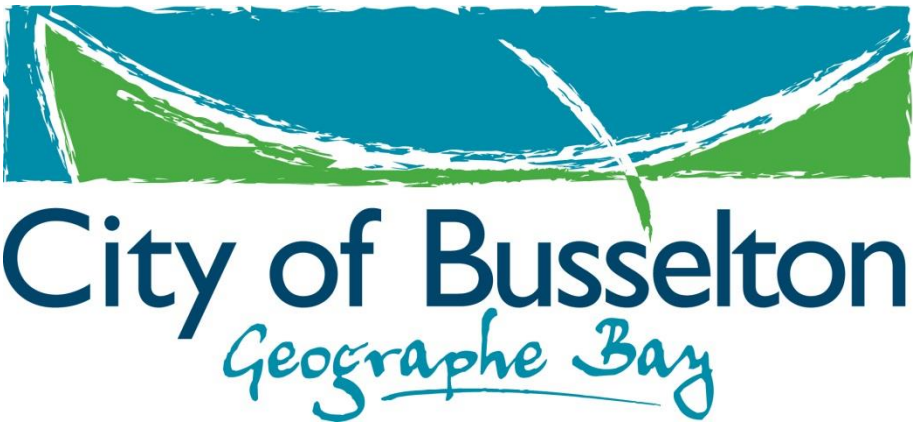

Airport Advisory Committee Agenda

8 June 2016

ALL INFORMATION AVAILABLE IN VARIOUS FORMATS ON REQUEST

CITY OF BUSSELTON

MEETING NOTICE AND AGENDA – 8 JUNE 2016

TO: **THE MAYOR AND COUNCILLORS**

NOTICE is given that a meeting of the Airport Advisory Committeewill be held in the Meeting Room A, City Administration Site, Harris Road, Busselton on Wednesday, 8 June 2016, commencing at 11.00am.

The attendance of Committee Members is respectfully requested.

MIKE ARCHER

CHIEF EXECUTIVE OFFICER

3 June 2016

CITY OF BUSSELTON

AGENDA FOR THE AIRPORT ADVISORY COMMITTEE MEETING TO BE HELD ON 8 JUNE 2016

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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 CommitteeMeeting held on 29 April 2016

RECOMMENDATION

That the Minutes of the Airport Advisory Committee Meeting held 29 April 2016 be confirmed as a true and correct record.

6. REPORTS

6.1 BUSSELTON-MARGARET RIVER AIRPORT NOISE MODELLING

SUBJECT INDEX:	Busselton-Margaret River Airport
STRATEGIC OBJECTIVE:	Infrastructure assets are well maintained and responsibly managed to provide for future generations.
BUSINESS UNIT:	Commercial Services
ACTIVITY UNIT:	Commercial Services
REPORTING OFFICER:	Manager, Commercial Services - Jennifer May
AUTHORISING OFFICER:	Manager, Community Services - Maxine Palmer
VOTING REQUIREMENT:	Simple Majority
ATTACHMENTS:	Attachment A BMRRA Noise Modeling Report Attachment B Noise Modeling Peer Review Close Out Letter

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 Regional Airport. As part of the project, environmental approvals are being sought through the Office of the Environmental Protection Authority and the Minister for the Environment using an Assessment on Proponent Information - Category A (API-A) referral, which includes submitting the noise modelling report and resulting noise contours.

This report presents the Noise Modelling Report (May 2016) prepared By To70 Aviation (Australia) Pty Ltd and noise contours to be submitted to the OEPA as part of the API-A referral.

BACKGROUND

In 2014, as part of the preparation of the State Government business case the City of Busselton engaged To70 Aviation (Australia) Pty Ltd (To70) to prepare noise models and noise contours using the then Busselton Regional Airport Master Plan (2011-2031) and specifically, proposed runway infrastructure. The purpose of the noise modelling was to identify any potentially noise affected residential properties in the vicinity of the airport resulting from the proposed upgrade to the then Busselton Regional Airport which could then be used to inform the business case for noise mitigation strategies and funding.

The initial noise modelling prepared by To70 in 2014 included the preparation of Australian Noise Exposure Concept (ANEC) contours, 'Number Above' noise contours (Nxx contours) and LAmax contours.

Noise Modelling and Contours

Australian Noise Exposure Concepts (ANEC) are part of the Australian Noise Exposure Forecast (ANEF) System, developed in 1980 from the Noise Exposure Forecast (NEF) system used at the time and modified to suit Australian conditions became termed the ANEF system. One of the main differences of the ANEF system was that it incorporated a weighting for aircraft events for the period 7pm to 7am as opposed to the 10pm-7am period used in the NEF system.

The ANEF was primarily developed as a land use planning tool aimed at controlling encroachment on airports by urban land development, in particular noise sensitive buildings. The ANEF system is the basis for the Australian Standard AS2021: Acoustics - Aircraft Noise Intrusion – Building Siting and Construction (2015) which provides advice to land planners on the acceptability of building uses (residential, schools, hospitals, industrial etc) based on ANEF zones. The ANEF is accepted as the

current Australian standard for forecasting aircraft noise. It is a forecast of the cumulative noise effect over a twelve month period of airport operations, including all projections of aircraft movements and weather patterns, divided by 365 to show an average annual day exposure. ANEF contours are given values of 5, 10, 15, 20, 25, 30, 35 and 40, with the higher the contour value, the greater the noise effect. The ANEF system is made up of the following three noise exposure indicators that all use the same calculation models but are based on different inputs and have different purposes.

- ANEF (Australian Noise Exposure Forecast) noise contours show the anticipated/forecast noise exposure patterns around an airport and are mainly used by land use planning authorities to manage land development in the vicinity of airports.
- ANEI (Australian Noise Exposure Index) contours show the historic noise exposure patterns (based on actual aircraft movements and weather patterns) and are generally used in environmental reporting and benchmarking.
- ANEC (Australian Noise Exposure Concept) are scenario contours and are used to predict ('what if') noise contours resulting from proposed changes to airport operations.

'Number above' contours show the average number of events per day, that exceed a certain sound level and is closer to how people typically perceive noise. For example, an N65 10 noise contour represents the number of events (10) over 65 decibels (65dB(A)) for a particular area. N contours are generally used to supplement the ANEF and in particular used in community consultation as they indicate a measureable sound that the user can relate to. It is important to note that N contours represent an average day and not a typical day. Hence, on any specific day a resident may actually experience more events (or fewer) than the N contour suggests.

LAmax Single event noise contours are a basic metric and represent the maximum noise exposure (in A-weighted Decibels) likely to be experienced during an overflight of a specific aircraft type.

The scope of the noise modelling completed in 2014 included the preparation of the following;

- Standard ANEC for the current Busselton Margaret River Regional Airport infrastructure / operations and upgraded* BMRRA infrastructure/operations projected out to twenty (20) years;
- N65, N70, N75 and N80 contours for the following scenarios:
    - upgraded aerodrome infrastructure / operations 2018/19
    - upgraded aerodrome infrastructure / operations 2022/23
    - upgraded aerodrome infrastructure / operations 2028/29
    - upgraded aerodrome infrastructure / operations 2038/39
- Single event LAmax contours
    - Fokker 100 (approach & departure for 03 and 21).
    - A320 (approach & departure for 03 and 21).
    - B737-800 (approach & departure for 03 and 21).
- The ANEC contours must meet the AirServices Australia ANEF Endorsement Criteria checklist for airports document.

* Note- the upgraded aerodrome infrastructure was based on the Busselton Regional Airport Master Plan 2011-2031.

Following the announcement of the State Government funding to redevelop the Busselton-Margaret River Regional Airport (BMRRA) in July 2015, the City reviewed and subsequently revised the BMRRA Master Plan (2016-2036), as endorsed by the Council at its meeting on 13 April 2016 (C1604/075).

The review of the Busselton Regional Airport Master Plan (2011-2031) identified that limitations within the overall planning existed, in that the Master Plan only considered infrastructure requirements within a 20 year period. Given the opportunity to revise these requirements, the City engaged an aviation specialist to design the concept and staging plans over a longer timeframe to

ensure that the Airport was 'future proofed' for planning and development works over a longer planning horizon.

In relation to the noise modelling that had been completed in 2014, the revised master plan (2016) included changes in the design characteristics of the airside infrastructure (runway thresholds, aprons and taxiways) and hence the input assumptions for the Integrated Noise Model (INM) used to generate the ANECs and N-contours in 2014 had changed, requiring the noise modelling to be rerun. Additionally, City Officers took the opportunity to review the aircraft traffic forecast and design aircraft inputs previously developed to ensure that they were still considered appropriate for the BMRRA redevelopment and made changes where considered necessary.

In late 2015, the City of Busselton engaged To70 to update the INM with the revised infrastructure input assumptions, traffic forecasts and design aircraft and generate the ANECs and N contours underlying the BMRRA Master Plan (2016) with the specific purpose of using the contours for the environmental approval process and community consultation relating to the future BMRRA operations. The scope of works for the noise modelling was as follows;

- Review of data inputs and remodeling of ANECs, N65, N70, N75 and N80 contours previously developed (2014) including traffic forecasting;
- The remodeling of standard ANECs (20 year) for the Busselton Regional Airport Master Plan 2016 aerodrome infrastructure / operations projected for twenty (20) years.
- The preparation of N65, N70, N75, N80s for the following scenarios;
    - Master Plan (2016) aerodrome infrastructure / operations 2017/2018 (first year of operations);
    - Master Plan (2016) aerodrome infrastructure / operations 2022/2023;
    - Master Plan (2016) aerodrome infrastructure / operations 2027/2028.
    - Master Plan (2016) aerodrome infrastructure / operations 2037/2038;
- Single event LAmax contours using the Master Plan (2016) infrastructure for the following design aircraft;
    - Fokker100 (approach & departure for 03 and 21).
    - A320 (approach & departure for 03 and 21).
    - B737-800 (approach & departure for 03 and 21).
- The ANEC contours must meet the AirServices Australia ANEF Endorsement Criteria checklist for airports document.

During consultation with the OEPA on the preparation of the noise modelling and contours for the BMRRA and future airport operations to be described in the API-A referral, the OEPA recommended that the City of Busselton have a peer review of the noise modelling report and the underlying INM, assumptions and inputs performed.

As such the City called for quotations in early 2016 to peer review the noise modelling undertaken and engaged GHD to complete this work. The scope of the works of the peer review involved a desktop review of the following;

- Review and assess the data sources and attribution for aircraft movement forecasts, aircraft type selection and flight paths/tracks, track maps with labels and track assignment assumptions, details of circuit operations, stage lengths for departures and forecast horizons
- Airport setup, runway description, temperature, headwind and humidity assumptions, calculations of airport capacity runway usage assumptions, day/night split assumptions and sources

- INM model setup including version, aircraft type selection, details of terrain files (if used), base map coordinate systems etc.

- Documentation of inputs and outputs.

GHD's review provided a report containing recommended amendments and a number of questions requiring clarification. The peer review report was forwarded to To70 for consideration. Following discussions between City Officers, To70 and GHD, a number of the recommended amendments to the INM inputs and settings were implemented and the models rerun, including regeneration of the noise contours. Additionally, the written report has been updated where clarification or further detail was requested to be included. For completeness a close out report and accompanying letter has been provided by GHD (Attachment B) and will be included in the API-A referral to be submitted to the OEPA.

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. Additionally, the BMRRA operations are managed in accordance with Ministerial Statement 1009 (under the Environmental protection Act 1996) and the City's Noise Management Plan (2015).

RELEVANT PLANS AND POLICIES

The Busselton Regional Airport Master Plan (2016- 2036) and BMRRA Noise Management Plan (2015) are relevant to this report.

FINANCIAL IMPLICATIONS

The preparation of the noise modelling reports were included in the adopted Airport Operations budget for 2015/16. There are no further cost implications for the 2015/16 or 2016/17 Airport Operations municipal budgets as a result of this report.

The State Government project funding of $55.9m has been incorporated into the City's draft 2016/17 budget, and will form part of future budgets. The funding covers operational and capital costs associated with the project, including noise mitigation and amelioration.

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, including costs relating to ongoing noise modelling, monitoring and noise amelioration if required. 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 1b), and will now 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.

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. Below outlines the risks assessed as 'high' and 'medium' relating to this report;

Risk	*Controls*	*Consequence*	*Likelihood*	*Risk Level*
The OEPA do not have confidence in the noise modelling results (based on inputs & assumptions) included in the API-A referral.	Noise modelling has been peer reviewed and the inputs/assumptions kept consistent with the State Government Business Case (i.e Funding Agreement).	Unlikely	Major	High
Future aircraft operations exceed projections resulting in increased aircraft noise exposure.	Review the aircraft traffic projections following negotiations with airlines and commencement of operations.	Possible	Moderate	Medium

CONSULTATION

Officers will continue to consult with the OEPA, CASA, AirServices Australia, City of Busselton residents and wider community, airport users and stakeholders throughout the environmental approval process and Airport Development Project.

