Australian Government
Civil Aviation Safety Authority
www.casa.gov.au

Pilbara Region Airspace Review

August 2023

File Reference: OP20/9

Document Reference: D23/132629

Document control

Version	Issue/Nature of Revision	Date
0.1	Initial draft	May 2020
0.2	Peer Review Draft	June 2020
0.3	Management review	June 2020
0.4	Stakeholder exposure draft	June 2020
0.5	Stakeholder exposure draft – peer comments	November 2020
0.6	Revised document and update data	April 2023
0.7	CASA management review	June 2023
0.8	BM ANAA review	July 2023
0.9	Draft report	August 2023
0.10	EM NOS comments	August 2023

1 Executive Summary

The *Airspace Act 2007*[1] (Act) provides the Civil Aviation Safety Authority (CASA)[2] with the authority to administer and regulate Australian-administered airspace and authorises CASA to undertake regular reviews of existing airspace arrangements.

The CASA Office of Airspace Regulation (OAR) conducted an airspace review within a 100 nautical mile (NM) of Coondewanna Airport (Coondewanna). This area is referred to as the Pilbara Region for the purpose of this review. The review examined the airspace architecture, airspace classification and the services within that airspace to ascertain the appropriateness for all airspace users from the surface up to Fight Level (FL) 125[3].

The study utilises CASA's regulatory philosophy which considers the primacy of air safety, while considering the environment, security, cost and is consistent with the Australian Airspace Policy Statement (2021) and the Minister's Statement of Expectations (2022).

The review included quantitative and qualitative analysis of:

- Aerodrome traffic data.
- Airspace design.
- Australian Transport Safety Bureau (ATSB) incident data.
- Airservices Australia (Airservices) incident and movement data; and
- Stakeholder consultation.

Aviation operations within the Pilbara Region are predominantly focussed on mining fly-in/fly-out (FIFO) operations, however, tourism and other agriculture industries utilise aviation in this area. The mining region is a significant primary sector industry and contributor to the Australian economy providing export income, employment and royalty payments.

Based on the available data of 11 certified aerodromes, between 2016 to 2022, total aircraft movement increased 33.3% from 24,624 to 32,821 and passenger movements increased 38.5% from 1,370,013 to 1,898,337.

Continued growth within the resource sector has resulted in additional aviation projects being constructed or are in the process of being commissioned. When operational, these new aerodromes will impact the complexity for users within this airspace.

1.1 Summary of conclusions

The OAR has undertaken a pragmatic, practical and proportionate approach in relation to the recommendations and observations related to the safety of air navigation in the review area.

The airspace classification within the Pilbara Region has been assessed by CASA as appropriate.

The airspace review found:

- Communication limitations in the area impact situational awareness. Very high frequency (VHF) radio communications are limited at some lower levels due topography and shielding.
- High frequency (HF) radio communication is available. HF communications are relayed and may be delayed due to operations separate from air traffic control (ATC).
- Frequency congestion is regularly experienced by users of the airspace on HF and VHF due to repeated transmissions, required broadcasts and the preference of users to use VHF.

[1] Federal Register of Legislation https://www.legislation.gov.au/Details/C2016C00178
[2] A full list of acronyms and abbreviations used in this report can be found in Annex A.
[3] A flight level is an altitude at international standard atmospheric pressure (1013 hectopascals (hPa)) that is expressed in hundreds of feet. Flight levels are used to ensure vertical separation between aircraft, despite natural local variations in atmospheric air pressure. In Australia, flight levels are utilised above 10,000 feet (FT) above mean sea level (AMSL).

- Some aircraft use satellite phones due to the limitations of HF. This impacts the situational awareness of operators in the area.
- Surveillance in the review area is based on automatic dependent surveillance – broadcast (ADS-B). ADS-B units are located at Newman and Paraburdoo which limits the surveillance coverage away from these areas.
- The production of a terminal area chart (TAC) specific for the Pilbara Region would provide support to users in the area.
- The development of a Pilbara Aviation Operator's Forum would enable greater access to information by varied stakeholders in the Pilbara Region.

1.2 CASA actions

CASA will undertake the following actions and follow-up on the observations, or opportunities to enhance services identified through CASA's analysis of the reviewed airspace:

Action 1:

The Office of Airspace Regulation facilitate the establishment of a Pilbara Operator's Safety Forum including all relevant stakeholders from airlines, aerodromes, resource companies and service providers (This action has been completed and is closed).

Action 2:

CASA will request that Airservices Australia publish a Terminal Area Chart (TAC) for the Pilbara Region by May 2024 (This recommendation has been actioned).

Observations/Opportunity to enhance regional services.

1. Improved VHF and surveillance capabilities at lower levels within the review area would lead to increased situational awareness and operational efficiency. Airservices Australia is best placed to explore opportunities to enhance these capabilities at lower levels within the review area. CASA will engage Airservices Australia on this as an ongoing matter.
2. CASA will, with assistance from Stakeholder Engagement Division and Airservices Australia, verify the ALAs shown on the Pilbara TAC to increase pilot awareness of nearby airstrips operating in the area. Operators who want their ALA to be promulgated in aeronautical information publications should provide information to Airservices Australia via the Aircraft Landing Area (ALA) / Helicopter Landing Site (HLS) Information Form. Alternatively, unverified ALAs should be examined with a view to remove these locations from the Pilbara TAC effective June 2025.[4]
3. The CTAF frequencies for Fortescue Dave Forrest and Christmas Creek should be published on the ERC-L8 (This matter has been actioned and is closed).
4. Aerodrome operators in nearby locations should examine having similar frequencies operating within the vicinity of other nearby aerodromes to assist with the situational awareness of pilots operating within that area. (This matter has been actioned and is closed).

[4] Civil Aviation Safety Regulation Part 175 — Airservices and You - Airservices (airservicesaustralia.com)

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2 Introduction

The Office of Airspace Regulation (OAR) within the Civil Aviation Safety Authority (CASA) has conducted an airspace review (the review) within a 100 nautical mile (NM) radius of Coondewanna airport (Coondewanna). For the purpose of this review, this area will be referred to as the Pilbara Region. The review examined the airspace architecture, airspace classification and the services within that airspace from the surface to flight level (FL) 125.[5]

The OAR is responsible for the administration and regulation of Australian-administered airspace, in accordance with section 11 of the *Airspace Act 2007* (Act). Section 12 of the Act requires CASA to foster both the efficient use of Australian-administered airspace and equitable access to that airspace for all users. CASA must also consider the capacity of Australian-administered airspace to accommodate changes to its use and national security. In exercising its powers and performing its functions, CASA must regard the safety of air navigation as the most important consideration.[6]

Section 3 of the Act states 'the object of this Act is to ensure that Australian-administered airspace is administered and used safely, considering the following matters:

- protection of the environment.
- efficient use of that airspace.
- equitable access to that airspace for all users of that airspace.
- national security.

2.1 Overview of Australian Airspace

Australian airspace classifications accord with Annex 11 of the International Civil Aviation Organization (ICAO) and are described in the Australian Airspace Policy Statement (AAPS). Australian airspace is classified as Class A, C, D, E and G depending on the level of Air Traffic Service (ATS) required to best manage traffic safety and efficiency. Government policy allows the use of Class B and Class F airspace, however, these are not currently used in Australia. The airspace classification determines the category of flights permitted, aircraft equipment requirements and the level of ATS provided. Annex B provides details of the classes of airspace used in Australia. Within this classification system, aerodromes are either controlled (i.e. Class C or Class D) or non-controlled (Class G).

2.2 Purpose and Scope

The purpose of the review was to satisfy CASA the airspace architecture, classification and the services within the reviewed area are safe and appropriate for all users of the airspace.

The scope of the review shall include:

- Airspace classification and architecture which allows the air navigation service provider (ANSP) to provide air traffic services safely and effectively.
- Airspace architecture which is appropriate to the region's aviation activities.
- An evaluation of air routes as applicable to the objectives.
- An evaluation of existing infrastructure to effectively support communication, navigation and surveillance in the volumes of airspace operating in the region.
- An analysis of risks supported by safety incident reporting from the ANSP and the Australian Transport Safety Bureau (ATSB).
- Restricted areas (RAs) and Danger Areas (DAs) and their impact on traffic flow; and
- Other issues determined by the review team to be applicable to the objectives.

[5] A flight level is an altitude at international standard atmospheric pressure (1013 hectopascals (hPa)) that is expressed in hundreds of feet. Flight levels are used to ensure vertical separation between aircraft, despite natural local variations in atmospheric air pressure. In Australia, flight levels are utilised above 10,000 feet (FT) above mean sea level (AMSL).
[6] Civil Aviation Act 1988, section 9A – Performance of Functions

3 Background

The airspace review examined the aerodromes and aircraft landing areas (ALAs) within the Pilbara Region, analysing aircraft and passenger movement data, incident reports, stakeholder information and material relevant to the review.

Historically, aircraft fly into and out of specific locations such as Newman and Karratha. Passengers were then transported from these hubs to mining locations which resulted in lengthy travel times for staff, impacting rostering and the productivity of the mine. Currently, mining companies are investing in establishing aerodromes or ALAs that enable aircraft to land closer to the mine sites, to increase efficiencies at these locations.

Within the Pilbara Region there are currently 11 certified aerodromes and 19 ALAs with others being proposed for development. All these airfields are located within Class G uncontrolled airspace. The area is remote and the topography varies around each location placing limitations on surveillance and communication coverage. At some aerodrome locations aircraft at one runway end may not be visible to aircraft at the other end of runway.

Between January 2016 to December 2022, total aircraft movement increased 33.3% from 24,624 to 32,821 and passenger movements increased 38.5% from 1,370,013 to 1,898,337.

Continued development projects within the review area are expected to increase aircraft and passenger movements. As at March 2023, an additional six new airfields at various locations in the Pilbara Region are being developed or planned for development. The result of these new aerodromes will increase airspace congestion, impact terminal instrument flight procedures and increase frequency congestion within Class G airspace.

There are no RAs or DAs in the review area. There are several blasting symbols which coincide with mining sites promulgated in various aeronautical information publication (AIP) documents.

4 Aerodromes and aircraft landing areas

The establishment and ongoing operation of aerodromes within the Pilbara Region Review area is predominantly for mining purposes, however, tourism and various agriculture industries also utilise aviation in the region. There are 11 certified aerodromes and 19 aircraft landing areas (ALAs) in the review area. The majority of ALAs marked on aeronautical charts are unverified i.e. marked as a broken circle because the information regarding these locations do not comply with a data product specification in accordance with Part 175 Aeronautical Information Management (Part 175 AIM).

There is no controlled airspace below FL125, therefore users operating below FL125 are provided an air traffic service in accordance with Class G airspace, where pilots are responsible for their own separation.

During the 12-month period between November 2021 and October 2022, Newman, Paraburdoo and Boolgeeda aerodromes represented 72.5% of total air transport movements and 48.5% of passenger movements recorded for the 11 certified aerodromes. Recorded movement data is detailed in Section 12 and Annex F.

Air transport and passenger movement data was not available for ALAs, however it is reasonable to assert the use of some ALAs is increasing as passengers are transported from these certified aerodromes to landing areas closer to individual mining operations by air.

Domestic passenger transport (PT) services operate to and from and between the aerodromes indicated below. These operators include but are not limited to Qantas, QantasLink, Network Aviation, Skippers, Virgin Australia and Alliance Airlines. The Royal Flying Doctor Service (RFDS) operates regular medical flights within the region.

The following diagram displays the aerodromes (cyan) and ALAs (green) within the review area where PT services directly or indirectly operate.

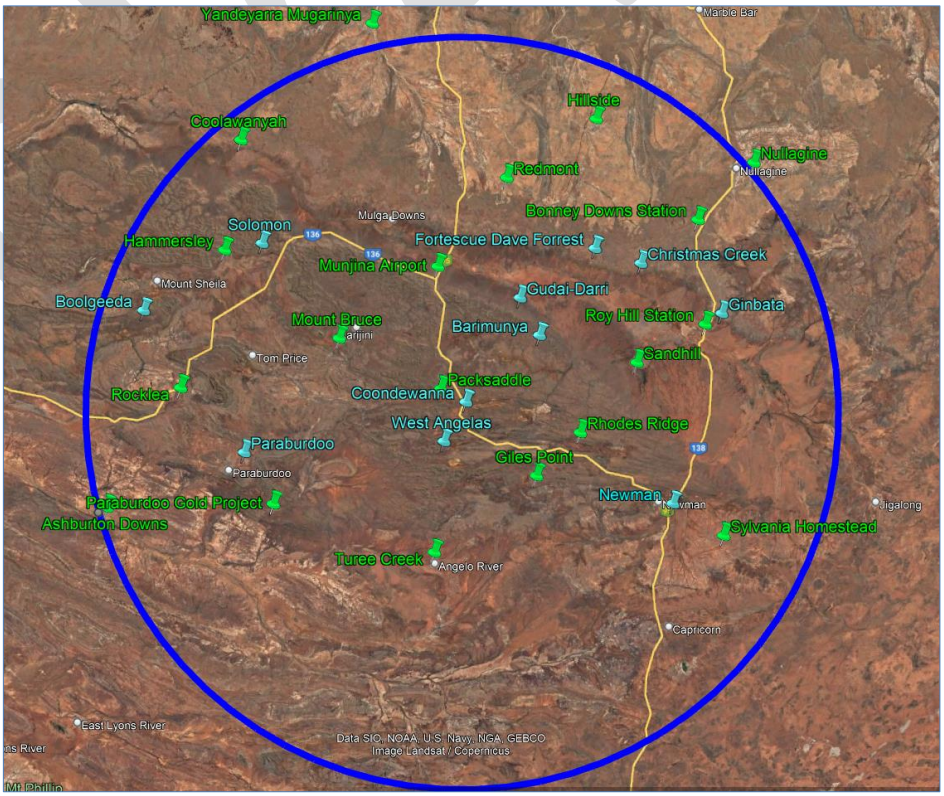

Figure 1 Aerodromes and aircraft landing areas within the review area[7]

[7] Pilbara Region review area Google Earth V 7.3.4.8248 (16 July 2021) Coondewanna, Western Australia. 22° 55' 59.00" S 118° 50' 39.00" E, Eye Alt 675.0km. Landsat Copernicus 2023. http://www.earth.google.com [30 March 2023]

A more detailed description of these locations, their runways and facilities can be found in Annex D and Annex E.

4.1 Aerodrome economics

Aviation activities within the review area revolve around mining, tourism and agriculture with the largest level of activity (passenger and aircraft movements) supporting mining.

Western Australia is the largest iron ore supplier in the world accounting for 38% of global supply in 2022[8]. Mining and the petroleum industry accounted for 94% of Western Australia's and 46% of Australia's income from total merchandise exports in 2019-2020.[9]

Mining and resource sectors create significant employment and investment in Western Australia and the transportation of the workforce can have local, State and national implications. The continued development of new sites in the Pilbara has to consider the cost of transporting workers to site to ensure operational efficiencies are maintained. Access to nearby airstrips or aerodromes reduces travel time and staff fatigue, increasing working roster arrangements and flexibility of flight times to meet demands.

The location of certified aerodromes in the review area enables direct flights to these locations and if required, onwards passenger movement to ALAs. These certified aerodromes comply with the applicable requirements detailed in the Manual of Standards Part 139 – Aerodromes (MOS139) including ongoing surveillance activities by authorised CASA staff.

There are several mining companies who own and/or operate certified aerodromes in the review area including BHP, Rio Tinto, Fortescue Metal Group and Roy Hill Mining.

There are a number of additional aerodromes under proposal for development to support mining operations. These aerodromes are expected to become certified and serviced by charter flights using instrument approach and landing procedures by 2028.

4.2 Certified aerodromes

Table 1 lists the certified aerodromes located within the review area. Aircraft and passenger movements are detailed in Section 12.

The topography does impact aerodrome operations, particularly relating to very high frequency (VHF) radio communications and surveillance coverage and discussed further in Section 10 and Section 9 respectively.

Aerodrome	Elevation (FT AMSL)	Aerodrome	Elevation (FT AMSL)
Newman	1,724	Solomon	2,008
Boolgeeda	1,870	Christmas Creek	1,454
Paraburdoo	1,406	Ginbata	1,409
West Angelas	2,346	Fortescue Dave Forrest	1,563
Barimunya	2,082	Gudai-Darrie Mine	1,479
Coondewanna	2,327		

Table 1: Certified aerodromes in review area

[8] Western Australia Iron Ore Profile – February 2023, Western Australian Government, WA Iron Ore Profile - February 2023.docx (live.com) [31 March 2023]
[9] Western Australian Mineral and Petroleum Statistics 2019-2020, Western Australian Government https://www.dmp.wa.gov.au/Documents/About-Us-Careers/Stats_Digest_2019-20.pdf retrieved 31 March 2023

4.3 Aircraft types at aerodromes

The majority of aircraft arriving at locations within the review area travel from the south west of Western Australia, including Perth (primarily), Busselton, Geraldton and Albany. There are flights arriving from Karratha, Port Hedland and Broome. Fortescue Metal Group Ltd report they are the only Pilbara-based mining company with flights between all its mine sites and the major communities of Karratha, Port Hedland, Broome, Kununurra and Fitzroy Crossing.[10]

The types of aircraft operating in the area vary in performance and passenger capacity. The number of aircraft that can operate within the area varies however movements are primarily determined by the mining roster at these locations. This can result in congestion at the aerodrome due to available space. Most aerodrome operations require prior permission and notification 20 minutes to estimated time of arrival (ETA).

Aircraft operating in the review area includes Airbus A320 (A320), Fokker 100 (F100), Boeing 737-800 (B738), Robinson 22 (R22) Robinson 44 (R44), Eurocopter AS350 (AS50), Pilatus PC12 (PC12), Cessna 510 (C510) business jet, Beechcraft Super King Air (BE20), Boeing 717-200 (B712), Embraer 120 Brasilia (E120), Cessna Caravan (C208), Swearingen Merlin (SW3) and Pilatus PC-24 business jet (PC24).

The following diagram displays common air routes in the review area (also refer Figure 4).

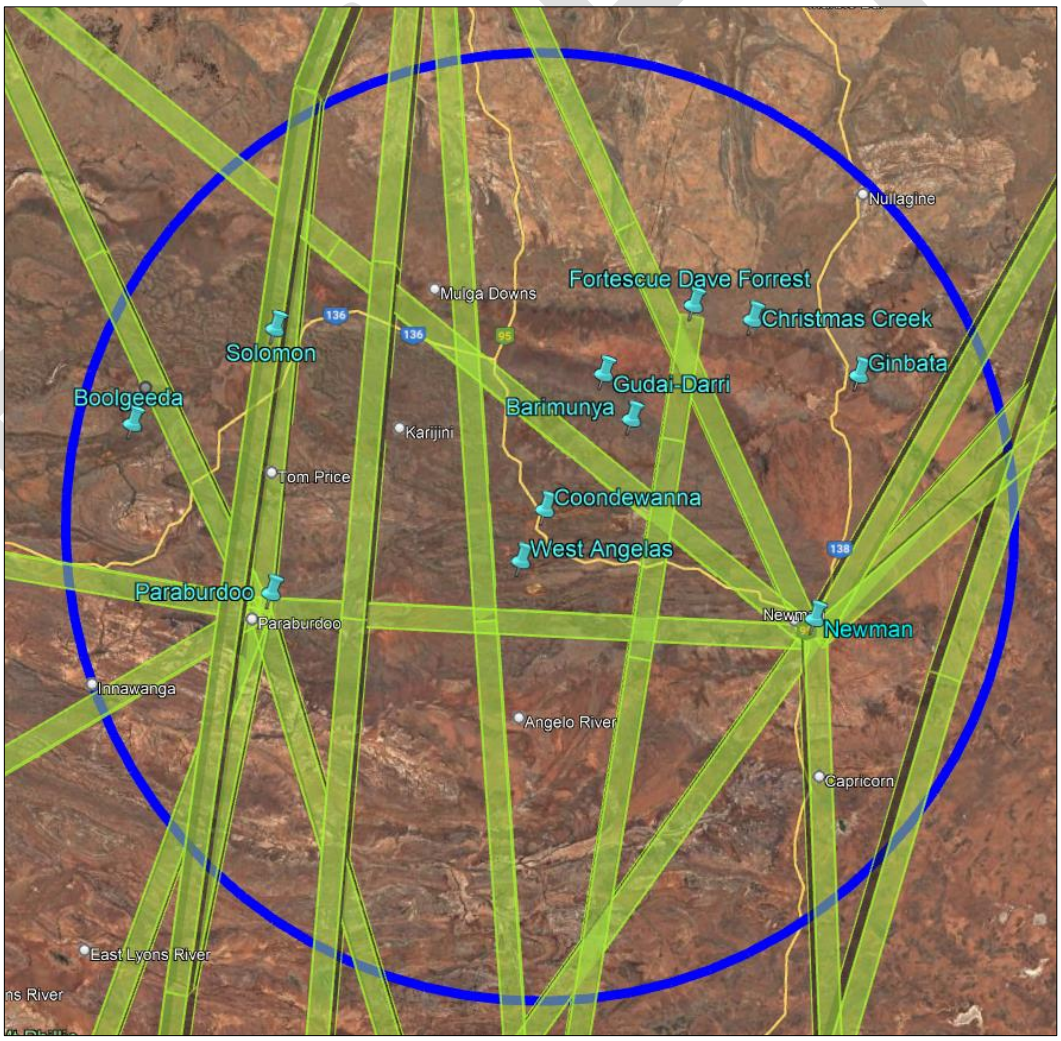

Figure 2: Certified aerodromes and air routes in review area[11]

[10] Fortescue takes flight from the South West | Fortescue Metals Group Ltd (fmgl.com.au) accessed 27/3/23

[11] Pilbara Region review area certified aerodromes Google Earth V 7.3.4.8248 (16 July 2021) Coondewanna, Western Australia. 22° 58' 07.00" S 118° 49' 19.00" E, Eye Alt 770.0km. Landsat Copernicus 2023. http://www.earth.google.com [31 March 2023]

4.4 Aircraft landing areas

There are several ALAs operating within the review area. Travel to and from these ALAs is undertaken by smaller fixed winged and rotary winged aircraft.

