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Pilbara Region Airspace Review

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0.1	Initial draft	May 2020
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0.3	Management review	June 2020
0.4	Stakeholder exposure draft	June 2020
0.5	Stakeholder exposure draft – peer comments	November 2020

1 Executive Summary

Note – this Airspace Review was conducted before the impact of COVID 19 on the aviation industry. The downturn in all aviation activity across Australia and internationally may have a significant impact on the analysis, outcomes and projections used in this report. It is noted that the downturn in aviation into Pilbara region has not been as significant as at aerodromes in the Eastern States due to the fly in fly out (FIFO) resource sector.

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

The Office of Airspace Regulation (OAR) within CASA has conducted an airspace review within 100 nautical miles (NM) of Coondewanna Airport (Coondewanna). This area is referred to as the Pilbara Region for the purpose of this review.

The aim of the Pilbara Region review is to determine if the airspace remains fit for purpose.[3] The review examined the airspace architecture, classifications, procedures and infrastructure from the surface up to Fight Level (FL) 180.

A multifaceted approach was used in conducting this review including quantitative and qualitative analysis consisting of:

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

Passenger numbers and air transport movements for the Pilbara Region have increased by 10.9% and 13.9% respectively during the review period from January 1st 2016 to 31st December 2019.

New mining projects in the Pilbara Region has resulted in an increase of air transport and passenger numbers. There are additional aviation infrastructure projects being constructed or that are in the process of being commissioned in the study area that need to be considered for future impact to the complexity of the airspace.

1.1 Summary of Issues

- Stakeholders state that the current very high frequency (VHF) communications are not fit for purpose in the Pilbara Region. Frequency congestion and “black spots” caused by terrain and infrastructure locations are contributing to a challenging operating environment for pilots. Lack of situational awareness is a result of communication issues and has reduced the ability for pilots to build a mental picture of aircraft operating in the region. The need for crews to occasionally repeat the aircraft’s position leads to additional radio transmissions, which causes interruptions and adds to frequency congestion at peak times.

- Satellite phone and High Frequency (HF) radio communications are currently in operation and are regarded as a poor substitute for VHF communications. This is due to the cumbersome operation of HF radios and no direct link with the area controller.

- Automatic Dependent Surveillance – Broadcast (ADS-B) surveillance coverage at lower levels is sporadic. During the study period, the lower level (LL) of Class E airspace was at FL 180. The lower level of Class E airspace has subsequently been lowered to FL125. Identification by air traffic control (ATC) before entering controlled airspace. Due to the higher altitude of the aircraft gave extended opportunity for

[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] For this review, fit for purpose means that the airspace architecture is suitable for its intended purpose.

ADS-B to receive the aircrafts transmissions and for controllers to assess threats before issuing a clearance into or out of controlled airspace.

- Consultation with airspace users was undertaken to investigate whether the implementation of a broadcast area or several broadcast areas would be beneficial to address the operational communication difficulties.
- Area Navigation (RNAV) Global Navigation Satellite System (GNSS) the following RWY 09 for Christmas Creek and RNAV (GNSS) RWY 30 for Fortescue Dave Forrest intersect. The vertical separation for waypoints CHKWF and FDFEF for opposing procedures is 60 feet. Notes are currently on the approach plates stating that separation is not assured. These notes are not displayed in a similar manner being the result of each design companies' unique style of notation in IFP plates.
- Stakeholders have suggested that a Terminal Area Chart (TAC) and review of low-level route review to align the route structure to performance based navigation (PBN) standards would be beneficial. The review of the Pilbara airspace classification June 2017 noted that the introduction of the new high-altitude air routes significantly reduced potential conflicts for arriving and departing aircraft into the region.

1.2 Recommendations

The following recommendations are:

Recommendation 1:

Airservices should increase the VHF infrastructure and coverage in the Pilbara region within 12 months to address the gaps in communication abilities for ATC and pilots. Future VHF infrastructure locations should be aligned with impending resource projects to produce the most effective VHF service for the area.

Recommendation 2:

Airservices should consider providing greater ADS-B coverage and more detailed information for crews regarding transmitter locations or expected service area for current infrastructure.

Recommendation 3:

CASA Flying Operations Inspectors (FOIs) along with the OAR to investigate a broadcast area for the area encompassing Fortescue Dave Forrest, Coondewanna, Christmas Creek Ginbata and Barimunya would better service the communication requirements of pilots.

Recommendation 4:

The relevant CASA department to investigate the exemptions given to the non-compliant RNAV procedures in the Pilbara. For the procedures that overlap, depiction of the conflicting arrival should be present in a light grey form with waypoints noted for greater situational awareness on the relevant approach plates.

Recommendation 5:

Airservices should publish a Terminal Area Chart (TAC) for the Pilbara Region by May 2021 aligned with the Aeronautical Information Regulation and Control (AIRAC) cycle. The TAC should be introduced sooner via Aeronautical Information Package Supplement (AIP SUP).

Recommendation 6:

Aerodromes which share a Common Traffic Advisory Frequency (CTAF) should operate a separate, discrete UNICOM frequency to stop non-separation critical information congesting the CTAF.

Recommendation 7:

CASA Flight Standards Division should align the Manual of Standards Part 139 and AIP/ERSA to ensure clarity for aerodrome and air operators.

Table of Contents

2 Introduction

The Office of Airspace Regulation (OAR) within the Civil Aviation Safety Authority (CASA) has carriage of the regulation to administer and regulate 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.[4]

Section 3 of the Act states that '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 the traffic safety and efficiency. Government policy also 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 aim of the Pilbara Region review is to determine if the airspace remains fit for purpose within 100 nautical miles (NM) radius of Coondewanna Airport (Coondewanna), from the surface up to Flight Level (FL) 180 in the Pilbara Region.

The review will focus on the current traffic levels, in addition to the forecast for a higher number of resource industry aviation operations (infrastructure and movements). This will comprise of regular public transport operations, general aviation and agricultural operations.

Whilst recognising that safety is the Civil Aviation Safety Authority's primary consideration, the review will consider the impacts of airspace against the following:

- Efficient use of the airspace.
- Equitable access to the airspace for all airspace users.
- National security issues.
- Cost of any recommendations of the review with the primacy of safety.
- Environment issues including weather phenomena.
- Appropriateness of the airspace classification; and
- Appropriateness of the services and facilities provided by the air navigation service provider (ANSP) including communication, navigation and surveillance.

[4] Civil Aviation Act 1988, section 9A – Performance of Functions

2.3 Objective

The objective of this review was to examine the current airspace arrangements and classifications within 100 NM of Coondewanna, from the surface to FL180, in order to determine if the airspace remains fit for purpose and compliant with the Airspace Regulations.

The review will include:

- An analysis of current passenger and aircraft movement numbers.
- A review of forecast air travel demand.
- An analysis of risks based on safety incident reporting from the air navigation service provider (ANSP) and the Australian Transport Safety Bureau (ATSB).
- An analysis of aircraft operations and traffic mix operating within 100 NM of Coondewanna.
- The suitability of the existing ATS servicing the area; and
- An evaluation of the ICAO airspace classifications within the study area based on aircraft and passenger movement numbers.

3 Aerodromes

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 10 certified aerodromes however, the majority of airfields are aircraft landing areas (ALAs).

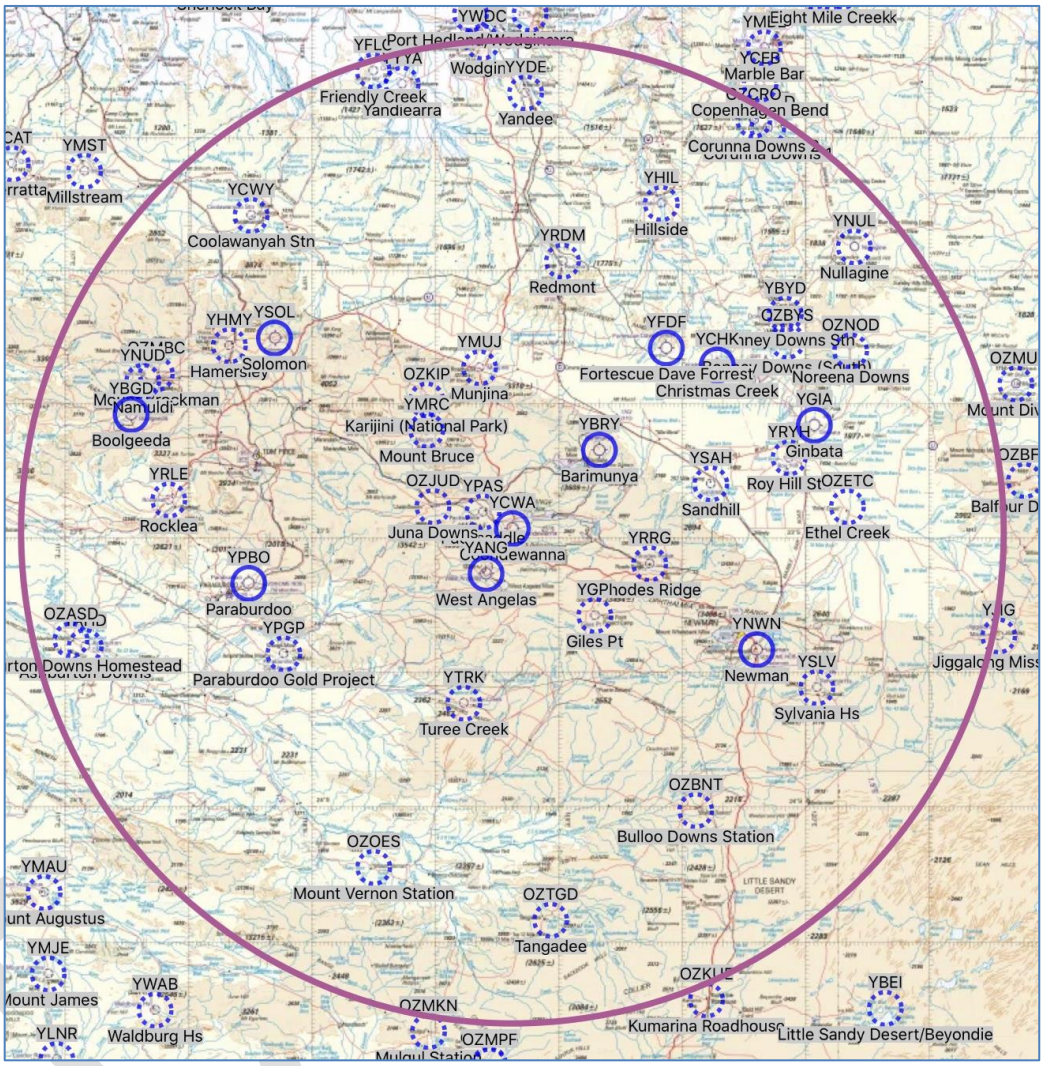

Figure 1: Airports in study area, Source: Oz Runways May AIRAC 2020.

3.1 Newman

Newman Airport[5] (Newman) is a certified aerodrome owned and operated by the Shire of East Pilbara and is located 5 NM south east of the town of Newman. Domestic passenger transport (PT) services operate to and from Perth daily. PT and charter operators include Qantas, QantasLink, Network Aviation, Skippers and Alliance Airlines. The Royal Flying Doctor Service operate regular medical flights. Visual flight rules (VFR) and instrument flight rules (IFR) traffic mix is 57.6% in favour of IFR traffic. During the study period, the passenger numbers have increased by 13.5%.

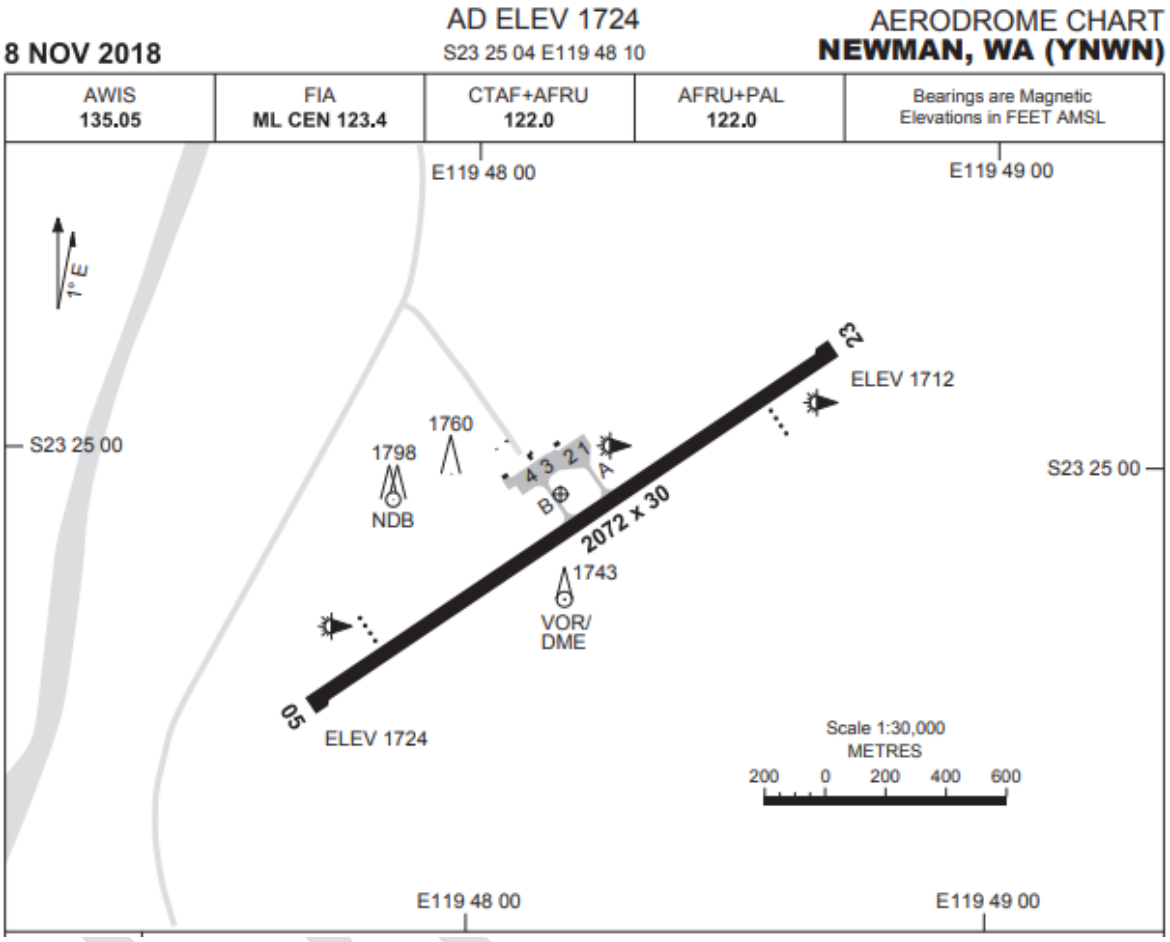

Figure 2: Newman aerodrome. Source: Airservices Aeronautical Information Package (*AIP) 27 FEB 2020*.