As part of the API-A referral process the City has performed the following community and stakeholder consultation.

Who	**Meeting Forum**	**Description**	**Information Provided**
Residents in vicinity of the Airport and/or near flight paths	Private meeting either at residents home or at the City offices.	• Brief outline of the development project, objectives and infrastructure; • Predicted flight movements; • Predicted noise impacts including ANECs, N-Contours and flight paths	• City's Noise brochure; • City project Fact sheet; • Information on External websites and agencies for further information.

		• Noise Management Plan review	
Community information sessions	Information session for up to 12 people held at the City offices.	• Brief outline of the development project, objectives and infrastructure; • Predicted flight movements; • Predicted noise impacts including ANECs, N-Contours and flight paths • Noise Management Plan review	• City's Noise brochure; • City project Fact sheet; • Information on External websites and agencies for further information.
Decision Making Agencies (DMAs) engagement	Individual meetings with DMAs – Libby Mettam MLA Dept Of Water Dept Parks and Wildlife Dept of Transport	• Brief outline of the development project, objectives and infrastructure; • Predicted flight movements; • Predicted noise impacts including ANECs, N-Contours and flight paths • Noise Management Plan review	• City's Noise brochure; • City project Fact sheet; • Information on External websites and agencies for further information.
NMP Public Comment	Revised NMP advertised on the City's Airport website for public comment.	• Revised NMP showing track changes advertised for 21 days for public comment.	• Revised NMP • Summary of changes and justification for changes • Information on API-a process

As part of the public consultation relating to the Development Project and understanding aircraft noise management associated with the BMRRA, eighty seven letters were sent out to residential property owners in the vicinity of the airport inviting them to a private meeting. A total of 8 meetings were booked with one resident cancelling prior to the meeting. The majority of feedback received from residents related to questions on flight paths and the possibility of flights late at night as well as asking to be kept informed of updates throughout the project.

Additionally, 1180 letters were sent out to property owners in residential areas approximately within 5km of the airport informing community members of the community information sessions and how to register. The community information sessions were also advertised in the local media. A total of five community sessions were held with between 10 and 14 people attending each session. As with the private meetings the main feedback received from the sessions related to questions on the flight paths and the possibility of flights late at night as well as requesting to be kept informed of updates throughout the project.

Following Council's consideration of the noise modelling report and noise contours, Officers will place the noise modelling report and noise contours on the BMRRA website and offer community

members to meet with City Officers to discuss any concerns and/or questions relating to the report and contours.

Additionally, City Officers have consulted with Australian Aircraft Noise Ombudsman and sought advice on the noise modelling requirements and resulting contours; and the public consultation process completed to date and planned for the duration of the project to ensure that a comprehensive and appropriate process is being undertaken.

OFFICER COMMENT

The Busselton-Margaret River Regional Airport (BMRRA) has operated under the authority of the Minister for the Environmental, regulated by the Office of the Environmental Protection Authority (OEPA) since the commencement of operations of the then Busselton Regional Airport (BRA) in 1996. As part of the initial BRA project, environmental approvals were sought from the Minister for the Environment for the operations of the Airport. The Ministerial approval for the then BRA resulted in the implementation of Ministerial Statement 399, which incorporated a number of environmental management commitments, including noise management and wetland protection in order to protect the environment. While the City has had amendments approved and implemented to the original Statement 399, and currently operates under Statement 1009, the Airport Development Project represents a significant change to the original proposal submitted to the EPA in 1995 and hence one of the priority approval processes identified for the project is the environmental approval required from the Minister of the Environment; Heritage.

The environmental approvals specifically involve the City of Busselton applying to the Office of Environmental Protection Authority (OEPA) to amend the proposal description that underlies the current Ministerial Statement 1009 and submit a revised NMP that will allow for the proposed interstate air services resulting from the Airport Development Project. Following consultation with the OEPA, an Assessment of Proponent Information-Category A (API-A) is considered the most appropriate assessment application to amend the existing Ministerial Statement and implement a revised NMP.

The API-A referral assessment requires the proponent to consider the EPA's Environmental Assessment Guideline No. 8: Environmental Principles, Factors and Objectives (2013b) to identify the key preliminary environmental factors that may be impacted as part of the Proposal. Consideration of these guidelines has identified the two key environmental factors to be included in the referral;

1. Amenity (aircraft noise);

2. Terrestrial fauna (Vasse-Wonnerup Wetlands).

To demonstrate that the future noise disturbance resulting from the Airport Development Project and future airport operations will not significantly impact on the community, the City has engaged aviation specialist consultants to prepare noise modelling and noise contours that will be included in the API-A referral submitted to the OEPA.

During the preparation of the Airport Business case, the City engaged consultants to prepare noise models and noise contours in order to assess any potential noise impacts from the future airport operations and to inform the business case. However, since the funding announcement the update of the BMRRA Master plan and revised runway infrastructure dimensions, has meant that the noise modelling inputs needed to be updated and the models rerun.

City Officers engaged To70 aviation consultants to prepare the noise modelling and contours. The scope of works included the preparation of ANECs, N contours and LAMax contours. The preparation of multiple noise contour information was seen as necessary to provide a comprehensive representation of the possible future airport operations noise impacts. The ANECs and N contours

will be used to inform future land planning in the vicinity of the airport and the City's Strategic Planning Department are expected to progress a town planning scheme amendment for a revised Airport Special Control Zone to be implemented into the TPS in 2017. The N contours and LAMax's will also be used in the public consultation to inform the community of the potential noise impacts for future BMRRA operations.

Finally, the ANECs, N contours and LAMax contours will be included in the API-A referral to be submitted to the OEPA as part of the Development Project environmental approvals process. The inclusion of the noise modelling is key in the assessment of the project environmental approvals as they indicate that the impacts from the future airport operations that may result from the Development Project on the surrounding environment (amenity and terrestrial fauna) are not considered significant. The BMRRA Noise Modelling Report (May 2016) can be viewed in Attachment A.

CONCLUSION

The redevelopment of the Busselton-Margaret River Regional Airport requires environmental approvals are sought from the Office of the Environmental Protection Authority and the Minister for the Environment. Consultation with the OEPA has indicted that an Assessment on Proponent Information - Category A (API-A) referral is the most appropriate process to achieve the approvals which will also need to include the noise modelling report and resulting noise contours.

Following the revision of the BRA Master Plan (2011-2031) and design changes to the runway infrastructure, it was determined that the noise modelling completed in 2014 needed to be updated and rerun. As such, Officers engaged To70 to prepare ANECs, N contours and LAMax contours using the BMRRA Master Plan (2016-2036) as informing documents to be included in the API-A referral to be submitted to the OEPA and for community consultation with regards to the Development Project.

To ensure the integrity of the noise contours, a peer review of the noise modelling was completed by an independent consultant (GHD) and recommended changes and clarifications have been implemented.

As such, this report presents the Noise Modelling Report (May 2016) prepared by To70 Pty Ltd and noise contours as informing documents to be submitted to the OEPA as part of the API-A referral and community consultation for the BMRRA Development Project.

OPTIONS

Council may choose not to accept the Officer's recommendation.

TIMELINE FOR IMPLEMENTATION OF OFFICER RECOMMENDATION

The BMRA Noise Modelling Report (May 2016) will be included in the API-A referral expected to be submitted to the OEPA in June 2016 and used as part of the community consultation immediately following Council's endorsement of the report.

OFFICER RECOMMENDATION

That the Council endorses the Busselton-Margaret River Regional Airport Noise Modelling Report (May 2016) prepared by To70 Aviation (Australia) Pty Ltd for inclusion in the API-A referral to be submitted to the Office of the Environmental Protection Authority and community consultation.


May 2016
Noise Modelling Report
Busselton Margaret River Regional Airport
BURG
EL
RID
TTGART HBF.
ON
LSINKI
RANCISCO-DALL
ARIS
ENEDIG
DALLAS
AMSTERDAM
721-725

Noise Modelling Report
Busselton Margaret River Regional Airport

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

Prepared by
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North Melbourne, May 2016

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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 Regional Airport (BMRRA). 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. The report includes updates based on the peer review of the report and INM model provided to BMRRA in December 2015 which was performed by GHD.

1.1 Background

The COB has been awarded funding of $55.9m for the redevelopment of BMRRA. 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 BMRRA redevelopment.

BMRRA is currently regulated by the Office Environmental Protection Authority (OEPA) 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 BMRRA 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 COB 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 BMRRA 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 BMRRA, 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 Margaret River 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

- Fokker 100 (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. Forecasts and aircraft type assumptions are based on COB input, which are based on the State Government business case. This is to maintain consistency between the business case and environment approvals for the project, which is based on the business case. Further modelling may be completed on completion of the project and the commencement of interstate operations.

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 BMMRA 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.

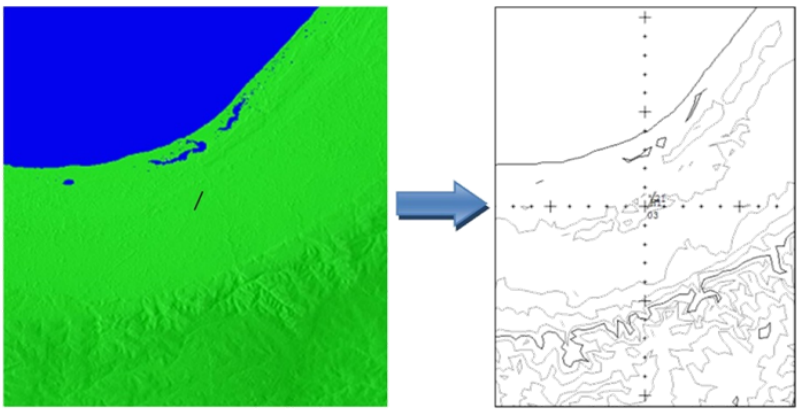


Figure 1 - Terrain

Aerodrome Reference Point

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

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

Table 1 – BMRRA ARP

Runway coordinates

To70 has modelled the revised/masterplan layout (Busselton Margaret River Regional 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	2520 × 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 forecast data is based on the State Government Business Case forecasts to maintain consistency between the business case and environmental approvals for the redevelopment project. 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. Note that the day/night split have been determined by COB based on existing operations.

Class	Aircraft Type	2018/19	2022/23	2028/29	2038/39
RPT	Narrow Body Jet	**6**	**14**	**16**	**24**
Closed Charter	Regional Jet	**20**	**20**	**20**	**20**
	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 detailed below.

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	CNA208
	Dornier 328	DO328
	Piper - PA31	PA31
General	Cessna 180,182, 172, 210	CNA172
	Cessna Citation	CNA55B
	Learjet 45	LEAR35
	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

Where substitute aircraft are required for the INM modelling, To70 have utilised the suggested aircraft types within the INM tool. For aircraft where a substitute is not available such as the 737MAX, these have been substituted using a surrogate methodology which is acknowledged and accepted by Airservices Australia (McLeod & Latimore, 2014)[1].

It is worthy to note that some helicopter noise data does not include Effective Perceived Noise data (EPNL) and this is due to the limitations of INM. Helicopter types with EPNL data have been selected to model helicopters with one or two engines as appropriate. The Cessna Citation has been modelled as the Cessna Citation 550 Bravo, as it was noted by the COB as being the most common version of the Citation that operates at BMRRA. The INM GASFP aircraft is a suitable representative of low performance, single engine aircraft and is therefore has been selected to model the Evektor Sportstar. The PC9 is modelled using the JPATS as this represents the military version of the PC9.

[1] McLeod, I., & Latimore, M. (2014). Challenges in Producing an Australian Noise Exposure Forecast. Retrieved April 5th, 2016, from http://www.acoustics.asn.au/conference_proceedings/INTERNOISE2014/papers/p607.pdf

2.3 Operational

Track Usage

This section shows the origin and destination of RPT and FIFO aircraft routes that services BMRRA. Figure 2 below illustrates the schematic route and does not reflect the actual flight tracks. Flight destinations can be found in the forecast data in Appendix A: Traffic Forecasts. Note that destinations of locally based aircraft are listed as various, however COB have indicated generally light aircraft will head to the coastline or in a southerly direction.

Figure 2 – Origins/Destinations for RPT and FIFO flights

The table below outlines the assumptions for the stage lengths used in the INM model, based on destination provided by COB.

Stage Lengths	Stage 1	Stage 2	Stage 3	Stage 4
Distance (nm)	<500	501 - 1000	1001-1500	1501-2500
Destination	ALH, EPR, GET, KGI	KTA, PHE, ZNE	ADL, ASP	BNE, CGK, DPS, MEL, SYD

Table 8 - Stage length assumptions

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

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

Table 9 – 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	100%
		D	STROUT	100%
	21	A	GNSSE	100%
		D	STROUT	100%
Helicopter	Helipad	A	HIN	100%
		D	OUT	100%

Table 10 – Track allocation (other)

Runway usage

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

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 study produced by To70 in 2014, which were developed with a local expert and have been adjusted to ensure they are flyable by the aircraft that are assigned to them. An assumption has been made for RPT operations conducting a 270 degree turn to the east for departures, this is based on the separation requirements between RPT and GA aircraft types. In addition to this, an assumption has been made on the separation requirements flown by jet and non-jet RPT aircraft due to performance characteristics and the ability for smaller aircraft to conduct a smaller radius turn.

