community impacts associated with its operations, particularly noise, while providing economic, social and tourism benefits to the City and the South West. Over time, the airport will become a hub for passenger, business, tourism and recreational uses that deliver benefit to the broader community.

1.6.3. Protecting Your Environment

As with any airport facility, there will be residents affected by its operations either by proximity to the facility or flight paths associated with it. To minimise that impact as far as possible, the City of Busselton makes the following commitments:

- We will manage noise by proactively implementing the Noise Management Plan
- We will proactively promote Fly Neighbourly practices
- We will consider the amenity implications when proposing any expansion of airport facilities and airport operations
- We will update and review noise modelling data as required and respond appropriately to changes in impact revealed
- We will respond to and investigate noise complaints
- We will consider potential noise amelioration as part of development proposals

1.6.4. Viability for the Community

The City of Busselton is committed to developing the BMRRA into a commercially viable community facility for the benefit of ratepayers. It is a particular vision to develop the airport into a sustainable facility including the capacity for asset renewal requirements to be funded from its operations.

- We will proactively seek Government funding for the facility
- We will seek to develop airport uses delivering income streams through landing fees, head taxes, licensing fees and other charges

AVIATION PROJECTS

- We will invest in infrastructure upgrades following favourable cost/benefit analysis

1.6.5. Economic Benefits

The City of Busselton recognises the significant economic opportunities associated with having an airport located in the District.

- We will promote Busselton, Dunsborough and Yallingup as well as The Margaret River Region and other South West locations as destinations serviced by the BMRRA for visitors, nationally and internationally
- We will promote the City of Busselton as a base for fly-in fly-out services and their employees and families
- We will investigate and pursue business (import and export) opportunities

1.6.6. Social Benefits

The City of Busselton seeks to deliver an accessible air transport service for the benefit of its residents and those of the broader South West.

- We will seek to facilitate the airport as a base for airborne emergency services
- We will seek to facilitate the provision of efficient and accessible passenger services such as interstate and international services
- We will seek to facilitate the provision of fly-in fly-out services to provide additional employment opportunities for local community members

1.6.7. Governance

The BMRRA will be managed by the City of Busselton in a manner that gives the highest regard to relevant regulations and safety, is responsible and progressive.

- We will ensure compliance with CASA and Air Services safety regulations and standards
- We will report any matter not in the jurisdiction of the City to the relevant authority
- We will be a responsible and accountable airport operator on behalf of the community
- We will continuously improve and review where necessary management principles and practices

1.6.8. Community Involvement

The City of Busselton recognises it is managing the BMRRA on behalf of its community and will therefore involve the community in decision-making.

- We will be consultative, informative and responsive
- We will regularly report on airport activities supporting the highest levels of transparency and visibility
- We will support a committee to provide advice on relevant airport matters.

AVIATION PROJECTS

1.7. Purpose of master planning study

The purpose of the Master Plan is to establish a framework for the future planning and development of BMRRA to ensure the region achieves its strategic objectives and capitalises on the aeronautical and commercial opportunities provided by the airport.

The Master Plan is intended to establish the basis for more detailed studies of design, infrastructure planning, land use planning and environmental impacts required to achieve the strategic direction.

1.8. Staging – 2011 Airport Master Plan

The 2011 Master Plan nominated four stages of development as outlined below:

1.8.1. Stage 1 – Code 3C intrastate

Stage 1 incorporates current operations, up to code 3C, instrument non-precision approaches, RPT and charter services, as well as other aviation activities.

Aircraft potentially operating during this stage include ATR42, ATR72, Bae146, F50, F100 and Dash8.

1.8.2. Stage 2 – Code 4C Domestic

Stage 2 will see A320/B737 code 4C narrow body jets using instrument non-precision approaches, conducting domestic RPT and charter services to east coast destinations, as well as other aviation activities. Aerodrome Rescue and Fire Fighting services will be required when passenger movements exceed 350 000 in the previous financial year.

Stage 2 operations are the most likely scope of operations at the end of the 20 year planning horizon.

1.8.3. Stage 2A – Code 4C International

Stage 2A will see narrow body code 4C jets flying to international destinations. Aerodrome Rescue and Fire Fighting services will be required regardless of the number of passenger movements.

1.8.4. Stage 3 – Code 4E

Stage 3 will see up to A330/B787 code 4E wide body jets using category I precision approaches, conducting domestic and international RPT and charter operations, as well as other aviation activities.

1.8.5. Stage 4 – Code 4F

The opportunity to consider A380 aircraft requirements has been taken so that the implications of providing an alternate for potential future Perth-bound A380 or other large wide body aircraft can be further examined and documented.

1.9. Staging – Revised

The stages of development contemplated in this master plan are outlined below:

AVIATION PROJECTS

1.9.1. Stage 1 – Code 3C intrastate

Stage 1 incorporates current operations, up to code 3C, instrument non-precision approaches, RPT and charter services, as well as other aviation activities.

Aircraft potentially operating during this stage include ATR42, ATR72, Bae146, F50, F100 and Dash 8.

Stage 1 ends when the Stage 2 upgrade project is complete.

1.9.2. Stage 2 – Code 4C Domestic

Stage 2 will see A320/B737 code 4C narrow body jets using instrument non-precision approaches, conducting domestic RPT and charter services to east coast destinations, as well as other aviation activities. Aerodrome Rescue and Fire Fighting services will be required when passenger movements exceed 350 000 in the previous financial year.

Under the funding agreement, the BMRRA Development Project is required to deliver the following elements of infrastructure:

- upgrade the airport to code 4C standard – certificate of compliance issued by CASA;
- runway extended to 2340 m x 45 m;
- two apron parking bays (A320 / B737 standard) and connecting taxiway;
- passenger terminal capable of handling up to 350 passengers;
- new 600 bay carpark;
- supporting services requirements such as; connection to water services, onsite waste treatment plant, undergrounding of overhead powerlines, telecoms, drainage, etc; and
- Jet fuel facility.

1.9.3. Stage 2 – Aviation Enterprise Opportunities (AEO)

Following the completion of Stage 2, and during the 20 year planning horizon, various aviation-related enterprise opportunities are expected to arise. Representative opportunities are incorporated in the overall concept plan to identify spatial planning requirements.

1.9.4. Stage 2A – Code 4C International

Stage 2A will see narrow body code 4C jets flying to international destinations. Aerodrome Rescue and Fire Fighting services will be required regardless of the number of passenger movements, and an air traffic control tower may be required.

1.9.5. Stage 3

Stage 3 will see up to A330/B787 code 4E wide body jets using category I precision approaches, conducting domestic and international RPT and charter operations, as well as other aviation activities.

AVIATION PROJECTS

1.9.6. Stage 4

In addition to the potential for BMRRA to act as an A380 alternate or emergency diversion airport, the master plan considers spatial requirements applicable to the permanent operation of a code 4F aircraft such as the B747-800F conducting freight operations.

1.10. Planning horizon

The Busselton-Margaret River Regional Airport Master Plan considers a 20 year period from 2016 through to the end of 2036.

Periods of the 20 year Master Plan are described as short, medium and long term.

1.10.1. Short term

The short term is the five year period through to mid-2020, and is characterised in two distinct phases – Stage 2 construction and then Stage 2 operations.

Stage 2 construction (to the end of 2017) characterises the construction period of the BMRRA Development Project (Stage 2).

Subject to the availability of funding, Stage 2 AEO and 2A infrastructure may also be constructed during this period.

Stage 2/2A operations are planned to commence once construction is complete.

1.10.2. Medium term

The medium term is the period between five and 10 years (mid-2020 to mid-2026).

1.10.3. Long term

The long term is the period beyond 10 years (mid-2026 and beyond).

AVIATION PROJECTS

1.11. Planning objectives

The aims of this Master Planning study are therefore to:

- consider the planning context within which the study is being undertaken;
- identify constraints to development of the airport;
- consider current and planned aeronautical activity to identify the infrastructure required to meet forecast demand. This infrastructure includes aircraft movement areas including the runway, taxiway and apron complex, aviation support facilities, passenger facilities, the ground transport system and utilities;
- consider current and planned compatible commercial activities, land use and development to identify opportunities for the future growth of the region's business activities;
- consider planning and environmental impacts of the proposed aeronautical and commercial developments;
- develop a Master Plan that provides a strategic framework for the realisation of forecast and potential aeronautical and compatible commercial opportunities; and
- develop a staged implementation strategy to guide planning and investment decisions. Funding requirements are to be incorporated at a later date.

Separate to but arising from the developments proposed in this Master Plan, governance/management arrangements will need to be investigated to ensure that BMRRA can be effectively managed.

Options for governance structures include:

- City department;
- City business unit;
- City organisation (trust); and
- independent organisation (company).

Considerations relating to determination of the most appropriate structure include:

- implications of legal status;
- relationship of the aerodrome business with the City;
- funding sources and their continuity;
- accountability arrangements;
- transparency of use of public funds;
- efficiency and effectiveness;
- relationships with industry stakeholders; and
- Funding conditions

AVIATION PROJECTS

1.12. Stakeholder engagement

Numerous stakeholders were consulted in the course of preparing this Master Plan, during the conduct of individual studies or in the development of the Master Plan document itself. These stakeholders included:

- aeromedical aircraft operators including Royal Flying Doctor Service and Surf Life Saving WA;
- airport management;
- aircraft operators, including Skippers, Qantas/Qantaslink and Virgin Australia;
- airport tenants, retailers and users;
- applicable community groups;
- City of Busselton and other local government authorities as applicable;
- prospective investors/tenants; and
- State Government agencies including the Environmental Protection Authority (EPA), Department of Fire and Emergency Services, Department of Parks and Wildlife.

Several significant issues were identified which influence the need for a planned approach towards the development and upgrade of BMRRA, including:

- aircraft noise;
- the success (failure) of previous RPT services;
- demand for FIFO services associated with employment opportunities in the resource industry;
- population growth;
- economic development including export opportunities; and
- growth of the tourism industry.

1.13. Regulatory context

Regulations, standards and other requirements applicable to the proposed developments at BMRRA include, but are not limited to the following:

Commonwealth of Australia

- Airspace Regulations 2007;
- Aviation Transport Security Act 2004 and Aviation Transport Security Regulations 2005;
- Civil Aviation Act, Civil Aviation Regulations 1988 and Civil Aviation Safety Regulations 1998;
- Civil Aviation Safety Regulations Part 139 – *Aerodromes* and Manual of Standards 139 – *Aerodromes*;
- Environmental Protection and Biodiversity Control Act 1999;

AVIATION PROJECTS

Government of Western Australia

- Environmental Protection Act 1986 and associated regulations;
- Planning and Development Act 2005;

City of Busselton

- Town Planning Scheme and associated instruments;

Other Agencies

- AS 2021-2015 *Acoustics - Aircraft noise intrusion - Building siting and construction*;
- International Civil Aviation Organization Standards and Recommended Practices Annex 14 – *Aerodromes*.

AVIATION PROJECTS

2. EXISTING AERODROME FACILITIES

2.1. Aeronautical infrastructure

BMRRA has a single runway oriented 03/21, 1800 m long and 30 m wide (with 3 m shoulders) with a 150 m graded runway strip. 60 m clearways and 60 m runway end safety areas (RESAs) are provided.

The aerodrome is published as a code 3 instrument non-precision aerodrome and was originally designed to support the operation of Bae146 aircraft.

The current runway width and pavement strength restricts operations to code 3C aircraft such as Bae146, Fokker F100 and Embraer E-170, as well as Dash 8-Q400 and ATR-72 and other smaller aircraft.

The provision of aerodrome lighting permits night operations.

The main central taxiway which connects the runway to the parking apron is 15 m wide with 3.5 m shoulders.

The parking apron is designed to accommodate three F100 aircraft simultaneously, with an additional bay provided for ad-hoc charter and general aviation aircraft parking.

The passenger terminal provides comfortable facilities for approximately 100 passengers, as well as a small check in area, airport management office and storage room.

2.2. General aviation

In addition to the Busselton Aero Club facility, there are three multi-bay light aircraft hangars connected to the central taxiway by a series of small taxiways.

These hangars occupy a high value part of the overall site and potentially constrain optimal development.

A small building and aircraft parking is provided just to the north of the current terminal for aerial ambulance patient transfer operations.

Two helicopter pads constructed in support of Department of Fire and Emergency Services (DFES) fire response operations are located to the north of the passenger terminal.

2.3. Support facilities

Avgas is provided from a fixed point refuelling facility located at the southern end of the main parking apron.

Jet A1 is not supplied for general aerodrome users. DFES provides its own supply in support of fire response activities. Other itinerant users provide their own fuel according to individual requirements.

A non-directional beacon (NDB) is located to the south of the passenger terminal. The NDB approach procedure is designed for a straight-in landing on runway 21. Global positioning system (GPS) based procedures are designed for straight-in approaches to each end of the runway.

An automatic weather information service (AWIS) with broadcast capability is provided.

AVIATION PROJECTS

2.4. Ground transport

Busselton-Margaret River Regional Airport is accessed from Vasse Highway then Neville Hyder Drive.

34 public spaces and 350 secure parking spaces are provided for longer term parking.

Images of the aerodrome and the passenger terminal precinct are provided in Figure 3 and Figure 4 (source: Google Earth).

Figure 3 Site overview

Figure 4 Passenger terminal precinct

AVIATION PROJECTS

2.5. Demand forecasts

Infrastructure requirements can only be scoped once demand for individual elements can be quantified over the planning period. This then enables an integrated development strategy to be prepared. Passenger demand, demand for aircraft parking and passenger terminal capacity requirements are explored in the following sections.

The terms compound annual growth rate and average annual growth rate have been used strictly in accordance with the documents from which applicable data has been sourced.

2.6. South West Regional Plan

The South West Regional Plan informs current and expected population within the region. The 2011 population was 161 255, while the expected population in 2026 is 206 640. These values derive an annual growth rate of 1.67% to 2026. Projecting this rate forward results in a forecast population in 2036 of 243 861.

An updated table of population forecast for each local government area in the South West region is provided in Table 3 (Based on data sourced from *Western Australia Tomorrow*, Department of Planning 2015 – Band C projections).

Table 3 Population forecast for the South West region

Shire	*1996*	*2001*	*2006*	*2007*	*2008*	*2011*	*2016*	*2021*	*2026*
Augusta-Margaret River	8,047	9,851	10,677	11,608	11,830	12,820	13,950	15,280	16,500
Boyup Brook	1,604	1,558	1,479	1,581	1,594	1,565	1,700	1,720	1,740
Bridgetown-Greenbushes	3,904	3,985	3,863	4,258	4,339	4,327	4,580	4,650	4,650
Bunbury (City)	26,556	28,682	29,072	32,037	32,841	33,238	34,350	35,390	35,820
Busselton	17,490	22,060	25,067	27,893	29,183	31,175	35,510	39,810	43,950
Capel	5,692	6,533	9,878	11,415	11,935	14,092	18,370	22,020	25,840
Collie	8,636	8,400	8,371	9,079	9,151	8,943	9,720	10,010	10,180
Dardanup	6,344	8,350	10,037	11,613	12,167	13,794	14,490	16,170	17,680
Donnybrook-Balingup	4,029	4,305	4,480	5,101	5,198	5,390	5,940	6,350	6,710
Harvey	14,766	17,272	18,925	21,550	22,529	24,675	27,220	30,340	33,310
Manjimup	10,093	10,030	9,391	9,875	9,995	9,828	9,220	9,050	8,890
Nannup	1,144	1,183	1,197	1,297	1,325	1,333	1,320	1,350	1,370
Totals	108,305	122,209	132,437	147,307	152,087	161,255	176,370	192,140	206,640

AVIATION PROJECTS

2.7. Most likely demand profile

A number of demand forecasts were prepared during the progressive development of the Busselton Regional Airport Upgrade Project Business Case. The various forecasts, along with a representative set of scenarios used for sensitivity testing were analysed by AEC Group in the development of financial and feasibility models as described in *Busselton Regional Airport Financial Modelling Outcomes, South West Development Commission*, 27 February 2014.

Figure 5 illustrates the range of passenger demand forecast results arising from earlier work. Option 2 (stage 2 base) was selected as the basis for the business case. According to the Stage 2 Base Case, at the 20 year planning horizon, it is expected that BMRRA will support approximately 350 000 passenger movements.

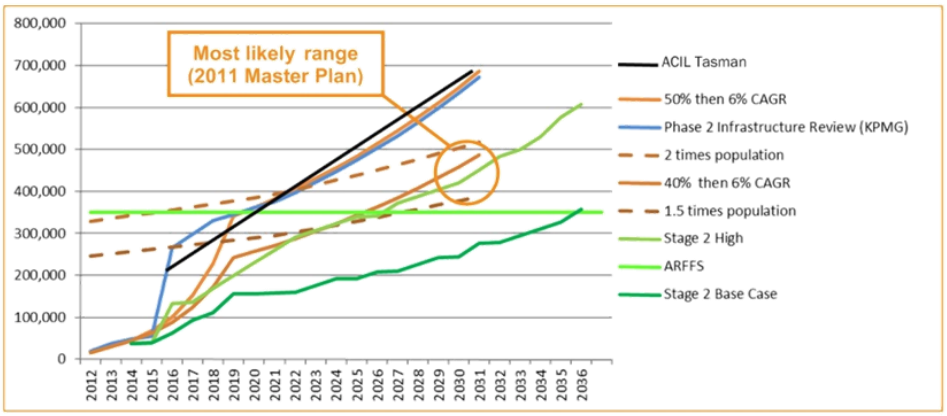


Figure 5 Option 2 (Stage 2 base case) passenger demand forecast

2.8. Demand assumptions

Assumptions used in the preparation of the Stage 2 Base Case forecast are listed below:

- Aircraft capacity 176 passengers with load factor 80%;
- Flight is one direction so return is two flights;
- Demand for another flight is based on 80% load factor as assumed determinant of airline decision. Note: 75% capacity and seating configuration of 168 have been considered but a representative low cost carrier seating configuration of 176 for B737-800 and A320-200 and an 80% load factor have been retained in the model;
- Flights are increased based on the profile provided by WA Tourism and then increased at a 6.2% AAGR; and
- Additional flights to other east coast destinations such as Brisbane will be provided for within the 6.2% demand increase.

The allocation of aircraft movements according to Stage 2 scenarios are copied in Table 4.

AVIATION PROJECTS

Table 4 Stage 2 Base Case aircraft and passenger movements forecast

Year	Stage 2 Base Case	Stage 2 High Case	Stage 2 Low Case
2015/2016	3 flights per week to Melbourne for 5 month of year	3 flights per week to Melbourne 3 flights per week to Sydney	3 flights week to Melbourne Jan to April
2016/2017	3 flights per week to Melbourne	3 flights per week to Melbourne 3 flights per week to Sydney	(Year 1) 3 flights per week to Melbourne for 6 months
2017/2018	(Year 2) 3 flights per week to Melbourne 2 flights per week to Sydney for 6 months	4 flights per week to Melbourne 4 flights per week to Sydney	(Year 2) 3 flights per week to Melbourne
2018/2019	(Year 3) 4 flights per week to Melbourne 3 flights per week to Sydney	5 flights per week to Melbourne 5 flights per week to Sydney	(Year 3) 3 flights per week to Melbourne 2 flights per week to Sydney for 6 months
2019/2020	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)	6 flights per week to Melbourne 6 flights per week to Sydney	(Year 4) 4 flights per week to Melbourne (2 months) 3 flights per week to Melbourne (10 months) 3 flights per week to Sydney (2 months) 2 Flights per week to Sydney (4 months)
2020/2021	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)	7 flights per week to Melbourne 7 flights per week to Sydney	(Year 5) 4 flights per week to Melbourne (2 months) 3 flights per week to Melbourne (10 months) 3 flights per week to Sydney (2 months) 2 Flights per week to Sydney (4 months)

AVIATION PROJECTS

Year	Stage 2 Base Case	Stage 2 High Case	Stage 2 Low Case
2021/2022	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)	8 flights per week to Melbourne 8 flights per week to Sydney	(Year 6) 4 flights per week to Melbourne 3 flights per week to Sydney
2022/2023	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)	8 flights per week to Melbourne 9 flights per week to Sydney	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)
2023/2024	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)	8 flights per week to Melbourne 10 flights per week to Sydney	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)
2024/2025	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)	8 flights per week to Melbourne 11 flights per week to Sydney	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)
2026 onwards	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)	AAGR 6.2% on previous years total passengers (modeled as additional flight when 176 capacity and 80% load factor achieved)

AVIATION PROJECTS

2.9. Stage 2 Base Case aircraft and passenger movements

The passenger and aircraft movements derived from the assumptions noted above are copied in Table 5.

Table 5 Stage 2 Base Case passenger and aircraft movements

	Passenger Movements				*Aircraft Movements*				
	Total	RPT Intrastate	RPT Interstate	FIFO/ Charter	Total	RPT Intrastate	RPT Interstate	FIFO/ Charter	GA/RAA
2015/2016	62,806	3,770	18,304	40,732	15,438	520	130	2288	12,500
2016/2017	92,472	3,770	43,930	44,772	15,692	520	312	2360	12,500
2017/2018	110,164	5,590	58,573	46,001	15,932	624	416	2392	12,500
2018/2019	155,336	5,590	102,502	47,243	16,348	624	728	2496	12,500
2019/2020	156,609	5,590	102,502	48,517	16,348	624	728	2,496	12,500
2020/2021	157,922	5,590	102,502	49,830	16,348	624	728	2,496	12,500
2021/2022	159,265	5,590	102,502	51,172	16,348	624	728	2,496	12,500
2022/2023	175,291	5,590	117,146	52,555	16,452	624	832	2,496	12,500
2023/2024	191,353	5,590	131,789	53,974	16,556	624	936	2,496	12,500
2024/2025	192,810	5,590	131,789	55,438	16,556	624	936	2,496	12,500
2025/2026	208,950	5,590	146,432	56,935	16,764	624	1,040	2,600	12,500
2026/2027	210,487	5,590	146,432	58,472	16,764	624	1,040	2,600	12,500
2027/2028	226,709	5,590	161,075	60,051	16,868	624	1,144	2,600	12,500
2028/2029	242,973	5,590	175,718	61,673	16,972	624	1,248	2,600	12,500
2029/2030	244,638	5,590	175,718	63,338	16,972	624	1,248	2,600	12,500
2030/2031	275,635	5,590	205,005	65,048	17,284	624	1,456	2,704	12,500
2031/2032	277,361	5,590	205,005	66,804	17,284	624	1,456	2,704	12,500
2032/2033	293,837	5,590	219,648	68,608	17,388	624	1,560	2,704	12,500
2033/2034	310,333	5,590	234,291	70,460	17,492	624	1,664	2,704	12,500
2034/2035	326,878	5,590	248,934	72,363	17,596	624	1,768	2,704	12,500
2035/2036	358,118	5,590	278,221	74,317	17,804	624	1,976	2,808	12,500

AVIATION PROJECTS

2.10. Passenger movement demand forecast sensitivities

Several sensitivities exist in this analysis:

- Actual demand is unquantified since there have been no RPT services at BMRRA for several years; and
- The date of introduction of east coast services is dependent upon demand and the commissioning date of the upgraded runway capable of supporting the applicable aircraft operations.

Other broader factors influencing passenger demand include:

- international recognition of the Margaret River Wine Region brand;
- the South West region's proximity to South East Asia;
- positioning of Busselton as the 'Events Capital';
- the strategic location of Busselton within the South West region;
- the current economic environment and desire to diversify the economic base of the region;
- investment in public and private infrastructure such as the Busselton Foreshore project and other commercial opportunities including development of the lots adjacent to BMRRA as a light industrial precinct; and
- constraints at Perth Airport.

2.11. Aircraft parking bay capacity

To plan for the number of required parking bays, an analysis of aircraft types and likely schedules has been performed. This analysis relies on some preliminary assumptions regarding noise management and likely destinations. The number and type of aircraft have been chosen with a view to arriving at indicative annual passenger movements according to the number and type of aircraft allocated to each parking bay.

Table 6 show indicative schedules, aircraft types and passenger numbers for a high side scenario at the 20 year horizon. The date in Table 6 should be interpreted as follows:

- Bays 1 and 2 refer to the parking bays in front of the current terminal, suitable for up to F100 size aircraft;
- Bay 4 is the recently constructed bay on the northern end of the main parking apron;
- Bays 5 and 6 refer to the new parking bays to be built in Stage 2 near the new terminal, suitable for up to B737-800 size aircraft;
- FIFO: fly-in fly-out operations, PVT: Private (corporate) operations, RPT: regular public transport operations, BNE: Brisbane, INTL: international destinations, MEL: Melbourne, SYD: Sydney; and
- PAX: passengers, LF: load factor (notionally 80%), Factored: aircraft passenger seating capacity multiplied by the load factor, x2: factored passenger numbers multiplied by 2 (arriving and departing), No: number of aircraft per day, Pax/day: factored number of passengers per day, Pax/year: factored passengers per year.

AVIATION PROJECTS

It can be seen from this analysis that the number of parking bays available will adequately accommodate and allow for substantial growth in passenger demand and provide some additional capacity for off-schedule or unscheduled aircraft and during peak periods.

Where parking apron capacity becomes constrained, scheduling arrangements can be put in place to optimise capacity until additional parking apron space can be provided.

2.12. Scheduling considerations

The curfew at 2300 hours for RPT operations outlined within the 2015 Noise Management Plan will restrict departure times for flights to Sydney to no later than approximately 1600 hours local time (1500 hours during daylight savings in New South Wales). This is because of the curfew at Sydney Airport which regulates movements to between 0600 and 2245 hours local time. It will not be practical to depart Busselton just before 2300 hours, because the aircraft would be arriving overhead Sydney Airport just after 0500 hours, nearly an hour before the curfew is lifted. Similarly, departure times for flights to Adelaide by aircraft such as A320, B737 and F100 will be restricted to no later than approximately 1830 hours local time (1730 hours during daylight saving in South Australia). The curfew at Adelaide Airport regulates movements to between 0600 and 2300 hours local time.

AVIATION PROJECTS

Table 6 High side of apron demand forecast at 20 year horizon

Bay	Aircraft/Time	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Pax	LF	Factored	x2	No	Pax/day	Pax/year
1	Charter		FIFO				FIFO		FIFO		FIFO		FIFO		FIFO					9	0.8	7	14	2	29	10,512
2	F100	FIFO							FIFO					FIFO						100	0.8	80	160	3	480	175,200
4	Private jet		PVT						PVT					PVT						10	0.8	8	16	3	48	17,520
5	B737/A320											SYD						MEL		176	0.8	141	282	2	563	205,568
6	B737/A320											SYD						INTL		176	0.8	141	282	2	563	205,568
																										614,368

Note: Subject to NMP restrictions, flights may occur after 11 pm (2300 hours local) and/or before 6 am (0600 hours local) but are not shown in this table for the purpose of legibility.

AVIATION PROJECTS

2.13. Passenger terminal capacity

The current passenger terminal has capacity for approximately 100 passengers, following a recent interim upgrade that saw the incorporation of security screening arrangements and expansion of the check-in and baggage reclaim areas.

Passenger terminal capacity is informed by spatial requirements associated with passenger numbers and functional requirements.

Spatial requirements are in part informed by the level of service framework articulated by the International Air Transport Association (IATA). Greater space per passenger is associated with a higher level of service. Level of Service C, described as 'Good level of service, condition of stable flow, acceptable delays, high level of comfort' is the recommended design specification.

Transport security requirements must also be considered in terminal design. Closed charter services are not currently required to screen their passengers, although this may change in the future. For the purpose of longer term planning, it is recommended that any new passenger terminal is designed with the potential to accommodate all charter (FIFO) and RPT passengers.

Generally, the terminal must have sufficient room to accommodate passengers arriving and departing on each aircraft that is parked on the parking apron at the same time. For example, a B737-800 with a capacity of 176 passengers would potentially disembark 176 passengers into the arrivals hall while there were 176 passengers moving through the check-in and screening areas into the sterile waiting lounge. Usually these figures are factored by the load factor, which is nominally 80% for planning purposes.

An essential deliverable of the BMRRA Development Project is a passenger terminal capable of handling up to 350 passengers.

This consideration arises from the potential to have two A320/B737 aircraft operating simultaneously.

2.14. Incidental demand as an alternate to Perth Airport

Due to its proximity to Perth Airport, BMRRA acts as an alternate airport for those aircraft that it can serve. As BMRRA is progressively upgraded it will serve as an alternate for commensurately larger aircraft, providing operational, economic and environmental efficiencies to those aircraft operators and potentially relieving some congestion at Perth Airport.

AVIATION PROJECTS

3. DEVELOPMENT CONSTRAINTS

Constraints to development include Town Planning Scheme requirements such as zoning, future road transport corridor(s), flood, mineral sands tenements and noise and other environmental considerations.

3.1. Zoning

The airport is zoned as the Busselton Regional Airport on Lot 9001, at the site known as Four Mile Hill, as indicated in Figure 6. Lot boundaries supplied by City of Busselton.

As part of the BMRRA Development Project a land acquisition strategy is required to expand the runway to the north and south.

Figure 6 Property boundaries

3.2. Town Planning Scheme

The City of Busselton Town Planning Scheme has identified areas for Special Provision (SP), Airport Protection and Additional Use as outlined below and shown in Figure 7 (source: Intramaps) and described in Table 7 and Table 8. The remainder of surrounding land is currently zoned rural, although Lots 203 and 204 are subject to an application for rezoning to light industrial.

AVIATION PROJECTS

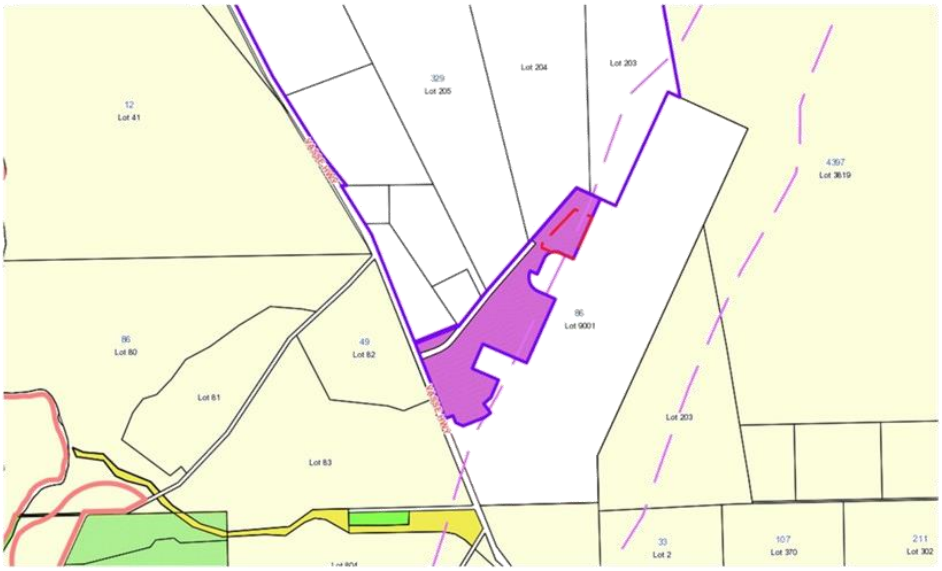


Figure 7 Town Planning Scheme

Additional Uses and Special Provisions applicable to the site are outlined in Table 7 and Table 8.

Table 7 Additional Use A41

Additional Use No	*Particulars of Land*	*Land use permitted/specified*	*Conditions*
A41	Portion Lot 340 Vasse Hwy, Yalyalup	Aviation Research; Education & Training including Incidental Accommodation	Development shall be in accordance with the Busselton Airport Business Park Development Guide Plan and the City of Busselton Industrial Development Code.

AVIATION PROJECTS

Table 8 Special Provisions

Special Provision No	Particulars of Land	Zone	Special Provisions
SP3	Portion of Lot 340 Vasse Hwy, Yalyalup	Industry	1. Subdivision and development shall generally be in accordance with the Busselton Airport Business Park Development Guide Plan and the City of Busselton Industrial Development Code. 2. The following uses shall not be permitted: • Abattoir • Amusement Parlour • Auctioneer's Premises • Builder's Yard • Chandlery • Depots for the Sale and Distribution of Coal, Coke and Cut Firewood • Extractive Industry • Fish Processing and Storage • Hardware Store • Laundromat • Marine Collectors Yard • Marine Facilities • Marine Filling Station • Motor Vehicle and Marine Sales • Motor Vehicle Repair • Other Offensive Trade • Place of Assembly • Prescribed Premises

AVIATION PROJECTS

A copy of the Busselton Airport Development Guide Plan is provided in Figure 8.

