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Aeronautical Study of Hobart

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Contents

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 obligates CASA to undertake reviews of existing airspace arrangements.

The purpose of this study is to evaluate the airspace arrangements and classification within 35 nautical miles (NM) radius of Hobart aerodrome. The Government considers the safety of passenger transport[2] (PT) services as the first priority in airspace administration, therefore CASA must respond quickly to emerging changes in risk levels for passenger transport operations. Airspace administration should also seek to deliver good safety outcomes to all aviation participants.

The scope of this study includes the review of the airspace architecture, identification of issues supported by safety incident reporting and evaluation of the efficiency of the airspace.

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.

In November 2009, the Office of Airspace Regulation (OAR) commissioned an Airspace Review of Hobart and Cambridge. The issues and findings identified in that review were considered during the conduct of this study.[3]

1.1 Operational context

Hobart is a certified aerodrome, operated by Hobart International Airport Pty Ltd. Cambridge is an uncertified aerodrome and is privately operated. The Hobart and Cambridge aerodrome runway thresholds are situated within 1 NM of each other.

The aerodromes are located approximately 17 kilometres east of Hobart, in the City of Clarence. Airservices Australia (Airservices) provides a Class D procedural (non-surveillance) tower (TWR) and an approach control service (Class C and D) from Hobart TWR.

Melbourne Air Traffic Service Centre provides a surveillance control service in Class A[4] and Class C Control Area (CTA) above 7,000 feet (ft) Above Mean Sea Level (AMSL) and a procedural (non-surveillance) control service in Class C and D airspace between 1,500 ft AMSL and 7,000 ft AMSL outside TWR hours. Melbourne Air Traffic Service Centre also provides a Directed Traffic Information (DTI) service in Class G airspace. As a certified aerodrome, aircraft operating in the vicinity of Hobart outside of the hours of air traffic control (ATC) are required to carry and use a Very High Frequency (VHF) radio.

1.2 Summary of issues and stakeholder comments

The following issues were identified:

- Hobart and Cambridge aerodromes are in such close proximity that they affect each other. The aerodromes are located within 1 NM of each other and share a runway designation (12/30). This close proximity occasionally presents traffic complexities and therefore needs to be considered when assessing the Hobart Control Zone (CTR).

[1] A full list of acronyms and abbreviations used within this report can be found at Annex A.
[2] For the purposes of this study, PT services can be defined as activities involving Regular Public Transport (RPT) and all non-freight-only Charter operations.
[3] Airspace Review of Hobart and Cambridge November 2009 https://www.casa.gov.au/files/hobartcambridgereviewpdf
[4] Australian airspace structure can be found at Annex B.

- Hobart's TWR provides combined TWR and procedural (non-surveillance) approach control services within Class C and D airspace from the surface to 8,500 ft AMSL during the hours of operation. The Hobart TWR facility provides an airways clearance delivery and surface movement control function at Hobart and a TWR and approach function for Hobart and Cambridge.
- There are a number of traffic crossover points located just outside 35 NM from Hobart. Inbound traffic from the Australian mainland is directed via the instrument flight rules (IFR) waypoint CLARK. The basic route structure for Hobart provides laterally displaced arrival and departure routes, with crossovers designed to be done inside the terminal airspace. In recent years it became practice between Hobart TWR and en route to process Brisbane and Sydney arriving traffic via CLARK when runway 12 is in use. This mode significantly increases workload and complexity in the en route Tasmania sector as there are consequential route crossovers between Melbourne, Sydney and Brisbane bound traffic. However this management mode significantly simplifies the TWR traffic pattern with no crossovers in the terminal airspace.
- Airline stakeholders provided comment on the potential efficiency benefit and improved predictability if Airservices introduced standard arrival routes (STARs) to facilitate both visual and instrument arrivals into Hobart;
- Airservices controllers manage workload by the division of control responsibility into two sectors: the Tasmania sector and the Huon sector. These sectors usually operate in a combined configuration, however with little warning the combined sectors can present on occasion, unpredictable levels of activity, resulting in rapid increases in controller workload for short periods. It is these occasions where the sectors maybe de-combined.
- Airspace users reported that on occasion they experienced delays in receiving airways clearances and general inefficiencies in the use of the airspace due to the reported claims of over servicing of Class D procedures by Hobart TWR.
- General aviation (GA) stakeholders believed that improvements to airspace access and efficiency could be achieved by increasing the level of surveillance available to ATC for separation in lieu of the existing procedural separation standards.
- Hobart has one runway which does not have a parallel full-length taxiway. Aircraft operating from Hobart therefore require backtracking on the runway. This results in longer runway occupancy times, increased delays and reduces the efficiency of traffic flow.
- Changes made to Hobart airspace in 2012 resulted in the Hobart Class C step being moved from 30 Distance Measuring Equipment (30 nautical miles as measured using DME) to 35 DME. This move of an airspace boundary provided an improved descent profile for jet operators and helped reduce workload for the aircrew.
- Comments regarding the 30 DME to 35 DME step change were also received from recreational airspace users. They highlighted that the change presented an impediment to their ability to climb safely above terrain while remaining clear of controlled airspace. The Tasmanian Hang Gliding and Paragliding Association have submitted an airspace change proposal.
- The stakeholder comments received highlighted that occasionally the TWR frequency experienced congestion and over transmission occurrences.

1.3 Findings and conclusions

- An 73% increase in traffic movements occurred at Cambridge between December 2009 and June 2016. Hobart's total traffic movements saw a decline between December 2011 and December 2012 of 24.2%. Hobart has recovered with steady growth in total aircraft movements from December 2012 to June 2016 of 14%.

Considering the period of December 2009 to June 2016, Hobart has seen an overall decline of traffic movements of 9.3%.

- The total annual PT passenger movements for Hobart (2.3 million) has exceeded the Class C airspace criteria threshold (1 million) in the Australian Airspace Policy Statement 2015 (AAPS). This requires CASA to complete an aeronautical risk review – hence this aeronautical study[5].
- Between December 2012 and June 2016, the average growth for PT movements have averaged at 2%. Based on this growth rate, PT movements would not exceed the next AAPS airspace criteria threshold (30,000 PT movements) until 2023 – 2024.
- The annual number of airspace related incidents[6] at Hobart has remained low. Between December 2009 and June 2016 there were seven recorded airspace related incidents. No injuries were recorded.
- There is a broad range of aircraft traffic mix and performance at Hobart and Cambridge aerodromes.
- Airline scheduling results in peaks between 09:00-13:00 and 15:00-19:00. These are the periods where congestion and delays are reported to occur.
- Current IFR traffic departing Hobart using runway 12, results in the Melbourne bound traffic remaining on the direct route via Launceston. The Sydney and Brisbane bound traffic are tracked to the fly-by waypoint at KAREN and NUNPA (Flinders Island). There is no outbound route crossover. Arriving aircraft for runway 12 via the CLARK waypoint, 31 NM to the northwest of Hobart creates two conflict points with outbound traffic during the climb phase.
- Traffic inefficiencies were observed as a result of these conflict points. This appears to create increased workload and traffic co-ordination for the Melbourne en route and Hobart TWR controller.

1.4 Recommendations

CASA applies a precautionary approach when conducting aeronautical studies. As a result of CASA's analysis of the Hobart airspace, the following recommendations are made:

Recommendation 1:
The existing airspace classification and architecture (apart from the one CTA step lower limit change, which is already the subject of an airspace change proposal) is appropriate and should remain unchanged.

Recommendation 2:
CASA should continue to monitor aircraft and passenger movements and incidents at Hobart over the next 24 months to determine whether the trend for growth continues. An aeronautical risk review should then be conducted if necessary.

Recommendation 3:
To improve efficiencies and predictability, taking into account PBN requirements Airservices should continue redesign work for flight routes into and out of Hobart, make improvements to existing Terminal Instrument Flight Procedures (TIFPs) and introduce STARs into Hobart.

[5] AAPS https://infrastructure.gov.au/aviation/aaps/files/Australian_Airspace_Policy_Statement_2015.pdf
[6] An airspace related incident is one that occurs whilst an aircraft is airborne. Airspace related incidents exclude mechanical issues.

2. INTRODUCTION

The Office of Airspace Regulation (OAR) within the Civil Aviation Safety Authority (CASA) has carriage of the regulation of Australian-administered airspace, in accordance with section 11 of the *Airspace Act 2007* (Act). Section 12 of the Act requires CASA to foster both the efficient use of Australian-administered airspace and equitable access to that airspace for all users. CASA must also take into account the capacity of Australian-administered airspace to accommodate changes to its use. In exercising its powers and performing its functions, CASA must regard the safety of air navigation as the most important consideration[7].

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

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

2.1 Overview of Australian Airspace

In line with the Standards and Recommended Practices (SARPs) of International Civil Aviation Organization (ICAO) Annex 11 and as described in the Australian Airspace Policy Statement 2015 (AAPS), Australian airspace is classified[8] as appropriate in accordance with ICAO Class A, B, C, D, E, F 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 classifications, although available, 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).

Pilots of aircraft operating at Certified, Registered, Military and CASA designated aerodromes are required to carry and use a Very High Frequency (VHF) radio. Aircraft operating within controlled airspace are also required to carry and use a VHF radio. Further information about aircraft operations at non-controlled aerodromes can be found on the CASA website:

http://casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_100058

2.2 Purpose and Scope

The purpose of this aeronautical study is to evaluate the airspace arrangements within 35 nautical miles (NM) of Hobart aerodrome from the surface (SFC) up to Flight Level (FL) 180 and determine if they are appropriate. This aeronautical study forms part of the OAR's program of work to review Australia's airspace as required by the Act.

