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Preliminary Airspace Review of Darwin

February 2020

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1 Executive Summary

The *Airspace Act 2007* (Act)[1] 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 purpose of this preliminary airspace review is to evaluate the current airspace arrangements and to ensure that the airspace surrounding Darwin Airport (Darwin) as per the parameters shown below within the scope, is fit for purpose.

The scope of this review assessed airspace within 40 Nautical Miles (NM) from Darwin from the surface up to 6,500 feet (ft) above mean sea level (AMSL).

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

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

CASA determined the airspace classification is compliant and fit for purpose. Four recommendations are made that are directed towards enhancing airspace efficiency and improving operations in the review area.

The current indications show that passenger and aircraft movements are in a slight decline at Darwin. The Darwin International Airport 2017 Master Plan[2] (the Master Plan) reported a compound annual growth in aircraft movements of 4.47% between 2006-2016. The Master Plan recorded volatility in General Aviation (GA) activities however forecasts positive growth in passenger and aircraft movements to 2037. Reviewed data has shown an average decrease of 2.43% and 2.63% in total aircraft movements and passenger movements respectively during the review period. One area of growth at the airport is in the increasing numbers of Military aircraft that are participating at each successive Military exercise held in Darwin.

Feedback from stakeholders indicated that some aircraft descent profiles are not matching the profile of the control area (CTA) steps. Aircraft are leaving and re-entering controlled airspace while on descent into Darwin.

1.1 Summary of Conclusions

- Military aircraft movements are increasing, particularly during Military exercises and this has an influence on civilian traffic and the current airspace capability.
- Changes may be required to the CTA steps to keep aircraft descent profiles contained within CTA.
- Foreign Military aircrews would benefit from increased education and information about operating near uncontrolled civilian airfields.

[1] A full list of acronyms and abbreviations used in this report can be found in Annex A.

[2] https://www.darwinairport.com.au/corporate/planning#master-plan.

1.2 Key Observations

The following observations were made of the Darwin airspace:

- Ten (10) out of a total of eleven (11) responses submitted to the CASA consultation hub expressed a view that the airspace is operating safely.
- CASA received one response indicating that the Darwin airspace was inefficient and not safe. However, no evidence was provided in the submission to support that claim. During the review process CASA did not find information supportive of the claim.
- Reviewed data has shown an average decrease of 3.56% and 5.27% in total aircraft movements and passenger movements respectively during the review period.
- Feedback from stakeholders indicated that some aircraft descent profiles are not matching the profile of the CTA steps. Aircraft are leaving and re-entering controlled airspace while on descent into Darwin.
- One (1) response considered the airspace was inefficient and not as safe as practicable. No reason was provided to support this comment.
- The Royal Australian Air Force (RAAF) Air Traffic Control (ATC) staff at Darwin, indicated they were satisfied with the civil and military traffic management around Darwin.

1.3 Key Recommendations

These recommendations are based upon the reviewed incident data, analysis of aircraft and passenger movement statistics at Darwin International Airport and consultation with various stakeholders.

Recommendation 1:
The RAAF should consider redesigning the CTA steps, in accordance with the findings of this review and as identified in consultation with relevant stakeholders.

Recommendation 2:
The RAAF should consider a review of procedures that may improve the efficiency of civilian traffic management particularly given the increasing number of military aircraft using the airspace around Darwin.

Recommendation 3:
The RAAF should provide Foreign Military aircrews with formal and regular education, regarding the location of and operations within the vicinity of local civil aerodromes.

Recommendation 4:
Stakeholders and Darwin ATC should consider the benefits of developing a Letter of Agreement (LOA) that supports Helicopter Emergency Medical Service (HEMS) operations.

Table Of Contents

1 EXECUTIVE SUMMARY 3
2 INTRODUCTION… 6
3 AERODROME…. 7
4 AIRSPACE…… 9
5 TRAFFIC……13
6 AVIATION INCIDENT REPORTS....14
7 CONSULTATION AND STAKEHOLDER FEEDBACK....16
8 KEY ISSUES, FINDINGS AND RECOMMENDATIONS 16
9 CONCLUSION……..18
ANNEX A ACRONYMS AND ABBREVIATIONS 19
ANNEX B AUSTRALIAN AIRSPACE STRUCTURE 21
ANNEX C STAKEHOLDERS 22
ANNEX D RAAF DARWIN FEEDBACK....23
ANNEX E AIRSERVICES AUSTRALIA FEEDBACK....24
ANNEX F CASA CONSULTATION HUB FEEDBACK - DE IDENTIFIED 25
ANNEX G AUSALPA FEEDBACK....27

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.[3]

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:

a. protection of the environment.
b. efficient use of that airspace.
c. equitable access to that airspace for all users of that airspace.
d. 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). 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 safely and effectively. Class B and Class F airspace are not currently utilised 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 this review is to ensure that the airspace around Darwin Airport (Darwin) is fit for purpose and complies with the Act for the safe operations, efficient use of and equitable access for airspace users.

The scope of the review included:

- A risk assessment of the airspace within 40 nautical miles (NM) of Darwin from the surface up to 6,500 feet (ft) above mean sea level (AMSL).
- Consultation with stakeholders
- Review and update of recommendations from the previous airspace review.

The review process included:

- Stakeholder engagement via direct email as well as through the Northern Territory Regional Airspace and Procedures Advisory Committee (RAPAC);
- Stakeholder feedback submitted through the CASA consultation hub.
- Direct stakeholder contact via meetings held at stakeholder locations; and
- Recommendations from the previous review.

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

2.3 Objective

The objective of this review was to examine the current airspace in order to ensure it is fit for purpose. Current factors affecting the airport are the increasing aircraft numbers participating in the military exercises undertaken biennially, and to a lesser extent, the number of international airlines operating to Darwin which increased over the last three years. It will also include:

- Analysis of aircraft movement data;
- Analysis of the mix of aircraft operations in the area;
- Analysis of the current aircraft movement levels to determine the suitability of existing airspace;
- Analysis of the incidents and occurrences within the review area;
- Identification of threats or risks to the safety of operations within the airspace; and
- Consultation and consideration of feedback from airspace users.

3 Aerodrome

Darwin is located six (6) kilometres to the north east of Darwin city and is a joint Military and civil use aerodrome. The civilian section is operated by Darwin International Airport Pty Ltd, with the Military section operated by the Royal Australian Air Force (RAAF) Base Darwin.