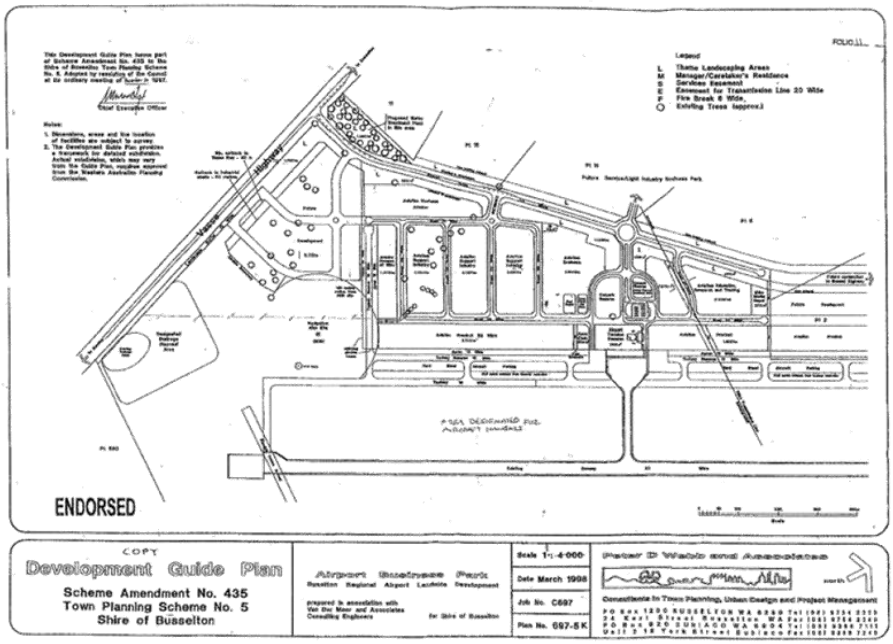


Figure 8 Busselton Airport Development Guide Plan

The Development Guide Plan (DGP) and other provisions of the Town Planning Scheme will need to be amended once this Master Plan is adopted.

3.3. Future road transport corridor(s)

Main Roads WA has identified several potential corridors for construction of a dual carriageway bypass of Busselton. The final location chosen for this bypass corridor will influence the airport's connection with surrounding developments. The bypass is not planned to be constructed within the 20 year planning horizon. The conceptual Busselton Outer Bypass alignment is shown in the drawing in Figure 9.

AVIATION PROJECTS

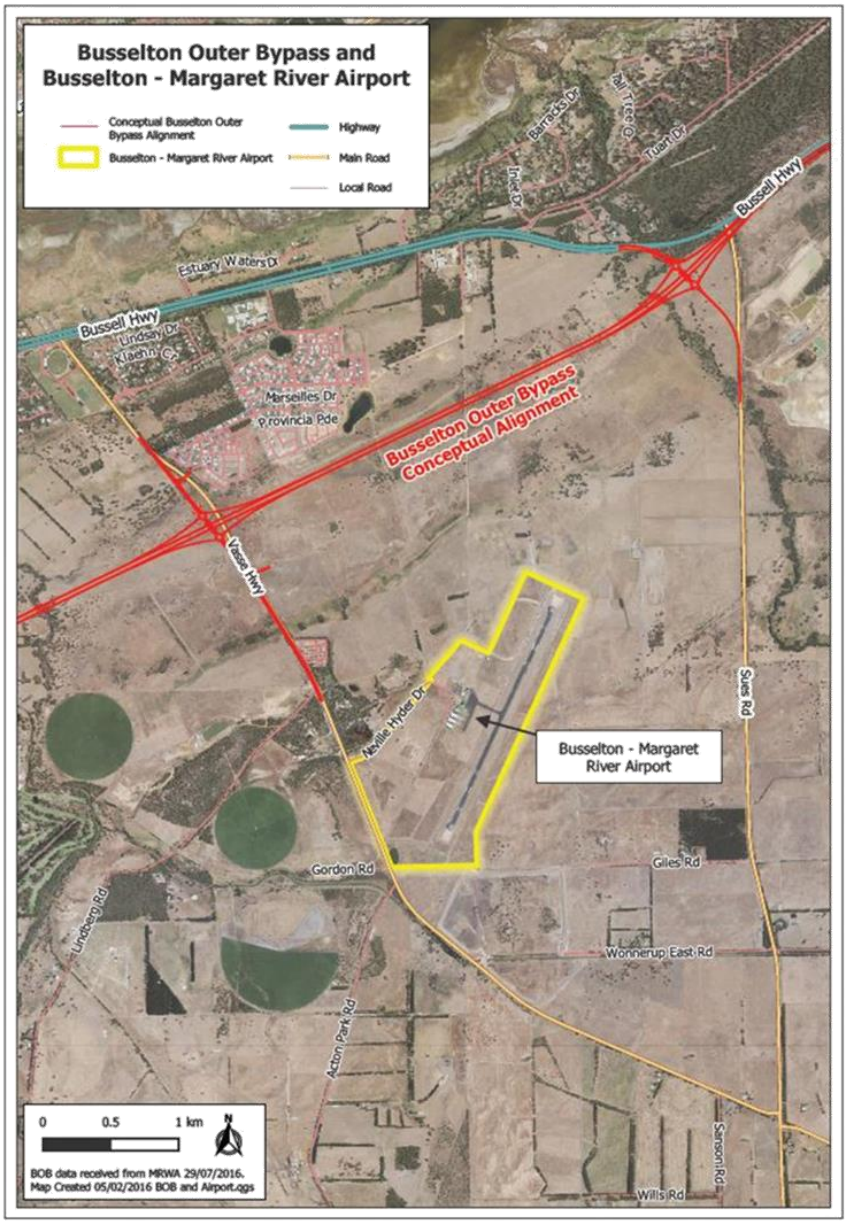


Figure 9 Conceptual Busselton Outer Bypass alignment

AVIATION PROJECTS

3.4. Flood

The land on which the airport is situated and on adjoining properties is relatively level, and is not identified as being flood prone. An image showing 5 m contour intervals is shown in Figure 10. Note the airport sits within the 10 m and 20 m contours.

Figure 10 Contours

An image taken from the threshold of runway 03 looking south is shown below.

AVIATION PROJECTS

3.5. Environmental constraints

There are a number of environmental constraints to development on and around the airport. These include original permit conditions relating to noise, the impact of aircraft noise, preservation of the obstacle restriction area around the airport and environmental impacts on flora and fauna, in particular the Vasse-Wonnerup (Ramsar) Wetlands. Each of these issues is discussed in further detail in section 12.

3.6. Mineral sands tenement

Cristal Mining Australia Ltd has mineral sands tenements within Lot 3819 to the north of the airport site which constrains development to the current site. Tenure or some form of arrangement will be required for permanent use of the land on which applicable mineral sands tenements are located.

Options for resolution of this issue include the following:

- The resource could be extracted and stockpiled clear of the site in preparation for the runway extension works;
- The entire resource could be extracted prior to the runway extension works;
- Only those parts of the resource which hinder construction and operation off the extended runway could be extracted prior to construction works;
- City of Busselton could buy the tenement and pay the landowner and Department of Minerals and Petroleum any royalties they would expect to receive from the resource being extracted; or
- City of Busselton could apply to have the tenement removed and the resources would stay in the ground.

An indicative drawing showing the extent of the clearing permit issued by WA Department of Petroleum and Mines on 09 April 2015 is shown in Figure 11.

AVIATION PROJECTS

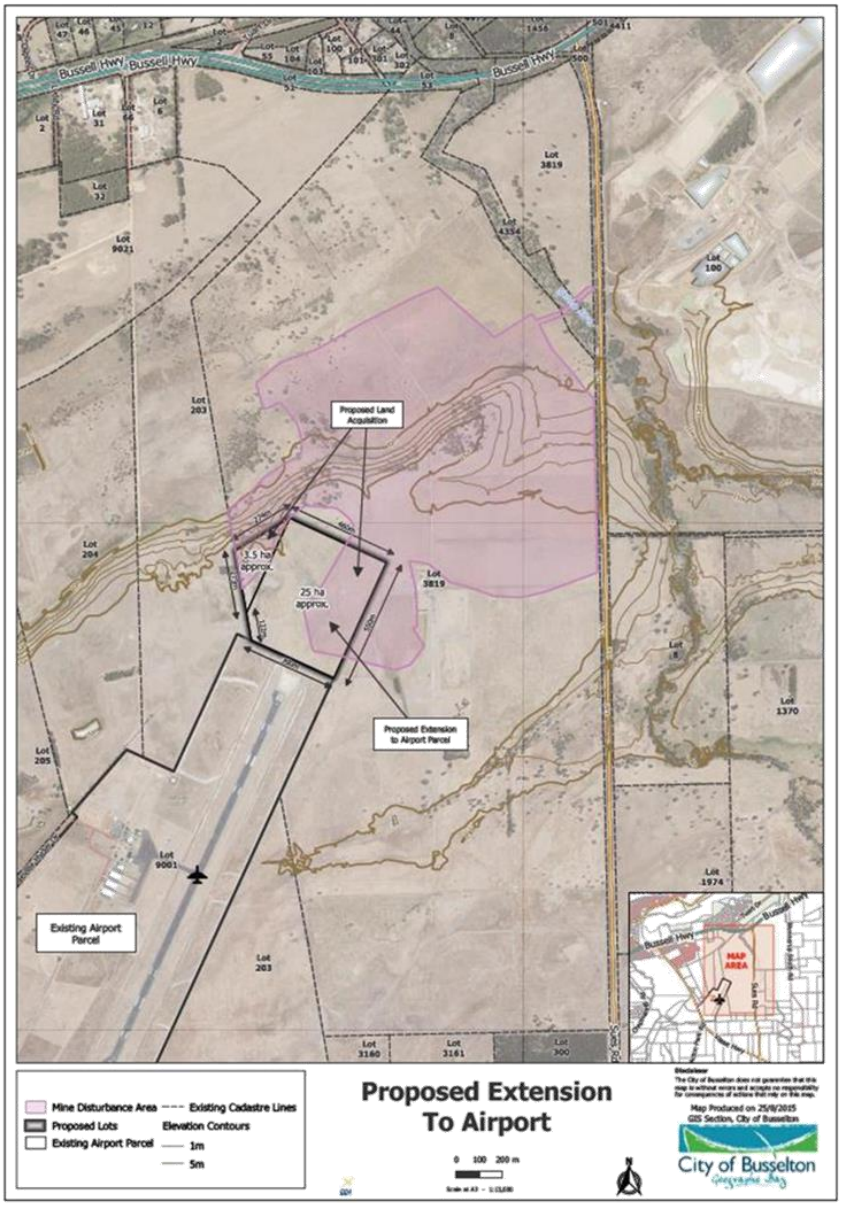


Figure 11 Mineral sands clearing permit

AVIATION PROJECTS

3.7. Development stages

The most significant influences on aerodrome development are the physical characteristics and obstacle limitation surfaces associated with aircraft intending to use the aerodrome. It is anticipated that these aircraft will be introduced according to demand, in stages.

The physical characteristics and obstacle limitation surfaces (OLS) design requirements are set out in Manual of Standards (MOS) Part 139 – Aerodromes. For the purpose of establishing these requirements, three design aircraft and intended scope of operations have been chosen according to the stages identified below.

3.8. Stage 1 – Complete

Stage 1 incorporates current operations, up to code 3C, instrument non-precision approaches, RPT and charter services, as well as other aviation activities.

Aircraft potentially operating during this stage include ATR42, ATR72, Bae146, F50, F100 and Dash 8.

Shown below are a Cobham Bae146, Skippers Dash 8, Skywest F50, and an Alliance F100.

Images courtesy Australian Aviation, Avcom, aegwaspotters.blogspot.com and Alliance.

AVIATION PROJECTS

3.9. Stage 2 – construction complete by end of 2017

Stage 2 will see A320/B737 code 4C narrow body jets using instrument non-precision approaches, conducting domestic RPT and charter services to east coast destinations, as well as other aviation activities. Aerodrome Rescue and Fire Fighting services will be required when passenger movements exceed 350 000 in the previous financial year.

Stage 2 operations are the most likely scope of operations at the end of the 20 year planning horizon.

Shown below area a Jetstar A320, a Virgin Australia B737 and Qantaslink B717.

Images courtesy Flight.org, Perth Airport Spotter's Blog and Australian Aviation.

3.10. Stage 2 AEO

Following the completion of Stage 2, and during the 20 year planning horizon, various aviation-related enterprise opportunities are expected to arise. These opportunities will rely on infrastructure available within the scope and according to the design aircraft of the other stages.

3.11. Stage 2A – as demand by international carriers dictate

Stage 2A will see narrow body code 4C jets flying to international destinations. Aerodrome Rescue and Fire Fighting services will be required regardless of the number of passenger movements.

Shown below are a Pacific Blue B737 and a Strategic A320 used for short haul international flights to South East Asia.

AVIATION PROJECTS

Image courtesy Mike Archer

3.12. Stage 3 – as required by demand

Stage 3 will see up to A330/B787 code 4E wide body jets using category I precision approaches, conducting domestic and international RPT and charter operations, as well as other aviation activities.

Shown below are a Jetstar A330 and a Boeing B787.

Images courtesy SMH.com.au and Boeing.

3.13. Stage 4 – Long term future planning opportunity

The opportunity to consider large code 4F aircraft (A380, B747-800) requirements has been taken so that the implications of supporting large code 4F freight aircraft such as the B747-800F or providing an alternate for potential future Perth-bound A380 or other large wide body aircraft can be further examined and documented.

Shown below are a Cathay Pacific B747-800F and an A380.

Images courtesy Cathay Pacific Cargo and Qantas.

AVIATION PROJECTS

3.14. Intended operations and design aircraft

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. Table 2.1-1: Aerodrome Reference Code taken from MOS 139 refers (shown in Table 9).

Table 9 MOS 139 Table 2.2-1

Code Element 1		*Code Element 2*		
Code number	*Aeroplane reference field length*	*Code letter*	*Wing span*	*Outer main gear wheel span*
1	Less than 800 m	A	Up to but not including 15 m	Up to but not including 4.5 m
2	800 m up to but not including 1200 m	B	15 m up to but not including 24 m	4.5 m up to but not including 6 m
3	1200 m up to but not including 1800 m	C	24 m up to but not including 36 m	6 m up to but not including 9 m
4	1800 m and over	D	36 m up to but not including 52 m	9 m up to but not including 14 m
		E	52 m up to but not including 65 m	9 m up to but not including 14 m
		F	65 m up to but not including 80 m	14 m up to but not including 16 m

AVIATION PROJECTS

3.15. Physical characteristics and obstacle limitation surfaces design requirements

A summary of current and future physical characteristics and obstacle limitation surfaces requirements is provided in Table 10.

Table 10 Physical Characteristics and OLS Design Criteria

Aspect		*Current*	*Stage 2 Code 4C A320/B737-800*	*Stage 3 Code 4E A330/B787*	*Stage 4 Code 4F A380/B747-8*
Minimum runway length		1800 m	2340 m (2) 2460 m (2A)	Subject to scope of ops	Subject to scope of ops
Minimum runway width		30 m	45 m	45 m	60 m
Runway shoulders		3 m	N/A	7.5 m	7.5 m
Aircraft (pavement) concession number		18	38 (nominal)	TBD	TBD
Runway strip width - graded		150 m	150 m	150 m	150 m
Total runway strip width		150 m	300 m	300 m	300 m
Runway strip length (beyond runway)		60 m	60 m	60 m	60 m
Runway end safety area		90 m	90 m (240 m Stage 2A)	240 m	240 m
Taxiway separation from runway		>190 m	93 m (non-prec) 168 m (prec)	182.5 m	190 m
Taxiway width		15 m	15 m	23 m	25 m
Taxiway shoulders		3.5 m	3.5 m	10.5 m	17.5 m
Taxiway strip width (total) each side of CL		26 m	26 m	47.5 m	57.5 m
Taxiway strip width (graded) each side of CL		12.5 m	12.5 m	22 m	30 m
Taxilane separation from object		24.5 m	24.5 m	42.5 m	50.5 m
Approach Surface	Width inner edge	150 m	300 m	300 m	300 m
	Divergence	15%	15%	15%	15%
	Length	15 000m	15 000 m	15 000 m	15 000 m
	Gradient	3.3%	2%	2%	2%
	Dist from threshold	60 m	60 m	60 m	60 m
Take-off Climb Surface	Width inner edge	180 m	180 m	180 m	180 m
	Divergence	12.5%	12.5%	12.5%	12.5%
	Length	15 000 m	15 000 m	15 000 m	15 000 m
	Gradient	2%	2%	2%	2%

AVIATION PROJECTS

The following notes apply:

1. Stage 2 runway length required is 2340 m (providing 2400 m take-off distance available).
2. Stage 2A runway length required is 2460 m (providing 2520 m take-off distance available).
3. The most likely instrument procedures to be used by code 4C aircraft such as the B737 and A320 are those non-precision approaches already published for the aerodrome, and potentially Area Navigation – Required Navigation Performance (RNAV-RNP) and other satellite-based non-precision approaches. Ground based precision approaches such as instrument landing system (ILS) are unlikely to provide value for money. Satellite-based precision approaches are considered the most likely requirement for code 4E aircraft operations.
4. The runway end safety area must be 90 m long. 240 m should be provided especially at international aerodromes.
5. Code C taxiway width is specified as 18 m but may be reduced to 15 m for aircraft with a wheelbase of less than 18 m. B737-800 and A320 aircraft wheelbases are less than 18 m and so the 15 m taxiway width applies. Other significant aspects of taxiway design including turning radii of design aircraft should also be applied during detailed design.

3.16. Aircraft performance

Aircraft performance was analysed by Aviation Projects to determine runway length requirements, in *Aircraft Performance Analysis – Busselton Regional Airport*, v1.1 14 December 2014. This analysis informed the BMRRA Development Project.

Primary destinations considered during the analysis for the BMRRA Development Project are listed in Table 11

Table 11 Sector distances and location codes

Sector	*Great circle distance (nm)*
Busselton (BQB) – Perth (PER)	109
Busselton (BQB) – Melbourne (MEL)	1453
Busselton (BQB) – Bali (DPS)	1491
Busselton (BQB) – Sydney (SYD)	1780
Busselton (BQB) – Brisbane (BNE)	1979
Busselton (BQB) – Singapore (SIN)	2192

The analysis recommended that:

1. In order to enable operation by A320-200 and B737-800W aircraft to Melbourne, Bali or Sydney, the runway should be extended to at least 2300 m; and
2. In order to enable operation by A320-200 and B737-800W aircraft to Brisbane or Singapore, the runway should be extended to at least 2500 m.

AVIATION PROJECTS

3.17. Development concept

The 2011 Master Plan proposed two options for the location of the new passenger terminal and associated infrastructure. The preferred option was to locate the passenger terminal precinct to the south of the current terminal. It was thought that this location was less constrained and provided the best solution for future expansion of the terminal and parking apron facilities, and that there was adequate room for development of car parking and other road transport infrastructure.

Aviation Projects subsequently undertook a review of infrastructure costs in *Infrastructure Cost Estimate Peer Review – Phase 2 - Busselton Regional Airport*, v1.0, 22 August 2013. In the course of this review, it was concluded that Stage 2 development could be delivered at a slightly reduced cost if the new passenger terminal and associated infrastructure was located to the north of the existing terminal precinct, subject to the cost of undergrounding the high voltage power lines. The siting of the passenger terminal in this location was not subject to future proofing for code F aircraft.

Following approval of funding for the Stage 2 Development Project, and in the course of preparing this master plan, City of Busselton specified a requirement to future proof the site for code F aircraft such as the B747-800F. This led to a review of the site for the passenger terminal and overall siting outcomes, resulting in a decision to locate the passenger terminal precinct to the south of the existing precinct as per the original 2011 Master Plan, and to protect a full length code F parallel taxiway. These considerations are the main determinants of the remainder of the development concept.

AVIATION PROJECTS

4. AIRCRAFT MOVEMENT AREAS

4.1. Runway 03/21

The current runway is 1800 m long and 30 m wide.

At the current runway length A320/B737 aircraft could reach Adelaide or Darwin, but not east coast destinations such as Brisbane, Melbourne or Sydney.

The annual technical inspection conducted in July 2010 found that the runway seal is showing signs of wear and tear and recommended that the runway should be resealed. It was last sealed in 1997. The seal was expected to continue to deteriorate. The need to maintain the current pavement and potentially incur the cost of a reseal was considered in the planning for upgrade works.

Subsequent inspections have noted progressive deterioration in the condition of the sealed runway surface.

A pavement strength rating is a set of pavement parameters which can be translated into an allowable aircraft gross weight, according to the load applied to the pavement through the aircraft wheels/tyres. The ACN-PCN method compares the damaging effect of aircraft with a maximum ramp weight above 5700 kg (ACN) with the supportive capability or bearing strength of the pavements on which they intend to operate (PCN).

The current pavement strength is described as PCN 18/F/A/1000 (145PSI)/T. This means that aircraft with an ACN of up to 18 and tyre pressure up to 1000 kPa can use the aerodrome without restriction. Such aircraft include F50, Dash 8-Q400 and BAE-146.

The B737-800 ACN is nominally 38. This means that the pavement of the current runway will need to be strengthened before it can sustain regular operations by these aircraft.

The runway strip will need to be increased to 300 m in order to conform to MOS 139 requirements.

The work required to upgrade the runway in Stage 2 is to:

- construct an additional 540 m to extend the length to 2340 m;
- widen the runway to 45 m; and
- strengthen the pavement to a minimum pavement concession number (PCN) of 38.

Issues for resolution are as follows:

- Land acquisition has been proposed to enable extension of the runway to the south (300 m) and north (240 m). The minimum land area should provide for a 300 m wide runway strip, drainage, a perimeter road, 60 m clearway and 240 m RESA; and
- Tenure or some form of arrangement will be required for permanent use of the land on which mineral sands tenements are located.

An image showing the proposed land acquisition to extend the runway to the north to facilitate the BMRRA Development Project is shown in Figure 12. Note the small section of Lot 203 represents a constraint to future development and has been included in the proposal, although it would not be essential for Stage 2 operations.

AVIATION PROJECTS

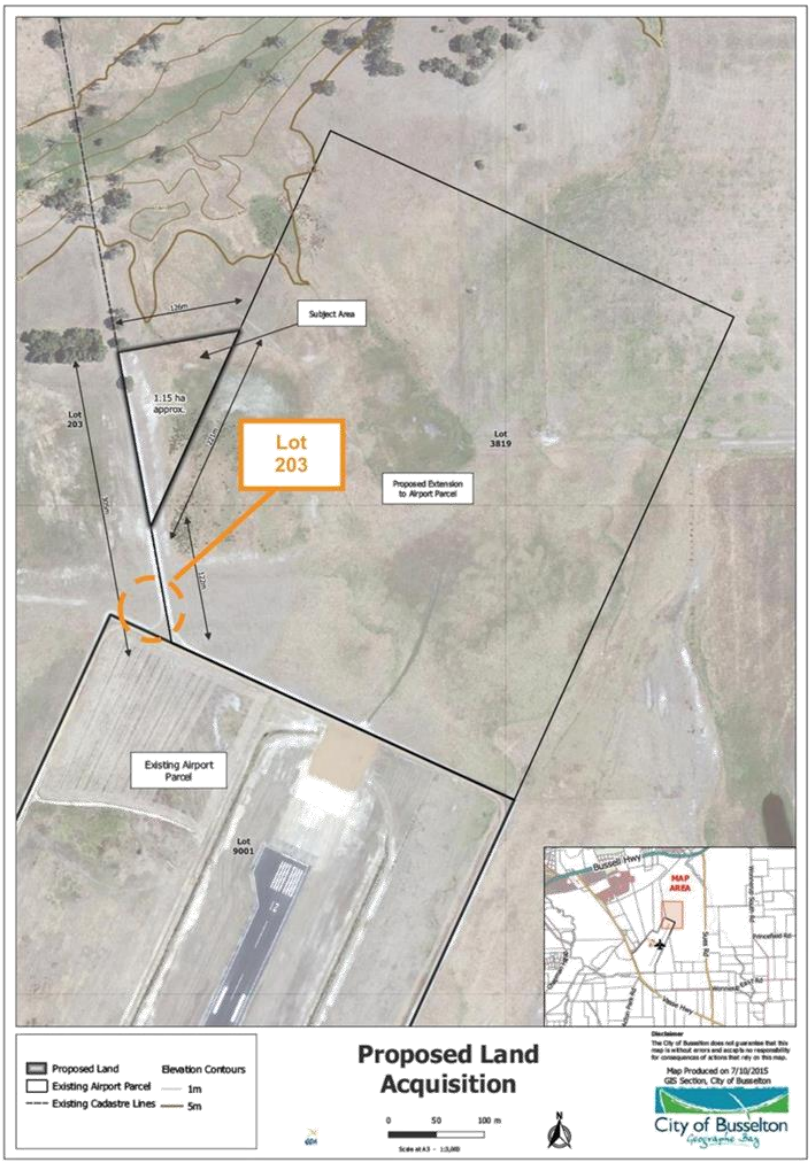


Figure 12 Minimum area required to extend current runway to 2340 m

AVIATION PROJECTS

4.2. Runway usability

An important consideration in the orientation, siting and number of runways at an aerodrome is runway usability with respect to the distribution of wind.

MOS 139 specifically excludes discussion of runway usability as being not within the scope of the standards; however, International Civil Aviation Organization (ICAO) Annex 14 – Aerodromes, which is strictly applicable to international aerodromes, recommends that the number and orientation of runways at an aerodrome should be such that the usability factor of the aerodrome is not less than 95% for the aeroplanes that the aerodrome is intended to serve.

It is not apparent whether a formal usability analysis has been prepared for the current runway orientation, so this consideration remains unresolved.

Wind rose data showing average direction and speed of wind in km/h at 9am and 3pm for BMRRA for the period 16 October 1997 to 28 February 2010 is shown in Figure 13. These wind roses indicate on a preliminary analysis that the runway would be preferably orientated north west/south east.

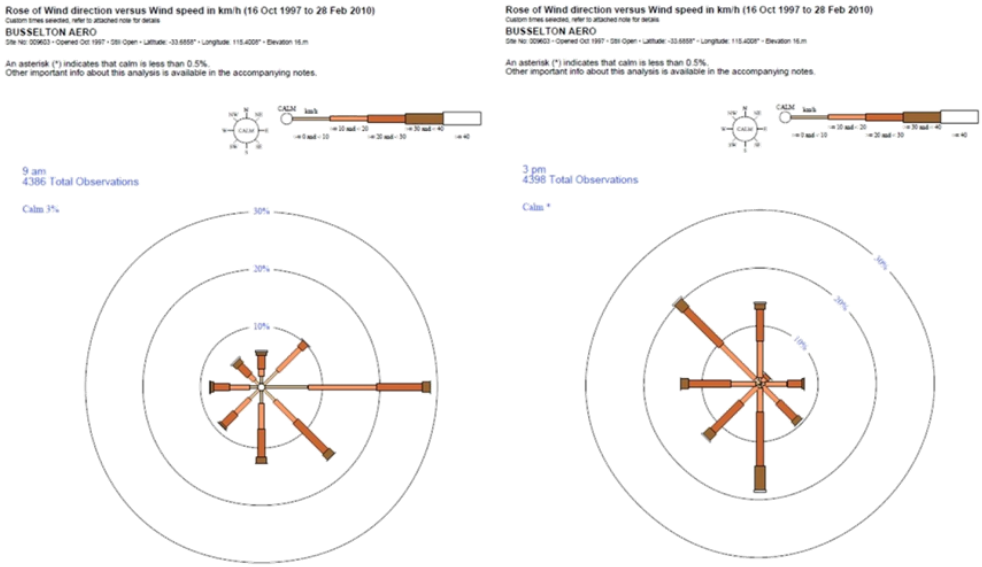


Figure 13 Wind Roses for average wind at BMRRA at 9am and 3pm for the period 16 Oct 1997 to 28 Feb 2010

4.3. Taxiways

The main stub taxiway is located centrally to the runway and is 15 m wide with 3.5 m sealed shoulders. Code C aircraft with a wheelbase of greater than 18 m require an 18 m wide taxiway (vice 15 m) with 3.5 m shoulders. The F100 wheelbase is less than 18 m so the current width is adequate.

AVIATION PROJECTS

This taxiway provides access to the general aviation precinct via a code B taxilane.

The new parking apron will require a new stub taxiway to join the runway. This taxiway should be 18 m wide with 3.5 m shoulders and be laterally separated from any other stub taxiway by a distance of at least 80 m.

A full length parallel taxiway capable of accommodating code 4F aircraft would need to be centred at least 190 m from the runway centreline.

It is unlikely that a full length parallel taxiway will be required in the 20 year planning horizon.

4.4. Main parking apron

The current parking apron is designed to accommodate three F100 aircraft simultaneously, with an additional bay provided for ad-hoc charter and general aviation aircraft parking.

4.5. New parking apron

Preliminary aircraft parking position demand analysis indicates that two new code C (A320/B737-800) parking bays will be adequate for the level of activity expected in the 20 year planning horizon. The bays should be designed for power-in, power-out operations.

When there is sufficient demand for another aircraft parking position, the parking apron should be extended in a linear arrangement.

When code E or F aircraft commence operations, the apron will need to be extended again. This is not likely to occur in the 20 year planning horizon.

The apron should be located so that a code F aircraft can park and remain below the transitional surface of the OLS. For the purpose of preliminary planning, the front of the terminal building should be located at least 410 m from the runway centreline.

4.6. Geotechnical aspects of pavement design

The current runway pavement has a PCN of 18.

The largest aircraft currently operating to BMRRA is the F100, which has an ACN of 25. This is greater than the derived PCN, but Golder Associates, as a result of a geotechnical investigation, concluded that the runway is safely accommodating F100 operations at the current low level of coverages.

The existing runway pavements are planned to be strengthened in the Stage 2 Development Project.

The existing taxiway and parking apron may require a strengthening overlay.

4.7. General aviation facilities

In addition to the Busselton Aero Club facility, there are three multi-bay light aircraft hangars connected to the central taxiway by a series of small taxiways.

AVIATION PROJECTS

A small building and aircraft parking area is provided just to the north of the current terminal for aerial ambulance patient transfer operations. This facility should not need to be moved in the short term, but may constrain future development.

The area to the north of the current terminal has been identified as the most suitable location for development of similar facilities in the short to medium term. A cul-de-sac arrangement with alternating taxiway and access roads is recommended. This allows easier implementation of security measures and separates pedestrian and vehicular traffic from aircraft moving on the taxiway.

The acquisition of Part of Lot 204 would allow further expansion of general aviation facilities.

The parking apron adjacent to the patient transfer facility is the most appropriate location for the development of code C hangars.

Structures should not be located any closer than 247.5 m to the current runway centreline to provide room for a parallel code F taxiway and taxiway strip if it is ever needed.

In the longer term, the site on the western side at the northern end of the current runway could be developed, or alternatively, land adjoining the south eastern side of the new runway could be acquired and developed.

4.8. Helicopter facilities

Two helicopter pads constructed in support of DFES fire response operations is located to the north of the current passenger terminal.

This helipad should be able to remain in its present location in the short term.

The overhead power lines near the current helipad are considered by DFES a hazard to their operations.

Since BMRRA is a regional base for DFES operations, it is anticipated that the temporary facilities will become permanent and additional hardstand area will be required.

4.9. Lighting

Aerodrome ground lighting around the runway will need to be removed and replaced when the runway is extended and widened.

The new parking apron and taxiway will require aerodrome ground lighting, and the parking apron will require flood lighting.

AVIATION PROJECTS

5. AVIATION SUPPORT FACILITIES

5.1. Fuel

Avgas is provided from a fixed point facility located on the southern edge of the current apron. In the medium term, avgas facilities should be relocated in closer proximity to general aviation facilities scoped for development to the north of the existing terminal site.

Jet A1 is not provided for general aerodrome users. This is a significant constraint to the development of the airport as aircraft operators are forced to carry additional fuel for any onward legs. This means that charter/FIFO/RPT operators will operate with reduced loads and incur additional and unnecessary costs. Private charter and itinerant aircraft will need to fly to another destination for fuel and park there, rather than at BMRRA. This potentially constrains the number of overnight visitors to the region.

Provision of Jet A1 fuel should be seen as an essential element of the overall Stage 2 Development Project. A site should be identified near the new terminal precinct that has landside access for bridger tanker resupply and airside access for refuelling trucks.

Code C aircraft such as A320/B737 can be refuelled from a tanker truck supplied from the main facility.

Code E/F aircraft generally require greater volumes of fuel that can only be practically delivered by in-ground systems and hydrants. Hydrant refuelling may need to be considered during the design of code E/F parking aprons, which is not expected until beyond the 20 year planning horizon.

5.2. Ground support equipment

Sufficient space should be provided in close proximity to the new passenger terminal and parking apron for parking of ground support equipment (GSE).

5.3. Navigation and approach aids

An NDB is located to the south of the passenger terminal. The NDB approach procedure is designed for a straight-in landing on runway 21.

GPS based procedures (RNAV-GNSS) are designed for straight-in approaches to each end of the runway. Non-precision approach procedures allow aircraft to descend to approximately 500 ft above ground level (AGL).

For efficient aircraft operations and to increase the likelihood of descending clear of weather in sight of the runway, it is preferable to have instrument approach procedures that permit descent to a lower height. This is possible with some relatively new GPS-based non-precision approach procedures called RNAV-RNP, which can allow descent to approximately 250 ft AGL. Specific approval is required to use these procedures.

Alternatively, precision approach procedures can be introduced which rely on ground based equipment such as ILS. These systems are relatively costly and have higher maintenance costs and do not necessarily provide a lower descent height than RNAV-RNP. They also require a straight-in approach along the runway extended centreline commencing approximately 10 nautical miles (nm) from the landing threshold.