The spread of the GNSS arrival tracks will be assumed to be 0.1 NM as the aircraft operating at BRMA are will conduct an RNAV approach, which is a very narrow approach path when compared to visual approach.

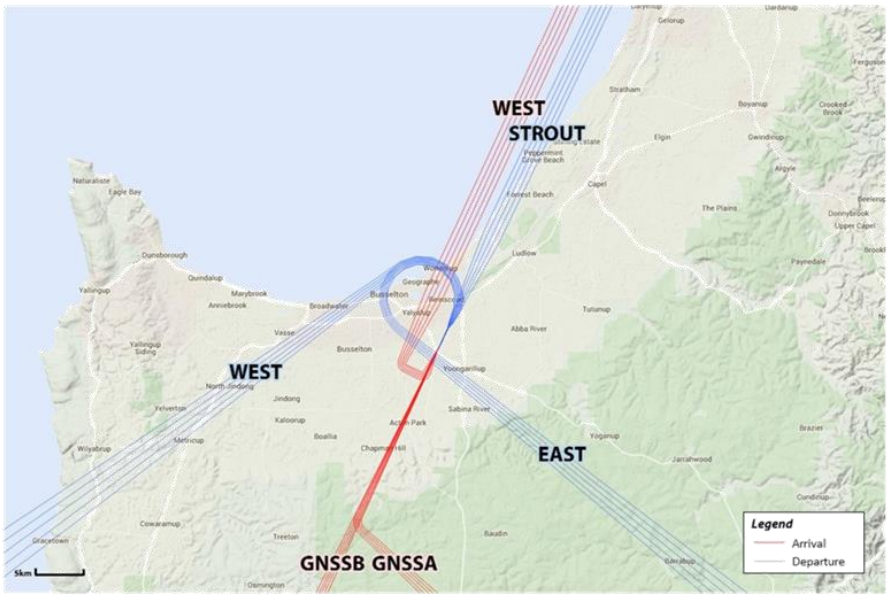


Figure 3 – Runway 03 flight tracks

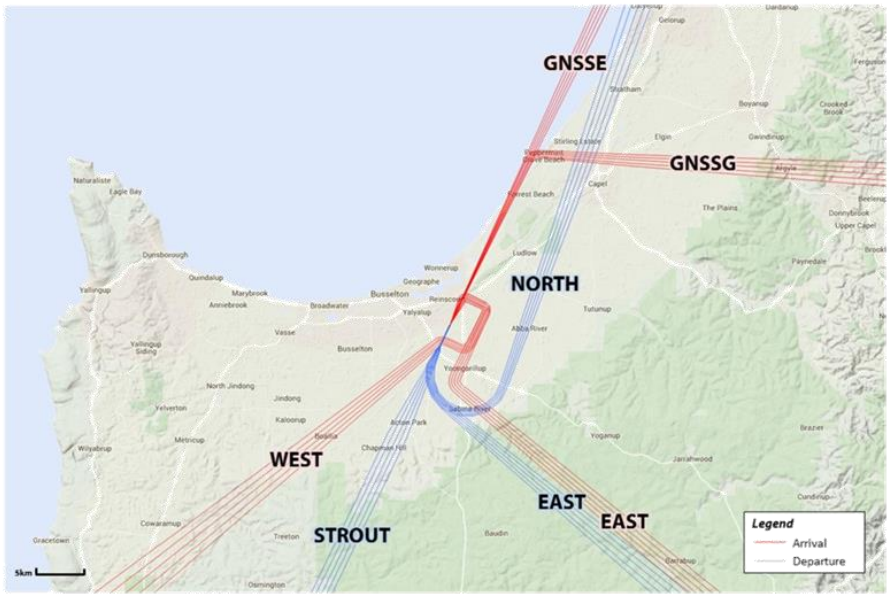


Figure 4 – Runway 21 flight tracks

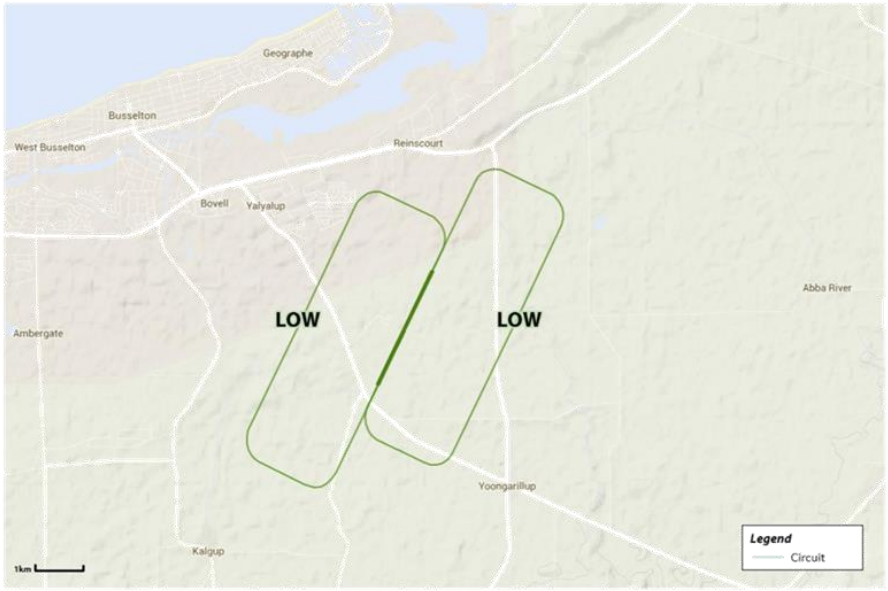


Figure 5 – Circuit flight tracks

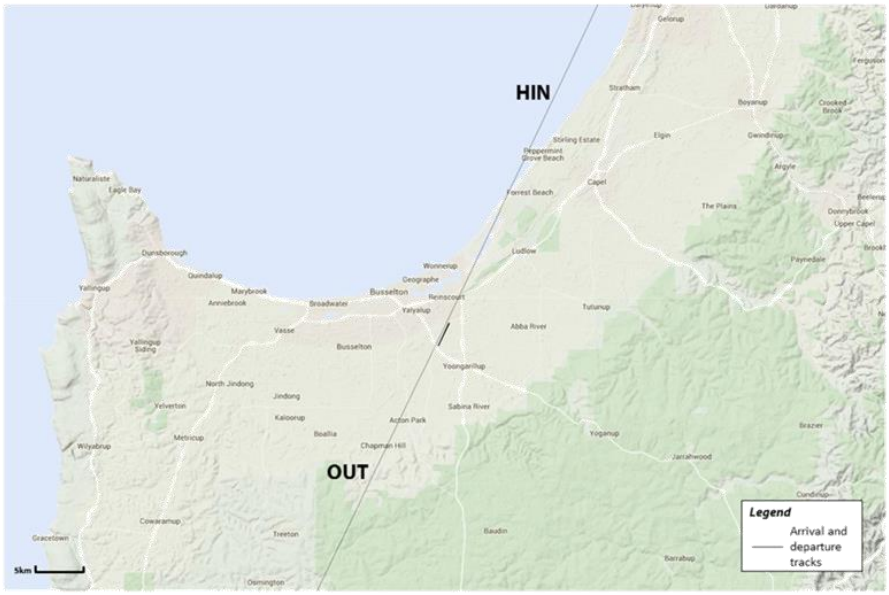


Figure 6 – Helicopter flight tracks

2.4 Items amended in model

The following settings are amended following the GHD peer review:

- Amended Fokker 100 charter forecast based on CoB input
- GNSS approach track spread are reduced to 0.1NM from the previous spread of 0.3-0.5NM
- The High performance GA tracks (MED) are removed as they were not required in the INM model
- Cessna Citation remodelled as Cessna Citation 550 Bravo based on input from CoB
- The INM model uses a recursive grid with a refinement of 12 rather than 10 as used previously
- The bank-angle effects are removed
- The profile ID of the 737MAX is renamed from STANDARD to USER

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 Airservices Australia 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

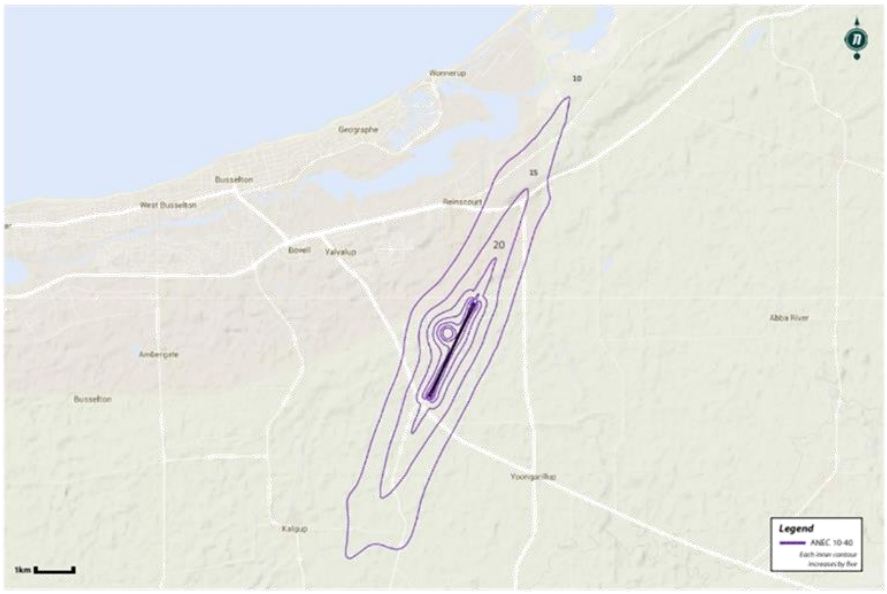


Figure 7: ANEC 2038/39

Observations

The ANEC for the BMRRA 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 BMRRA.

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 ANEF 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