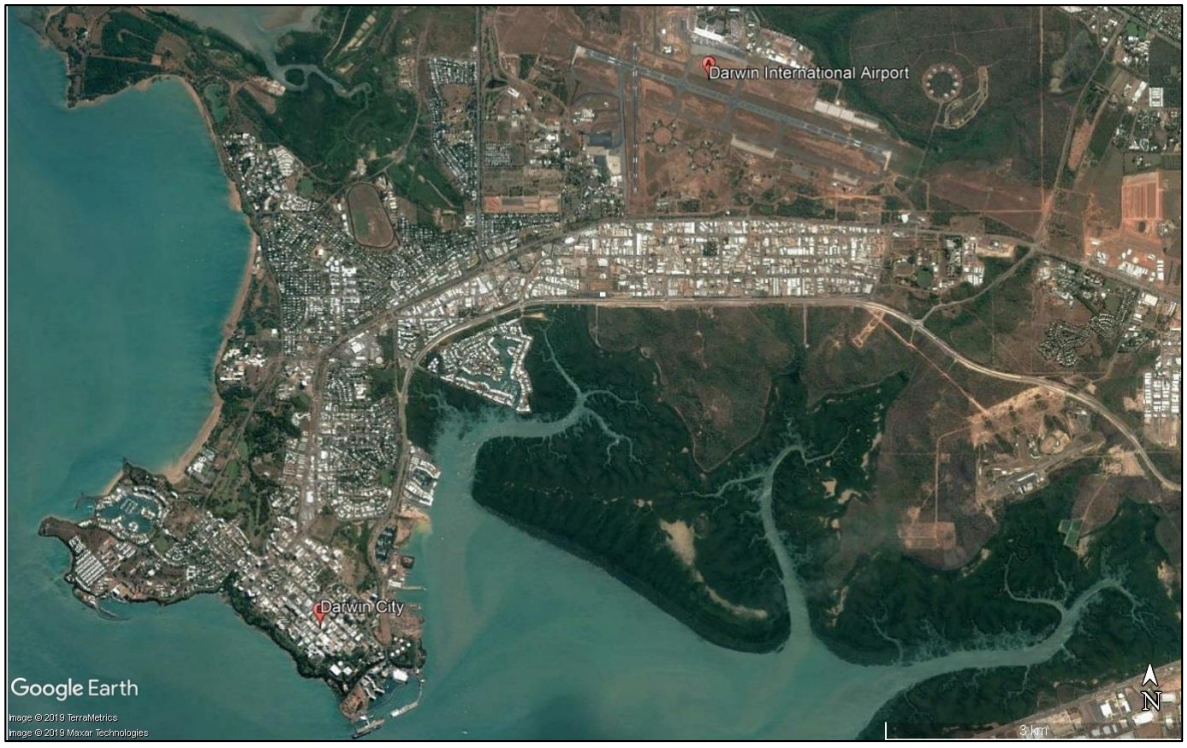

Figure 1 Darwin Airport, *Reference* Google Earth.

3.1 Terminal Instrument Flight Procedures

The instrument approaches available at Darwin airport include:

- Non Directional Beacon (NDB) approach for RWY 11.
- Distance Measuring Equipment (DME) approach procedure available for RWY 29, RWY11, RWY18, RWY36.
- Very High Frequency (VHF) Omnidirectional Range (VOR) approaches for RWY 11 and RWY 29
- Area Navigation (RNAV) approaches for RWY 11 and RWY 29
- Instrument Landing System (ILS) approach for RWY 29
- Tactical Navigation (TACAN) use only for military.

3.2 Aerodrome Facilities

Darwin airport has two sealed runways, see Figure 2.

Runways:

- **RWY 11 / 29**
  Grooved / Sealed runway surface, 3,354 meters (M) long, 60M wide.
- **RWY 18 / 36**
  Sealed runway surface, 1,524M long, 30M wide.

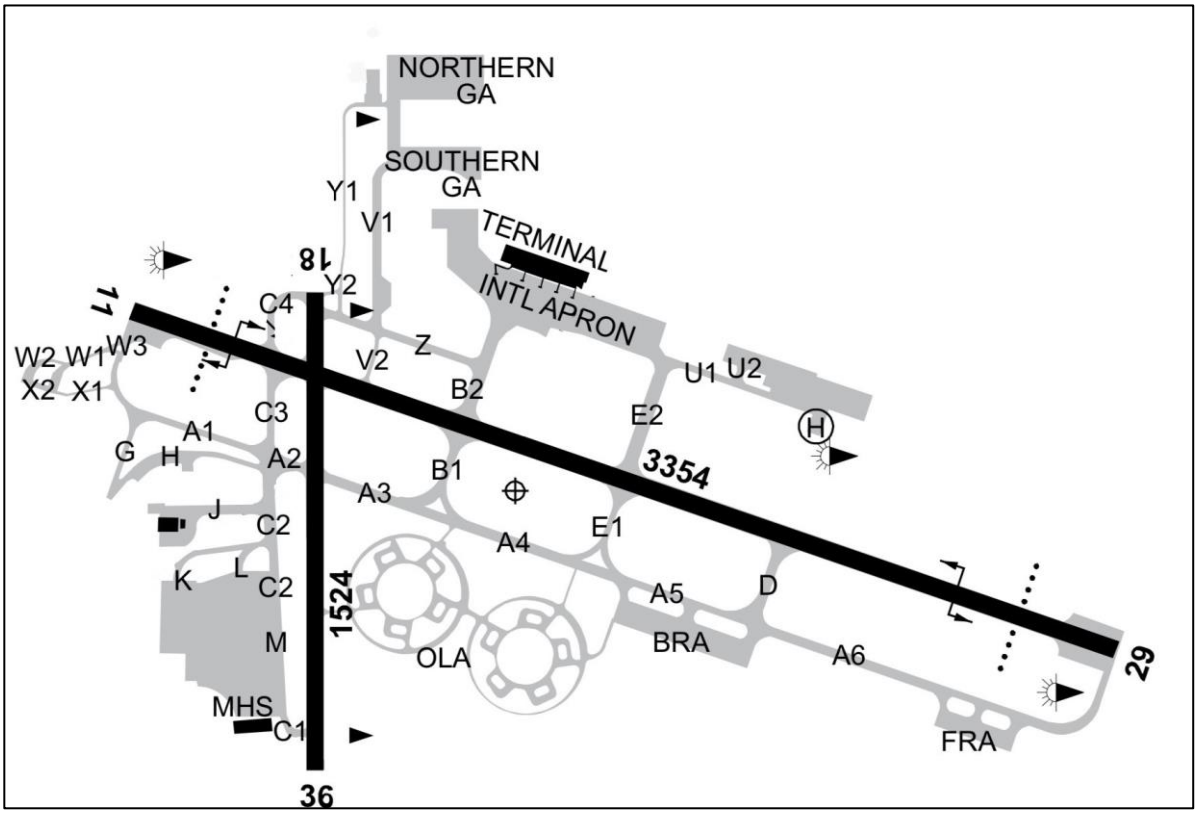

Figure 2: Extract of Darwin Airport layout, reference En Route Supplement Australia (ERSA) Effective 23rd May 2019.

3.3 Darwin Airport Masterplan

Darwin operates as a joint user facility between Darwin International Airport Pty Ltd (DIA) and the Department of Defence, RAAF Base Darwin. The DIA Masterplan was undertaken in 2017 and provides a 20-year scope to 2037. DIA projects that by 2037, passenger movements will have increased from 2 million passengers to almost 6 million passengers.