The OAR commissioned the Argus Consulting Group to conduct the previous Airspace Review on the airspace surrounding Hobart and Cambridge in November 2009. This can be found on the CASA website:

https://www.casa.gov.au/files/hobartcambridgereviewpdf

The scope of this current Aeronautical Study included identification and consultation with stakeholders to gather the necessary data and information related to airspace issues around Hobart. This included consultation with regular public transport (RPT) operators, charter operators, flying training schools, the Air Navigation Service Provider (ANSP), Department of

[7] Civil Aviation Act 1988, Section 9A – Performance of Functions

[8] Australian Airspace Structure can be found at Annex B.

Defence (Defence), emergency service operators and the aerodrome operators of Hobart and Cambridge.

The scope of the study included:

- An evaluation of the airspace architecture to confirm suitability for the ANSP to provide air traffic services safely and effectively;
- Ensuring the airspace architecture is appropriate for the range of aeronautical activities conducted;
- An evaluation of air routes as applicable to the objectives;
- Identification of issues supported by safety incident reporting from the ANSP and the Australian Transport Safety Bureau;
- An evaluation of the appropriateness of the ICAO SARPs airspace classifications being applied;
- An evaluation of airspace efficiency;
- Restricted and Danger Areas (DAs) and their impact on traffic flow; and
- Other issues determined by the study team to be applicable to the objectives.
- The scope of this study did not include aerodrome facilities and infrastructure unless any weakness or failings in these areas have an effect on the safety of aircraft operations near Hobart.

2.3 Objective

The objective of this study was to examine the airspace around Hobart to determine the appropriateness of the current airspace arrangements. This was accomplished by:

- Examining through stakeholder consultation and investigation, the appropriateness of the current airspace design and classification, equitable access issues, terminal instrument flight procedure (TIFP) design[9] issues, expected changes to the current traffic levels and mix of aircraft operations within the existing airspace;
- Analysis of current traffic levels and mix of aircraft operations within the existing airspace in relation to the level of services provided;
- Identifying any threats to aircraft operations, focussing as a priority on the safety and protection of passenger transport (PT)[10] services;
- Reviewing relevant Aeronautical Information Publication (AIP) entries for applicability; and
- Ensuring that any identified issues are passed onto the appropriate stakeholder group for their consideration.

2.4 Study Methodology

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

- Traffic data analysis;
- Airspace design review;
- Incident analysis;
- Stakeholder consultation; and
- Site visits.

[9] Refer to Civil Aviation Safety Regulation (CASR) Manual of Standards (MOS) Part 173.

[10] For the purposes of this study, PT services can be defined as activities involving Regular Public Transport and all non-freight-only Charter operations

Historical aircraft traffic data recorded between December 2009 and June 2016 for Hobart and Cambridge aerodromes was evaluated. This evaluation provided an indication for the current and likely future level of air traffic. Analysis of aviation safety incident reports was conducted to identify potential trends in airspace related incidents.

CASA conducted consultation visits in October and November 2015 while on-site in Hobart and Cambridge. This resulted in contact with a large number of aircraft operators, service providers, other organisations and stakeholders (refer to Annex C for a full list of stakeholders). CASA reviewed the stakeholder feedback and after further analysis of relevant data and information, conclusions were reached regarding the issues identified. These conclusions were used in formulating appropriate recommendations for Hobart's airspace.

CASA applies a precautionary approach when conducting aeronautical studies and where appropriate CASA will make recommendations based on existing and projected data.

3. AERODROMES

3.1 Hobart International Airport

Hobart is a certified aerodrome operated by Hobart International Airport Pty Ltd. The aerodrome has an elevation of 13 feet (ft) Above Mean Sea Level (AMSL) and is situated to the east of high terrain reaching 1,300 ft AMSL. Hobart has one runway designated as 12/30 which is 2,251 metres long and 45 metres wide. Refer to Figure 1 below. The aerodrome has two taxiways entering onto the runway that are located centrally. Backtracking is required after landing and to access the full length for departures.

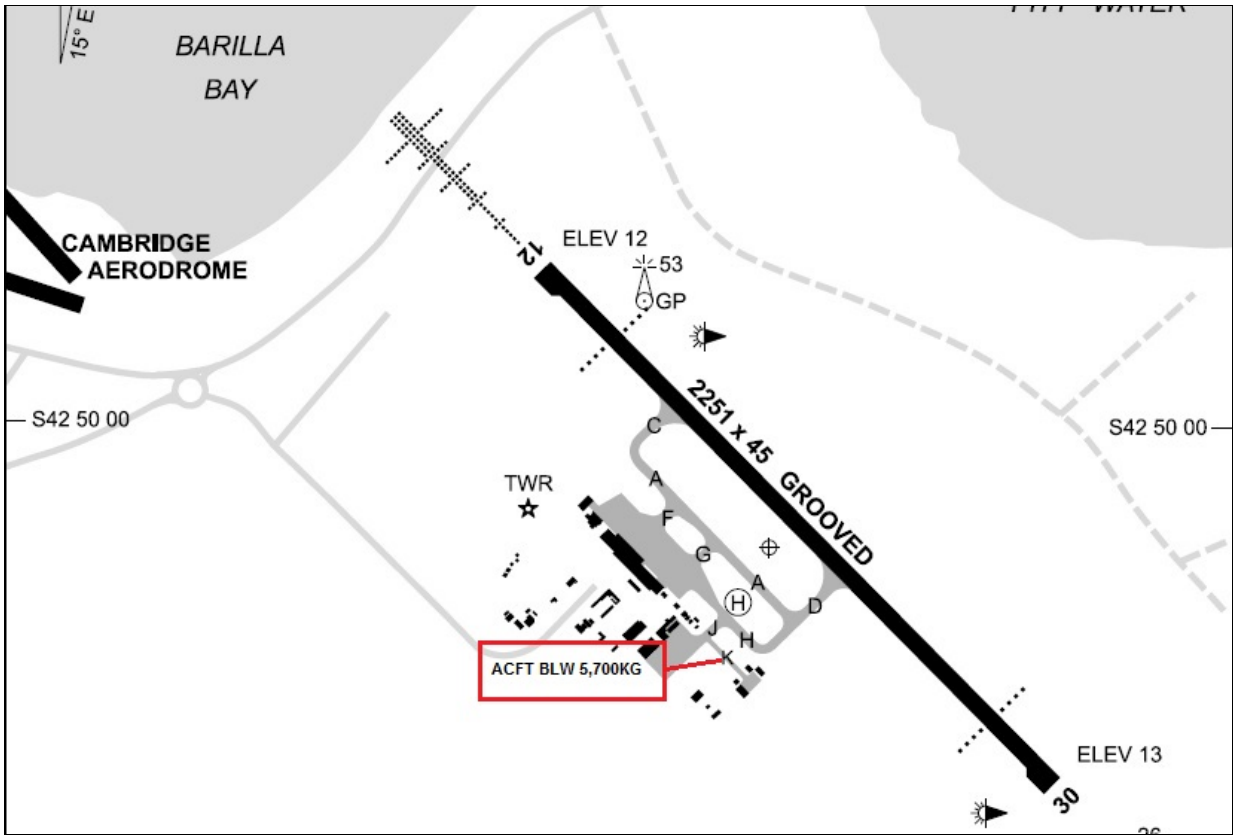

Figure 1: Hobart Aerodrome layout, DAP (3 March 2016).

Hobart is the main gateway for southern Tasmania. Hobart aerodrome has seen strong growth in passenger numbers since privatisation in 1998, growing from 856,000 to 2.3 million passengers per year in 2016. As a result, a large proportion of Hobart traffic is scheduled PT operations.

3.2 Cambridge aerodrome

Cambridge is an uncertified aerodrome that is privately owned and operated. Initially opened in the 1920s, Cambridge was used as Hobart's primary aerodrome until 1956.

Cambridge aerodrome has an elevation of 67 ft AMSL and is situated less than 2 kilometres from Hobart's runway 12 threshold. The aerodrome has three runways: 12/30 which is approximately 965 metres long, 14/32 which is approximately 760 metres long and; 09/27 which is approximately 830 metres long. Cambridge is not available to aircraft above 5,700 kg. Refer to Figure 2. Cambridge runway 12/30 is the preferred runway for both Hobart TWR and the primary operator at Cambridge.

Figure 2: Hobart and Cambridge Airports (Source: Google Earth).

3.3 Instrument approaches

Hobart aerodrome's published instrument flight procedures include instrument landing system (ILS) for runway 12, VHF Omni-Directional Radio Range (VOR) runway 12/30 and DME or Global Navigation Satellite System (GNSS) arrival instrument procedures for runway 12/30. Hobart aerodrome has been included in the initial candidate aerodrome list in the draft Australia's Policy Approach to Baro-VNAV. The Baro-VNAV approaches to Hobart are expected to be validated by December 2016. There are no published TIFPs for Cambridge aerodrome. Stakeholders reported no issues with the TIFPs.

3.4 Aeronautical information

A review of the published aeronautical information indicated adequate detail for operations at Hobart and Cambridge. Publications reviewed included, but were not limited to:

- Civil Aviation Act 1988*;*
- Airspace Act 2007;
- Airspace Regulations 2007
- Civil Aviation Regulations 1988;
- Australian Airspace Policy Statement 2015;
- AIP documents including Departure and Approach Procedures (DAP), En Route Supplement Australia (ERSA), Designated Airspace Handbook (DAH), MAP and relevant charts for Hobart; and
- Tasmanian Regional Airspace and Procedures Advisory Committee (RAPAC) minutes.