All the aerodromes and ALAs are located within Class G airspace. A number of the ALA runways have been overgrown and their level of use cannot be confirmed. However, the number of active ALAs are sufficient to contribute to the complexity of operations within the review area.

Additionally while the ALAs recorded in Annex E are predominantly involved with mining operations, there are ALAs involved in the support of agriculture and pastoral leased land, particularly to the north and south of where mining operations occur. Light aircraft and helicopter operations (R22) occur at these locations including low level operations for mustering purposes.

The following figure displays ALAs (green) and four large pastoral leases (yellow) within the review area.

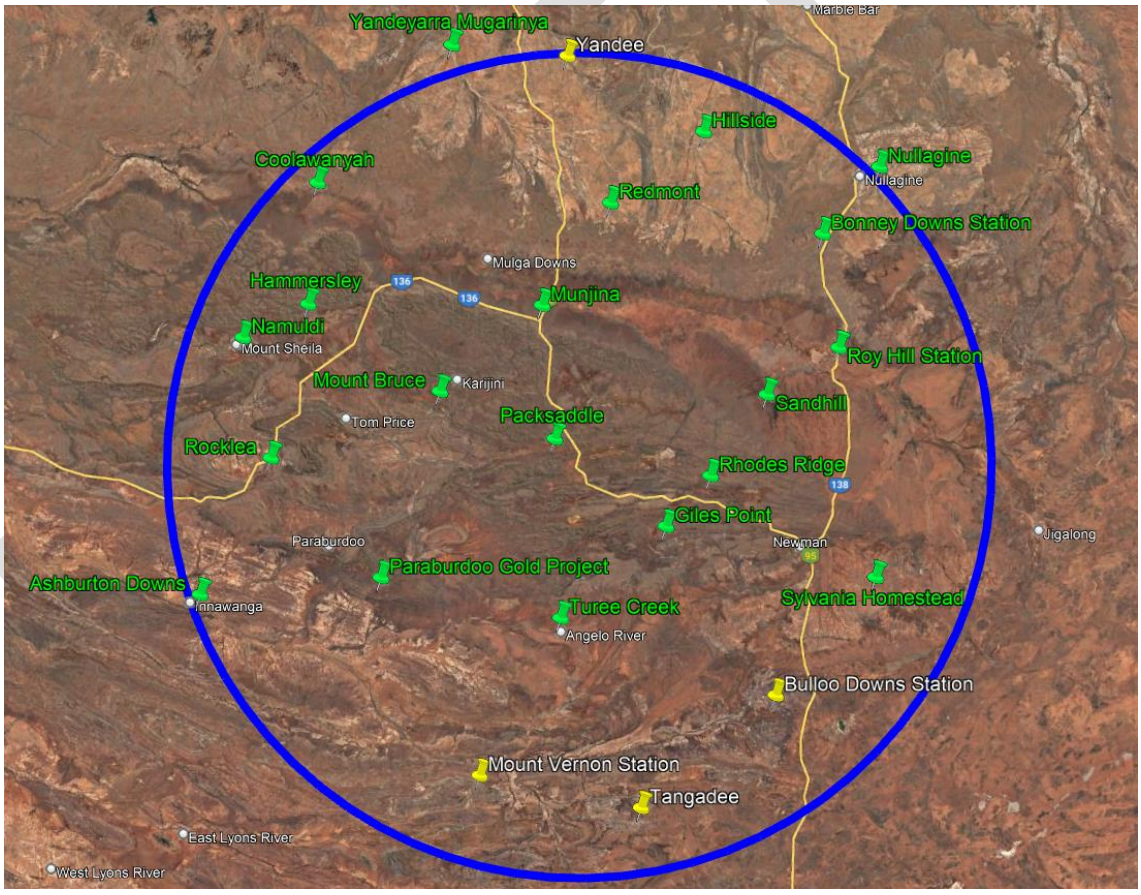

Figure 3: ALAs and pastoral lease areas within review boundary[12]

[12] Pilbara Region review area aircraft landing areas and pastoral areas Google Earth V 7.3.4.8248 (16 July 2021) Coondewanna, Western Australia. 22° 58' 07.00" S 118° 49' 19.00" E, Eye Alt 770.0km. Landsat Copernicus 2023. http://www.earth.google.com [31 March 2023]

5 Aeronautical information publication

The review identified some ambiguities, omissions or inconsistencies within the suite of aeronautical information publications. None of the identified issues were of a critical safety nature however the appropriate action was completed during the review process to publish updated information which will assist airspace users e.g. publication of CTAF for Fortescue Dave Forrest and Christmas Creek on the Enroute Chart Low (ERC-L) 8.

There were no identified errors in ERSA.

5.1 Terminal Instrument Flight Procedures

The Civil Aviation Safety Regulations Part 173 (CASR Part 173) establishes the regulatory standards for designing Terminal Instrument Flight Procedures (TIFPs). The Manual of Standards Part 173 – Standards Applicable to Instrument Flight Procedure Design (MOS173) has additional design standards not included in Procedures for Air Navigation Services – Aircraft Operation (PANS-OPS) and are differences adopted by Australia.

PANS-OPS procedures are for reduced visibility weather conditions when an instrument flight rules (IFR) pilot is dependent upon and guided by the aircraft instruments for flying.

The Obstacle Limitation Surface (OLS) is for aircraft operating under visual flight rules (VFR) within visual meteorological conditions (VMC). The OLS dimensions differ between whether the runway has an instrument approach available or whether the runway is certified only for VFR operations and circling approaches.

There are a number of promulgated overlapping TIFPs within the review area. Fortescue Dave Forrest and Christmas Creek TIFPs have been promulgated through exemption. Other overlapping TIFPs are promulgated for West Angelas and Coondewanna, Barimunya and Gudai-Darri Mine, Boolgeeda and Eliwana (which is outside the review area). The nominal flight paths of these procedures are published on the Pilbara terminal area chart (TAC)[13].

The development of additional aerodromes in the review area is likely to impact new TIFPs and MOS173 compliance regarding overlapping procedures.

Standard arrival routes (STARs) and standard instrument departures (SIDs) may enable suitably equipped aircraft to follow a predetermined route, which will facilitate an efficient use of airspace by aircraft and assist pilot's situational awareness.

[13] TAC-8 Pilbara Broome Airservices Australia effective 1 December 2022

6 Airspace

6.1 General

In May 2020, the upper limit of Class G airspace in the review area was lowered from FL180 to FL125. The overlying Class E airspace extends from FL125 to FL245 and Class A is from FL245 to FL600. The review focussed on reported occurrences within Class G airspace.

There are no restricted areas (RAs) or danger areas (DAs) in the review area. There are several blasting symbols associated with the resource industry and there are various notifications promulgated within the AIP regarding blasting times and contact details.

The airspace overlies a varying topography which presents challenges when establishing 'line of sight' for communication and surveillance purposes.

6.2 Airspace Structure

The Australian airspace classifications accord with ICAO Annex 11 Air Traffic Services and are described in the AAPS.

Class G airspace is non-controlled airspace where IFR and VFR flights are permitted. Flights do not need to contact ATC to enter or land but aircraft are subject to weather conditions, speed limitations below 10,000 FT AMSL and radio requirements. In Class G airspace, ATC provide a flight information service (FIS) which includes traffic information and advice for the safe and efficient conduct of flights to IFR aircraft and upon request and workload permitting to VFR aircraft.

In non-controlled airspace, ATC do not provide a control service and pilots remain responsible for separation from other aircraft and collision avoidance. The following methods are used by aircraft for separation purposes within non-controlled airspace:

- Climbing, descending, maintaining different altitudes and changes in heading.
- Referencing ground features such as roads, rivers, townships identifiable or landmarks such as rail lines, solar farms that are visible from the air.
- Navigation references such as a bearing or radial and/or distance or global positioning system (GPS) distance.
- Clock reference codes which assist with sighting aircraft.

6.3 Restricted and Danger Areas

As stated above there are no restricted or danger areas in the review area. The declaration and architecture for an RA or a DA are detailed in Annex C.

Historically, DAs were established around blasting locations. Overtime, these areas were removed and replaced with the blasting symbol currently used on aviation charts. Additional information regarding blasting was including in ERSA for the specific aerodrome location.

Given the limitations of VHF communication and surveillance capability and the number or types of aircraft operating in the Pilbara Region, the review examined the possibility to establish a DA. The purpose of the DA was to notify itinerant aircraft of the complexity of operations in the Pilbara however the matter required further examination of the impacts to all stakeholders.

7 Air Routes

The low level air route structure in the review area is structured on Newman and Paraburdoo aerodromes. The frequently used air routes are for aircraft travelling to or from Perth. The route structure also takes aircraft to or from Karratha, Port Hedland and Broome, located north west, north and north east, respectively of the review area.

The air routes provide the structure in which aircraft can operate within or through the review area. However when aircraft are seeking clearance into controlled airspace there are a number of factors which pilots and ATC must be aware of including applicable separation standards, time requirements, available surveillance and establishing communication in order to operate on these air routes. These factors can create delays particularly for aircraft arriving from or departing to the south of the review area.

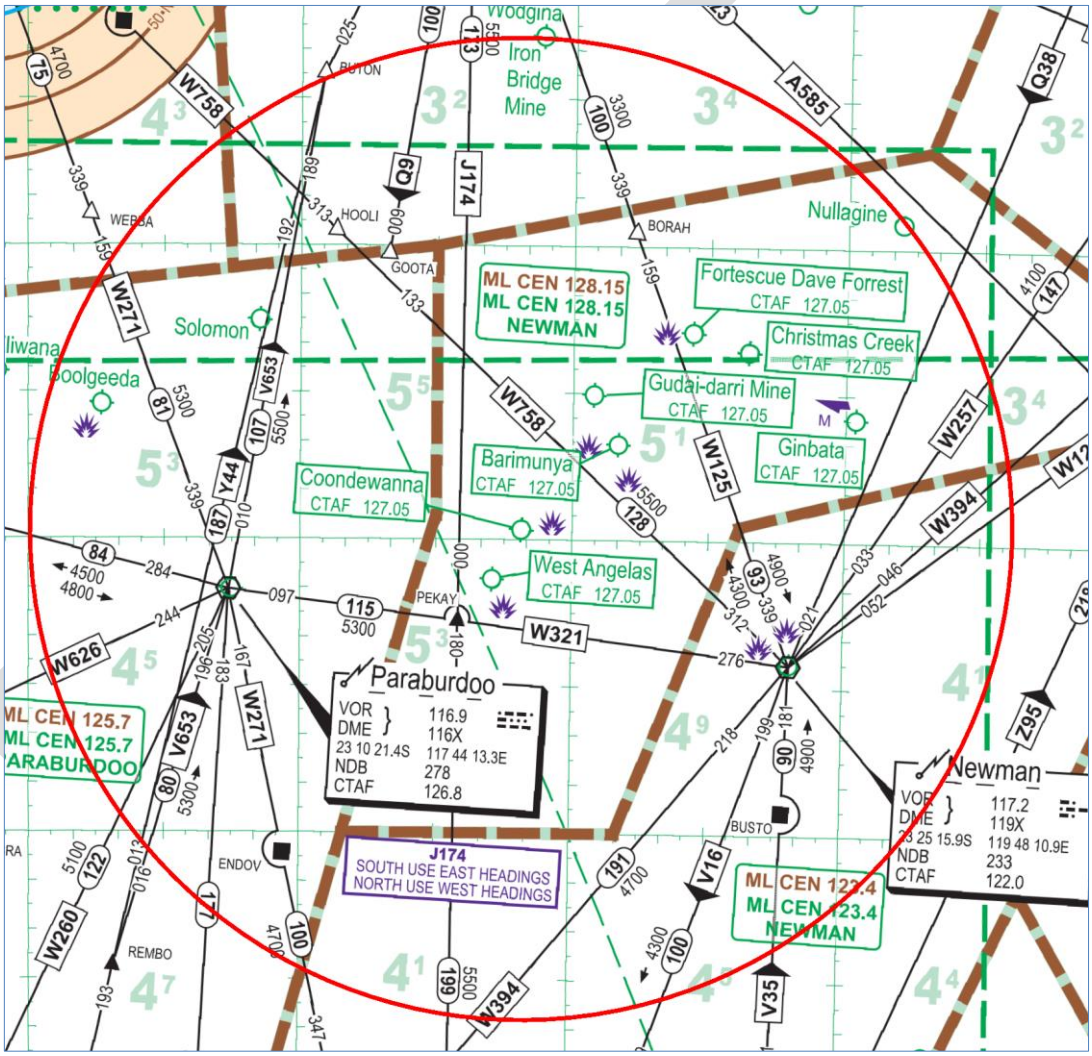

Figure 4 Low Level air route structure within the review area[14]

Stakeholder feedback indicated a review of the air routes in the review area could reduce track miles flown which would also improve the environmental impact of aviation operations.

[14] ERC-L 8 Airservices Australia effective 15 June 2023

8 Air Traffic Services

The airspace within the review area is Class G airspace. Air traffic services are provided by Airservices from the Melbourne Air Traffic Services Centre (Melbourne Centre) located at the Melbourne Tullamarine Airport (Melbourne). The following diagram depicts the frequency boundaries used by ATC within the review area. The review noted the ATC sectors are often combined which can increase ATC workload particularly in areas where users experience limitations to VHF radio communications.

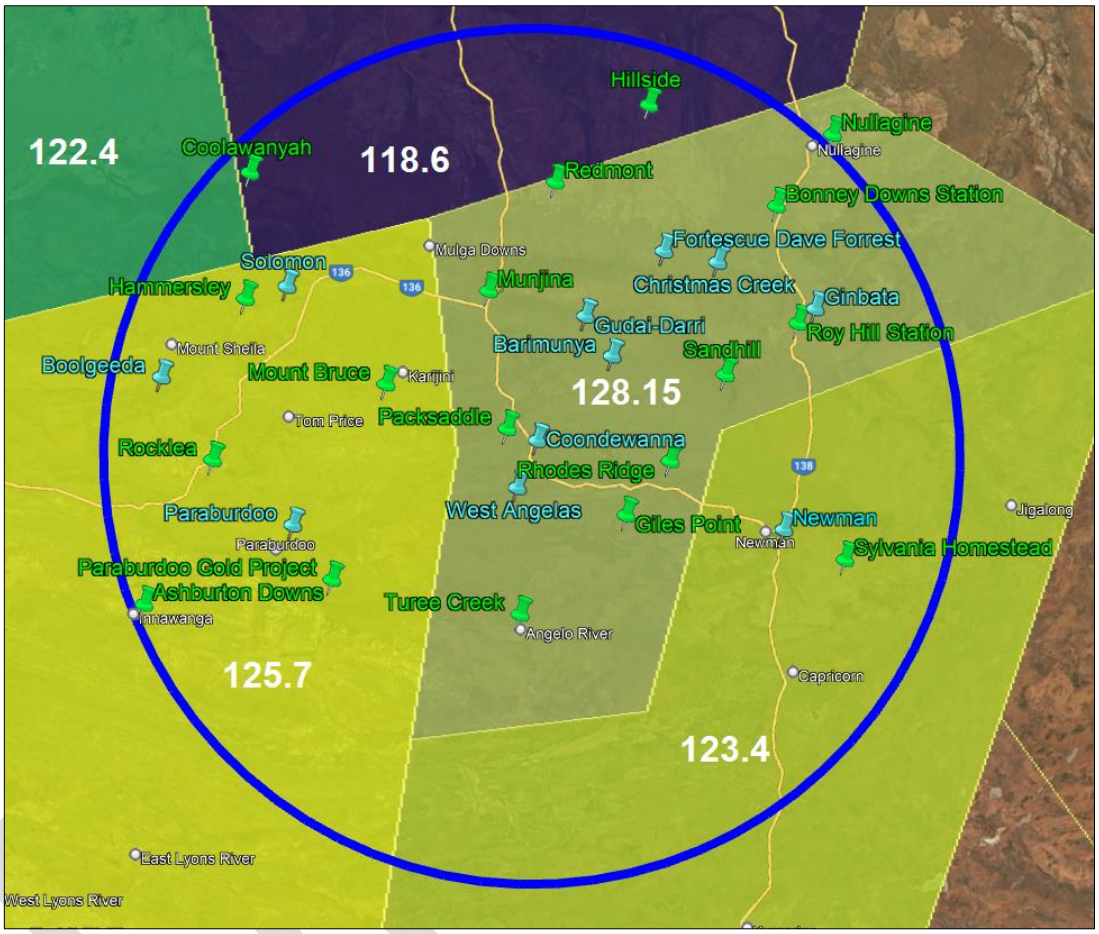

Figure 5: Frequency boundaries within the review area[15]

When users experience the limitations of VHF communications at lower levels, air traffic services are also relayed through high frequency (HF) radio communications. ATC are responsible for the provision of ATS and HF operators, being a third party communication and alerting post, are not responsible for aircraft separation. HF operators relay messages between ATC and pilots. This relay process does increase radio communication times during periods where multiple aircraft from different locations are landing, taxying, departing or seeking clearances to enter or leave controlled airspace.

When aircraft are on the ground, the establishment of 2-way VHF communications with ATC may not be possible until the aircraft is approximately 1,500 FT to 2,000 FT above the aerodrome i.e. 3,000 FT AMSL to 4,500 FT AMSL.

[15] Pilbara Region review area frequency sectors Google Earth V 7.3.4.8248 (16 July 2021) Coondewanna, Western Australia. 22° 58' 07.00" S 118° 49' 19.00" E, Eye Alt 800.0km. Landsat Copernicus 2023. http://www.earth.google.com [1 April 2023]

9 Surveillance

Surveillance in the review area is provided by automatic dependent surveillance – broadcast (ADS-B) which is a system whereby suitably equipped aircraft automatically broadcast their location. The data is received by Airservices' ground stations and can be displayed on ATC air situation displays (ASDs). This enables ATC to provide a radar-like surveillance service. The data can also be received by other suitably equipped aircraft for situational awareness and to enable detect and avoid capability.

ADS-B ground stations are located at Paraburdoo and Newman. Surveillance coverage varies dependent on altitude throughout the review area. The following diagram depicts the ADS-B coverage for aircraft operating at 5,000 FT AMSL within the review area.

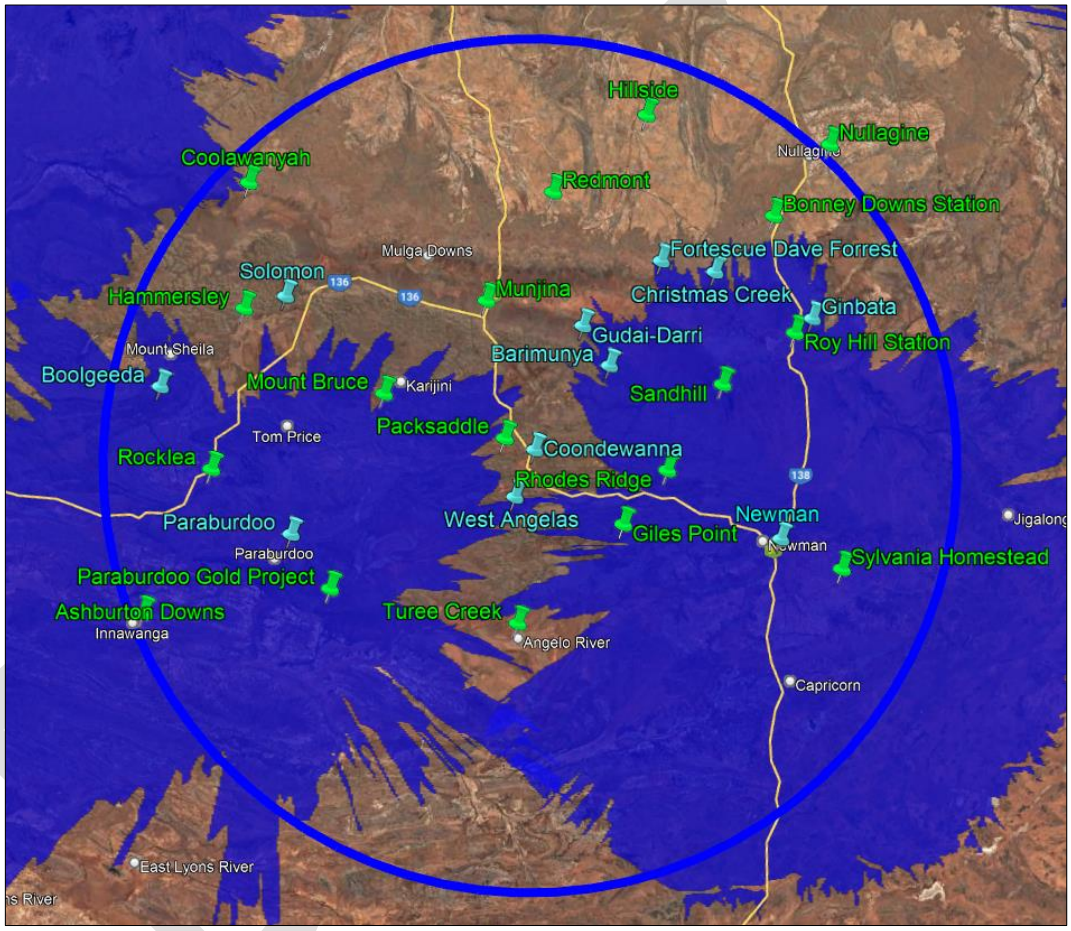

Figure 6: ADS-B coverage at 5,000 FT AMSL[16]

The above figure illustrates aircraft operating below 5,000 FT AMSL will have limited ADS-B coverage, except for those locations near the Newman and Paraburdoo ground stations. The majority of the review area does provide ADS-B coverage for aircraft operating at 10,000 FT AMSL however the northern sections of the review area, ADS-B surveillance is not available at this level (see Figure 7).