Domestic airfreight is estimated to increase as a direct result of anticipated increase in domestic airline movements as the airport continues to evolve. The masterplan[4] states that the airport was initially a hub for Jetstar services between Australia and South East Asia and it is now positioning itself as a hub for northern Australia.

General aviation movements are expected to grow from 74,000 movements per year to over 100,000 movements per year by 2037.

4 Airspace

4.1 Airspace Structure

Darwin Air Traffic Control is serviced in accordance with Class C[5] airspace requirements and is serviced by RAAF personnel. Darwin Approach control is also controlled by RAAF personnel and provides Air Traffic Services out to 40NM.

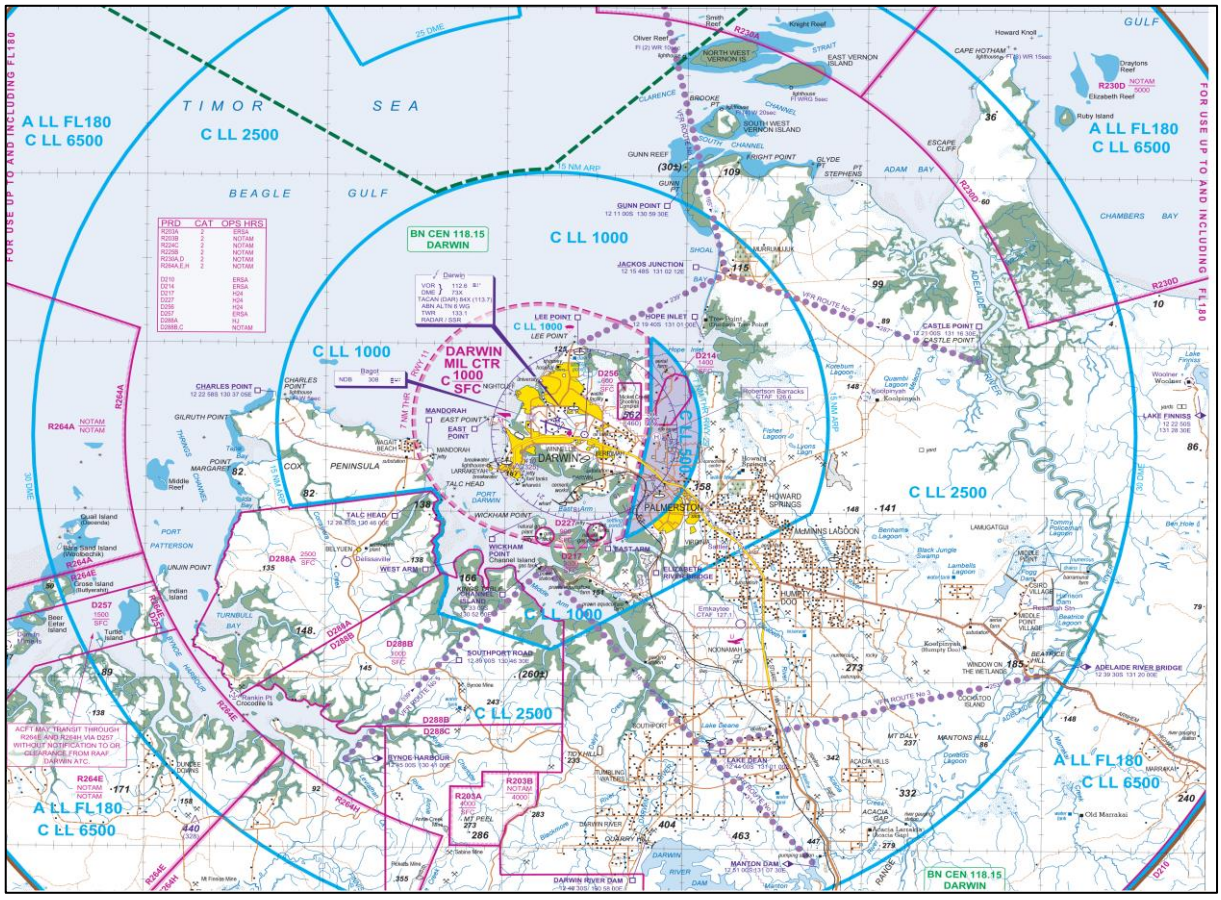

Figure 3: Extract of Darwin Visual Terminal Chart (VTC) Effective 23rd May 2019.

[4] https://www.darwinairport.com.au/corporate/planning

[5] Explanation of Class C Airspace can be found at Annex B

4.2 Restricted and Danger Areas

The following list of Danger and Restricted Areas are within 40NM of Darwin. No issues were raised regarding these Restricted and Danger Areas.

RESTRICTED AREAS

R203A Kangaroo Flat – Military Flying/ Non Flying

Vertical Limits Surface (SFC) to 4,000 ft AMSL

R203B Kangaroo Flat – Military Flying / Non Flying

Vertical Limits 4,000 ft AMSL to NOTAM

R230A Darwin – Military Flying / Non Flying

Vertical Limits 5,000 ft AMSL to NOTAM

R230B Darwin – Military Flying / Non Flying

Vertical Limits NOTAM To NOTAM

R230C Darwin – Military Flying / Non Flying

Vertical Limits NOTAM to NOTAM

R230D Darwin – Military Flying / Non Flying

Vertical Limits NOTAM TO NOTAM

R264A Darwin - Military Flying / Non Flying

Vertical Limits 5,000 ft AMSL TO NOTAM

R264B Darwin - Military Flying / Non Flying

Vertical Limits NOTAM to NOTAM

R264C Darwin - Military Flying / Non Flying

Vertical Limits NOTAM to NOTAM

R264D Darwin - Military Flying / Non Flying

Vertical Limits NOTAM to NOTAM

R264E Darwin - Military Flying / Non Flying

Vertical Limits NOTAM to NOTAM

R264F Darwin - Military Flying / Non Flying

Vertical Limits NOTAM to NOTAM

R264G Darwin - Military Flying / Non Flying

Vertical Limits NOTAM to NOTAM

R264H Darwin - Military Flying / Non Flying

Vertical Limits NOTAM to NOTAM

R264J Darwin - Military Flying / Non Flying

Vertical Limits 5,000 ft to NOTAM

R264K Darwin - Military Flying / Non Flying

Vertical Limits 5,000 ft to NOTAM

DANGER AREAS

D214 Robertson Barracks – Rifle Range
Vertical Limits SFC to 1,400 ft AMSL

D217 Bladin Point – High Velocity Exhaust Plume

Vertical Limits SFC to 3000 ft AMSL

D227 Wickham Point – High Velocity Exhaust Plume

Vertical Limits SFC to 900 ft AMSL

D256 Micket Creek – Rifle Range

Vertical Limits SCF to 600 ft AMSL

D257 Darwin - Access Lane

Vertical Limits SFC to 1,500 ft AMSL

D288A Cox Peninsula – Flying Training

Vertical Limits SFC to 2,500 ft AMSL

D288B Cox Peninsula – Military Flying Training

Vertical Limits SFC to 1,000 ft AMSL

D288C Cox Peninsula – Military Flying Training

Vertical Limits SFC to 1,000 ft AMSL

4.3 Air Routes

Darwin is serviced by several domestic air routes into and out of the Northern Territory as well as air routes that overfly, for airlines operating internationally into and out of Australia.