[5] http://www.eastpilbara.wa.gov.au/Newman-Airport/Home

3.1.1 Newman aircraft and passenger movements

Newman passenger numbers tend to fluctuate according to demand within the resource sector. Passenger numbers for the 12 month period to 31 January 2017 were 379,923. The passenger numbers decreased to 320,392 for the 12 month period January 2018 aligning with reduced demand and price for commodities. January 2019 a higher demand and price for minerals bolstered the passenger figures to surpass the start of the study timeline with 396,147 passenger per annum.

It is worth noting a sharp increase in visual flight rules (VFR) aircraft has occurred over the past 12 months. Decommissioning of the Paraburdoo secondary surveillance radar (SSR) was completed in the first quarter of 2017

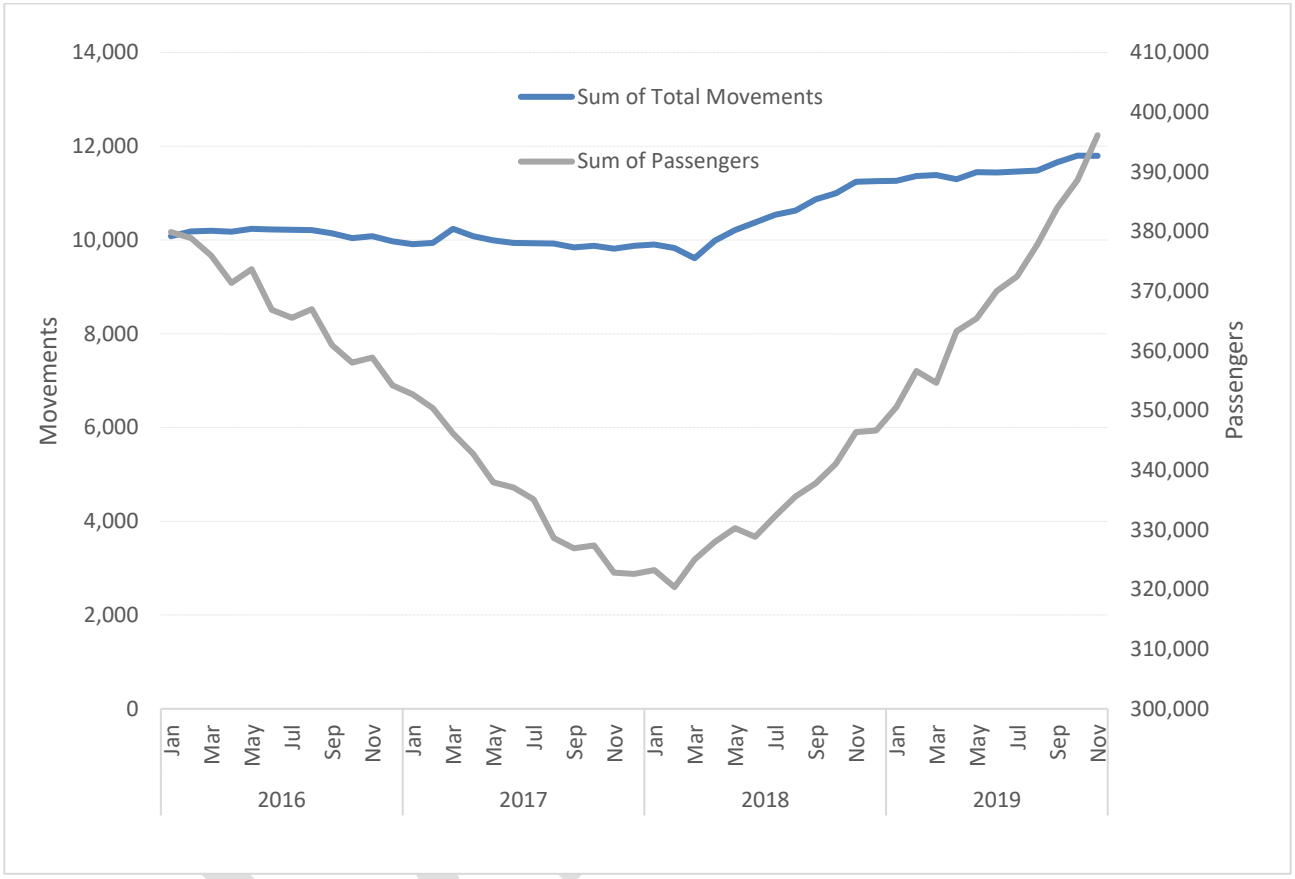

Table 1: Newman passenger and aircraft movement data January 2016 to December 2019.

3.2 Ginbata

Ginbata Airport (Ginbata) is a certified aerodrome owned and operated by Roy Hill Holdings Pty Ltd and is located at the Roy Hill mine. The charter operator for the Roy Hill mine is Qantas Airways and Network Aviation (a part of the Qantas Group). No VFR traffic was observed to operate into Ginbata during this review period. Passenger numbers remain under the Australian Airspace Policy Statement 2018 (AAPS) airspace review criteria of 350,000 passengers. The passenger numbers over the rolling 12 month period December 2019 were 95,100 passengers.

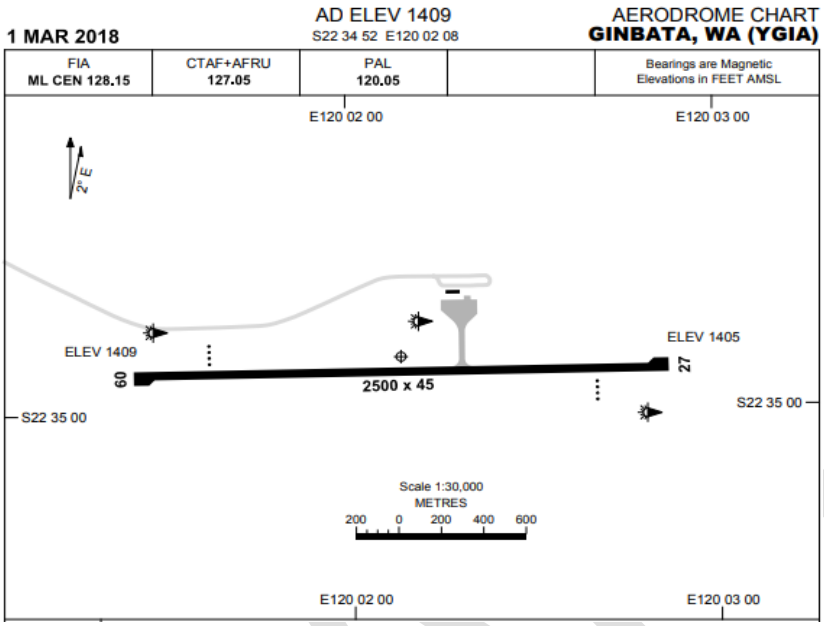

Figure 3: Ginbata aerodrome, Source: Airservices AIP 27 FEB 2020.

3.2.1 Ginbata aircraft and passenger movements

Ginbata was certified in July 2012. Passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were at 105,000 before contracting to 65,900 as at May 2017. Higher demand and price for minerals has bolstered the PPA figures back to 95,100 for the 12 month rolling period.

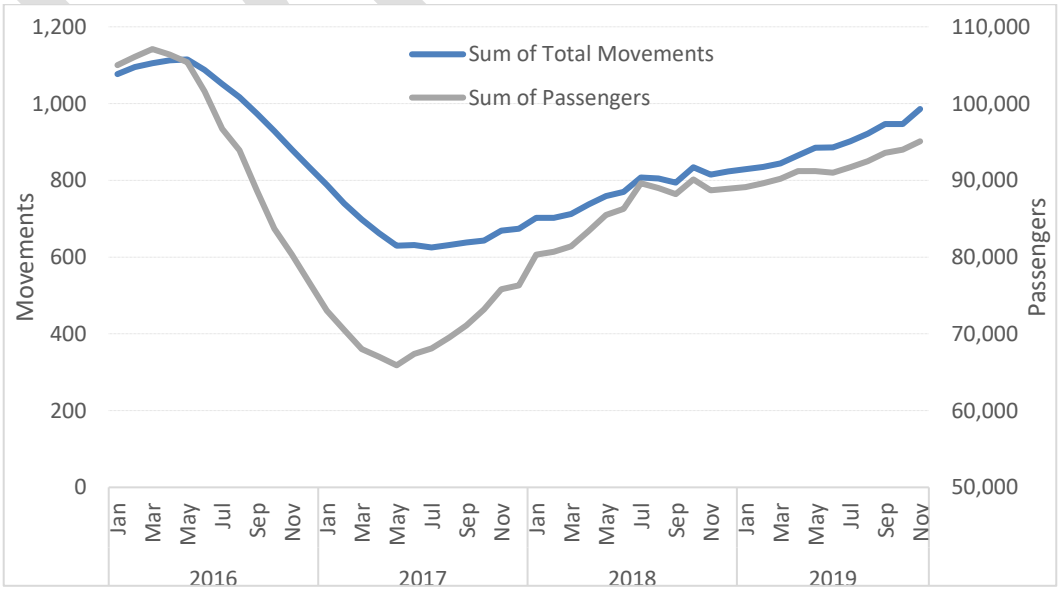

Table 2: Ginbata passenger and aircraft movement data January 2016 to December 2019

3.3 Christmas Creek

Christmas Creek Airport (Christmas Creek) is a certified aerodrome owned and operated by Chichester Minerals Pty Ltd and is located at the Christmas Creek mine. The charter operator for Christmas Creek is Qantas and Network Aviation. Minimal VFR traffic during the study period. Passenger numbers are under the AAPS airspace review criteria threshold of 350,000 per annum at 103,200 for the rolling 12 months December 2019.

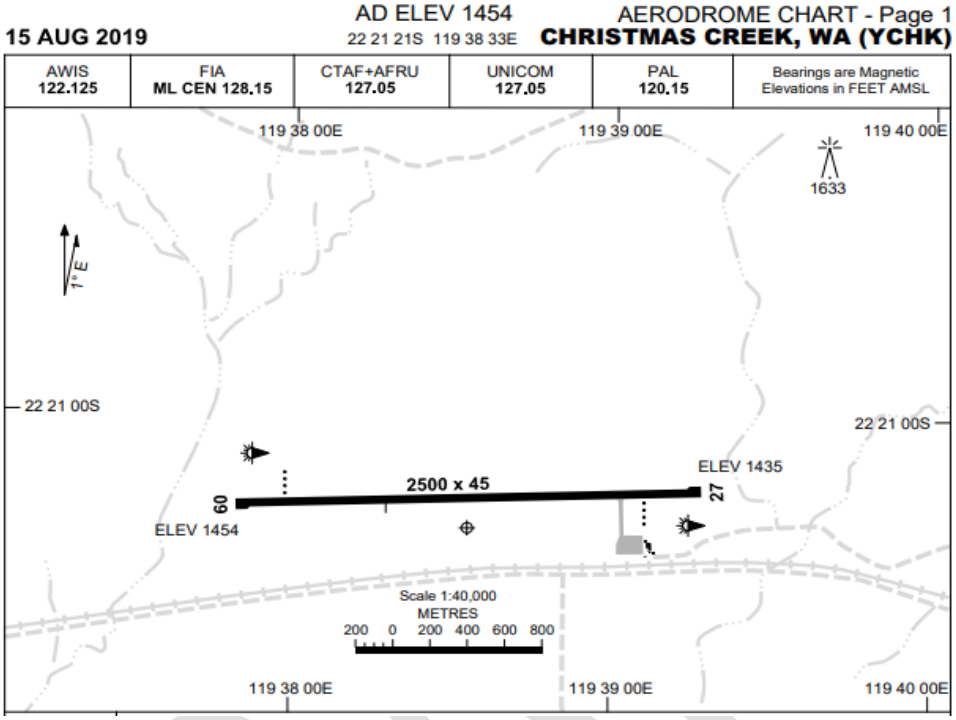

Figure 4: Christmas Creek layout, Source: Airservices AIP 27 FEB 2020.

3.3.1 Christmas Creek aircraft and passenger movements

Christmas Creek passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were at 112,200 before contracting to 82,700 when demand for and price per tonne of Iron Ore was at its lowest. Passenger figures have returned to over 110,00 for the rolling 12 months December 2019.

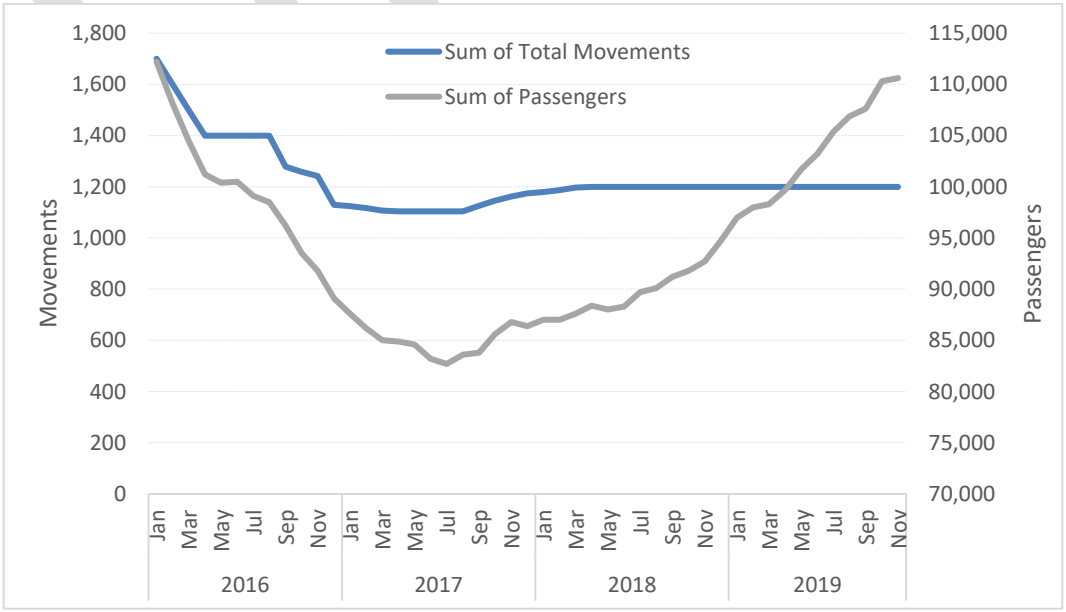

Table 3: Christmas Creek passenger and aircraft movement data January 2016 to December 2019

3.4 Fortescue Dave Forrest

Fortescue Dave Forrest Airport (Fortescue Dave Forrest) is a certified aerodrome owned and operated by Chichester Metals Pty Ltd and is located at the Fortescue Dave Forrest mine. The charter operator for Fortescue Dave Forrest is Qantas and Network Aviation. No VFR traffic operates at Fortescue Dave Forrest. Passenger numbers are under the AAPS airspace review criteria threshold of 350,000 per annum at 84,100.

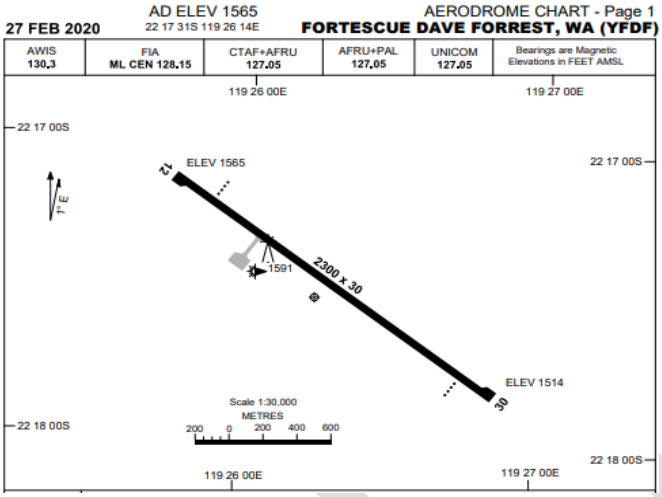

Figure 5: Fortescue Dave Forrest layout, Source: Airservices AIP 27 FEB 2020.