RNAV-RNP approaches have a significant operational and environmental benefit over other types of approaches because they can be designed with curves to avoid terrain and they do not need to be aligned with

AVIATION PROJECTS

the runway until approximately 2 nm from the landing threshold. This flexibility in design also means that the approach track can be designed to minimise noise and other environmental impacts.

The NDB antenna is situated in a location which will potentially have a higher and better use in the future, and will likely restrict the location of the new terminal building. GPS-based approaches are progressively replacing approaches to ground-based navigation aids such as the NDB.

Airservices Australia is responsible for maintaining the NDB as part of the longer term planning for a national backup network of ground-based navigation aids. The lease agreement for the site provides for relocation of the NDB antenna on the request of City of Busselton.

Siting requirements are set out in MOS 139. The immediate surrounding area within a radius of 60 m of the antenna should be free of obstacles. Development between 60 m and 300 m radius from the centre of the NDB antenna that exceed an elevation angle of 5° from ground level at the centre of the NDB antenna, require assessment by an NDB technical authority.

Overhead power lines, 33kV or greater, should be at least 300 m from the centre of the NDB antenna.

It is preferable that the NDB is decommissioned or relocated to another aerodrome to maximise commercial development opportunities.

5.4. Weather information service

An AWIS with broadcast capability is provided and is considered adequate.

Subject to future development opportunities, the AWIS may require relocation.

There is potential to provide a site for a Bureau of Meteorology facility if part of Lot 3819 to the north west of the current site is acquired.

5.5. Aerodrome rescue and fire fighting services

Civil Aviation Safety Regulation 1998 Part 139 Subpart H sets out the requirements applicable to provision of aerodrome rescue and fire fighting services (ARFFS). According to these regulations, ARFFS must be provided at an aerodrome from or to which an international passenger air service operates; and any other aerodrome through which more than 350 000 passengers passed on air transport flights during the previous financial year.

According to preliminary passenger demand forecasts this requirement is not likely to be triggered until at or around the 20 year planning horizon. The ARFFS facility must be situated so that response time requirements can be met.

5.6. Air traffic control and airspace

The airport is currently located within non-controlled Class G airspace and no air traffic control services are provided.

AVIATION PROJECTS

The introduction of air traffic control services is subject to an aeronautical study which weighs risk in a cost/benefit analysis. Air traffic control services are not likely to be required for domestic aircraft operations until beyond the 20 year planning horizon.

International operations may trigger a requirement for air traffic services. This issue will depend to some extent on the aircraft operator and type of operations being conducted.

Any significant changes to airspace or instrument approach procedures will require an environmental assessment and potentially a referral under the EPBC Act.

AVIATION PROJECTS

6. PASSENGER FACILITIES

6.1. Passenger terminal overview

The recently expanded passenger terminal, shown in Figure 14, provides comfortable facilities for approximately 100 passengers, as well as a small check in area, airport management office, storage room and kiosk.

Figure 14 Passenger terminal building

6.2. Passenger terminal Stage 1

Stage 1 operations are scoped to include FIFO and RPT operations by aircraft up to F100 size.

Following its recent expansion, the existing terminal is considered adequate for the purpose of sustaining Stage 1 operations and/or aviation related business operations.

An image of the departures lounge is provided at Figure 15.

AVIATION PROJECTS

Figure 15 Departures lounge

6.3. Passenger terminal Stage 2 – general description

An essential deliverable of the BMRRA Development Project is a passenger terminal capable of handling up to 350 passengers.

Facilities should include a check area, waiting area, security screening area, sterile waiting area and baggage claim area, along with necessary public facilities. A small area should be set aside for concessions such as hire cars, tourism information and a cafe.

Applicable security screening requirements are set out in the Aviation Transport Security Regulations and associated guidance material.

Provision should be made in the design to accommodate international operations when the need arises. This would most likely include additional security screening measures set out in the Aviation Transport Security Regulations as well as Australian Quarantine and Inspection Service (AQIS) requirements set out in the *International Airport Operator's Guide* prepared by the Australian Customs and Border Protection Service.

The terminal should be designed to permit progressive expansion according to future demand along the linear frontage of the parking apron.

The location of the passenger terminal and associated infrastructure is an important determinant of the ultimate development concept.

AVIATION PROJECTS

6.4. Passenger terminal Stage 2

The master planning team assessed two options for placement of the terminal:

- Option 1 - Adjacent to the existing terminal; and
- Option 2 - At the centre/core of the site.

Option 2 was deemed by the client and planning team to be of greater benefit to the airport for the following reason:

> The strategy for Option 2 focusses on re-purposing the existing terminal, situated in the centre of the site. This will minimize visitor exposure to the proximate industrial environment while presenting the new terminal and commercial opportunities in a manner that reflect the growth, diversity, vision and aspirations of the Busselton and Margaret River region.

The main aspects for Option 2 include:

- Presentation
  - Displays / presents terminal as front of house;
  - Landscape integration into presentation; and
  - General aviation and future freight can be at back of house;
- Growth expansion
  - Lateral growth and expansion both north and south; and
  - Parking for opportunities code 4F aircraft at terminal;
- Circulation and parking
  - Alignment of industrial park and freight opportunity with vehicle access at back of site;
  - Circulation presents drop off and terminal/landslide developments as a priority; and
  - Car parking is designed to be operational rather than a welcome mat to the airport precinct.

6.5. Charter terminal

While closed charter services are not required to provide security screening, there will potentially be some efficiencies gained by charter operators if they can operate through the current terminal once the new terminal is built. The current terminal and parking apron could therefore be designated the Charter Terminal/FBO for the use of FIFO and other charter operators, or leased to a FIFO operator for its sole use.

Once security screening is required of FIFO and other certain closed charter operations their passengers would preferably be handled through the new terminal. The current terminal could then be made available for smaller charter or private operators according to demand, airport management, emergency services, office accommodation or other appropriate uses.

AVIATION PROJECTS

6.6. Car parking facilities

There are currently 34 public car parking spaces and 350 secure parking spaces for longer term parking. There is also provision for disabled and hire car parking.

A progressive increase in demand for car parking spaces is anticipated.

There will also be progressively increasing demand for charter bus services as tourist numbers increase, so parking spaces should be set aside for buses with trailers.

Stage 1 parking will be in the vicinity of the current terminal. Stage 2 car parking will be in the vicinity of the new terminal building. The disposition of these car parking spaces will depend upon the number of FIFO passengers and whether charter operations require security screening. In the first instance, FIFO operations are planned to continue from the current terminal building during Stage 2 development.

The Development Project must deliver a new 600 bay park.

AVIATION PROJECTS

7. GROUND TRANSPORT SYSTEMS

7.1. Access roads

Busselton-Margaret River Regional Airport is accessed from Vasse Highway via Neville Hyder Drive.

The entrance statement at the turn off from Vasse Highway could be improved to achieve the impression desired of airport visitors.

Figure 16 Airport entrance statement

The turn off from Vasse Highway will also need to be upgraded to provide turning lanes, lighting etc according to demand.

7.2. Busselton Bypass Transit Corridor

Main Roads WA has identified several potential corridors for construction of a dual carriageway bypass of Busselton. The final location chosen for this bypass corridor will influence the airport's connection with surrounding developments.

7.3. Light industrial area connection

Properties adjacent to the airport to the west, including Lots 203 and 204, are subject to development as a light industrial area. The development of this precinct will heavily influence the airport's connection with the surrounding region. The light industrial development should incorporate consideration of ground transport and

AVIATION PROJECTS

traffic requirements between each site and ensure that any access through the light industrial area to the airport achieves desired urban planning and design outcomes.

7.4. Other transport modes

Only road transport is scoped in the 20 year planning horizon.

There is an opportunity to develop a transport hub at the airport that would combine air services, road services and potentially rail services.

AVIATION PROJECTS

8. COMMERCIAL LAND USE AND DEVELOPMENT

8.1. Current commercial activities

Only minimal commercial activities are based or conducted at BMRRA. Southern Skydiving operates from a hangar in the GA precinct, and the Busselton Aero Club conducts flying training.

8.2. Land use and development plan

City of Busselton is negotiating with a number of prospective investors that are seeking to develop aviation related enterprises at BMRRA.

Other aviation-related commercial development opportunities are likely to be put forward as the level of activity at the airport increases over time. These will likely include air freight, aircraft manufacture, maintenance and repair or overhaul, charter, flying training, parachute jumping, as well as cleaning, catering and others.

Although there is a light industrial estate proposed to be developed on adjoining land, the airport represents an ideal site for businesses that are not sensitive to noise and require relatively large sites for their operation.

The South West Action Statement identifies an Agrifood processing facility as an important regional development project. While the location of this facility is still to be determined, there exists an opportunity to locate the facility adjacent to the BMRRA in the proposed industrial sub-division, near major road transport and air freight distribution networks.

As a longer term goal, City of Busselton should seek to develop a land use master plan that maximises the 'landside' real estate value of the airport whilst being sensitive to operational requirements, accommodates the future airport growth, and identifies opportunities for real estate value to be realised and income to be generated.

This goal can be achieved by preparing a commercial land use and development plan that:

- provides for the future growth of the region's business activities through a pragmatic development 'vision';
- maximises the value of the land for the City (and generates income-producing investments for the City);
- encourages and facilitates general business, employment and commercial real estate activity;
- embodies good urban planning and design outcomes;
- integrates with the planning scheme for the region (including the City's hierarchy of development and general planning policies and guidelines) – including the rezoning and revision of the Development Guide Plan for the airport;
- integrates with surrounding development,
- identifies trends of development near the airport and maximise the City's ability to leverage from the development of the airport;
- considers in detail the physical development constraints;

- identifies key landmark sites for iconic 'place-making' opportunities; and
- outlines the steps and issues to be addressed in the implementation of the commercial land use and development plan (including resourcing, funding, Development Control Plan, etc).

Development sites on the current aerodrome site are located on the south western side of the property, to the north of the current terminal building and around the new terminal precinct.

Other potential sites exist to the north west and south east of the current site, subject to acquisition. Potential development on these sites, subject to further planning, include general aviation facilities, commercial/industrial activities, a Bureau of Meteorology facility and/or an ARFFS fire training ground.

AVIATION PROJECTS

9. UTILITIES

9.1. Water

The Busselton Water Board (Busselton Water) provides water to customers within its area of responsibility, which includes the airport. Scheme water is not currently available at the airport. Potable water and water for fire fighting is provided by rain water collected in tanks at each building site.

Scheme water will be an essential requirement for construction and operation of the new terminal building.

Busselton Water has indicated that the scheme water supply is being progressively extended along Vasse Highway to the site at Lot 1602 from where water could be supplied to the airport. The supply is currently near the land designated as future Showgrounds and is being extended at a rate of approximately 300 m per year.

It is necessary to connect scheme water to the new terminal precinct.

9.2. Electricity

Electricity is provided to the site via overhead transmission lines which go underground to the north of the current terminal.

Any future development on the airport will require further investigation of supply and distribution requirements according to demand.

Figure 17 Overhead transmission lines go underground to the north of the current terminal

Any development to the north of the existing terminal precinct will be dependent upon the relocation and/or undergrounding of these powerlines.

9.3. Sewer

There is no sewer service on the site. Each building has its own septic system. Waste treatment options should be investigated in further design work. In the first instance, on site waste treatment may be required. It should be noted that the new light industrial estate to the north west of the site is planned to be connected to the reticulated waste water scheme.

AVIATION PROJECTS

9.4. Communications

Fixed line and mobile telephone services are available at the airport, although a high speed (ADSL) internet service is not available.

A robust and high capacity, high speed internet service will be essential for effective operations. The new terminal building should be provided with a high speed internet service.

9.5. Liquefied petroleum gas

Liquefied petroleum gas (LPG) is not provided at BMRRA except in refillable bottles or tanks. There is no reticulated supply within close proximity to the airport so any future requirements for supply of LPG to facilities on the site would be met by storage tanks. The location for this storage facility would be identified on an as required basis.

AVIATION PROJECTS

10. ENVIRONMENTAL AND LAND USE PLANNING IMPACTS

10.1. Conditions relating to noise

BMRRA is required to be operated in accordance with conditions set out in Ministerial Statement 399. Some of these conditions relate to noise emissions from aircraft operating at the aerodrome.

Management Commitments for Aircraft Noise set out in Appendix 4 of Bulletin 785 are as follows:

10. Ensure that noise levels at any adjacent residential properties do not exceed a maximum of 65 dB(A) L_{dn}: this constraint will limit the number of aircraft movements and aircraft size.
11. In the event that any residence is found to be within the L_{dn}55 noise contour than Council undertakes to liaise with the affected landowners to implement the noise reduction measures appropriate to the circumstances of the dwelling, at Council's cost, and to consider noise management techniques for the airport itself.
12. Ensure aircraft over the Vasse-Wonnerup Estuary remain above 640 ft AGL.
13. Initiate a monitoring program to determine the effect of aircraft noise on the breeding behaviour of waterbird species.

The monitoring program required under condition 13 is discussed in further detail in section 10.3.

City of Busselton operates BMRRA under a Noise Management Plan (NMP). The purpose of the NMP is to assist the general community in understanding noise management controls and procedures employed at the airport and define clear guidelines for airport users as well as providing amenity protection for the local community who may be affected by noise emanating from the airport.

The NMP was first submitted to the Environmental Protection Authority (EPA) in 2011 and after an extensive consultation process was approved. In 2012 the NMP was reviewed and amendments approved in 2015.

The noise management issue is the single most important constraint to future development of the airport in terms of operating hours and will need to be reviewed, again to facilitate more flexible operating arrangements.

10.2. Noise impacts - general considerations

City of Busselton has indicated in the NMP that Australian Noise Exposure Forecast (ANEF) contours and N65 and N70 contours will be further considered for land use planning purposes and the development of an Airport Buffer Zone and Special Control Area via a Town Planning Scheme amendment process.

ANEF contours provide a scientific measure of the aircraft noise exposure levels around airports taking into account the frequency, intensity, time and duration of aircraft operations. Standard methodology for evaluating the noise climate around airports is defined in AS 2021-*2015 Acoustics – Aircraft Noise Intrusion – Building Sitting and Construction*, which recognises the ANEF contour charts as the primary method for long-term noise impact assessment.

N65 and N70 contours depict the annualised average daily number of location-based noise events louder than a specified noise level.

AVIATION PROJECTS

The ANEF contours are compared against a set of criteria published in AS 2021-2015 and reproduced in Table 12.

The applied criteria are used to determine suitable land usage for land which is impacted by aircraft noise emission. Typically, regions around an airport falling below the 20 ANEF curve are found to be suitable for residential, municipal and commercial urban development, with less strict criteria being applied to industrial premises. Levels below the 20 ANEF chart are dominated by background noise coming from sources other than aircraft and are thus not included in the charts. For zones termed conditionally acceptable, the noise criteria can be achieved by providing adequate sound insulation to the exposed building facades.

Table 12 Building types according to ANEF

Building Type	*ANEF Zone of Site*		
	Acceptable	*Conditionally acceptable*	*Unacceptable*
House, home unit, flat, caravan park	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
Hotel, Motel, hostel	Less than 25 ANEF	ANEF 25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF	ANEF 20 to 25 ANEF	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF	20 to 30 ANEF	Greater than 30 ANEF
Commercial Building	Less than 25 ANEF	25 to 35 ANEF	Greater than 35 ANEF
Light industry	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Heavy industry	Acceptable in all ANEF zones		

10.3. Noise modelling

To70 Aviation (Australia) Pty Ltd (To70) was contracted by City of Busselton to perform noise modelling for BMRRA, specifically ANECs and N-Contours for the Stage 2A infrastructure modelling Stage 2 operations.

An ANEC chart is determined by the same procedures as an ANEF chart, excluding the confidence in forecasting required. These procedures are detailed in AS 2021-2000. Therefore, the ANEC can be considered equivalent to the ANEF, without having AirServices Australia endorsement.

AVIATION PROJECTS

To70 produced the following outputs:

- Standard ANEC for the Busselton Regional Airport Master Plan 2016 aerodrome infrastructure / operations projected to twenty years, 2038/39; and
- N65, N70, N75 and N80 contours for the following scenarios:
    - Master Plan (2016) aerodrome infrastructure / operations 2018/19;
    - Master Plan (2016) aerodrome infrastructure / operations 2022/23;
    - Master Plan (2016) aerodrome infrastructure / operations 2028/29; and
    - Master Plan (2016) aerodrome infrastructure / operations 2038/39.

A full copy of the report is provided at **Annexure 2**.

10.3.1. Software

The Federal Aviation Administration's (FAA) Integrated Noise Model (INM) version 7.0d was used for the calculation of the ANEC and other contours. INM 7.0d is the latest version of this software package.

10.3.2. Weather

INM requires the input of weather conditions observed at the airport. Average weather settings are derived from the Bureau of Meteorology (BoM) for Nov-14 to Oct-15. The annual average temperature and pressure at Busselton Airport weather station (station 009603) is used as input for this INM study.

The weather settings used in the modelling are noted as follows:

- Temperature 19.6 degrees C;
- Pressure 764.22 mm-Hg;
- Relative humidity 59.3%; and
- Headwind 14.8 km/h (default INM value).

10.3.3. Traffic Forecast

Updated aircraft traffic forecasts for the noise modelling were provided by City of Busselton to To70 in the form of a spreadsheet containing annual movements by year. The forecasts were reviewed and updated based on input from To70. The detailed aircraft traffic forecasts (including day/night split) can be found in Appendix A of the report.

10.3.4. Runway usage

To70 assumed the following runway use based on information provided by City of Busselton:

- Runway 03 - 40%; and

- Runway 21 - 60%.

10.3.5. ANEC Observations

In its report, To70 noted the ANEC –standard 20 year (shown in Figure 18) shows the ANEC 20 contour does not extend to any populous areas and for this reason ANEC 10 has been shown for informational purposes. As specified in AS2021, buildings (residences) which fall within ANEC 20 are permissible and as such would apply for ANEC 10. In that regard, there is no major impact to dwellings both north and south of the runway that are situated within the ANEC.

10.3.6. N-Contour results

To complement the ANEF maps, Noise-Above contours (N contours) charts show the number of aircraft noise events per day exceeding specific noise levels. N contours can be used to provide information both on past and planned aircraft operations. This helps communities and individuals to visualise noise impact in specific areas as it takes a person's reaction to noise out of the equation. In its report, To70 notes that, similar to the ANEC findings, both the N65 and N70 10 event noise contours do not extend to any populous areas, as can be seen in Figure 19.

AVIATION PROJECTS

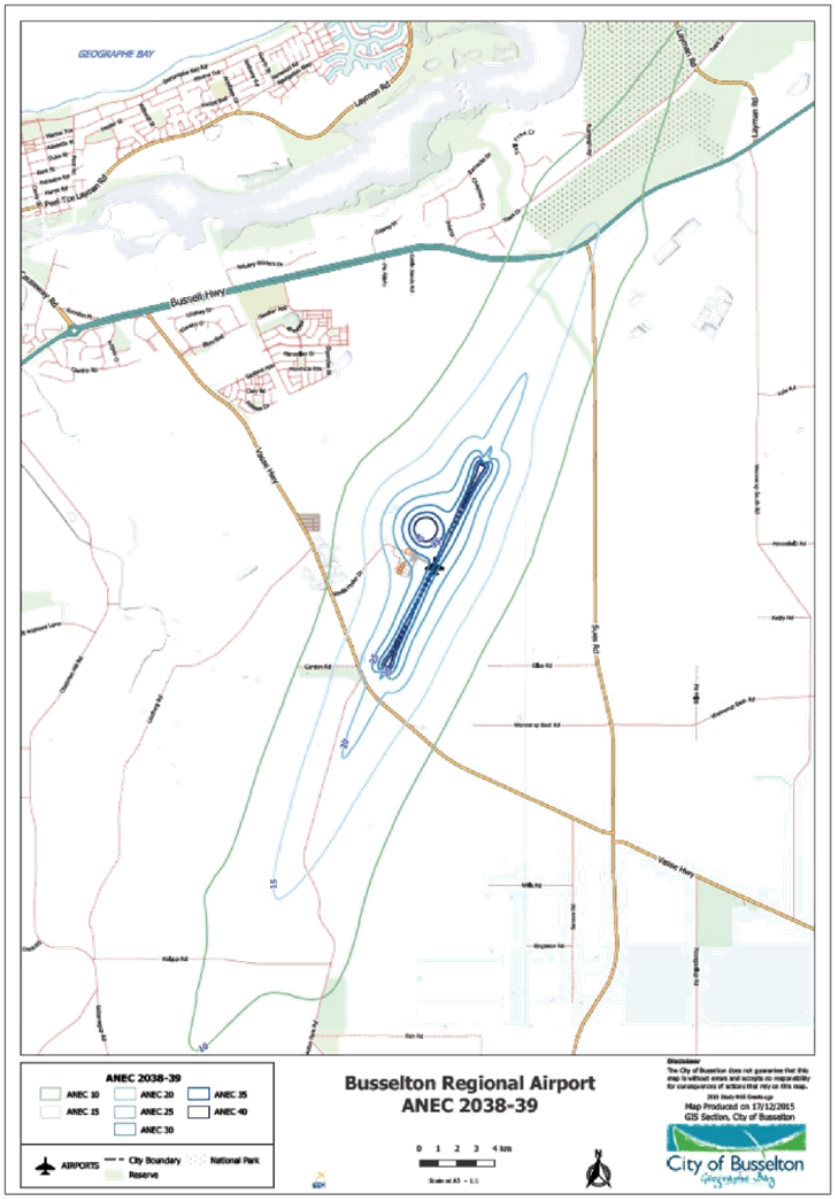


Figure 18 ANEC 2038/39

AVIATION PROJECTS

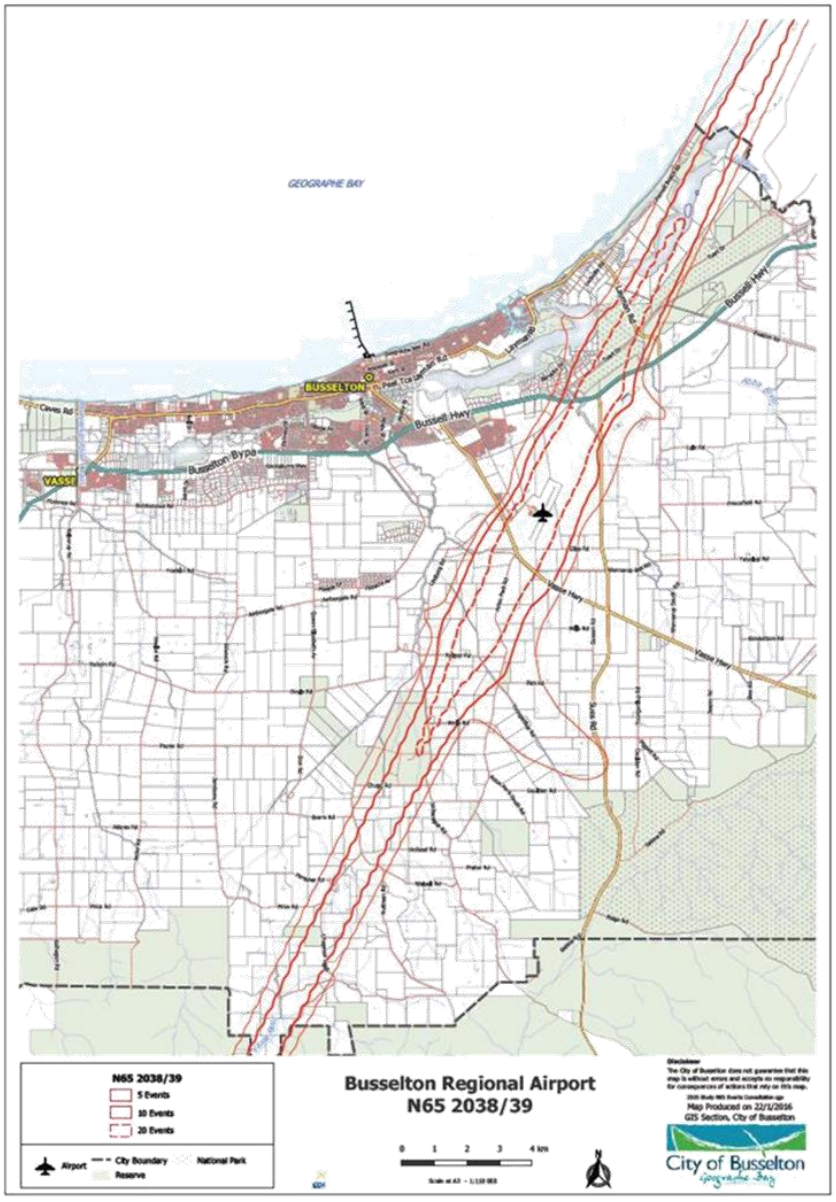


Figure 19 N65 2038/39

AVIATION PROJECTS

10.4. Waterbirds of the Vasse-Wonnerup Wetlands

The Vasse-Wonnerup Wetland System lies approximately 5km north of the BMRRA site. It is listed as an Internationally Important Wetland under the Ramsar Convention because of its significance for waterbirds.

The location of the Vasse-Wonnerup Wetland system with respect to the town of Busselton and BMRRA is shown in Figure 20.

The monitoring program required under condition 13 of the Management Commitments for Aircraft Noise set out in Bulletin 785 was undertaken over three years from 1997 to 1999. In a report issued by Birds Australia on 14 February 2000, it was concluded that:

> *There has been no observable impact on waterbird breeding by aircraft using Busselton Regional Airport.*

To assess the potential effects or impacts of the proposed increases in aircraft activity over the Vasse Wonnerup System, the overlap between the modelled increases in the frequency of 65 decibel noise events across the wetland system and the known distribution and nesting patterns of waterbirds within the system was examined by environmental consultant Green Iguana, which concluded as follows:

> *The most recent detailed distribution data suggest that the current flight path and extent of increased noise events (for all scenarios) over the wetland system does not overlap with the areas of highest waterbird usage within the system. For all waterbirds combined, the western end of the Vasse Estuary, and the eastern end of the Wonnerup Estuary (i.e. those parts of the wetland system that are furthest from the modelled flight path) support the highest number of waterbirds whereas Malbup Creek and the lower Wonnerup Estuary channel support far lower numbers of waterbirds than other areas within the system. In terms of migratory waders (shorebirds), the pattern of distribution was similar to all waterbirds and although shorebird usage of the Wonnerup Estuary was somewhat more uniform than the Vasse Estuary, the flight path does not overlap with the areas of greatest shorebird usage.*
>
> *Because the effects of increased aircraft activity on the species present within the system cannot be accurately predicted, it is possible that the breeding and foraging of some species may be affected. All of the species which may be affected occur and/or breed in greater numbers in other parts of the system, away from the modelled flight path affected areas, with the exception of the Yellow-billed Spoonbill nesting colony which may be adversely affected by aircraft overflights. The Yellow-billed Spoonbill is not a species that the wetland is statutorily important for, nor is it a listed threatened or migratory species.*
>
> *Because the likely impacts of the airport upgrade on the system's waterbirds cannot be estimated with certainty, if the proposed upgrade is to occur using the existing flight path (rather than re-routing the flight path to avoid the system entirely), the proposal should be referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities for determination on whether the proposal requires assessment under the Environmental Protection and Biodiversity Control (EPBC) Act.*

Figure 20 Location of the Vasse Wonnerup Ramsar Wetlands site

As part of the process of attaining project environmental approvals for the BMRRA Development Project, City of Busselton engaged environmental consultants to assess the potential of any future impacts resulting from the BMRRA development on the Vasse-Wonnerup Wetlands. This involved consulting with Department of Parks and Wildlife offices from the area and engaging an environmental specialist to conduct a literature review on the effects of aircraft operations on wetlands of similar significance in the vicinity of other airports. City of Busselton has also consulted with the Australian Government agency, Department of the Environment (DotE) with regards to submitting a referral under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and, subject to advice from DotE, will submit a project proposal for referral under the EPBC Act.

10.5. Fauna assessment

Green Iguana was also engaged to provide information on the fauna values of the BMRRA runway extension footprint (based on extension of the current runway to 2600 m).

To minimise the impacts of the proposed airport expansion on the site's fauna and fauna habitats, the following recommendations were made:

> *(1) Clearing of Marri and Peppermint woodland should be offset by a comparable area of rehabilitation of both vegetation communities within a suitable distance of the site.*

AVIATION PROJECTS

(2) Clearing of the Peppermint woodland should be carried out in accordance with DEC clearing guidelines for the Western Ringtail Possum, including obtaining a Regulation 15 Licence to Take Fauna for Public Purposes issued by DEC under the WA Wildlife Conservation Act (1950).

(3) Loss of seasonal wetland habitat within the site should be offset by rehabilitation of seasonal wetland habitat elsewhere, preferably within the boundaries of the Vasse- Wonnerup Ramsar site.

The locations of the habitats mentioned are indicated in Figure 21.

As part of the BMRRA Development Project, City of Busselton engaged environmental consultants to complete a Level 1 flora and vegetation survey to define values pertaining to flora and vegetation within the BMRRA precinct. The level 1 survey was to determine if the remnant vegetation located on the airport precinct was suitable as foraging, roosting or nesting habitat for any of the Black Cockatoo species and Western Ringtail Possum listed as Threatened under the EPBC Act and the Wildlife Conservation Act 1950 (WC Act). The results from the survey are to be submitted to the Western Australian Government Office of the Environmental Protection Authority as part of the environmental approval process required for the BMRRA Development Project.

AVIATION PROJECTS

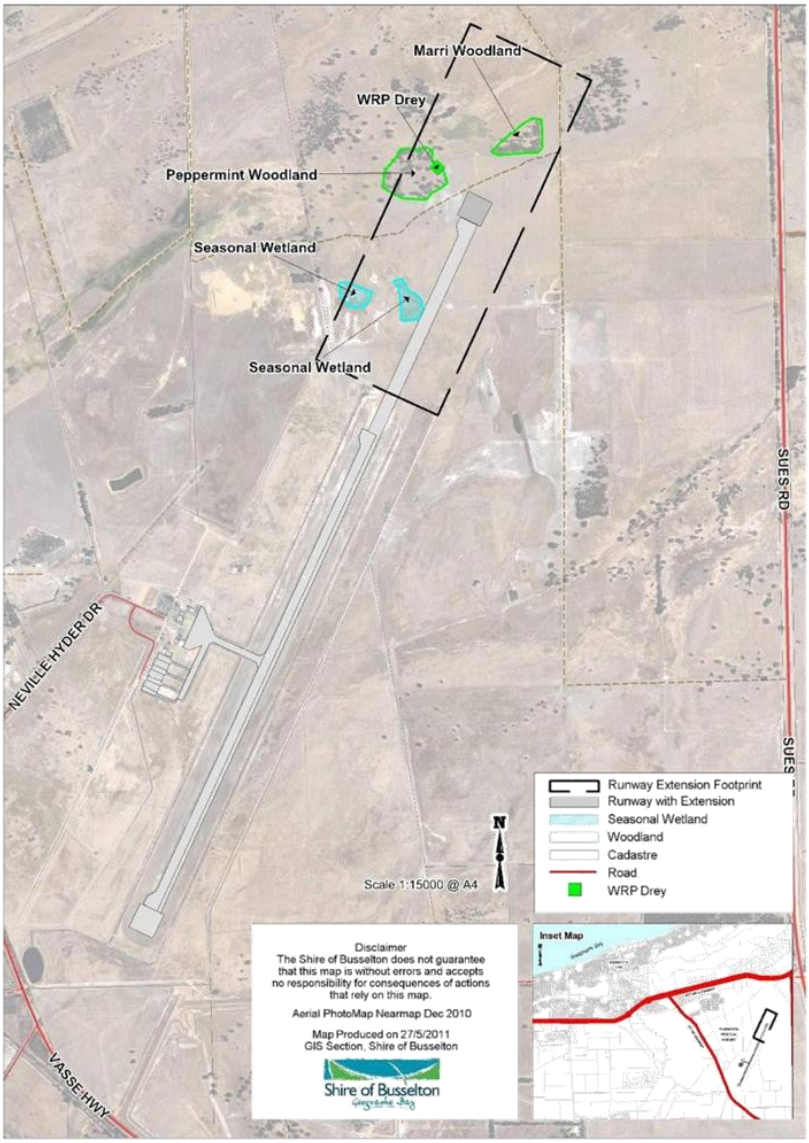


Figure 21 BMRRA runway extension footprint for fauna assessment

AVIATION PROJECTS

10.6. Aircraft flight path optimisation to reduce noise impacts

RNAV-RNP or other instrument approach procedures which can be designed with flexible flight paths have not been scoped as an input to the noise model; however, further investigation should be undertaken to determine if noise impacts can be reduced through careful design of these procedures for introduction in time for the commencement of Stage 2 operations.

10.7. Obstacle limitation surfaces

So that the obstacle restriction area around the aerodrome can be protected from penetration by obstacles, the obstacle limitation surfaces applicable to the ultimate aerodrome design should be published in the Town Planning Scheme.

10.8. Flooding and stormwater drainage

Flooding is not a significant issue for the future planning of the airport. The current site and parts of adjoining properties scoped for development lie outside any flood prone land.