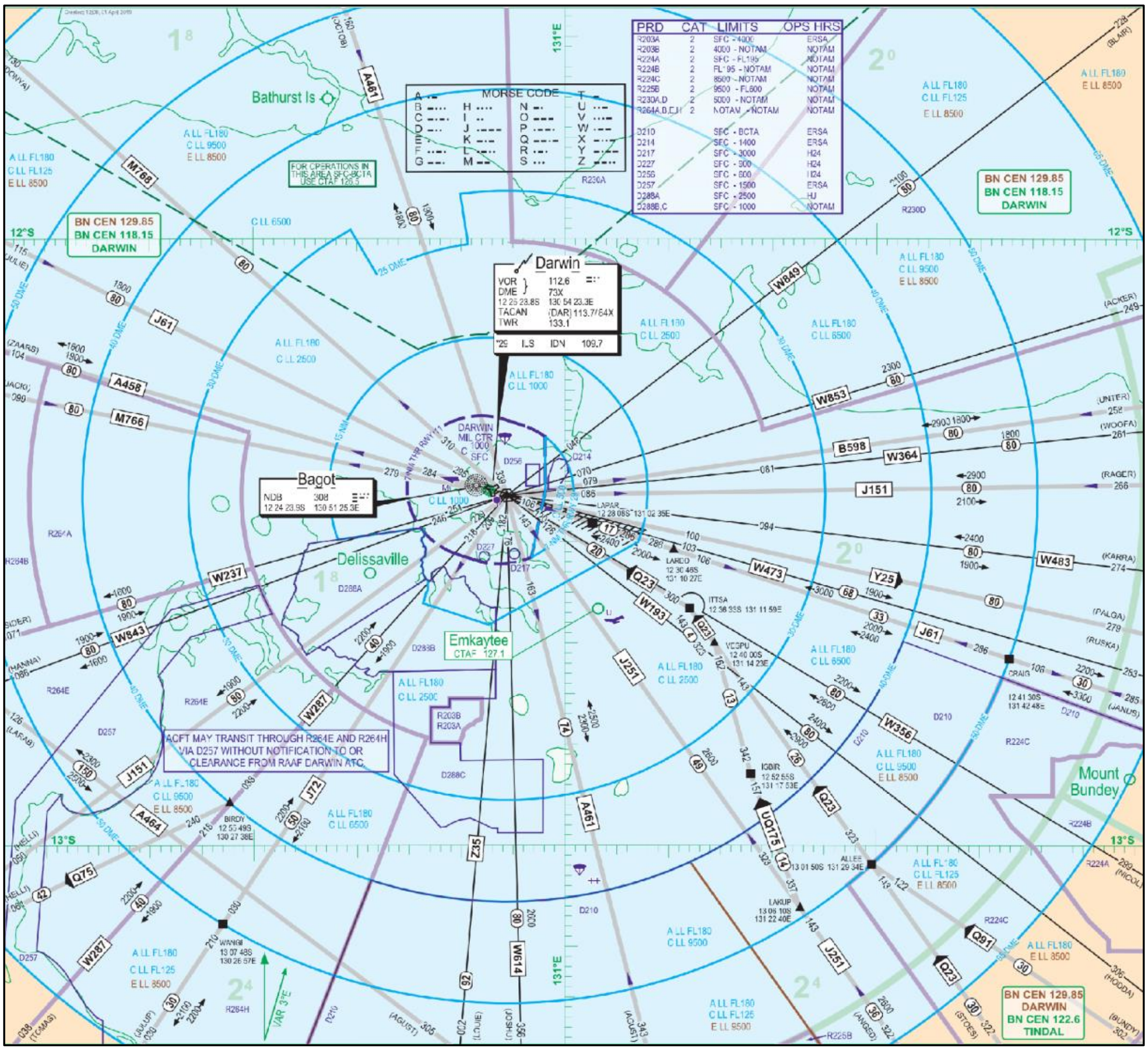

Figure 4 Extract of Darwin Terminal Area Chart (TAC) Effective 23rd May 2019.

4.4 Environment

The airspace within 40NM of Darwin was reviewed for potential issues related to the environment:

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

No issues were raised regarding the above environmental considerations.

4.5 Surrounding Aerodromes

The aerodromes within the 40NM scope of this preliminary review included Emkaytee and Batchelor aerodromes, both are uncertified aerodromes. Stakeholder feedback was sought from operators at these airports and any feedback received was added to the review.

5 Traffic

5.1 Analysis of aircraft movement numbers

Darwin airport handles both Civil and Military traffic 24 hours a day. The major domestic and regional regular public transport (RPT) airlines that use the airport include Qantas Airways, Virgin Australia Airlines, Air North, Alliance Airlines, Tiger Airways, Jetstar, Chartair and Fly Tiwi. The airport is also served by a significant number of local air charter providers. International airlines operating to Darwin include Donghai Airlines from China, Silk Air from Singapore and Jetstar Asia.

Figure 5 below displays both the total aircraft movements and the total air transport movements during the two-year review period.

- Total Movements as at November 2017 (85,470).
- Total Movements as at October 2019 (81,313).
- The data shows a decrease of -4.86% over this period.

This two year period shows an overall decrease in Total Movements.

- Total Air Transport movements as at November 2017 (58,102).
- Total Air Transport movements as at October 2019 (56,030).
- The data shows a decrease of -3.56% over this period.