3.4.1 Fortescue Dave Forrest aircraft and passenger movements

Fortescue Dave Forrest passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were at 96,500 before contracting to 69,200 when demand for and price per tonne of Iron Ore was at its lowest. Capacity has increased at the mine with the introduction of Boeing 737-800 (B738) aircraft on 80% of services with aircraft movements remaining moderately static.

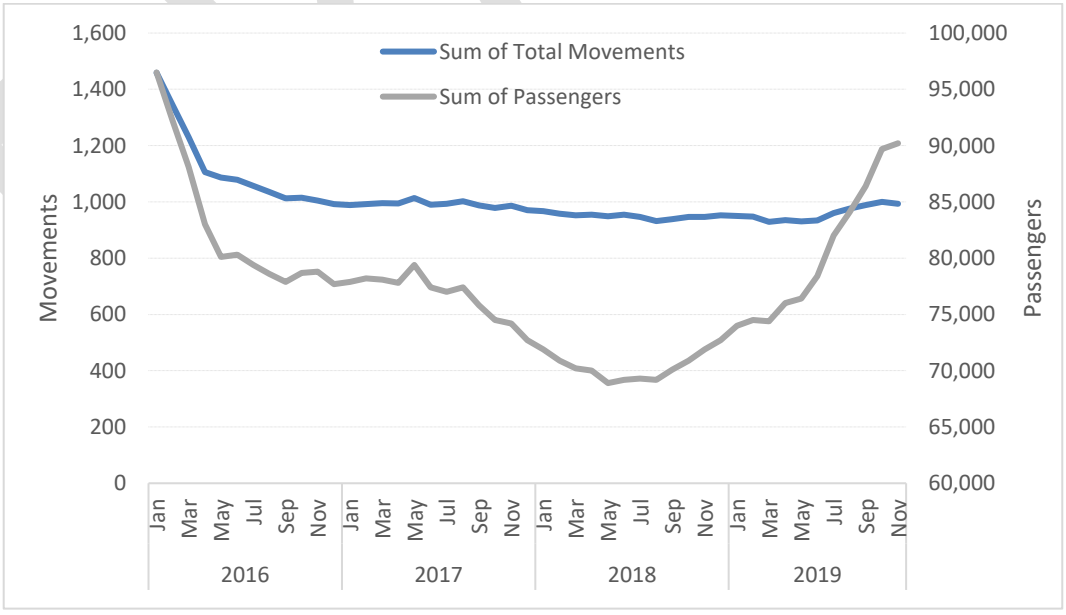

Table 4: Fortescue Dave Forrest passenger and aircraft movement data January 2016 to December 2019

3.5 Barimunya

Barimunya is a certified aerodrome owned and operated by Barimunya Joint Venture and is located at the Barimunya mine. The charter operator for Barimunya is Alliance and Virgin Australia Regional Airlines. VFR traffic is approximately 10% of movements. Passenger numbers are under the AAPS airspace review criteria threshold of 350,000 per annum at 139,100.

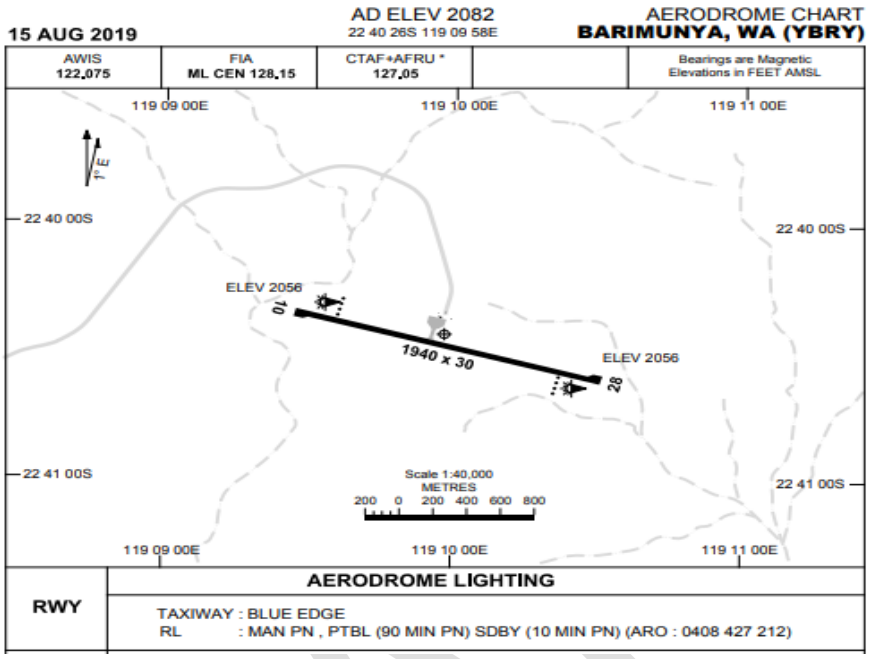

Figure 6: Barimunya layout, Source: Airservices AIP 27 FEB 2020.

3.5.1 Barimunya aircraft and passenger movements

Barimunya passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were 105,000 before contracting to 65,900 when demand for and price per tonne of Iron Ore was at its lowest.

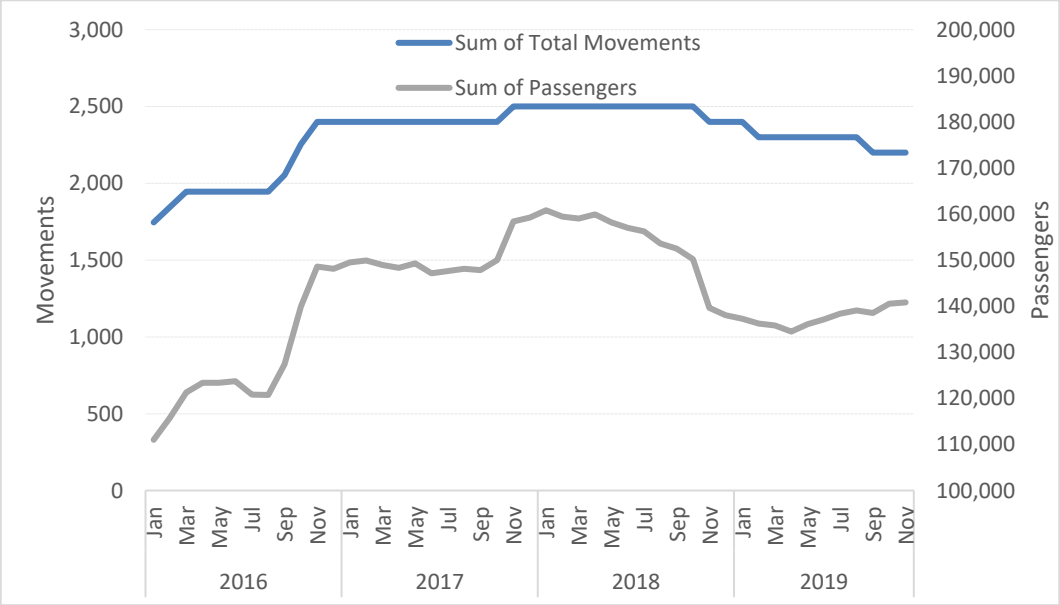

Table 5: Barimunya passenger and aircraft movement data January 2016 to December 2019

3.6 Coondewanna

Coondewanna Airport (Coondewanna) is a certified aerodrome owned and operated by BHP Iron Ore and is located at the Coondewanna mine. Charter operators for Coondewanna are Alliance and Virgin Australia. VFR traffic makes up less than 10% of movements. Passenger numbers are under the AAPS airspace review criteria threshold of 350,000 per annum 103,200.

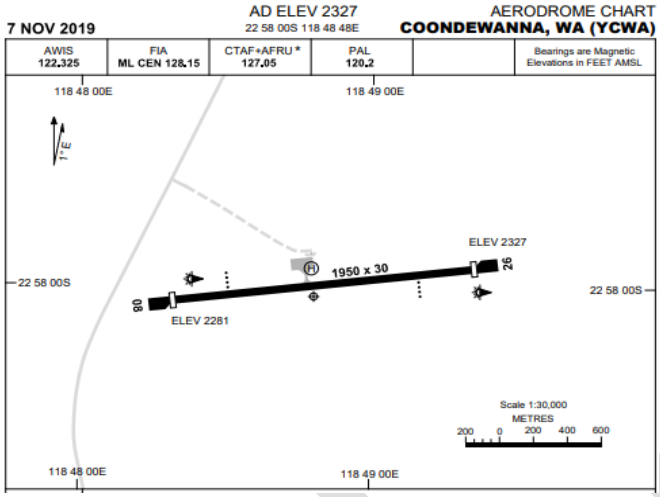

Figure 7: Coondewanna layout, Source: Airservices AIP 27 FEB 2020.

3.6.1 Coondewanna aircraft and passenger movements

Coondewanna passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were at 105,000 before contracting to 65,900 when demand for and price per tonne of Iron Ore was at its lowest. Coondewanna capacity has increased with the upgrade to aircraft operating into the aerodrome. Airbus A320s (A320) are replacing Fokker F100 aircraft (F100).

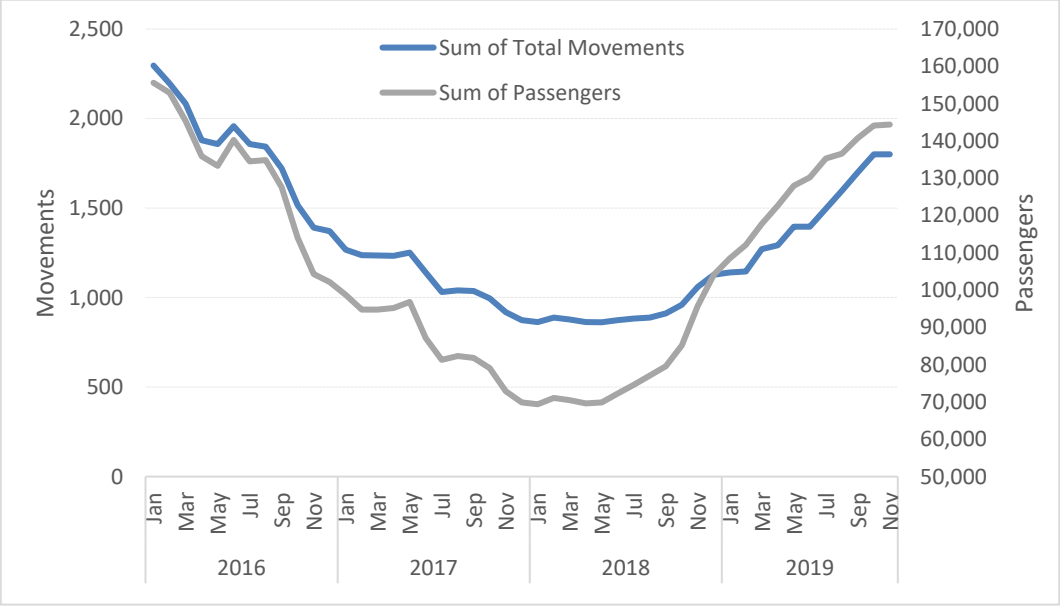

Table 6: Coondewanna passenger and aircraft movement data January 2016 to December 2019

3.7 West Angelas

West Angelas Airport (West Angelas) is a certified aerodrome owned and operated by Robe River Mining Company Pty Ltd and is located at the West Angelas mine. The charter operators for Coondewanna is Alliance and Virgin Australia. VFR traffic is less than 5% of movements. Passenger numbers are under the AAPS airspace review criteria threshold of 350,000 per annum 110,700.

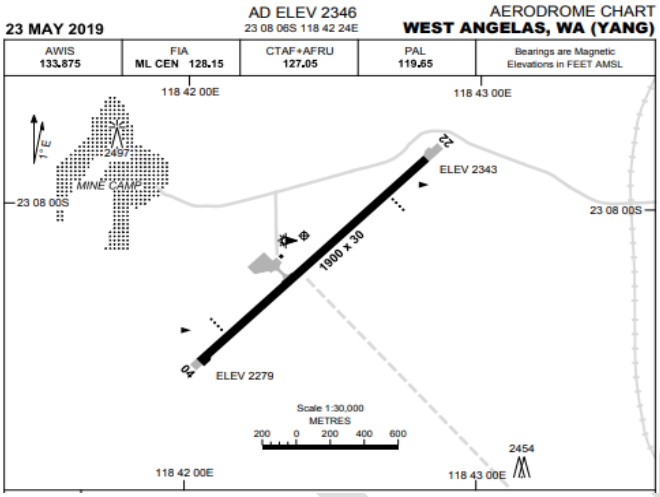

Figure 8: West Angelas layout, Source: Airservices *AIP 27 FEB 2020*.

3.7.1 West Angelas aircraft and passenger movements

West Angelas passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were at 81,700 before contracting to 77,600 when demand for and price per tonne of Iron Ore was at its lowest. Higher demand and price for minerals has bolstered the PPA figures to 122,900 for the 12 month period December 2019. Higher capacity jet aircraft have been established on the route with A320 aircraft.

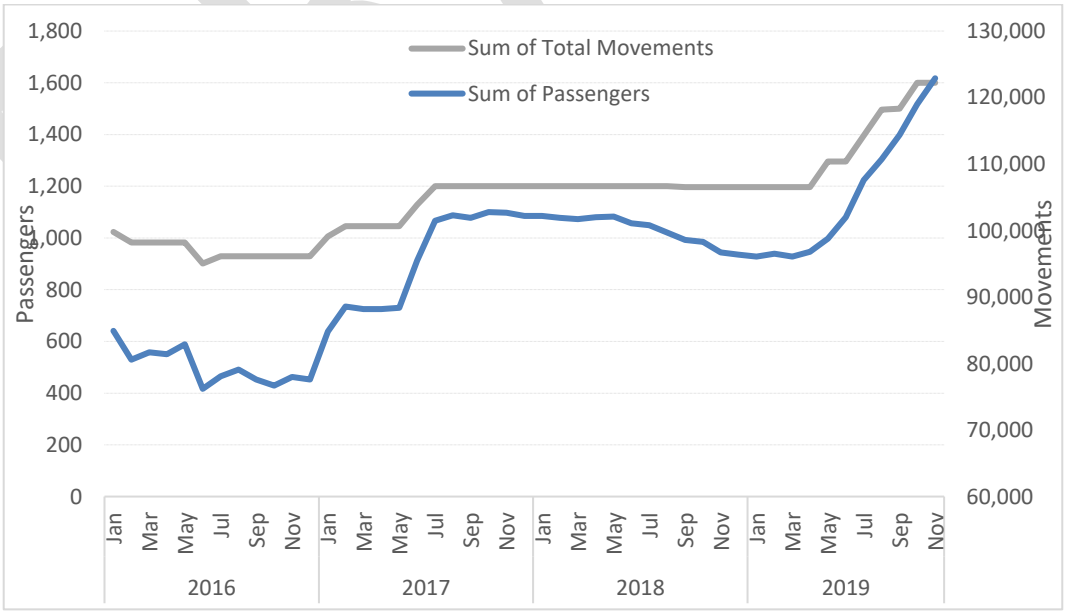

Table 7: West Angelas passenger and aircraft movement data January 2016 to December 2019

3.8 Paraburdoo

Paraburdoo Airport[6] (Paraburdoo) is a certified aerodrome owned and operated by Pilbara Iron and is located at the township of Paraburdoo. There are charter and RPT operations at Paraburdoo is operated by Qantas. VFR and IFR traffic mix is 99% in favour of IFR traffic. Passenger numbers are under the AAPS airspace review criteria threshold of 350,000 per annum at 190,400.