An open unlined drain along the southern boundary of the existing airport site will need to be modified to permit extension of the runway to the south, into the neighbouring property subject to acquisition.

10.9. Other development control measures

There are other development control measures which are not part of the statutory planning framework but should be considered with a view to ensuring the development is positioned to meet future requirements.

10.9.1. National Airport Safeguarding Framework

The Commonwealth Government has an interest in better planning and integrated development on and around airports and to lessen the adverse effects of aviation activity on the environment and communities. It is not a planning authority in this case, but provides guidance on broader issues such as noise around airports that can be used by statutory authorities to achieve the stated objectives.

The National Airports Safeguarding Advisory Group (NASAG) has produced National Airport Safeguarding Framework to advance this agenda.

10.9.2. Public Safety Zones

A public safety zone is used to restrict development in areas where there is potentially a higher risk of an accident involving an aircraft landing or taking off.

A public safety zone is not currently required for BMRRA.

As outlined above, the National Airports Safeguarding Advisory Group (NASAG) will be working on the development of a national policy on public safety zones.

10.9.3. Lighting in the vicinity of an airport

MOS 139 establishes a restriction to lighting within the vicinity of an airport which, by reason of its intensity, configuration or colour, might endanger the safety of an aircraft. The vicinity of the airport

AVIATION PROJECTS

can be taken to be within a 6 km radius of the airport. For a code 4 instrument runway, the areas most likely to cause problems to aircraft operations are within a rectangular area the length of which extends at least 4500 m before each threshold and the width of which is at least 750 m either side of the extended runway centreline.

10.9.4. Bird hazards

Birds present a significant safety hazard to aircraft, so controls should be put in place to minimise the use of land within the vicinity of the airport that attracts birds.

MOS 139 suggests careful consideration of the location of off-airport attractors such as animal sale yards, picnic areas, aeration facilities and waste disposal or land fill areas.

Also, Management Commitments for Aircraft Safety set out in Appendix 4 of Bulletin 785 requires the Council to:

14. Maximise aircraft movements to the south, to reduce the risk of bird strike.

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11. MASTER PLAN

The Master Plan is characterised by progressive upgrades in four distinct stages according to aircraft types and operations as outlined below.

The triggers and dependencies of the elements of Stages 1, 2, 2 AEO and 2A are provided in Table 13 and Table 14. Timings are indicative and subject to further feasibility assessment, funding, approvals, design and construction of necessary infrastructure, as well as negotiation with applicable aircraft operators. Development of Stages 3 and 4 are beyond the 20 year planning horizon and subject to demand and government consideration.

11.1. Stage 1 – ongoing to the end of 2017

Charter (and potentially RPT) operations from the current facility by aircraft such as ATR42, ATR72, Bae146, F50, F100 and Dash 8:

- interim expansion of passenger terminal facilities to accommodate F50/F100 RPT operations (complete);
- provision of passenger screening (complete but not currently required);
- development and implementation of a Transport Security Program which will require definition and fencing of the airside/landside boundary (complete);
- provision of a Jet A1 fuel facility (deferred to Stage 2);
- expansion of car parking facilities according to demand (complete);
- construction of an additional aircraft parking bay (complete); and
- land acquisition in preparation for future stages - preferably the maximum envelope rather than the minimum requirement (deferred to Stage 2).

11.2. Stage 2 – construction complete by end of 2017

Infrastructure required for the introduction of narrow body code 4C jet aircraft such as A320, B737:

- strengthening, widening to 45 m and extension to 2340 m (TODA 2400 m) of runway 03/21;
- construction of a two bay parking apron and connecting taxiway;
- construction of a new passenger terminal capable of handling 350 passengers at one time; and
- expansion of car parking facilities, including hire cars, buses etc to at least 600 new spaces.

11.3. Stage 2 AEO – as demand arises

Infrastructure anticipated as a result of potential aviation enterprise opportunities includes:

- expansion of the existing apron near the existing Aero Club;

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- construction of a code B parking apron and taxiway;
- development of code B hangar precinct sites (includes provision for RFDS transfer station and avgas facility);
- expansion of the existing parking apron to facilitate development of code C hangars; and
- construction of new roads to connect these developments to the internal road network.

11.4. Stage 2A – as demand by international carriers dictate

International narrow body code 4C jet RPT such as A320, B737:

- Extension of the runway to 2460 m (TODA 2520 m);
- provision of 240 m RESA at each runway end;
- Installation of additional precision approach path indicator lights at each runway end;
- expansion of the passenger terminal to provide international passenger facilities; and
- provision of ARFFS and ATC if/when required.

End of 20 year planning horizon

11.5. Stage 3 – subject to demand

Wide body code 4E jet RPT operations such as A330, B787:

- extension of runway 03/21, initially at the northern end, to a length of approximately 2700 m, within the RESA footprint, 45 m wide with 7.5 m shoulders;
- construction of 23 m wide taxiways with 10.5 m shoulders;
- if extending the current runway, construction of a parallel taxiway to near the threshold of the current runway (subject to land ownership constraints and the little wedge of Lot 203) designed around Code E separation requirements;
- extension of the parking apron;
- expansion of the passenger terminal; and
- provision of hydrant refuelling.

11.6. Stage 4 – subject to demand

International freight and/or alternate aerodrome for large wide body or code F aircraft such as the A380 or B747-800:

- Upgrade runway/taxiway and pavement to Code F requirements; and
- Provide other facilities as required to support the scope of operations.

AVIATION PROJECTS

11.7. Precinct plan

A number of precincts have been identified for the purpose of characterising the likely developments appropriate for each area of the aerodrome site, based on upon function. These precincts, along with the ultimate development and other planning considerations are described below and shown in **Annexure 1.**

11.7.1. Aeronautical Business Park

The Aeronautical Business Park is identified as a land bank, providing a zone for aeronautical business opportunities.

The precinct is located within prime access to the Vasse Highway / Airport entry and in close proximity to the Terminal. As such, front of house land uses would be encouraged in this zone.

11.7.2. Aeronautical Operations Precinct

The Aeronautical Operations Precincts is defined by the airside / landside secure separation. All aspects of this precinct are incremental to the operations of the Airport.

11.7.3. Terminal Precinct

The Terminal Precinct is on axis with the Vasse Highway entrance to the site. The terminal building is located within the view corridor of the arrivals sequence; reinforcing the use of the site.

The arrivals / departure sequence features regional landscapes as a buffer between the airport and surrounding infrastructure to heighten the visitors' experience of the Terminal Precinct.

11.7.4. Aviation Logistics Precinct

The Aviation Logistics Precinct is located to the north of the Terminal Precinct and houses predominantly landside operational requirements and support facilities for the Airport. This precinct is also land banked to enable planned growth for the Airport proper.

11.7.5. Light Aviation Precinct

The Light Aviation Precinct is located in close proximity to the existing terminal building. This precinct seeks to re-purpose the current uses on the northern most parcel of the site proper.

There is opportunity for integration with adjacent developments off-site.

11.7.6. Helicopter Operations Precincts

The Helicopter Operations Precinct is currently located on a parcel of land that is still under negotiation. The following document identifies options for the resolution of this precinct both within the staging and design options. This precinct will principally house all rotary wing operations.

11.8. Utilities plan

Utilities will need to be provided according to incremental demand. Requirements should be scoped during planning for construction of Stage 2 infrastructure.

AVIATION PROJECTS

Table 13 Stage 2/2A infrastructure summary by stage

Element	*Stage 2 – Code 4C*	*Stage 2A – Code 4C International*
Site	Extend site by 550 m to the north Include the little corner cut out and the additional triangular area in the Manning property. Extend the site to the south over the Water Corp property.	
Runway	2340 TORA (essential criteria) 2400 TODA (essential criteria) Extend 300 m south Culvert for open drain along southern boundary of existing site – under runway strip Extend 240 m north 45 m wide (essential criteria) No turning pads at this stage 90 m RESAs 300m runway strip	Extend another 120 m north so that we have 2460 m TORA and 2520 m TODA 240 m RESAs Note: Based on variable runway ends in earlier planning work the following essential criteria are specified for this aspect of the project: 2400 m TORA (essential criteria) 2520 TODA (essential criteria)
Taxiways	New code C stub taxiway to new apron (essential criteria) 18 m wide with 3.5 m wide shoulders	New parallel taxiway between new stub taxiway and existing apron along code F alignment 18 m wide with 3.5 m wide shoulders
New terminal	Building line offset 410 m from runway centreline to accommodate B747-800F tail height under transitional surface Accommodate 350 passengers (essential criteria)	Expand to accommodate border control agencies (essential criteria)
New apron	2 x B737-800 (essential criteria)	
Jet A1 Fuel storage	North of the new terminal building west of the building line	
Works depot	Relocate works depot to between new terminal and Jet A1 fuel storage facility	
Existing apron	Consider pavement overlay	
Avgas	Retain in current location (short term)	

AVIATION PROJECTS

Element	Stage 2 – Code 4C	Stage 2A – Code 4C International
Existing code A hangars	Retain pending resolution of leases in short-medium term	Remove and relocate leases to Light Aviation Precinct (include remove existing light pavement taxiways between existing apron and hangars).
Aeroclub	Retain in present position in short term	Relocate Aero Club to Light Aviation precinct
NDB	Remain as is, protect building restricted area	Remain as is, protect building restricted area
Primary IWDI	Relocate clear of OLS – near new main apron (northern side), clear of code F taxiway strip	
Secondary IWI	Relocate as indicated, noting problem with siting of IWI near threshold 21 due to OLS.	
AWS	Relocate to a 30 m x 30 m box just east of 1.15 ha site identified for acquisition and west of the airside road near threshold 21	
Aeronautical ground lighting	Medium Intensity runway edge lighting etc RTIL Single sided PAPI	Double sided PAPI
OLS	Code 4 Instrument non-precision	
ATC tower	N/A (subject to number of aircraft movements and timing of Stage 2A)	West of the existing terminal building and north of the existing main entrance road. There is some flexibility about the specific location within the general area in which it has been shown.
ARFFS	N/A (subject to number of passenger movements and timing of Stage 2A)	ARFFS facility at airside edge of Light Aviation Precinct – access via new stub taxiway
Car parking	Additional 600 parking spaces (Essential criteria)	As required by demand
Intersection upgrade	Upgrade intersection from Vasse Highway	
Entrance road	Create new entrance road and loop past terminal front	

AVIATION PROJECTS

Element	Stage 2 – Code 4C	Stage 2A – Code 4C International
Other roads	As shown – note allocation of public and internal roads	
Power lines	Relocate power lines along northern boundary of Light Aviation Precinct with 8.5 m easement.	
Water, sewer	Along western side of showgrounds, east of cemetery and Busselton Water Lot 11 to Busselton Water Lot 1602 to pumping station, then into airport site.	

AVIATION PROJECTS

Table 14 Stage 2 AEO infrastructure summary

Element	*Stage 2 AEO*
Taxiways	New code B stub taxiway to Light Aviation precinct Connect to existing apron via short parallel code B taxiway 10.5 m wide taxiway
Existing apron	Extend apron to south over grassed area in front of Aero Club – for code B fixed wing aerial fire fighting aircraft (DPaW) Extend apron in front of new F100 extension to service code C hangars.
Code B hangars	Create new Light Aviation Precinct, connected to the runway via a code B stub taxiway, designed around code B aircraft. Leave room on northern side of precinct for access road and underground power easement. Provide itinerant parking area.
Avgas	Relocate to Light Aviation Precinct
RFDS transfer station	Relocate to Light Aviation Precinct
Code C hangars	Identify two sites– first one adjacent to the new F100 parking apron north of the existing terminal (over the RFDS transfer station), with a second one alongside to the north
Fixed wing aerial fire fighting (DPaW)	On the southern side of the existing apron (Pavement infill of grassed area in front of Aero Club)
Rotary wing aerial fire fighting (DFES)	First option – co-located with DPaW in area in front of aero club (details to be worked out in further detail) Second option – in part of site north of Light Aviation Precinct (land not yet acquired)
Existing code A hangars	Remove and relocate leases to Light Aviation Precinct (include remove existing light pavement taxiways between existing apron and hangars).
Aeroclub	Relocate Aero Club to Light Aviation precinct
Other roads	As shown – note allocation of public and internal roads
Power lines	Relocate power lines along northern boundary of Light Aviation Precinct with 8.5 m easement.
Water, sewer	As required to service developments

AVIATION PROJECTS

12. STAGING CONSIDERATIONS

Staging of development over the course of the master planning horizon and beyond will be influenced by a number of general considerations outlined below.

12.1. Demand

Demand forecasts were prepared in support of the Busselton Regional Airport Upgrade Project Business Case. They relied upon the best known information at the time, but are subject to a number of uncertainties outlined herein.

12.2. Code E and A380 alternate for Perth Airport

Given the significant cost of infrastructure that would be required to provide an alternate aerodrome for Perth Airport's code E and A380 operations, the issue should be addressed to State and Commonwealth Government agencies so that its place in the future planning of BMRRA can be ascertained.

12.3. Funding

Each stage of the master plan will require significant capital expenditure. The availability of capital funding will influence the viability and/or timing of each stage.

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13. FUNDING/COST ANALYSIS

While this Master Plan has considered costs at a high level, further investigation of the likely costs of the upgrades proposed will inform future feasibility studies and preparation of business cases in support of funding applications.

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GLOSSARY

AAGR	average annual growth rate
ACN	aircraft concession number
AGL	above ground level
ANEF	Australian Noise Exposure Forecast
ARFFS	aerodrome rescue and fire fighting service
ATC	air traffic control
AWIS	automatic weather information system
BITRE	Bureau of Infrastructure, Transport and Regional Economics
BMRRA	Busselton-Margaret River Regional Airport
CAGR	compound annual growth rate
CAR	Civil Aviation Regulation 1988
CASR	Civil Aviation Safety Regulation 1998
EPA	Environmental Protection Authority
EPBC	Environmental Protection and Biodiversity Control
DFES	Department of Fire and Emergency Services
DPaW	Department of Parks and Wildlife
FIFO	fly-in fly-out
ft	feet
GPS	global positioning system
GSE	ground support equipment
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ILS	instrument landing system
LCC	low cost carrier
LPG	liquefied petroleum gas
MOS	Manual of Standards

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MTOW	maximum take-off weight
NASAG	National Airports Safeguarding Advisory Group
NDB	non-directional beacon
nm	nautical miles
NMP	Noise Management Plan
OLS	obstacle limitation surfaces
PCN	pavement concession number
RESA	runway end safety area
RNAV-GNSS	Area Navigation – Global Navigation Satellite System
RNAV-RNP	Area Navigation – Required Navigation Performance
RPT	regular public transport
WA	Western Australia

AVIATION PROJECTS

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ANNEXURES

1. Master Plans and Precinct Plans
2. Noise Modelling Report

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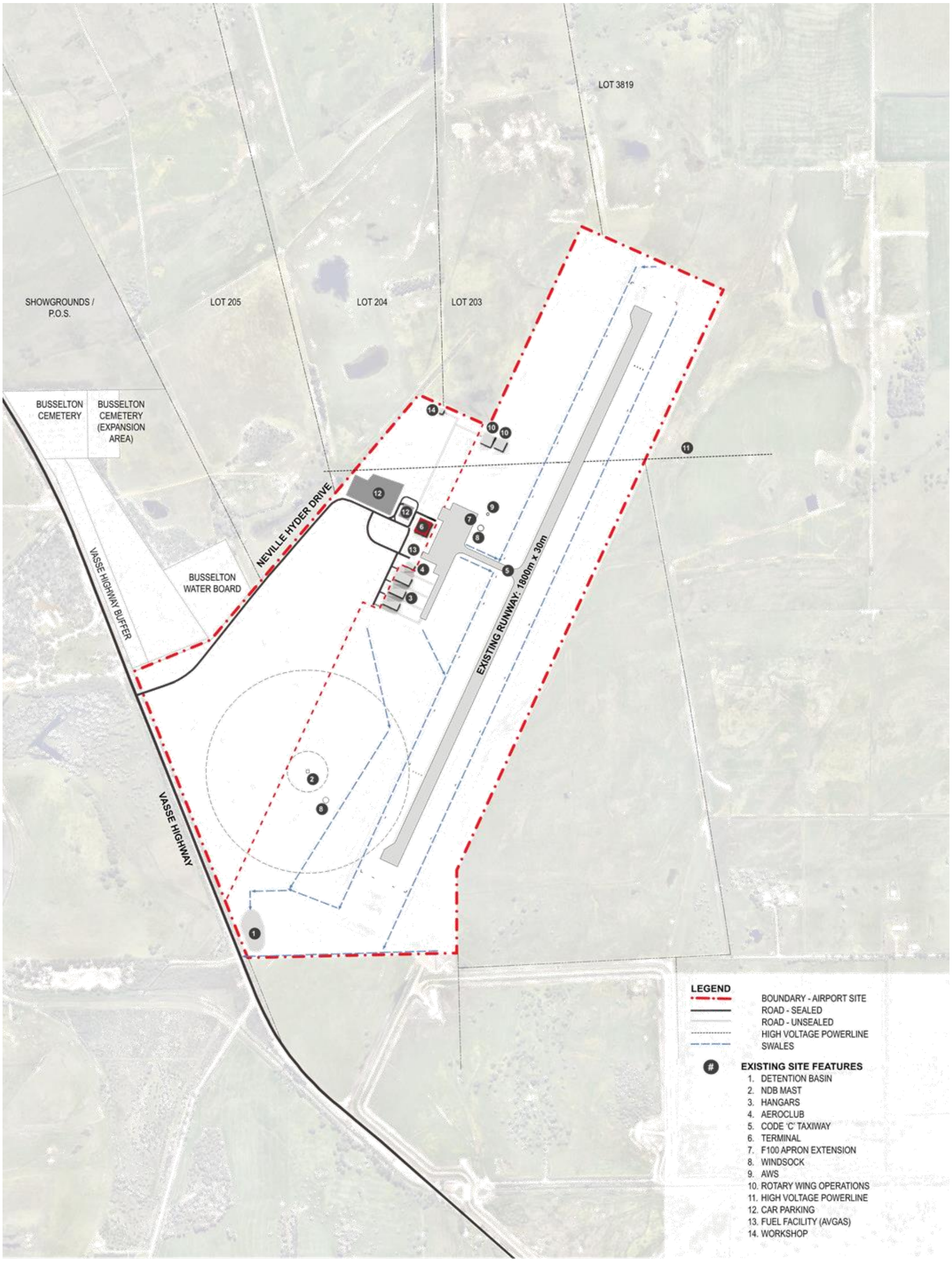
ANNEXURE 1 – MASTER PLANS AND PRECINCT PLANS

1. Existing Airport Precinct, Drawing DD-A-0001, Rev B, 09 February 2016
2. Stage 2, Drawing DD-A-0002, Rev B, 09 February 2016
3. Stage 2 AEO, Drawing DD-A-0003, Rev B, 09 February 2016
4. Stage 2A, Drawing DD-A-0004, Rev B, 09 February 2016
5. Aeronautical Business Park Precinct, Drawing DD-A-0005, Rev B, 09 February 2016
6. Aeronautical Operations Precinct – Stage 2, Drawing DD-A-0006, Rev B, 09 February 2016
7. Aeronautical Operations Precinct – Stage 2 AEO, Drawing DD-A-0007, Rev B, 09 February 2016
8. Aeronautical Operations Precinct – Stage 2A, Drawing DD-A-0008, Rev B, 09 February 2016
9. Terminal Precinct, Drawing DD-A-0009, Rev B, 09 February 2016
10. Aviation Logistics Precinct, Drawing DD-A-0010, Rev B, 09 February 2016
11. Light Aviation Precinct, Drawing DD-A-0011, Rev B, 09 February 2016
12. Helicopter Operations Precinct, Drawing DD-A-0012, Rev B, 09 February 2016



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MASTER PLAN
EXISTING AIRPORT PRECINCT

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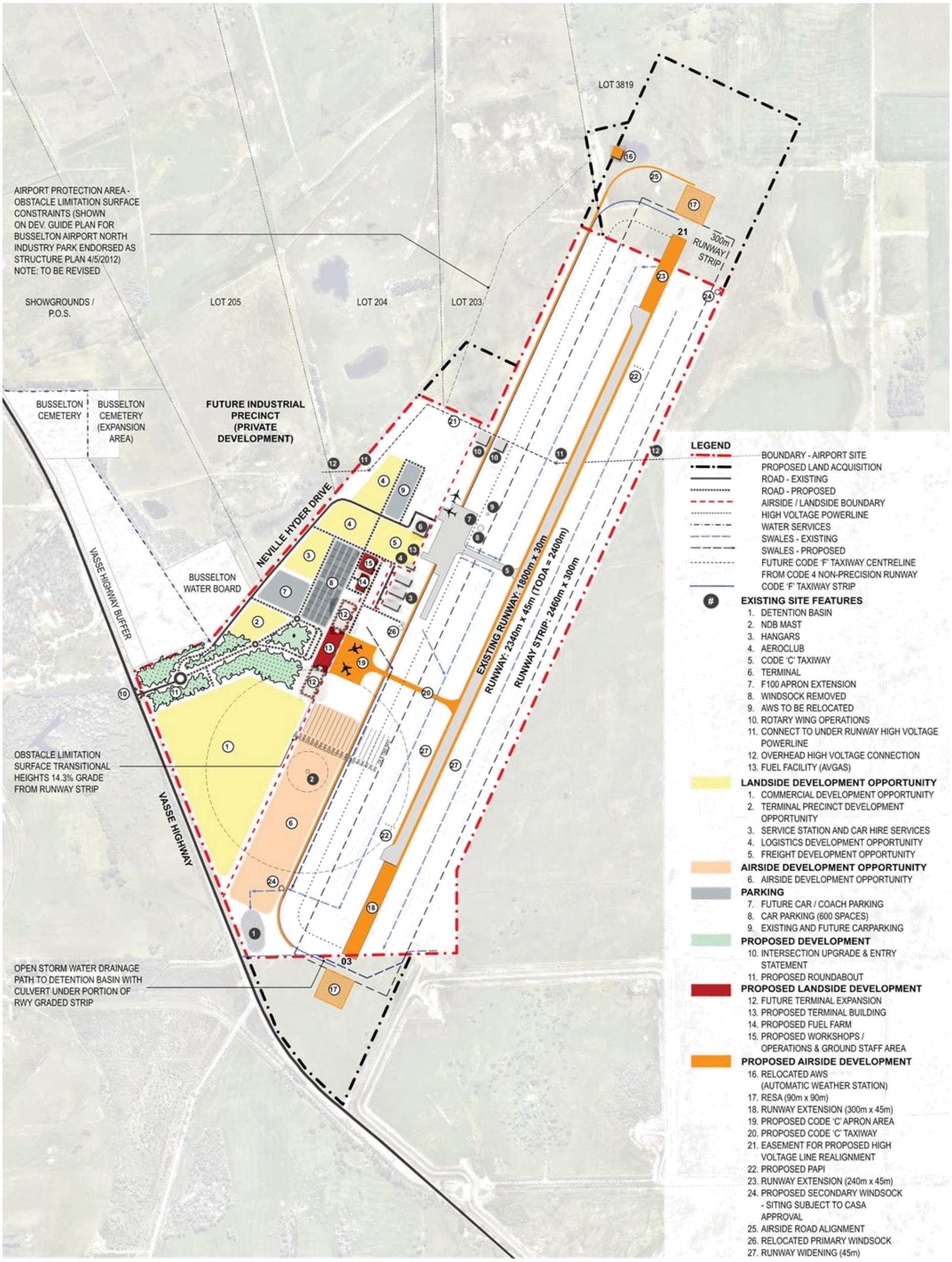

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MASTER PLAN - STAGE 2

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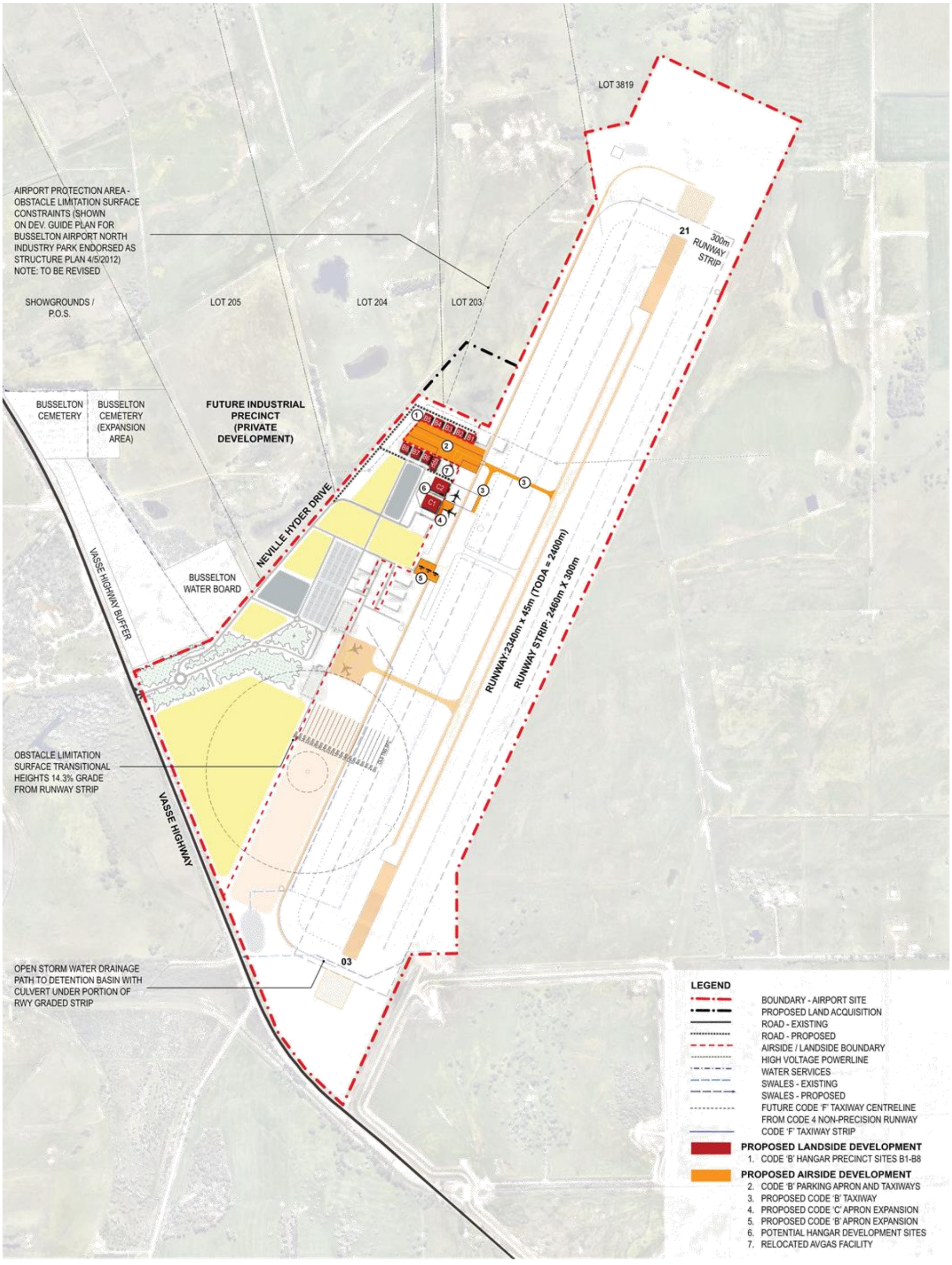

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MASTER PLAN - STAGE 2 AEO

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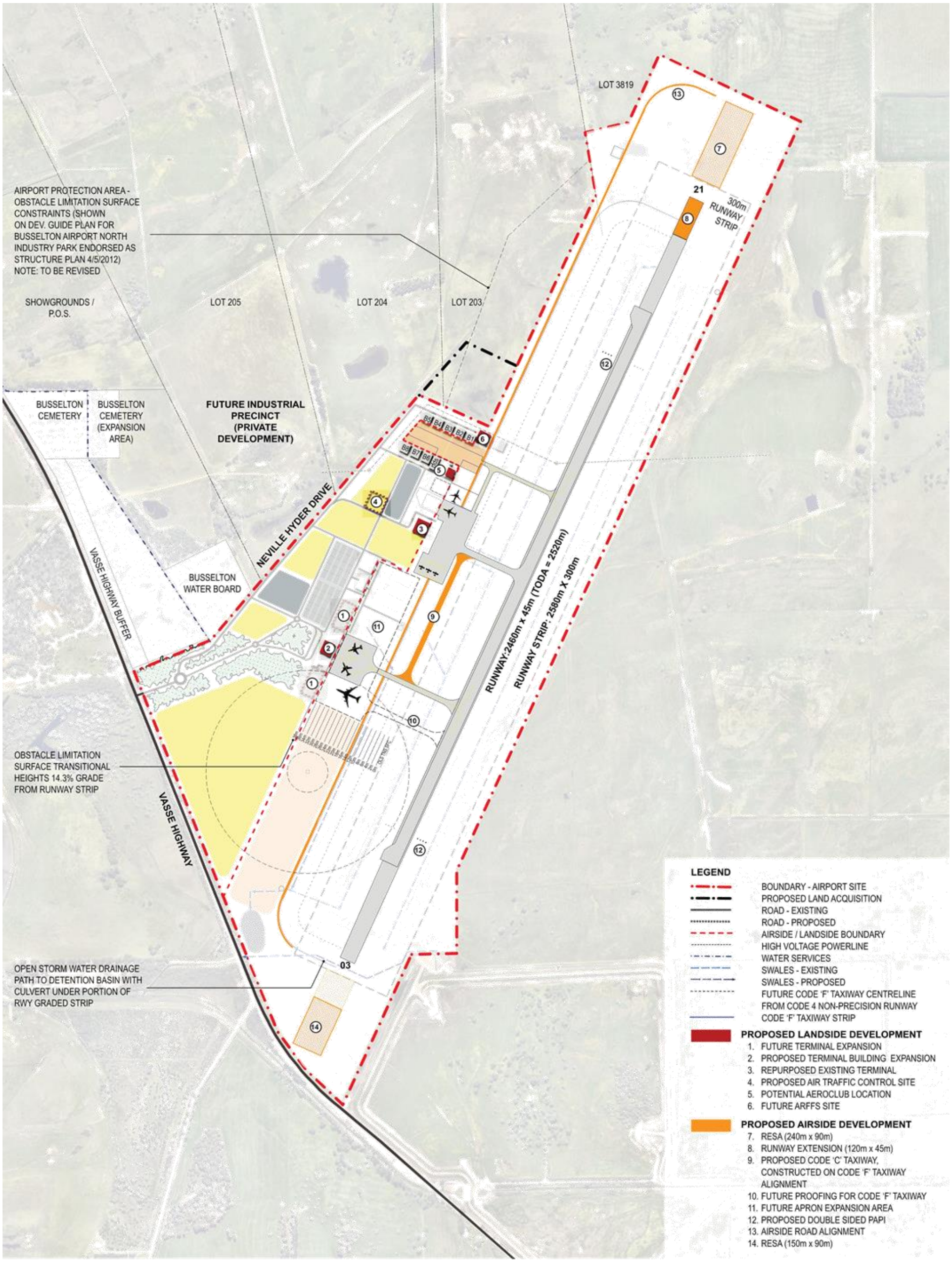

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MASTER PLAN - STAGE 2A

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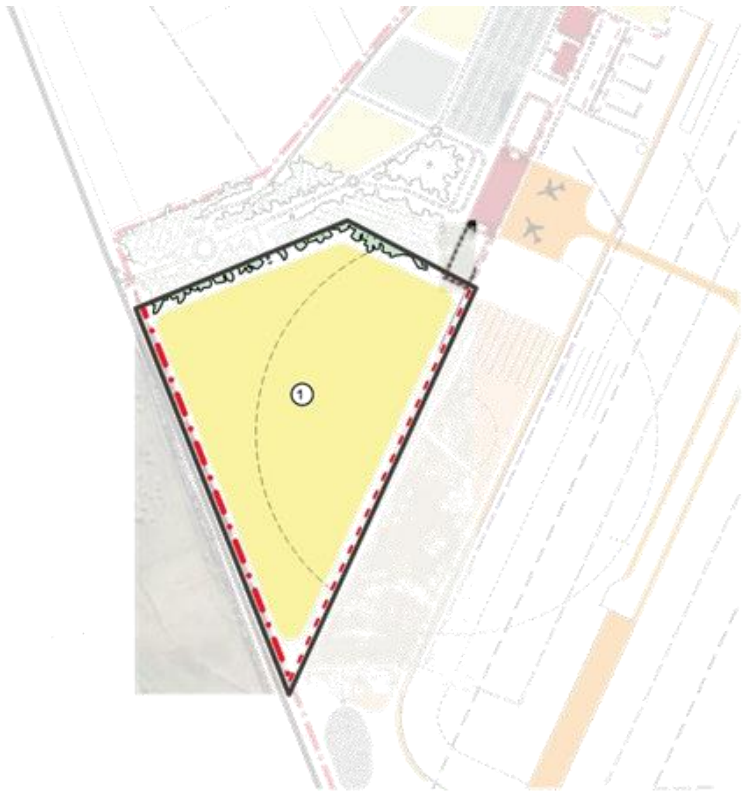