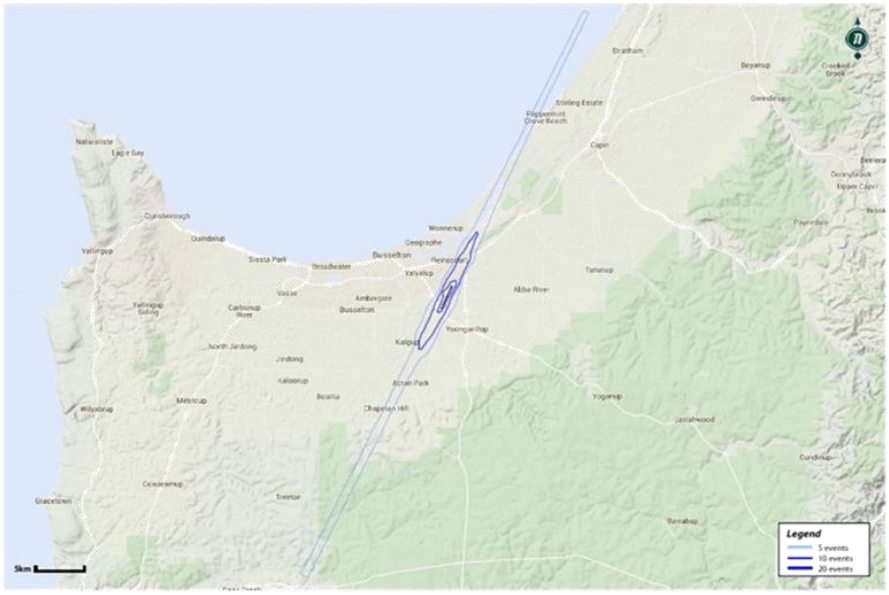


Figure 8: N65 Contours: 2018/19

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

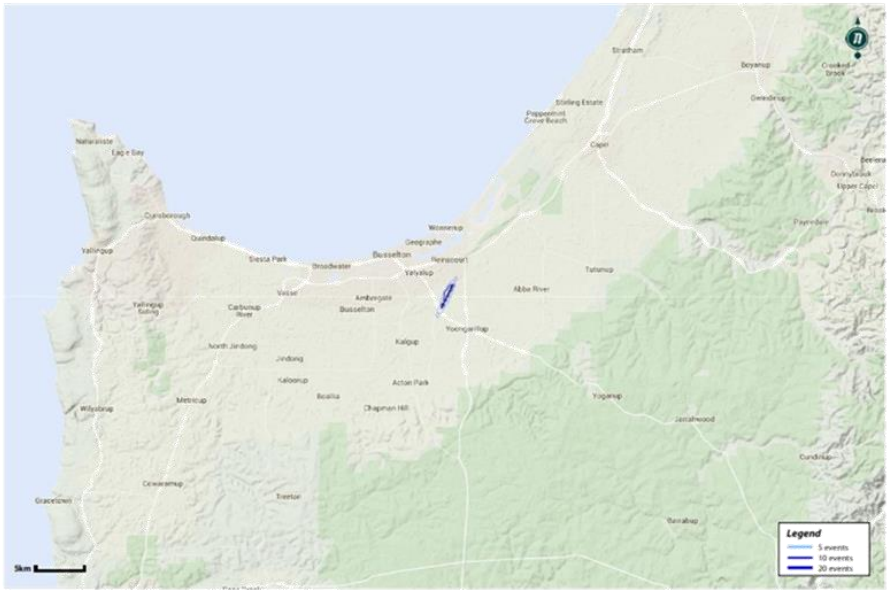


Figure 11: N80 Contours: 2018/19

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

N65 Contours: 2022/23

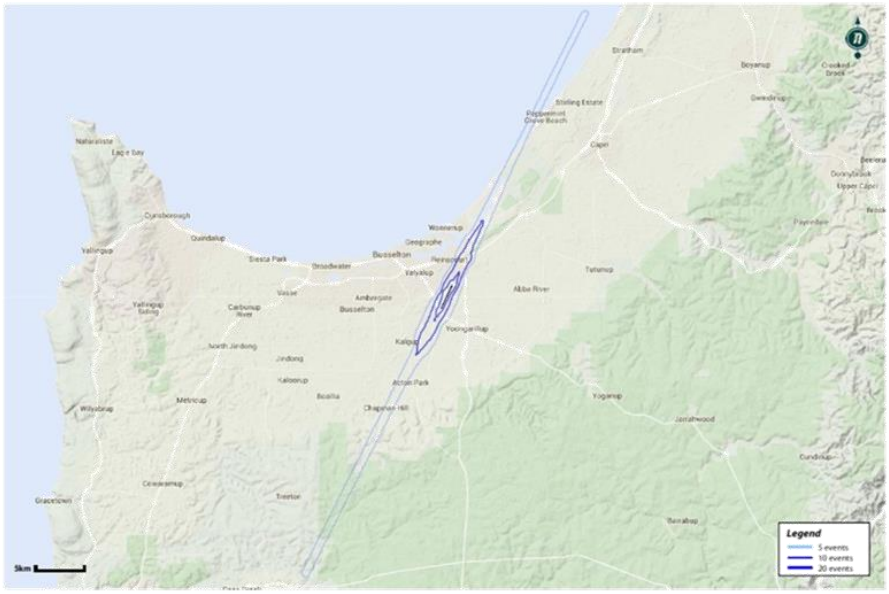


Figure 12: N65 Contours: 2022/23

N70 Contours: 2022/23

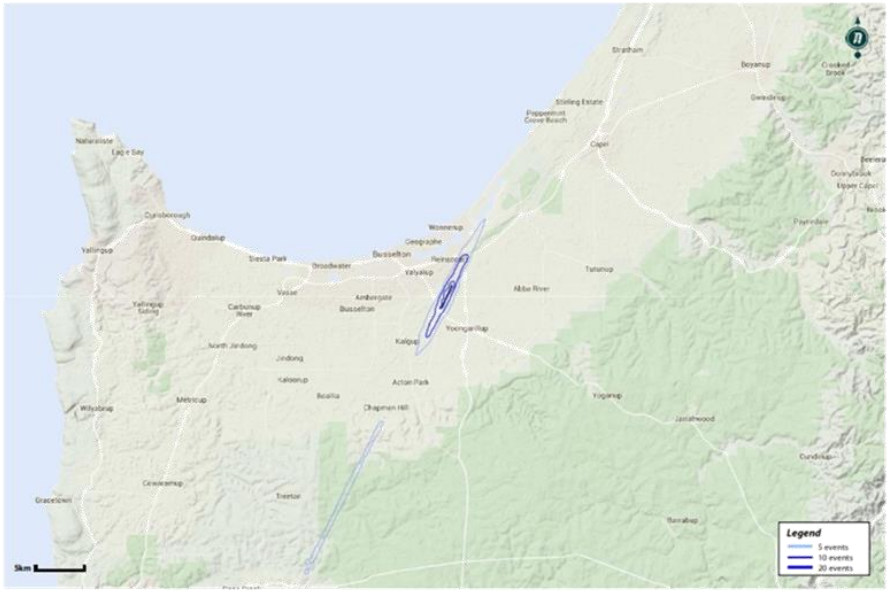


Figure 13: N70 Contours: 2022/23

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

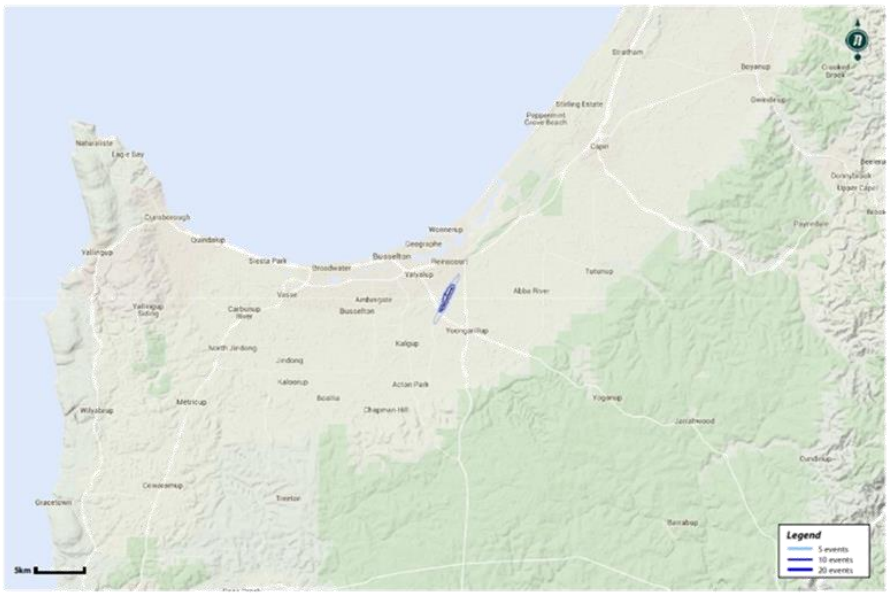


Figure 19: N80 Contours: 2028/29

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

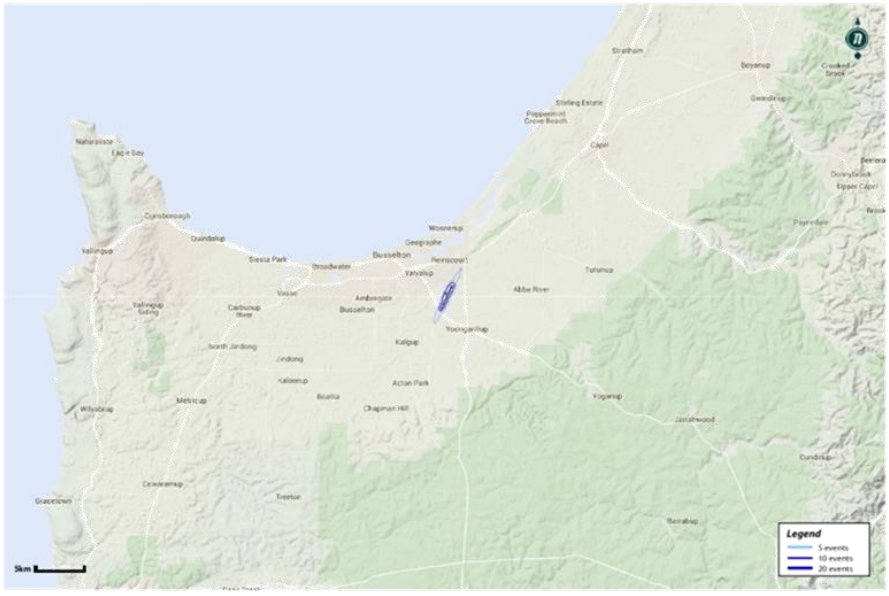


Figure 23: N80 Contours: 2038/39

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

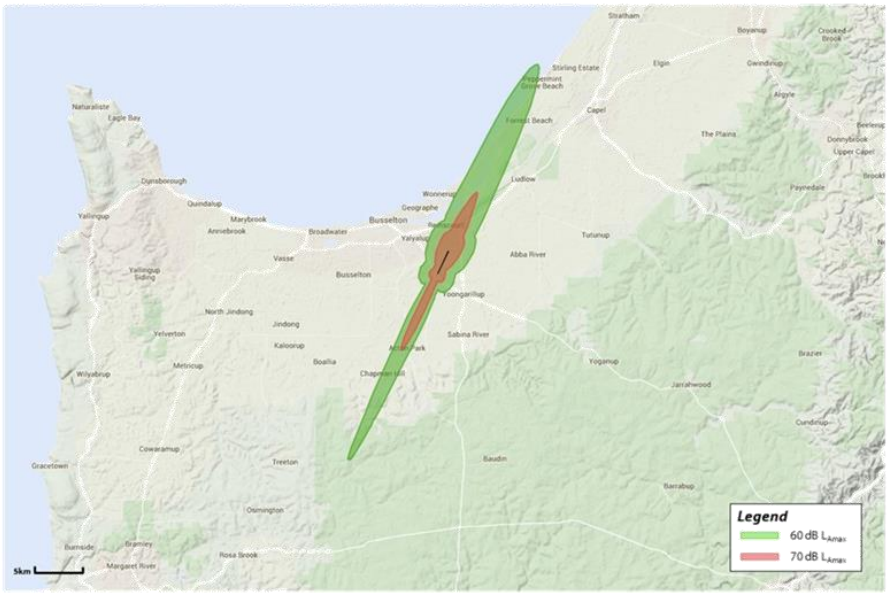


Figure 24: L_{Amax} F100: Runway 03

L_{Amax} F100: Runway 21

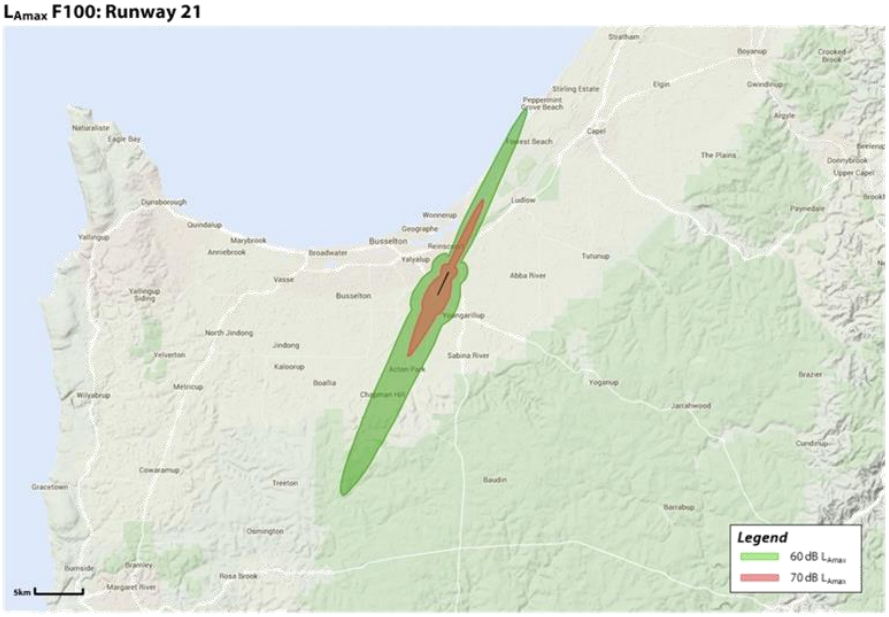


Figure 25: L_{Amax} F100: Runway 21

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

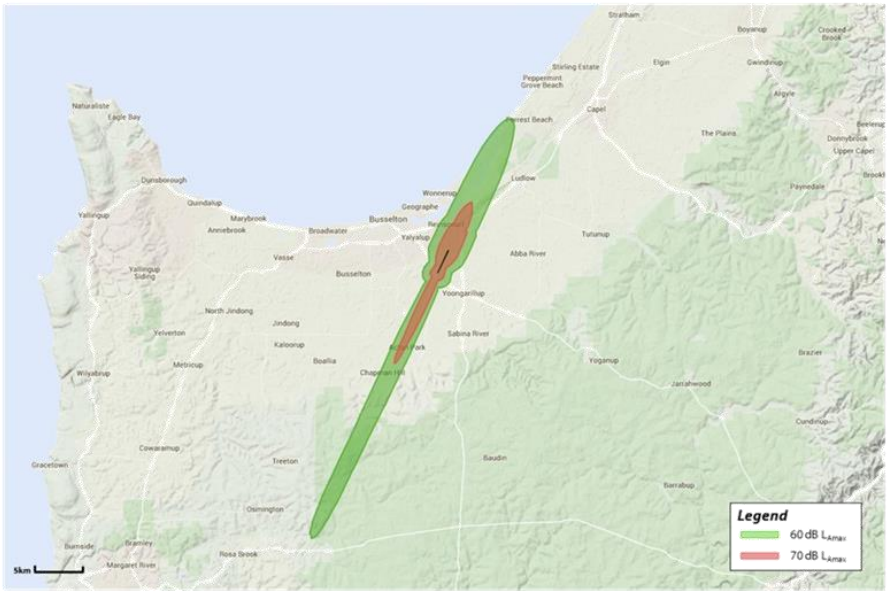


Figure 26: L_{Amax} A320: Runway 03

L_{Amax} A320: Runway 21

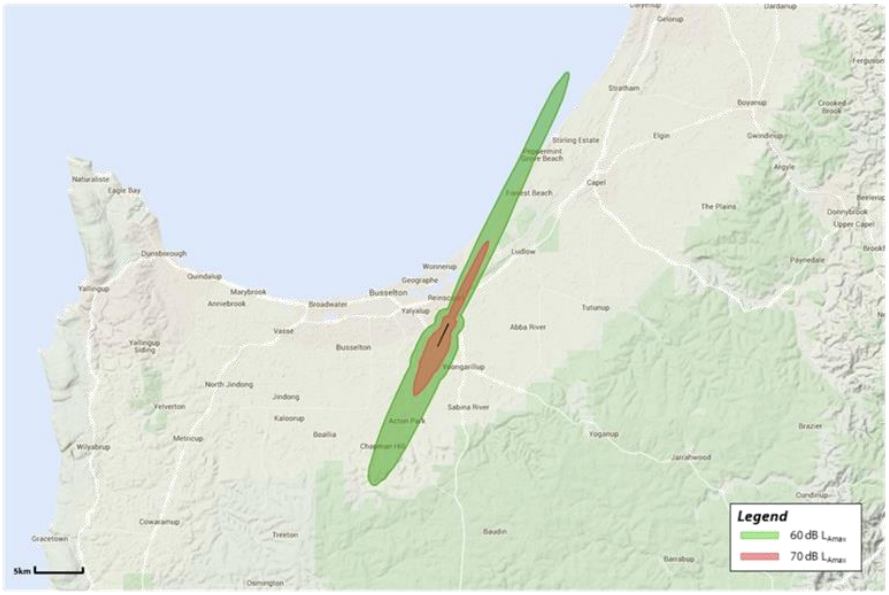


Figure 27: L_{Amax} A320: Runway 21

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

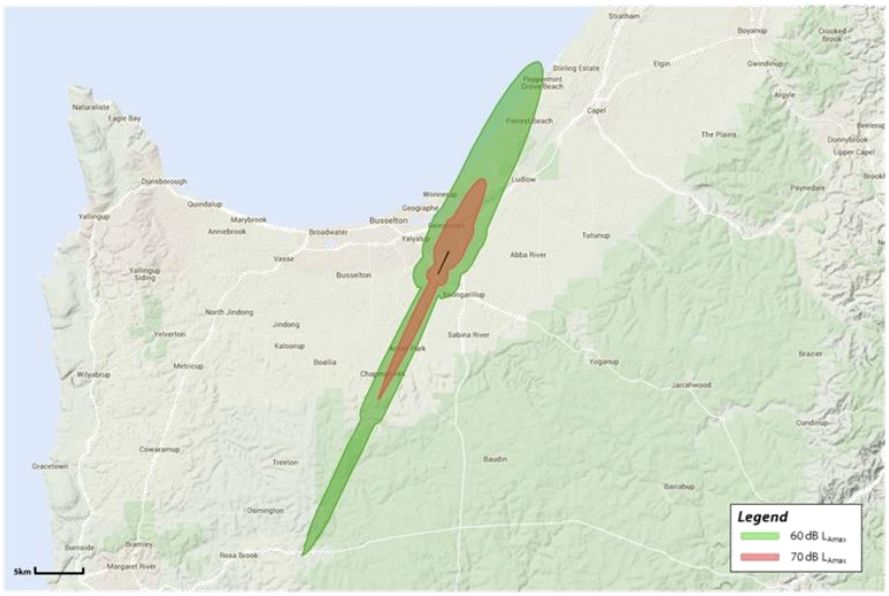


Figure 28: L_{Amax} B737-800: Runway 03

L_{Amax} B737-800: Runway 21

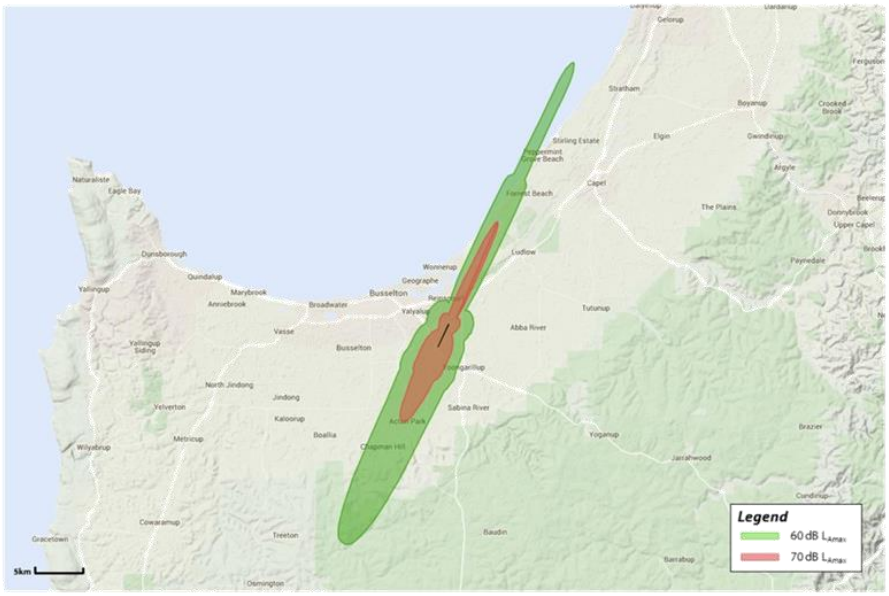
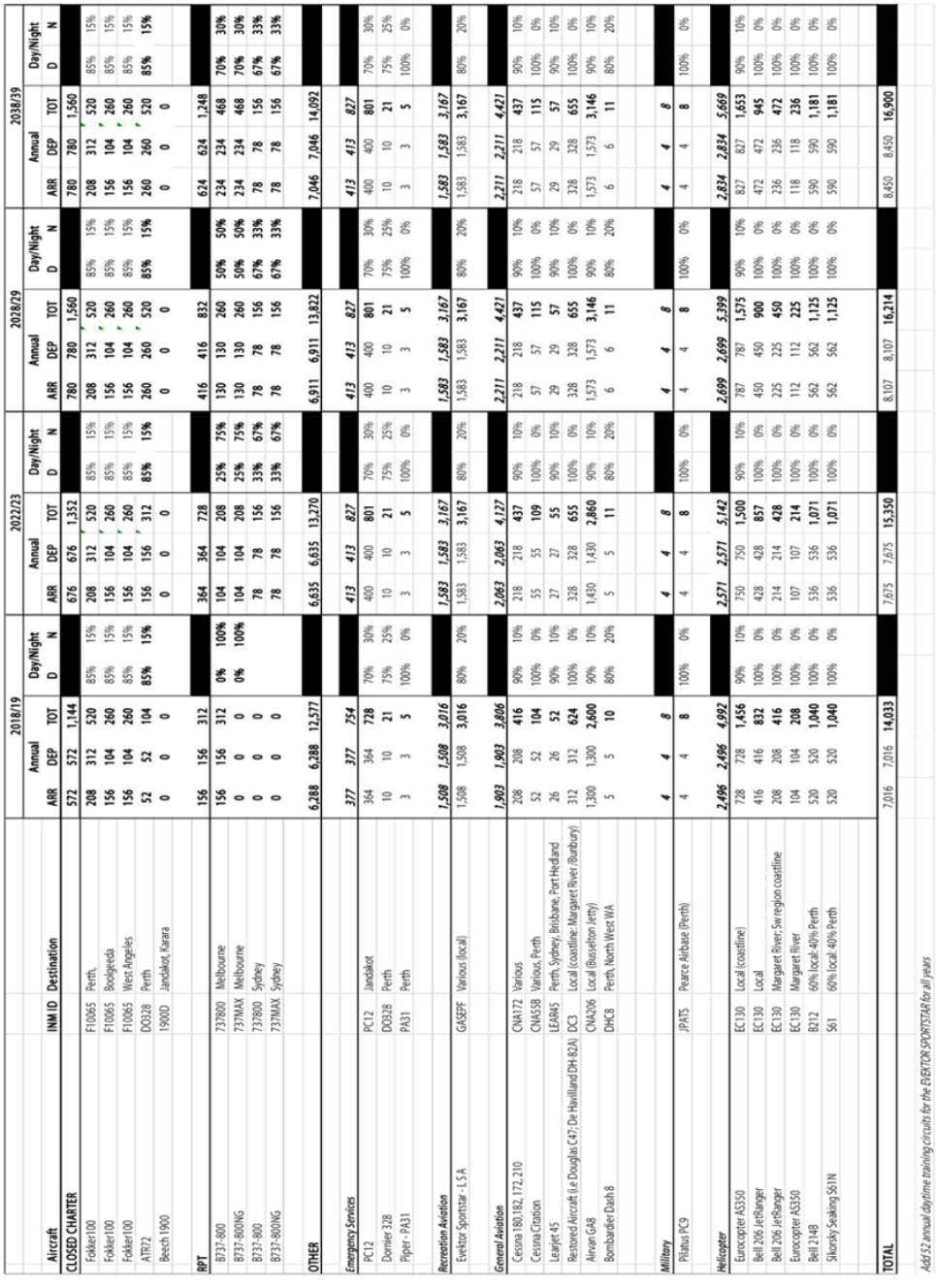


Figure 29: L_{Amax} B737-800: Runway 21

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

Appendix A: Traffic Forecasts



Aircraft	INM ID	Destination	2018/19 Annual ARR	2018/19 Annual DEP	2018/19 Annual TOT	2018/19 Day/Night D	2018/19 Day/Night N	2022/23 Annual ARR	2022/23 Annual DEP	2022/23 Annual TOT	2022/23 Day/Night D	2022/23 Day/Night N	2028/29 Annual ARR	2028/29 Annual DEP	2028/29 Annual TOT	2028/29 Day/Night D	2028/29 Day/Night N	2038/39 Annual ARR	2038/39 Annual DEP	2038/39 Annual TOT	2038/39 Day/Night D	2038/39 Day/Night N