Stakeholders reported no known errors or omissions.

4. AIRSPACE

4.1 Airspace Structure

Hobart airspace (centred on the aerodrome reference point (ARP)), consists of Class A, C, D and G airspace. The airspace within 35 NM of Hobart starts with a Class D Control Zone (CTR) operating from surface (SFC) to 1,500 ft AMSL, then Class D and Class C steps. Refer to the DAH[11]. The CTR shape reflects a truncated circle with arcs of 8 NM from the ARP to the north west and 9 NM from the ARP to the south east. Above the CTR are a number of Class D steps with increasing lower limit intervals of 1,500 ft AMSL, 2,500 ft AMSL then to 3,500 ft AMSL (with an upper limit of 4,500 ft AMSL) during the TWRs hours of operation. (Refer to Figure 3).

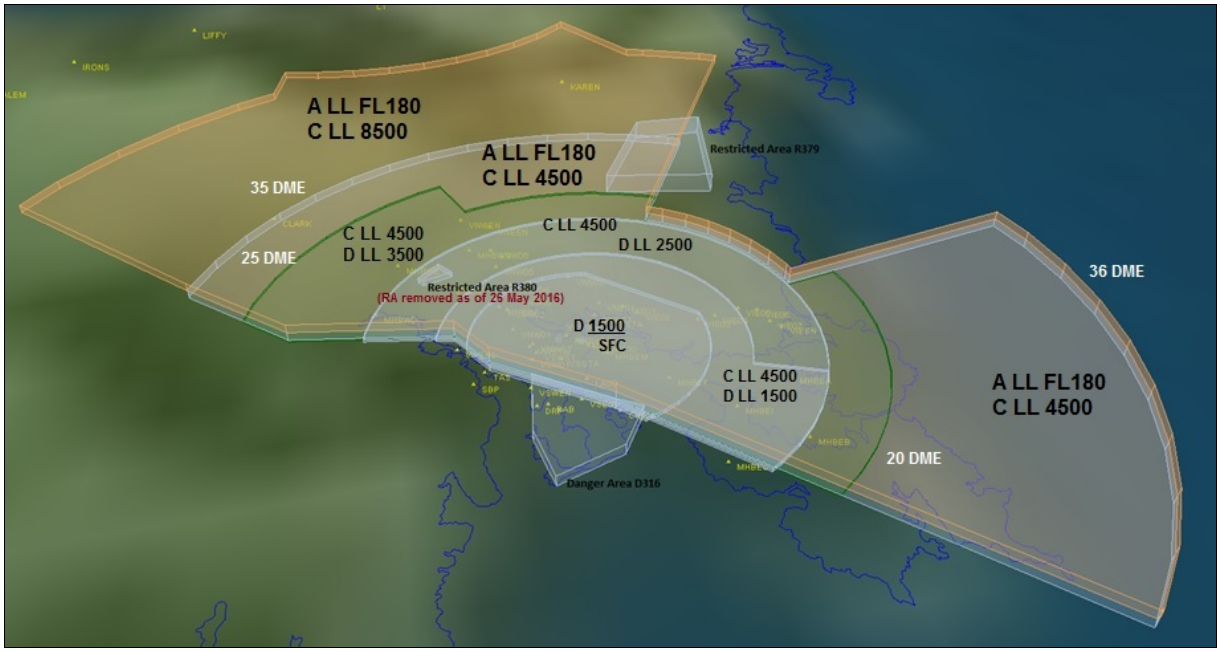

Figure 3: Hobart Airspace. 3 Dimensional View.

Overlaying Hobart Class D airspace is Class C airspace commencing at a lower limit of 4,500 ft AMSL and an upper limit of FL180 which extends out to 35 NM. Overlaying these two airspace volumes is Class A airspace with a lower limit of FL180.

Located within Hobart's controlled airspace volumes are Restricted Area (RA) R379 (SFC-NOTAM[12]) and Danger Area (DA) D378 (SFC to 1,700 ft AMSL). R379 and D378 cover the Buckland Military Training Area. These service a military non-flying small arms range.

To the west of the Hobart controlled airspace volumes, there is predominantly Class G airspace from SFC to the lower limit of Class E which ranges from FL180 to FL245. Contained within this airspace is D316 (SFC to 5,000 ft AMSL). This is used for civil flying training activities. To the east of the Hobart controlled airspace volumes, there is predominantly Class G airspace from SFC to the lower limit of Class E of FL180.

To the north of Hobart are numerous Class C and D Control Area (CTA) steps with various lower limits. CTA extends to the south east to 36 DME with a lower limit of 4,500 ft AMSL.

[11] Designated Airspace Handbook, Effective 26 May 2016; http://www.airservicesaustralia.com/aip/current/dah/dah.pdf
[12] Notice to Airmen.

Figure 4: Hobart Aeronautical Study area 35 NM. Visual Terminal Chart (VTC). (26 May 2016).

4.2 Restricted and Danger areas

The declaration of a RA creates airspace of defined dimensions within which the flight of aircraft is restricted in accordance with specified conditions. Clearances to fly through an active RA are generally only withheld when activities hazardous to the aircraft are taking place, or when military activities require absolute priority. RAs are mainly declared over areas where military operations occur.

R379 is the only promulgated RA within Hobart's vicinity. (Refer to Figure 4 above). Two additional RAs were disestablished on 26 May 2016. Defence is the controlling authority for R379, which is activated by NOTAM (SFC – NOTAM). R379 has a flight planning conditional status of RA2. This requires pilots not to flight plan through the RA unless on a route specified in ERSA or under agreement with Defence. However, a clearance from air traffic control (ATC) or the controlling authority is not assured. Other tracking may be offered through the RA on a tactical basis. There were no issues raised by stakeholders with regard to R379.

The declaration of a DA defines airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specific times. Approval for flight through a DA is not required, however, pilots are expected to maintain a high level of vigilance when transiting DAs.

D316 is established for flying training (SFC – 5,000 ft AMSL) and D378 (SFC to 1,700 ft AMSL) is declared over the military training area replacing the old R379A. There were no issues raised by stakeholders with regard to either DA.

4.3 Airspace management and air traffic services

Hobart's TWR is operated daily between 0600 – 2230 hours (local time). The TWR provides combined TWR and procedural (non-surveillance) approach control services within Class C and D airspace from SFC to 8,500 ft AMSL during the hours of operation. Refer to Figure 5 below.

Air traffic services in the Hobart TWR facility include an airways clearance delivery and surface movement control function through Hobart Ground on 121.7 Megahertz (MHz), and a TWR and approach function on 118.1 MHz.

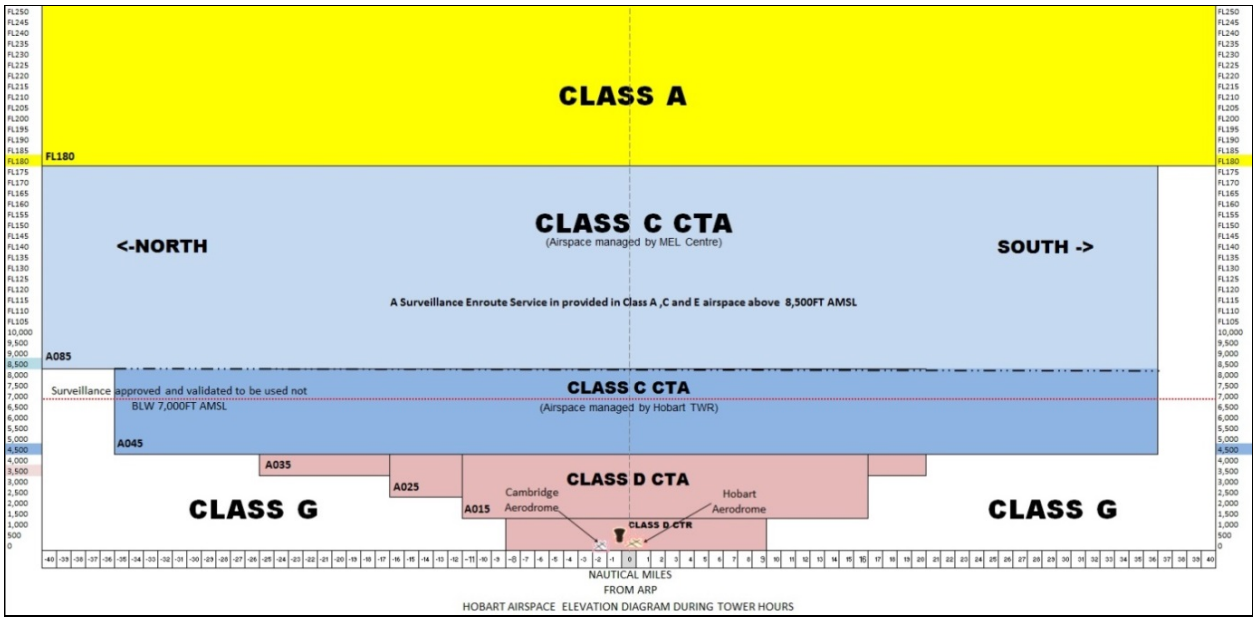

Figure 5: Hobart airspace during TWR hours.