[16] ADS-B coverage 5,000 FT AMSL source Airservices Australia 2019; Google Earth V 7.3.4.8248 (16 July 2021) Coondewanna, Western Australia. 22° 58' 07.00" S 118° 49' 19.00" E, Eye Alt 800.0km. Landsat Copernicus 2023. http://www.earth.google.com [1 April 2023]

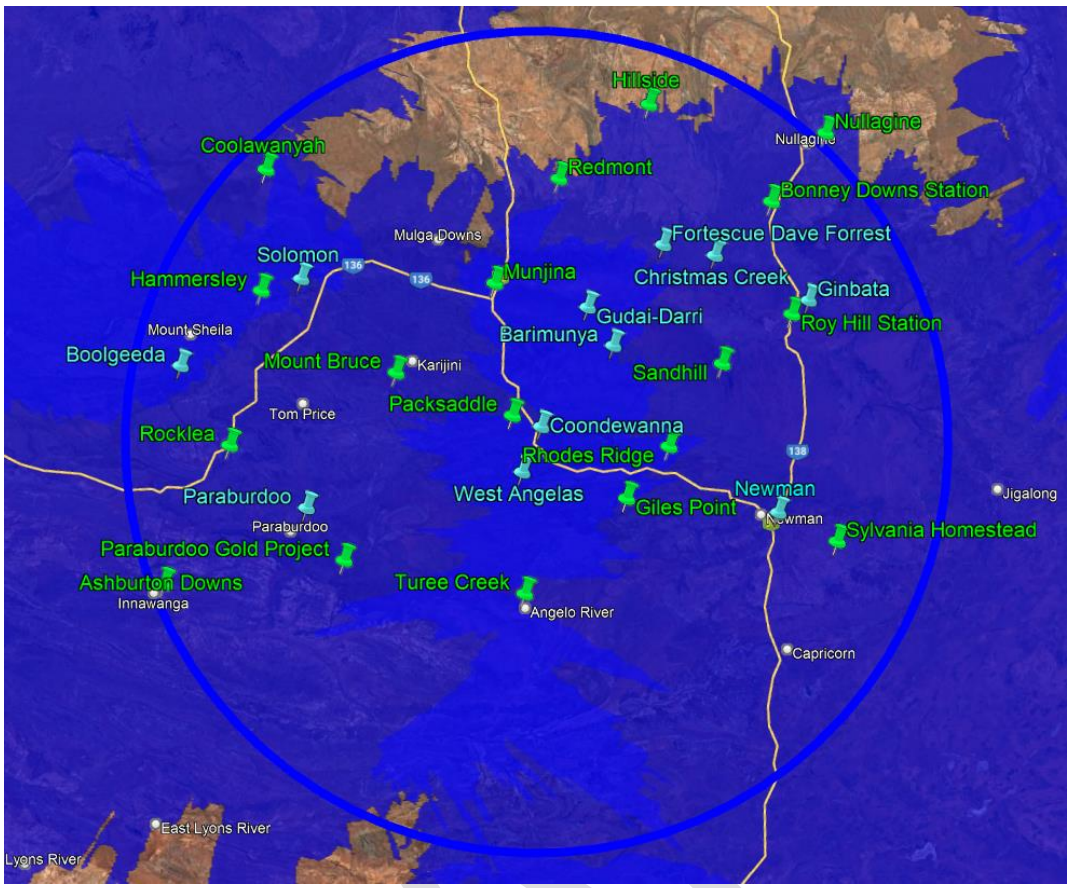

Figure 7: ADS-B coverage at 10,000 FT AMSL[17]

The diagrams show the majority of suitably equipped aircraft should be surveilled at or above 10,000 FT AMSL. However due to the climb rate and speed of aircraft there may be limited time between when the aircraft is under surveillance and entering Class E airspace. This may delay the aircraft being given a clearance, assuring aircraft separation or affect continuous climb operations, increasing the workload for ATC and pilots.

Airservices is continually enhancing ADS-B coverage nationally however these projects are subject to operational requirements and priorities. There are a number of infrastructure issues which must be considered prior to ADS-B infrastructure being added to the Pilbara region.

[17] ADS-B coverage 10,000 FT AMSL source Airservices Australia 2019; Google Earth V 7.3.4.8248 (16 July 2021) Coondewanna, Western Australia. 22° 58' 07.00" S 118° 49' 19.00" E, Eye Alt 800.0km. Landsat Copernicus 2023. http://www.earth.google.com [1 April 2023]

10 Communications

Civil Aviation Safety Regulations Part 171 (CASR 171) sets out the rules and standards for aeronautical telecommunications including communication and surveillance services and radio navigation services. Airservices is an approved Part 171 service provider.

Radio communication is achieved with the Pilbara review area by a combination of VHF and HF radio transceivers. Radio communication is essential and significantly reduces the risk to aviation operations.

VHF radio transmitters are located at Paraburdoo and Newman and require 'line of sight' communication. The topography within the review area impacts effective VHF radio communication for aircraft operating in the area which are then reliant upon HF to establish communication, develop or maintain situational awareness. Other factors impacting radio transmissions are atmospheric conditions, ionospheric absorption and other obstacles such as towers and tailing piles.

There are several entries promulgated in the AIP for locations within the review area detailing VHF radio communication limitations including aircraft not being able to hear other aircraft at nearby locations. Additionally, communication issues are present at ALAs and these are not listed in AIP.

Stakeholders reported the inability to directly communicate with other aircraft on the ground at nearby locations resulting in reduced situational awareness. Delays experienced on HF due to congestion or difficulties in understanding HF transmissions reduces situational awareness.

The additional placement of transmitting and receiving antennas can increase the effective communication range however due to the terrain shielding experienced in the review area, this may not adequately address all the VHF communication issues currently experienced. The following diagram displays the expected VHF coverage of the review area.

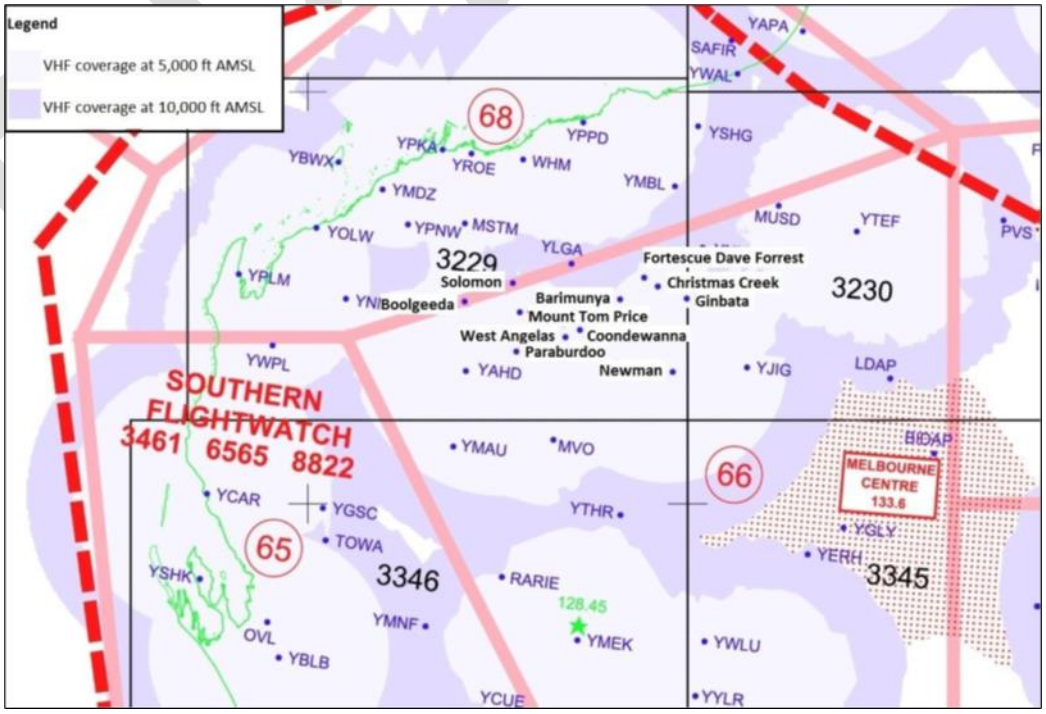

Figure 8: Expected VHF coverage north west Western Australia[18]

Stakeholder comments suggest reciprocal runway operations are commonly conducted when there is calm or light variable wind forecast at aerodromes. Such weather conditions provides

[18] Planning Chart Australia (PCA) Airservices Australia effective 1 December 2022

a pilot the option to land or take-off from either runway end. This requires consideration from following aircraft to determine the most suitable runway end for their operations and provides no predictability to approaching pilots into these aerodromes.

The review identified that pilots are, at times, using satellite phones to obtain traffic information and alert ATC of an IFR departure. The use of satellite phones is promulgated in AIP however this is not a standard practice and limits situational awareness of airspace users on frequency.

The continuing development of mines and certified aerodromes will increase air traffic operating the review area. The complexities experienced by users of the airspace will be exacerbated by additional aircraft operating in Class G airspace, relying upon effective radio communication to establish and maintain situational awareness where terrain and environmental factors impact radio transmissions.

11 Environment

In keeping with CASA's obligations under subsection 9A(2) of the *Civil Aviation Act 1988*, and with particular regard to the relevant provisions of the *Australian Airspace Policy Statement 2021*, CASA administers airspace as far as practicable in a manner that contributes to the protection of the environment.

The airspace structure within 100 NM of Coondewanna was reviewed to consider current environmental impact and there were no issues identified. Matters relating the interactions with birds and wildlife are the responsibility of the airport's wildlife management program and are normally detailed within the respective Aerodrome Operations Manual.

12 Traffic

12.1 General

The aircraft and passenger movements are based on the data recorded at certified aerodromes. New certified aerodromes require time to understanding developing trends. There is limited available data recorded for ALAs, which are essentially private airfields that require prior permission to operate from these locations.

Aircraft and passenger movements in the Pilbara Review area are primarily based on shifts at mining locations. This does lead to busy periods of aircraft operations within the airspace.

The area north and west of Newman has the highest concentrations of aerodromes and airfields owned and operated by private companies as well as local Councils and Shires, within Australia. Forecast development includes up to six additional airports by 2028, resulting in increased passenger and aircraft movements.

Aircraft and passenger movement data shows increased totals from the previous year. COVID-19 did have some impact on staff movements however this was only short-term. Generally the high global demand for minerals has increased the price of commodities, in turn, increasing production which requires a commensurate increase in aircraft and passenger movements. When mining operations have not been maintained, aviation operations have decreased proportionately.

Based on the available data of 11 certified aerodromes, between 2016 to 2022, total aircraft movement increased 33.3% and passenger movements increased 38.5%. It is reasonable to assume the actual figures are likely to be higher if accurate data was available for all aerodromes and ALAs. However, the available data does provide a good indication on movements occurring within the review area.

Annex F details recorded aircraft and passenger movements for the review period.

12.2 Analysis of aircraft movements

Total aircraft movements for the review area has increased by 33.3% from 24,624 (October 2016) to 32,821 (October 2022) and is attributable to mining activities. Larger aircraft with greater seating capacity are being used to transport the mining workforce to and from the area.

Newman airport has the highest aircraft movement rate in the review area. To assist with the movement of aircraft at Newman the procedures outlined in ERSA include pilots contacting the aerodrome operator for a slot allocation prior to planning operations into Newman. During the review period, total aircraft movements have increased by around 40% from 10,085 to 14,011.

Aircraft movements remained steady at Paraburdoo and notable increases were recorded at Barimunya and West Angelas from mid-2019.

Not all aerodromes experienced increases in aircraft movements. Coondewanna and Solomon recorded increases during 2020-2021 period however these movements decreased during 2022. Ginbata, Christmas Creek and Fortescue Dave Forrest recorded decreases between 2016-2022 review period.

The fluctuations in aircraft movements are driven by commodity prices which impacts the overall activity at mining sites.

The planned development of new aerodromes will further increase the total number of aircraft movements. It will also impact movements at specific locations as aircraft are able to operate at new locations, thus reducing transport time to and from site locations.

The following graph provides a visual representation of the annualised movements recorded between October 2016 to October 2022. Comparing the following graphs shows a similarity in increases, however aircraft movements decreased during 2022 while passenger movements increased supporting the assertion aircraft with greater seating capacity are increasingly being used in the area.

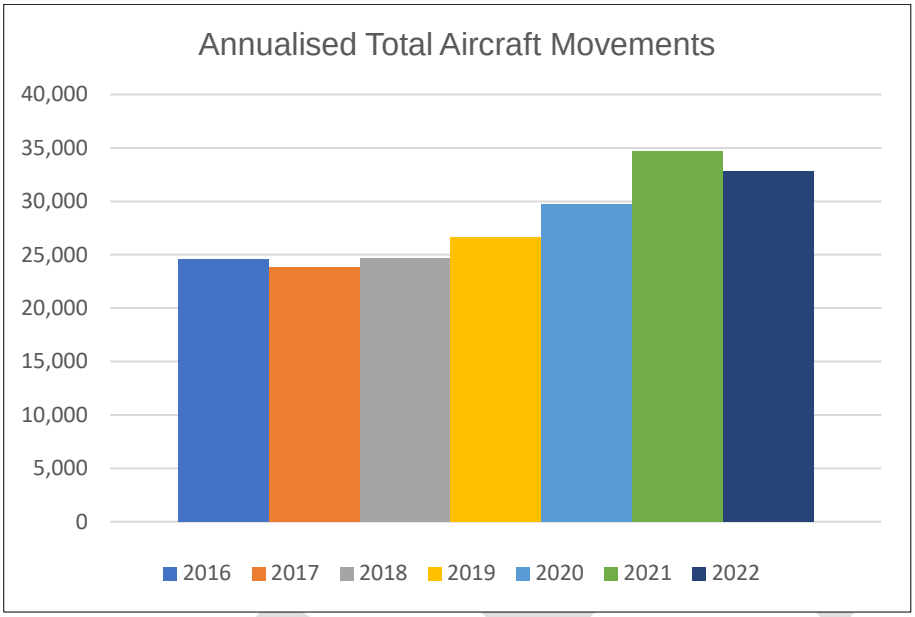

Figure 9 Total aircraft movements 2016 to 2022

12.3 Analysis of passenger numbers

Total passenger movements for the review area has increased by 38.5% from 1,370,013 (October 2016) to 1,898,337 (October 2022). The increase in movements is directly related to the mining activities and the availability of new aerodromes, reducing transportation time for mining staff.

The continuing development of new locations for mining purposes will result in increased passenger movement numbers.

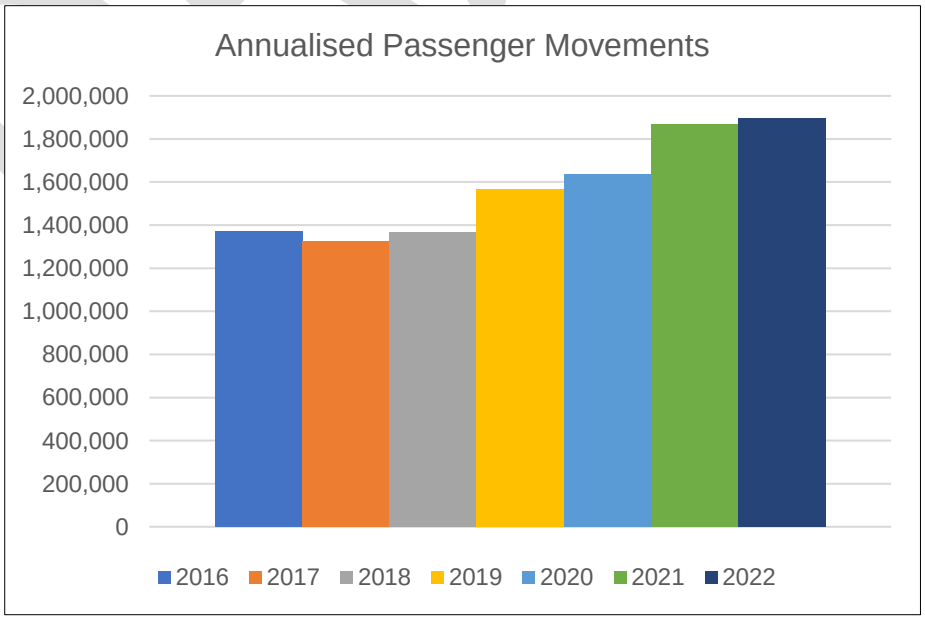

Figure 10: Passenger movements 2016-2022

12.4 Aircraft and passenger forecasts

The 2018 to 2028 Western Australia Resources Sector Outlook report published by the Chamber of Minerals and Energy WA stated, "*The continued expansion in global growth and increased capacity of the Western Australian resources sector will continue to support growth in Western Australian exports*."[19] This outlook provides a reasonable expectation of increased mining activity, along with a subsequent increase in aviation activity, within the Pilbara review area. Projects are already being established in this review area which will contribute to complexities when operating in the airspace including increased aircraft and passenger movements.

The Department of Jobs, Tourism, Science and Innovation and the Department of Mines, Industry Regulations and Safety have repeatedly stated their intentions for continued growth in the Pilbara region. New projects are being established and applications for mining tenure continuations are being lodged. As of March 2020, WA had future resources projects were valued at an estimated $118.4 billion[20].

Most of the aviation infrastructure established in the review area is associated with the resource industry. The increased investment of projects and the desire of resource companies to have facilities for workforce transfer near the project will result in the establishment of more airfields in the review area. This will increase the number of schedule flights operating to and from the area and increase passenger movements.

While some movements will decrease at some locations such as Newman and Paraburdoo, these will be offset by increases to other locations closer to the various mines in the review area.

[19] https://cmewa.com.au/wp-content/uploads/2019/09/2018-2028-Western-Australia-Resources-Sector-Outlook.pdf
[20] https://www.dmp.wa.gov.au/About-Us-Careers/Latest-Resources-Investment-4083.aspx

13 Aviation Occurrence Reports

Aircraft operations involving Australian civil registered aircraft, or foreign civil aircraft in Australian airspace in which an immediate or routine reportable matter occurs must be reported to the ATSB. These may be events, incidents, serious incidents or accidents. The ATSB receives incident information via pilot reports, Airservices' Corporate Integrated Reporting and Risk Information System (CIRRIS) reports and the Australian Defence Forces' Aviation Safety Occurrence Reports.

The ATSB maintains a database, the Safety Investigation Information Management System (SIIMS), in which all reported occurrences are logged, assessed, classified and recorded. The information contained within SIIMS is dynamic and subject to change based on additional and/or updated data. Each individual report is known as an Aviation Safety Incident Report (ASIR).

For identification purposes each ASIR is allocated its own serial number, detailed as an incident, serious incident or accident, and is assigned one of the following Level 1 Descriptions:

- Airspace – includes airspace infringements, loss of separation, loss of separation assurance, breakdown of coordination/information error, error by ANSP instruction or pilot actions, encounter with a remotely piloted aircraft (RPA), Airborne Collision Alert System (ACAS) Warning.
- Consequential Events – includes aircraft conducting missed approaches, fuel dumping, diverting or returning to aerodrome.
- Environment – most common description for a bird strike, evidence of bird strike after landing or locating animals during runway inspections. Also includes lightning strikes, turbulence, windshear and microbursts and interference from ground issues.
- Infrastructure – such as runway lighting, approach lighting and radio frequency failures.
- Operational – considers pilot actions and runway incursions (resulting in events including Loss of Separation), ground proximity warnings, terrain collisions, crew, and cabin safety, smoke, or fumes events, avionics, and equipment issues; and
- Technical – includes airframe, systems such as landing gear indications and power plant matters e.g., engine running rough, engine failure.

A CIRRIS report is an electronically submitted air safety occurrence report, completed by ATC staff, which forms part of the risk information system maintained by Airservices. Not all information in CIRRIS is required to be reported to the ATSB and there may be differences between the two reporting systems.

The airspace related incidents within 100 NM of Coondewanna from 1 January 2016 to 31 December 2022 were reviewed to determine subsequent risks to aviation safety.

13.1 ATSB Aviation Safety Incident Reports

The following table identifies the total number of ASIRs recorded between January 2016 and December 2022.

Primary Occurrence	2016	2017	2018	2019	2020	2021	2022
Airspace	3	1	1	0	0	0	0
Consequential Events	0	0	1	1	2	1	0
Environment	35	34	30	20	17	48	31
Infrastructure	0	0	0	0	1	1	0
Operational	21	19	32	39	23	23	6
Technical	6	5	2	2	4	5	0
Total occurrences	**65**	**59**	**66**	**62**	**47**	**78**	**37**
Total Aircraft Movements (12-month to October)	**24,624**	**23,809**	**24,667**	**26,633**	**29,701**	**34,654**	**32,821**

Table 2: ASIRs recorded during the review period

The incidents show the most common ASIR submitted related to the environment. The majority of these reports involved bird/animal strikes and included weather related events. With the exception of 2021, ASIRs have decreased when aircraft movements increased.

The five airspace incident summaries are:

- 2016: An inbound aircraft and an outbound aircraft using reciprocal runways at Boolgeeda required ATC intervention to maintain/assure separation.
- 2016: During an outbound climb from Newman, an aircraft received a traffic collision and avoidance system resolution advisory (TCAS RA) on an inbound aircraft that descend below its cleared altitude. The climbing aircraft manoeuvred to maintain separation.
- 2016: The pilot of an outbound aircraft from Newman, received traffic on another aircraft but initially could not establish contact on the CTAF. When communications were established, aircraft were approximately 100 FT vertically separated. When visual contact could not be established, the outbound aircraft descended for separation purposes.
- 2017: ATC failed to pass traffic between two aircraft operating in the vicinity of Fortescue Dave Forrest aerodrome.
- 2018: During the approach to Newman, an aircraft observed another aircraft departing on the reciprocal runway. The approaching aircraft stopped the descent to maintain separation.

There were 28 ASIRs submitted for remotely piloted aircraft systems (RPAS) colliding with terrain during operations. The increased usage of RPAS for mining purposes will continue within the review area however there were no reports of RPAS encounters during approach or departure procedures by other aircraft.

13.2 Airservices CIRRIS data

The following table identifies the total number of CIRRISs recorded between January 2016 and December 2022.