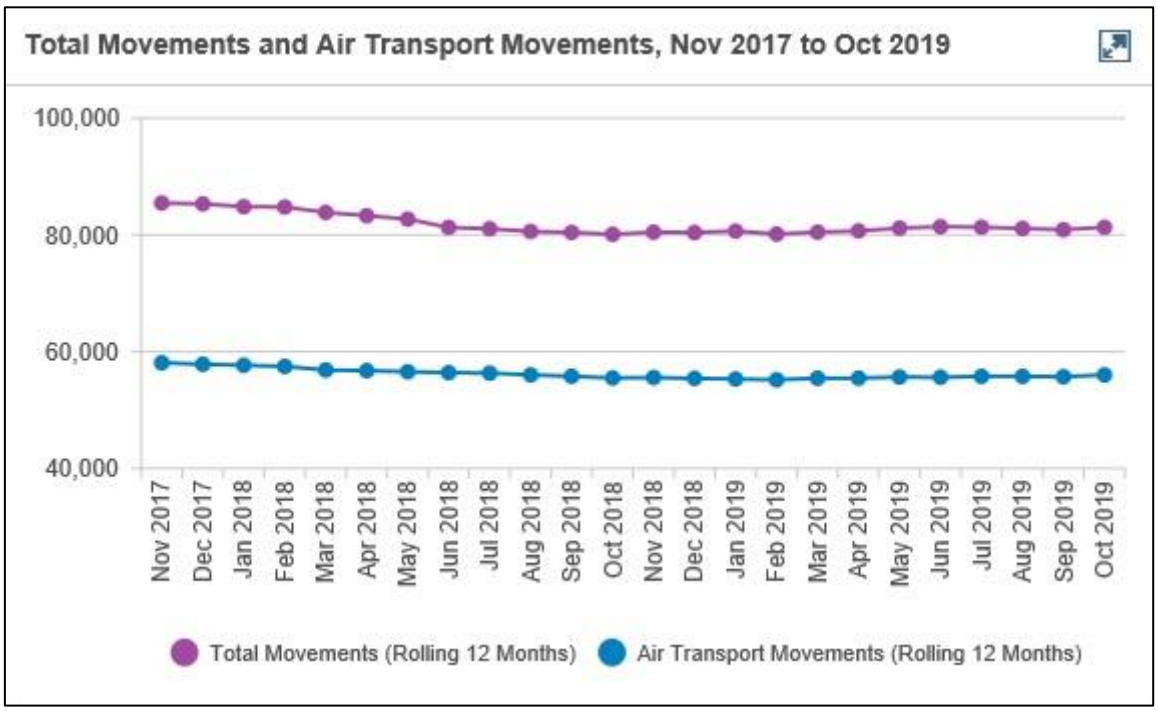

Figure 5: Aircraft movement data November 2017 to October 2019. Source: Airservices.

5.2 Analysis of annual passenger numbers

Figure 6 below displays the annual passengers travelling through Darwin. This represents a rolling twelve month period spanning two years commencing November 2017, (2,305,334 passengers) through to October 2019 (2,183,830 passengers). Overall the trend has shown a decrease of 5.27% in passengers over the period. These declining numbers can be attributed to the following:

- The current economic climate in the Northern Territory.
- Aviation developments, aircraft now fly direct to destination and no longer require Darwin as a technical stop.
- A slowing resources industry.
- Completion of major oil and gas projects in the region.

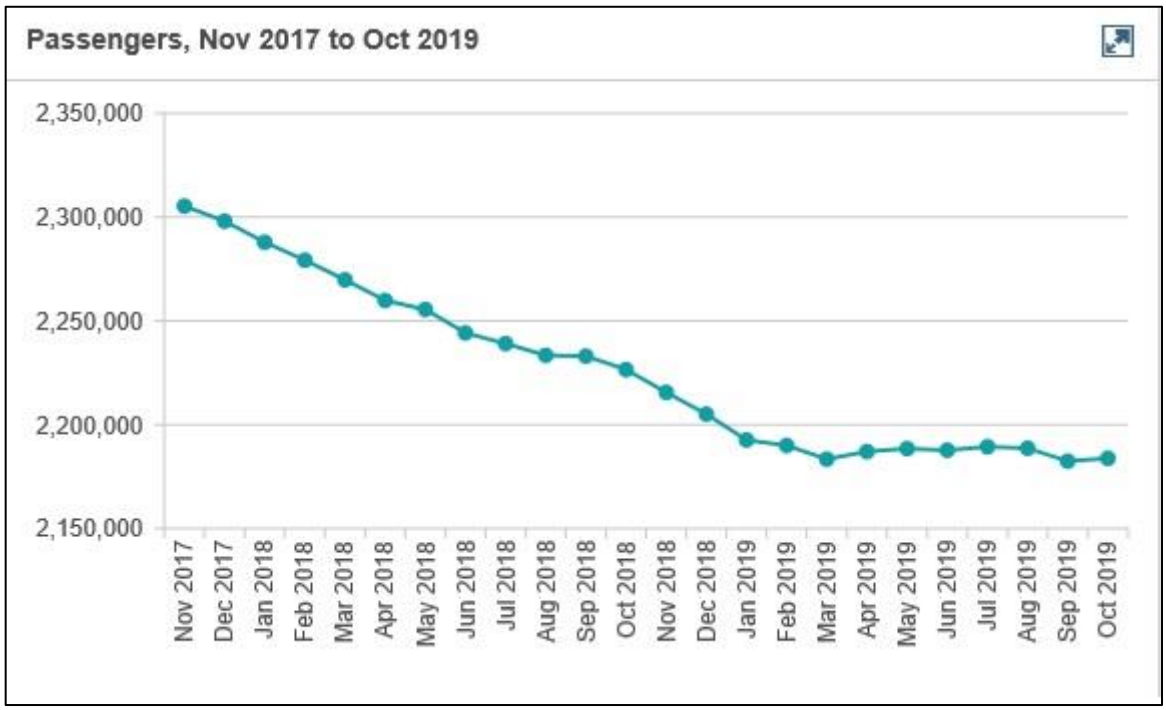

Figure 6: Passenger data from November 2017 to October 2019. Source: Airservices Australia (Airservices).

6 Aviation Incident Reports

All incidents and accidents involving Australian registered aircraft, or foreign aircraft in Australian airspace must be reported to the ATSB. The ATSB receives incident information via pilot reports, Airservices' Corporate Integrated Reporting and Risk Information System reports and the Australian Defence Forces' Aviation Safety Occurrence Reports.

The ATSB maintains its own 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 40NM of Darwin from March 2017 to August 2019 were reviewed, see table 1 below.

6.1 ATSB Aviation Safety Incident Reports

Over the period between March 2017 to August 2019 there were a total of 456 Occurrences, of which 41 were classified as being airspace related.

Year	2017	2018	2019	
Aircraft Separation	7	16	9	32
Operational Non-Compliance	1	0	1	2
ANSP Operational Error	2	5	0	7
Airspace Infringement	0	0	0	0
Totals	10	21	10	**41**

Table 1: Airspace related incidents March 2017 to August 2019 (ATSB data).

6.2 Breakdown of incident data for the review period.

2019 The 10 incidents can be broken down as follows:

- 6 incidents due to ATC error.
- 4 incidents due to Pilot error.

2018 The 21 Incidents can be broken down as follows:

- 15 incidents due to ATC error.
- 6 incidents due to Pilot error.

2017 The 10 incidents can be broken down as follows:

- 7 incidents due to ATC error.
- 3 incidents due to Pilot error.

Table 1 above was constructed utilising the Level 2 Occurrence Description from the ASIR database. The 41 incidents are all categorised as Airspace under the Level 1 Occurrence Type, on the Australian Transport Safety Bureau's (ATSB's) Occurrence taxonomy. The Occurrences Summary field was then manually assessed, and incidents were then classified by the author as either Pilot or ATC error. Given the incidents that have occurred over the review period a change in air space would not have reduced the number of occurrences. It would be advised to highlight the incidents and casual factors associated with operating at Darwin airport to participants at the CASA safety seminars.