CLOSED CHARTER			572	572	1,144			676	676	1,352			780	780	1,560			780	780	1,560		
Fokker100	F10065	Perth,	208	312	520	85%	15%	208	312	520	85%	15%	208	312	520	85%	15%	208	312	520	85%	15%
Fokker100	F10065	Boolgeeda	156	104	260	85%	15%	156	104	260	85%	15%	156	104	260	85%	15%	156	104	260	85%	15%
Fokker100	F10065	West Angeles	156	104	260	85%	15%	156	104	260	85%	15%	156	104	260	85%	15%	156	104	260	85%	15%
ATR72	DO328	Perth	52	52	104	85%	15%	156	156	312	85%	15%	260	260	520	85%	15%	260	260	520	85%	15%
Beech 1900	1900D	Jandakot, Karara	0	0	0			0	0	0			0	0	0			0	0	0		
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	0%	100%	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	DO328	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	GASEPF	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	CNA55B	Various, Perth	52	52	104	100%	0%	55	55	109	100%	0%	57	57	115	100%	0%	57	57	115	100%	0%
Learjet 45	LEA45	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 (i.e Douglas C47; De Havilland DH 82A)	DC3	Local (coastline: Margaret River /Bunbury)	312	312	624	100%	0%	328	328	655	100%	0%	328	328	655	100%	0%	328	328	655	100%	0%
Airvan GA8	CNA206	Local (Busselton Jetty)	1,300	1,300	2,600	90%	10%	1,430	1,430	2,860	90%	10%	1,573	1,573	3,146	90%	10%	1,573	1,573	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***			***2,571***	***2,571***	***5,142***			***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 214B	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			7,016	7,016	14,033			7,675	7,675	15,350			8,107	8,107	16,214			8,450	8,450	16,900		

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

Appendix B: N-Contour results (alternative zoom)