Primary Occurrence Type	2016	2017	2018	2019	2020	2021	2022
Aircraft Confliction	1	0	0	0	0	0	0
Airspace Infringement	0	0	0	0	1	1	1
AIS Information Error	0	0	0	0	2	1	0
Emergency Operations	3	1	2	0	0	1	2
Information Error	1	1	4	1	1	0	0
Malfunction - Aircraft System	1	0	0	1	0	0	0
Operational Deviation	2	1	2	0	0	1	0
Other - Safety Related	2	1	1	2	0	0	0
Runway Excursion	0	0	0	0	1	0	0
Total CIRRIS reports	**10**	**4**	**9**	**4**	**5**	**4**	**3**
Total Aircraft Movements (12-month to October)	**24,624**	**23,809**	**24,667**	**26,633**	**29,701**	**34,654**	**32,821**

Table 3: CIRRIS reports recorded during the review period

The disparity between ASIR and CIRRIS data is expected as Airservices' CIRRIS reports are predominantly incidents observed by ATC, as such, CIRRIS reports are more common in towered locations compared to the enroute environment. However these CIRRIS reports further establish communication and surveillance limitations in the review area. The airspace infringement incidents are at altitudes outside the review area, but these reports resulted from aircraft failing to obtain a clearance and climbing into CTA.

13.3 Airline incidents

The following information was provided by an airline group in relation to issues encountered by their crews during the 2020-2022 period. The ATSB primary occurrence has been used by the OAR for these examples.

Operational – Departing aircraft runway 12 YFDF on climb, following departure procedures heard departure call of aircraft departing runway 27 YCHK, destination Karratha. YCHK aircraft was not clear if following published departure procedure. YCHK departing aircraft advised attempted to contact Centre on HF without success. No TCAS-TA/RA however aircraft were within 5 NM. YCHK departing aircraft did not comply with promulgated departure instructions.

Operational – Aircraft approaching runway 09 YCHK in IMC, conducted missed approach. During missed approach this aircraft noted two other aircraft were not holding at VEPEK. Both aircraft holding at IAF for approach to YFDF. Separation maintained but increased workload environment.

Operational – IFR taxi call made on HF at YCHK. Traffic received on aircraft at YFDF. Upon departure, TCAS showed GA aircraft 9,000 FT 5 NM south of YCHK. No traffic provided on GA aircraft. When queried HF advised only traffic provided was at YFDF but it was busy on the radio at that time.

Operational – During descent into YCHK, the CTAF frequency was used for purposes other than the necessary broadcasts to ensure other aircraft were aware of aircraft operations and intentions. The CTAF should be used for operational communications.

Operational – Multiple calls made on CTAF during descent into YGIA with no response from departing aircraft. Contact made through Melbourne Centre and changed over to CTAF to arrange separation. Melbourne Centre did not advise on conflicting traffic. The lack of communication increased risk and the impacted the ability to plan appropriately. Descending aircraft diverted from normal descent profile to ensure separation.

Operational – Apron congestion at YNWN with aircraft bays occupied and aircraft holding on the runway and aircraft holding 5 NM for approach. Safety car also broadcasting on CTAF increased frequency congestion. Taxying aircraft called centre and CTAF. Backtracked and during the turn, stopped as holding aircraft on runway was still on runway. When clear, aircraft departed. When contact was made with centre, a query about traffic was made. ATC advised that no traffic was given to aircraft holding on runway as they should have picked it up on the CTAF. Shortly after, a second aircraft departed and queried if the first departing aircraft gave a taxi call, ATC advised this was not done. Congestion on the ground led to a loss of SA by pilots and ATC.

This following matters related to risks to operational complexity.

Newman – Upon landing and entering taxiway it became apparent aircraft would be unable to taxi behind Bay 3 due other aircraft at Bay 1, 2 and 3. Held short of the apron but would create delays with holding aircraft waiting to land. Using safety car and Captains from other aircraft who provided signalling, we conducted a U-turn with adequate room, taxied and cleared runway and apron for next arrival.

Newman – Advised due congestion on the ground to remain in the air. Estimated timing on less than 10 minutes turned into 30 minutes. Aircraft should be advised of reasonable delay expectations. Information on aircraft on the ground, such as type would assist when taxiing off the runway due limited space.

Newman – Delays on the ground has an impact for aircraft on the ground at other departing location for Newman. Delays by ground handling crews add to the delays.

Ginbata – ground handling agents should be aware of the processes involved with ATC and the understand the limitations of radio communications on the ground. Only after a follow-up call by a flight attendant to Centre, did ATC ‘join the dots’ regarding cancelling SARWATCH. The lack of cellular coverage on the ground impacts the ability to submit fuel orders and update relevant weathers etc, making turnaround difficult.

14 Summary of feedback from consultation

Stakeholders were invited to provide comment on airspace related safety issues within the Pilbara Region. Consultations through industry forums, CASA's Consultation Hub and face to face interviews were undertaken and information received from this process included:

- Lack of communication and surveillance at lower levels is a concern for all operators.
- An increase in VHF coverage to the ground would greatly improve this safety and workload balance in a positive manner. Difficulties in contacting with Melbourne Centre on the ground creates significant extra workload.
- HF limitations creates barriers in gaining situational awareness of traffic and can cause delays prior to taxi. Developing an appropriate situational awareness is better facilitated on the ground before taxi rather than when airborne and during the critical phase of flight involving other operating the aircraft, following standard operating procedures, self-separating from other traffic and making required broadcasts on a congested frequency.
- Self-separation on a CAVOK[21] day can present difficulties due to local traffic density and frequency congestion.
- The presence of hazardous or inclement weather in the region increases the crew's workload significantly. Examples of this include:
    - Managing communication across multiple radio frequencies.
    - Managing the aircraft's climb profile due to delays experienced in climbing into CTA.
    - Managing the aircrafts lateral and vertical flight path to avoid weather in the region, particularly during the 'wet season'.
    - Maintaining adequate situational awareness during the above stated periods.
- The number of aerodromes and ALAs in close proximity is a concern to most operators.
- Clearance into controlled airspace during climb while the aircraft has had to leave a published airway route to avoid weather or other traffic is a concern for operators due to poor VHF communications and electronic surveillance.
- Multiple instrument approach and landing procedures overlap and are identified as a high risk by the airlines. During calm conditions where winds and light and variable, aircraft could be on conflicting courses as both runway ends are suitable for landing or departing procedures.
- Surveillance at FL125 for aircraft is sometimes not available resulting in delays due to procedural separation standards being used.
- Frequency congestion for ATC is very high. When track diversions are required due weather, frequency congestion increases.
- Frequency congestion and monitoring multiple frequencies simultaneously impacts situational awareness.
- Non-essential aviation information is being transmitted on the CTAF, impacting awareness and aircraft separation. A proposed solution of a discrete UNICOM in the Pilbara to reduce frequency congestion would alleviate some frequency congestion issues.
- The development of a terminal area chart for the Pilbara would provide awareness and safety benefits to operations in the review area. The inclusion of RNAV procedures would provide a visual representation of possible conflicts during critical phases of flight. (The Pilbara TAC has been promulgated by Airservices Australia.)

[21] CAVOK is an abbreviation for 'cloud and visibility and weather OK'. The term is used when the following conditions are forecast simultaneously; visibility is greater than 10 km; no cloud below 5,000 FT or below the highest 25 NM minimum sector altitude whichever is the higher; no cumulonimbus at any height and no weather of significance.

- A review of the existing airways would benefit operators in reducing track miles and increase aircraft and airspace efficiencies.
- Information submitted as part of the feedback indicated VFR aircraft and helicopter movements are increasing in the region. A number of these aircraft are not fitted with conspicuity devices and or appropriate radios for communication, increasing the risk to users of the airspace.
- Discussion through the Pilbara Aviation Operators Group suggested that the establishment of a Danger Area would provide itinerant pilots notification of the complexity of operations in the Pilbara Region. However, a DA does not reduce to the risks currently experienced by airline operators in the area.

15 Key Issues, Recommendations and Observations

15.1 Issues

15.1.1 VHF and surveillance coverage

VHF coverage in the review area is limited, particularly at lower levels. Aircraft have been utilising other methods of communications resulting in increased workloads for ATC and pilots during critical phases of flight.

Surveillance is based on the ADS-B ground stations located at Paraburdoo and Newman which provides coverage through the review area. Factors such as terrain and aircraft altitude impacts surveillance and communication effectiveness, particularly for aircraft operating below 5,000 FT AMSL within the northern section of the review area.

15.1.2 Frequency congestion

Radio communication within the review area is achieved by a combination of VHF and HF radio transceivers. The VHF radio transmitters located at Paraburdoo and Newman aerodromes require 'line of sight' for effective operations. The terrain of the area can impact the effectiveness of VHF communications for aircraft operating outside the line of sight of these transmitters.

HF communication is used outside VHF coverage. Factors such as atmospheric conditions, ionospheric absorption and obstacles can impact HF effectiveness.

The above VHF and HF factors results in aircraft making broadcasts regarding their intensions prior to leaving the coverage area. Readbacks, repeat transmissions and unknowingly over transmitting other broadcasts can lead to frequency congestion.

The continuing development of mines and certified aerodromes will increase air traffic, particularly operations within Class G airspace. Increased aircraft movement is likely to result in higher levels of frequency congestion for VHF and HF radio transmissions. This will increase ATC and cockpit workload, limit situational awareness and increased risk to airspace operations.

15.1.3 Pilbara TAC

The existing aviation charts provide limited information for aviation activities within the Pilbara region. The primary reference chart at the commencement of the review area was ERC-L 8.

The development and promulgation of the Pilbara TAC displaying appropriate information has assisted users operating in the area. The majority of ALAs marked on the Pilbara TAC are marked with a broken circle. This indicates the information for these locations do not comply with a data product specification in accordance with Part 175 AIM.

15.1.4 Exchange of safety information

There are a number of stakeholders operating in the review area including airlines, private aircraft operators, mining companies operating certified aerodromes, other certified and uncertified aerodromes. The exchanging of risk-based information impacting operations within the review area faces a number of barriers including point of contact and impacts to operations due changes. There is no platform or forum where relevant stakeholders can share safety related information with others based on operations within the review area.

15.2 Findings

15.2.1 VHF and surveillance coverage

VHF coverage is not universal in the Pilbara region. Effective VHF and surveillance coverage require 'line of sight'. Aircraft operating below 5,000 FT AMSL can be reliant upon HF communications to develop or maintain situational awareness.

Terrain impacts the reliability of VHF communication and surveillance coverage within the review area. Meteorological factors and man-made obstacles i.e. towers and tailing piles can inhibit radio communications.

There are a number of entries in AIP detailing VHF radio limitations within the review area including aircraft not being able to hear other aircraft at nearby locations. Promulgated procedures for aircraft operating at Fortescue Dave Forrest and Christmas Creek assist with aircraft separation and broadcasts.

Communication ability at uncertified aerodromes varies greatly, depending on their location to Paraburdoo, Newman and the surrounding terrain.

Continued development of new aerodromes in the review area is likely to exacerbate VHF and HF communication and surveillance limitations.

This review did not include an assessment of the infrastructure needed or suitable locations to enhance support for communication or surveillance activities. Such locations may not adequately address all the VHF communication and surveillance issues identified in the review area.

15.2.2 Frequency congestion

Aircraft experience delays due to VHF frequency congestion and the inherent delays associated with HF communications. HF radio communication are relayed and may be delayed due to operations separate from ATC.

Stakeholders stated frequency congestion in the Pilbara is very high and increases when inclement weather requires aircraft to divert off-track diversion. Stakeholders also advised frequency congestion limited their situational awareness due high cockpit workload, monitoring multiple frequencies and the number of required broadcasts.

Flight schedules into and out of the review area are based primarily on the transportation of the workforce and reducing travel time to and from sites. The number of aircraft operating in the area can be dependent upon the time and day of week and the number of changes to personnel. When multiple aircraft are operating in the area, frequency congestion increases.

The addition of new aerodromes will increase frequency congestion events.

CTAF's in the Pilbara are congested with UNICOM information. AIP provides UNICOM information must not inhibit the transmission of standard positional broadcasts. The establishment of discrete UNICOM frequencies at locations were the CTAF operates for multiple locations, will likely reduce some frequency congestion.

CASA will engage the Aviation Safety Advisors to include radio discipline and communications in any activity in this area.

15.2.3 Pilbara TAC

Stakeholders advised switching between charts is cumbersome while trying to manage frequency changes and routine tasks such as checks associated with descending, approaching and landing.

The production of a TAC would be beneficial for the Pilbara. The TAC will assist air crew's situational awareness due to the information promulgated on a single chart, negating the need to change charts.

Prior to the publication of this review, a TAC for the Pilbara was promulgated. Positive feedback has been received as a result of the Pilbara TAC.

The verification of data for ALAs on the Pilbara TAC in accordance with Part 175 would improve pilot awareness within the area display on the TAC. The publication of unverified ALAs could provide a pilot a false indication of an available landing position when it does not exist. CASA will, with the assistance of their Stakeholder Engagement Division and Airservices Australia, verify the ALAs shown on the Pilbara TAC.

15.2.4 Exchange of safety information – Pilbara Forum

The ability to share safety related information with other operators in the review area will enhance a positive safety culture.

Stakeholders in the review area are willing to share safety information in order to reduce or limit the risk to operations.

Such forums have been successfully developed at aerodrome specific locations. The development of a regional forum will be unique, involving representatives from resource organisations, airline operators, aerodromes, air navigation service provider and certified instrument flight procedure designers.

The forum has been established by the CASA and the ongoing operation handed over to forum members.

15.2.4.1 Pilbara Forum

The OAR conducted multiple industry forums beginning in 2020 focusing on the review area. Information sharing between airlines, resources companies and aerodrome operators has been conducted. Stakeholders have input in the identification of hazards and mitigation measures when risks are assessed. The whole of industry approach ensured a thorough examination of issues during the hazard mitigation process.

Stakeholders are working in good faith to collaborate, identify and mitigate risks.

Noting the economics of the region to Western Australia and Australia and the exports of minerals, resource companies have indicated a willingness to fund and project manage the infrastructure to assist mitigating airspace risks due to expanding resource projects. However as discussed previously, this review did not examine the infrastructure requirements or suitability of locations. It is noted, if additional infrastructure was undertaken, due to the topography, it is unlikely to address all the communication and surveillance issues within the review area.

15.2.5 Other findings or observations

- The CTAF frequencies were not published on the ERC-L 8 for Fortescue Dave Forrest and Christmas Creek. (This matter was addressed prior to the publication of the final report).
- The development of standard arrival routes (STARs) and standard instrument departures (SIDs) is likely to increase pilot situational awareness. SIDs and STARs provide predictability giving other users a reasonable expectation where aircraft operate along those paths. Depicting overlapping or overlying instrument approach and landing procedures on AIP documents, subject to clutter, will provide greater situational awareness during a critical phase of flight.
- The development of new aerodromes will have impact the provision of air traffic services and communication in the area.

15.3 CASA Actions

CASA will undertake the following actions and follow-up on the observations, or opportunities to enhance services identified through CASA's analysis of the reviewed airspace:

Action 1:

The Office of Airspace Regulation facilitate the establishment of a Pilbara Operator's Safety Forum including all relevant stakeholders from airlines, aerodromes, resource companies and service providers (This action has been completed and is closed).

Action 2:

CASA will request that Airservices Australia publish a Terminal Area Chart (TAC) for the Pilbara Region by May 2024 (This action has been completed and is closed).

Observations/Opportunity to enhance regional services

1. Improved VHF and surveillance capabilities at lower levels within the review area would lead to increased situational awareness and operational efficiency. Airservices Australia is best placed to explore opportunities to enhance these capabilities at lower levels within the review area.
2. CASA will, with the assistance from CASA Stakeholder Engagement Division and Airservices Australia, verify the ALAs shown on the Pilbara TAC to increase pilot awareness of nearby airstrips operating in the area. Operators who want their ALA to be promulgated in aeronautical information publications should provide information to Airservices Australia via the Aircraft Landing Area (ALA) / Helicopter Landing Site (HLS) Information Form. Alternatively, unverified ALAs should be examined with a view to remove these locations from the Pilbara TAC effective June 2025.[22]
3. The CTAF frequencies for Fortescue Dave Forrest and Christmas Creek should be published on the ERC-L8 (This matter has been actioned and is closed).
4. Aerodrome operators in nearby locations should examine having similar frequencies operating within the vicinity of other nearby aerodromes to assist with the situational awareness of pilots operating within that area. (This matter has been actioned and is closed).

[22] Civil Aviation Safety Regulation Part 175 — Airservices and You - Airservices (airservicesaustralia.com)

16 Conclusion

The OAR has conducted a review of the airspace of the Pilbara Region from the surface up to FL125, based on a 100 NM radius of Coondewanna, Western Australia.

The airspace review complied with the requirements of the *Airspace Act (2007)*, *Airspace Regulations (2007)*, the Australian Airspace Policy Statement (2021), the Minister's Statement of Expectations (2022) and CASA's Regulatory Philosophy.

The remoteness, traffic mix, restrictions at aerodromes, limitations of effective communication and surveillance at lower levels, presents challenges to aviation operations in the Pilbara region. Investment in the resource sector is continuing with (potentially) six more aerodromes in the review area. The competing nature of the resource industry leads to different organisations bringing projects online at the same time. This impacts the air traffic services available with increased air traffic. With this ongoing resource sector investment, the infrastructure to support aviation activity needs to be discussed well in advance of projects commencing.

The review found the airspace classification remains appropriate however recommendations, observations and opportunities for improvement have been made to enhance the safety of operations within the area.

The OAR will continue to monitor aircraft and passenger movement statistics, recorded incident data and other information sources to determine the appropriateness of the next airspace review.

Annex A Acronyms and Abbreviations

The following acronyms and abbreviations were used during the airspace review.

Acronym / Abbreviation	Explanation
AA	Audio acknowledgement
AAPS	Australian Airspace Policy Statement 2021
ACP	Airspace change proposal
Act	*Airspace Act 2007*
ADS-B	Automatic Dependent Surveillance – Broadcast
AFRU	Aerodrome frequency response unit
AIP	Aeronautical Information Publication
Airservices	Airservices Australia
ALA	Aircraft landing area
AMSL	Above mean sea level
ANSP	Air Navigation Service Provider
ASIR	Aviation Safety Incident Report
ATC	Air Traffic Control
ATS	Air Traffic Services
ATIS	Automatic terminal information service
ATSB	Australian transport safety bureau
AvSEF	Aviation state engagement forum
CASA	Civil Aviation Safety Authority
CIRRIS	Corporate Integrated Reporting & Risk Information System
CTAF	Common traffic advisory frequency
DA	Danger area
DME	Distance measuring equipment
ERC_L	En Route Chart Low
ERSA	En Route Supplement Australia
FIA	Flight information area
FIFO	Fly In Fly Out
FL	Flight level
FOI	Flying operations inspector
FT	Feet
GA	General Aviation
GNSS	Global Navigation Satellite System
HF	High frequency
ICAO	International Civil Aviation Organization
IFP	Instrument flight procedure
IFR	Instrument flight rules
IMC	Instrument meteorological conditions
LL	Lower level
m	Metres
MLAT	Multilateration
NDB	Non-directional beacon
NOTAM	Notice to air men
NM	Nautical miles
OAR	Office of Airspace Regulation
OLS	Obstacle limitation surface
PAL	Pilot activated lighting
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operation
PAPI	Precision approach path indicator

Acronym / Abbreviation	Explanation
PT	Passenger transport
PBN	Performance Based Navigation
RA	Restricted area
RNAV	Area navigation
SIS	Surveillance Information Service
SMS	Safety management system
SSR	Secondary surveillance radar
TAC	Terminal area chart
TCAS	Traffic Alert and Collision Avoidance System
TIFP	Terminal Instrument Flight Procedure
Unicom	Universal Communications
VFR	Visual flight rules
VHF	Very high frequency
VMC	Visual meteorological conditions
VOR	VHF omnidirectional range

Annex B Australian Airspace Structure

Class	Description	Summary of Services, Procedures, Rules
A	All airspace above Flight Level (FL) 180 (east coast) or FL245 elsewhere	Instrument Flight Rules (IFR) only. All aircraft require a clearance from Air Traffic Control (ATC) and are separated by ATC. Continuous two-way radio and transponder^ required. No speed limitation.
B	Not currently used within Australia	IFR and Visual Flight Rules (VFR) flights are permitted. All flights are provided with ATS and are separated from each other.
C	In control zones (CTRs) of defined dimensions and control area steps generally associated with controlled aerodromes	• All aircraft require a clearance from ATC to enter airspace. All aircraft require continuous two-way radio and transponder^. • IFR separated from IFR, VFR and Special VFR (SVFR) by ATC with no speed limitation for IFR operations. • VFR receives traffic information on other VFR but are not separated from each other by ATC. SVFR are separated from SVFR when visibility (VIS) is less than Visual Meteorological Conditions (VMC). VFR and SVFR speed limited to 250 knots (kt) Indicated Air Speed (IAS) below 10,000 feet (FT) Above Mean Sea Level (AMSL)*.
D	Towered locations such as Bankstown, Jandakot, Archerfield, Parafield and Alice Springs.	• All aircraft require a clearance from ATC to enter airspace. For VFR flights this may be in an abbreviated form. • As in Class C airspace all aircraft are separated on take-off and landing. All aircraft require continuous two-way radio and are speed limited to 200 kt IAS at or below 2,500 FT AMSL within 4 NM of the primary Class D aerodrome and 250 kt IAS in the remaining Class D airspace**. • IFR are separated from IFR, SVFR, and provided with traffic information on all VFR. • VFR receives traffic on all other aircraft but is not separated by ATC. SVFR are separated from SVFR when VIS is less than VMC.
E	Controlled airspace not covered in classifications above	• All aircraft require continuous two-way radio and transponder^ (unless VFR aircraft are unable to power a transponder). All aircraft are speed limited to 250 kt IAS below 10,000 FT AMSL*. • IFR require a clearance from ATC to enter airspace and are separated from IFR by ATC and provided with traffic information as far as practicable on VFR. • VFR do not require a clearance from ATC to enter airspace and are provided with a Flight Information Service (FIS). On request and ATC workload permitting, a Surveillance Information Service (SIS) is available. within surveillance coverage.
F	Not currently used in Australia	IFR and VFR flights are permitted. All IFR flights receive an air traffic advisory service and all flights receive a flight information service if requested.
G	Non-controlled	• Clearance from ATC to enter airspace not required. All aircraft are speed limited to 250 kt IAS below 10,000 FT AMSL*. • IFR require continuous two-way radio and receive a FIS, including traffic information on other IFR. VFR receive a FIS. On request and ATC workload permitting, a SIS is available within surveillance coverage. VHF radio required above 5,000 FT AMSL and at aerodromes where carriage and use of radio is required.