During periods of TWR de-activation, Melbourne Centre operates Hobart's Class C and D airspace above 1,500 ft AMSL on 125.55 MHz. Melbourne Centre provides a procedural (non-surveillance) approach control service between 1,500 ft and 7,000 ft AMSL. Airspace below 1,500 ft AMSL reverts to Class G and Hobart operates under Common Traffic Advisory Frequency procedures on 118.1 MHz (Refer to Figure 6 below).

Melbourne Centre provides a surveillance en route service in all airspace classes above 7,000 ft AMSL, 24 hours a day. However, below 8,500 ft AMSL a procedural service is provided within the Class D and C airspace by Hobart TWR during hours of operation.

Aircraft separation within the CTR in proximity to Hobart and Cambridge is predominantly conducted visually by ATC within Hobart TWR. VFR procedures/routes have recently been implemented (see Section 6.2). The use of the Tower Situational Awareness Display (TSAD) assists ATC's situational awareness. As such, the costs and complexities of introducing additional electronic surveillance (see Section 4.4) need to be balanced against any possible increase in safety or efficiency of the airspace surrounding Hobart and Cambridge.

Observations and comments received from airspace users indicated that VHF radio facilities provided adequate coverage to Melbourne Centre and Hobart TWR.

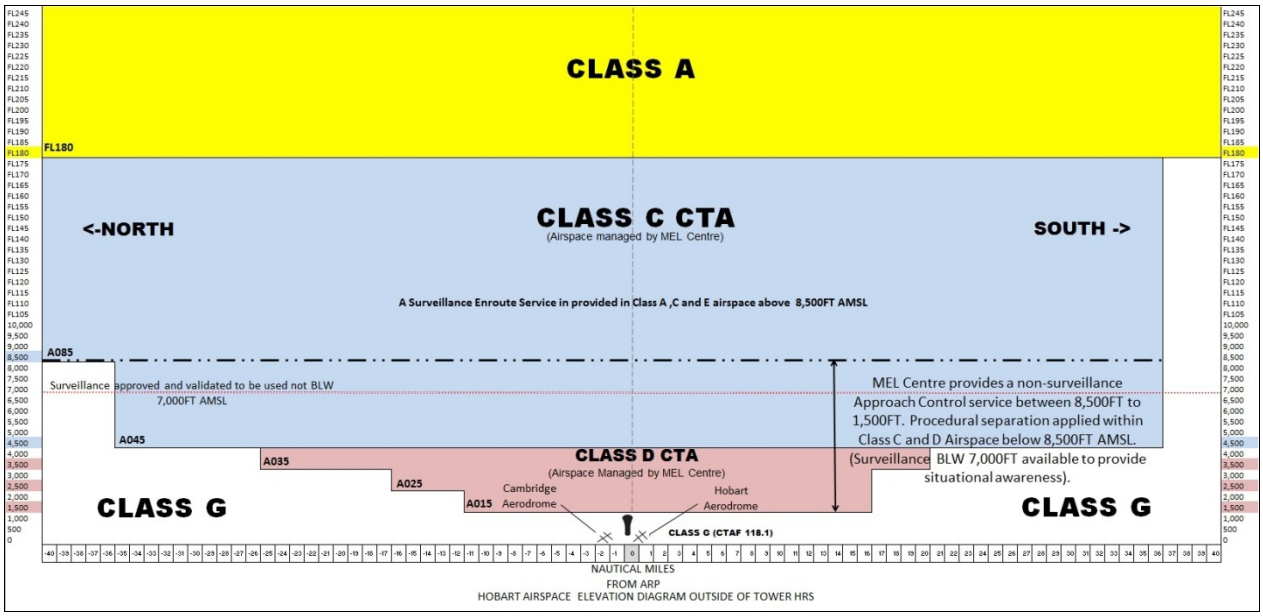

Figure 6: Hobart airspace outside of TWR hours.

4.4 Surveillance

Electronic surveillance can play an important role in delivering ATS. Surveillance provides ATC with the ability to establish the location of aircraft and has a direct influence in applying separation distances between aircraft (i.e. separation standards). In areas without reliable surveillance, ATC is reliant on pilots to verbally report their position, therefore aircraft have to be separated by relatively large distances to account for uncertainty in the estimated position of the aircraft (i.e. procedural separation)[13]. The difference in cost between the two methods is significant. As such, installation of surveillance capability considers a number of parameters including safety benefits and efficiency benefits, as well as traffic volume and complexity.

The Tasmanian surveillance network includes a combination of radar coverage that extends from Melbourne, Automatic Dependent Surveillance - Broadcast (ADS-B) and Wide Area Multilateration (WAM). Aircraft in the en route phase of flight can be detected using multiple inputs: from Melbourne radar and from the ground-based units located across Tasmania that comprises the Tasmanian Wide Area Multilateration (TASWAM) system which incorporates ADS-B. The TASWAM surveillance system consists of 14 remote ground units, with four of these units located within the immediate vicinity of Hobart aerodrome which also includes the ground unit located on Mount Rumney.

The TASWAM system receives aircraft transponder transmissions including mode A/C, mode S and ADS-B signals. A central processing unit in Melbourne receives these messages and calculates the position of each aircraft. After the information is received, it is then displayed on the en route controller's workstation as well as in Hobart TWR through the TSAD. This provides accurate position information which assists Melbourne Centre controllers to provide surveillance separation services and Hobart Tower controllers with situational awareness via TSAD in the provision of effective procedural services.

The use of ADS-B enhances the TASWAM surveillance capability. Under the terms of the ADS-B mandate, all instrument flight rules (IFR) aircraft will be ADS-B equipped by February 2017. The ADS-B mandate is not applicable for VFR aircraft, however the majority of VFR aircraft operating at Hobart and Cambridge are equipped with mode A/C or mode S transponders and TASWAM receives aircraft transponder transmissions.

TASWAM uses non-duplicated data links between the WAM units and the track processor located in the Melbourne Air Traffic Service Centre, posing as single point of failure. The

[13] ICAO, Guidance Material on Comparison of Surveillance Technologies, Edition 1.0 – September 2007.

design of the system is such that where a number of ground stations fail at the same time, the multi-lateration display information is not useable. Whilst TASWAM and communications infrastructure is suitable for applying the larger surveillance separation standards applicable in the en route environment, Airservices have highlighted that additional ground stations and supporting infrastructure would be necessary to meet the requirements for application of the smaller surveillance separation standards applicable in the approach or terminal area. In November 2012, Airservices approached CASA seeking approval by way of a safety case to extend the use of TASWAM surveillance from 8,500 ft AMSL to 7,000 ft AMSL in order to extend the application of en route surveillance standards to this altitude. This was subsequently approved.

The cost of installing and commissioning ground based surveillance equipment (i.e. radar) to serve Hobart is considerable, with costs in the order of $10 - $12 million to install, with ongoing costs of $140,000 per annum. The equipment cost of implementing increased WAM surveillance is less than radar, due to lower overall equipment costs and the current availability of some of the necessary WAM surveillance infrastructure, however it is still considerable.

In broad terms, there are two options to enhance surveillance services at Hobart:

1. Introduce a surveillance approach control service from the Hobart Tower.
2. Introduce a surveillance approach control service from a remote location e.g. Melbourne Centre.

Both options have a significant cost associated with them, which would need to be borne by the aviation industry. A number of systems must be upgraded or installed before an approach control service can be provided to the surface at Hobart. These enhancements include:

- Installation of a Radar Data Processing and Display system. The data feed may need to be enhanced.
- Installation of an additional The Australian Advanced Air Traffic System (TAAATS) console or a Radar Data Processing and Display system (if the service is provided from Melbourne Centre).
- Additional WAM ground stations.
- Additional communication links between the WAM ground stations and the central processing unit to provide redundancy and ensure a continuous link is maintained.
- Installation of a radio feed to Melbourne Centre or the relevant remote location (if the service is not provided from the Hobart TWR).
- Additional ATC staff may be required.
- Current and any additional ATC staff would require additional training to achieve surveillance approach control status.

The Federal Government requires CASA to "consider the economic and cost impact on individuals, businesses and the community in the development and finalisation of new or amended regulatory changes."[14]

In terms of safety, the incident analysis identified an average of one loss of separation assurance incident per year, since 2011. Refer to Section 8.2 for incident analysis. The number of incidents is very low. Of the five loss of separation assurance incidents that have occurred since 2011, none were the result of incorrect airspace classification. None of the loss of separation assurance incidents would have been mitigated or avoided by additional surveillance.

[14] Statement of Expectations for the Board of the Civil Aviation Safety Authority for the period 16 April 2015 to 30 June 2017.

In terms of efficiency, this aeronautical study has been informed that Cambridge aircraft operators occasionally experience delays and holding while they wait for airways clearances. Concerns in relation to delays at Hobart that would be reduced by surveillance have not been raised by industry stakeholders.

The traffic levels at Hobart have increased since 2012, however they are still below the traffic levels of 2010 and 2011. The traffic levels at Cambridge have doubled since 2011. The traffic mix at each aerodrome is different, however, the number of incidents have remained low compared to aerodromes with similar movements and traffic mix.

It is recognised that electronic surveillance is likely to increase the airspace efficiency. A risk based approach is employed by Airservices to determine levels of air traffic service provision nationally, and this is dependent on the volume and complexity of air traffic in a particular airspace. Airservices will continue to employ the surveillance coverage available in the area to manage operational risk. Airservices is evaluating the use of ADS-B below 7,000 ft AMSL with the current ADS-B coverage. Airservices is seeing an increase in surveillance effectiveness as IFR aircraft equip to meet the ADS-B mandate and as VFR aircraft voluntarily equip with ADS-B.