N65 Contours: 2018/19

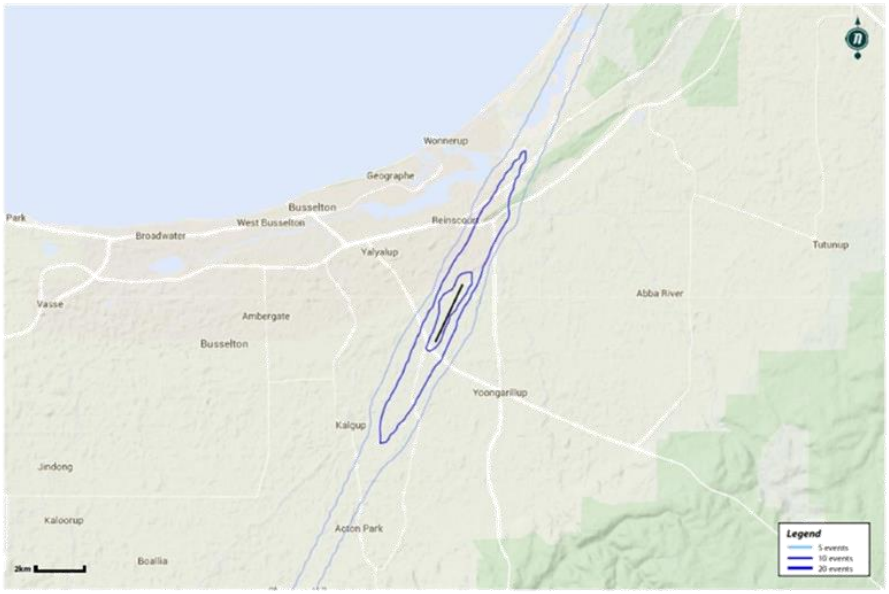


Figure 30: N65 Contours: 2018/19

N70 Contours: 2018/19

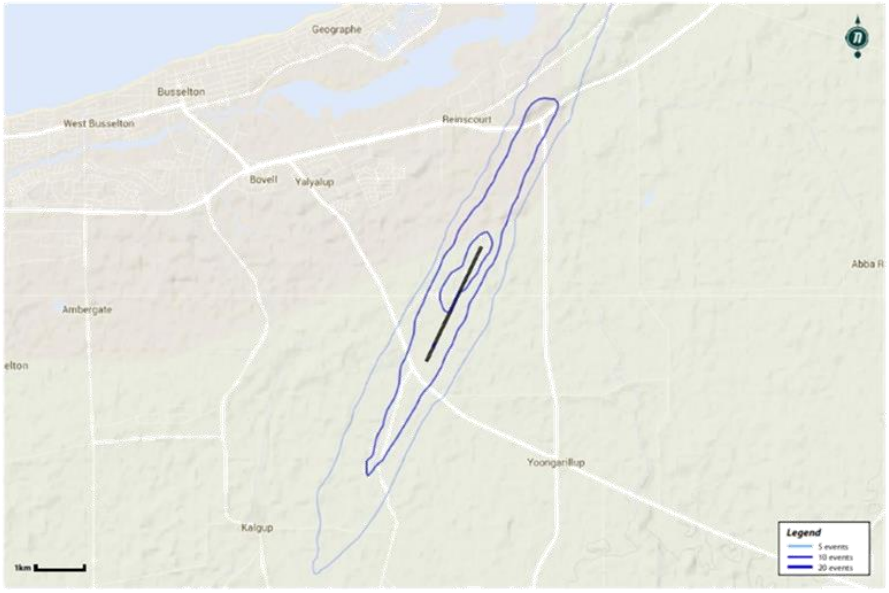


Figure 31: N70 Contours: 2018/19

N75 Contours: 2018/19

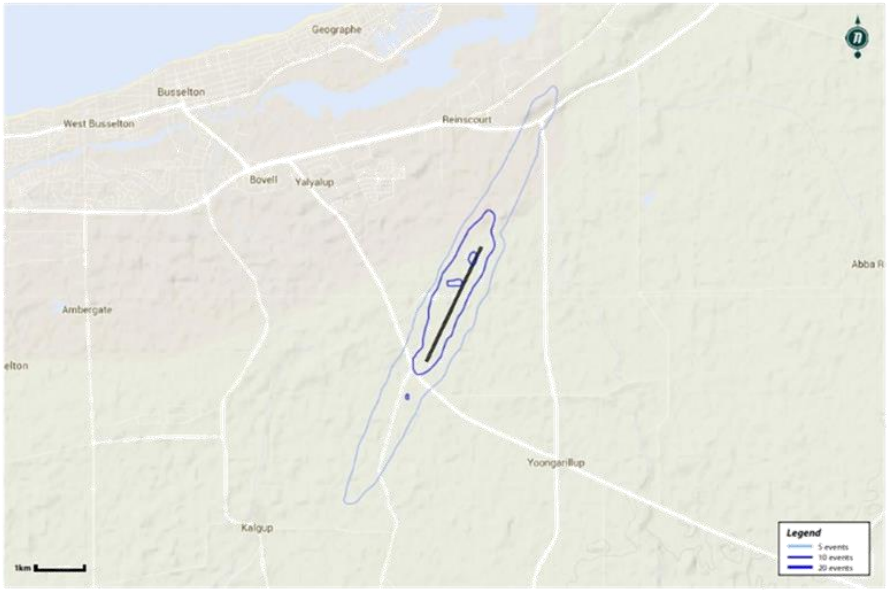


Figure 32: N75 Contours: 2018/19

N80 Contours: 2018/19

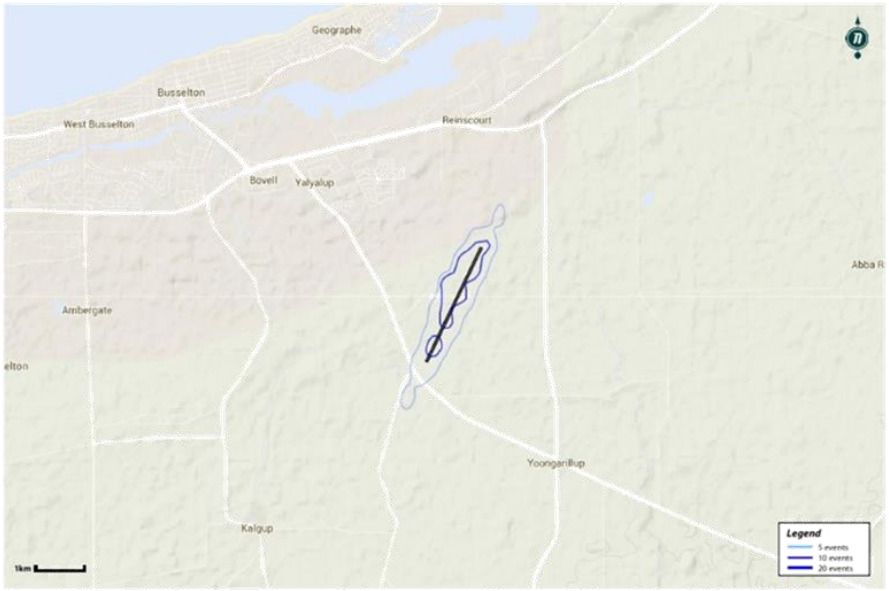


Figure 33: N80 Contours: 2018/19

N65 Contours: 2022/23

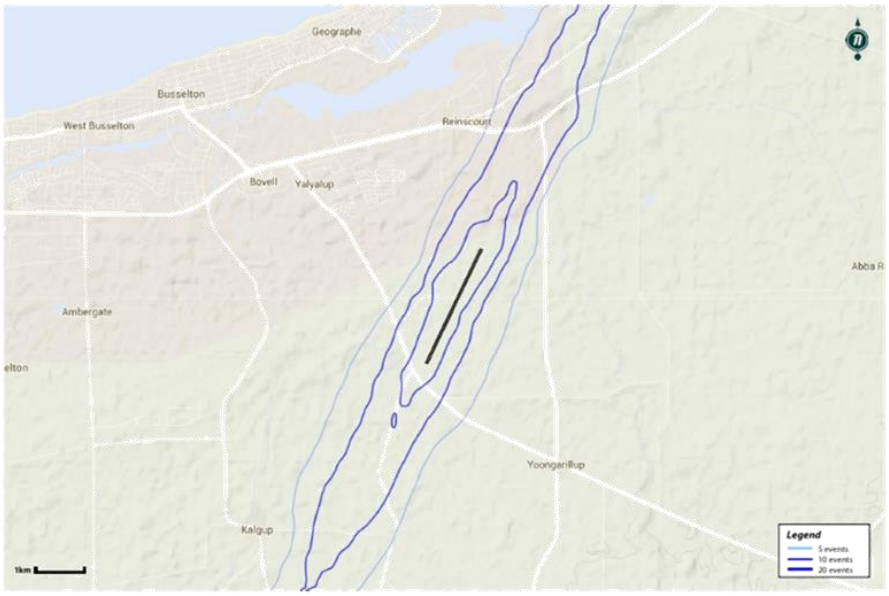


Figure 34: N65 Contours: 2022/23

N70 Contours: 2022/23

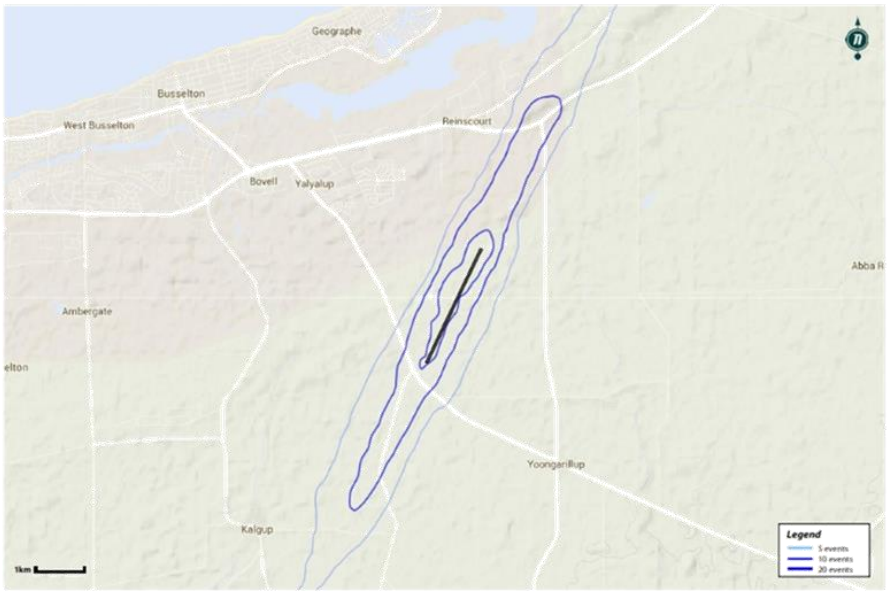


Figure 35: N70 Contours: 2022/23

N75 Contours: 2022/23

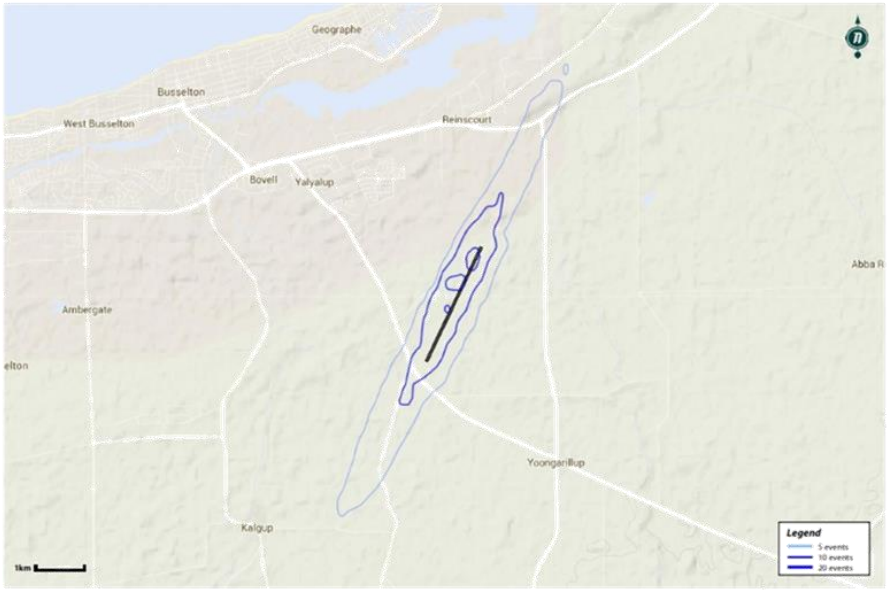


Figure 36: N75 Contours: 2022/23

N80 Contours: 2022/23

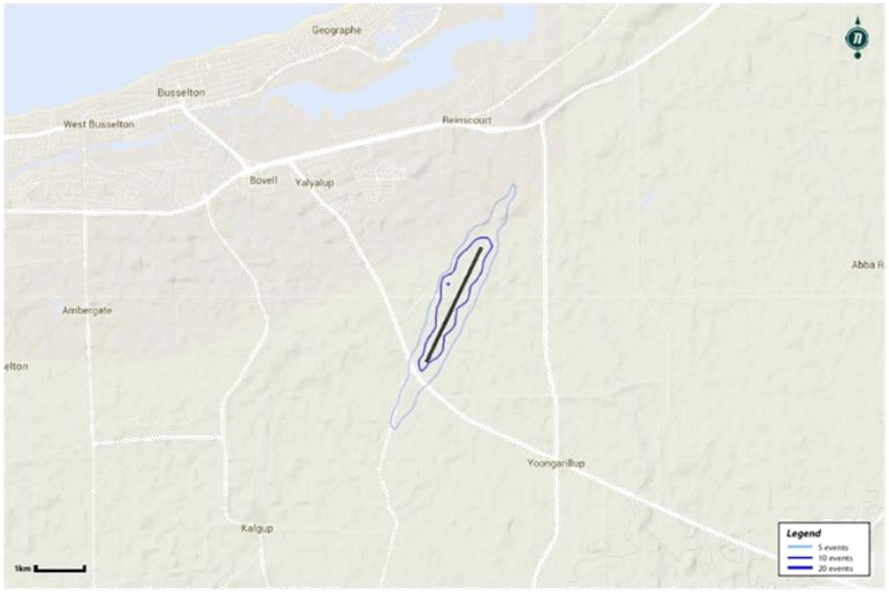


Figure 37: N80 Contours: 2022/23

N65 Contours: 2028/29

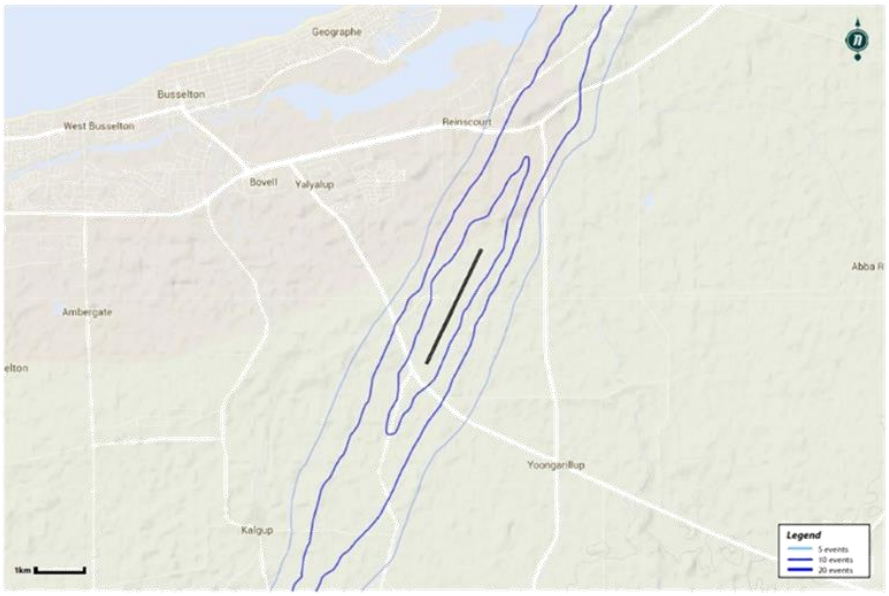


Figure 38: N65 Contours: 2028/29

N70 Contours: 2028/29

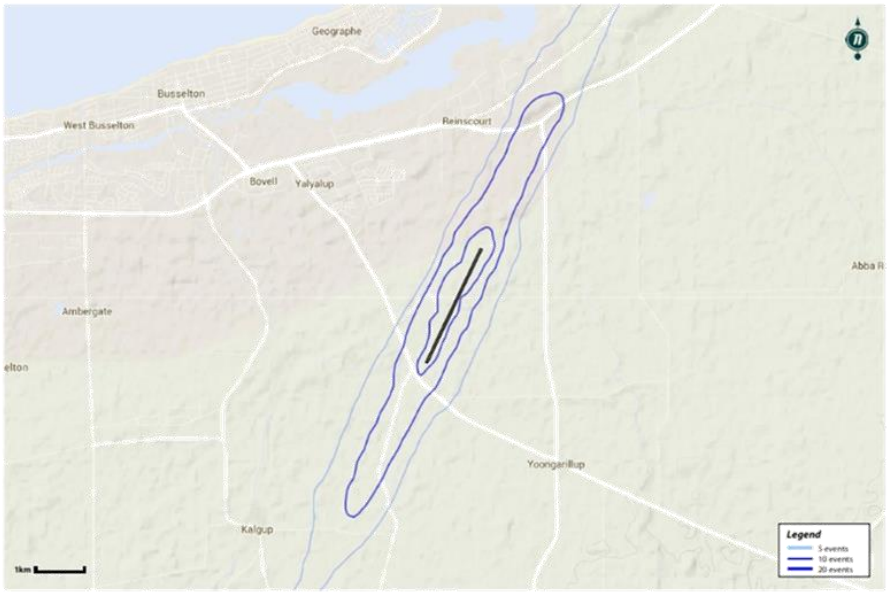


Figure 39: N70 Contours: 2028/29

N75 Contours: 2028/29

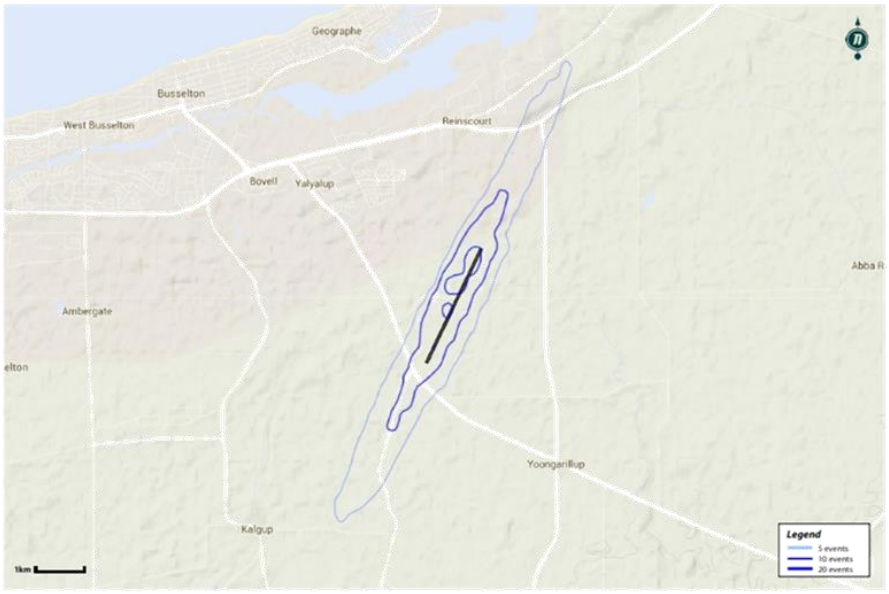


Figure 40: N75 Contours: 2028/29

N80 Contours: 2028/29

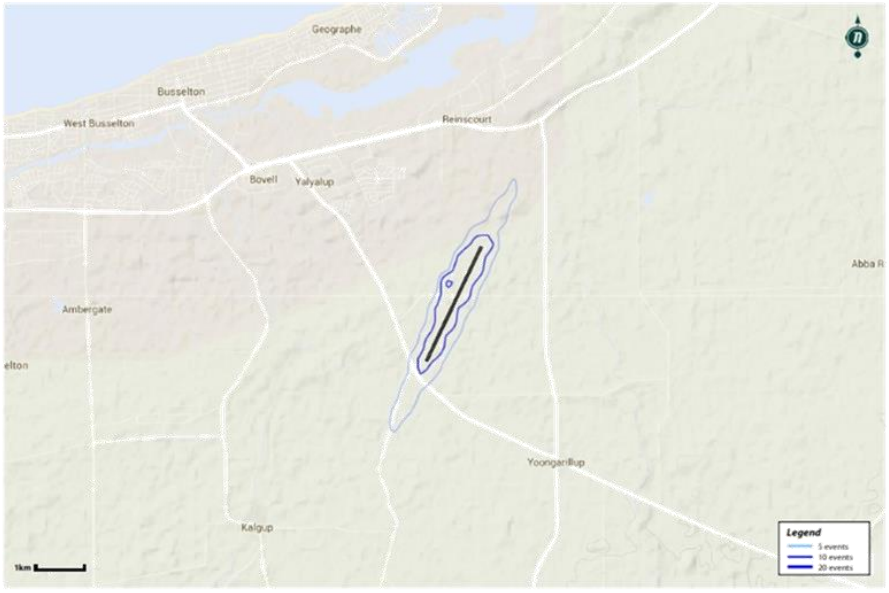


Figure 41: N80 Contours: 2028/29

N65 Contours: 2038/39

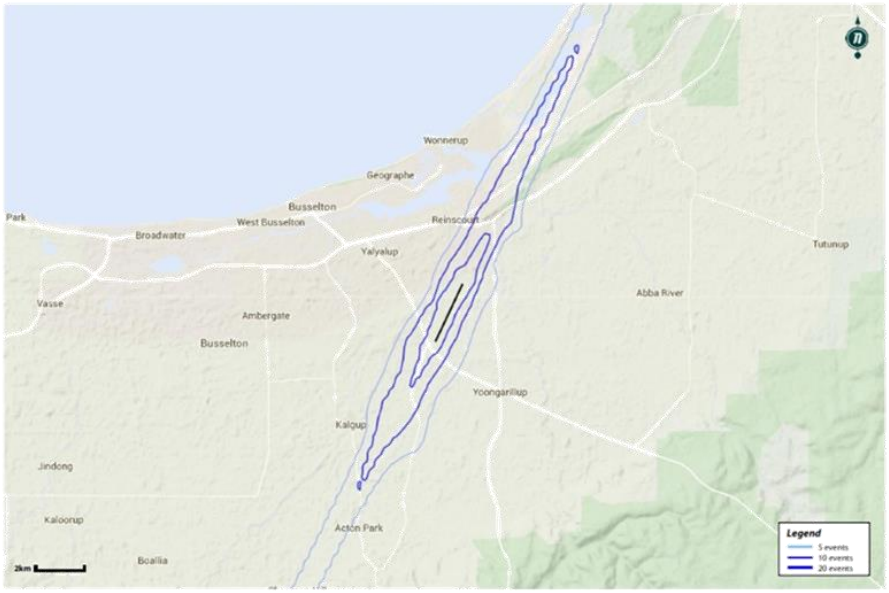


Figure 42: N65 Contours: 2038/39

N70 Contours: 2038/39

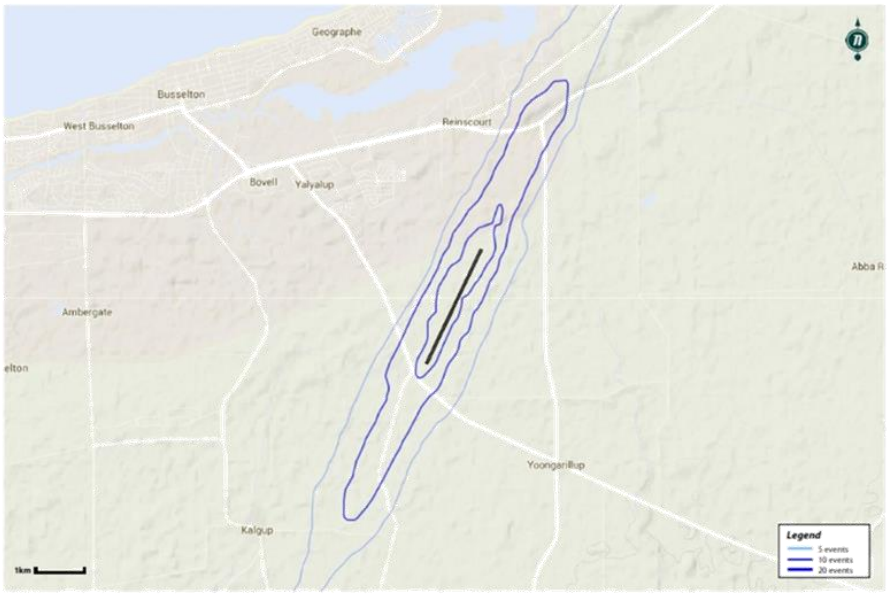


Figure 43: N70 Contours: 2038/39

N75 Contours: 2038/39

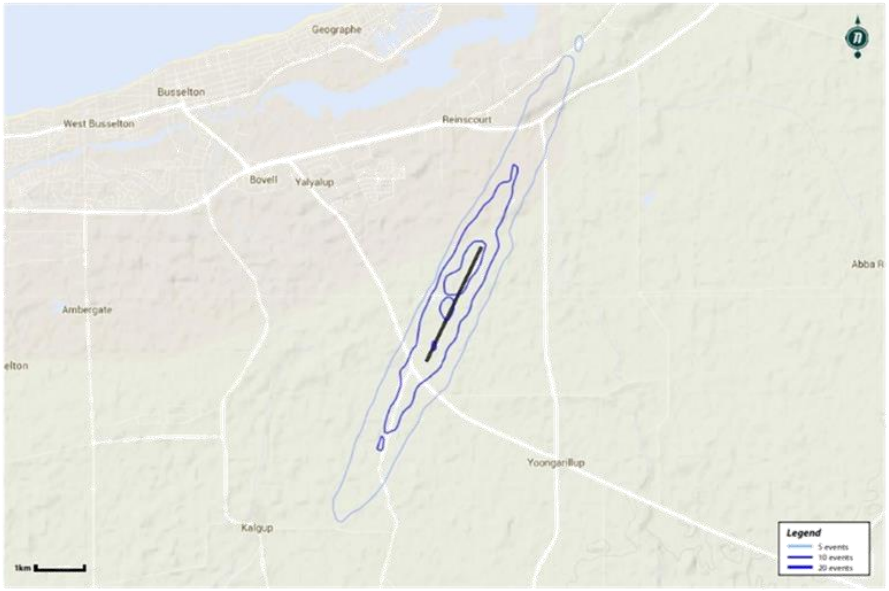


Figure 44: N75 Contours: 2038/39

N80 Contours: 2038/39

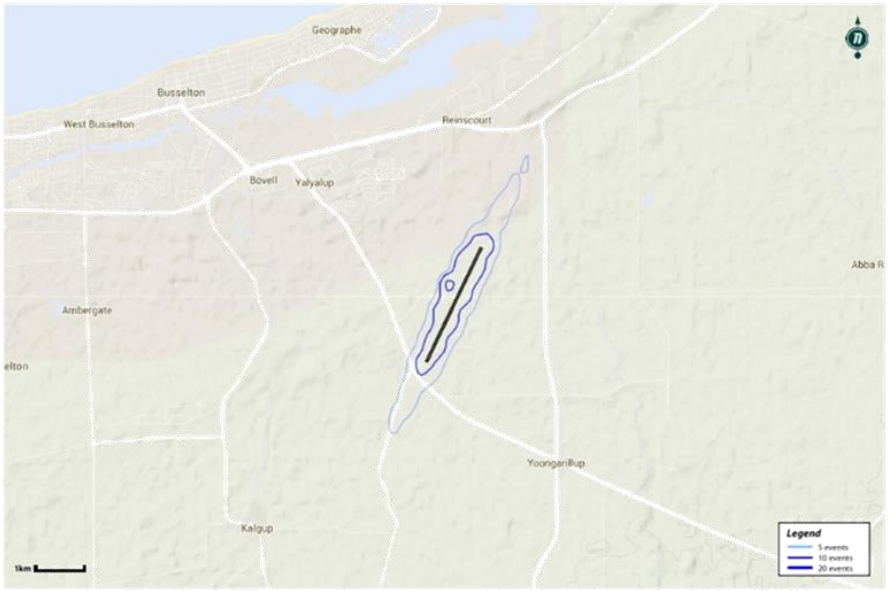


Figure 45: N80 Contours: 2038/39

Appendix C: 40-50 Year Forecast

The following section contains the results of noise simulations for an additional forecast, produced as an addendum to the original report. The 40-50 year forecast is produced by doubling the traffic forecast for 2038/39 and is intended as an indicative view of BMRRA's long term development.

ANEC 40-50 Year Forecast

Figure 46: ANEC 40-50 Year Forecast

N65 Contours: 40-50 Year Forecast

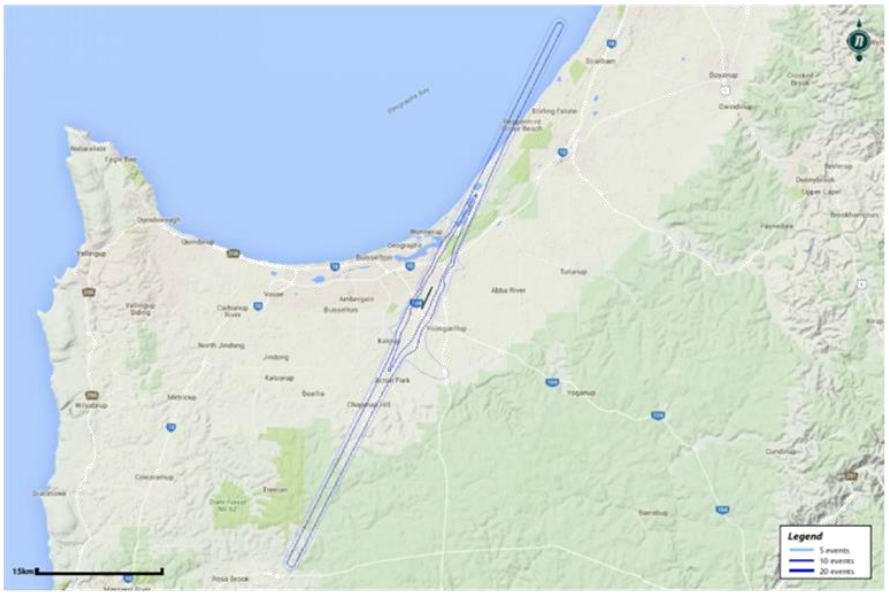


Figure 47: N65 Contours: 40-50 Year Forecast

N70 Contours: 40-50 Year Forecast

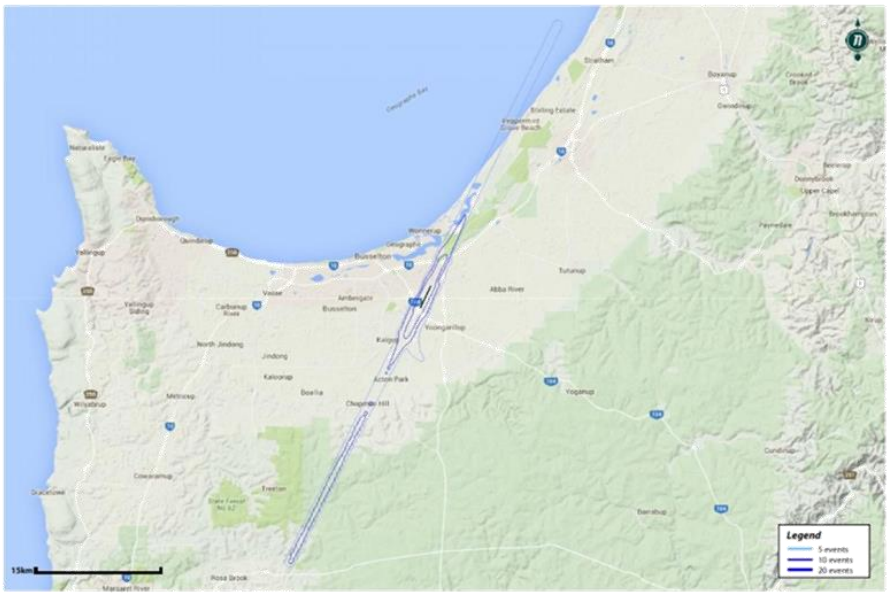


Figure 48: N70 Contours: 40-50 Year Forecast

N80 Contours: 40-50 Year Forecast

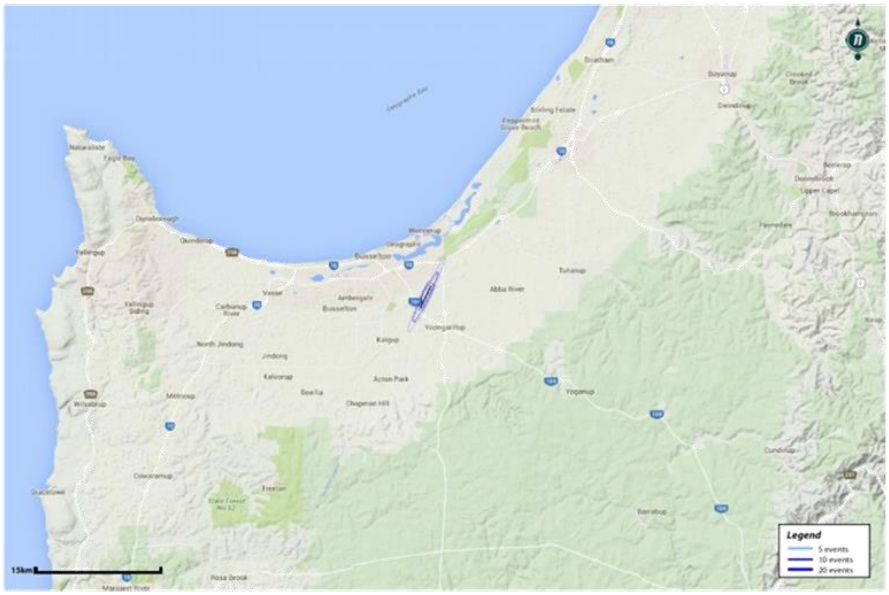


Figure 49: N80 Contours: 40-50 Year Forecast


to70

9 May 2016

Jennifer May
Manager Commercial Services
City of Busselton
Locked Bag 1
BUSSELTON WA 6280

Our ref: 61/33115 156257
Your ref:

Dear Jenny

Busselton-Margaret River Regional Airport