* Not applicable to military aircraft

** If traffic conditions permit, ATC may approve a pilot's request to exceed the 200 kt speed limit to a maximum limit of 250 kt unless the pilot informs ATC a higher minimum speed is required.

^ Transponder requirement includes ADS-B OUT.

Annex C Restricted area and danger area architecture

The declaration of a Restricted Area (RA) creates an airspace of defined dimensions within which the flight of aircraft is restricted in accordance with specified conditions. Clearances to fly through an active RA are generally only withheld when activities hazardous to the aircraft are taking place, or when Military activities require absolute priority.

RAs are generally promulgated at specified times and dates which are detailed in the Designated Airspace Handbook (DAH). However, a TRA may be declared for special events where there may be a public safety issue – such as the Avalon Air Show, the Olympic Games or a police activity that requires control access to airspace in a particular area.

TRAs may have different periods of activation that can occur over a day or multiple days. For example, an air display may require a TRA for a short period of time such as 30-60 minutes. However, an air show, sporting event or military exercise may require several hours each day, over several days for the activity to be completed.

To assist with shared use of airspace, all restricted areas have been allocated a “Restricted Area Conditional Status”. This status will give an indication as to the likelihood of obtaining a clearance to fly through restricted airspace. NOTAMs may be issued to indicate changes to the RA Conditional Status.

The following definitions apply to the conditional status types of RAs:

- **Conditional Status RA 1**: Pilots may flight plan through the Restricted Area and upon request will be granted a clearance from ATC when the area is active unless a NOTAM indicates that a clearance is not available.
- **Conditional Status RA 2**: Pilots may not flight plan through the Restricted Area or expect a clearance from ATC. However, tracking may be offered through the Restricted Area on a tactical basis by ATC unless a NOTAM indicates that a clearance is not available; and
- **Conditional Status RA 3**: Clearance through the Restricted Area is not available except in a declared emergency.

RAs are mainly declared over areas where Military operations occur however, RAs also cater for communications and space tracking operations.

The declaration of a Danger Area (DA) defines airspace within which activities dangerous to the flight of aircraft may exist at specified times. Approval for flight through a DA outside controlled airspace is not required. The airspace remains available for other aircraft to use or operate within however, pilots are expected to maintain a high level of vigilance when transiting or operating within DAs.

DAs are primarily established to alert aircraft on the following:

- Flying training areas where student pilots are learning to fly and / or gather in large numbers.
- Parachute operations.
- Gliding areas where communications with airborne gliders might be difficult.
- Unmanned aerial vehicle testing or operations.
- Weapon firing and rifle ranges.
- Blasting at mine sites.

Annex D Certified Aerodromes within the review area

NEWMAN

Newman airport (Newman) is a certified aerodrome owned and operated by the Shire of East Pilbara. The aerodrome is located approximately 9.2 km (5.0 NM) south east of the Newman township and 113.1 km (61.1 NM) south east of Coondewanna airport.

Newman has an elevation of 1,724 FT AMSL and one designated sealed runway, RWY 05/23 which has the following characteristics:

- Runway length is 2,072m and the runway width is 30m.
- RWY 05 threshold elevation is 1,724 FT AMSL.
- RWY 23 threshold elevation is 1,712 FT AMSL.
- Runway strip width (RWS) is 150m.

The following diagram depicts the runway and facilities at Newman.

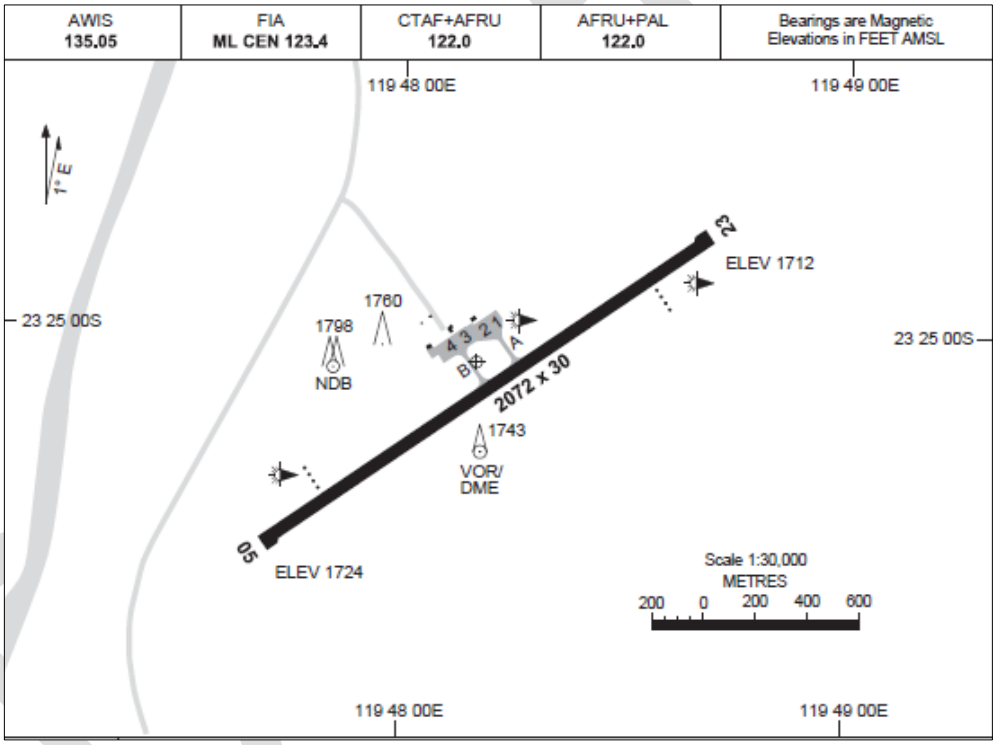

Figure 11: Aerodrome chart Newman[23]

Newman serves a mixture of scheduled jet, turboprop, general aviation and helicopter services. Common types of aircraft operating at Newman include Airbus A320 (A320), Fokker 100 (F100), Boeing 737-800 (B738), Robinson 22 and 44 (R22 & R44), Eurocopter AS350 (AS50) and Pilatus PC12 (PC12).

The mix of air traffic at Newman is varied in size, performance and passenger carrying capacity. Common domestic PT services operate to Newman from Perth, Busselton and Port Hedland. Newman is used as a hub servicing the mining area in the Pilbara review area, however the development of additional aerodromes closer to these mining sites is likely to reduce aircraft and passenger movements at Newman while increasing the complexity faced by PT services operating within the region.

Newman navigation aids include a VOR/DME and NDB. These aids are located on the aerodrome grounds, on either side of the runway. A PAPI is located on the left hand side at each runway end. There is an illuminated WDI serviceable to and located on the left hand

[23] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

side at each runway end. There is another illuminated WDI located adjacent to the apron area.

Pilot activated lighting with low intensity runway lighting is available.

The CTAF, AFRU and PAL frequency is 122.0 MHz and AWIS frequency is 135.05 MHz. The ATS FIA is 123.4 MHz.

Local traffic instructions published in ERSA provide that due to possible congestion, operators of Code 2, 3 and 4 aircraft are to contact the aerodrome operator for a slot allocation prior to planning operations at Newman, including planned fuel stops.

During the 12-month period between 1 November 2021 and 31 October 2022, Newman recorded 14,011 total aircraft movements and 407,363 passenger movements.

BOOLGEEDA

Boolgeeda airport (Boolgeeda) is a certified aerodrome owned and operated by Hamersley Iron Pty Ltd. The aerodrome is located approximately 4.8 km (2.6 NM) north west of the West Pilbara Village camp and 164.6 km (89.9 NM) west north-west of Coondewanna airport.

Boolgeeda has an elevation of 1,870 FT AMSL and one designated sealed runway, RWY 08/26 which has the following characteristics:

- Runway length is 2,200m and the runway width is 45m.
- RWY 08 threshold elevation is 1,822 FT AMSL.
- RWY 26 threshold elevation is 1,870 FT AMSL.
- Runway strip width (RWS) is 300m and graded to 150m.

The following diagram depicts the runway and facilities at Boolgeeda.

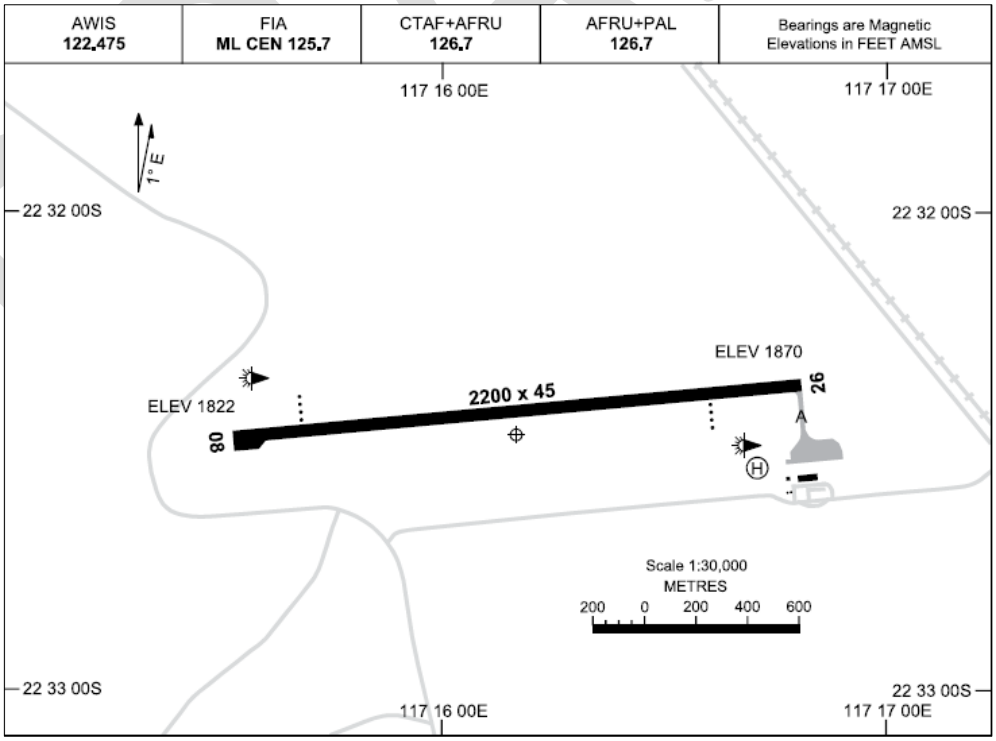

Figure 12: Boolgeeda aerodrome chart[24]

Boolgeeda serves a mixture of scheduled jet and turboprop aircraft. Prior permission required (PPR) with 24 hour notice from the aerodrome operator is needed before landing at

[24] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

Boolgeeda. Common types of aircraft operating at Boolgeeda include F100, A320, B738, Cessna 510 (C510) business jet, Beechcraft Super King Air (BE20) and PC12.

Scheduled domestic PT services operate to Boolgeeda from Perth, Geraldton, Busselton and Albany.

A PAPI and an illuminated WDI is located on the left hand side at each runway end. Pilot activated lighting with low intensity runway lighting is available.

The CTAF, AFRU and PAL frequency is 126.7 MHz and AWIS frequency is 122.475 MHz. The ATS FIA is 125.7 MHz.

Promulgated instrument flight procedures are in close proximity of Eliwana airport whose location is approximately 6 NM outside the review area.

During the 12-month period between 1 November 2021 and 31 October 2022, Boolgeeda recorded 3,700 total aircraft movements and 297,700 passenger movements.

PARABURDOO

Paraburdoo airport (Paraburdoo) is a certified aerodrome owned and operated by Hamersley Iron Pty Ltd. The aerodrome is located approximately 8.3 km (4.5 NM) north east of the Paraburdoo township and 111.5 km (60.2 NM) west of Coondewanna airport.

Paraburdoo has an elevation of 1,406 FT AMSL and one designated sealed runway, RWY 06/24 which has the following characteristics:

- Runway length is 2,132m and the runway width is 45m.
- RWY 06 threshold elevation is 1,374 FT AMSL.
- RWY 24 threshold elevation is 1,405 FT AMSL.
- Runway strip width (RWS) is 280m.

The following diagram depicts the runway and facilities at Paraburdoo.

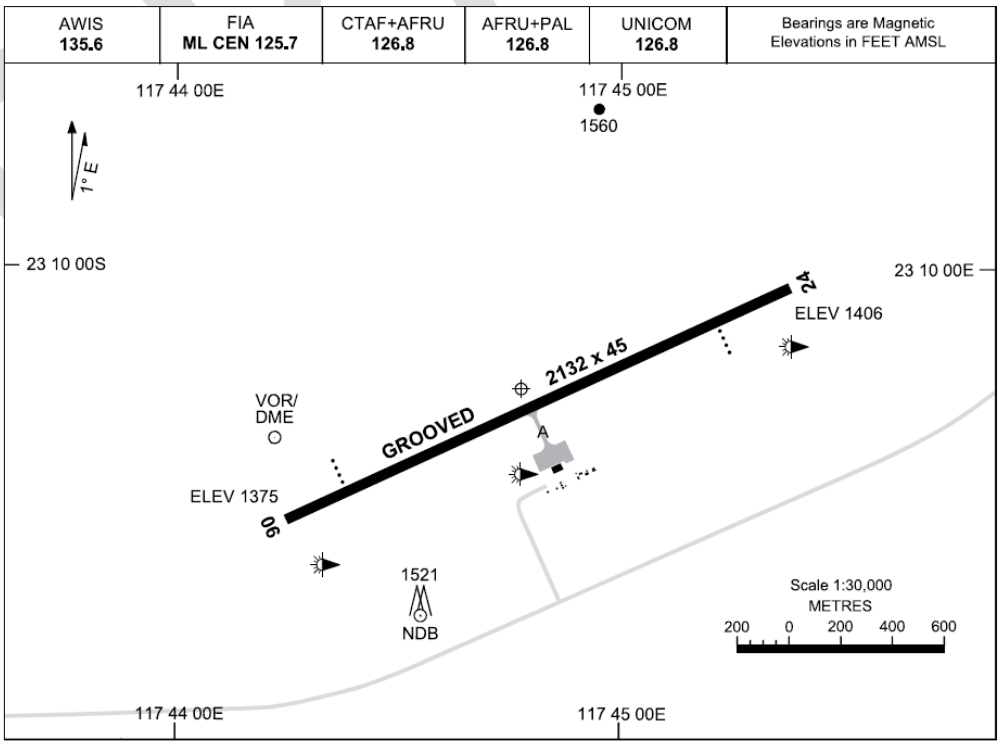

Figure 13: Paraburdoo aerodrome chart[25]

[25] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

Paraburdoo navigation aids include a VOR/DME and NDB. These aids are located on the aerodrome grounds, on either side of the runway. A PAPI is located on the left hand side at each runway end. There is an illuminated WDI serviceable to each runway end and located to the southern side at each runway end. There is another illuminated WDI located adjacent to the apron area.

Pilot activated lighting with low intensity runway lighting is available.

The CTAF, AFRU, PAL and UNICOM frequency is 126.8 MHz and AWIS frequency is 135.6 MHz. The ATS FIA is 125.7 MHz.

A varied mixture of aircraft operate at Paraburdoo including F100, Boeing 717-200 (B712), PC12, Fokker 28 (F28), Embraer 120 Brasilia (E120) and Pilatus PC-24 business jet (PC24). There are approximately 32 flights each week from Perth to Paraburdoo.

Right hand circuits are nominated for RWY 24 operations in order to avoid the township area.

During the 12-month period between 1 November 2021 and 31 October 2022, Paraburdoo recorded 3,633 total aircraft movements and 217,300 passenger movements.

WEST ANGELAS

West Angelas airport (West Angelas) is a certified aerodrome owned and operated by Robe River Mining Company Pty Ltd. The aerodrome is located approximately 1.2 km (0.6 NM) south east of the West Angelas mining camp and 22.0 km (11.9 NM) south west of Coondewanna airport.

West Angelas has an elevation of 2,346 FT AMSL and one designated sealed runway, RWY 04/22 which has the following characteristics:

- Runway length is 1,900m and the runway width is 30m.
- RWY 04 threshold elevation is 2,279 FT AMSL.
- RWY 22 threshold elevation is 2,343 FT AMSL.
- RWY 22 has a displaced threshold of 60m.
- Runway strip width (RWS) is 150m, graded 90m.

The following diagram depicts the runway and facilities at West Angelas.

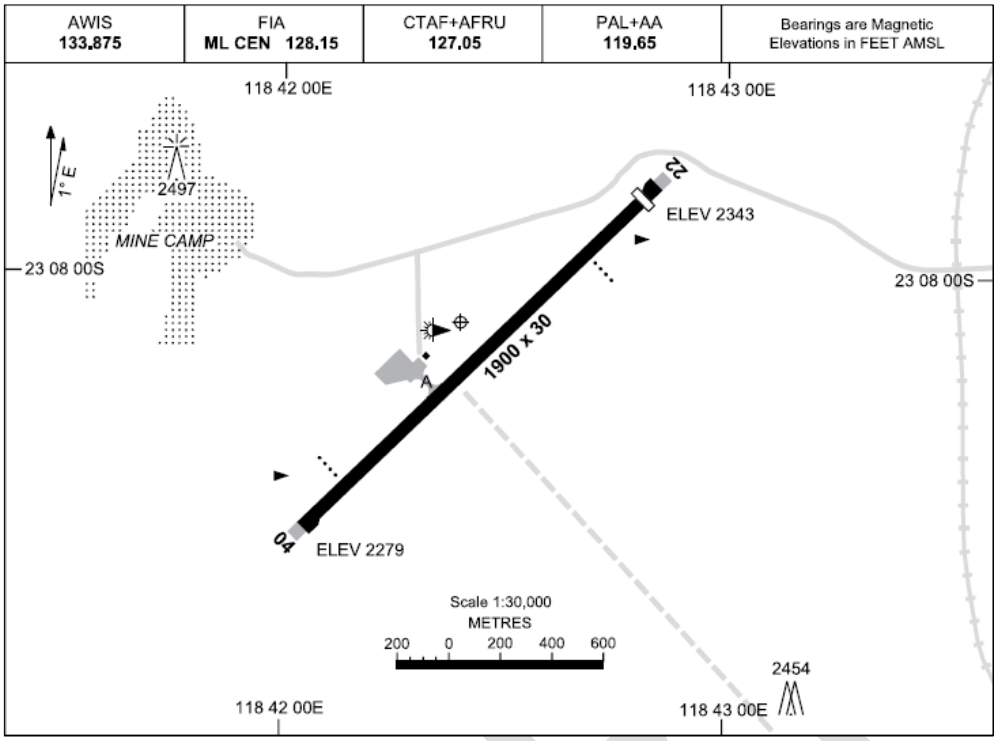

Figure 14: West Angelas aerodrome chart[26]

Prior permission is required before operating at West Angelas.

West Angelas has a PAPI located on the left hand side at each runway end. There is an unlit WDI serviceable to and located on the left hand side at each runway end. There is another illuminated WDI located adjacent to the apron area.

Pilot activated lighting with low intensity runway lighting is available.

The CTAF and AFRU frequency is 127.05 MHz and it is recorded the AFRU is no available when on the ground. PAL and audio acknowledgement (AA) frequency is 119.65 MHz and AWIS frequency is 133.875 MHz. The ATS FIA is 128.15 MHz which is available in the circuit area.

The mix of aircraft operating at West Angelas include A320, F100, PC12, C510 and BE20. There are approximately 11 scheduled flights each week from Perth to West Angelas and four (4) flights each week from Busselton to West Angelas.

Right hand circuits are nominated for RWY 04 operations in order to avoid the mining camp area.

During the 12-month period between 1 November 2021 and 31 October 2022, West Angelas recorded 2,400 total aircraft movements and 181,700 passenger movements.

[26] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

BARIMUNYA

Barimunya airport (Barimunya) is a certified aerodrome owned and operated by Barimunya Aerodrome Joint Venture. The aerodrome is located approximately 6.3 km (3.4 NM) north east of the Barimunya mining village camp and 48.6 km (26.2 NM) north east of Coondewanna airport.

Barimunya has an elevation of 2,082 FT AMSL and one designated sealed runway, RWY 10/28 which has the following characteristics:

- Runway length is 1,940m and the runway width is 30m.
- RWY 10 threshold elevation is 2,056 FT AMSL.
- RWY 28 threshold elevation is 2,056 FT AMSL.
- Runway strip width (RWS) is 150m and graded to 90m.

The following diagram depicts the runway and facilities at Barimunya.

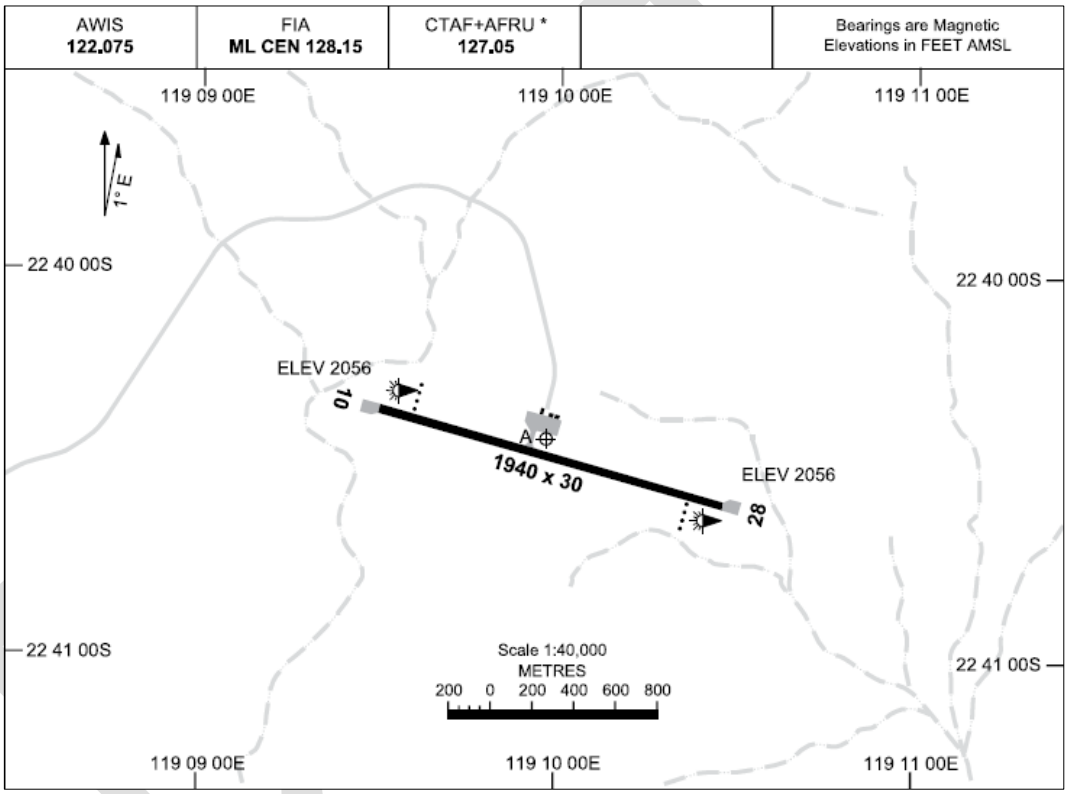

Figure 15: Barimunya aerodrome chart[27]

Prior permission is required before operating at Barimunya with all operations required to contact the aerodrome operator at least 20 minutes before their estimated time of arrival.