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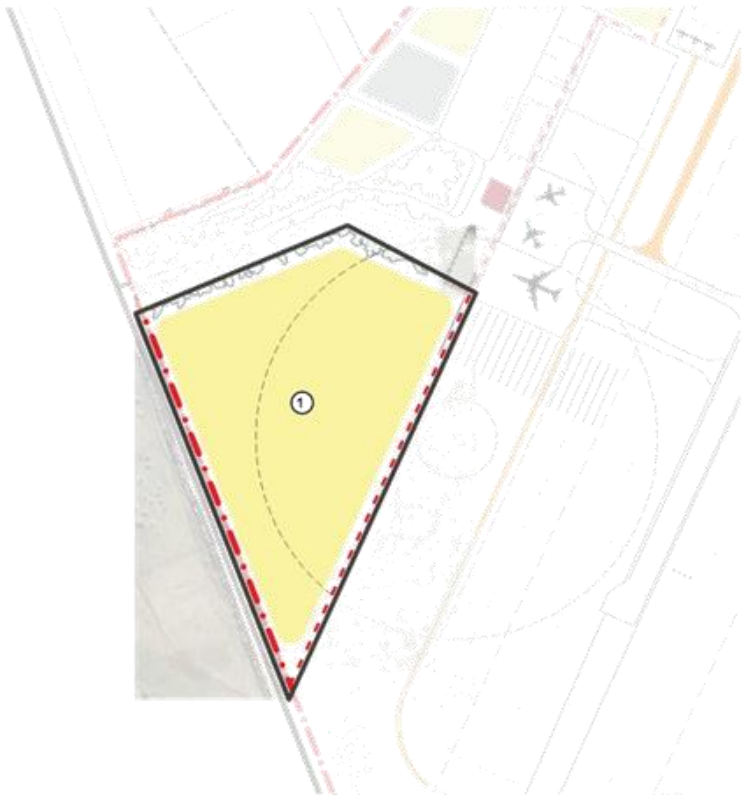
STAGE 2 AEO



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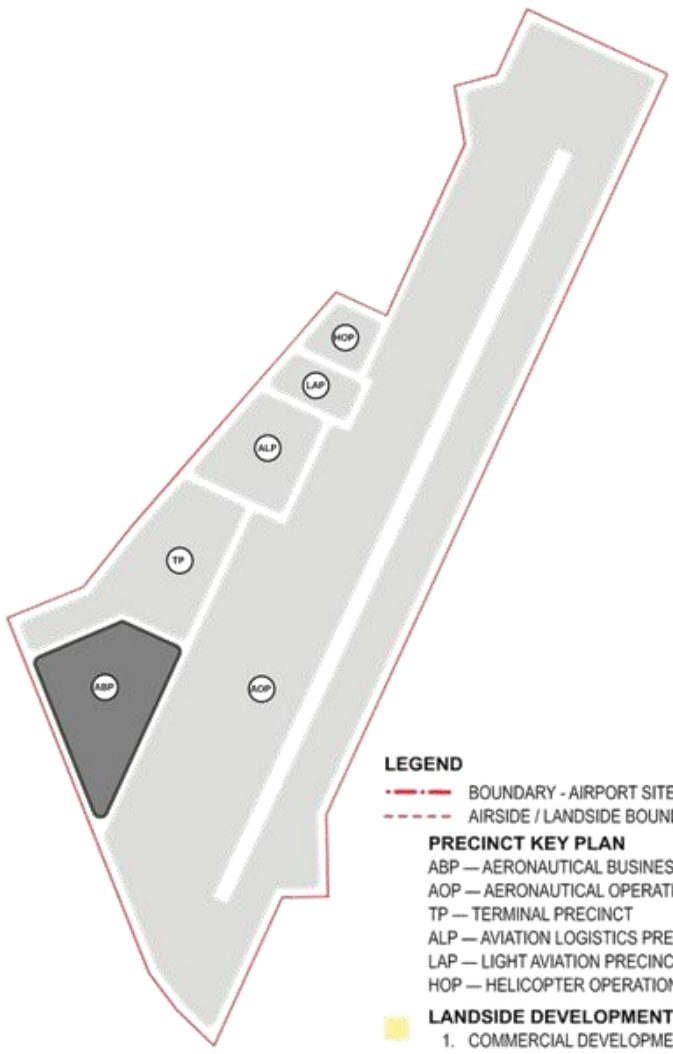

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PRECINCT PLANS
AERONAUTICAL BUSINESS PARK

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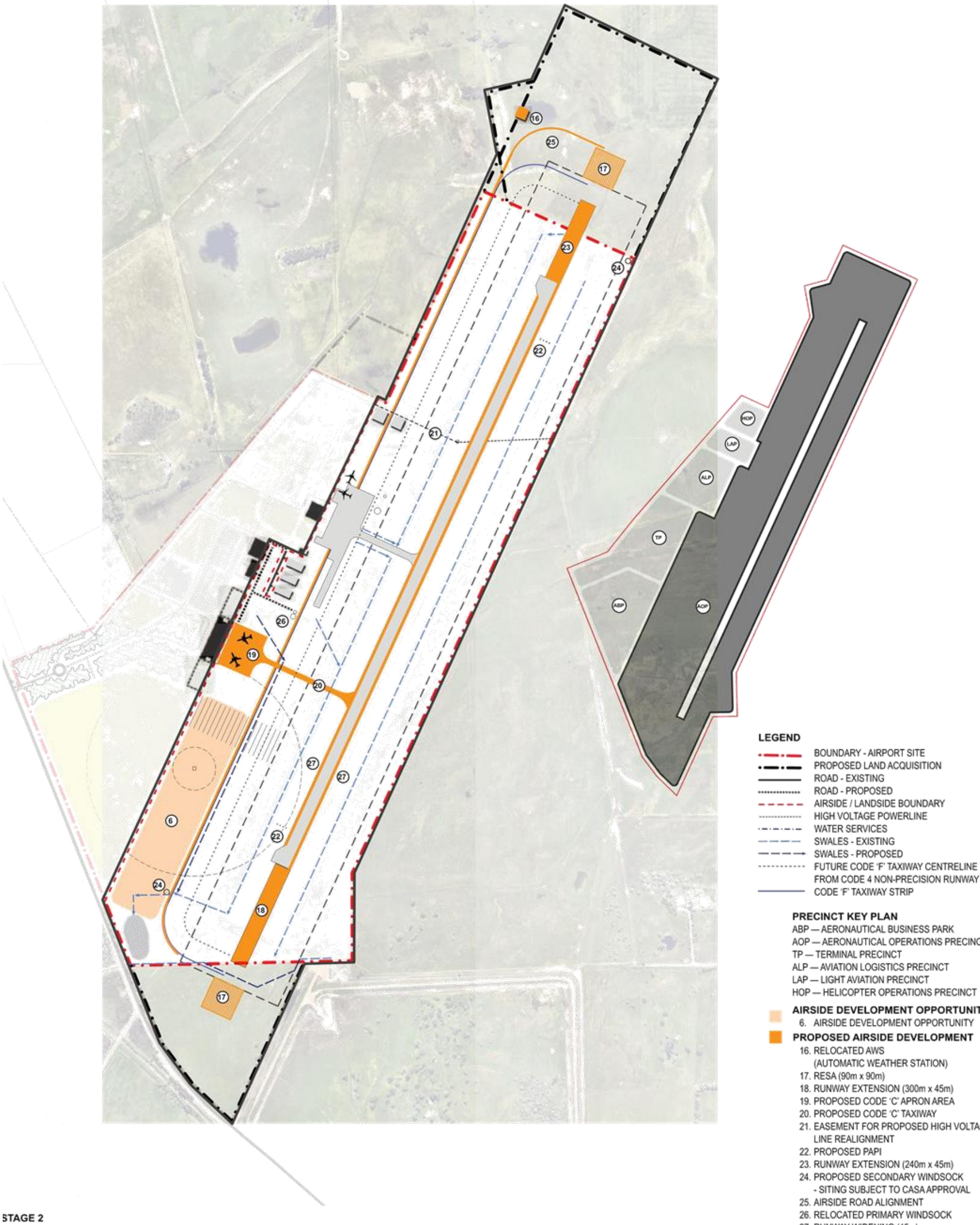

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PRECINCT PLANS
AERONAUTICAL OPERATIONS PRECINCT - STAGE 2
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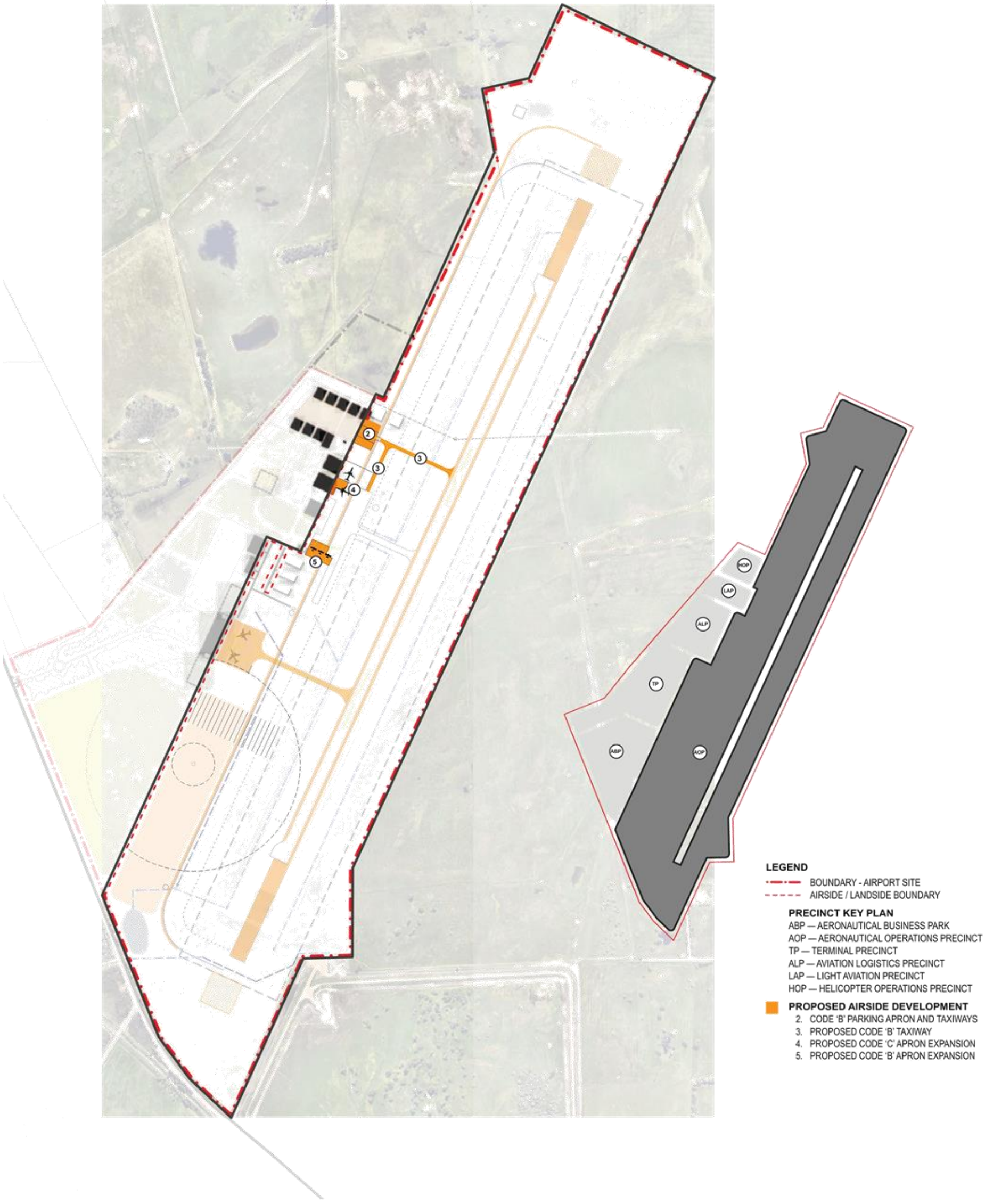

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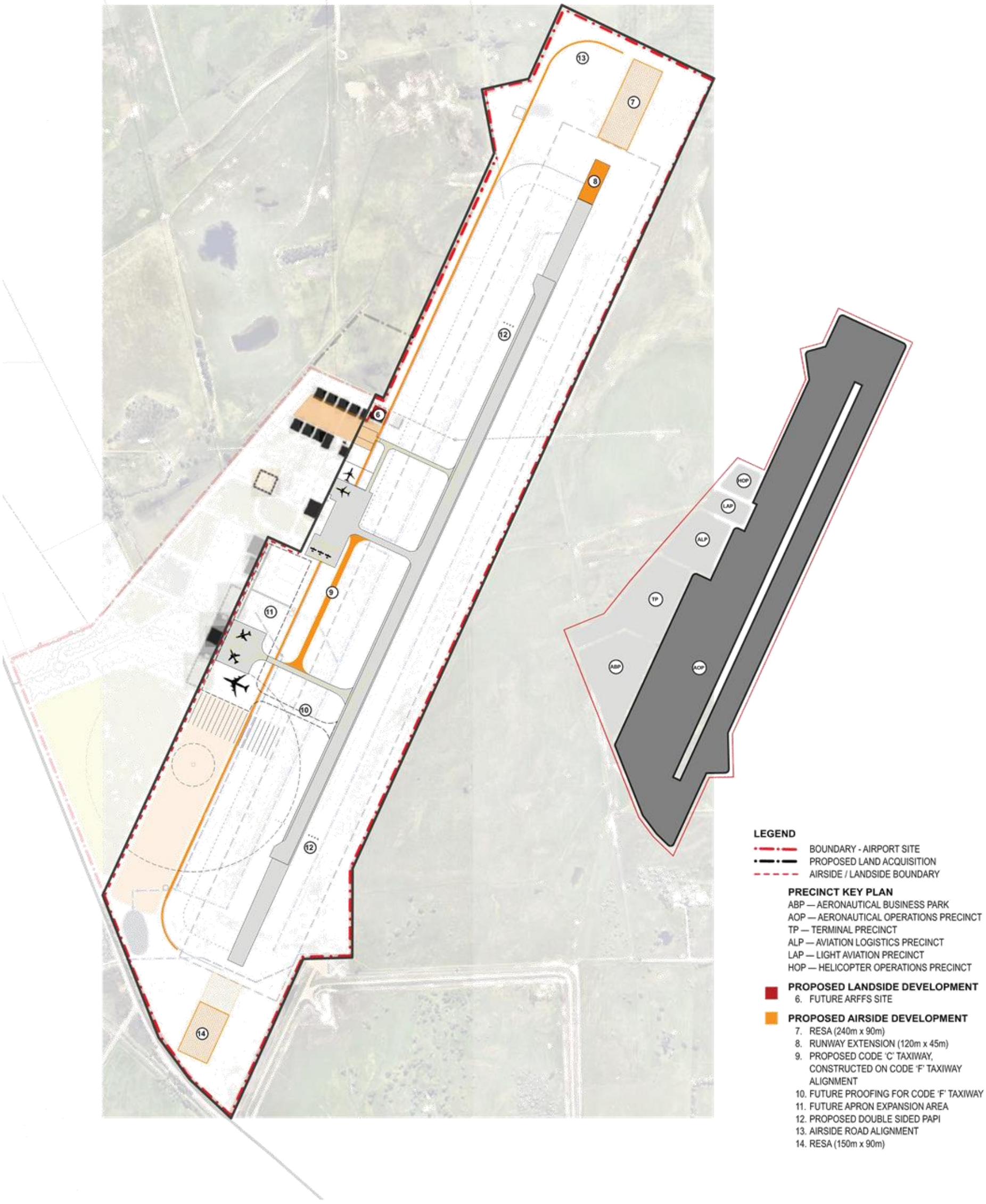

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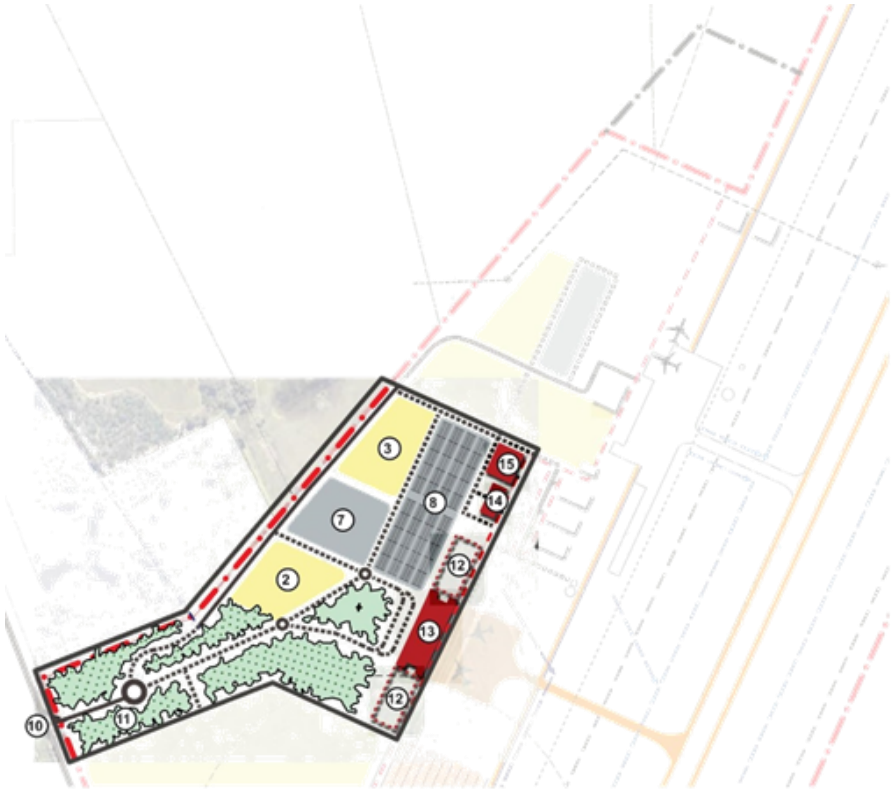

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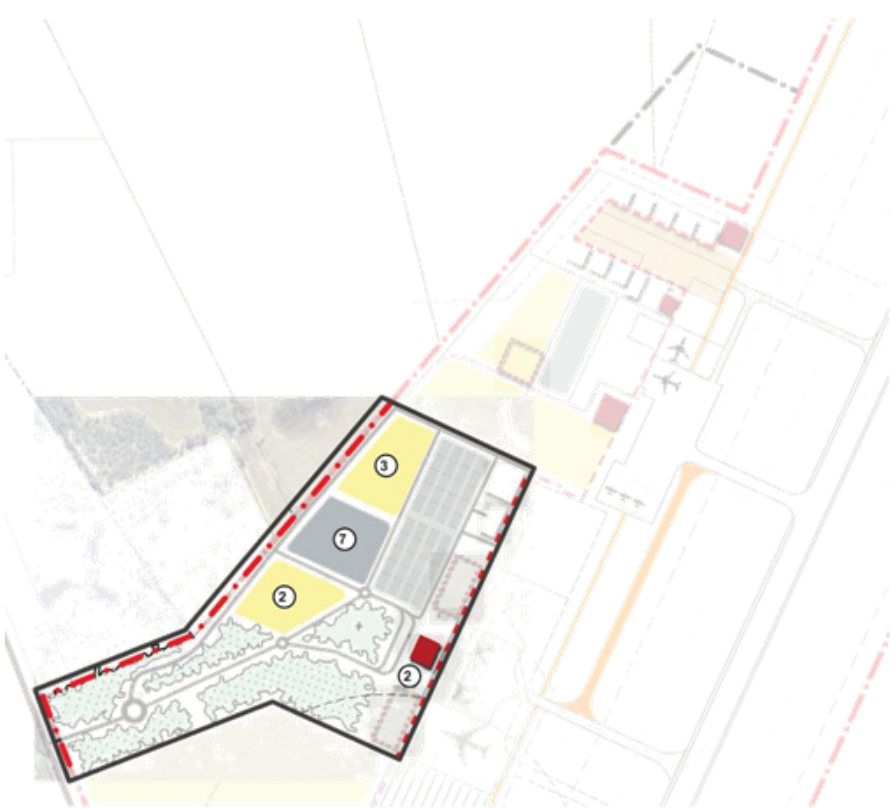
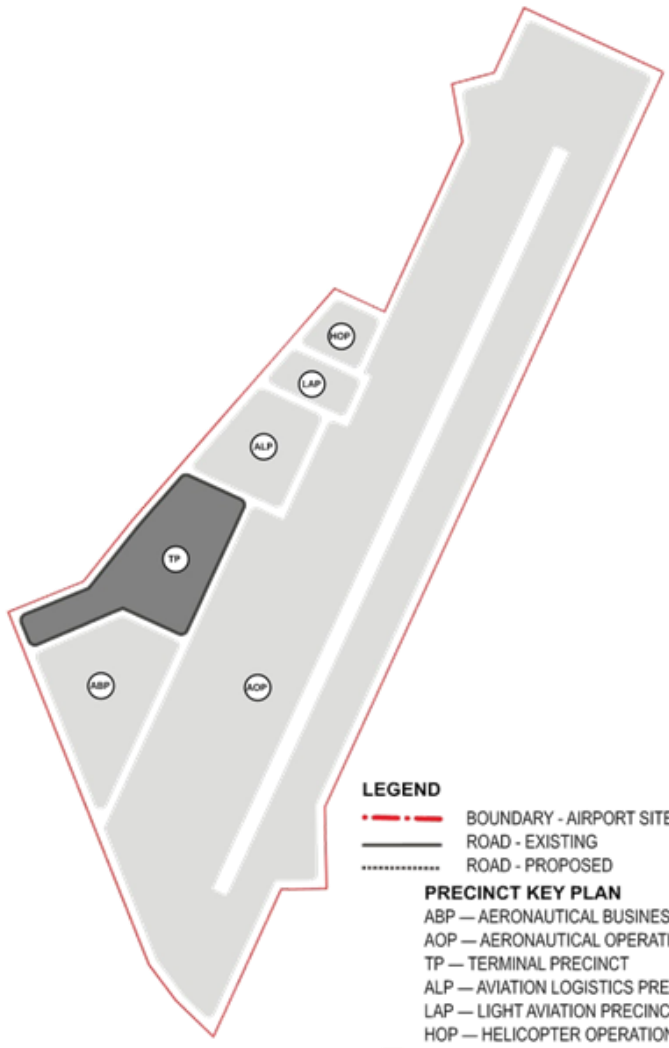
STAGE 2 AEO



STAGE 2A



LEGEND

BOUNDARY - AIRPORT SITE
ROAD - EXISTING
ROAD - PROPOSED

PRECINCT KEY PLAN

ABP — AERONAUTICAL BUSINESS PARK
AOP — AERONAUTICAL OPERATIONS PRECINCT
TP — TERMINAL PRECINCT
ALP — AVIATION LOGISTICS PRECINCT
LAP — LIGHT AVIATION PRECINCT
HOP — HELICOPTER OPERATIONS PRECINCT

LANDSIDE DEVELOPMENT OPPORTUNITY
2. TERMINAL PRECINCT DEVELOPMENT OPPORTUNITY
3. SERVICE STATION AND CAR HIRE SERVICES

PARKING
7. FUTURE CAR / COACH PARKING
8. CAR PARKING (600 SPACES)

PROPOSED DEVELOPMENT
10. INTERSECTION UPGRADE & ENTRY STATEMENT
11. PROPOSED ROUNDABOUT

PROPOSED LANDSIDE DEVELOPMENT
2. PROPOSED TERMINAL BUILDING EXPANSION
12. FUTURE TERMINAL EXPANSION
13. PROPOSED TERMINAL BUILDING
14. PROPOSED FUEL FARM
15. PROPOSED WORKSHOPS / OPERATIONS & GROUND STAFF AREA

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bne@modedesign.com.au

AVIATION PROJECTS
BUSSELTON-MARGARET RIVER AIRPORT MASTER PLAN
86 Neville Hyder Dr, Yalyalup WA 6280

PRECINCT PLANS
TERMINAL PRECINCT

FINAL

Project No: 15477PEF
Date: 09/02/16
Scale: 1:10,000 @ A3

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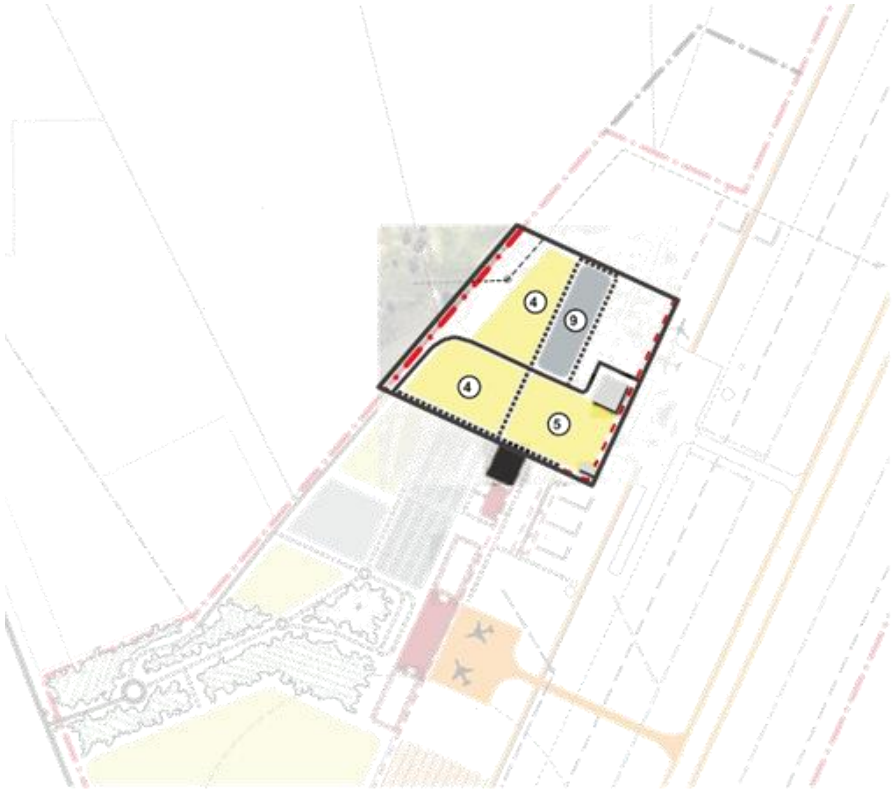
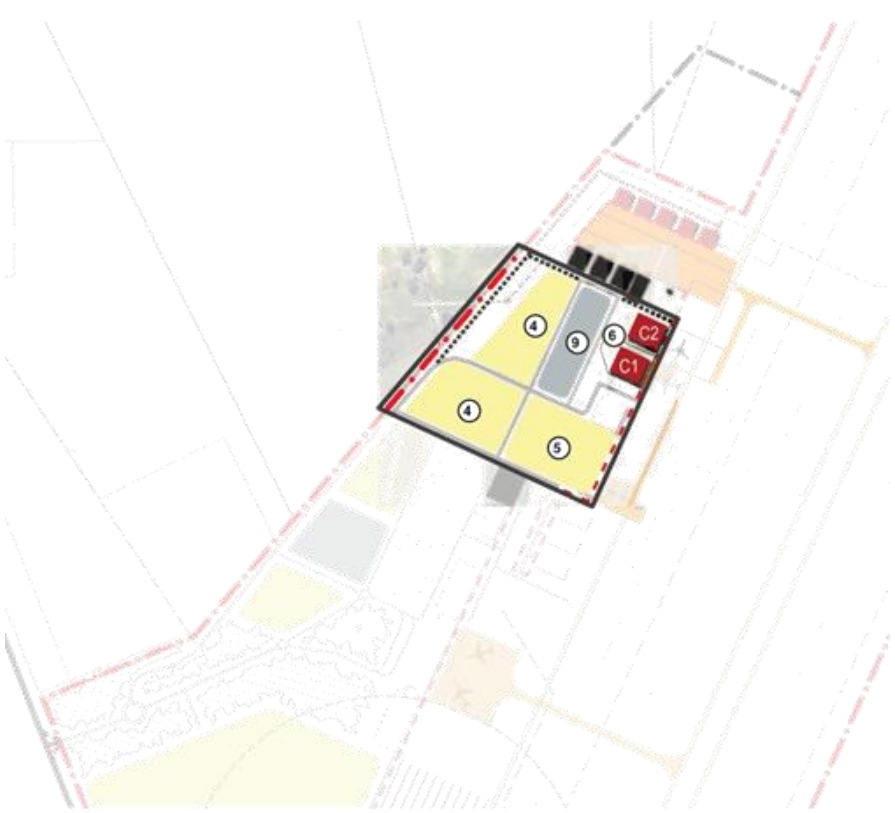


STAGE 2



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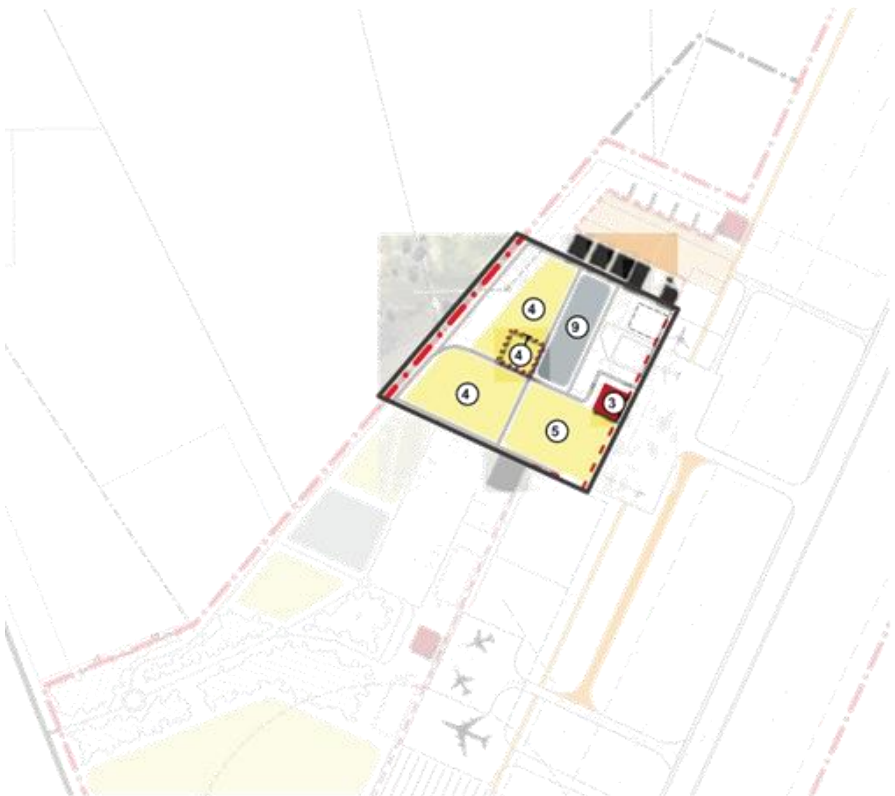

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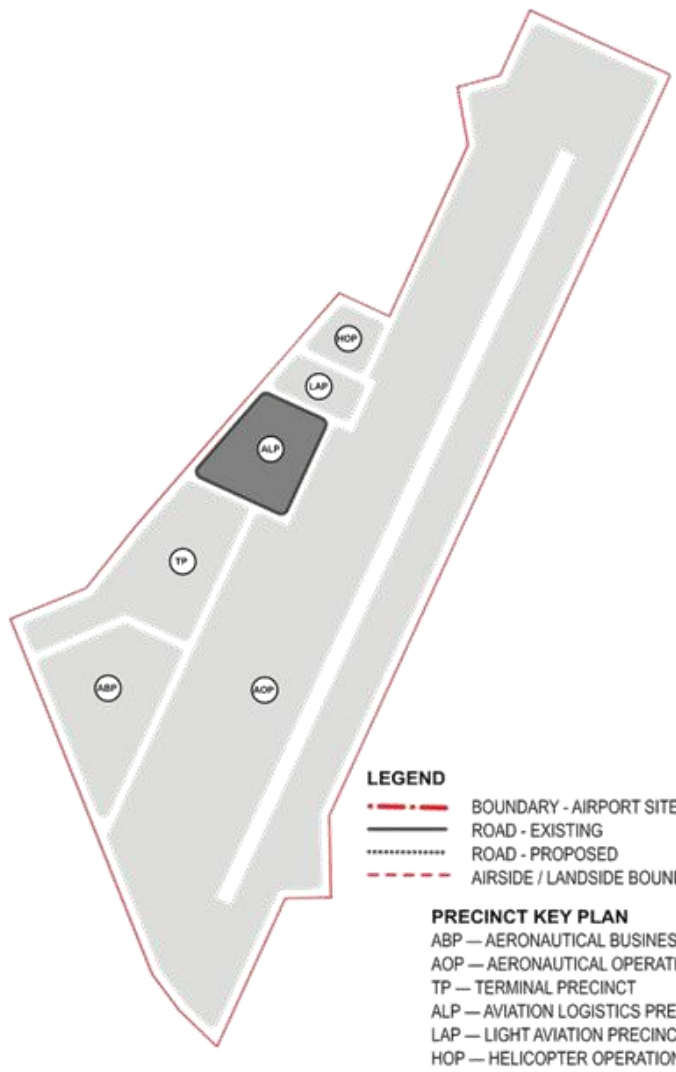