Peer Review of Noise Modelling

GHD Pty Ltd (GHD) has completed a peer review of noise modelling contours (ANECs, N65, N70, N75, N80 and LAmax contours) recently prepared for the proposed Busselton-Margaret River Regional Airport development and reported in *Noise Modelling Report – Busselton Margaret River Airport*, completed by To70 Aviation (Australia) Pty Ltd (To70), dated December 2015.

1 Scope of work

The scope of works completed by GHD was as follows:

- Reviewed and assessed the data sources and attribution for aircraft movement forecasts, aircraft type selection and flight paths/tracks, track maps with labels and track assignment assumptions, details of circuit operations, stage lengths for departures and forecast horizons.
- Reviewed and assessed airport setup, runway description, temperature, headwind and humidity assumptions, calculations of airport capacity runway usage assumptions, day/night split assumptions and sources used as input for the INM model.
- INM model setup including version, aircraft type selection, details of terrain files (if used), base map coordinate systems etc.
- Documentation of inputs and outputs.

GHD completed a desktop peer review of To70 generated outputs; including:

- ANECs (standard) for the Busselton Regional Airport Master Plan 2015 aerodrome infrastructure / operations projected for twenty (20) years.
- N65, N70, N75, N80s for the following scenarios:
  - Master Plan (2015) aerodrome infrastructure / operations 2017/2018
  - Master Plan (2015) aerodrome infrastructure / operations 2022/2023
  - Master Plan (2015) aerodrome infrastructure / operations 2027/2028
  - Master Plan (2015) aerodrome infrastructure / operations 2037/2038
- ANEC (standard) for a 40-50 year projection (doubling of the 20 yr traffic forecast)

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- N65 and N70 for a 40-50 year projection (doubling of the 20 yr traffic forecast)
- LAmax contours using the Master Plan (2015) infrastructure for the following design aircraft:
  - Fokker100 (approach & departure for 03 and 21)
  - A320 (approach & departure for 03 and 21)
  - B737-800 (approach & departure for 03 and 21)

2 Peer review report and close out comments

GHD has issued the report *Busselton-Margaret River Regional Airport - Peer Review of Noise Modelling*, dated March 2016.

Comments from the peer review report have been collated into a comments table, which incorporates a response to the peer review comments from To70 and a close out comment from GHD as peer reviewer. The close out comments table is attached to this letter.