Barimunya passenger numbers fluctuate with demand for the resource sector.

The mix of aircraft operating at Barimunya include F100, A320, Fokker 70 (F70), Cessna Conquest (C441), PC12 and BE20. There are approximately 13 scheduled flights each week from Perth to Barimunya and two (2) flights each week from Busselton to Barimunya.

A PAPI and an illuminated WDI is located on the left hand side at each runway end.

The CTAF and AFRU frequency is 127.05 MHz and AWIS frequency is 122.075 MHz. The AFRU in not available when on the ground. The ATS FIA is 128.15 MHz and available at or above 3,500 FT AMSL, that is approximately 1,500 FT above the aerodrome.

[27] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

During the 12-month period between 1 November 2021 and 31 October 2022, Barimunya recorded 2,400 total aircraft movements and 157,900 passenger movements.

COONDEWANNA

Coondewanna airport (Coondewanna) is a certified aerodrome owned and operated by BHP Iron Ore. The aerodrome is located approximately 2.4 km (1.3 NM) south east of the Coondewanna mining village camp and the centred location for this Pilbara Region review.

Coondewanna has an elevation of 2,327 FT AMSL and one designated sealed runway, RWY 08/26 which has the following characteristics:

- Runway length is 1,950m and the runway width is 30m.
- RWY 08 threshold elevation is 2,281 FT AMSL.
- RWY 26 threshold elevation is 2,327 FT AMSL.
- Runway strip width (RWS) is 150m and graded to 90m.

The following diagram depicts the runway and facilities at Coondewanna.

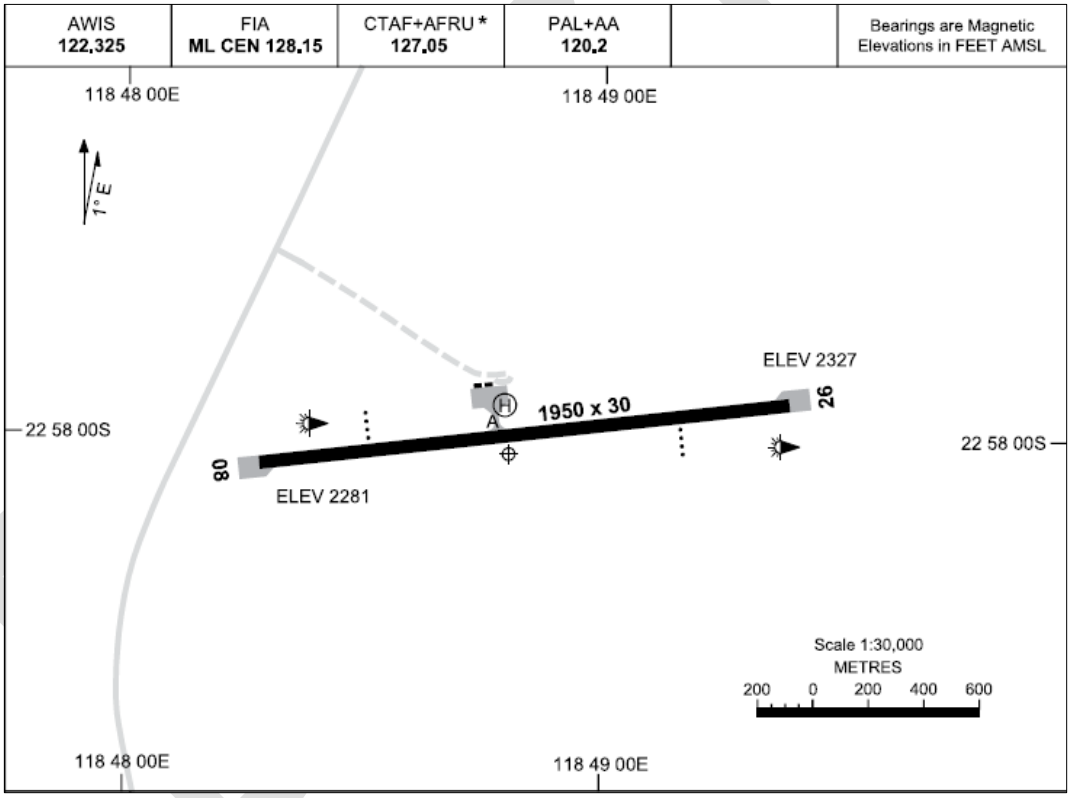

Figure 16: Coondewanna aerodrome chart[28]

Prior permission is required before operating at Coondewanna with all operations required to contact the aerodrome operator at least 20 minutes before their estimated time of arrival.

The types of aircraft operating at Coondewanna are the A320, F100, F70 and BE320. There are approximately 16 scheduled flights each week from Perth to Coondewanna and one (1) flight each week from Busselton to Coondewanna.

A PAPI and an illuminated WDI is located on the left hand side at each runway end.

The CTAF and AFRU frequency is 127.05 MHz and AWIS frequency is 122.325 MHz. The AFRU unit at Fortescue Dave Forrest is not heard on the ground at Coondewanna. The ATS FIA is 128.15 MHz and available in the circuit area. PAL and AA frequency is 120.2 MHz. The PAL activation is intermittent at the lowest safe altitude, north of the aerodrome.

[28] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

During the 12-month period between 1 November 2021 and 31 October 2022, Coondewanna recorded 1,800 total aircraft movements and 155,300 passenger movements.

SOLOMON

Solomon Airport (Solomon) is a certified aerodrome owned and operated by Fortescue Metals Group Ltd. The aerodrome is located approximately 5.0 km (2.7 NM) south east of the Solomon mining camps and 126.5 km (68.3 NM) north west of Coondewanna airport.

Solomon has an elevation of 2,008 FT AMSL and one designated sealed runway, RWY 09/27 which has the following characteristics:

- Runway length is 2,000m and the runway width is 30m.
- RWY 09 threshold elevation is 1,990 FT AMSL.
- RWY 27 threshold elevation is 2,007 FT AMSL.
- Runway strip width (RWS) is 150m and graded to 90m.

The following diagram depicts the runway and facilities at Solomon.

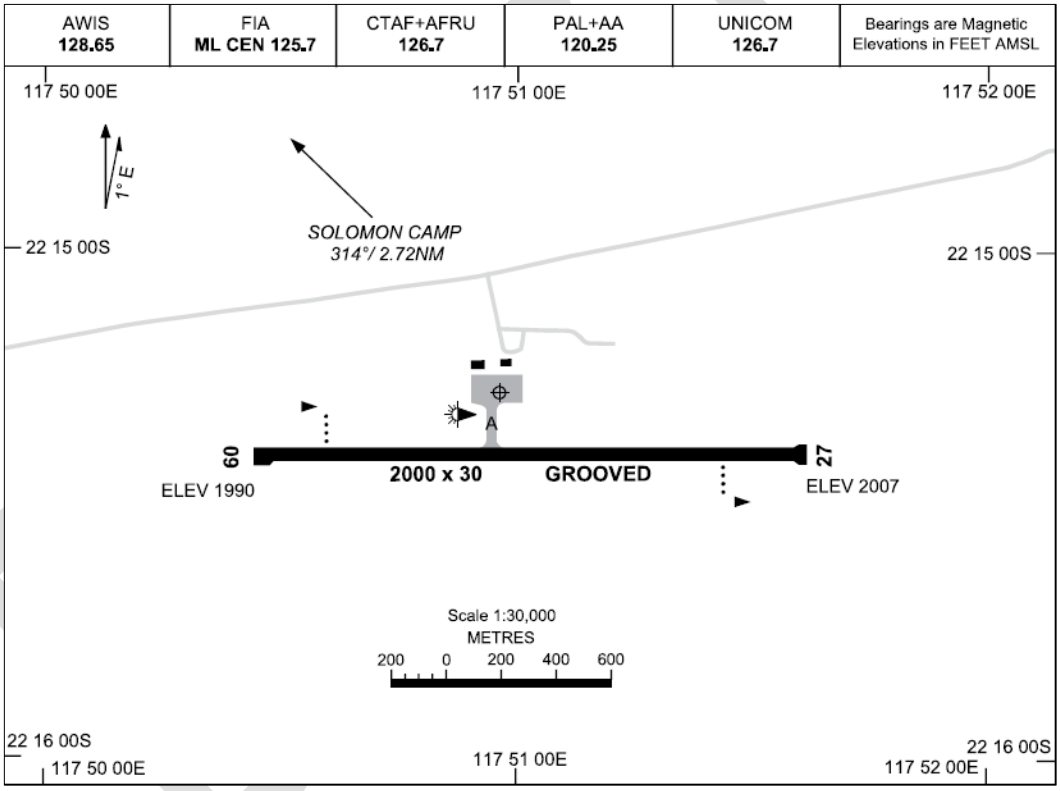

Figure 17: Solomon aerodrome chart[29]

Prior permission is required before operating at Solomon.

The types of aircraft operating at Solomon are the F100, A320, B738, PC12 and F70. There are approximately 16 scheduled flights each week from Perth to Solomon and 1 flight each week from Karratha to Solomon.

A PAPI and an unlit WDI is located on the left hand side at each runway end. A lit WDI is located near the apron area.

The CTAF, AFRU and UNICOM frequency is 126.7 MHz, the AWIS frequency is 128.65 MHz. The AFRU unit at Boolgeeda is not available on the ground at Solomon. PAL and AA frequency is 120.25 MHz. The ATS FIA is 128.15 MHz and available in the circuit area.

[29] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

During the 12-month period between 1 November 2021 and 31 October 2022, Solomon recorded 1,300 total aircraft movements and 142,700 passenger movements.

CHRISTMAS CREEK

Christmas Creek Airport (Christmas Creek) is a certified aerodrome owned and operated by Chichester Minerals Pty Ltd. The aerodrome is located approximately 2.9 km (1.6 NM) south west of the Christmas Creek mining camp and 109.4 km (59.1 NM) north east of Coondewanna airport.

Christmas Creek has an elevation of 1,454 FT AMSL and one designated sealed runway, RWY 09/27 which has the following characteristics:

- Runway length is 2,500m and the runway width is 45m.
- RWY 09 threshold elevation is 1,454 FT AMSL.
- RWY 27 threshold elevation is 1,435 FT AMSL.
- Runway strip width (RWS) is 300m and graded to 150m.

The following diagram depicts the runway and facilities at Christmas Creek.

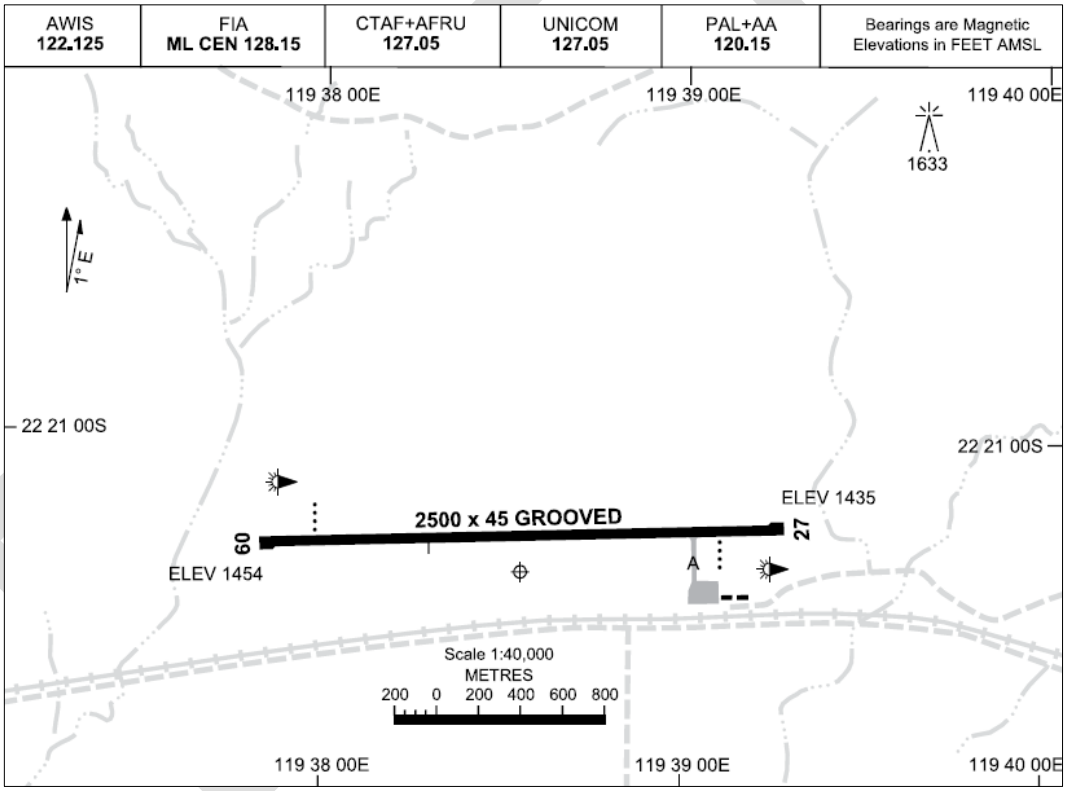

Figure 18: Christmas Creek aerodrome chart[30]

Prior permission is required for all unscheduled aircraft to Christmas Creek. The aerodrome is located in close proximity to Fortescue Dave Forrest aerodrome (approximately 12 NM west of Christmas Creek). Both locations have IFPs that cross during critical phases of flight and due to terrain shielding, VHF contact with aircraft on or close to the ground at Fortescue Dave Forrest is not possible.

The types of aircraft operating at Christmas Creek are F100, A320, B738, BE20 and PC12. There are approximately 16 scheduled flights each week to Christmas Creek, primarily from Perth.

[30] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

The aerodrome has a PAPI and an illuminated WDI located on the left hand side at each runway end.

The CTAF, AFRU and UNICOM frequency is 127.05 MHz, the AWIS frequency is 122.125 MHz. The AFRU is not available on the ground at Christmas Creek. Frequency confirmation is via the UNICOM on receipt of the taxi departure call. PAL and AA frequency is 120.15 MHz. The ATS FIA is 128.15 MHz and available in the circuit area.

During the 12-month period between 1 November 2021 and 31 October 2022, Christmas Creek recorded 1,200 total aircraft movements and 115,400 passenger movements.

GINBATA

Ginbata Airport (Ginbata) is a certified aerodrome owned and operated by owned and operated by Roy Hill Holdings Pty Ltd. The aerodrome is located approximately 10.2 km (5.5 NM) south of the Roy Hill mining camp and 132.9 km (71.8 NM) north east of Coondewanna airport.

Ginbata has an elevation of 1,409 FT AMSL and one designated sealed runway, RWY 09/27 which has the following characteristics:

- Runway length is 2,500m and the runway width is 45m.
- RWY 09 threshold elevation is 1,409 FT AMSL.
- RWY 27 threshold elevation is 1,405 FT AMSL.
- Runway strip width (RWS) is 300m and graded to 150m.

The following diagram depicts the runway and facilities at Ginbata.

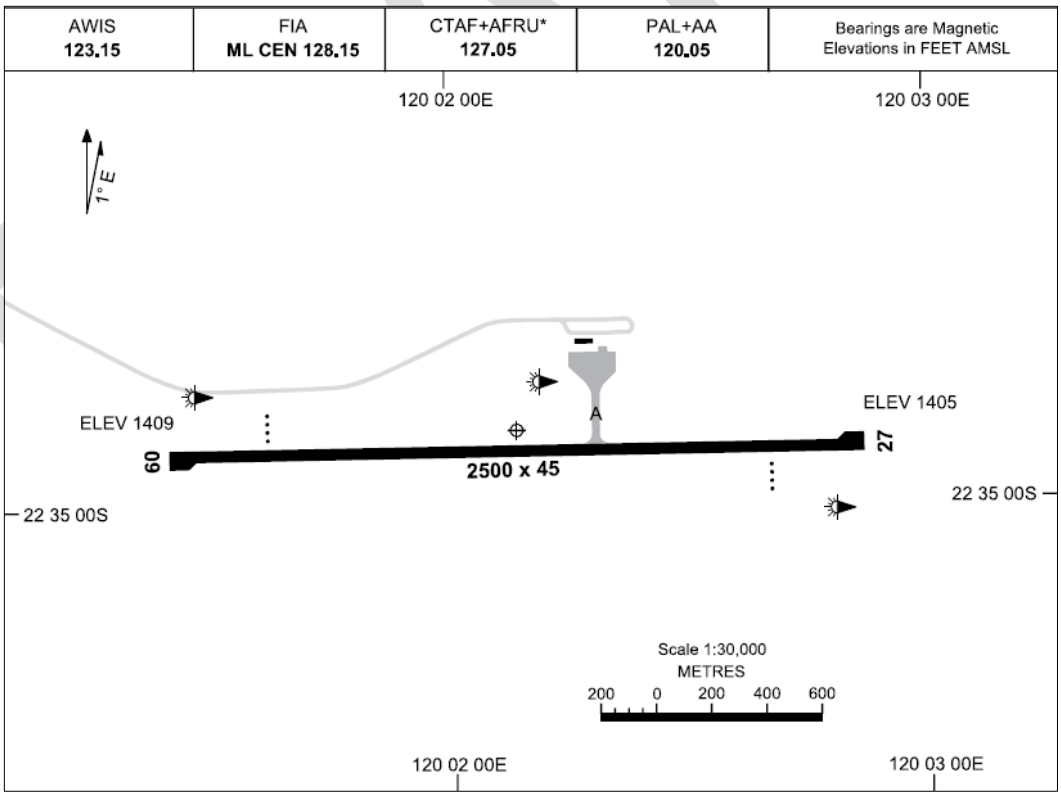

Figure 19: Ginbata aerodrome chart[31]

Prior permission is required for itinerant aircraft operating at Ginbata.

The types of aircraft operating at Ginbata are B738, F100, A320, PC12 and C441. There are approximately 13 scheduled flights each week to Ginbata, primarily from Perth.

[31] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

The aerodrome has a PAPI and an illuminated WDI located on the left hand side at each runway end. There is another illuminated WDI located near the apron area.

The CTAF and AFRU frequency is 127.05 MHz, PAL and AA frequency is 120.05 MHz and the AWIS frequency is 123.15 MHz. The AFRU is not available on the ground at Ginbata. Frequency confirmation is via the UNICOM on receipt of the taxi departure call. PAL and AA frequency is 120.15 MHz. The ATS FIA is 128.15 MHz.

During the 12-month period between 1 November 2021 and 31 October 2022, Ginbata recorded 1,196 total aircraft movements and 127,700 passenger movements.

FORTESCUE DAVE FORREST

Fortescue Dave Forrest Airport (Fortescue DF) is a certified aerodrome owned and operated by Chichester Metals Pty Ltd.

The aerodrome is located approximately 1.5 km (0.8 NM) north of the Cloudbreak mining camp and 98.2 km (53.0 NM) north east of Coondewanna airport.

Fortescue DF has an elevation of 1,563 FT AMSL and one designated sealed runway, RWY 09/27 which has the following characteristics:

- Runway length is 2,300m and the runway width is 30m.
- RWY 09 threshold elevation is 1,563 FT AMSL.
- RWY 27 threshold elevation is 1,512 FT AMSL.
- Runway strip width (RWS) is 150m and graded to 90m.

The following diagram depicts the runway and facilities at Fortescue DF.

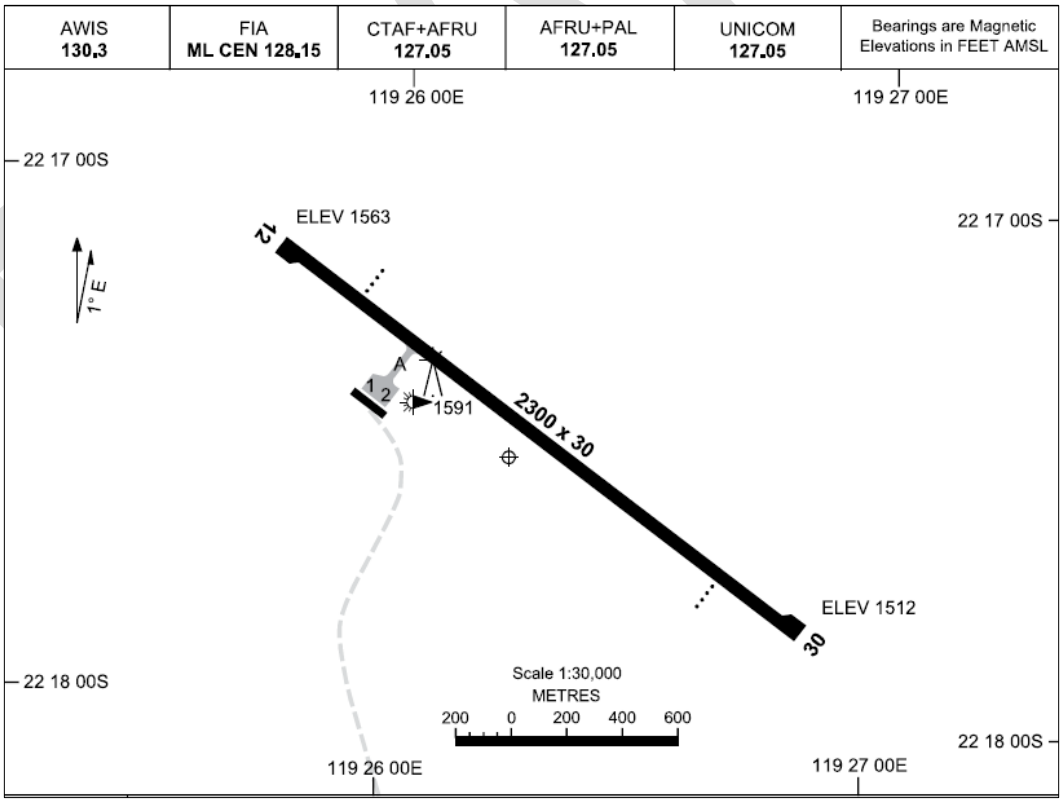

Figure 20: Fortescue Dave Forrest aerodrome chart[32]

Fortescue Dave Forrest aircraft and passenger movement data fluctuates with demand for the resource sector. Prior permission is required for all unscheduled aircraft using the aerodrome.