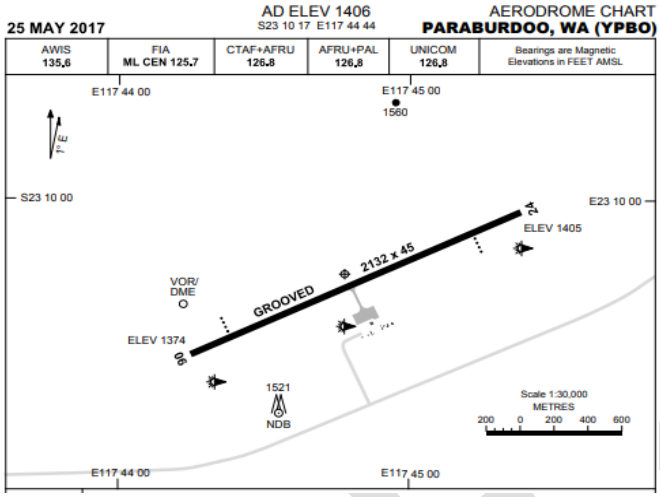

Figure 9: Paraburdoo layout, Source Airservices AIP 27 FEB 2020.

3.8.1 Paraburdoo aircraft and passenger movements

Paraburdoo passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were at 105,000 before contracting to 65,900 when demand for and price per tonne of Iron Ore was at its lowest. Passenger figures continue strong growth for the 12 month period starting December 2019.

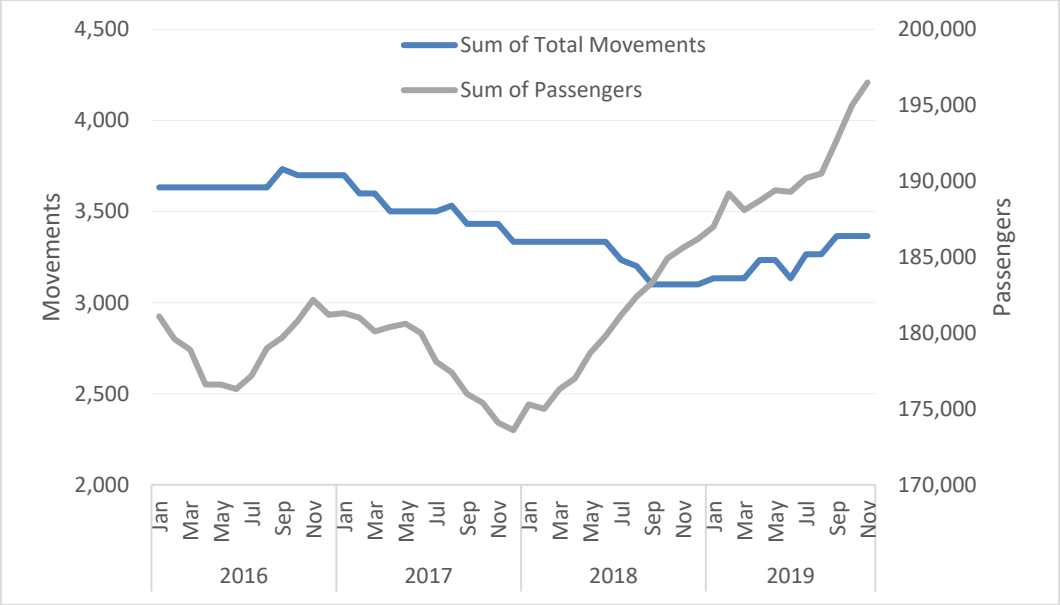

Table 8: Paraburdoo passenger and aircraft movement data January 2016 to December 2019

[6] https://www.ashburton.wa.gov.au/airports-and-flight-times-

3.9 Boolgeeda

Boolgeeda Airport (Boolgeeda) is a certified aerodrome owned and operated by Hamersley Iron Pty Ltd and is located at the Boolgeeda mine. The charter operators for Boolgeeda is Virgin Australia. VFR traffic Makes up less than 10% of movements. Passenger numbers are under the AAPS airspace review criteria threshold of 350,000 per annum at 169,100.

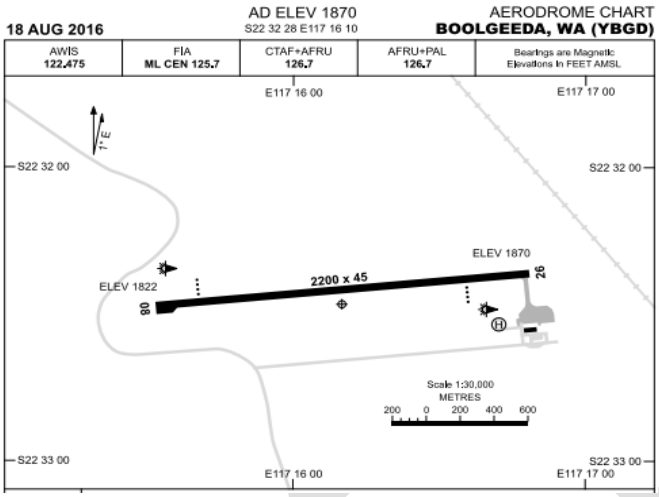

Figure 10: Boolgeeda layout, Source: Airservices AIP 27 FEB 2020.

3.9.1 Boolgeeda aircraft and passenger movements

Boolgeeda passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were at 105,000 before contracting to 65,900 when demand for and price per tonne of Iron Ore was at its lowest. Higher demand and price for minerals has bolstered the PPA figures.

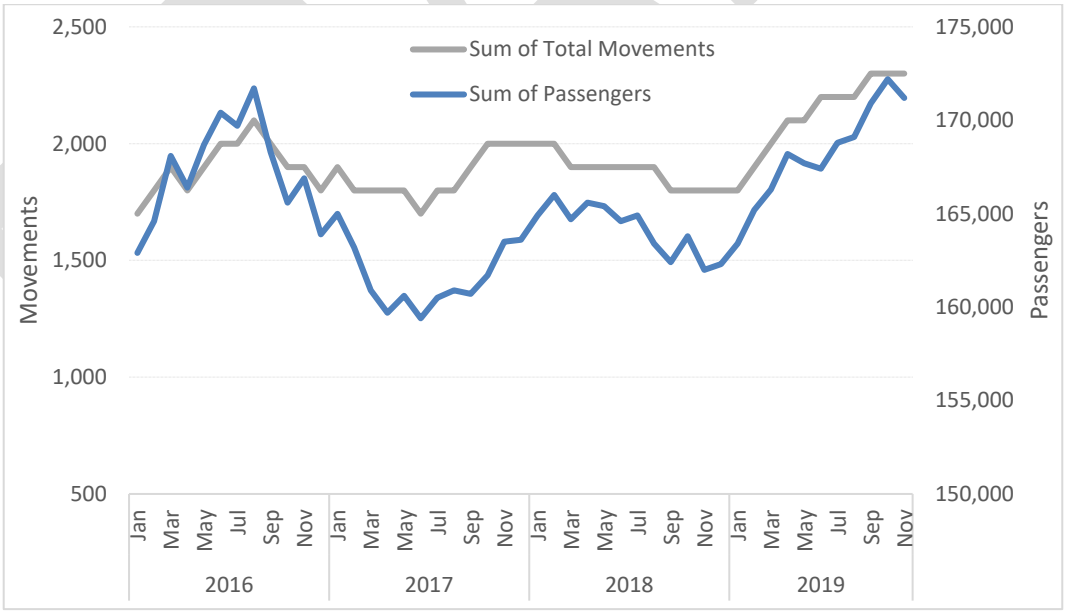

Table 9: Boolgeeda passenger and aircraft movement data January 2016 to December 2019

3.10 Solomon

Solomon Airport (Solomon) is a certified aerodrome owned and operated by Fortescue Metals Group Ltd and is located at the Solomon mine. The charter operators for Solomon are Alliance Airlines and Virgin Australia. VFR traffic is less than 5% of movements. Passenger numbers are under the AAPS airspace review criteria threshold of 350,000 per annum at 96,700.

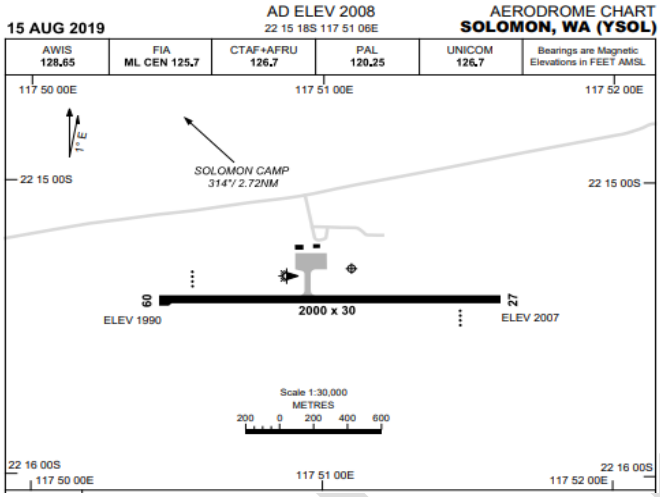

Figure 11: Solomon layout Source: Airservices AIP 27 FEB 2020.

3.10.1 Solomon aircraft and passenger movements

Solomon passenger numbers fluctuate with demand for the resource sector. Passenger numbers for the 12 month period starting January 2016 were at 105,000 before contracting to 96,700 when demand for and price per tonne of Iron Ore was at its lowest. The 12 month period to December 2019 has seen steady growth.

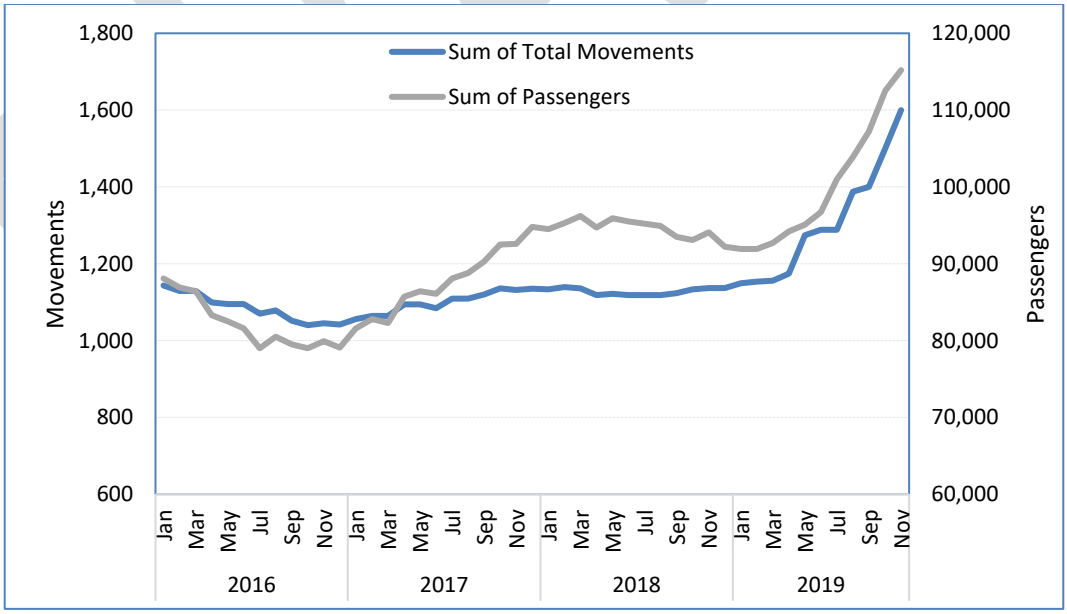

Table 10: Solomon passenger and aircraft movement data January 2016 to December 2019

3.11 Aircraft Landing areas

There are several aircraft landing areas that contribute to the complexity of operating in the Pilbara basin.

Turee Creek (YTRK) is a privately-owned ALA. Turee Creek is 68.5 NM south west of Newman and is located within Class G airspace. Turee Creek has three unmarked, unsealed, dirt runways RWY 10/28 approximately 1,200 m long; RWY 07/25 approximately 633 m long; and RWY 16/34 approximately 640 m long. There is no ERSA entry for the aerodrome.

Paraburdoo Gold Project (YPGP) is a privately-owned ALA. Paraburdoo Gold Project is 58.1 NM south west of Coondewanna and is located within Class G airspace. Paraburdoo Gold Project has one unmarked, unsealed, dirt runway designated as RWY10/28 approximately 1,200 m long. There is no ERSA entry for the aerodrome.

Ashburton Downs (YAHD) is a privately-owned ALA. Ashburton Downs is 57.6 NM south west of Tom Price and is located within Class G airspace. Ashburton Downs has one unmarked, unsealed, dirt runway designated as RWY 12/30 approximately 1,200 m long. There is no ERSA entry for the aerodrome.

Sylvania Hs (YSLV) is a privately-owned ALA. Sylvania Hs is 77.6 NM south east of Coondewanna and is located within Class G airspace. Sylvania Hs has one unmarked, unsealed, dirt runway designated as RWY 12/30 approximately 1,200 m long. There is no ERSA entry for the aerodrome.

Giles PT (YGPI) is a privately-owned ALA. Giles PT is 27 NM south east of Coondewanna and is located within Class G airspace. Giles PT has one unmarked, unsealed, dirt runway designated as RWY 08/26 approximately 1,200 m long. There is no ERSA entry for the aerodrome.

Rhodes Ridge (YRRG) is a privately-owned ALA. Rhodes Ridge is 30 NM south east of Coondewanna and is located within Class G airspace. Rhodes Ridge has one unmarked, unsealed, dirt runway designated as RWY 10/28 approximately 2,200 m long. There is no ERSA entry for the aerodrome.

Packsaddles (YPAS) is a privately-owned ALA. Packsaddles is 7 NM north east of Coondewanna and is located within Class G airspace. Packsaddles has one unmarked, unsealed, dirt runway designated as RWY 10/28 approximately 2,200 m long. There is no ERSA entry for the aerodrome.

Rokewood (YRLE) is a privately-owned ALA. Rokewood is 23.2 NM south east of Tom Price and is located within Class G airspace. Rokewood has one unmarked, unsealed, dirt runway designated as RWY 10/28 approximately 555 m long. There is no ERSA entry for the aerodrome.