3 Noise modelling to inform environmental approvals

City of Busselton has requested GHD to comment, as an additional scope item, following completion of the peer review, on the suitability of the noise modelling for informing environmental approvals.

The use of Australian Noise Exposure Concept (ANEC) (Australian Noise Exposure Forecast (ANEF)) and Nxx (number above) contours is considered the conventional approach to providing information on aircraft noise in Australia for both land use planning and assessing aircraft noise impacts at Australian airports as referenced by the Federal Government Department of Infrastructure and Regional Development.

The resultant Nxx (N65, N70, N75 and N80) noise modelling contours do not extend to any populous areas for modelled scenarios for 2018/19, 2022/23 and 2028/29. The noise modelling demonstrates that noise impacts from forecast aircraft movements are not predicted to impact on residential areas.

The noise modelling has been completed based on forecast air traffic levels provided by City of Busselton. The future forecasts have been based on a number of assumptions and may change. Indications from City of Busselton are that air traffic forecasts are conservative and the forecast activity levels may never be realised in practice. As such, noise modelling contours produced can be considered as worst case (as is a typical requirement for noise modelling studies to inform environmental approvals).

In addition, peer review has found on several occasions older model aircraft have been used as representative of newer models of aircraft. Old model aircraft are typically louder than new models, resulting in higher predicted noise levels.

Based on the peer review undertaken, GHD concludes that the noise modelling completed is suitable for informing environmental approvals and presents a representative prediction of noise levels from the proposed development of Busselton-Margaret River Regional Airport.

4 Closing

Thank you for engaging GHD to undertake the peer review of noise modelling for the proposed Busselton-Margaret River Regional Airport development.

Please contact the undersigned should you require further information or assistance in relation to this peer review.

Kind regards

James Forrest
Principal Environmental Scientist / Team Leader – Air & Noise Assessments (WA)
Service Line Leader – Air & Noise (Australia, Asia Pacific, United Kingdom & Middle East)
08 6222 8380 / 0406 522 496

7. GENERAL DISCUSSION ITEMS

8. NEXT MEETING DATE

Friday, 29 July 2016

9. CLOSURE