[32] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

The types of aircraft operating at Fortescue DF are F100, B738, A320, BE20 and PC12. There are approximately 11 scheduled flights each week to Fortescue DF, primarily from Perth.

The aerodrome has a PAPI located on the left hand side at each runway end. There is an illuminated WDI located near the apron area.

The CTAF, AFRU, PAL and UNICOM frequency is 127.05 MHz. The AWIS frequency is 130.3 MHz. The ATS FIA is 128.15 MHz.

Fortescue DF is located in close proximity to Christmas Creek where IFPs cross tracks close to the ground, during the critical phases of flight i.e. arriving or departing these locations. Due to terrain shielding, VHF contact with aircraft on the ground or close to the ground at Christmas Creek is not possible.

During calm wind conditions, users are requested to depart using RWY 30 to reduce interactions with Christmas Creek traffic.

During the 12-month period between 1 November 2021 and 31 October 2022, Ginbata recorded 1,181 total aircraft movements and 95,100 passenger movements.

GUDAI-DARRI MINE

Gudai-Darri Mine Airport (Gudai-Darri Mine) is a certified aerodrome owned and operated by Mount Bruce Mining Pty Ltd. The aerodrome was previously known as Koodaideri Mine airport prior to the current name. The ICAO code for this location is YKDD. The aerodrome is located approximately 1.8 km (1.0 NM) east of the Gudai-Darri mine site and 57.3 km (30.9 NM) north east of Coondewanna airport.

Gudai-Darri Mine has an elevation of 1,479 FT AMSL and one designated sealed runway, RWY 12/30 which has the following characteristics:

- Runway length is 2,200m and the runway width is 45m.
- RWY 12 threshold elevation is 1,473 FT AMSL.
- RWY 30 threshold elevation is 1,456 FT AMSL.
- Runway strip width (RWS) is 300m and graded to 150m.

The following diagram depicts the runway and facilities at Gudai-Darri Mine.

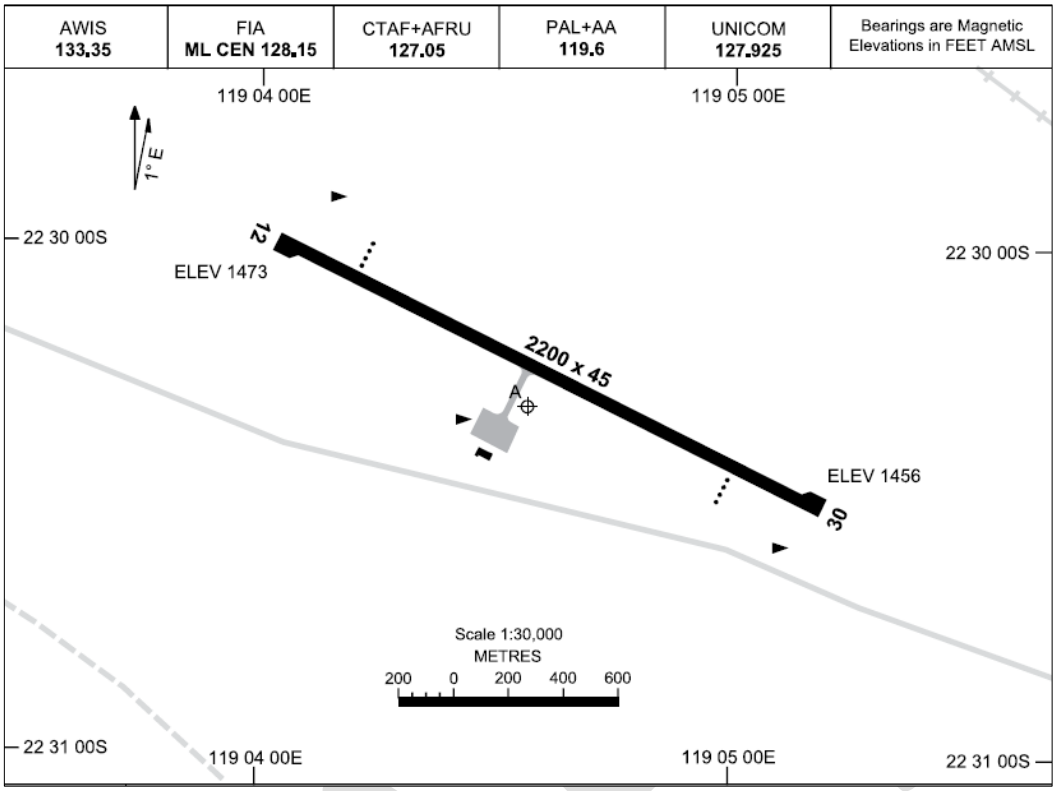

Figure 21: Gudai-Darri Mine aerodrome chart[33]

Operations at Gudai-Darri Mine are available during daylight hours and prior permission is required by users of the aerodrome. The airfield is new and movement data has not been able to be accessed, however, online information through programs such as Flightradar24 indicates there is an average of 13 flights each week operating to this location. Flights appear to be operated by Virgin Australia. Common aircraft types include B738, F100, A320 and BE20 via Perth.

A PAPI and an unlit WDI is located on the left hand side at each runway end. Another unlit WDI is located near the apron area.

The CTAF and AFRU frequency is 127.05 MHz, the PAL and AA frequency is 119.6 MHz. The UNICOM frequency is 127.925 MHz, the AWIS frequency is 133.35 MHz. The AFRU signal is not available on the ground at Gudai-Darri Mine. The ATS FIA is 128.15 MHz and available in the circuit area.

[33] DAP West amendment 173 effective 1 December 2022, Airservices Australia, Canberra

Annex E Aircraft landing areas within the review area

The majority of ALAs promulgated on aviation charts are identified as an unverified location. Nullagine ALA is the only verified location and compliant with the requirements of Part 175 AIM.

NULLAGINE

Nullagine is operated by the Shire of East Pilbara. The ALA is located 184.1 km (99.4 NM) north east of Coondewanna. Nullagine has one unmarked, unsealed natural/sand runway RWY 14/32. The runway is 1,620m in length and 30m wide.

Recorded movement data shows common aircraft operating at Nullagine are Cessna Caravan (C208), PC12 and Swearingen Merlin (SW3).

Figure 22: Nullagine ALA[34]

ROCKLEA

Rocklea ALA is located approximately 140.1 km (75.7 NM) west of Coondewanna. Rocklea has one unmarked, unsealed runway RWY 10/28. The runway is approximately 920m in length and 25m wide. Activity appears to fluctuate dependent upon the resource sector based on recorded movement data with an average of 1.5 movements per month.

The three types of aircraft recorded as using Rocklea are the Kawasaki BK-117 (BK17), Partenavia P68 (P68) and the Eurocopter AS355 (AS55).

[34] Nullagine ALA Google Earth V 7.3.4.8248 (16 July 2021) Nullagine, Western Australia. 21° 54’ 36.81” S 120° 11’ 41.92” E, Eye Alt 5.0km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]

Figure 23: Rocklea ALA[35]

TUREE CREEK

Turee Creek ALA is located approximately 74.8 km (40.4 NM) south of Coondewanna. Turee Creek has three unmarked, unsealed runways, RWY 10/28 approximately 1250m in length and 50m wide, RWY 16/34 approximately 640m in length and 30m wide and RWY 07/25 approximately 640m in length and 25m wide. Activity appears to have increased since August 2018 to regular weekly flights to this location. The common aircraft recorded at Turee Creek is C208.

Figure 24: Turee Creek ALA[36]

[35] Rocklea ALA Google Earth V 7.3.4.8248 (16 July 2021) Rocklea, Western Australia. 22° 53' 01.00" S 117° 26' 55.40" E, Eye Alt 1.9km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]
[36] Turee Creek ALA Google Earth V 7.3.4.8248 (16 July 2021) Turee Creek, Western Australia. 23° 37' 25.87" S 118° 39' 18.35" E, Eye Alt 2.1km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]

PARABURDOO GOLD PROJECT

Paraburdoo Gold Project ALA (YPGP) is located approximately 106.7 km (57.6 NM) south west of Coondewanna. YPGP has one unmarked, unsealed runways, RWY 03/21 approximately 1270m in length and 40m wide.

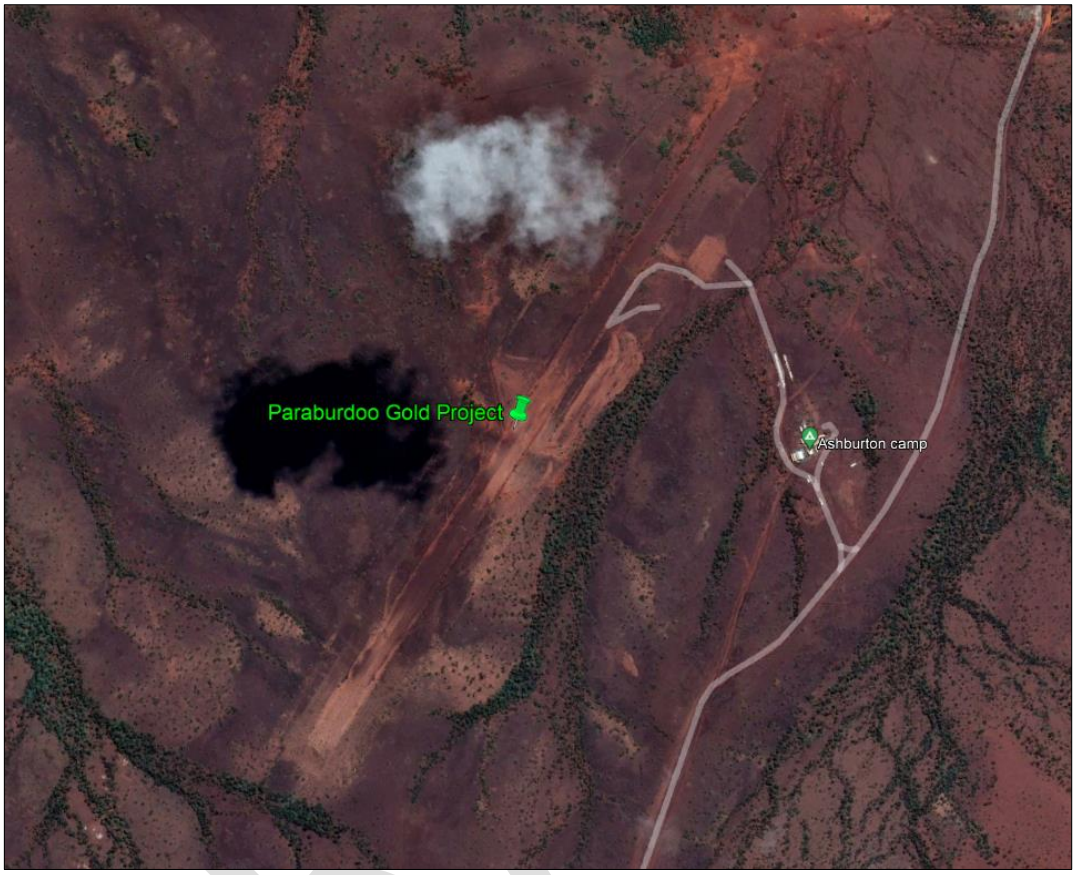

Figure 25: Paraburdoo Gold Project ALA[37]

ASHBURTON DOWNS

Ashburton Downs ALA is located approximately 183.7 km (99.2 NM) west of Coondewanna. Ashburton Downs has one unmarked, unsealed runway RWY 13/31. The runway is approximately 1,350m in length and 40m wide.

[37] Paraburdoo Gold Project ALA Google Earth V 7.3.4.8248 (16 July 2021) Paraburdoo, Western Australia. 23° 24' 07.90" S 117° 53' 03.20" E, Eye Alt 3.4km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]

Figure 26: Ashburton Downs ALA[38]

PACKSADDLE

Packsaddle ALA is located approximately 13.8 km (7.4 NM) north west of Coondewanna. Packsaddle has one unmarked, unsealed and overgrown runway RWY 07/25. The runway is approximately 1,100m in length and indicatively marked below.

Figure 27: Packsaddle ALA[39]

[38] Ashburton Downs ALA Google Earth V 7.3.4.8248 (16 July 2021) Ashburton Downs, Western Australia. 23° 24' 21.64" S 117° 04' 56.52" E, Eye Alt 2.4km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]
[39] Packsaddle ALA Google Earth V 7.3.4.8248 (16 July 2021) Packsaddle, Western Australia. 22° 54' 17.00" S 117° 04' 56.52" E, Eye Alt 4.8km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]

MOUNT BRUCE

Mount Bruce ALA is located approximately 69.4 km (37.5 NM) north west of Coondewanna. Packsaddle has one unmarked, unsealed runway RWY 14/32. The runway is approximately 1,000m in length.

Figure 28: Mount Bruce ALA[40]

NAMULDI

Namuldi ALA is located on the Pilbara TAC, situated north of Barimunya. This chart does not provide any indication of runway direction etc. A search of the estimated location indicates a possible ALA at the Nammuldi mine operated by Rio Tinto, may have been repurposed for accommodation and vehicle housing. This area is approximately 160.5 km (86.7 NM) north west of Coondewanna. The following diagram provides an outline of a possible ALA and the accommodation village. Action to confirm the ALA or removal from AIP should be undertaken by the responsible agents.

[40] Mount Bruce ALA Google Earth V 7.3.4.8248 (16 July 2021) Mount Bruce, Western Australia. 22° 40' 36.20" S 118° 12' 41.15" E, Eye Alt 3.0km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]

Figure 29: Nammuldi Mine part area[41]

HAMMERSLEY

Hammersley ALA is located approximately 139.6 km (74.4 NM) north west of Coondewanna. Hammersley has one unmarked, unsealed runway RWY 07/25. The runway is approximately 1,290m in length.

Figure 30: Hammersley ALA[42]

[41] Nammuldi Mine ALA Google Earth V 7.3.4.8248 (16 July 2021) Nammuldi mine, Western Australia. 22° 23' 26.10" S 117° 22' 21.90" E, Eye Alt 5.3km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]
[42] Hammersley ALA Google Earth V 7.3.4.8248 (16 July 2021) Hammersley, Western Australia. 22° 16' 48.81" S 117° 40' 14.46" E, Eye Alt 3.9km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]

COOLAWANYAH

Coolawanyah station ALA is located approximately 169.2 km (91.3 NM) north west of Coondewanna. Coolawanyah has one unmarked, unsealed and overgrown runway RWY 08/26. The runway is approximately 1,250m in length.

Figure 31: Coolawanyah ALA[43]

MUNJINA

Munjina ALA is located approximately 67.5 km (36.4 NM) north of Coondewanna. Munjina has one unmarked, unsealed runway RWY 12/30. The runway is approximately 1,400m.

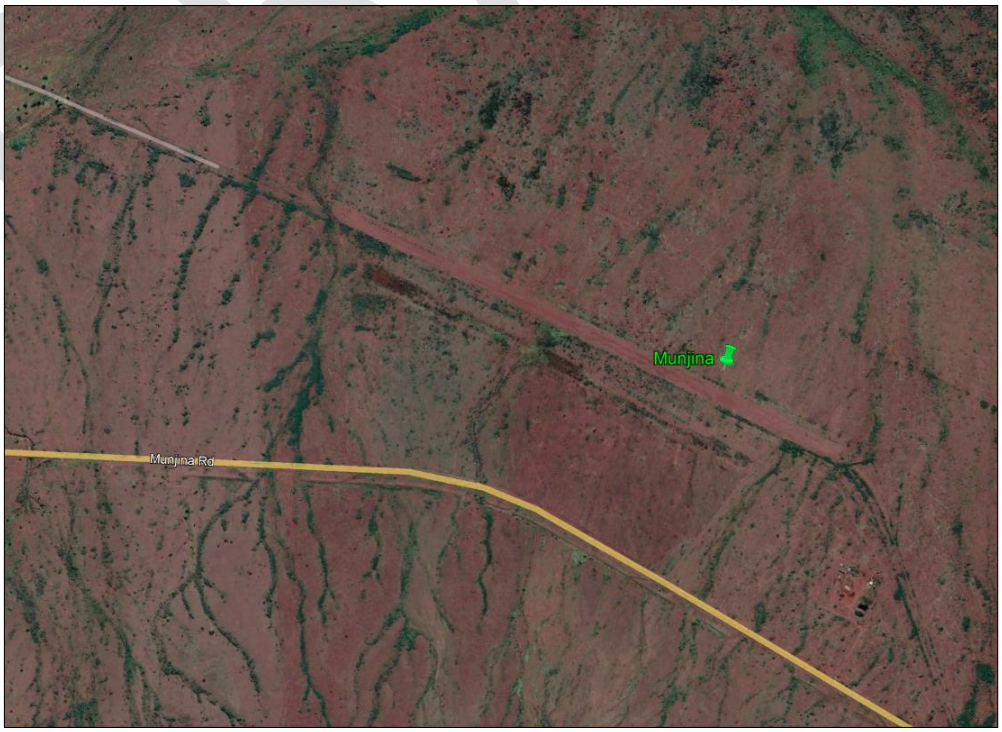

Figure 32: Munjina ALA[44]

[43] Coolawanyah ALA Google Earth V 7.3.4.8248 (16 July 2021) Coolawanyah, Western Australia. 21° 47' 40.20" S 117° 45' 17.10" E, Eye Alt 3.2km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]
[44] Munjina ALA Google Earth V 7.3.4.8248 (16 July 2021) Munjina, Western Australia. 22° 21' 56.00" S 118° 41' 06.82" E, Eye Alt 4.3km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]

REDMONT

Redmont ALA is located approximately 111.4 km (60.1 NM) north of Coondewanna. Redmont has one unmarked, unsealed runway RWY 08/26. The runway is approximately 1,530m in length and 25m wide.

Figure 33: Redmont ALA[45]

HILLSIDE

Hillside ALA is located approximately 152.6 km (82.4 NM) north of Coondewanna. Hillside has one unmarked, unsealed runway RWY 08/26. The runway is approximately 1,900m.

Figure 34: Hillside ALA[46]

[45] Redmont ALA Google Earth V 7.3.4.8248 (16 July 2021) Redmont, Western Australia. 21° 58' 34.20" S 119° 01' 00.40" E, Eye Alt 4.1km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]
[46] Hillside ALA Google Earth V 7.3.4.8248 (16 July 2021) Hillside, Western Australia. 21° 43' 04.73" S 119° 26' 39.79" E, Eye Alt 6.8km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]

BONNEY DOWNS STATION

Bonney Downs Station ALA is located approximately 144.8 km (78.2 NM) north east of Coondewanna. Bonney Downs Station has two unmarked, unsealed runways RWY 08/26, approximately 940m in length and a narrower RWY13/31 approximately 1,200m in length.

Figure 35: Bonney Downs Station ALA[47]

ROY HILL STATION

Roy Hill Station ALA is located approximately 123.6 km (66.8 NM) east north east of Coondewanna. Roy Hill Station has one unmarked, unsealed natural/sand runway RWY 14/32, approximately 1,060m in length.

[47] Bonney Downs Station ALA Google Earth V 7.3.4.8248 (16 July 2021) Bonney Downs Station, Western Australia. 22° 10' 20.70" S 119° 55' 35.20" E, Eye Alt 5.9km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]

Figure 36: Roy Hill Station ALA[48]

SANDHILL

Sandhill ALA is located approximately 86.2 km (46.5 NM) east of Coondewanna. Sandhill has one unmarked, unsealed and overgrown runway RWY 14/32, approximately 1,200m in length.

Figure 37: Sandhill ALA[49]

[48] Roy Hill Station ALA Google Earth V 7.3.4.8248 (16 July 2021) Roy Hill Station, Western Australia. 22° 37' 33.31" S 119° 57' 34.24" E, Eye Alt 3.6km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]
[49] Sandhill ALA Google Earth V 7.3.4.8248 (16 July 2021) Sandhill, Western Australia. 22° 47' 37.80" S 119° 37' 53.70" E, Eye Alt 4.1km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]

RHODES RIDGE

Rhodes Ridge ALA is located approximately 50.1 km (31.4 NM) east south east of Coondewanna. Rhodes Ridge has one unmarked, unsealed runway RWY 10/28, approximately 2,200m in length.

Figure 38: Rhodes Ridge ALA[50]

SYLVANIA HOMESTEAD

Sylvania Homestead ALA is located approximately 142.5 km (77.0 NM) south east of Coondewanna. Sylvania Homestead has one unmarked, unsealed runway RWY 10/28, approximately 980m in length.

Figure 39: Sylvania Homestead ALA[51]

[50] Rhodes Ridge ALA Google Earth V 7.3.4.8248 (16 July 2021) Rhodes Ridge, Western Australia. 23° 06' 17.20" S 119° 21' 58.40" E, Eye Alt 5.2km. Maxar Technologies 2023. http://www.earth.google.com [30 March 2023]
[51] Sylvania Homestead ALA Google Earth V 7.3.4.8248 (16 July 2021) Sylvania Homestead, Western Australia. 23° 33' 28.50" S 120° 02' 51.70" E, Eye Alt 3.0km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]

GILES POINT

Giles Point ALA is located approximately 49.9 km (26.9 NM) south east of Coondewanna. Giles Point has one unmarked, unsealed runway RWY 08/26, approximately 1,780m in length.