The introduction of a surveillance approach service to Hobart would not mitigate the loss of separation assurance incidents which have occurred. The introduction of a surveillance approach service would result in significant additional costs to the aviation industry to achieve a minimal efficiency benefit. The financial burden of introducing a surveillance approach service at Hobart would be greater than the benefit of reducing the occasional delays experienced. The introduction of a surveillance approach service at Hobart is not required nor recommended at this time.

4.5 Environment

The airspace within 35 NM of Hobart was reviewed to examine if there are current aircraft environmental issues associated with:

- Noise;[15]
- Gaseous emissions;
- Interactions with birds and wildlife; and
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) items.

No environmental issues were identified. Should an airspace change proposal be lodged as an outcome of this review that results in changes in aircraft traffic patterns, the above environmental issues will require assessment of the potential impacts.

Noise

The AIP ERSA does not require any noise abatement procedures for the aerodromes.

Gaseous emissions

Aircraft fuel use and associated gaseous emissions are unlikely to be influenced by the current airspace architecture.

Bird and wildlife aircraft interactions and EPBC issues

A review of relevant data sets indicate that aircraft operations in the Hobart airspace have not had a significant adverse impact on protected parks, ecosystems and wildlife pursuant to the EPBC Act.

[15] Refer to Airservices, Hobart, Cambridge and Launceston Airports, Aircraft Noise Information Report, Quarter 4 2015 (October to December, http://www.airservicesaustralia.com/wp-content/uploAds/Q4_2015_Hobart_Cambridge_Launceston_ANIR.pdf

5. AIRSPACE USERS AND AERONAUTICAL INFORMATION

5.1 Airspace Users

The aeronautical study of Hobart identified and consulted with a number of operators providing domestic passenger transport (PT) services, charter, flying training, aeromedical services and sports related aviation activities. These organisations operate regularly into and out of Hobart and Cambridge. The PT operators operating within this airspace include:

- Virgin Australia operate direct services to Melbourne, Sydney and Brisbane;
- Qantas Airlines and Cobham Aviation. Services provided by these companies are predominantly provided using B717 aircraft, which operate under a 'wet lease' agreement for QantasLink. Direct services are operated to Melbourne and Sydney;
- Jetstar operate direct services to Melbourne, Sydney and Brisbane;
- Tiger Airways operate direct services to Melbourne; and
- Hobart Airport is the operational base for the Australian Antarctic Program. Direct charter services are provided to Wilkins aerodrome each summer.

Some GA flights operate from Hobart aerodrome however, the majority of flights operate from Cambridge. The GA organisations operating from these aerodromes include:

- Par-Avion Airlines and Flight Training;
- Rotor-Lift Aviation;
- Westpac Rescue Helicopter Service;
- Heli Adventures Tasmania; and
- Royal Flying Doctor Service (South Eastern Section).

Other airspace users that were identified were members from the recreational aviation sector in particular the Tasmanian Hang Gliding and Paragliding Association (THPA) and RAPAC (Tasmanian Region).

6. CONSULTATION

Stakeholders were contacted and invited to provide comment or input to issues relating to Hobart's airspace. A list of stakeholders invited to contribute to this review can be found in Annex C.

CASA consulted with representatives of Hobart and Cambridge aerodromes, aircraft operators as well as PT operators, Defence and ATC staff from Airservices, specifically Melbourne Centre and Hobart TWR.

6.1 CASA

CASA officers including Aviation Safety Advisors, Aerodrome Inspectors and CNS/ATM inspectors were contacted for their input to this aeronautical study. Their responses are included within the study.

6.2 Airservices

The OAR visited Airservices' air traffic service centre in Melbourne where aircraft operations in the Hobart area were observed. Traffic volumes and behaviours were discussed with ATC staff.

The traffic co-ordination between the ATC staff in the combined en route configuration sectors of Tasmania and Huon and Hobart TWR were observed. During discussions with staff, they raised some issues regarding air traffic route crossover points. They identified a number of traffic crossover points falling just outside 35 NM of Hobart. The issue is that most inbound traffic is directed by waypoint CLARK. This quite often results in inbound and outbound traffic crossing each other's tracks. Crossing tracks in most cases are unavoidable, however, if located in close proximity to the aerodrome, which can add to the workload and inefficiencies in air traffic management. Airservices added that currently, traffic processing off published routes is negotiated tactically between tower and the en route sector, with both units having responsibility to manage their own workload appropriately. Airservices plans to implement a route structure that minimises crossovers through the use of segregated flight paths to reduce complexity.

Consultation with ATC staff highlighted that there would be benefit from the introduction of Feeder Fixes and standard arrival routes (STARs) as a way of improving efficiency and predictability to aircraft arrivals and reducing effects of controller and pilot workload.

Airservices briefed CASA on the work currently in progress to redesign routes, making improvements to the routing structure into and out of Hobart along with the introduction of STARs. It is Airservices intention that route structures for Hobart will provide laterally displaced arrival and departure routes with crossovers minimised as far as practicable.This work takes into account Performance Based Navigation (PBN) requirements and is anticipated to be completed in the second half of 2016.

Airservices have also been proactive in responding to VFR airspace user concerns regarding access to Hobart airspace. VFR pilots were seeking predictability to airways clearances for Cambridge departures and arrivals. As a result, amendments have been made to both ERSA FAC Hobart and ERSA FAC Hobart/Cambridge introducing six VFR flight procedures/routes describing inbound and outbound procedures[16], (Refer to Figure 7).

Airservices and CASA are currently reviewing the Class D step design to the northwest of Hobart (between 25 DME and 35 DME). This has been as a result of comments received from the THPA regarding access to airspace (Refer Figure 8). The THPA are consulting with CASA and Airservices to progress an airspace change proposal that will support improved airspace access for the gliders launching from the sites around Jericho and Lemont.

It is important to note that any airspace changes will consider the containment of Hobart's TIFPs and follow the standard airspace change process.

[16] Airservices, AIP EARSA, FAC Hobart, Flight Procedures 26 May 2016.
http://www.airservicesaustralia.com/aip/current/ersa/FAC_YMHB_26-May-2016.pdf

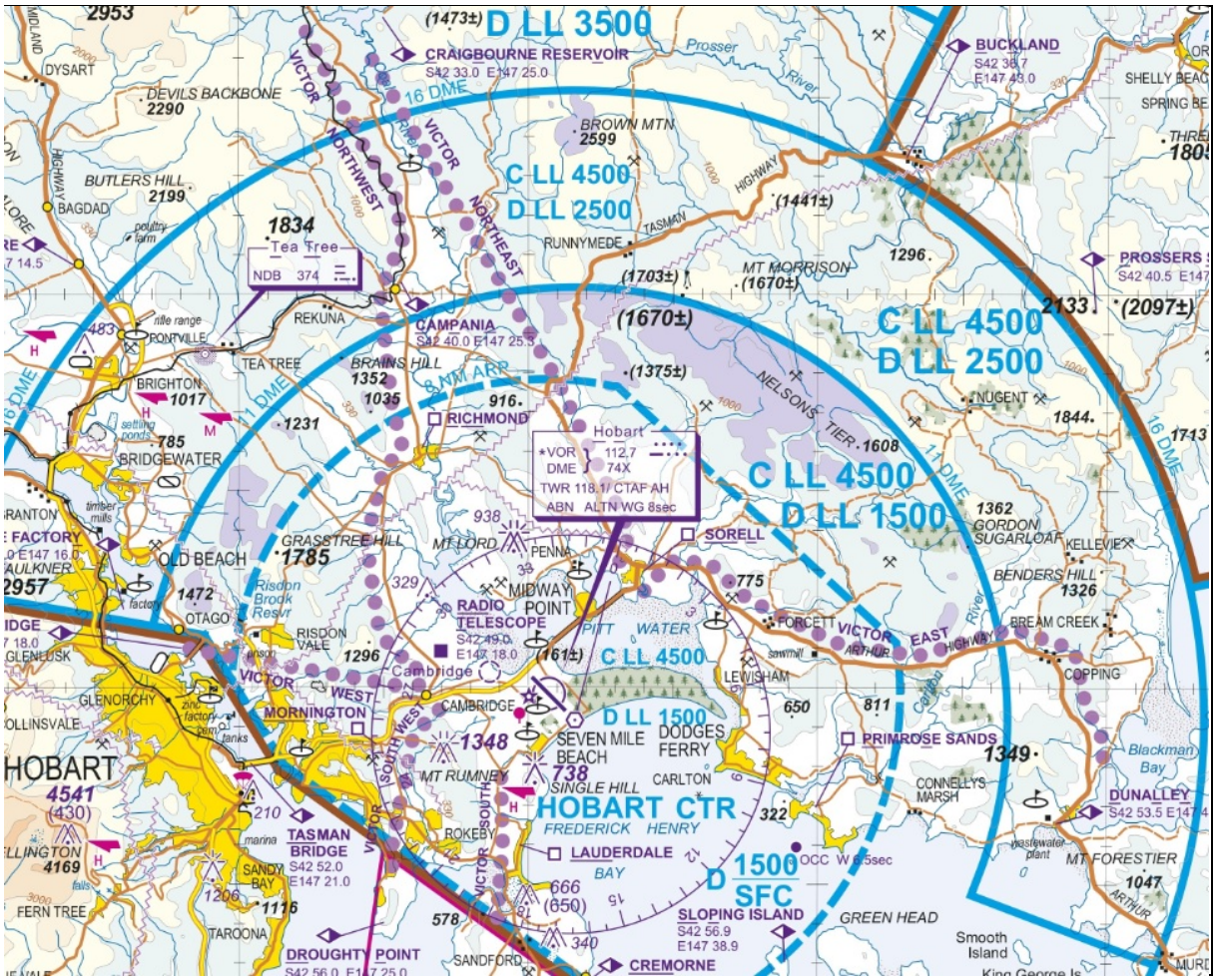

Figure 7: Hobart airspace, Visual Terminal Chart (VTC), VFR Routes. (26 May 2016).