LEGEND

- BOUNDARY - AIRPORT SITE
- ROAD - EXISTING
- ROAD - PROPOSED
- AIRSIDE / LANDSIDE BOUNDARY

PRECINCT KEY PLAN

ABP — AERONAUTICAL BUSINESS PARK
AOP — AERONAUTICAL OPERATIONS PRECINCT
TP — TERMINAL PRECINCT
ALP — AVIATION LOGISTICS PRECINCT
LAP — LIGHT AVIATION PRECINCT
HOP — HELICOPTER OPERATIONS PRECINCT

LANDSIDE DEVELOPMENT OPPORTUNITY

4. LOGISTICS DEVELOPMENT OPPORTUNITY
5. FREIGHT DEVELOPMENT OPPORTUNITY

PARKING

9. EXISTING AND FUTURE CARPARKING

PROPOSED LANDSIDE DEVELOPMENT

3. REPURPOSED EXISTING TERMINAL
4. FUTURE AIR TRAFFIC CONTROL SITE
6. POTENTIAL HANGAR DEVELOPMENT SITES

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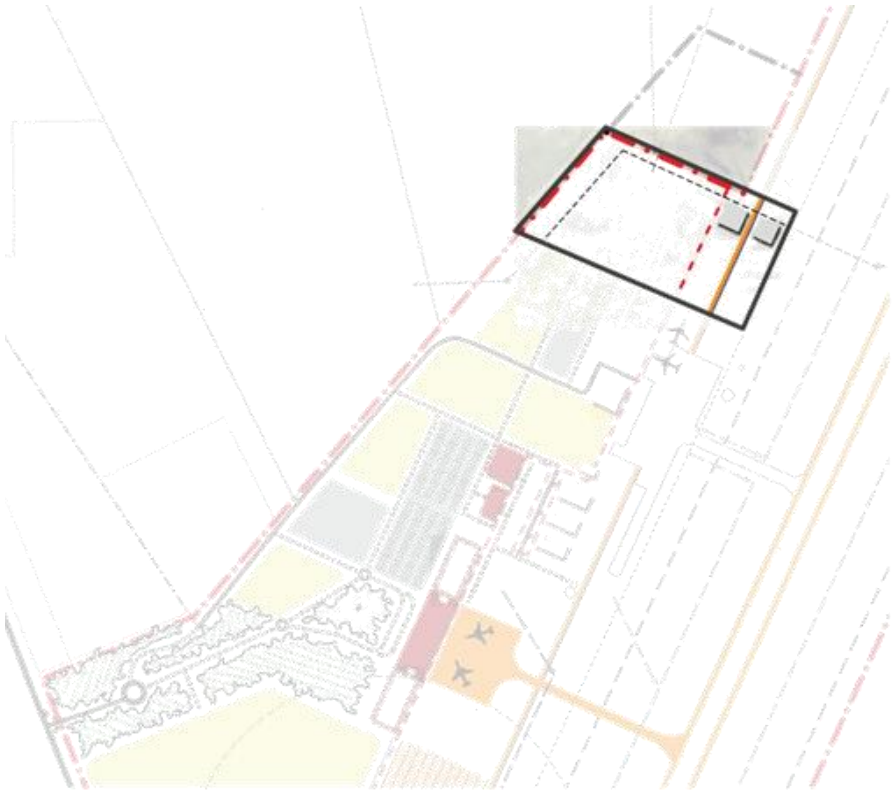
AIRPORT MASTER PLAN
86 Neville Hyder Dr, Yalyalup WA 6280

PRECINCT PLANS
AVIATION LOGISTICS PRECINCT

FINAL

Project No: 15477PEF
Date: 09/02/16
Scale: 1:10,000 @ A3

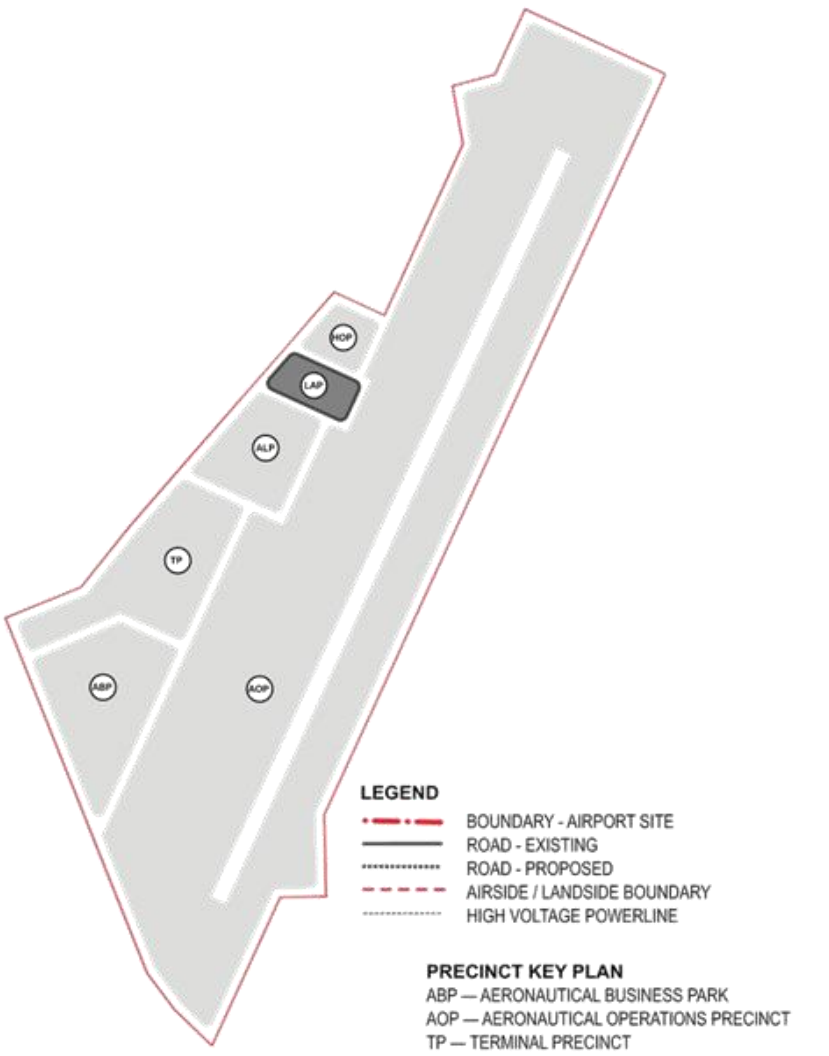
DD-A-0010 E



STAGE 2

STAGE 2 AEO

STAGE 2A



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AVIATION PROJECTS
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AIRPORT MASTER PLAN
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PRECINCT PLANS
LIGHT AVIATION PRECINCT

FINAL

Project No: 15477PEF
Date: 09/02/16
Scale: 1:10,000 @ A3

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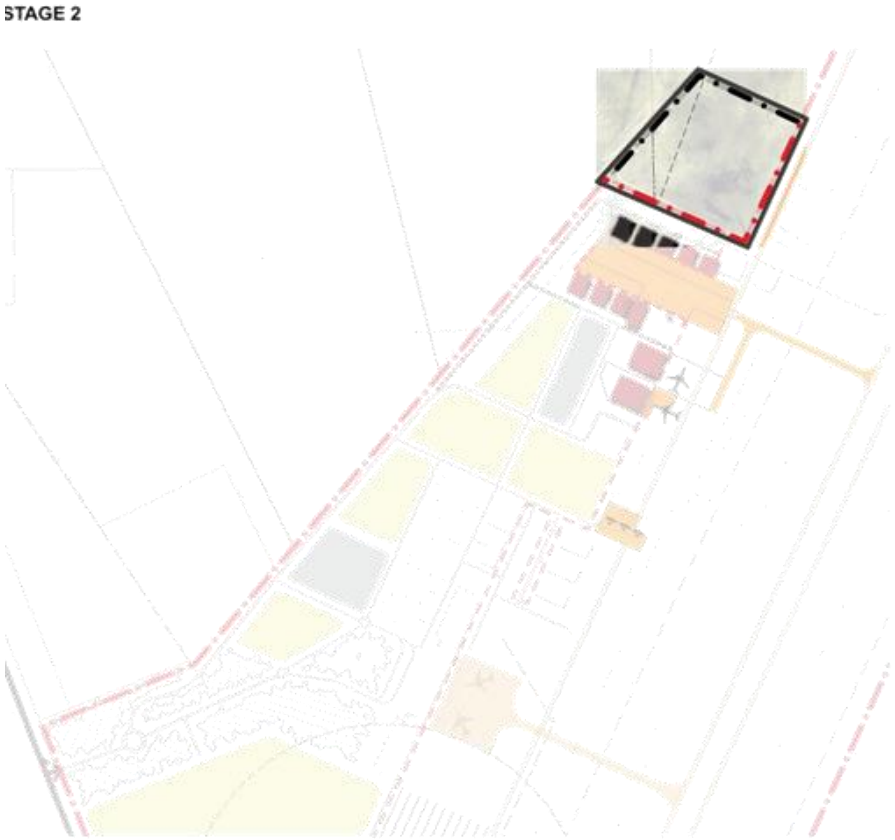
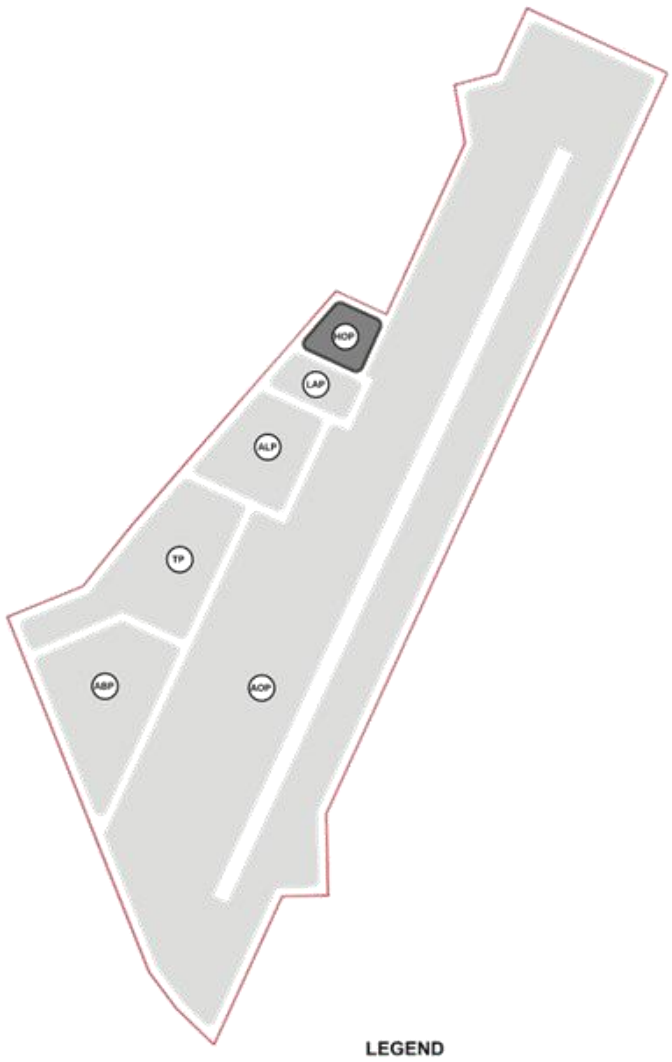
STAGE 2



STAGE 2 AEO

STAGE 2A



LEGEND

BOUNDARY - AIRPORT SITE
PROPOSED LAND ACQUISITION

PRECINCT KEY PLAN

ABP — AERONAUTICAL BUSINESS PARK
AOP — AERONAUTICAL OPERATIONS PRECINCT
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BUSSELTON-MARGARET RIVER
AIRPORT MASTER PLAN
86 Neville Hyder Dr, Yalyalup WA 6280

PRECINCT PLANS
HELICOPTER OPERATIONS PRECINCT

FINAL

Project No: 15477PEF
Date: 09/02/16
Scale: 1:10,000 @ A3

DD-A-0012 E

AVIATION PROJECTS

ANNEXURE 2 – NOISE MODELLING REPORT

1. To70, Noise Modelling Report Busselton-Margaret River Airport, December 2015


December 2015
Noise Modelling Report
Busselton-Margaret River Airport
BURG
EL
RID
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ON
LSINKI
RANCISCO-DALL
ARIS
ENEDIG
DALLAS
AMSTERDAM
721-725

Noise Modelling Report

Busselton-Margaret River Airport

Prepared for
City of Busselton
2 Southern Drive
Busselton
Western Australia 6280

Prepared by
To70 Aviation (Australia) Pty Ltd
Suite 14, 204-218 Dryburgh Street
North Melbourne, VIC 3051
Australia
E-mail: info@to70.com.au

North Melbourne, December 2015

Table of contents

1 Introduction

The City of Busselton (COB) require the preparation of an additional Australian Noise Exposure Concept (ANEC), noise modelling and noise contour maps for Busselton-Margaret River Airport (BMRA). COB have awarded this work to To70 Aviation (Australia) Pty. Ltd. (To70). This report provides the results of the noise modelling work as well as details of the inputs and assumptions used in the noise modelling work.

1.1 Background

The COB has been awarded funding of $55.9m for the redevelopment of BMRA. This redevelopment is aimed at providing the necessary airport infrastructure to allow for interstate air services. Since the preparation of the ANECs and noise contours by To70 in 2014, some of the design characteristics of the airside infrastructure (runway, aprons and taxiways) have changed and need to be remodelled. Additionally, the COB wishes to review the aircraft traffic forecast, design aircraft and model inputs previously developed to ensure that they are still considered appropriate for the BMRA redevelopment.

BMRA is currently regulated by the Environmental Protection Authority (EPA) in accordance with Ministerial Statement 1009. The Statement 1009 and preceding statements (399, 825, 878, 887 and 901) determine the environmental conditions in which the BMRA operates, including the requirement to produce an approved Noise Management Plan. As part of the redevelopment project, environmental approvals from the Minister for Environment; Heritage and OEPA are required. The City of Busselton will therefore need to prepare an environmental review document for an Assessment on Proponent Information (Category A) (API – Category A) under the Environmental Protection Act (1986). The API – Category A review document will need to include the ANEC, N65 and N70 Contours prepared for the development project infrastructure and future (projected) aircraft operations. As a result of the changes in infrastructure, possible changes to traffic forecasts and the statutory requirements placed on the COB, To70 was engaged to review the original noise modelling assumptions, aircraft traffic forecasting and provide updated Noise Contours (ANEC, N-contours and L_{Amax}). The Noise Contours identify the predicted noise footprint of redeveloped BMRA upgrade for comparison with modelling of current operations and alternative aerodrome development scenarios.

1.2 Scope and deliverables

To70 have been contracted by COB to conduct additional noise modelling for BMRA, specifically revision of the ANEC, N-contours and L_{Amax} contours. The scope of work required a review of previous noise modelling undertaken by To70 in order to reproduce noise contours reflective of updated changes to infrastructure and traffic forecasts. Consequently, the following outputs have been produced;

- Remodelled standard ANEC for the Busselton Regional Airport Master Plan 2015 (first draft 30 Oct 2015) aerodrome infrastructure / operations projected to twenty (20) years, that is; 2038/39.
- N65, N70, N75 and N80 contours for the following scenarios:
  - Master Plan (2015) aerodrome infrastructure / operations 2018/19
  - Master Plan (2015) aerodrome infrastructure / operations 2022/23
  - Master Plan (2015) aerodrome infrastructure / operations 2028/29
  - Master Plan (2015) aerodrome infrastructure / operations 2038/39
- Single event L_{Amax} contours
  - Fokker100 (approach & departure for 03 and 21).
  - A320 (approach & departure for 03 and 21).
  - B737-800 (approach & departure for 03 and 21).

2 Inputs and assumptions

This section provides detail on the inputs and assumptions used for the noise calculations. These have been discussed and verified by COB.

2.1 General settings

The Federal Aviation Administration's (FAA) Integrated Noise Model (INM) version 7.0d is used for the calculation of the ANEC and other contours. INM 7.0d is the latest version of this software package.

Weather

INM requires the input of weather conditions observed at the airport. Average weather settings are derived from the Bureau of Meteorology (BoM) for Nov-14 to Oct-15. The annual average temperature and pressure at Busselton Airport weather station (station 009603) is used as input for this INM study.

The weather settings are as follows:

Temperature	19.6 degrees C
Pressure	764.22 mm-Hg
Relative humidity	59.3 %
Headwind	14.8 km/h (default INM value)

Terrain data has been downloaded from the NASA website. The Shuttle Radar Topography Missions digital topographic data has been converted to an INM compatible format and imported into the INM study in the World Geodetic System 1984 (WGS84) coordinates. The images below show the terrain in original and INM format.

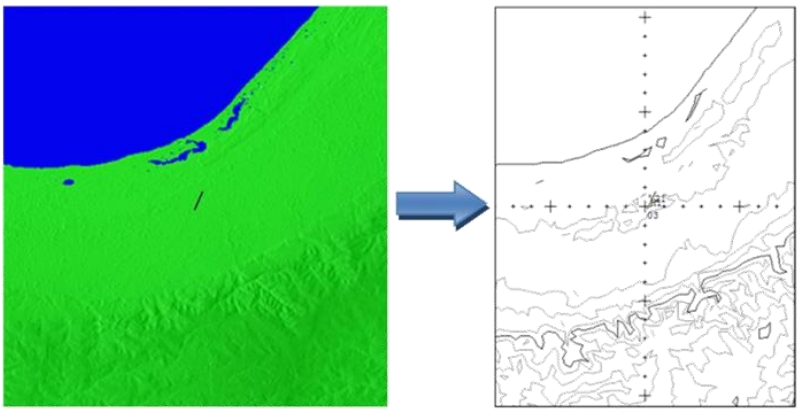


Figure 1 - Terrain

Aerodrome Reference Point

The Busselton Aerodrome Reference Point (ARP) is shown below.

Description	Latitude	Longitude	Elevation (m)
ARP	-33.692500	115.395278	17

Table 1 – Busselton ARP

Runway coordinates

To70 has modelled the revised/masterplan layout (Busselton Airport Master Plan General Arrangement - 2A), which will include a 360m extension to runway end 21 and 300m extension to runway end 03 (and not the 480m extension to the south previously modelled). There are no displaced thresholds. Details of the runway are below.

Description	Latitude	Longitude	Length × Width (m)	Elevation (m)
Runway 03	-33.697328	115.396362	2460 × 45	17
Runway 21	-33.677320	115.407818		17

Table 2 – Runway end coordinates

Helipad

The study uses the existing helipad location.

Description	Latitude	Longitude	Elevation (m)
Helipad	-33.683626	115.401024	17

Table 3 – Helipad coordinates

2.2 Traffic

Forecast

Updated aircraft traffic forecasts for the noise modelling have been provided by COB to To70 in the form of a spreadsheet containing annual movements by year. The forecasts have been reviewed and changes made based on input from To70. The detailed aircraft traffic forecasts (including day/night split) can be found in Appendix A of this document.

Class	Aircraft Type	2018/19	2022/23	2028/29	2038/39
RPT	Narrow Body Jet	**6**	**14**	**16**	**24**
Closed Charter	Regional Jet	**14**	**14**	**14**	**14**
	Turboprop	**2**	**6**	**10**	**10**
Other		**242**	**255**	**266**	**271**

Table 4 – Traffic forecast summary (weekly movements)

Aircraft and substitutes

Aircraft types used in the noise modelling have been specified by the Council and is based on historic traffic and traffic forecasts. To70 has modelled the forecast aircraft using the following INM equivalents

Class	Forecast Aircraft	INM ACFT ID
RPT	**B737-800**	**737800**
	B737-800NG	**737MAX**
Closed Charter	**Fokker100**	**F10065**
	ATR72	**DO328**
Used in L_{Amax} only	*A320*	*A320-211*

Table 5 – RPT/Charter aircraft types

.

Class	Forecast Aircraft	INM ACFT ID
Recreation	Evektor Sportstar - L S A	GASEPF
Emergency Services	PC12	PC12
	Dornier 328	DO328
	Piper - PA31	PA31
General	Cessna 180,182, 172, 210	CNA172
	Cessna Citation	CNA750
	Learjet 45	LEAR45
	Restored Aircraft (i.e Douglas C47; De Havilland DH-82A)	DC3
	Airvan GA8	CNA206
	Bombardier Dash 8	DHC8
Military	Pilatus PC9	JPATS

Table 6 – Other aircraft types

Class	Forecast Aircraft	INM ACFT ID
Helicopter	Eurocopter AS350	EC130
	Squirrel A350	EC130
	Bell 206 JetRanger	EC130
	Bell 214B	B212
	Sikorsky Seaking S61N	S61

Table 7 – Helicopter types

2.3 Operational

Runway usage

To70 has assumed the following runway use based on information provided by COB:

Runway 03	40%
Runway 21	60%

Tracks

This section shows the arrival, departure and circuit tracks that have been assigned for each runway end. Tracks are based on the existing model and have been adjusted to ensure they are flyable by the aircraft that are assigned to them.

Figure 2 – Runway 03 flight tracks

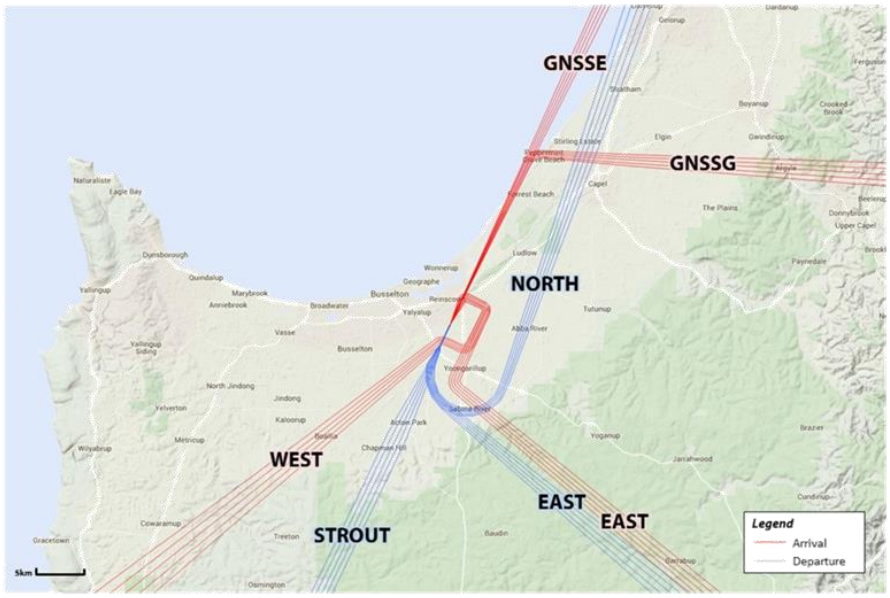


Figure 3 – Runway 21 flight tracks

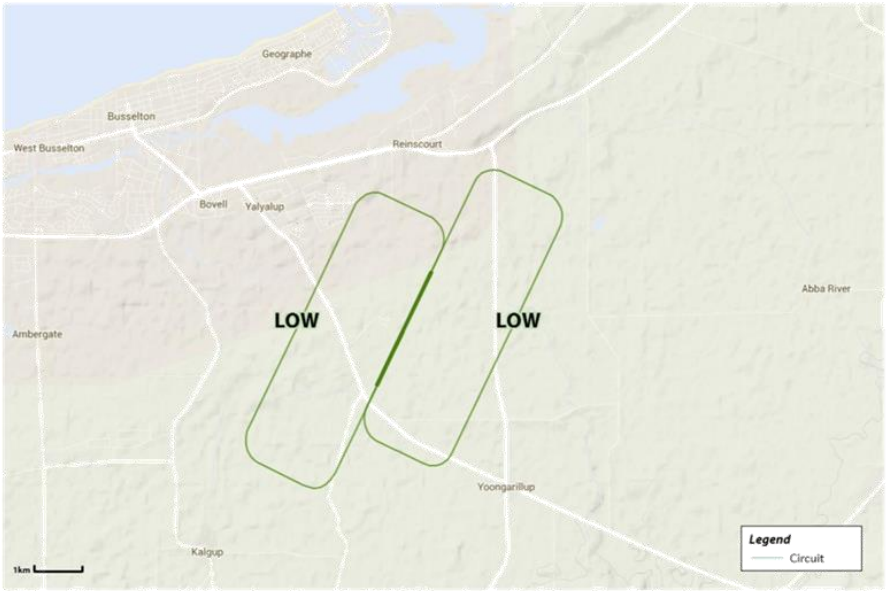


Figure 4 – Circuit flight tracks

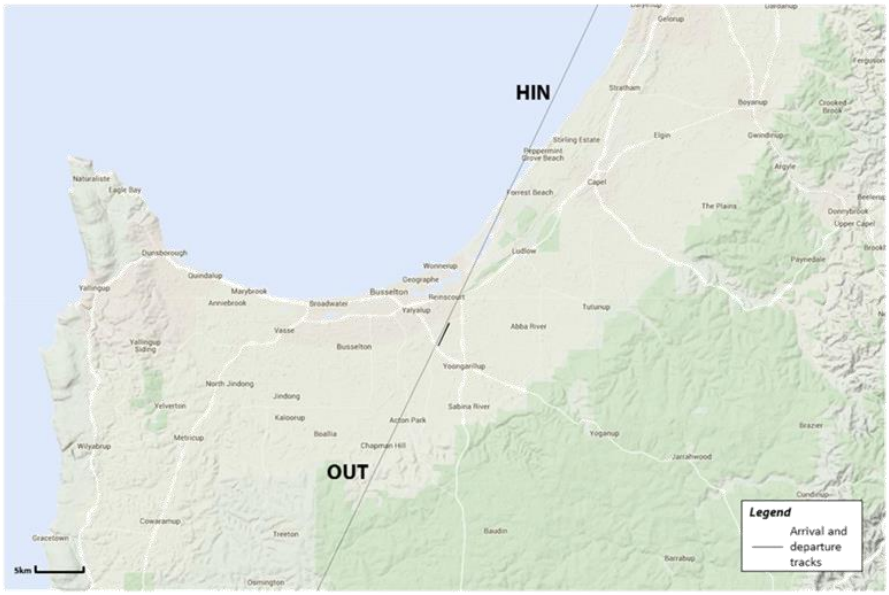


Figure 5 – Helicopter flight tracks

Track Usage

This section shows the origin and destination of RPT and FIFO aircraft routes that services Busselton Airport.

Figure 6 – Origins/Destinations for RPT and FIFO flights

RPT, and closed charter movements are assigned to tracks based on shortest distance to origin/destination and is represented in the following table.

Origin/Destination	Runway 03 track		Runway 21 track	
	Arrivals	Departures	Arrivals	Departures
Perth, Boolgeeda, West Angeles, Jandakot, Karara	WEST	STROUT	GNSSG	NORTH
Melbourne, Sydney	GNSSA	EAST	GNSSG	EAST

Table 8 – Track allocation (RPT and closed charter)

Other traffic (such as general aviation) is assigned to tracks as follows, as per previous noise modelling.

Traffic	Runway	Operation	Track	Percentage
General Aviation / Recreation Aviation / Emergency Services	03	A	GNSSB	50%
			WEST	50%
		D	WEST	33%
			EAST	33%
			STROUT	33%
	21	A	GNSSE	33%
			WEST	33%
			EAST	33%
		D	EAST	33%
			NORTH	33%
			STROUT	33%
Military	03	A	GNSSB	50%
		D	STROUT	33%
	21	A	GNSSE	33%
		D	STROUT	33%
Helicopter	Helipad	A	HIN	100%
		D	OUT	100%

Table 9 – Track allocation (other)

3 Results

In this section, we present the results of the noise modelling and describe the metrics used to generate the contours. To70 has generated the following contours:

- ANEC for 2038/39
- N-Contours for 2018/19, 2022/23, 2028/29 and 2038/39
- Single Event L_{Amax} contours for A320, B737-800 and Fokker 100

3.1 ANEC Results

ANEC contours are used to quantify the noise impact of airport development scenarios. These maps are based on assumptions about the size, shape and demand of aircraft and airport operations, and can relate to the distant future. Because the concepts and scenarios are hypothetical and may never occur, the maps produced have no official status for land-use planning purposes. The ANEC uses the Effective Perceived Noise Level (EPNL) which applies a weighting to account for the fact that by the human ear is less sensitive to low audio frequencies.

ANEC contours are generated using the FAA-approved Integrated Noise Model (INM). The INM combines factors such as aircraft noise signatures, distance from source of the noise, duration and frequency of events to calculate the average noise levels on the ground at any point around a given airport. These noise levels are expressed as contours overlaid over an aerial map of the airport and surrounding areas where aircraft noise is likely to be relevant for planning. ANEC contours do not refer to normal decibel levels, but are the result of "averaged annual day" data inputs. ANEC contours also take into account the cumulative nature of noise exposure, for example, night time operations are weighted higher than day time operations to reflect peoples increased sensitivity to aircraft noise at night.

ANEC 2038/39

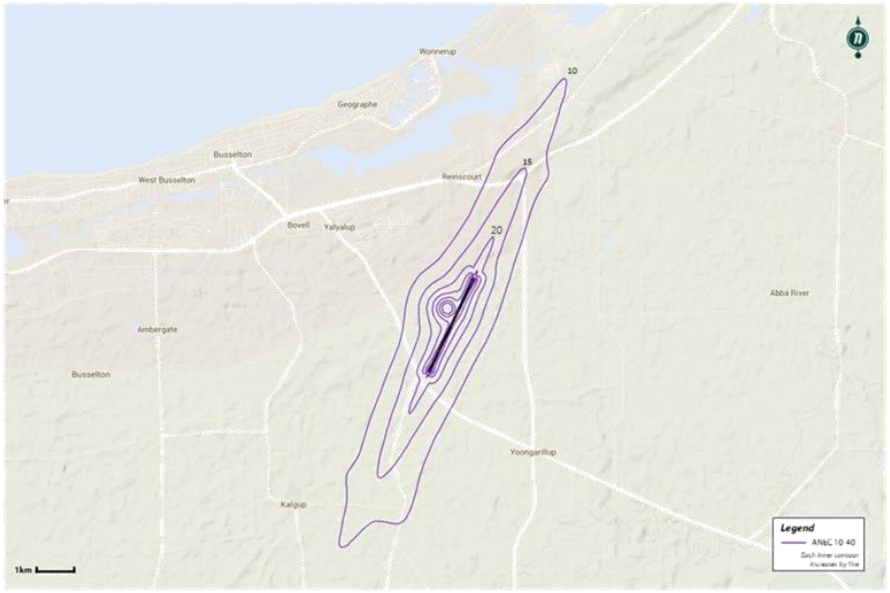


Figure 7: ANEC 2038/39

Observations

The ANEC for the BMRA is a result of consultation with the Council and expert knowledge and judgement about aircraft noise, operations and modelling. It uses robust, accurate and defensible assumptions which have come about from detailed knowledge of the operations at BMRA.

The ANEC 20 contour does not extend to any populous areas and for this reason ANEC 10 has been visualised for informational purposes. As specified in AS2021, buildings (residences) which fall within ANEC 20 are permissible and as such would apply for ANEC 10. In that regard, there is no major impact to dwellings both north and south of the runway that are situated within the ANEC,

3.2 N-Contour results

To complement the ANEF maps, Noise-Above contours (N contours) charts show the number of aircraft noise events per day exceeding specific noise levels. N contours can be used to provide information both on past and planned aircraft operations. This helps communities and individuals to visualise noise impact in specific areas as it takes a person's reaction to noise out of the equation. Further information including a detailed technical explanation of N contours can be found on the DIRD website at; https://infrastructure.gov.au/aviation/environmental/transparent_noise/expanding/4.aspx.

See next page.