Hamersley (YHMY) is a privately-owned ALA. Hamersley is 10.6 NM south east of Solomon mine site and is located within Class G airspace. Hamersley has one unmarked, unsealed, dirt runway designated as RWY 07/25 approximately 1,300 m long. There is no ERSA entry for the aerodrome.

Mount Bruce (YMRC) is a privately-owned ALA. Mount Bruce is 39.9 NM north west of Barimunya and is located within Class G airspace. Mount Bruce has one unmarked, unsealed, dirt runway designated as RWY 10/28 approximately 800 m long. There is no ERSA entry for the aerodrome.

Munjina (YMUJ) is a privately-owned ALA. Munjina is 33.2 NM north east of Barimunya and is located within Class G airspace. Munjina has one unmarked, unsealed, dirt runway designated as RWY 12/30 approximately 1,400 m long. There is no ERSA entry for the aerodrome.

Boone Downs Station (YBYD) is 19.9 NM north east of Christmas Creek and is located within Class G airspace. Boone Downs Station has two unmarked, unsealed, dirt runways designated as RWY 08/26 approximately 1,000 m long and RWY 12/30 approximately 1,300 m long. There is no ERSA entry for the aerodrome. Nullagine (YNUL) is an ALA operated by the Shire of East Pilbara. Nullagine is 23.2 NM north east of Tom Price and is located within Class G airspace. Nullagine has one unmarked, unsealed, dirt runway designated as RWY 14/32 approximately 1,000 m long. The ERSA entry for the aerodrome holds current information.

Hillside (YHIL) is a privately-owned ALA. Hillside is 23.2 NM north of Fortescue Dave Forrest and is located within Class G airspace. Hillside has one unmarked, unsealed, dirt runway designated as RWY 08/26 approximately 1,000 m long. There is no ERSA entry for the aerodrome.

Coolawanyah Station (YCWY) is a privately-owned ALA. Coolawanyah Station is 27.4 NM north of Solomon and is located within Class G airspace. Coolawanyah Station has one unmarked, unsealed, dirt runway designated as RWY 08/26 approximately 1,000 m long. There is no ERSA entry for the aerodrome.

Yandiearra (YYYA) is a privately-owned ALA. Yandiearra is 63.4 NM north east of Solomon and is located within Class G airspace. Yandiearra has one unmarked, unsealed, dirt runway designated as RWY 08/26 approximately 1,200 m long. There is no ERSA entry for the aerodrome.

4 Terminal Instrument Flight Procedures

The Civil Aviation Safety Regulations Part 173 (CASR Part 173) establishes the regulatory standards for designing Terminal Instrument Flight Procedures (TIFP)s. 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.

The following is noted regarding the study area TIFPs.

- RNAV (GNSS) RWY 09 for Christmas Creek and RNAV (GNSS) RWY 30 for Fortescue Dave Forrest intersect. The vertical separation for waypoints CHKWF and FDFEF for opposing procedures is 60 feet. Notes are on the approach plates stating that separation is not assured. These notes are not in a uniform manner due to different certified designers responsible for development and maintenance of the TIFPs. See Figure 11.
- Christmas Creek RNAV 09 and Fortescue Dave Forrest RNAV 30 procedures do not comply with the MOS 173 requirements for non-overlapping procedures. The procedures were permitted on exemption. The procedures are provided by two independent procedure design organisations, with an exemption issued to each organisation.
- Northern initial approach fixes for West Angelas RWY 04/22 are omitted due to the proximity of the Coondewanna RNAV (GNSS) arrivals.
- Southern initial approach fixes for Coondewanna RWY 08/26 are omitted due to the proximity of the West Angelas GNSS arrivals.

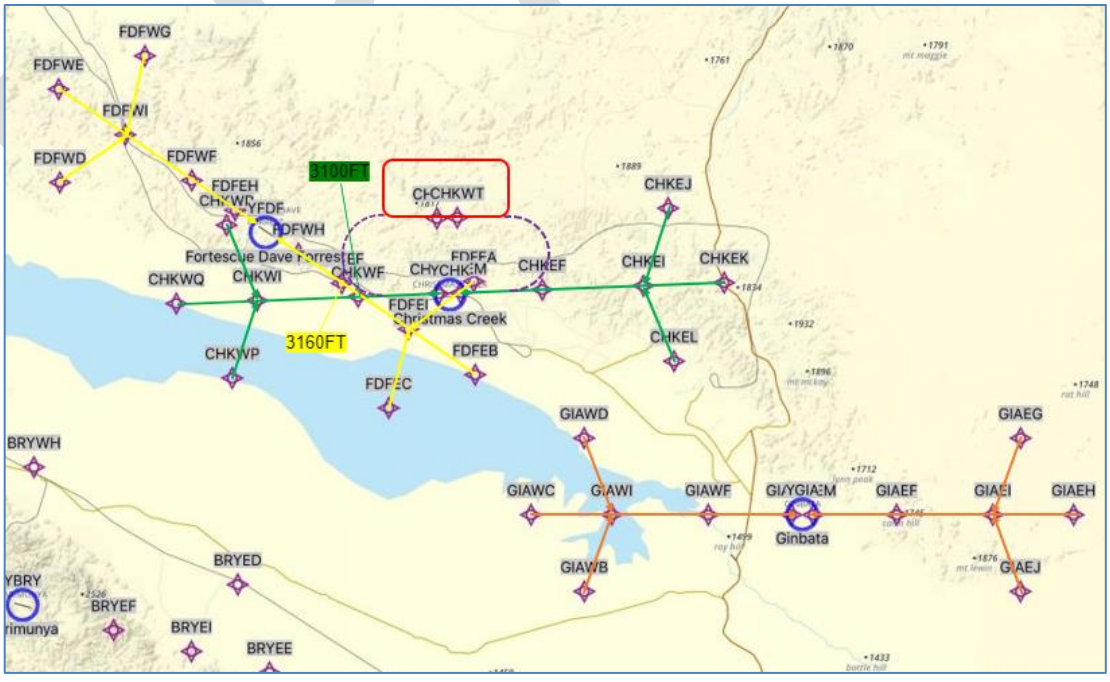

Figure 12: Illustration of overlapping GNSS arrivals Source: Airservices AIP 27 FEB 2020.

4.1 Aeronautical Information

The En Route Supplement Australia (ERSA) entries for the airports in the study area were determined to be accurate. Errors were found on aeronautical charts ERC L8 WA and ERC Low NAT. The CTAF Frequencies were not printed for reference for Fortescue Dave Forrest and Christmas Creek. These errors have already been highlighted to Airservices for their rectification. There were no know errors in ERSA entries.

5 Airspace

5.1 Airspace Structure

The study area is centred 100NM from Coondewanna up to FL180. The airspace is classified as Class G[7]. ATC do not provide separation services to any aircraft and only provide traffic information[8] and flight following service, workload permitting. Class E airspace is from FL180 up to FL 245. Class A airspace is above FL 245

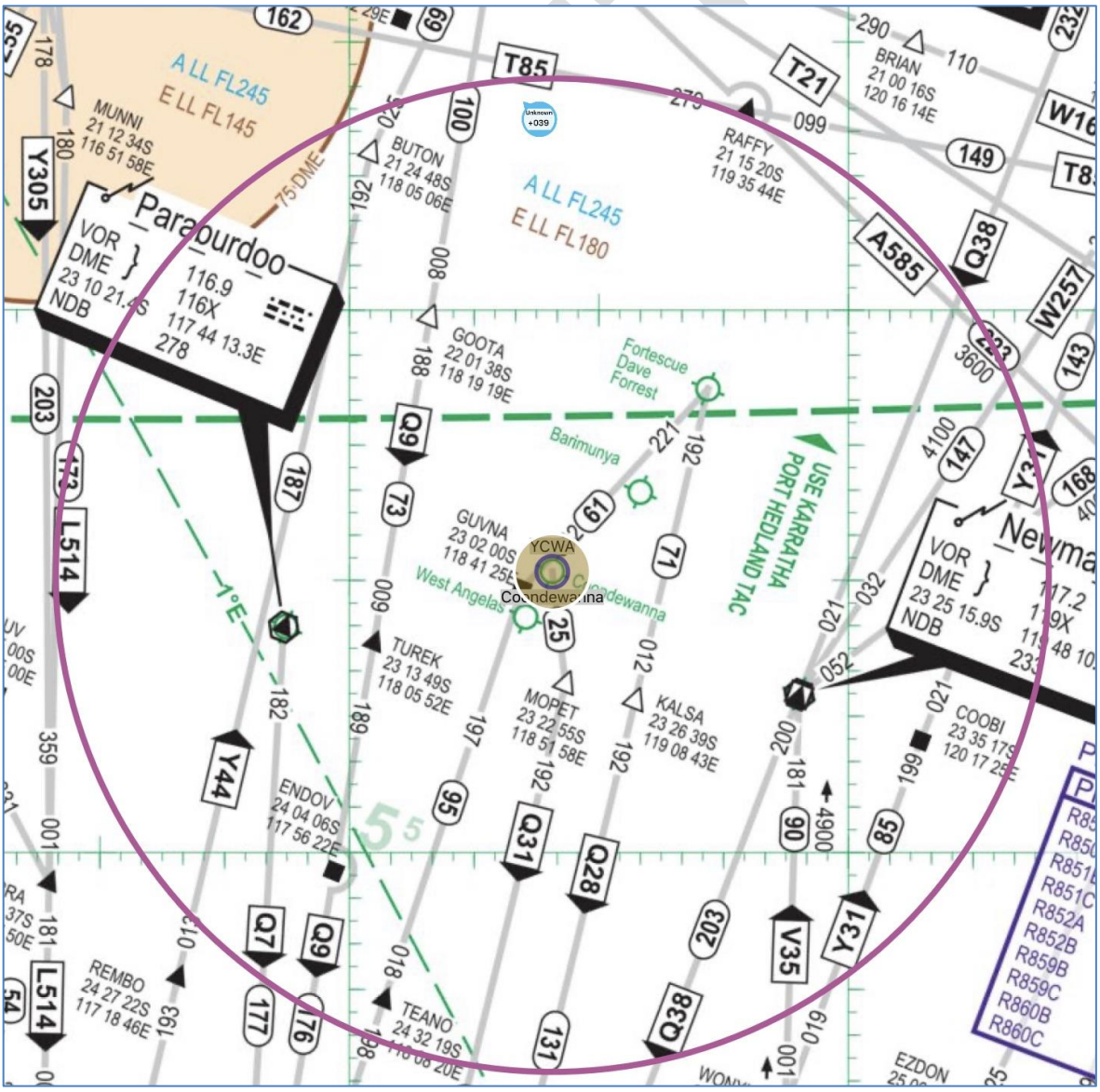

Figure 13: Study area airspace ERC H3 South, Source: Airservices AIP 07 November 2019.

[7] During the Study, there was a change to the lower level of Class E to FL125 May 2020.

[8] Flight Following is the provision of an ongoing surveillance information service (SIS) for aircraft in Class E and Class G airspace.

5.2 Restricted and Danger Areas

There are no restricted or danger areas in the study area. There are several blasting symbols associated with the resource industry. No other published hazardous notifications for aviation exist in the study area.

6 Air Routes

The airway routes in the study area contain both Low and High level routes. The airways were designed according to aircraft tracking via terrestrial navigation aids and the ATC requirement of procedural separation.

Previously, route design needed to take into consideration that no electronic surveillance was available to ATC. Procedural separation was applied in the Pilbara to control aircraft. This required extended distances between air routes due to tolerance in navigational equipment on aircraft. The practice of navigating via terrestrial navigation aids was appropriate at the time, matching the technology on the aircraft.

With the introduction of Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance for appropriately equipped aircraft. Airservices redesigned the upper airway route structure according to modern PBN GNSS guidelines[9] in 2016 providing a more efficient flight path and better flexibility for Air traffic control. An additional review of the lower airway route structure could also be of benefit in the same ways. A redesign of lower airway routes in the region will allow for better alignment of the low and high airway route structure.

It is worth noting that Airservices has been granted an approval for an airspace change proposal submitted which requested a lowering of the LL of Class E airspace from FL180 down to FL125. The benefits of this would encompass the lower route structure to now be in controlled airspace.

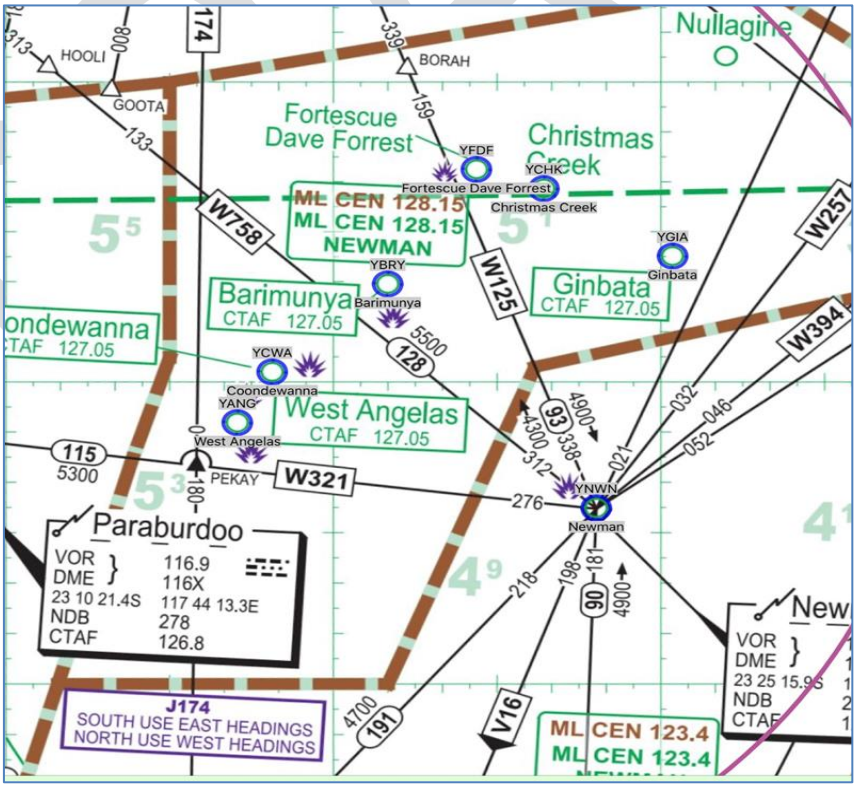

Figure 14: Low Level air route structure - ERC L8, Source: Airservices AIP 07 November 2019.

[9] https://www.casa.gov.au/book-page/chapter-6-performance-based-navigation

6.1 Historical ADS-B tracks

The OAR requested ADS-B data from Airservices, overlaid with the existing route structure to assess that it is fit for purpose. At the time this document was published, Airservices had still not provided the information requested.

7 Air Traffic Services

Airservices Melbourne Centre is responsible for managing and staffing the Ore sector(s) that provide air traffic services the study area. Operations are conducted from Airservices Melbourne facility at Tullamarine Airport.

Sectorisation for air traffic control was reviewed and amended in line with the May AIRAC 2019. The sectors and frequencies in the study area are often combined into larger sectors increasing the area of responsibility and workload for one controller. Stakeholder feedback concerning frequency congestion for the Pilbara Ore Flight information areas (FIA) sectors is very high when the frequencies are combined. Clearance into controlled airspace and self-separation outside of controlled airspace at peak periods makes broadcasting positions and intentions difficult at times. Controllers also have difficulty in issuing instructions to and receiving requests from aircraft in controlled airspace due to congestion.