During the site visit to Hobart TWR, the proximity of Hobart and Cambridge runways was noted. It was also observed that both aerodromes share the same runway designation. This was a result of a runway re-designation change for Cambridge that occurred on 17 June 2014, from runway 13/31 to runway 12/30. Cambridge operators and Hobart TWR supported this change.

ATC have developed radio procedures and phraseologies for pilot use that will assist in distinguishing the relevant aerodrome runway that is in use (e.g. “Runway 12 Hobart”, “Runway 12 Cambridge”). ATC have concluded that this procedure mitigates confusion on runway use.

Hobart TWR identified that traffic efficiency was occasionally affected by the lack of a full-length taxiway. Aircraft operating from Hobart therefore require backtracking on the runway. This results in longer runway occupancy times, increases delays and reduces the efficiency of traffic flow.

No airspace issues or concerns were raised by air traffic controllers about aircraft operations into Hobart. The surveillance coverage supporting traffic in the en route phase and situational awareness of traffic within 35 NM of Hobart was observed to be effective.

6.3 Aerodrome operators

The Hobart and Cambridge aerodromes have both indicated strong growth in recent years. Hobart International Airport Pty Ltd has included in their recent Airport Master Plan[17] expansion plans to further increase the number of passengers into Hobart while delivering strategic infrastructure. Capital investment expansion plans to Hobart aerodrome have seen

[17] 2015 Hobart International Airport Master Plan

funding assistance of $38 million offered from the Australian Government to improve operations of the airport and will include:

- A runway extension of 500 metres that will increase aircraft access to and from other locations within Australia and Asia along with expanded freight opportunities. The runway extension will also provide direct benefit to further developing Antarctic aviation programs by enabling larger aircraft to be used and heavier payloads to be delivered; and
- A further $25 million will be invested in the redevelopment of the passenger terminal that will meet expected passenger demands through to 2023.

Hobart is the main aviation gateway for southern Tasmania. The aerodrome supports four main PT operators in Qantas and QantasLink, Jetstar, Virgin Australia and Tiger Airways. All PT operations are conducted under the IFR and are scheduled to arrive and depart during TWR hours. All PT operations are ADS-B equipped. The aerodrome also serves the Royal Flying Doctor Service with just over 350 movements per year.

The review of recent movement data between December 2014 and June 2016 has seen total aircraft movements (VFR and IFR) increase from 25,191 to 26,249.[18] According to the 2015 Hobart International Master Plan, PT services were forecast to be 16,000 movements for the 2015 financial year. The Master Plan forecasts PT aircraft movements to double by financial year 2035.

Comment was received from Hobart Airport relating to the runway designation at Cambridge aerodrome. The issue outlined a safety concern held as a result of the runway designation change promulgated by Cambridge in June 2014 via NOTAM. The NOTAM described a change of Cambridge runway from 13/31 to 12/30. This change resulted in runways at Hobart and Cambridge having identical runway designation number of 12/30.

Due to the close proximity of Cambridge to Hobart (approx. 1 NM), this has caused some confusion for staff operating on the airfield at Hobart. Specifically, the awareness of which of the runways 12/30 the pilot or ATC are referring to. ATC and pilots have implemented a risk mitigation to suffix the radio call to include the name of the aerodrome, (e.g. 'runway 12/30 Cambridge' and ‘runway 12/30 Hobart’). However, on occasion this suffix can be missed during communications, causing confusion among those operating in the vicinity of the two airports. Hobart Airport submitted that there should be consideration for runway designations to be reviewed.

[CASA Comment: Feedback from Industry states that the new radiotelephony procedures work well and should be retained.]

Cambridge operates a varied traffic mix, which includes multi and single-engine aircraft. It is important to note that as Cambridge aerodrome is limited to aircraft not above 5,700 kg. It is utilised by aircraft predominantly in the GA and sports aviation category. Runway lights are installed at Cambridge on runway 12/30 and runway 14 so operations can take place both during night and daytime hours.

Cambridge aerodrome supports a mixture of flight training and charter operations. These include fixed-wing and helicopter operations. Par-Avion Airlines operate a scheduled PT service from Cambridge to King Island and Burnie/Wynyard. The review of recent movement data over 12 months ending June 2016 saw the total PT movements for Cambridge to be 2,401. PT operations represents 10.2% of total movements at Cambridge during this period.

Due to the nature of Cambridge as a flight-training aerodrome, passenger numbers have not been the focus of the aerodrome operator. However, aircraft movements have seen a substantial increase. Between December 2012 and June 2016 Airservices movement data showed aircraft movements increasing from 14,208 to 23,587, an increase of 66%. This was

[18] Airservices Data Validation Report Aircraft Total Movements for Hobart 12 months ending December 2015.(Report Run Date: 15 April, 2016 11:02:04 AM

in response to increases in flying training activity. Representatives from Cambridge indicated that they are actively seeking further growth in their flying training through the Asian market.

6.4 Airspace users

Tasmania's RAPAC and various other organisations were engaged for comment.

Airspace users from the flying training and charter sector raised the specific issue of the use of surveillance. Stakeholders were concerned why surveillance was not being used to provide a surveillance separation standard level of service at levels below 7,000 ft AMSL. Airspace users explained that occasionally delays and holding are experienced while they wait for airways clearances through Hobart's CTR and CTA. This mainly affects aircraft departing and arriving from Cambridge aerodrome. These delays in accessing airspace were raised as inefficient and a cost issue for Cambridge airspace users.

It had been suggested by some airspace users that the introduction of VFR corridors might provide improvements to efficiency and access to airspace. As a result, Airservices have designed and published VFR corridors in the VTC and ERSA effective from 26 May 2016. It is expected that these corridors will assist ATC to provide improvements to airspace access and efficiency while providing predictability for pilots within Hobart's CTA and CTR.

Other comments received include that users perceived that Hobart TWR seem to "over service". Comments suggested that ATC provided more than a Class D service in Hobart's CTA and CTR. They also commented that the levels and type of service were not consistent across all the ATC officers operating Hobart TWR. It was recognised by stakeholders that recent staff turnover might have an impact on this.

Airspace users identified that the flying community would benefit greatly if improved engagement and collaboration between all stakeholders was to occur. Currently there are no formal or informal airspace user groups other than RAPAC.

The THPA was concerned about access to airspace issues. Before 2011 the THPA and the Soaring Club of Tasmania (SCT) had access to Class G airspace from SFC to 8,500 ft AMSL from 30 DME Hobart (Refer to Figure 8).

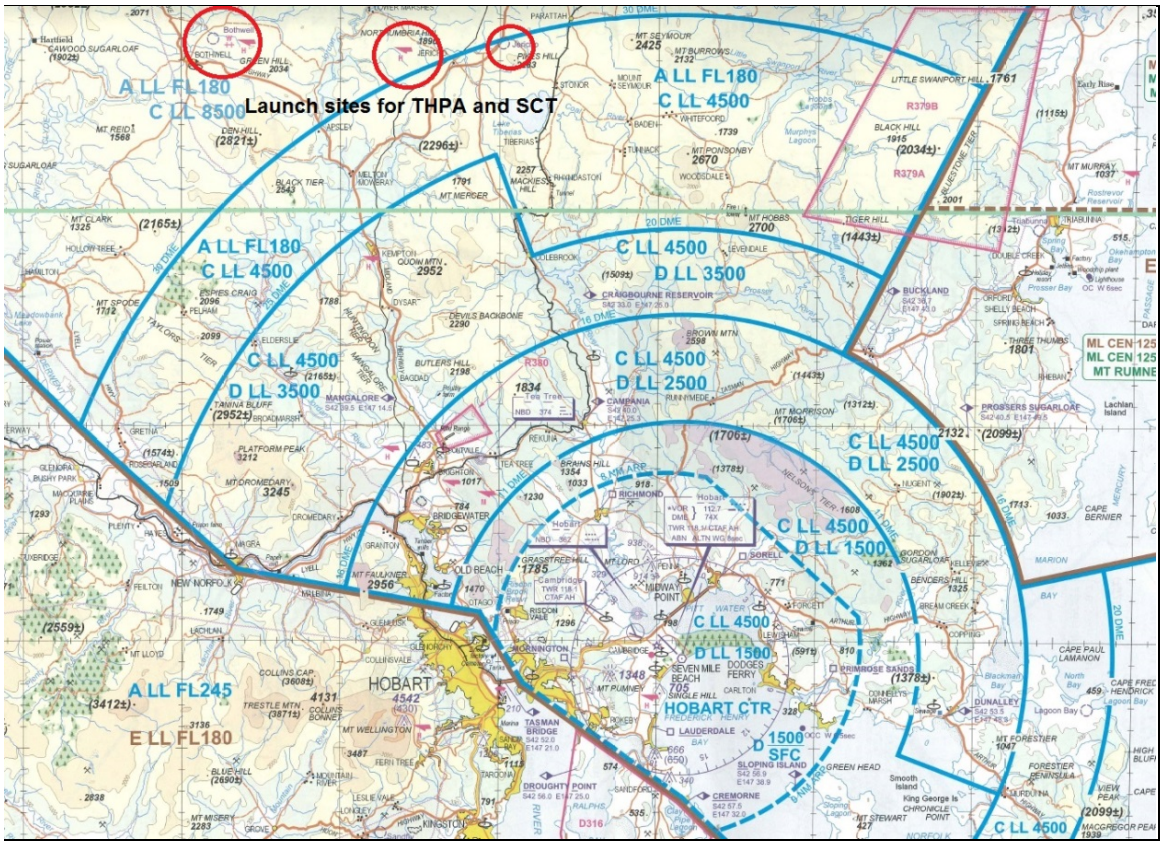

Figure 8: Hobart airspace, VTC, THPA and SCT activity. (18 Nov 2010).