Corporate Integrated Reporting and Risk Information System (CIRRIS) data was also analysed for incidents within the Darwin airspace. A total of 69 incidents were recorded with only three incidents categorised as Airspace Infringements. Investigation further into these three occurrences revealed that the incidents occurred at Flight Levels which were above the scope of the review.

7 Consultation and stakeholder feedback

Stakeholders were contacted and invited to provide comment or input on issues relating to Darwin airspace. A list of stakeholders invited to contribute to this review can be found in Annex C. Direct email correspondence was sent to appropriate stakeholders in addition to the wider audience being made aware of the review via the CASA consultation hub[6] on the CASA web site. Notification of the review also being made available through the Northern Territory RAPAC. Responses from stakeholders can be found at Annexes D, E, F and G. Certain stakeholders raised their concerns regarding the current airspace structure and its affect it has on crews need to manage the aircraft flight path and energy state. At times the aircrafts constant descent profile is not matching the control steps into Darwin.

8 Key Issues, Findings and Recommendations

Issue:

The current design of the Control Area (CTA) steps surrounding Darwin does not always facilitate arriving aircraft being able to remain within controlled airspace during descent.

An airline pilot's association (the association) has advised that their members have indicated that the CTA step at 40NM Darwin should be lowered to 4,500 ft AMSL.

Findings:

The current design of the Darwin ATC steps at times can create situations where aircraft on their standard descent profile will fly temporarily outside CTA during arrival into Darwin.

IFR piston aircraft are required to leave and re-enter-controlled airspace due to the aircrafts decent profile not matching that of the CTA steps. Stakeholders advise that the lowering of this step would assist the affected aircraft operators, while flying their typical descent profile. This would provide an added safety benefit by reducing the pilot's workload as well as allowing the aircraft to remain in controlled airspace during descent. This is considered important as these operations are typically single pilot and the existing workload, as claimed by the association, of leaving and re-entering CTA is distracting to both pilots and ATC. In addition, the association claims that this lower altitude will enhance safety as the projected descent path will provide a buffer of 500 ft from the base of the proposed CTA steps. It has been requested that should the lowering of control steps occur that the airspace remain as the current published Class C.

Recommendation:

The RAAF should consider redesigning the CTA steps, in accordance with the findings of this review and as identified in consultation with relevant stakeholders.

Issue:

Stakeholder advises that the airspace is efficient most of the time however they do experience delays more frequently, due to local military exercises.

Findings:

Currently the ATC provider manages civil and Military traffic with due regard to safety and consideration to equitable access for civil flight operations. It has been noted that the number of aircraft participating in these Military exercises grows as each exercise takes place. This apparent increase in Military aircraft participation is causing delays to the civil aircraft operating at Darwin.

Recommendation:

[6] https://consultation.casa.gov.au/

RAAF should consider a review of procedures that may improve the efficiency of civilian traffic management particularly given the increasing number of military aircraft using the airspace around Darwin.

Issue:

Stakeholder based out of Emkaytee airfield, (located approximately 15NM to the south of Darwin), advises that Military aircraft have been observed to fly within 10NM of the airfield, under 2,500 ft AMSL. Aircraft are flying in the region without making appropriate radio calls on Very High frequency (VHF) 127.10 Megahertz (MHz) common traffic advisory frequency (CTAF)

Findings:

Observed instances of this occurring have apparently reduced over the last 18 months. The prominent aircraft at the time appeared to be United States Military Rotary Winged aircraft.

Recommendation:

The RAAF should provide Foreign Military aircrews with formal and regular education, regarding the location of and operations within the vicinity of local civil aerodromes.

Issue:

An aeromedical operator requests the promulgation, in order to ensure its continued availability, of the following current arrangements for their Helicopter Emergency Medical Service (HEMS) helicopter operations. The same stakeholder has also advised that delays into Darwin have led to crew's inadvertent flight into controlled airspace without the appropriate clearance. The following bullet points below outline the current operations that provide timely and efficient operations into and out of Darwin airport.

- Current circuit area clearances allow for timely departures and arrivals during day operations
- The current ability for aircraft to conduct a visual departure while operating under a filed Instrument Flight Rules (IFR) flight plan.
- Night departures utilising Night Vision Goggles (NVG) at Lowest Safe Altitude (LSALT) Visual Flight Rules (VFR) for Aeromedical flights

Findings:

The provision of the three options above provides the operator with timely departures or arrivals in response to HEMS and aeromedical flights.

Currently the requirement with ATC for these operations is for the pilot to contact Airways Clearance Delivery (ACD) only for departures above 1,000 ft AMSL. This will allow for helicopters to quickly and efficiently depart controlled airspace for HEMS flights.

Recommendation:

Stakeholders and Darwin ATC should consider the benefits of developing a Letter of Agreement (LOA) that supports Helicopter Emergency Medical Service (HEMS) operations.

9 Conclusion

The OAR has conducted a review of the airspace around Darwin. The review determined that the airspace complied with the *Airspace Act (2007)*, Airspace Regulations (2007), the Australian Airspace Policy Statement (2018), the Minister's Statement of Expectation (2017) and CASA's Regulatory Philosophy.

The OAR has determined that the current airspace classification is fit for purpose. A review of some CTA steps that do not currently support continuous descents into Darwin should be undertaken by the RAAF, Airservices and local stakeholders.

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
Airservices	Airservices Australia
ALA	Aircraft landing area
ALARP	As Low As Reasonably Practicable
AMSL	Above Mean Sea Level
ANSP	Air Navigation Service Provider
ASA	Aviation Safety Advisor
ASIR	Aviation Safety Incident Report
ATC	Air Traffic Control
ATS	Air Traffic Services
ATSB	Australian Transport Safety Bureau
CASA	Civil Aviation Safety Authority
CCO	Continuous Climb Operations
CDO	Continuous Descent Operations
CTA	Control Area
CTAF	Common Traffic Advisory Frequency
CTR	Control Zone
DA	Danger Area
Defence	Department of Defence
DIA	Darwin International Airport Pty Ltd
DME	Distance Measuring Equipment
ERC	En Route Chart
ERSA	En Route Supplement Australia
ft	Feet
FL	Flight Level
GA	General Aviation
HEMS	Helicopter Emergency Medical Service
IAL	Instrument Approach and Landing
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
km	Kilometre
kt	Knot
LL	Lower Level
NOTAM	Notice to air men
NM	Nautical Miles
OAR	Office of Airspace Regulation
PT	Passenger transport
PTO	Public Transport Operations
RA	Restricted Area
RAPAC	Regional Airspace and Procedures Advisory Committee
RCO	Range Control Officer
RFC	Request for Change
RNAV	Area Navigation

Acronym/abbreviation	Explanation
RPAS	Remotely Piloted Aircraft Systems
SFC	Surface
SID	Standard Instrument Departure
STAR	Standard Terminal Arrival Route
TAC	Terminal Area Chart
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VNC	Visual Navigation Chart
VTC	Visual Terminal Chart

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.