N65 Contours: 2018/19

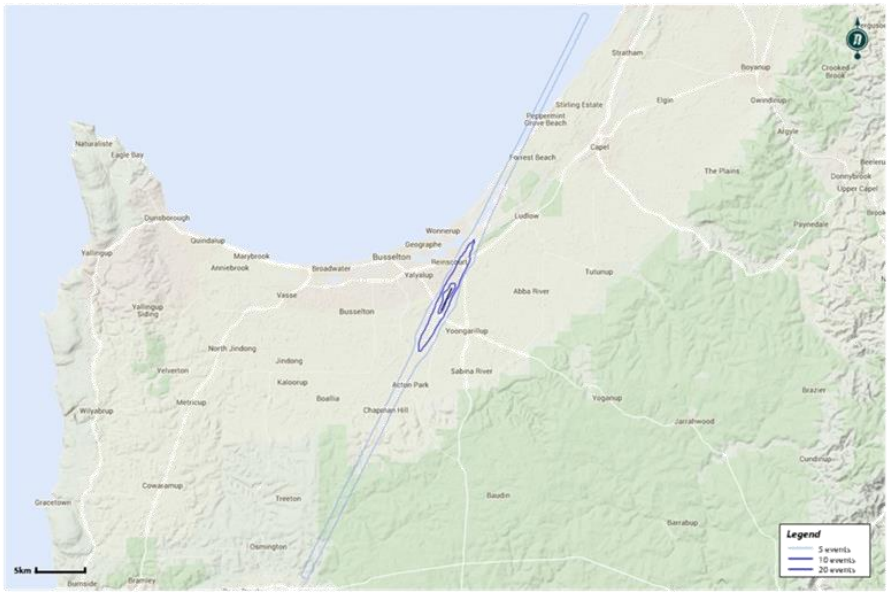


Figure 8: N65 Contours: 2018/19

N70 Contours: 2018/19

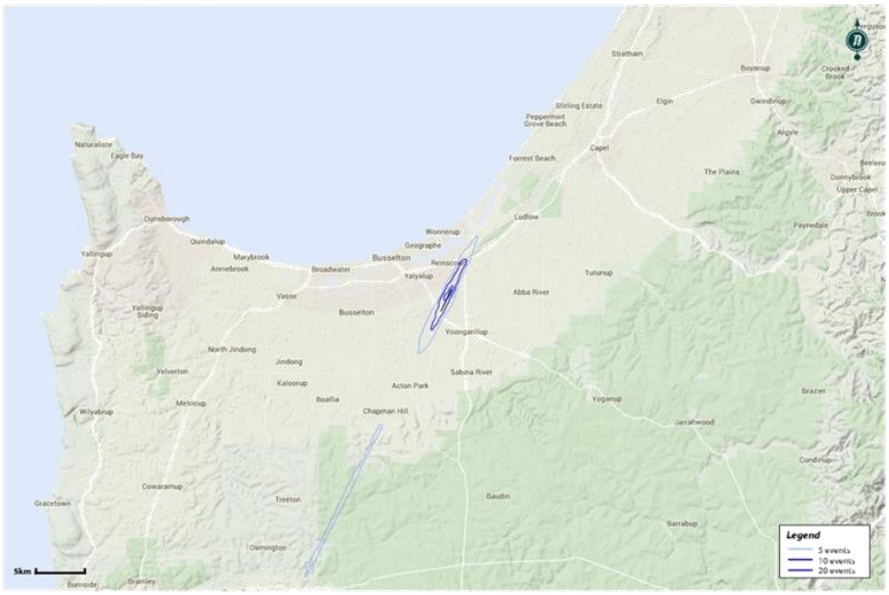


Figure 9: N70 Contours: 2018/19

Similar to ANEC findings, both the N65 and N70 10 event noise contours do not extend to any populous areas.

N75 Contours: 2018/19

Figure 10: N75 Contours: 2018/19

N80 Contours: 2018/19

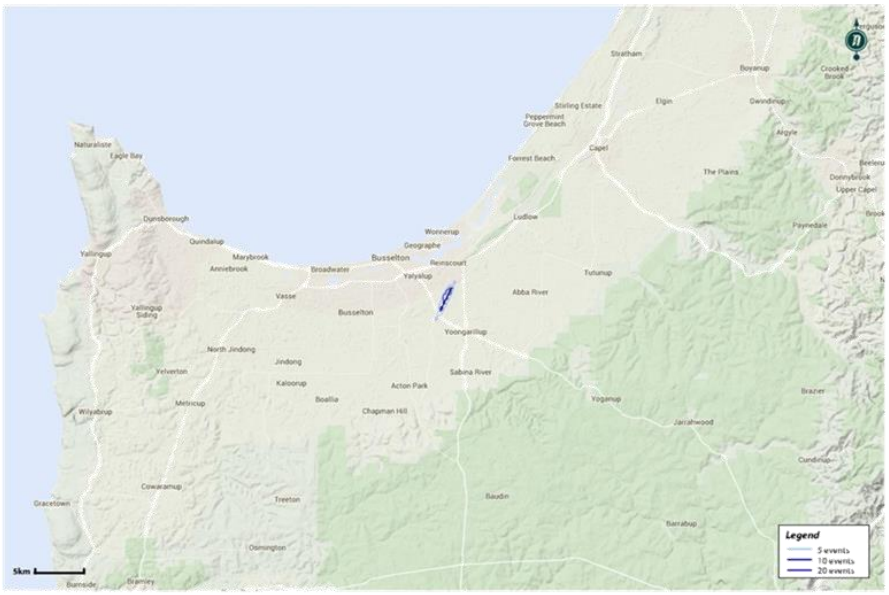


Figure 11: N80 Contours: 2018/19

Similar to ANEC findings, both the N75 and N80 10 event noise contours do not extend to any populous areas.

N65 Contours: 2022/23

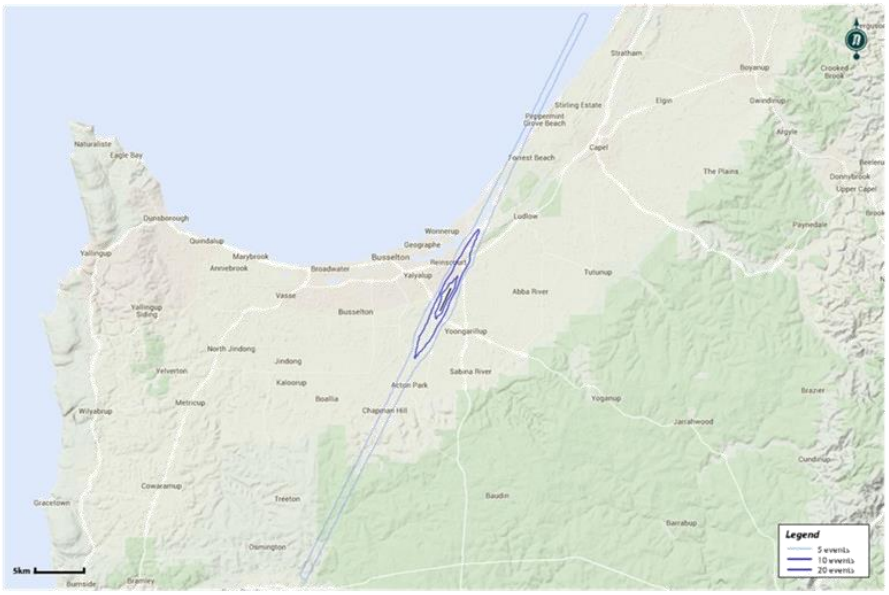


Figure 12: N65 Contours: 2022/23

N70 Contours: 2022/23

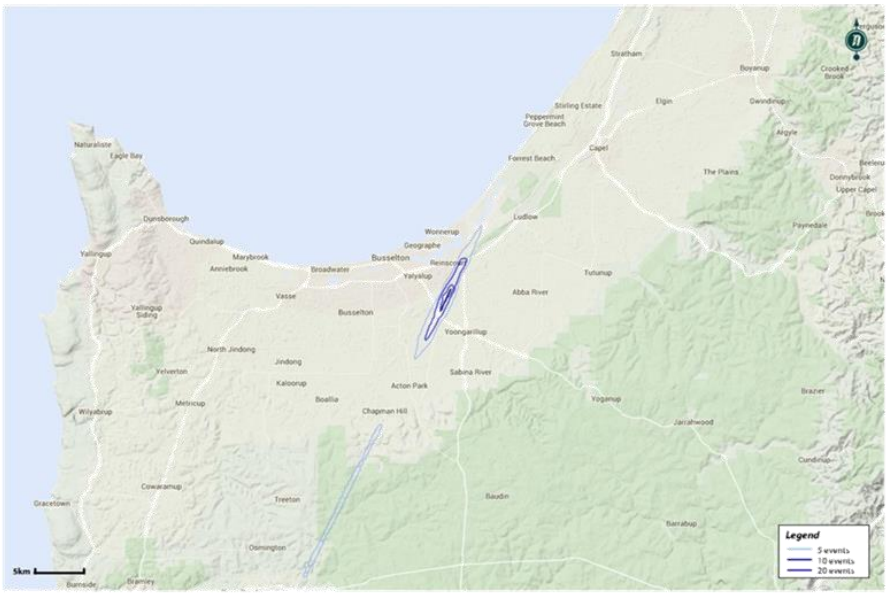


Figure 13: N70 Contours: 2022/23

Similar to ANEC findings, both the N65 and N70 10 event noise contours do not extend to any populous areas.

N75 Contours: 2022/23

Figure 14: N75 Contours: 2022/23

N80 Contours: 2022/23

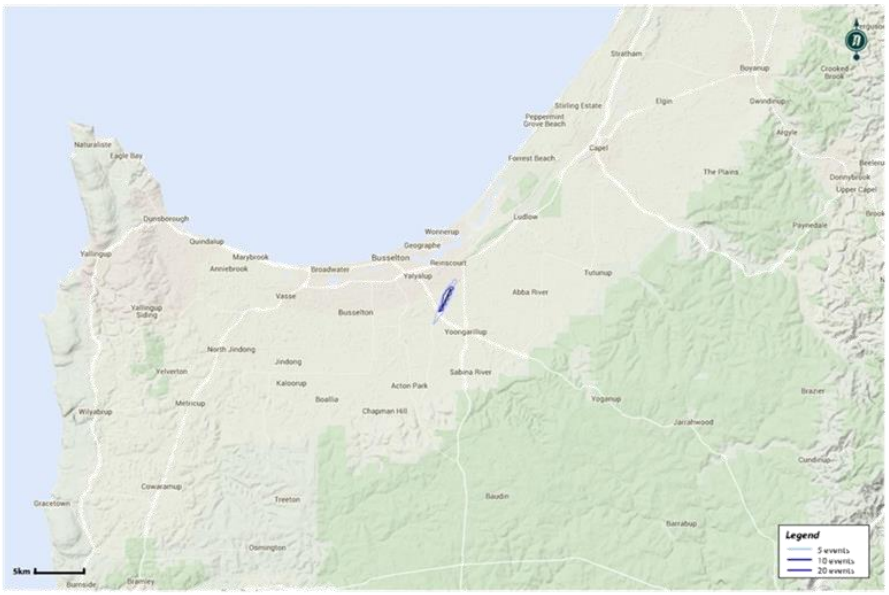


Figure 15: N80 Contours: 2022/23

Similar to ANEC findings, both the N75 and N80 10 event noise contours do not extend to any populous areas.

N65 Contours: 2028/29

Figure 16: N65 Contours: 2028/29

N70 Contours: 2028/29

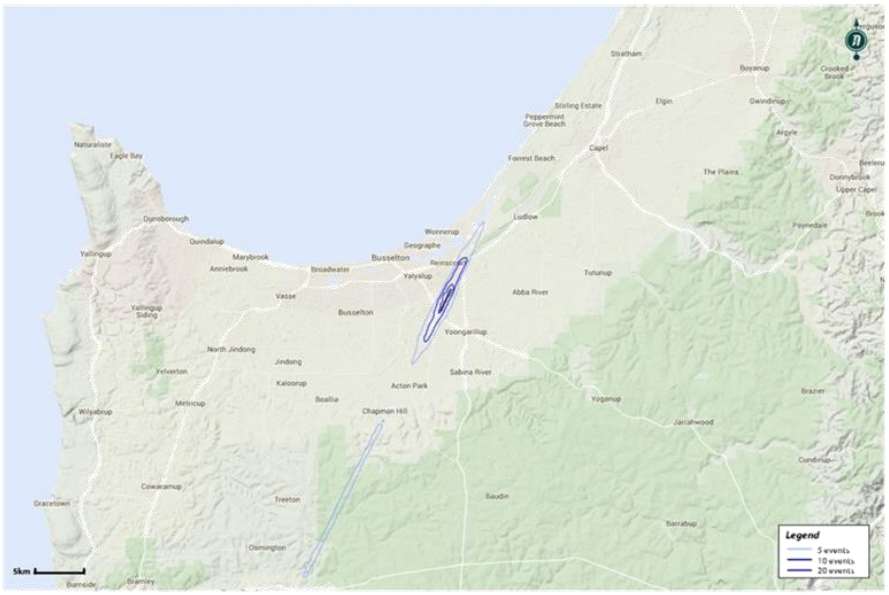


Figure 17: N70 Contours: 2028/29

Similar to ANEC findings, both the N65 and N70 10 event noise contours do not extend to any populous areas.

N75 Contours: 2028/29

Figure 18: N75 Contours: 2028/29

N80 Contours: 2028/29

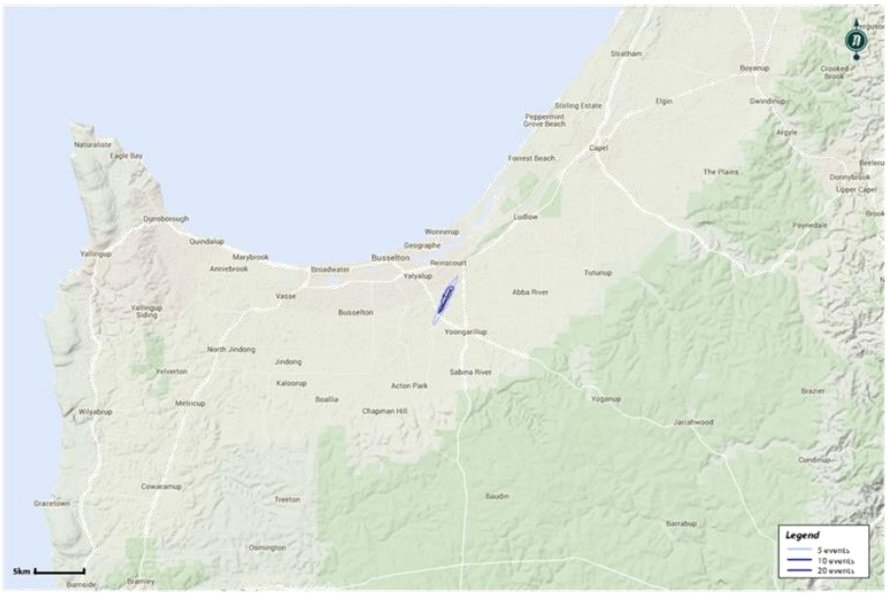


Figure 19: N80 Contours: 2028/29

Similar to ANEC findings, both the N75 and N80 10 event noise contours do not extend to any populous areas.

N65 Contours: 2038/39

Figure 20: N65 Contours: 2038/39

N70 Contours: 2038/39

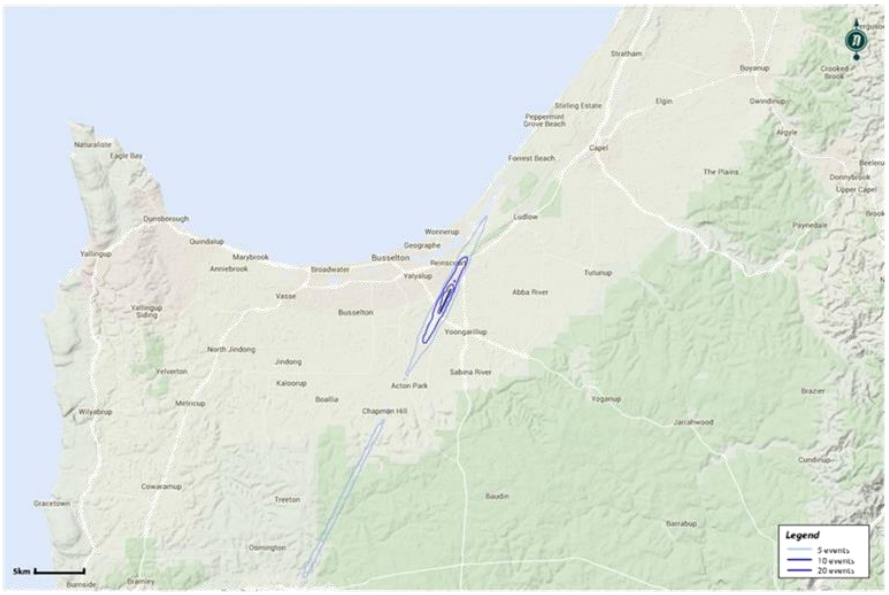


Figure 21: N70 Contours: 2038/39

Similar to ANEC findings, both the N65 and N70 10 event noise contours do not extend to any populous areas.

N75 Contours: 2038/39

Figure 22: N75 Contours: 2038/39

N80 Contours: 2038/39

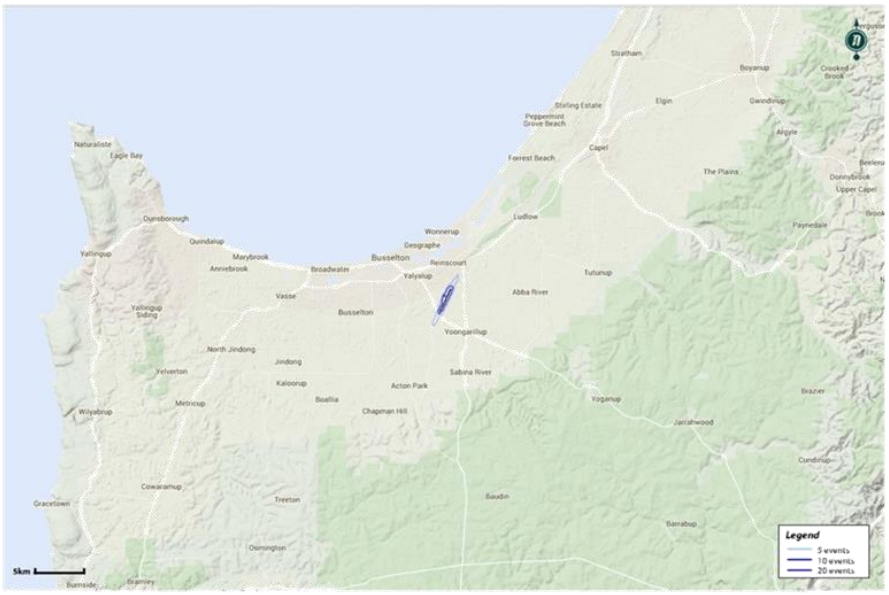


Figure 23: N80 Contours: 2038/39

Similar to ANEC findings, both the N75 and N80 10 event noise contours do not extend to any populous areas.

3.3 Single event contour results

L_{Amax} Single event noise levels are a basic metric and are the maximum noise exposure (in A-weighted Decibels) during an overflight. They should only be used for indicative purposes. The figures below show the maximum noise exposure for a single arrival and departure for each runway direction using indicative straight in/straight out flight paths.

See next page.

L_{Amax} F100: Runway 03

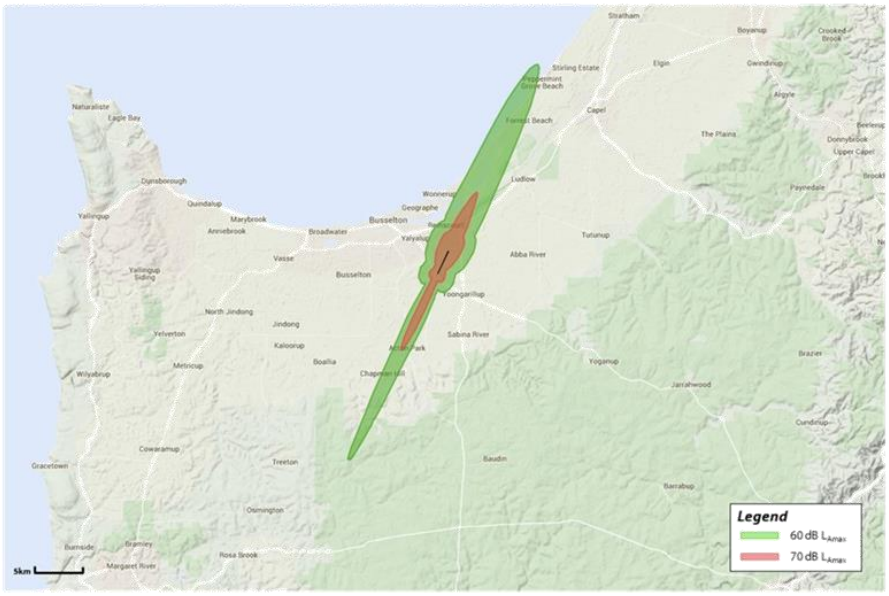


Figure 24: L_{Amax} F100: Runway 03

L_{Amax} F100: Runway 21

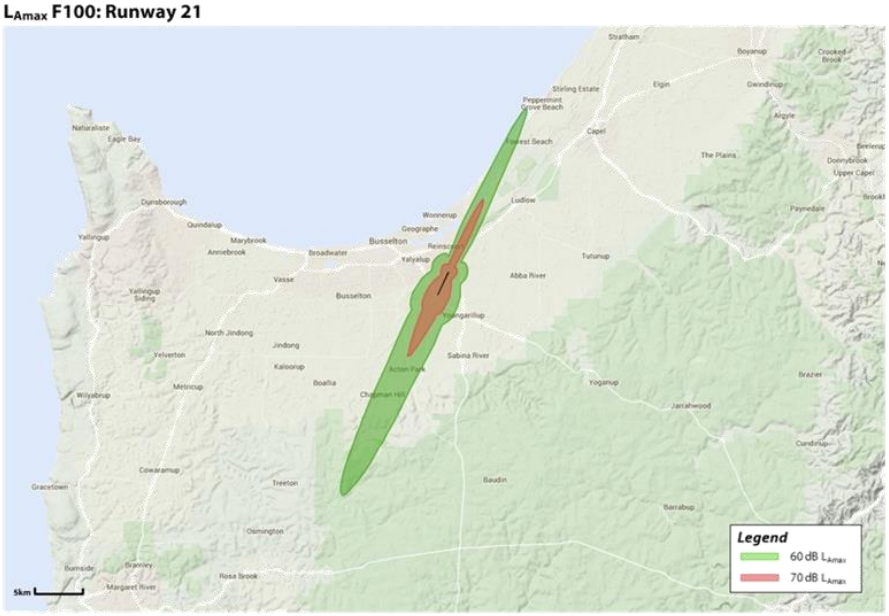


Figure 25: L_{Amax} F100: Runway 21

The 60 dB contour reaches part of Reinscourt and part of Yalyalup. The 70 dB contour reaches part of Reinscourt.

L_{Amax} A320: Runway 03

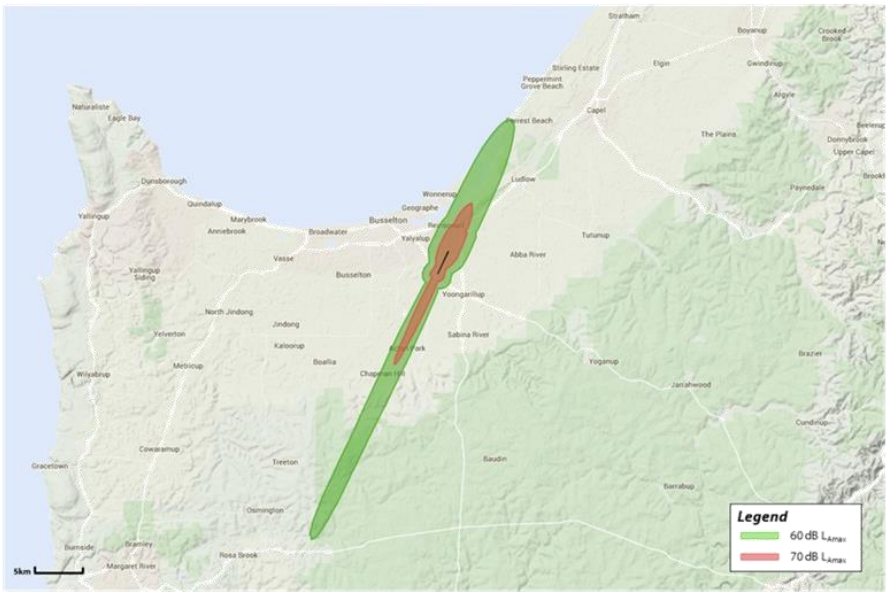


Figure 26: L_{Amax} A320: Runway 03

L_{Amax} A320: Runway 21

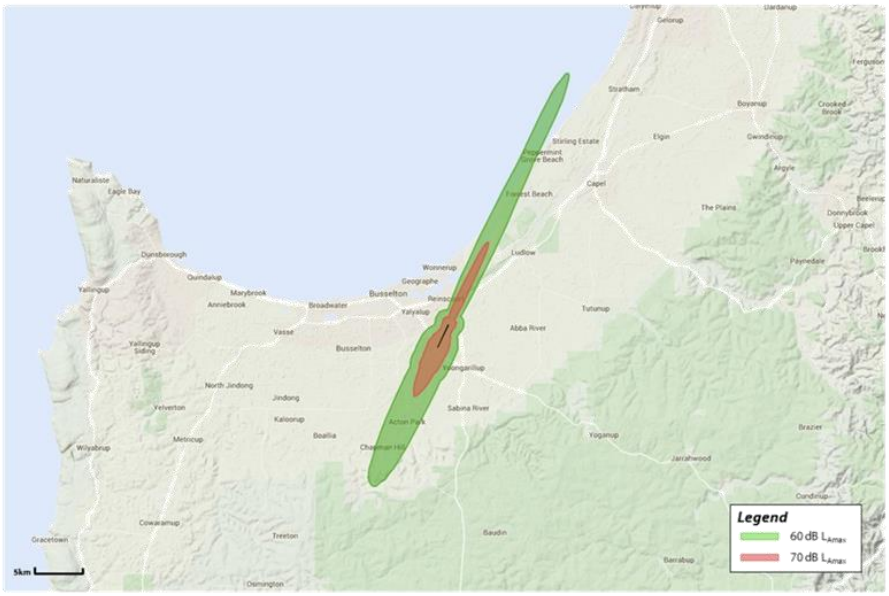


Figure 27: L_{Amax} A320: Runway 21

The 60 dB contour reaches part of Reinscourt. The 70 dB contour does not extend to any populous areas.

L_{Amax} B737-800: Runway 03

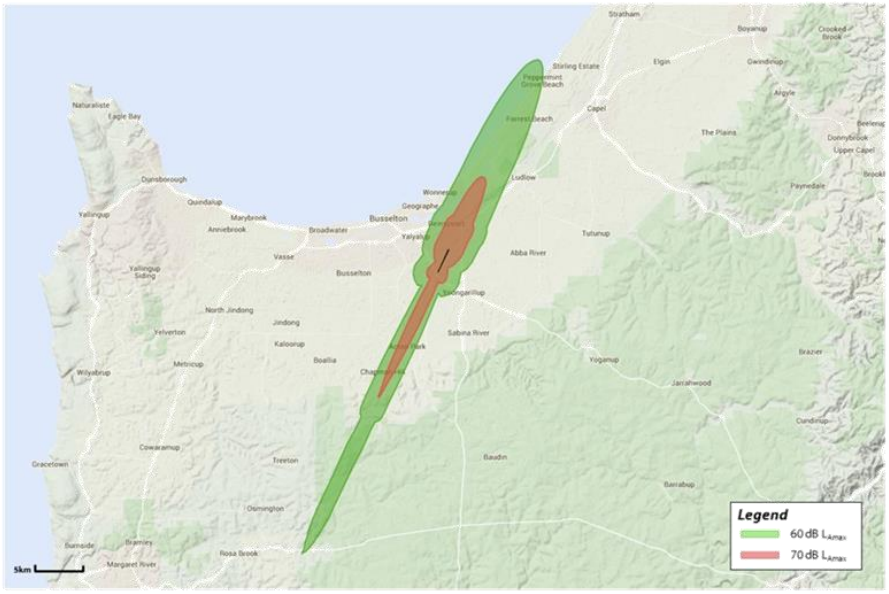


Figure 28: L_{Amax} B737-800: Runway 03

L_{Amax} B737-800: Runway 21

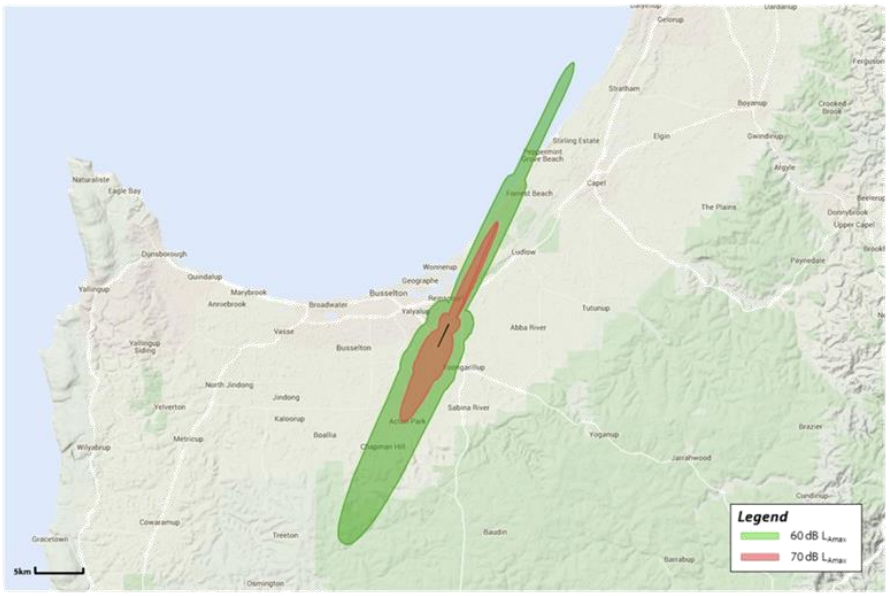
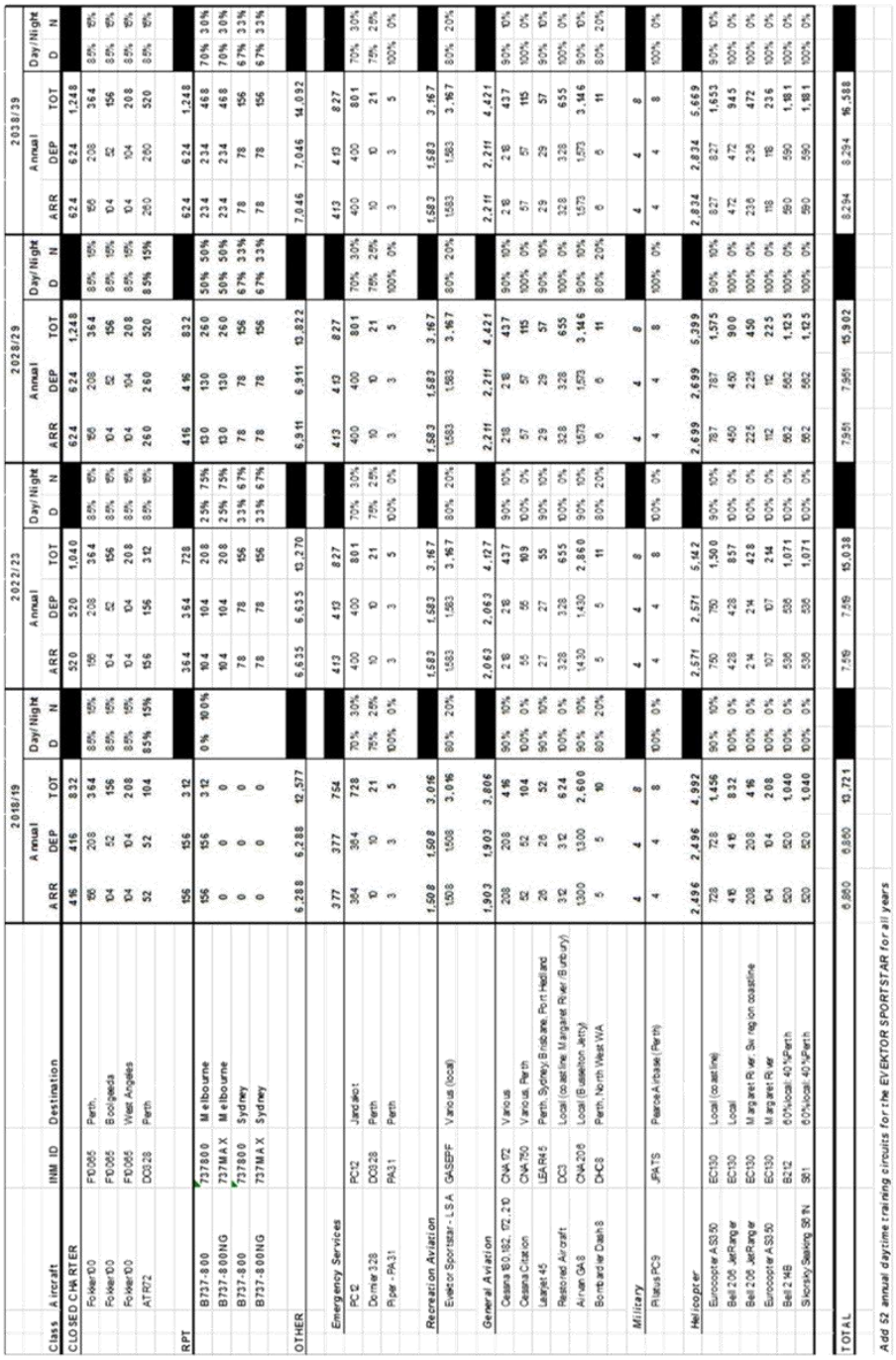


Figure 29: L_{Amax} B737-800: Runway 21

The 60 dB contour reaches Reinscourt and part of Yalyalup. The 70 dB contour reaches part of Reinscourt.