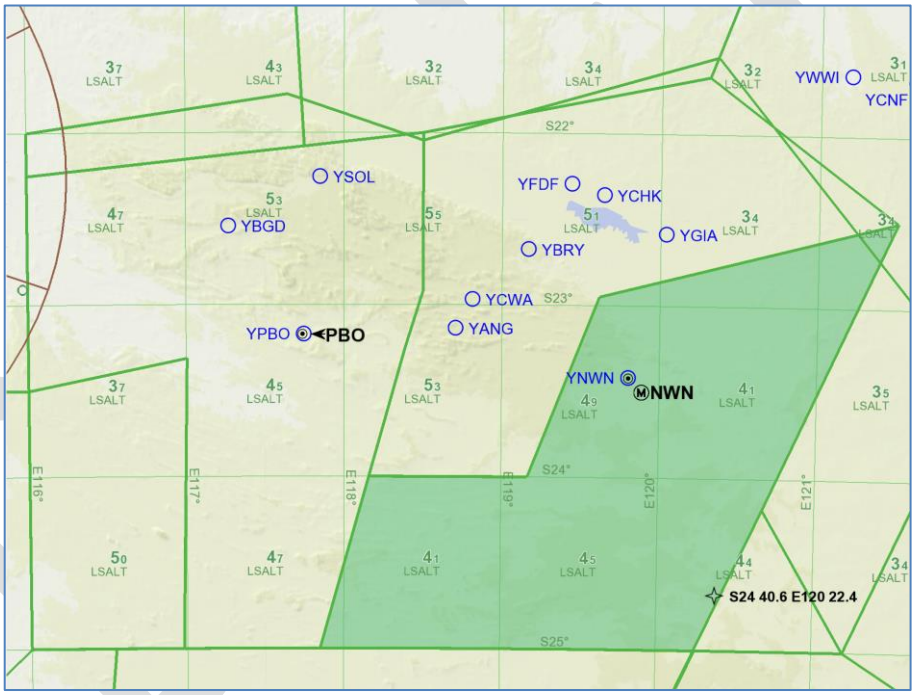

Figure 15: Low level Newman sector 123.400mHz Jeppesen Low IFR chart Nov AIRAC 2019

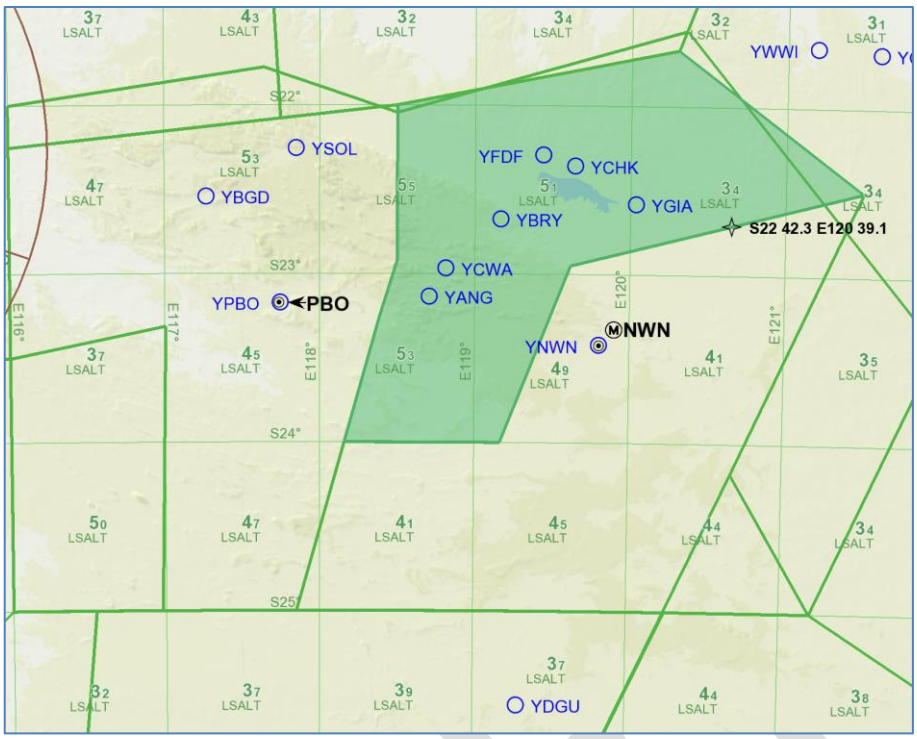

Figure 16: Low level Newman sector 128.150mHz Jeppesen Low IFR chart Nov AIRAC 2019

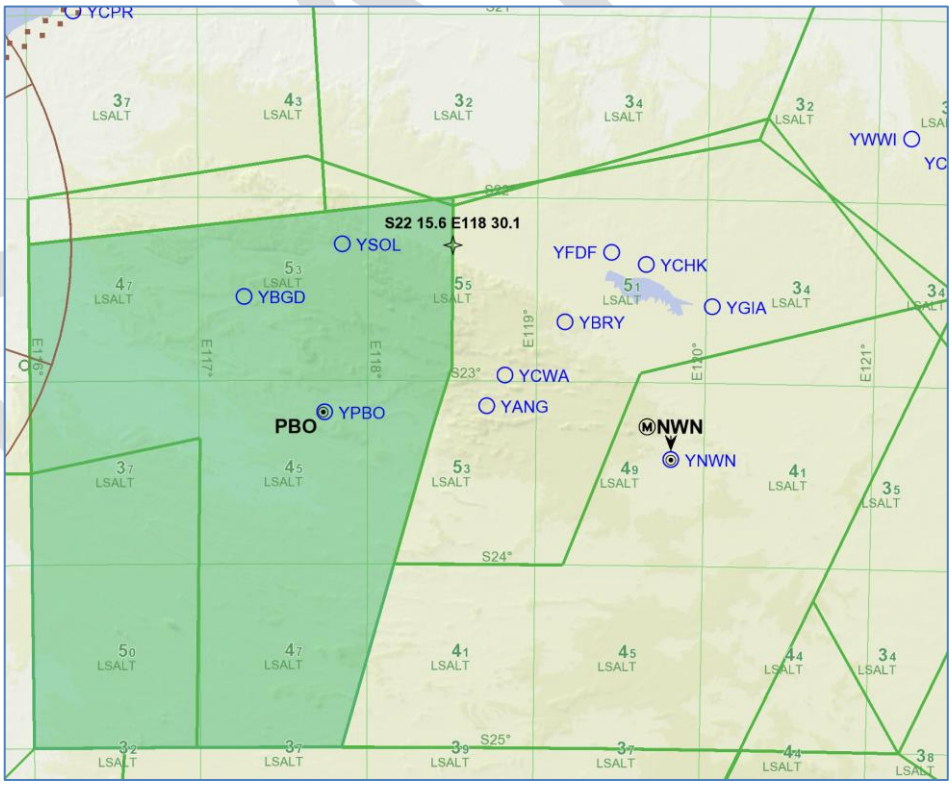

Figure 17: Low level Paraburdoo sector 125.700mHz Jeppesen Low IFR chart Nov AIRAC 2019

The Office of Airspace regulation requested information from Airservices on the usage of frequencies by air traffic controllers. By determining the time controllers are either broadcasting or receiving transmissions, determines frequency congestion and the amount of workload the controller is experiencing. Airservices could not provide this information due to equipment failure and technical difficulties.

8 Surveillance

Radar or Multilateration (MLAT) electronic surveillance is not available in the study area. ADS-B ground stations are located at Paraburdoo and Newman which detect appropriately equipped aircraft. Surveillance coverage altitude is varied through the study area. ADS-B coverage can begin at 5,000 ft AMSL (shown in Figure 6) while at times ADS-B identification is not available until 10,000 ft. Flight following services is not available for aircraft operating under VFR in the study area due to a lack of appropriate surveillance coverage or avionic equipage.

It is worth noting that the ADS-B information available is out of date and does not depict the current surveillance capabilities of the ANSP.

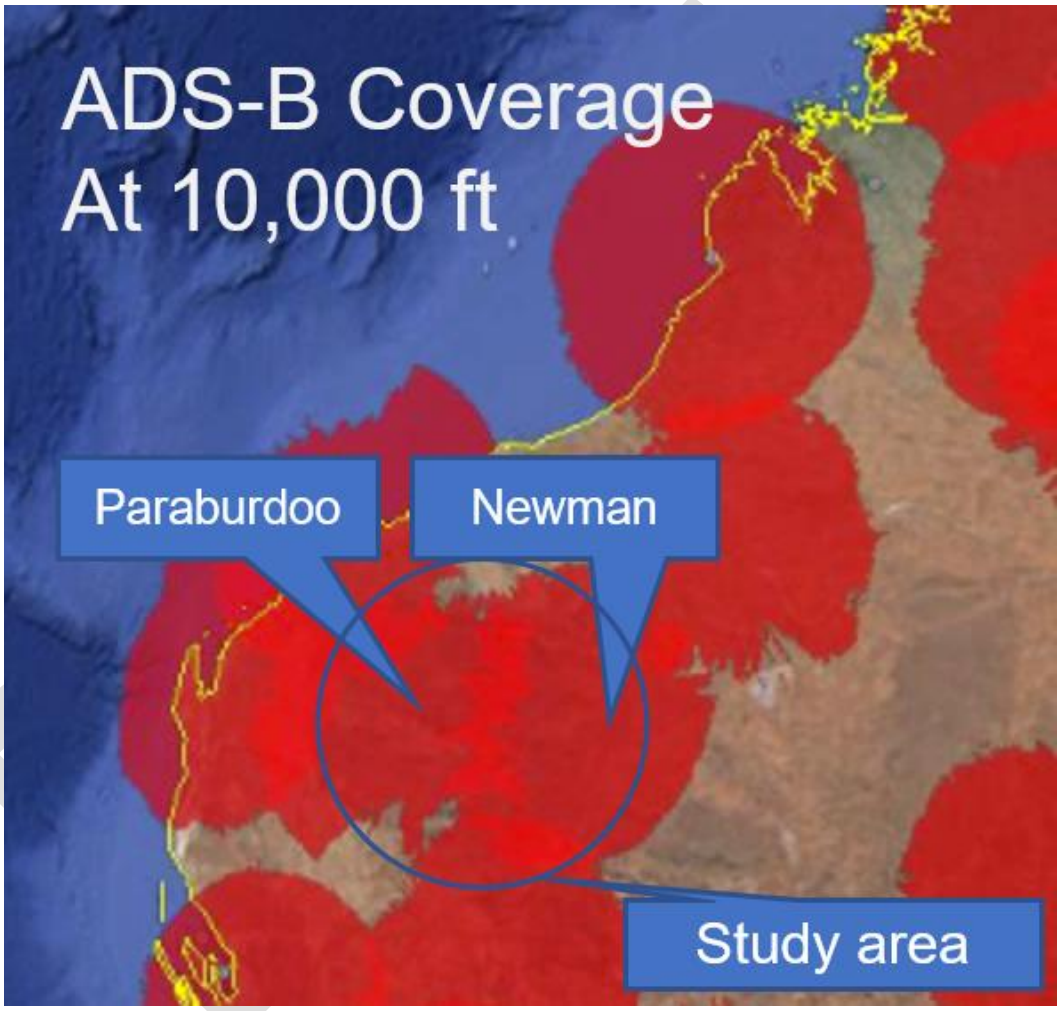

Figure 18: ADS-B coverage at 10,000 ft AMSL (Source: Airservices website)

9 Communications

Very high frequency (VHF) radio transmitters used by Airservices to communicate with aircraft in the study area are located at Paraburdoo and Newman. Information such as, flight plan details, meteorological conditions and any hazardous conditions that may affect the aircraft during its flight are transmitted using VHF. Communication ability at uncertified aerodromes in the study area vary greatly. Terrain and location of VHF infrastructure can hinder the transmission or reception of critical aviation broadcasts. It has been noted that during the “wet season” VFR aircraft tracking overhead particular certified mining aerodromes tend to operate just below cloud height in line with VFR, this type of operation reduces safety and reduces effective use of collision avoidance techniques while flying when VHF communications are unreliable[10].

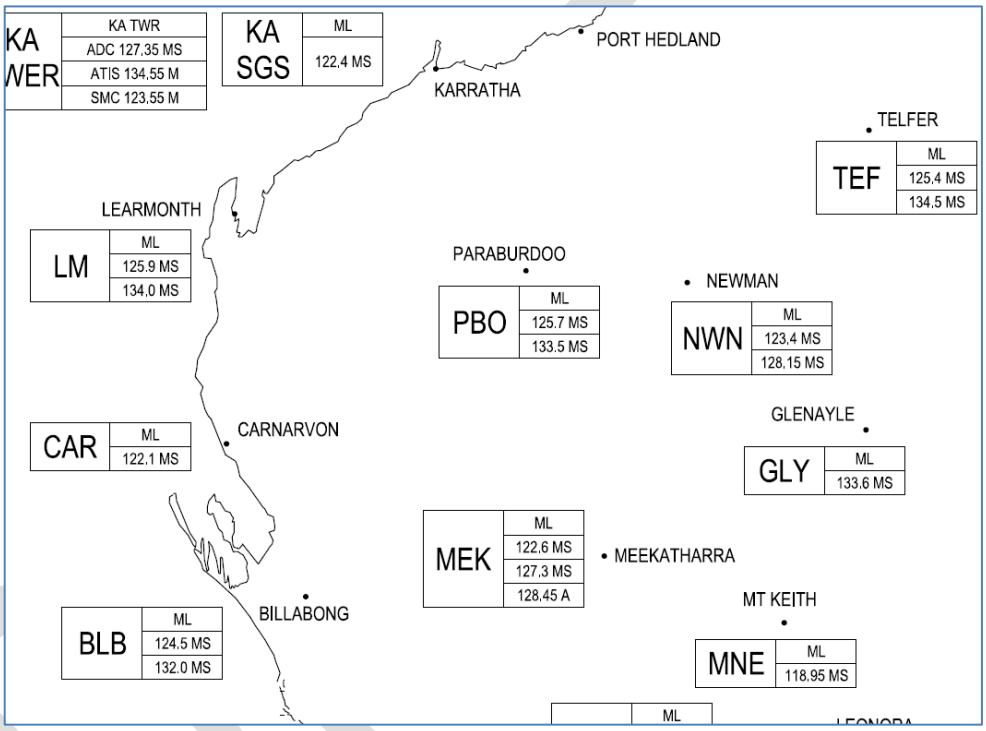

Figure 19: VHF transmitter locations. Source: Airservices.

It was noted in the previous study of the Pilbara region that there are several potential options to improve VHF coverage. New VHF ground stations, VHF repeater infrastructure and carrier offset were all discussed. To date no extra infrastructure has been established.

Stakeholder feedback suggests the main communication issue is the inability for ATC and aircraft to utilise VHF communications for the entire flight. VHF communication becomes unavailable between ATC and aircraft while operating at lower altitudes and while aircraft are on the ground at the various aerodromes in this review. Poor communication at low altitude is due partly to terrain shielding which directly affects VHF line of sight transmissions and partly to the amount of infrastructure that is available. As a result, crews are often unaware of traffic that is departing from neighbouring airports which results in reducing situational awareness.