Within the 17 November 2011 Aeronautical Information Regulation and Control (AIRAC) cycle, the 30 DME arc was extended to 35 DME. This change was promulgated based on enhancements to, and containment of, TIFP designs and aircraft profile adjustments. By extending this arc, the Class C airspace with a Lower Level (LL) of 4,500 ft AMSL was extended and positioned above the launch sites used by the THPA and SCT. The THPA has sought to improve this situation.

After preliminary analysis of the glideslope of the ILS for RWY 12 Hobart, the potential exists to increase the Class C LL between 30 DME and 35 DME from 4,500 ft AMSL to 6,500 ft AMSL. (Refer to Figure 9).

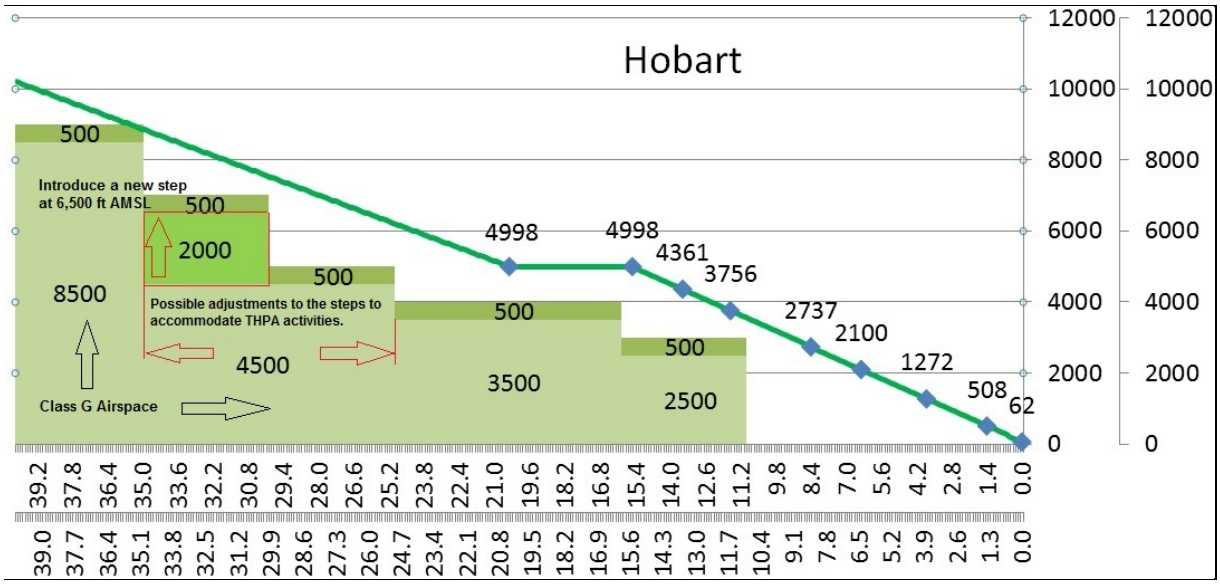

Figure 9: Hobart airspace model looking North-West of Hobart approach under ILS to Runway 12.

The THPA and SCT have submitted an application for a proposed airspace change. Consultation is currently underway at the time of writing this report and submission of the application for airspace change is expected to CASA within the second half of 2016.

6.5 Defence

Defence were contacted for their comment regarding any issues concerning the airspace surrounding Hobart. Defence advised that they had no issues with the current airspace design.

6.6 Emergency services

Emergency service providers were contacted for comment regarding the airspace surrounding Hobart. Comments received included some areas that fell outside the scope of this study. However, these issues have been included where they may present contributory factors to airspace efficiency and safety.

- Airport infrastructure:
    - Hobart does not have a full length taxiway. This is perceived as the biggest causes of taxi and airborne delays in the Hobart area.
    - Hobart has only a single runway. This raises a safety issue as a result of the varied meteorological factors that can impact on Hobart, including changes in surface wind direction, and mechanical turbulence events that occur below 10,000 ft AMSL.
    - Taxi delays due to limited parking bays. This can force aircraft to occupy taxiways while aircraft vacate parking bays. Examples of limited parking were provided when taxiway H is unavailable each time a RAAF C17 aircraft parks at Hobart.

- ATC and air traffic services:
    - Airline scheduling was raised as an issue from emergency service stakeholders. They have found that arrivals and departures were clustered together and a more even spread of their arrivals and departures could help smooth out peak periods. These clusters of increased traffic volumes along with operations at Cambridge occasionally resulted in radio congestion and over transmission occurrences.
    - The idea of radar surveillance was suggested for Hobart TWR. It was suggested that radar surveillance replace the existing TASWAM surveillance. The expectation of this is that a surveillance separation standard would be introduced at lower levels. The surveillance separation standard could then be applied to VFR and IFR traffic operating within the Hobart CTR resulting in a reduction of holding delays and improving efficiency and access to airspace. *[CASA comment: The cost of radar surveillance would be greater than the resultant benefit. Refer to Section 4.4].*
    - Enhancements should be considered to existing published IFR routes and TIFPs. Suggestions were made to consider additional fixes (waypoints) in addition to CLARK that might help reduce excess vectoring and track miles for aircraft to join the Hobart runway 12 ILS.

7. AVIATION TRAFFIC DATA

7.1 Airspace Research Application (ARA)

Airservices ARA database was developed to enhance their situational awareness of traffic at aerodromes throughout Australia and identify locations of interest that may trigger further research. CASA obtains ARA data from Airservices to assist in the analysis of collision risk at aerodromes that are under review.

ARA data consists of aircraft movements, passenger numbers and aircraft incidents from sources such as Avdata Australia, Australian Transport Safety Bureau (ATSB), Airservices' Corporate Integrated Reporting and Risk Information System, submitted flight plans and location specific intelligence reports.

The following ARA reports were sourced from Airservices:

- **Trigger criteria summary report:** – records total aircraft movements, air transport movements and passenger numbers at all aerodromes in Australia over a 12 month period. An aerodrome is flagged if, for the 12 month period:
    - total passenger numbers exceed 350,000;
    - total aircraft movements exceed 80,000; or
    - total air transport movements exceed 15,000. Air Transport Movements are aircraft with a maximum take-off weight greater than 2,000 kilograms. For the purposes of this Aeronautical Study, they are considered to be the same as PT movements.

- **Aircraft types by port:** – This report identifies aircraft by type arriving and departing from the port during a selected period[19]. The data is used to estimate the proportion of aircraft types that are utilising an aerodrome. This report is also used to identify VFR and IFR traffic by analysing the aircraft seating capacity and the number of movements per aircraft type. Generally, all rotary winged aircraft are considered VFR traffic as well as aircraft that have three or less seating capacity.
- **Data validation reports:** – This report is used to validate the trigger report; identify the number of training circuits flown per annum and add VFR traffic.

[19] This data is extracted from the aircraft register database (maintained by CASA) using the aircraft call sign only, therefore there may be some inaccuracies

7.2 Airservices movement data

Two types of Airservices aircraft and passenger movement data reports covering the period December 2009 to June 2016 for Hobart and Cambridge were reviewed. The Summary of these movement trends (Figures 10 to 13) show total aircraft movements, air transport movements, other than PT movements and passengers.

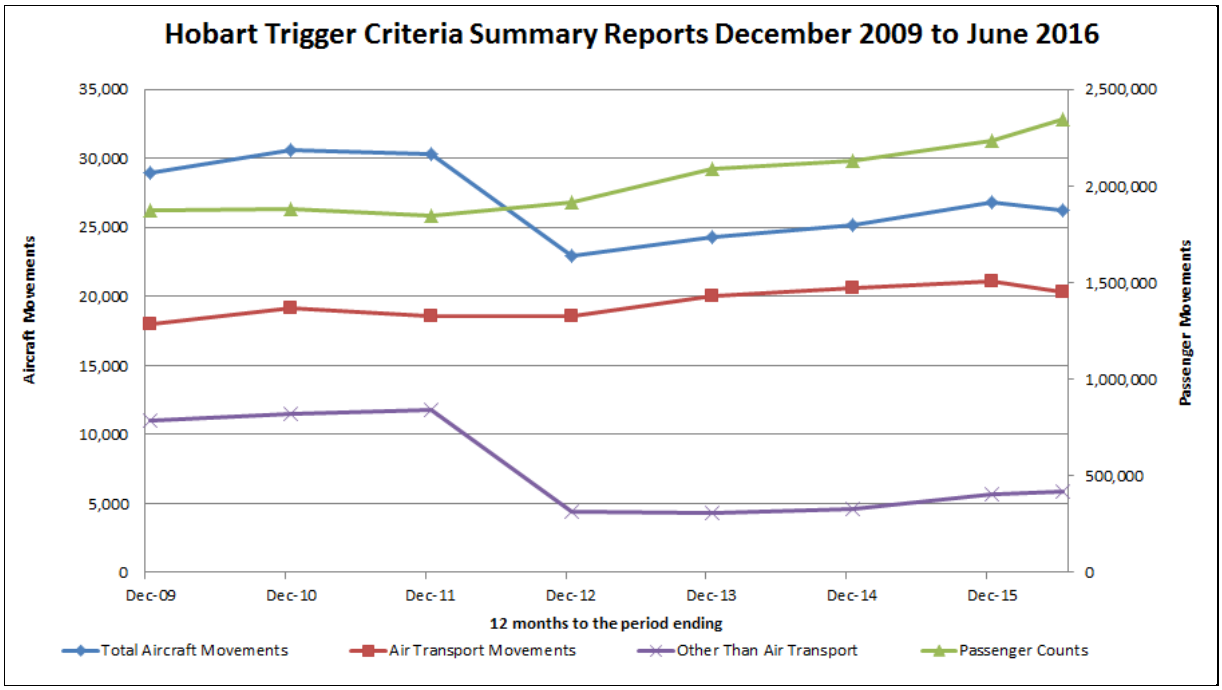

Figure 10: Airservices summary reports – Annual aircraft and passenger movements (2009 to June 2016).