Appendix A: Traffic Forecasts



Class	Aircraft	INM ID	Destination	2018/19 ARR	2018/19 Annual DEP	2018/19 Annual TOT	2018/19 Day/Night D	2018/19 Day/Night N	2022/23 ARR	2022/23 Annual DEP	2022/23 Annual TOT	2022/23 Day/Night D	2022/23 Day/Night N	2028/29 ARR	2028/29 Annual DEP	2028/29 Annual TOT	2028/29 Day/Night D	2028/29 Day/Night N	2038/39 ARR	2038/39 Annual DEP	2038/39 Annual TOT	2038/39 Day/Night D	2038/39 Day/Night N
CLOSED CHARTER				416	416	832			520	520	1,040			624	624	1,248			624	624	1,248		
	Fokker 100	F0065	Perth	156	208	364	85%	15%	156	208	364	85%	15%	156	208	364	85%	15%	156	208	364	85%	15%
	Fokker 100	F0065	Boolgeeda	104	52	156	85%	15%	104	52	156	85%	15%	104	52	156	85%	15%	104	52	156	85%	15%
	Fokker 100	F0065	West Angelas	104	104	208	85%	15%	104	104	208	85%	15%	104	104	208	85%	15%	104	104	208	85%	15%
	ATR72	D0328	Perth	52	52	104	85%	15%	156	156	312	85%	15%	260	260	520	85%	15%	260	260	520	85%	15%
RPT				156	156	312			364	364	728			416	416	832			624	624	1,248		
	B737-800	737800	Melbourne	156	156	312	0%	100%	104	104	208	25%	75%	130	130	260	50%	50%	234	234	468	70%	30%
	B737-800NG	737MAX	Melbourne	0	0	0			104	104	208	25%	75%	130	130	260	50%	50%	234	234	468	70%	30%
	B737-800	737800	Sydney	0	0	0			78	78	156	33%	67%	78	78	156	67%	33%	78	78	156	67%	33%
	B737-800NG	737MAX	Sydney	0	0	0			78	78	156	33%	67%	78	78	156	67%	33%	78	78	156	67%	33%
OTHER				6,288	6,288	12,577			6,635	6,635	13,270			6,911	6,911	13,822			7,046	7,046	14,092		
	Emergency Services			377	377	754			413	413	827			413	413	827			413	413	827		
	PC12	PC12	Jandakot	364	364	728	70%	30%	400	400	801	70%	30%	400	400	801	70%	30%	400	400	801	70%	30%
	Dornier 328	D0328	Perth	10	10	21	75%	25%	10	10	21	75%	25%	10	10	21	75%	25%	10	10	21	75%	25%
	Piper - PA31	PA31	Perth	3	3	5	100%	0%	3	3	5	100%	0%	3	3	5	100%	0%	3	3	5	100%	0%
	Recreation Aviation			1,508	1,508	3,016			1,583	1,583	3,167			1,583	1,583	3,167			1,583	1,583	3,167		
	Evektor Sportstar - LSA	GASEFF	Various (local)	1,508	1,508	3,016	80%	20%	1,583	1,583	3,167	80%	20%	1,583	1,583	3,167	80%	20%	1,583	1,583	3,167	80%	20%
	General Aviation			1,903	1,903	3,806			2,063	2,063	4,127			2,211	2,211	4,421			2,211	2,211	4,421		
	Cessna 180,182, 172, 210	CNA172	Various	208	208	416	90%	10%	218	218	437	90%	10%	218	218	437	90%	10%	218	218	437	90%	10%
	Cessna Citation	CNA750	Various, Perth	52	52	104	100%	0%	55	55	109	100%	0%	57	57	115	100%	0%	57	57	115	100%	0%
	Learjet 45	LEAR45	Perth, Sydney, Brisbane, Port Hedland	26	26	52	90%	10%	27	27	55	90%	10%	29	29	57	90%	10%	29	29	57	90%	10%
	Restored Aircraft	DC3	Local (coastline, Margaret River (Burekury)	312	312	624	100%	0%	328	328	655	100%	0%	328	328	655	100%	0%	328	328	655	100%	0%
	Airvan GA8	CNA208	Local (Busselton Jetty)	1300	1300	2,600	90%	10%	1430	1430	2,860	90%	10%	1573	1573	3,146	90%	10%	1573	1573	3,146	90%	10%
	Bombardier Dash 8	DHC8	Perth, North West WA	5	5	10	80%	20%	5	5	11	80%	20%	6	6	11	80%	20%	6	6	11	80%	20%
	Military			4	4	8			4	4	8			4	4	8			4	4	8		
	Pilatus PC9	JPATS	Pearce Airbase (Perth)	4	4	8	100%	0%	4	4	8	100%	0%	4	4	8	100%	0%	4	4	8	100%	0%
	Helicopter			2,496	2,496	4,992			2,671	2,671	5,342			2,699	2,699	5,399			2,834	2,834	5,669		
	Eurocopter AS350	EC130	Local (coastline)	728	728	1,456	90%	10%	750	750	1,500	90%	10%	787	787	1,575	90%	10%	827	827	1,653	90%	10%
	Bell 206 JetRanger	EC130	Local	416	416	832	100%	0%	428	428	857	100%	0%	450	450	900	100%	0%	472	472	945	100%	0%
	Bell 206 JetRanger	EC130	Margaret River, Sw region coastline	208	208	416	100%	0%	214	214	428	100%	0%	225	225	450	100%	0%	236	236	472	100%	0%
	Eurocopter AS350	EC130	Margaret River	104	104	208	100%	0%	107	107	214	100%	0%	112	112	225	100%	0%	118	118	236	100%	0%
	Bell 248	B212	60% local 40% Perth	520	520	1,040	100%	0%	536	536	1,071	100%	0%	562	562	1,125	100%	0%	590	590	1,181	100%	0%
	Sikorsky Seaking S61N	S61	60% local 40% Perth	520	520	1,040	100%	0%	536	536	1,071	100%	0%	562	562	1,125	100%	0%	590	590	1,181	100%	0%
TOTAL				6,860	6,860	13,721			7,519	7,519	15,038			7,951	7,951	15,902			8,294	8,294	16,588		

Add 52 annual daytime training circuits for the EVEKTOR SPORTSTAR for all years

Appendix B: N-Contour results (alternative zoom)

N65 Contours: 2018/19

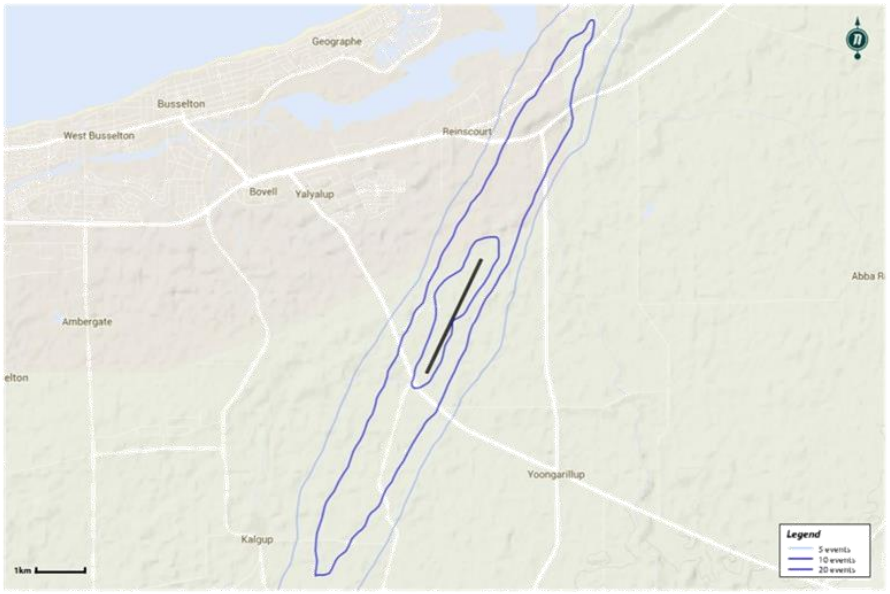


Figure 30: N65 Contours: 2018/19

N70 Contours: 2018/19

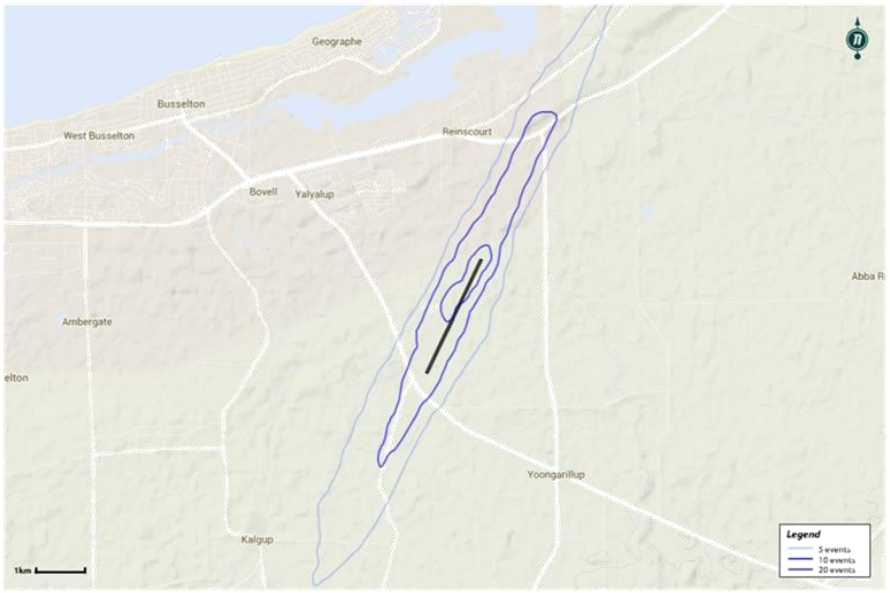


Figure 31: N70 Contours: 2018/19

N75 Contours: 2018/19

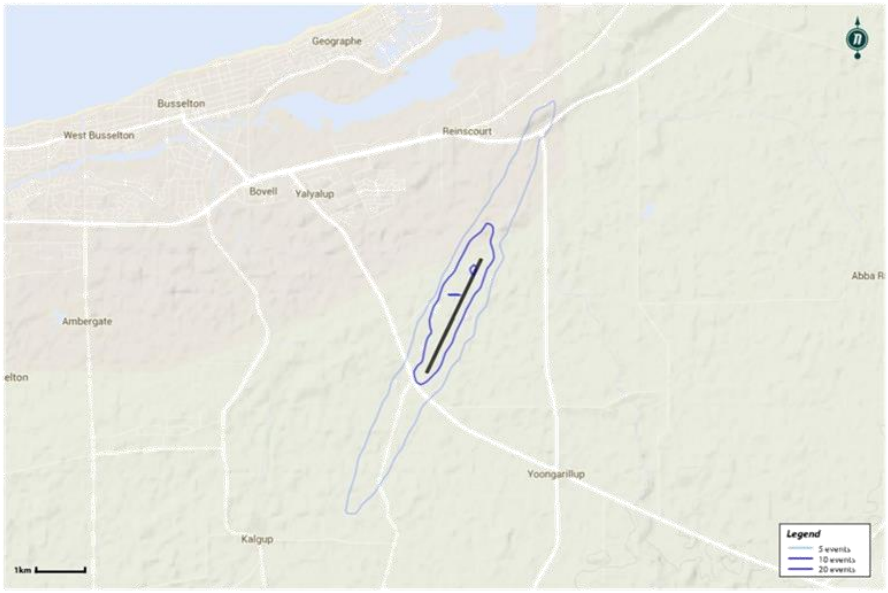


Figure 32: N75 Contours: 2018/19

N80 Contours: 2018/19

Figure 33: N80 Contours: 2018/19

N65 Contours: 2022/23

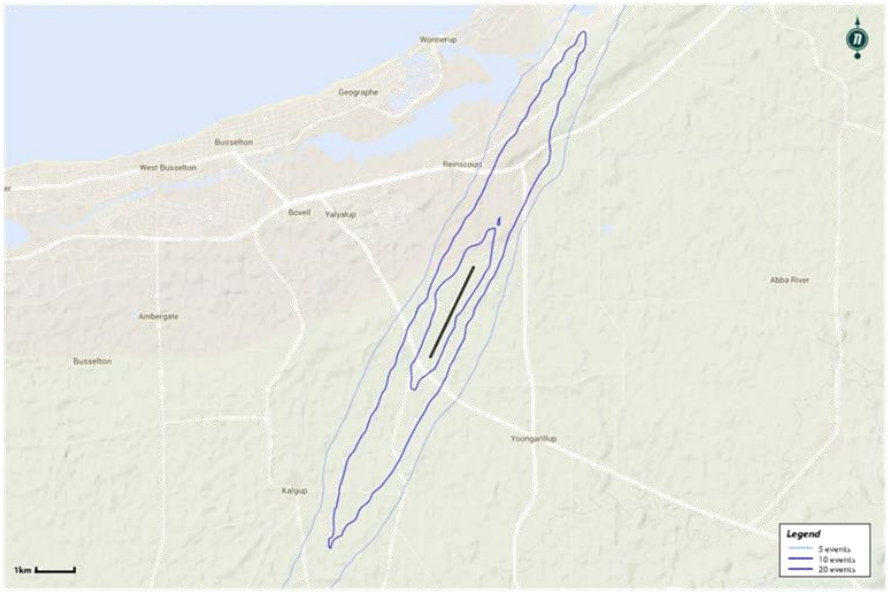


Figure 34: N65 Contours: 2022/23

N70 Contours: 2022/23

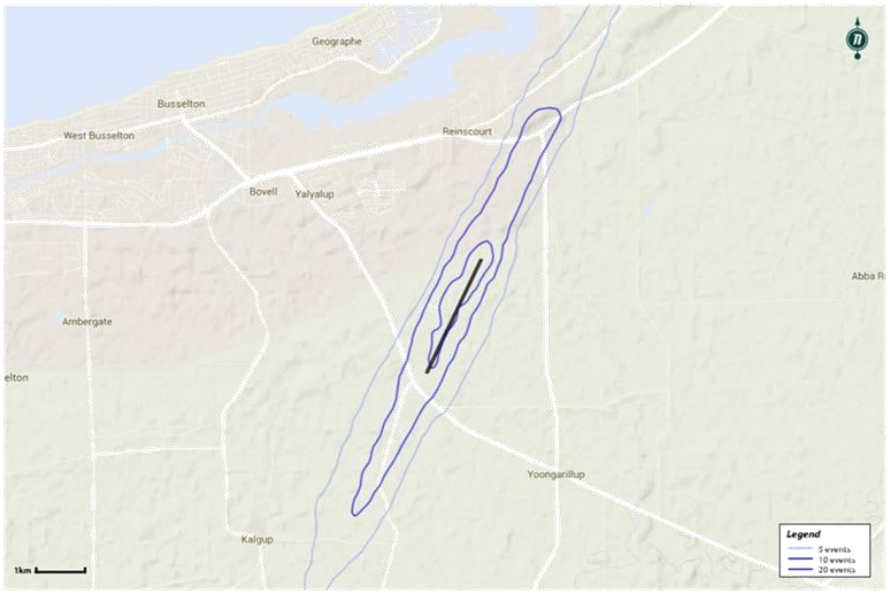


Figure 35: N70 Contours: 2022/23

N75 Contours: 2022/23

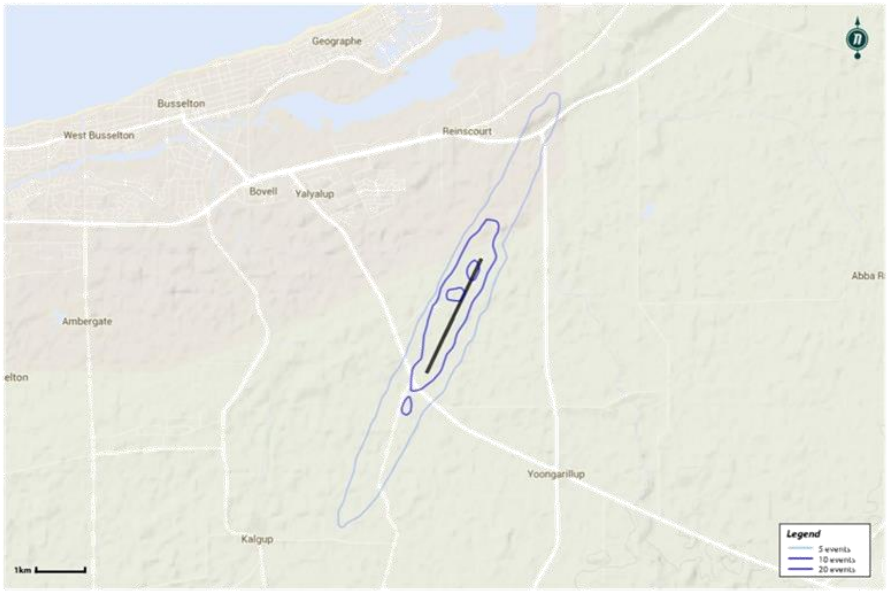


Figure 36: N75 Contours: 2022/23

N80 Contours: 2022/23

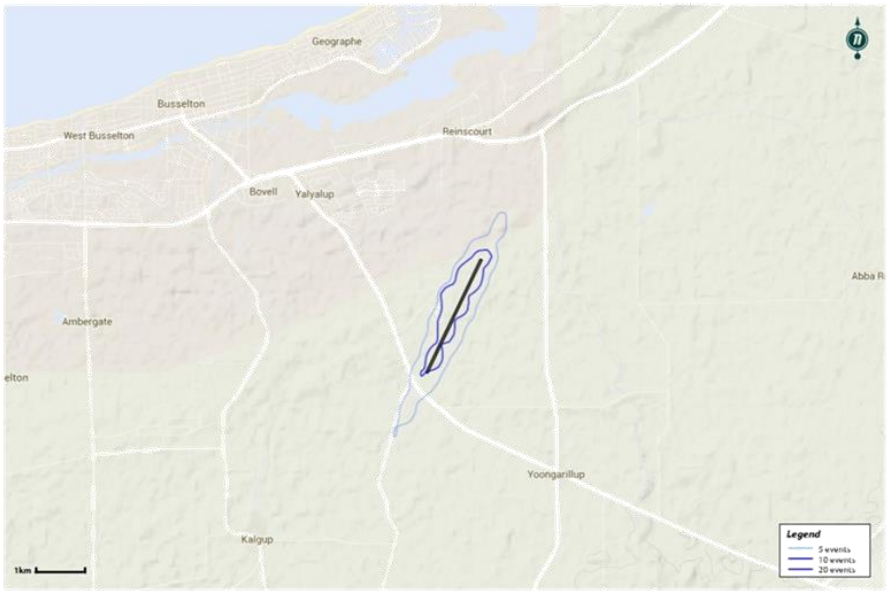


Figure 37: N80 Contours: 2022/23

N65 Contours: 2028/29

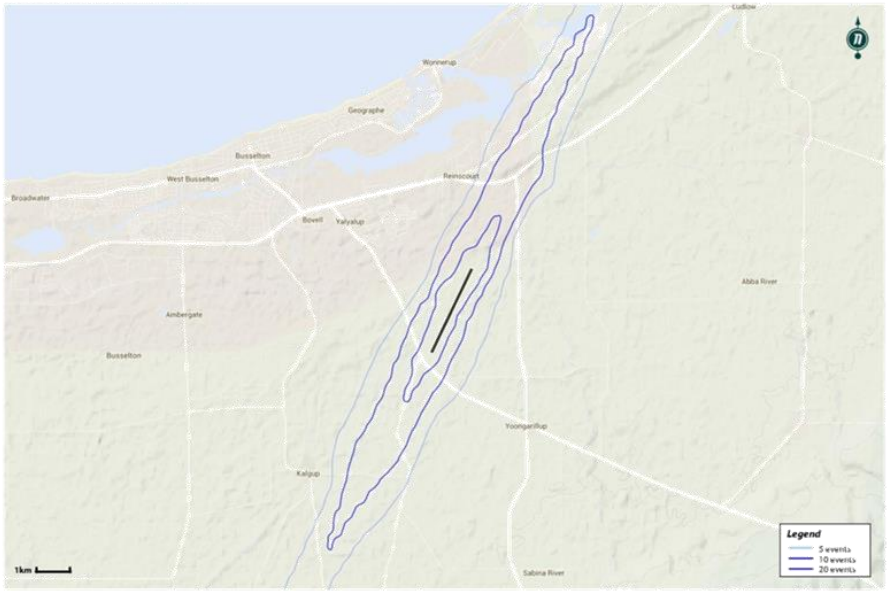


Figure 38: N65 Contours: 2028/29

N70 Contours: 2028/29

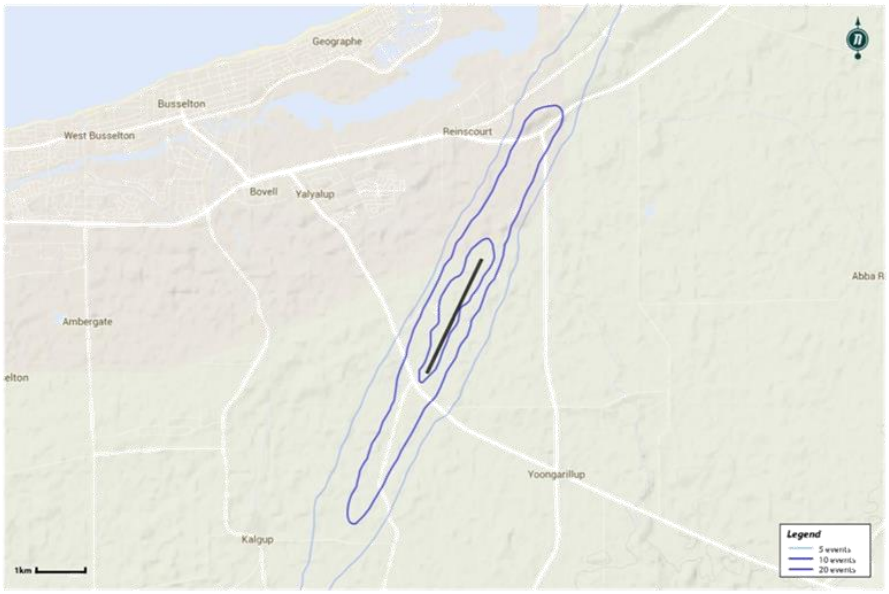


Figure 39: N70 Contours: 2028/29

N75 Contours: 2028/29

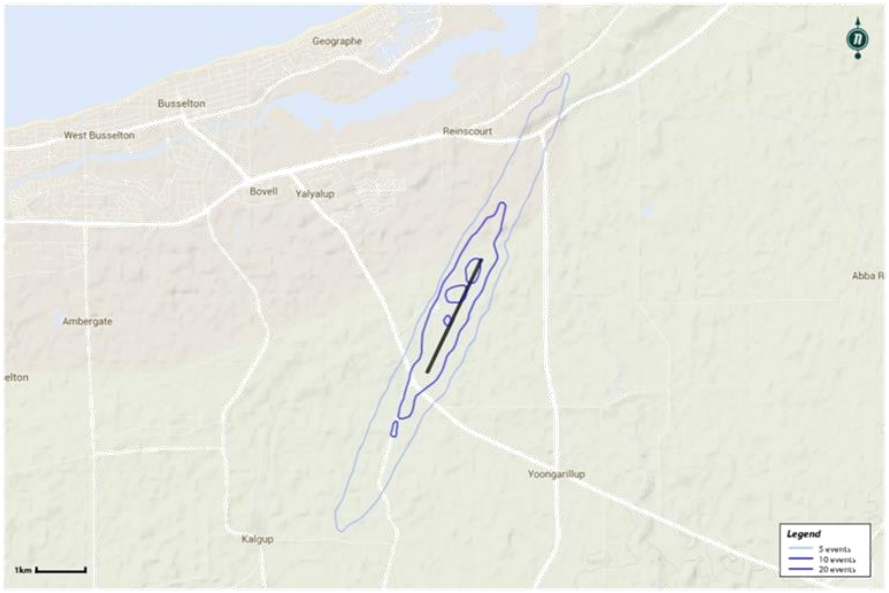


Figure 40: N75 Contours: 2028/29

N80 Contours: 2028/29

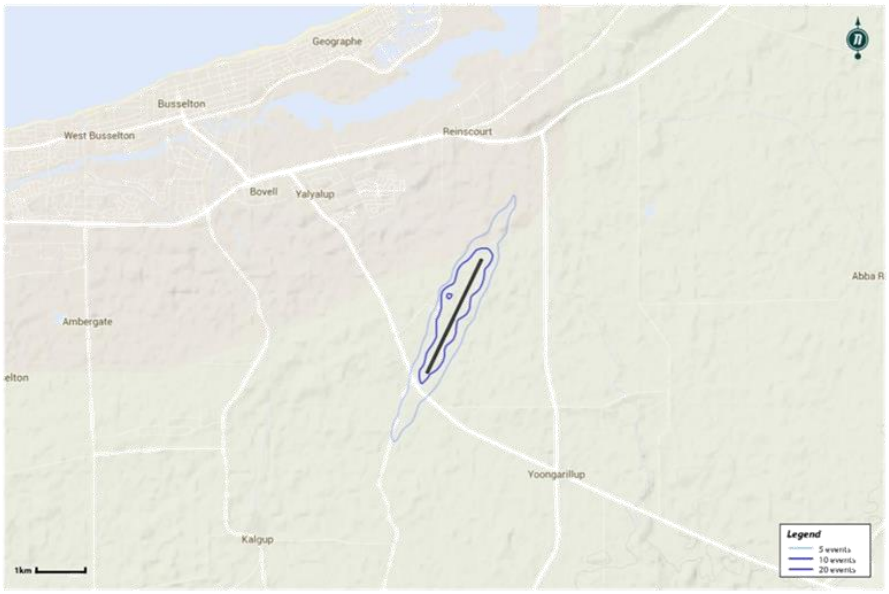


Figure 41: N80 Contours: 2028/29

N65 Contours: 2038/39

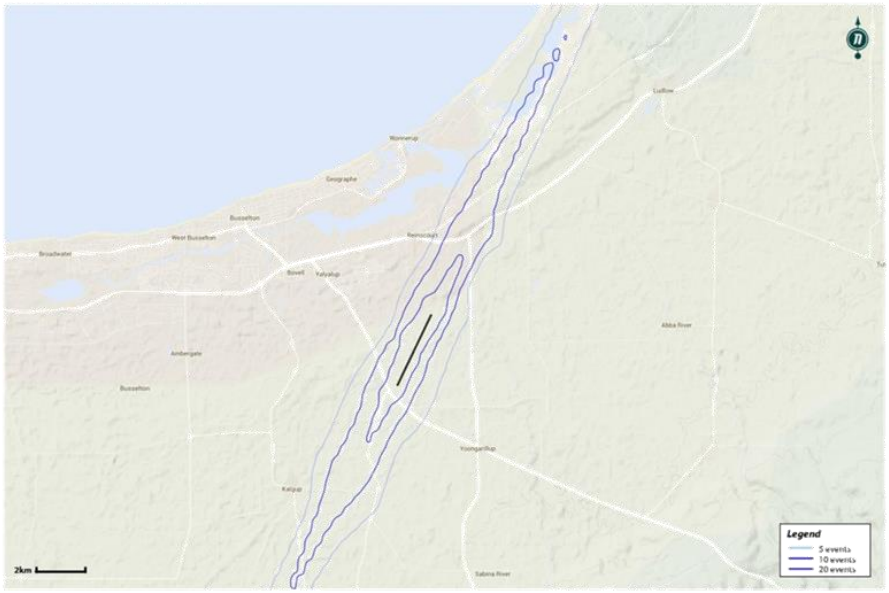


Figure 42: N65 Contours: 2038/39

N70 Contours: 2038/39

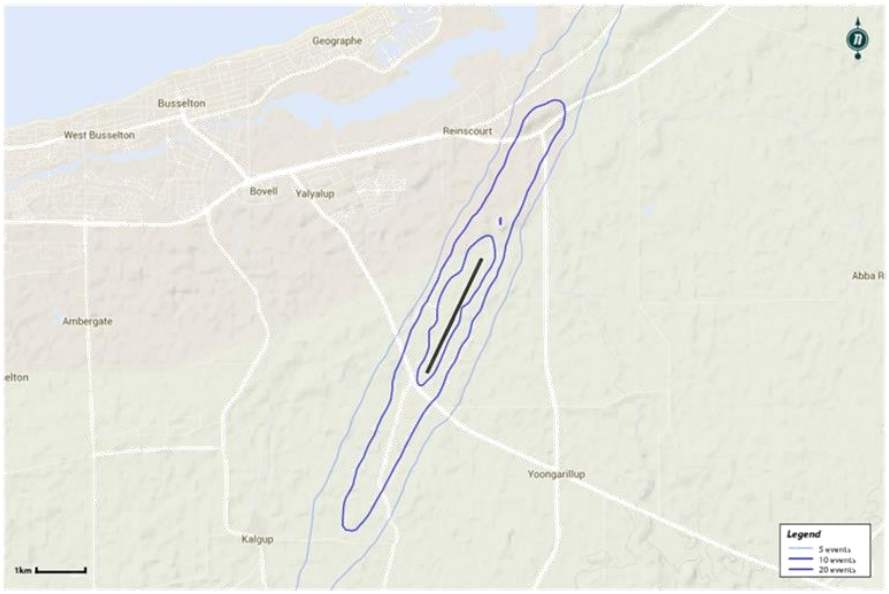


Figure 43: N70 Contours: 2038/39

N75 Contours: 2038/39

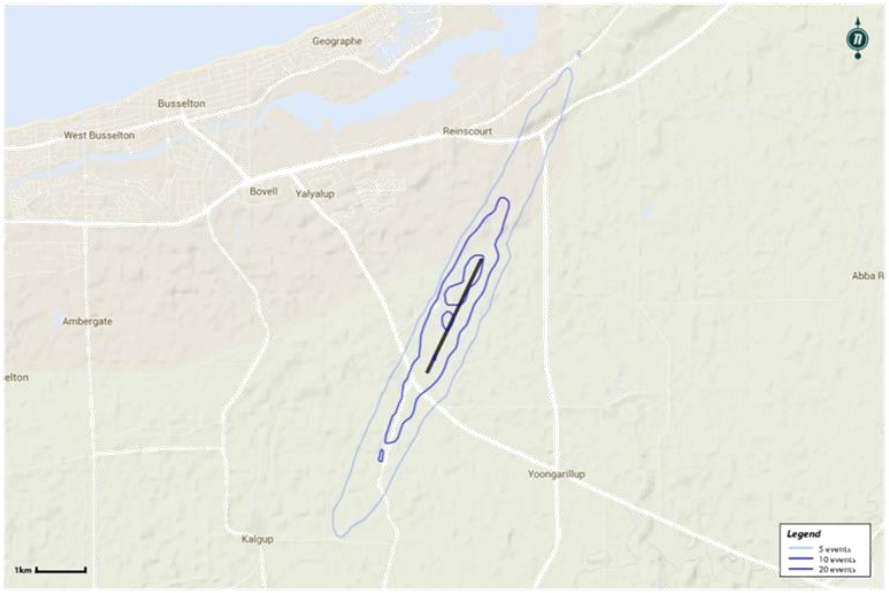


Figure 44: N75 Contours: 2038/39

N80 Contours: 2038/39

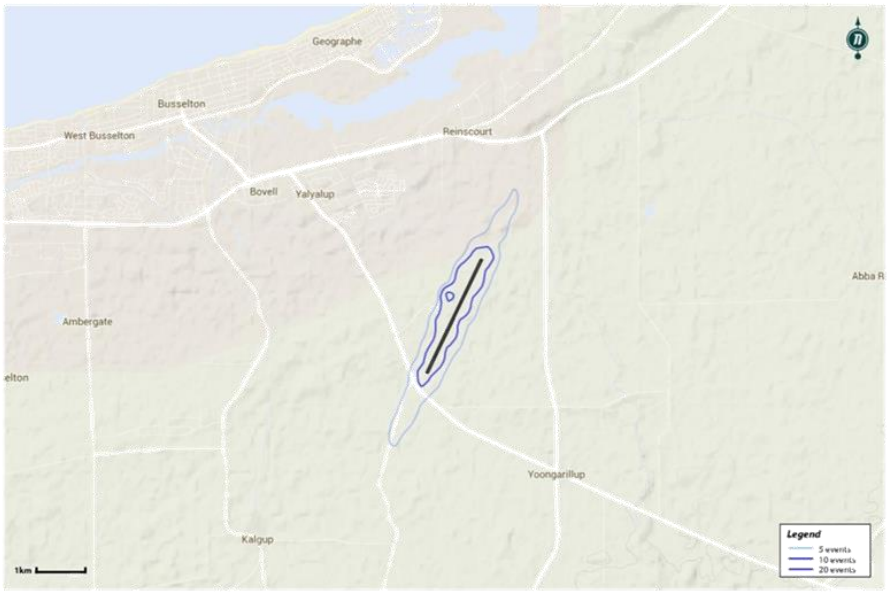


Figure 45: N80 Contours: 2038/39


to70

AVIATION PROJECTS

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7. GENERAL DISCUSSION ITEMS

8. NEXT MEETING DATE

Friday, 29 April 2016

9. CLOSURE