The proximity of airports to each other has required the establishment of common traffic advisory frequencies (CTAFs). Stakeholders report the inability to communicate with other aircraft on the ground at nearby aerodromes due to the reasons stated above.

[10] Note: Transponder equipped VFR aircraft are visible to an IFR aircraft’s Traffic Collision Avoidance System (TCAS), should VFR aircraft operate without a transponder, permissible in the class of airspace under study, the aircraft are effectively invisible to both IFR aircraft and ATC.

It is common for crews to benefit from being able to communicate to other aircraft while arriving, taxiing or departing from surrounding airports in order to build a mental picture of local traffic. This has a direct effect on limiting a pilot's ability to build situational awareness whilst operating in the region.

Stakeholder comments suggest reciprocal runway operations are commonly conducted when there is calm or light variable wind forecast at these aerodromes. This leads to there being no predictability for pilots to rely on for their operation into these aerodromes.

Terrain shielding has been found to affect aerodromes as close as 8NM apart. In addition to not being able to communicate with local traffic, crews also are unable to contact ATC via VHF. To overcome this, High Frequency (HF) is largely used for communications. HF can present issues around length of time required for aircraft to receive clear radio transmissions from both ATC and the aircraft. HF communications are not directly linked with the respective air traffic controller responsible for the sector, this leads to delays relaying the information between the aircraft and the controller.

At times satellite phones area used to undertake the necessary communication to obtain traffic information and alert ATC of an IFR departure. This is in contravention to Aeronautical Information Publication Australia (AIP) 3.6.1 that states "Telephone services may be used as follows to contact Australian ATS units for urgent, non-routine or safety-related matters, or to report arrival"[11] It is not standard practice to use satellite phones to alert ATC of an impending departure in normal operations for any aircraft.

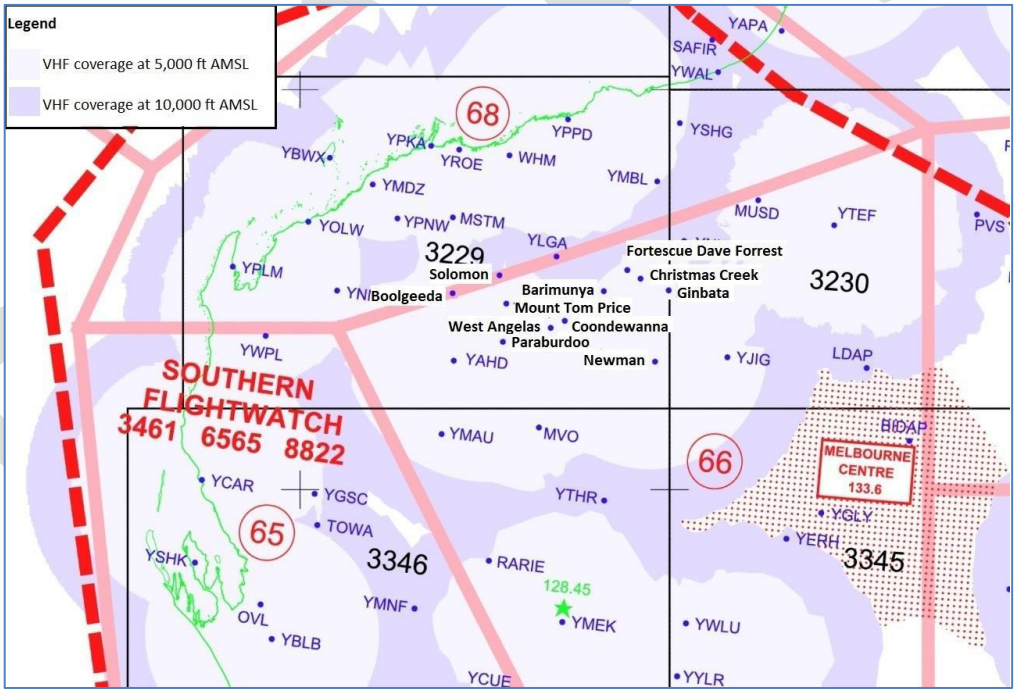

Figure 20: VHF transmitter locations. Airservices Australia.

[11] Aeronautical Information Publication Australia Feb 27 2020

10 Environment

The airspace within 100 NM of Coondewanna was reviewed to examine current aircraft environmental issues associated with:

- Noise;
- Gaseous emissions;
- Interactions with birds and wildlife; and
- Environment Protections and Biodiversity Conservation Act 1999 (EPBC Act) items.

Stakeholders believe that the low level air routes are inefficient due to the current design, which when flown, results in excessive track miles compared to that of a PBN route . It is believed that the current air routes could be redesigned based on PBN guidelines. The resultant benefits would lead to reduced track miles having to be flown and subsequent reduction of gaseous emissions. Both these factors would provide an improvement on the environmental impact from aircraft in the area.

11 Traffic

Traffic in the study area consists mostly of regular passenger traffic and charter fly-in fly-out (FIFO) services. Agricultural flying and geotechnical surveys are also conducted in the Pilbara. Little recreational flying is conducted in the study area.

The traffic flows in the study area is often subject to very busy peak periods with aircraft arriving and departing with FIFO workforce either returning to or departing the respective aerodromes. There are three main peak times that the Pilbara experiences significant levels of high traffic numbers. These peaks are typically; 7 am to 9 am, 11 am to 1 pm, and 3 pm to 5 pm. These times coincide generally with shift changes of mining staff and therefore see traffic on the air routes in the area increase.

The area north and west of Newman is known as the ‘Iron Triangle’. The Iron Triangle has one of the highest concentrations of aerodromes that are owned and operated by private companies as well as local Councils and Shires which are serviced primarily by jet RPT and charter aircraft that can be flown from anywhere in Australia. The purpose of these aerodromes is to primarily service the resource industry in the Pilbara region.

11.1 Total Airspace and Airport Modelling

Modelling of the airspace using current Northern Winter schedule[12] IFR flight information was conducted to assess any air traffic capacity issues. Modelling revealed that there are currently no capacity issues. However, this modelling could not replicate the idiosyncrasy of weather-related diversions due to thunderstorms and terrain in the area. With increased infrastructure forecast and that currently being established, there is a possibility that greater surveillance and communication capabilities will be required to cater for this expansion in the future.

[12] As published by Airport Coordination Australia

11.2 Analysis of aircraft movements

Total aircraft movements for the study area period is 34,495, Refer Figure 7. With the bulk of the flying conducted via contract to commodity companies to transport workforce to site,

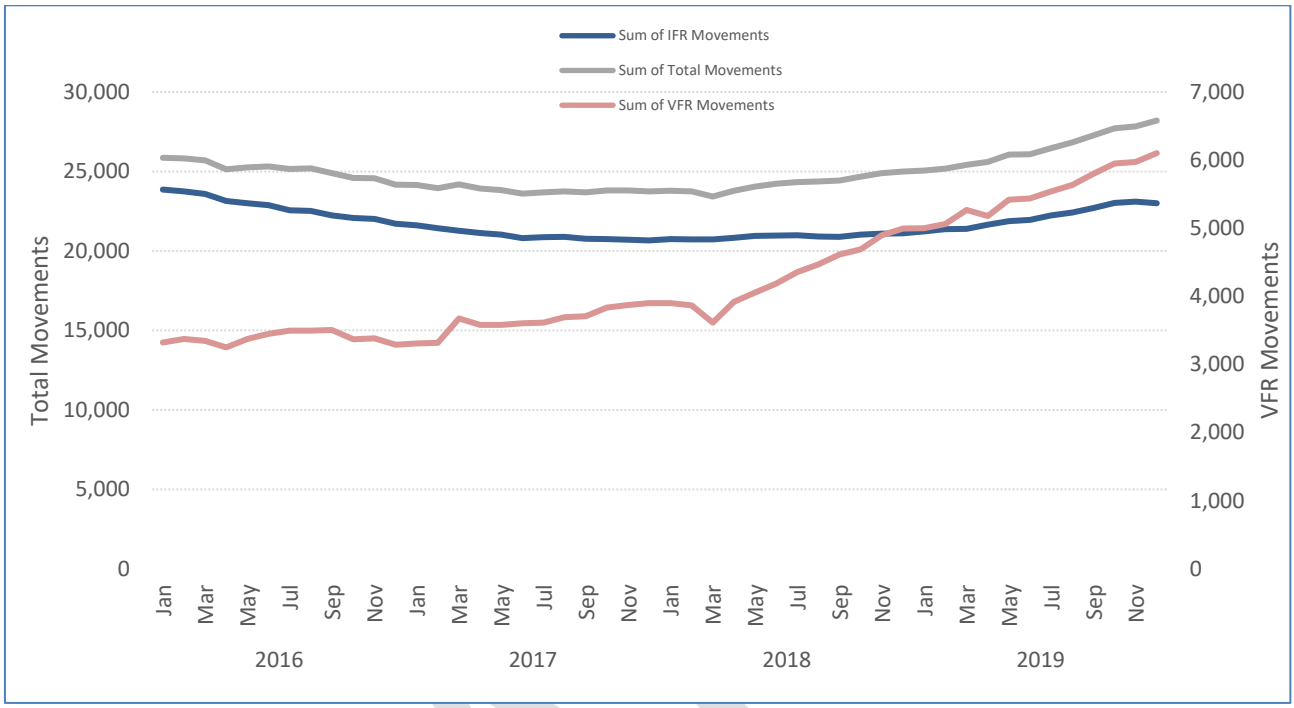

Figure 21: Total movement Study area.

11.3 Analysis of passenger numbers

Total passenger movements for the study area was 1,619,845 on a rolling 12-month basis. Refer Figure 8

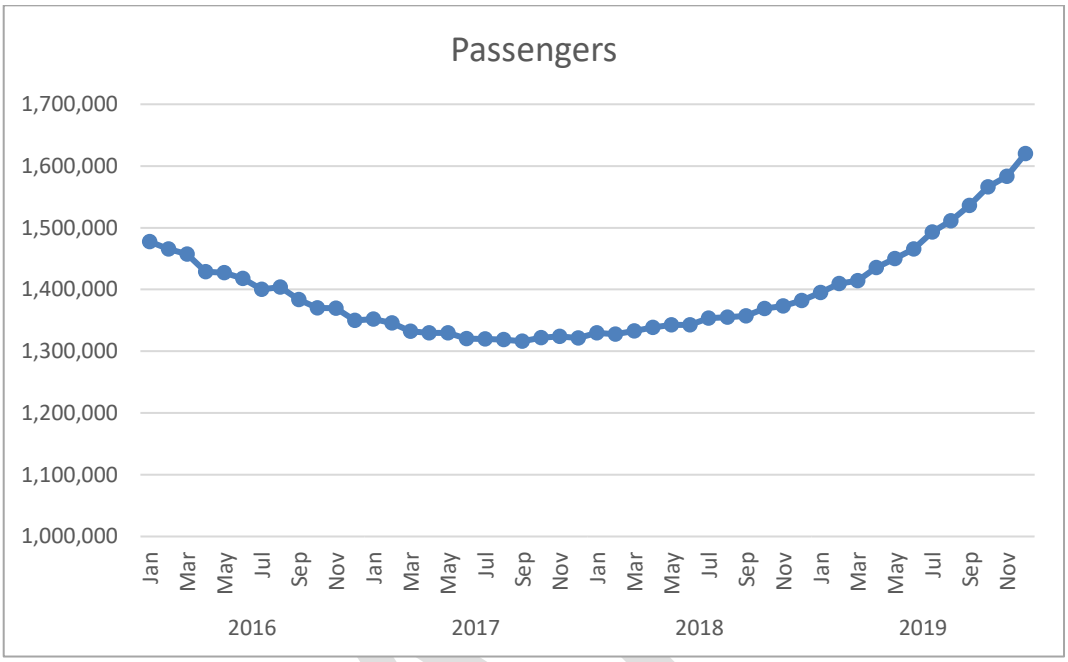

Figure 20: Combined passenger movements

Although individually, the passenger numbers and movement rates to each airport are below the Australian Airspace Policy Statement for triggering a preliminary airspace review. The combination of the individual aerodrome passenger and movement numbers for the review area, reveals a significant increase. From mid-2017, passenger numbers were their most contracted at 1,316,105. The end of the review period, there has been growth in the study area of almost 600,000 passengers per annum to nearly 1.6 million. Combining airports in the study area, the figure for air transport movements is 28,200 per annum.

11.4 Passenger number growth

In the 2018 to 2028 Western Australia Resources Sector Outlook report published by the Chamber of Minerals and Energy WA states "*The continued expansion in global growth and increased capacity of the Western Australian resources sector will continue to support growth in Western Australian exports. Over the next decade, economic growth in Western Australia is expected to continue to be higher than the national average.*

The difference between the two is expected to be less marked over the forecast horizon than it was during the past decade. Importantly, growth in the Western Australian economy is also expected to be less volatile than it has been in the recent past."[13]

The Chamber of Minerals and Energy Western Australia is forecasting that expansion for mineral projects will continue in the Pilbara area. There are several projects already being established in the study area that will contribute further to the complexity and volume of air traffic that supports the resource sector.

Points of consideration for the continues expansion of projects in the Pilbara region are;

- New projects being established and the amount of crossover operations with existing mines (new for old) before being retired due end of life.

[13] https://cmewa.com.au/wp-content/uploads/2019/09/2018-2028-Western-Australia-Resources-Sector-Outlook.pdf

- The increase in traffic during the construction phase of new projects. And extra
- Surveillance and communication capabilities for new projects for air traffic controllers.
- The duration of the concentrated traffic and in the mid to long term the ability for Airservices to best assess for placement of new infrastructure for air traffic services.
- A temporary change in classification to airspace to accommodate the amount of increase of traffic.
-

11.5 Passenger and traffic Forecast

Indications from the Department of Jobs, Tourism, Science and Innovation and the Department of Mines, Industry Regulations and Safety is that there will be continued growth in the Pilbara region. New projects are being established and applications for mining tenure continue to be lodged. As of March 2020, WA had future resources projects valued at an estimated $118.4 billion[14]

The majority of aviation infrastructure established in the study area is associated with the resource industry. The increased investment of projects and the desire of resource companies to have facilities for workforce transfer in close proximity to the project would suggest that more airfields will be established in the iron triangle in line with the new projects.

Due to Covid-19 and the effects on the global economy, predicting when this investment and return to status que for global demand on minerals will be difficult to predict.

Passenger number since the start of the study period have grown 8.8% overall. January 2016 saw passenger numbers at 1,477,223 for the study area then contacting to 1,316,105 mid 2017. The resource industry then rebounded to produce passenger figures of 1,619,845.

12 Aviation Incident Reports

All occurrences involving Australian civil registered aircraft, or foreign civil aircraft in Australian airspace 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 also 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) and for identification purposes is allocated its own serial number.

CASA receives de-identified ASIR data for the purpose of improving safety. The airspace related incidents within 100 NM of Coondewanna from 1 January 2016 to 31 December 2019 were reviewed to determine any risks to aviation safety.

12.1 ATSB Aviation Safety Incident Reports

The Following information is a breakdown of ASIR incident data for the review period.