* 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.

Annex C Stakeholders

The following stakeholders were contacted to contribute to this review/study.

Organisation	Position
Civil Aviation Safety Authority	Stakeholder Engagement
Civil Aviation Safety Authority	Aviation Safety Advisor
Australian International Pilots Association	Office
Australian Airports Association	Secretary
Air Frontier	Chief Pilot
Air North	Senior Base Pilot
Air Services Australia	Regulatory Services
Alliance Airlines	Chief Pilot
Aircraft Owners Pilots Association of Australia	Secretary
Arafura	Chief Pilot
Australian Airline Pilots Association	Secretary
Australian Ballooning Federation	Secretary
Black Diamond Aviation	Chief Pilot
Careflight	Chief Pilot
Cobham Aviation	Senior Base Pilot
Flight Standards	Chief Pilot
Gliding Federation of Australia	Secretary
Katherine Aviation	Chief Pilot
Hardy Aviation	Chief Pilot
Jetstream Air Services	Chief Pilot
Jandakot Flight Centre Darwin	Chief Pilot
Outback Helicopter Airwork	Chief Pilot
Northern Territory Airports	Airport Manager
Northern Territory Aviation Services	Chief Pilot
Pearl Aviation	Chief Pilot
Qantas Airways	Senior Base Pilot
Recreation Aviation Australia	Secretary
Royal Flying Doctor Service	Senior Base Pilot
Territory Air Services	Chief Pilot
Top End Aviation	Chief Pilot
Virgin Australia Airlines	Chief Pilot

Annex C RAAF Darwin Feedback

Recommendation 1:

The Royal Australian Air Force (RAAF) should consider possible redesign of the CTA steps, as identified in consultation with relevant stakeholders.

RAAF comment: A redesign of the vertical limits of DN CTA would be supported by DAR FLT provided some context is attained for why the 30-40DME step was published as A065 in the first place. It does represent a substantial jump so if this is not required for operational purposes of class G, then a lowering would be feasible.

Recommendation 2:

RAAF should consider any opportunities for better efficiencies applied to civilian traffic management particularly given the increasing number of Military aircraft participating in local Military exercises.

RAAF comment: Each year this is improved but still remains a difficult period for ATC traffic management. Exercise traffic are afforded priority in stipulated departure windows. Exercise traffic are advised that outside of these priority windows, military departures will not receive priority. The issue still stands that a stipulated arrival priority window is not a feasible solution for fast jet operations. This means ATC are consistently required to apply triage to very short notice sequences.

Recommendation 3:

Briefing packages should be delivered to foreign Military crews regarding the location of and the operation within proximity to local civil aerodromes.

RAAF comment: Issues with MRF-D conflicting with YMKT operations should have been rectified. MRF-D are now briefed thoroughly on local airfields by default.

Recommendation 4:

Stakeholders and Darwin ATC to discuss, with a view to formalise, the opportunity to implement a Letter of Agreement (LOA) that supports HEMS operations.

RAAF comment: This recommendation will require clarification. The recommendation reads as though they are happy with the current procedures and want them formalized via LOA? As the procedures utilized for HEMS are simply contained within YPDN Low Level Aircraft Release Procedures (LLARP) there is no anticipated change to these procedures. Facilitating a LOA should not pose too much difficulty provided it does not require a change to extant procedures unless HEMS operators are experiencing delays.

Annex D Airservices Australia Feedback

Recommendation 1:

The Royal Australian Air Force (RAAF) should consider possible redesign of the CTA steps, as identified in consultation with relevant stakeholders.

Airservices comment: Airservices agree there may be some benefit in lowering the steps for aircraft operating at A090 to A100, however, any extension to the north would significantly impact workload for both Airservices and Darwin. This can be expanded upon if required

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Annex E CASA Consultation Hub Feedback - de identified

	Do you consider the current airspace safe?	Do you consider the current airspace efficient?	What issues, if any, do you have in this current airspace?	What solutions could you suggest for improving the issues listed in the previous question?	Do you have any additional comments about the airspace surrounding Darwin?
Stakeholder 1	Yes	Yes	Not Answered	Not Answered	Not Answered
Stakeholder 2	No – No comment provided	No - Military separation with trainee air traffic controllers	The steps of the airspace do not facilitate our arrivals to always be in CTA, so the new proposal is great Often aircraft are all cleared via the same tracks/way points, this has caused reduction in separation Arriving traffic should be cleared below departing traffic	Perhaps a conversation will be better, over all I have a positive opinion of most interactions in Darwin.	Not Answered
Stakeholder 3	Yes	Yes	Not Answered	Not Answered	No
Stakeholder 4	Yes	Yes	While the airspace is efficient most of the time on occasion there have been delays. Particularly during defence exercises.	Unsure	Not Answered
Stakeholder 5	Yes	Yes	Not Answered	Not Answered	Not Answered
Stakeholder 6	Yes	Yes	Not Answered	Not Answered	Not Answered
Stakeholder 7	Yes	Yes	VFR MEDEVAC helicopter was delayed clearance into Darwin airspace for tracking to Darwin Hospital, resulting in a Violation of Controlled Airspace.	ATC and operator have started discussions on the best method of ensuring this type of scenario occurs again. This includes the aircraft calling ATC for clearance earlier and having a MOU on agreed routes to Darwin Hospital.	The current requirement to contact ACD only for departures below A010 allows for MEDEVAC aircraft to quickly and efficiently depart controlled airspace for any MEDEVAC or Hospital status flight. This should continue.
Stakeholder 8	Yes	Yes	Careflight enjoys the freedom of manoeuvre of operating on a circuit area clearance for timely departures and arrivals for HEMS and Medivac helicopter operations during daytime. The use of a timely daytime visual departure on an IFR flight plan for the above operations is also proving very effective. The flexibility of departing at night utilising an NVG LSALT (VFR) also assists greatly in facilitating our specific NVG HEMS operations. The helicopter crews at Careflight appreciate the timely assistance given by ATC Darwin to support our higher priority HEMS operations.	The proper promulgation of these procedures in ATC systems and processes so as longevity and consistency of timely HEMS operations can be assured.	Not Answered

	Do you consider the current airspace safe?	Do you consider the current airspace efficient?	What issues, if any, do you have in this current airspace?	What solutions could you suggest for improving the issues listed in the previous question?	Do you have any additional comments about the airspace surrounding Darwin?
Stakeholder 9	Yes	Yes	Not Answered	Not Answered	I Believe the positive relationship maintained between CASA, RAAF and recreational fliers is strengthened by sharing of information including newsletters from RAAF and surveys like this one. Thank you.
Stakeholder 10	Yes	Yes	I fly from YMKT and at times have seen military aircraft fly within 10 miles and under 2500' and appear to have not made radio calls on YMKT freq 127.10. This has improved over the last 18 months. seemed to also be more prominent with rotary wing defence from US.	Better briefing of new and visiting air crew to the existence of YMKT.	Please re consider Jabiru and Oenpelli traffic having their own CTAF.
Stakeholder 11	Yes	No – The Darwin RNV-Z 11 instrument approach is not available via any Darwin STARs	Consideration should be given to revising relevant procedures to make the RNAV-Z 11 procedure available via a STAR. Options for achieving this could include: • Redesign the RNAV-Z 11 instrument approach to include an IAF at NASUX (this may present minimum distance and capture region problems on the GATOR STAR) • Redesign the RNAV-Z 11 instrument approach to include IAFs at GIVEN, NASUX and ELGUM Additionally, in order to provide a STAR connected LNAV/VNAV approach to runway 29 during periods of ILS unserviceability, consideration should be given to redesigning the RNAV-Z 29 instrument approach to include IAFs at DAKTI and SARRE.		