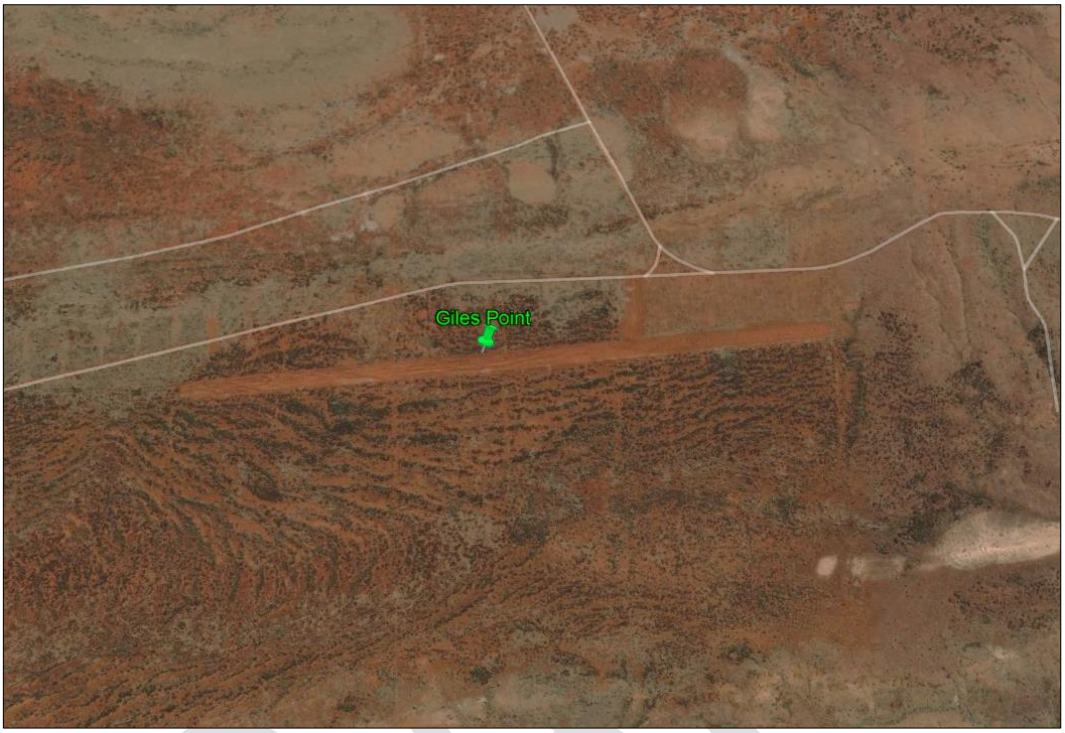

Figure 40: Giles Point ALA[52]

[52] Giles Point ALA Google Earth V 7.3.4.8248 (16 July 2021) Giles Point, Western Australia. 23° 17' 25.15" S 119° 08' 53.05" E, Eye Alt 5.1km. CNES/Airbus 2023. http://www.earth.google.com [30 March 2023]

Annex F Aircraft and passenger movement

The following tables and graphs display the total aircraft movements and passenger movements during the review period.

Annualised monthly movements is the recorded total within the 12-month period for that month e.g. October 2020 displays the total movements recorded between 1 November 2019 to 31 October 2020

Location	2016	2017	2018	2019	2020	2021	2022
Newman	10,085	9,878	10,999	11,801	10,845	15,293	14,011
Boolgeeda	1,900	2,000	1,800	2,300	2,700	3,600	3,700
Paraburdoo	3,700	3,433	3,100	3,366	3,500	4,000	3,633
West Angelas	929	1,200	1,196	1,600	2,200	2,400	2,400
Barimunya	2,254	2,400	2,500	2,200	2,200	2,400	2,400
Coonde-wanna	1,515	995	959	1,800	2,800	1,800	1,800
Solomon	1,040	1,136	1,133	1,500	2,100	1,500	1,300
Christmas Creek	1,258	1,146	1,200	1,199	1,188	1,400	1,200
Ginbata	928	643	834	947	1,055	1,105	1,196
Fortescue Dave Forrest	1,015	978	946	1,000	1,113	1,156	1,181
TOTAL	**24,624**	**23,809**	**24,667**	**26,633**	**29,701**	**34,654**	**32,821**
% change	0	-3.30	3.60	7.97	11.52	16.67	-5.29

Table 4: Aircraft movements recorded 12-month period to October 2016-2022

The following graphs detail the annualised monthly total aircraft movements for the abovementioned locations. The graphs have been presented where similar movement numbers have been recorded.

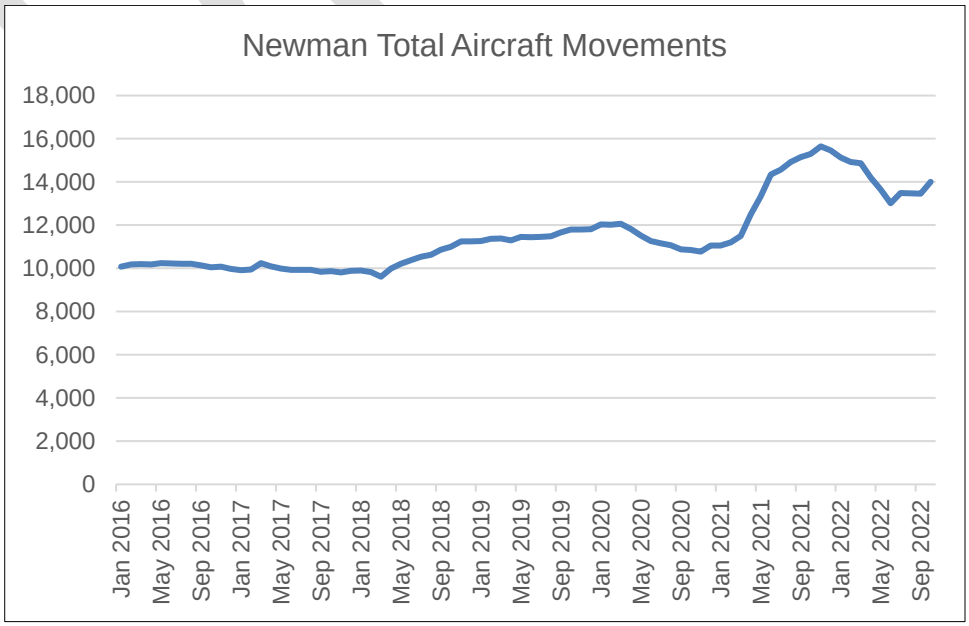

Figure 41: Newman total aircraft movements

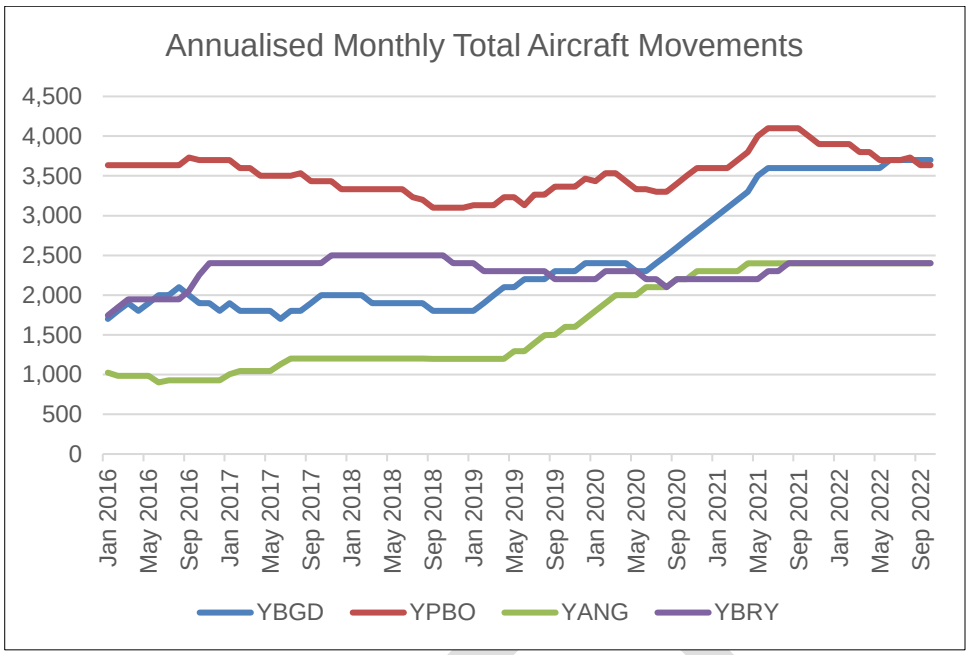

Figure 42: Total aircraft movements for Boolgeeda, Paraburdoo, West Angelas & Barimunya

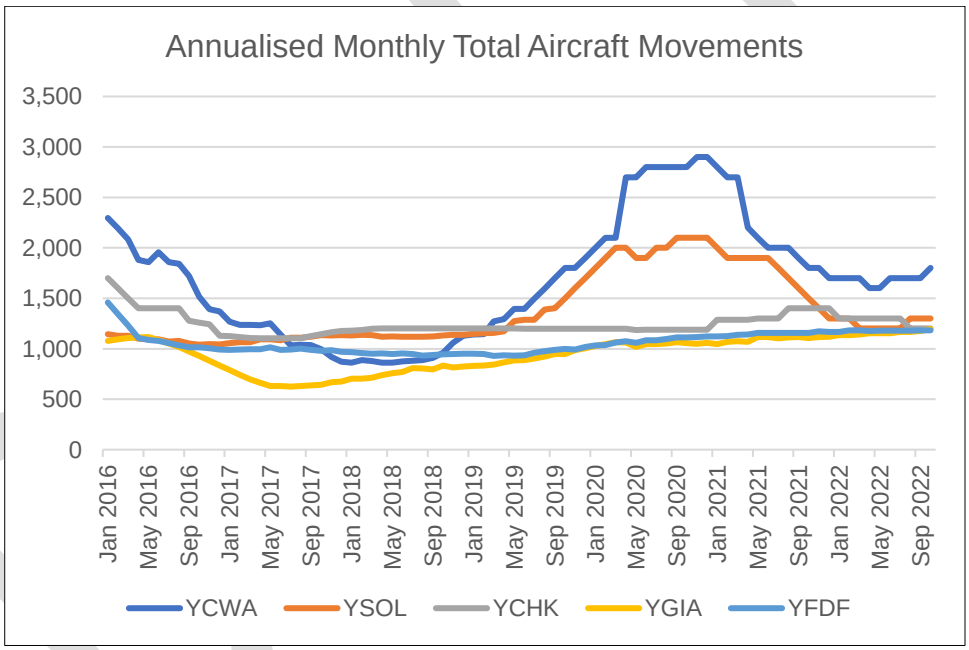

Figure 43: Total aircraft movements for Coondewanna, Solomon, Christmas Creek, Ginbata & Fortescue Dave Forrest

Location	2016	2017	2018	2019	2020	2021	2022
Newman	358,051	327,370	341,066	388,617	275,392	388,042	407,537
Boolgeeda	165,600	161,700	163,800	172,200	204,500	299,000	297,700
Paraburdoo	180,862	175,400	184,900	195,000	178,000	202,000	217,300
West Angelas	76,700	102,800	98,300	119,000	176,100	174,100	181,700
Barimunya	139,900	150,000	150,200	140,500	148,700	157,600	157,900
Coonde-wanna	114,000	79,100	85,200	144,100	180,800	160,400	155,300
Solomon	79,000	92,500	93,100	112,500	159,000	151,900	142,700
Christmas Creek	93,500	85,600	91,800	110,300	111,600	126,000	115,400
Ginbata	83,700	73,200	90,100	94,000	103,000	113,000	127,700
Fortescue Dave Forrest	78,700	74,500	70,900	89,700	97,100	96,200	95,100
TOTAL	**1,370,013**	**1,322,170**	**1,369,366**	**1,565,917**	**1,634,192**	**1,868,242**	**1,898,337**
% change	0	-3.49	3.56	14.35	4.36	14.32	1.61

Table 5: Passenger movements recorded 12-month period to October 2016-2022

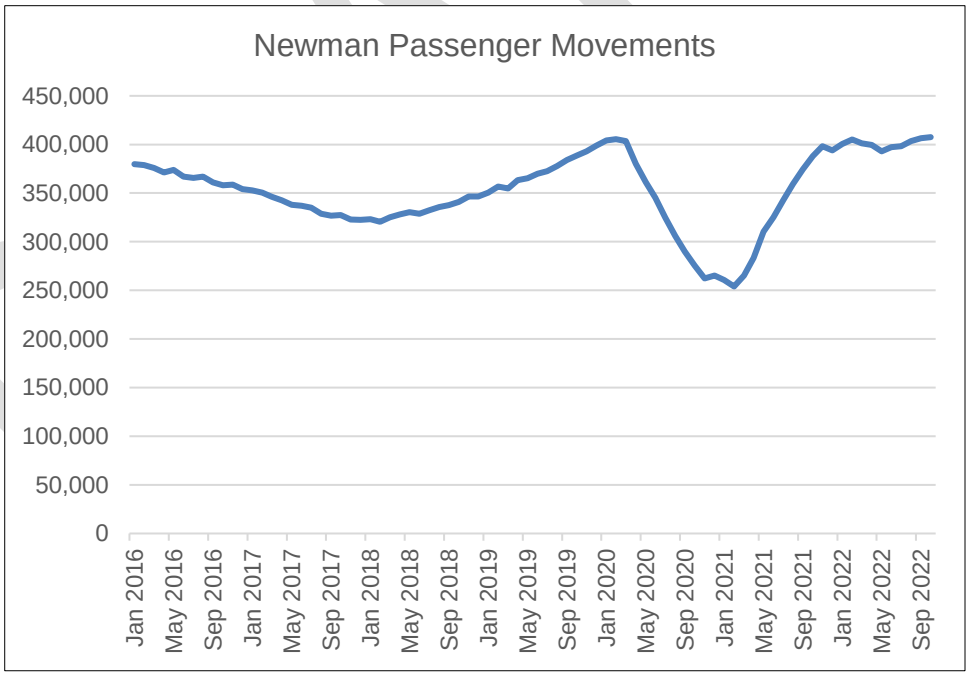

Figure 44: Passenger movement data Newman

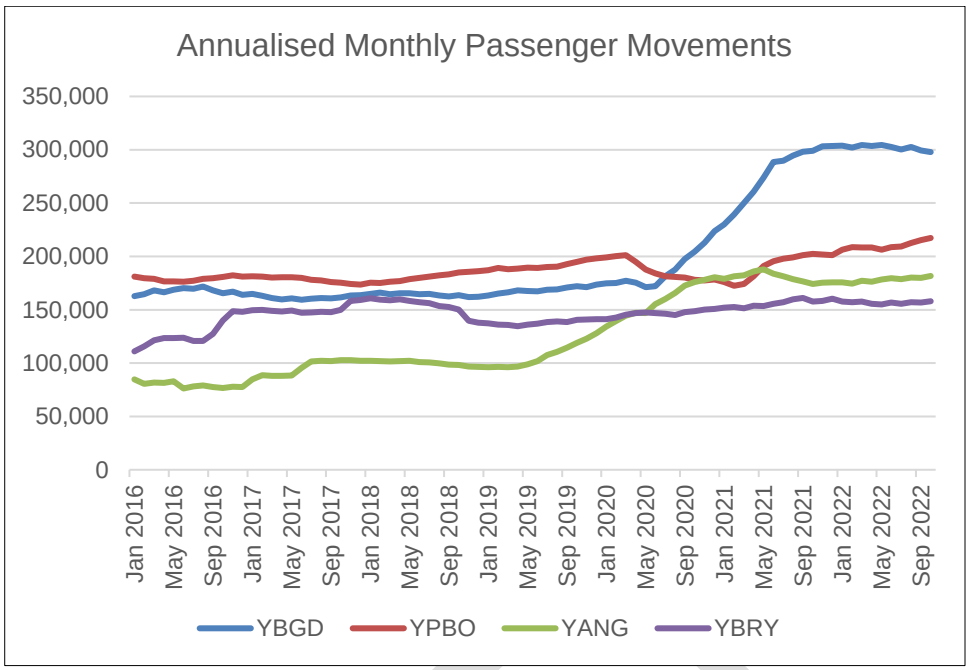

Figure 45: Total passenger movements Boolgeeda, Paraburdoo, West Angelas & Barimunya

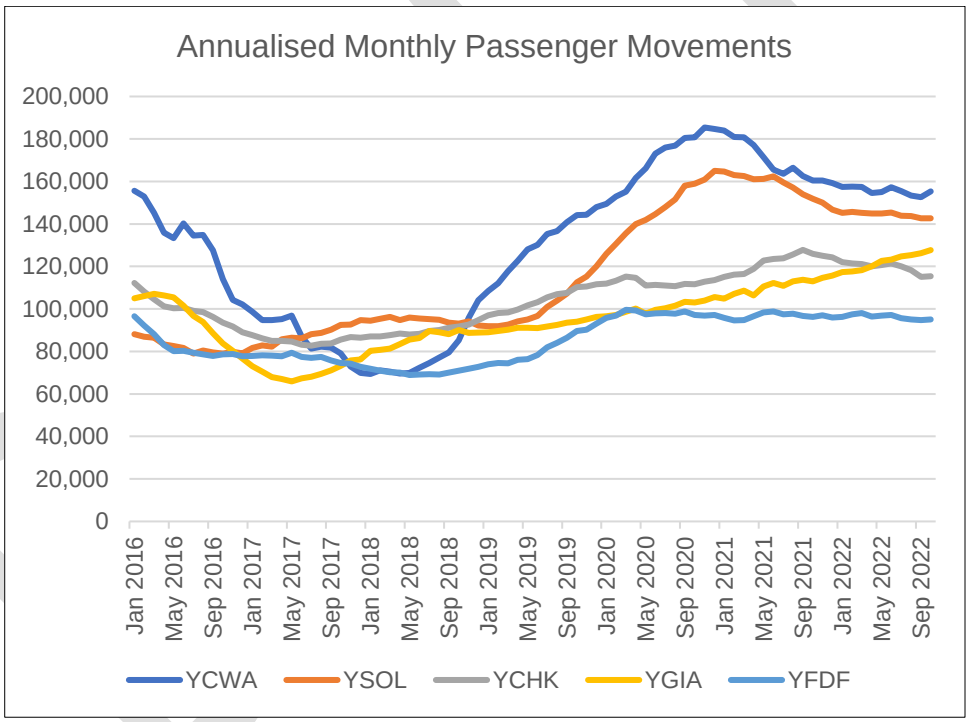

Figure 46: Total aircraft movements for Coondewanna, Solomon, Christmas Creek, Ginbata and Fortescue Dave Forrest

Annex G Stakeholders

The following stakeholders were contacted to contribute to this review/review. Amend as required

Organisation	Position
CASA	Aerodrome Inspector
CASA	Aviation Safety Advisor
Airservices Australia	Aviation Regulatory Engagement
Department of Transport WA	Principal Policy Officer - Aviation Infrastructure
Virgin Australia	Head of Operations - WA
Virgin Australia Regional Airlines	Chief pilot
Qantas Airways	Base Manager - WA
Skippers Aviation	Chief Pilot
Network Aviation	Head of Operations - WA
Royal Flying Doctor Service	Deputy Head of Operations
Cobham Aviation 717	Chief Pilot
Aviair	Chief Pilot
AVSEF	Members
Chamber of Minerals and Energy	Manager Economic Competitiveness
Department of Mines and Petroleum	Planning Manager Land Use Planning
BHP	Aerodrome owner
RIO Tinto	Aerodrome owner
FMG	Aerodrome owner
Roy Hill	Aerodrome owner

Annex H References

Airservices Australia Aeronautical Information Publication Australia amendment 113 effective 1 December 2022 Airservices Australia

Airservices Australia; Australia En-Route Chart Low 8, effective 1 December 2022 Airservices Australia

Airservices Australia Departure and Approach Procedures (DAP) amendment 173, effective 1 December 2022 Airservices Australia

Airservices Australia Designated Airspace Handbook (DAH) effective 1 December 2022 Airservices Australia

Airservices Australia En-Route Supplement Australia (ERSA) effective 1 December 2022 Airservices Australia

Airservices Australia, Projects (2018, May 22) retrieved 9 July 2018 from http://www.airservicesaustralia.com/projects;

Airservices Australia, Terminal Area Chart (TAC) 7, Karratha effective 1 December 2022 Airservices Australia

Airservices Australia, TAC 8 Pilbara effective 1 December 2022 Airservices Australia

Airspace Act 2007 (Cth), Canberra

Airspace Regulations 2007 (Cth), Canberra

Annex 11 to the Convention on International Civil Aviation Air Traffic Services, Fourteenth Edition, July 2016 International Civil Aviation Organization

Aviation Safety Incident Reports 2016-2022 Australian Transport Safety Bureau, Canberra

Corporate Integrated Reporting and Risk Information System 2016-2022, Airservices Australia, Canberra

Department of Infrastructure, Transport and Regional Development 2021. Australian Airspace Policy Statement 2021, Canberra. https://www.legislation.gov.au/Details/F2021L01589

Google Earth V 7.3.1.4507 2018. Coondewanna, Western Australia http://www.earth.google.com;

Google Earth V 7.3.4.8248 2021. Coondewanna, Western Australia http://www.earth.google.com

Minister's Statement of Expectations for the Board of the Civil Aviation Safety Authority for the Period 31 January 2022 to 30 June 2023 (Cth), Canberra https://www.legislation.gov.au/Details/F2022L00061

Annex I HazID Workshop

On 26 October 2022, a Hazard Identification (HazID) workshop was undertaken by CASA OAR and involved representatives from the organisations including Airservices Australia, Alliance Airlines, Fortescue Metals Group, IDS Australasia, Network Aviation, Rio Tinto, Qantas, Virgin Australia, and from other sections within CASA including Flight Standards, Flight Operations and Communications, Navigation, Surveillance/Air Traffic Management.

Minutes of the meeting and a bowtie relating to airborne conflicts were created and is held on file (reference CASA folder OP20/9).