2019 The 1 incident was categorised as Airspace

• Its type 2 category was listed as Encounter with RPA

2018 The two occurrences listed as Airspace

• 1 further categorised as Operational Non Compliance. The pilot of the aircraft failed to respond to particular radio calls after departure.

• 1 further categorised as Aircraft Separation

[14] https://www.dmp.wa.gov.au/About-Us-Careers/Latest-Resources-Investment-4083.aspx

2017 The 1 incident was categorised as Airspace

• This incident was further categorised as ANSP operational error.

2016 There were four incidents categorised under Airspace

• Two further categorised as Aircraft Separation Compliance – on both occurrences pilots took avoiding action one via visually sighting and separating and the other via guidance from the on board Collision Avoidance System.

• Two further categorised as Operational Non Compliance – One occurrence was due to pilot error with regard to Flight Management System (FMS) data entry. The second occurrence was due to Pilot error in which the crew of one aircraft had inadvertently used the incorrect call sign of another same type aircraft that departed prior

12.2 Airservices CIRRIS data

There were 4 CIRRIS occurrences in 2016 that were applicable to the review scope.

1 OTHER SAFETY RELATED in Class G

NHV and TXE were issued "traffic statement" on each other by ATC. Aircraft were operating on reciprocal Rwys and reciprocal routes, TXE arriving, NHV departing YPBO. Aircraft were issued with a "safety alert" when they were about 10nm apart which was interrupted by another aircraft call and subsequently a "suggested heading" was issued to TXE as avoiding action. TXE did not respond. Pilots did not report sighting each other. Phone conversation with pilot of NHV indicated that he was unable to contact TXE on either CTAF or area, Pilot had watched conflicting traffic on TCAS and took avoiding action when they were approximately 8nm apart.

2 OTHER SAFETY RELATED in Class G

VOZ9213 inbound to Boolgeeda and VOZ9224 outbound were using reciprocal runways and required controller intervention to prevent the aircraft becoming too close.

3 AIRCRAFT CONFLICTION in Class G

VOZ9210 (Boolgeeda to Perth and departing runway 26 at Boolgeeda) and VOZ9223 (Perth to Boolgeeda and arriving runway 08) received mutual traffic information. As the aircraft approached approximately 15 NM from passing in Class G airspace, the controller re-iterated the traffic advice, upon which VOZ9223 arrested descent and began to climb, while VOZ9210 arrested climb and descended. The aircraft passed approximately 2-3 NM abeam and the pilots advised that while receiving the initial traffic advice, the departure call of VOZ9210 and the 'all stations' call of VOZ9223 had not been copied; VOZ9210 reported receiving a Traffic Advisory.

4 OPERATIONAL DEVIATION in Class G

QJE1979 had planned YSOL to YPPH via waypoint ENDOV.

QJE1979 was cleared via amended waypoint RANGR. Audio replay confirmed the amended route clearance was correctly read back.

When identified QJE1979 was observed to be tracking via planned waypoint ENDOV. The error was identified by ATC and corrected prior to RAM alert activation.

There was 1 CIRRIS occurrence in 2017

1 OTHER SAFETY RELATED - (Pilot error regarding use of incorrect call sign)

There was 1 CIRRIS occurrence in 2018

1 OPERATIONAL DEVIATION - (Aircraft Altitude Excursions while cruising above FL180)

There was 1 CIRRIS occurrence in 2019

1 OTHER SAFETY RELATED - (Medical diversion) N/A

13 Summary of feedback from consultation

Stakeholder consultation included information relating to the airspace review via industry forums, CASA's Consultation Hub and face to face interviews. Information received from this process included:

- Self-separation on a Ceiling and Visibility OK (CAVOK)[15] day can present difficulties due to local traffic density and frequency congestion. The presence of hazardous weather in the region can also increase the crew's workload significantly Examples of this include,
    - Managing communication across multiple radio frequencies.
    - Managing the aircrafts climb profile because of a delay to continue climbing into CTA.
    - Managing the aircrafts lateral and vertical flight path to avoid weather in the region.
    - Crews maintaining adequate situational awareness during periods stated above
- The proximity and the number of airports in the study area 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. Operators also advised of problems due to delays in being granted a clearance into CTA and at times no clearance being granted at all.
- Multiple RNAV arrivals overlap each other and are identified as a high risk. When winds are light and variable aircraft flying via these RNAV arrivals could possibly be on conflicting courses. The flight procedure design companies responsible for creating these approaches are aware of this.
- Surveillance at FL125 for Aircraft is sometimes not available. With a lower level Class E airspace proposed for this region, traffic delays are anticipated to arise because of aircraft being controlled via procedural separation standards.
- Frequency congestion for ATC is very high. When weather requiring track diversion is in the area the congestions increases. There is a chance of limited situational awareness due to the multiple frequency to monitor in the area and the sheer volume of communication.
- CTAF verses UNICOM is now a concern. Non-essential aviation information is being passed in the CTAF making self-separation difficult at times. Discrete UNICOM frequencies should be required in the Pilbara to reduce frequency congestion.
- A Terminal Area Chart (TAC) Chart would be a significant safety benefit to crews operating in this region. This will be achieved by improving crew's situational awareness. In addition, its application to flight crews electronic Flight Bags (EFB)'s would allow for visual representation of the RNAV arrivals and air routes.
- A redesign of the current airways would be a great benefit to operators due to a reduction in track miles and an increase in efficiency.
- Lack of communication and surveillance at lower levels is a concern for all operators.

[15] CAVOK
The abbreviation CAVOK (Cloud And Visibility and weather OK) is used when the following conditions are forecast simultaneously:
• Visibility is 10 kilometres or more
• No cloud below 5,000 feet or below the highest 25 nautical mile minimum sector altitude whichever is the higher; and no cumulonimbus at any height
• No weather of significance, i.e. none of the weather listed in the weather table
Bureau of Meteorology

- Evidence has shown that VFR aircraft and helicopter movements are increasing in the region. A problem posed by this is that a number of these VFR operations often operate and at times are not fitted with transponders, coupled with a lack of reliable VHF communications in the area will add to the increased risk.
- The lack of VHF contact with ML Centre on the ground creates significant extra workload. HF is unreliable and radio transmissions and gaining situational awareness of traffic is much better facilitated on the ground before taxi rather than when airborne and busy with operating the aircraft, SOPs and self-separating from other traffic. An increase in VHF coverage to the ground would greatly improve this safety and workload balance in a positive manner.

14 Key Issues, Recommendations and Observations

14.1 Issues

Stakeholders have expressed a view that VHF coverage in the study area is inadequate for safe operations. Non preferred methods of communication are being utilised, resulting in increased stress and workload for crews before departing in a very busy environment.

Stakeholders have expressed that frequency congestion in the Pilbara is very high. This is increased when inclement weather requires aircraft track diversion in the area. There is a chance of limited situational awareness due to the multiple frequencies to monitor in the area and the sheer volume of communication. The situation is exacerbated when ATC Flight Information Areas (FIA) sectors are combined.

Stakeholders stated the lack of a TAC makes switching between charts cumbersome while trying to cope with frequency changes and routine tasks such as checks associated with descending through the transition level and pre landing checks. The production of a TAC would be beneficial for the Pilbara. Situational awareness would be enhanced through visual representation of the RNAV arrivals and air routes. TAC's are published at a smaller scale giving the ability to publish more valuable information on a single chart.

14.2 Findings

Christmas Creek RNAV 09 and Fortescue Dave Forest RNAV 30 procedures do not comply with MOS 173 requirements for non-overlapping procedures. The procedures were permitted via exemption. The procedures are produced by independent MOS 173 procedure design organisations, with an exemption issued to each organisation. Notations on the charts between the organisations are not uniform

The Lack of usage of the option to have discrete UNICOM is unnecessarily adding to frequency congestion. The misalignment between MOS 139 AIP and ERSA makes CTAF and UNICOM an ambiguous topic. Clear definitions between the rolls, and best practise to apply them is needed so that the hindrance of aviation critical broadcasts is not hindered.

Charting Error for Fortescue Dave Forrest and Christmas Creek on the ERC L8 WA chart where the CTAF frequencies are not published. This has been submitted to Airservices Australia for rectification.

Surveillance through the study area varies at what altitude ADS-B identification is obtained by ATC. There is minimal current information on ADS-B transmitters and expected service ceiling.

The proliferation or airports in such a confined area with more infrastructure being added has the potential to complicate operations in the "iron triangle". IFR RNAV procedures that are designed to increase safety are getting increasingly congested to the point of overlapping. This in turn has the potential to generate high workloads in the flight deck with difficult situational awareness for all traffic in the area. Entities that are considering new aviation infrastructure need to engage CASA and Airservices Australia for potential IFP's and communication impacts in the region.

CTAF's in the Pilbara are congested with UNICOM information. Information such as passenger information, fuel required, parking bay and estimated times are all information determined as UNICOM. AIP GEN3.4 -7 3.3.2 states that UNICOM information must not inhibit the transmission of standard positional broadcasts. Therefore, discrete UNICOM frequencies must be established by aerodromes where the CTAF (or broadcast area) is servicing multiple locations.

14.3 Recommendations

The recommendations are:

Recommendation 1:

Airservices should increase the VHF infrastructure in the Pilbara region within 12 months to address the gaps in communication abilities for ATC and pilots. Future VHF infrastructure locations should be aligned with impending resource projects to produce the most effective VHF service in the area.

Recommendation 2:

Airservices should consider providing greater ADS-B coverage and more detailed information for crews regarding transmitter locations or expected service area for current infrastructure.

Recommendation 3:

CASA Flying Operations Inspectors (FOIs) along with the OAR to investigate if a broadcast area for the area encompassing Fortescue Dave Forrest, Coondewanna, Christmas Creek Ginbata and Barimunya would better service the communication requirements of pilots.

Recommendation 4:

The relevant CASA department to review the exemptions given to the non-compliant RNAV procedures in the Pilbara. For the procedures that overlap, depiction of the conflicting arrival should be present in a light grey form with waypoints noted for greater situational awareness on the relevant approach plates.

Recommendation 5:

Airservices should publish a Terminal Area Chart (TAC) for the Pilbara Region by May 2021 aligned with the Aeronautical Information Regulation and Control (AIRAC) cycle. The TAC should be introduced sooner via Aeronautical Information Package Supplement (AIP SUP).

Recommendation 6:

CTAF's that service multiple aerodromes must require a discreate UNICOM frequency to stop non-separation critical information congesting the frequency. The Manual of Standards 139 and AIP/ERSA should align for better clarity for air operators and aerodromes.

15 Conclusion

The OAR has conducted a review of the airspace based on a 100NM radius of Coondewanna W.A.

The Pilbara area presents varied challenges to aviation operations within the region. The remoteness, type of traffic mix and density of the airports and lack of sufficient communication and surveillance infrastructure contribute to the complexity of operating in this location. The extreme heat generated turbulence and seasonal weather patterns make flying in this activity dense area challenging. Itinerate pilots can struggle with the nuances of getting into and out of the Pilbara, local knowledge plays a large part providing a situational awareness picture. Surveillance and communications are key to keeping this area as safe as possible. The new LL of Class E at FL125 is appropriate if the supporting infrastructure is available to reduce pilots and controller's workload. A national post implementation review of Class E airspace to FL125 will be conducted. Once that Data is available, another desktop review will be conducted.

The review determined that there are opportunities to improve airspace efficiency and safety.

At the commencement of this review process the low-level route network for the study period was outside of controlled airspace. By the time this report has been released, there will have been a national change for the lowering of Class E airspace down to FL 125. This now encompasses the lower level route structure. Better usage of PBN design guidelines could possibly generate more efficient routes servicing the Pilbara.

During this review, feedback indicated that the VHF Communication network in the Pilbara region is at a standard below that required for safe operation. Most stakeholders noted this as their biggest concern. As a result of these challenges faced due to the VHF communication network in the region, feedback reveals there are several "workarounds" currently being employed. These workarounds are not considered best practice and in addition are adding complexity to operations in the region. Multiple forms of communications are being used for communication to ATC and other airspace users.

CTAF's that are employed in the Pilbara are congested due to the number of aerodromes sharing the same frequency. Discreate UNICOM frequencies must be utilised in the Pilbara where there are multiple aerodromes sharing the one CTAF frequency. With the possibility of the establishment of broadcast areas, this change in operation will be critical to ensure that the flow of aviation critical broadcasts are free from unnecessary interruption.

It should be noted that in consultation with the Department of Mines, Industry Regulation and Safety and the Chamber of Minerals and Energy (WA), investment in the resource sector is continuing with the potential for 4 more projects in the study area alone. With this impending investment, the infrastructure to support aviation activity needs to be discussed well in advance of projects commencing. The length of time to establish an aerodrome to support mining operations as opposed to any changes or implementation in aviation support infrastructure is vastly different. Mining aerodromes are being constructed and certified for operation within a 6 month time frame. Changes in aviation routes, communication, surveillance and air traffic control potentially take years to establish or change.

The competing nature of the resource industry leads to different organisations bringing projects online at the same time. This applies pressure to air traffic controllers and aircrew to become familiar with changes in airspace and air route challenges in an already complex environment. Without the adequate supporting infrastructure these challenges are only exacerbated.

The Office of Airspace Regulation along with Airservices and other related government agencies should discuss the future requirements for aviation in remote Western Australia.

Annex A - Acronyms and Abbreviations

Acronym/abbreviation	Explanation
AAPS	Australian Airspace Policy Statement 2018
ACP	Airspace Change Proposal
Act	*Airspace Act 2007*
ADS-B	Automatic Dependent Surveillance – Broadcast
AIP	Aeronautical Information Publication
Airservices	Airservices Australia
ALA	Aircraft landing area
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
CASA	Civil Aviation Safety Authority
CAVOK	Cloud and Visibility OK
CIRRIS	Corporate Integrated Reporting & Risk Information System
CTAF	Common Traffic Advisory Frequency
ERC	En Route Chart
ERSA	En Route Supplement Australia
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	Meters
MLAT	Multilateration
NOTAM	Notice to air men
NM	Nautical Miles
OAR	Office of Airspace Regulation
OLS	Obstacle Limitation Surface
PANS-OPS	Procedures for Air Navigation Services – Aircraft Operation
PT	Passenger transport
PBN	Performance Based Navigation
RNAV	Area Navigation
SIS	Surveillance Information Service
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

Acronym/abbreviation	Explanation
VMC	Visual Meteorological Conditions

Annex B - Australian Airspace Structure

Class	Description	Summary of Services/Procedures/Rules
A	All airspace above Flight Level (FL) 180 (east coast) or FL 245 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	IFR and Visual Flight Rules (VFR) flights are permitted. All flights are provided with ATS and are separated from each other. Not currently used in Australia.	
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. 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	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. Not currently used in Australia.	
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.

Annex C - 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
Regional Airspace and Procedures Advisory Committees (RAPAC)	Members
Chamber of Minerals and Energy	Manager Economic Competitiveness
Department of Mines and Petroleum	Planning Manager Land Use Planning

Annex D - References

Airservices Australia; En Route Chart Low 8, Effective 07 November 2019 Airservices Australia;

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Department of Infrastructure and Regional Development 2015. Australian Airspace Policy Statement 2015, Canberra. https://www.legislation.gov.au/Details/F2015L01133 ;

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