Annex G AusALPA Feedback

CASA OAR Darwin Airspace Review (2020) – AusALPA Feedback

AusALPA welcomes the opportunity to contribute feedback to the latest Darwin Airspace Review.

General Comments

Broadly speaking, our members inform us that the Darwin control zone airspace functions reasonably well. However, there are also some areas identified by our representatives where improvements are possible and preferable. AusALPA supports all 5 of the recommendations in the draft preliminary airspace review for Darwin airspace.

In considering our positions, we are cognisant of the existence of the significant variability in weather conditions in the Darwin control zone, and their impact on the various types of flying operations. We also note that there exists a wide variety of airspace user in the Darwin control zone. Military and civil, high performance and light aircraft, fixed wing and rotary wing, IFR and a sizable number of VFR aircraft operations too.

Recommendation 4 from the draft preliminary airspace review will help ease flight deck workload. There are well known benefits for safety and efficiency in the industry for the use of closed STARs. AusALPA strongly supports recommendation 4.

Visual Flight Rules (VFR) Operations

When weather in the vicinity of Darwin is poor, it is beneficial for VFR traffic to have the ability to remain below the CTA steps but at a reasonably high altitude. Much of the VFR traffic is conducted in single engine aircraft and the ability to have a greater variety of glide-to options is important for safety purposes. For this scenario, the higher the base of CTA the better it is for VFR aircraft. However, we understand that VFR clearances to enter CTA are more probable when there is an operational requirement due to adverse weather.

Instrument Flight Rules (IFR) Operations

AusALPA is unaware of any problem with the CTA design for high performance IFR aircraft operations. Alternatively, though, we have learned that piston IFR operations are often required to obtain clearances to “leave and re-enter controlled airspace on descent” on arrival to Darwin.

IFR piston/non-pressurised aircraft operations are typically planned with a 6x profile. I.e., at 40nm the aircraft would be at 6,700 feet Above Aerodrome Height (AAH) and at 30nm, these aircraft would typically be at 5,000 feet AAH. With regards to the current Darwin airspace architecture, this approach profile places the aircraft OCTA for the majority of this descent and arrival phase (40-30nm).

In this instance, AusALPA believes that lowering the 40nm control step would be beneficial for IFR piston-engine operations so that airspace containment can be achieved.

Continuous Descent Operations (CDO) and Flight Deck Workload

Any discussion of airspace containment must necessarily include consideration of operational techniques, most relevantly, continuous descent approaches (CDA) in Australian terminology or, more broadly, CDO. ICAO Doc 9931 Continuous Descent Operations provides extensive guidance on CDO, particularly in regard to stakeholder issues and the interface with ATS. While it is written primarily in the context of operations within controlled airspace, the principles apply equally to operations that transition between CTA and OCTA, and redesign of airspace architecture as a result. One of the important aspects underpinning safe CDO is the concept of providing flight crew with the time and mental space to manage the aircraft flight path and energy state. Avoiding disruptions is a high priority, as is the need for unambiguous ATC communications. AusALPA

believes that aspects of the current airspace design increase workload and distractions for both ATC and pilots. It is important to note that the IFR operations in question, are typically conducted single pilot.

The monitoring the airspace control zone boundaries and the increase in Radio Transmissions (RT) with “leave and re-enter” clearances both unnecessarily increase both controller and flight deck workload when compared to outcomes if there was a suitable change made to the airspace architecture. AusALPA believes that if the Darwin 40nm CTA step was sufficiently lowered a beneficial change to the attentional resources for both flight crew and controllers would be achieved and that this would be consistent with the aspects underpinning CDO.

Airspace Architecture Change Proposal

AusALPA believes that the Darwin 40nm CTA step should be lowered to 4,500 feet. This will allow for typical IFR piston descent to occur, allow for a 500 foot buffer above the base of CTA (approaching 30nm CTA step) for these operations, and it would also facilitate reasonable access for VFR OCTA aircraft operations. AusALPA cautions against lowering this CTA step below 4,500 though due concerns regarding single engine VFR aircraft operations (when OCTA in this area) being able to have height for viable glide-to options in the event of engine failure.

AusALPA strongly supports recommendation 1 from the draft airspace review report.

Airspace Classification

AusALPA views Class E airspace as controlled airspace for IFR aircraft and uncontrolled airspace for VFR aircraft (akin Class G airspace). Generally speaking, we do not favour Class E airspace when compared to Class C airspace. This is especially the case for lower level use of Class E, due to greater prevalence of VFR aircraft in lower airspace.

At altitudes and airspace where there exists VFR traffic, AusALPA and our members recognise that the benefits of Class E are outweighed by the increased risks and operational inefficiencies that Class E introduces. That is to say, we believe that with a decrease in altitude, Class E airspace represents an increasing level to risk.

Airspace hubs (i.e. aerodromes) further heighten the likelihood of inappropriate separation encounters between VFR and IFR aircraft, further reducing safety margins.

We believe that our airspace classification concerns and positions are only exacerbated by the traffic mix and weather conditions indigenous to Darwin. There are many VFR operations in the Darwin vicinity and the local conditions known as “territory VMC” are factors that should be considered too. Therefore, it is our strong belief that any increase to the CTA 40nm step (lowering it) should only occur with the airspace classification being designation of Class C.

Controller Influenced Inefficiencies

AusALPA’s members have noted over an extended period that the control services provided by the local ATC are less efficient for their operations when compared to other control services at other locations. These inefficiencies are affecting aircraft operations that are high performance IFR operations. There are examples of inefficient climb and descent clearances and times when extensions to legs of a STAR can border on the excessive. To a lesser extent, to SIDs too. AusALPA would like these opportunities for creating greater efficiencies noted and for there to be greater consideration and efforts made to resolve some of these matters. These kind of matters can and do result in unnecessary fuel burns that in many instances, could have been avoided with greater anticipation and an understanding of the typical performance characteristics of jet and turboprop aircraft.