The Hobart data displayed in Figure 10 above indicates the following:

- Total aircraft movements experienced a 24% decline between December 2011 and December 2012;
- Total aircraft movements experienced a 14% increase between December 2012 and June 2016;
- Since December 2011, passenger movements have seen continuous steady growth averaging 24%. Passenger movements as of June 2016 were 2.3 million passengers. This exceeds the Airspace Criteria Threshold by 1.3 million passengers;[20]
- The decline in movements over the 2012 calendar year did not influence the passenger movement count, which continued its upward trend. This can be explained by the introduction of aircraft variants with increased seating capacity; and
- A sharp decline of 62% in aircraft not engaged in PT activities was experienced over the 2012 calendar year. After 2012, Other Than Air Transport movements remained constant averaging 4,973 movements.

[20] *Australian Airspace Policy Statement 2015.* Process for Changing the Classification of a Volume of Airspace at an Aerodrome. Airspace Criteria Thresholds.

The Cambridge data displayed in Figure 11 below indicates the following:

- A substantial increase in total aircraft movements of 113% occurred between December 2011 to June 2016. Of interest is the Cambridge movement increase from December 2011 to December 2012 of 28%. The corresponding movement decline for this same period for Hobart was 24%.
- Figures collected for June 2016 indicate a decline of 6.7% in total aircraft movements from June2016 to June 2016.
- That the main type of traffic influencing the total movements is aircraft activities engaged in activities other than air transport.
- Over all passenger movements for Cambridge are very low compared to passenger numbers at Hobart. An air transport service is operating from Cambridge to three destinations within Tasmania (See Section 6.3). Annual air transport movement numbers have remained relatively constant.

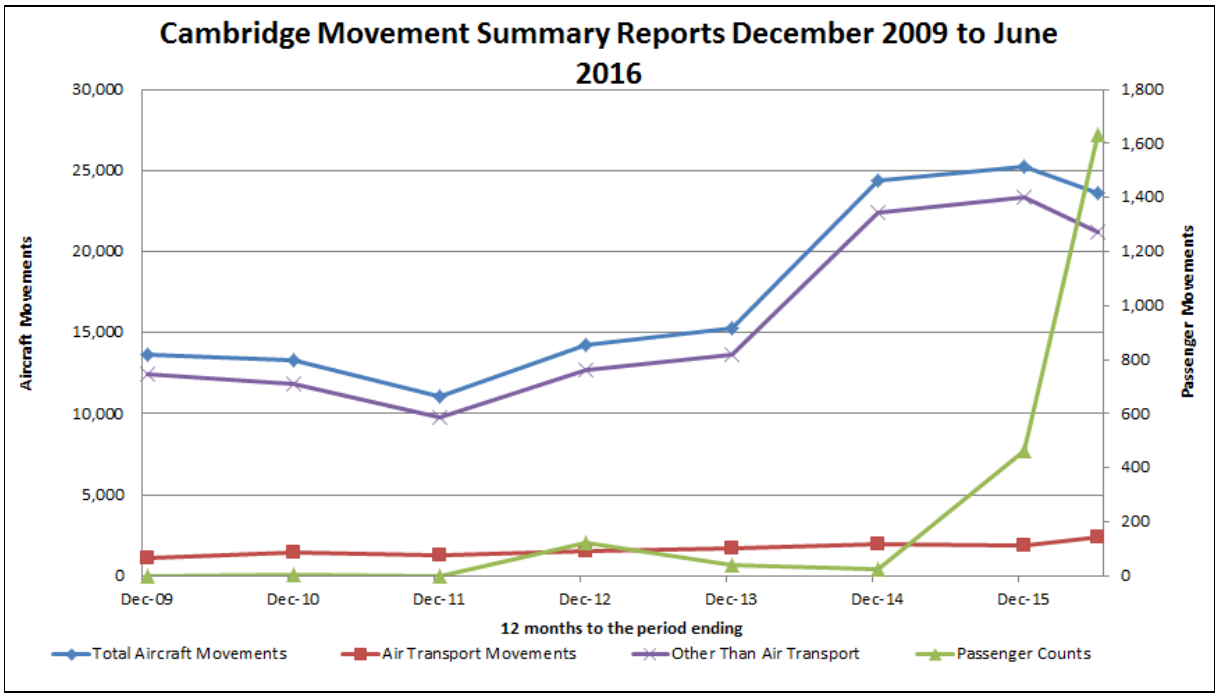

Figure 11: Airservices summary reports – Annual aircraft and passenger movements (December 2009 to June 2016)

Data was also collected from Airservices Data Validation Reports (December 2009 to June 2016). The data collected for Hobart in Figure 12 below indicates the following:

- A 66% reduction in circuit operations at Hobart between December 2011 and December 2012;
- A 47% reduction in total VFR operations at Hobart between December 2011 and December 2012. These reductions also added influence on the Total Movements decline over this same period; and
- The Hobart traffic mix has seen an overall decline in VFR activity replaced with a steady growth in IFR operations.

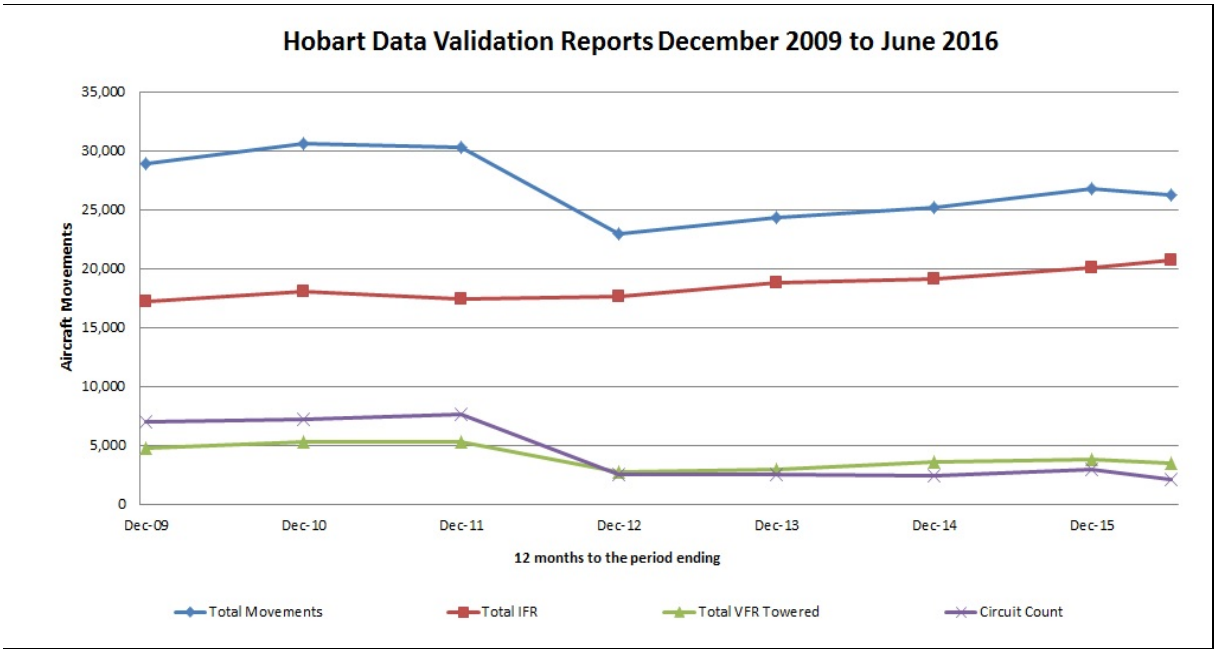

Figure 12: Airservices data validation reports – Hobart annual aircraft IFR, VFR and circuit movements (December 2009 to June 2016).

Airservices' data validation reports (December 2009 to June 2016) for Cambridge in Figure 13 below indicates the following:

- A 40% increase in circuit operations at Cambridge between December 2011 and December 2012. Circuit traffic continued to increase at Cambridge from December 2013 to June 2016 by 831%;
- A 66% increase in total VFR operations at Cambridge between December 2012 and December 2013; and
- Traffic mix has seen the continued growth of VFR activities with total IFR movements remaining constant.

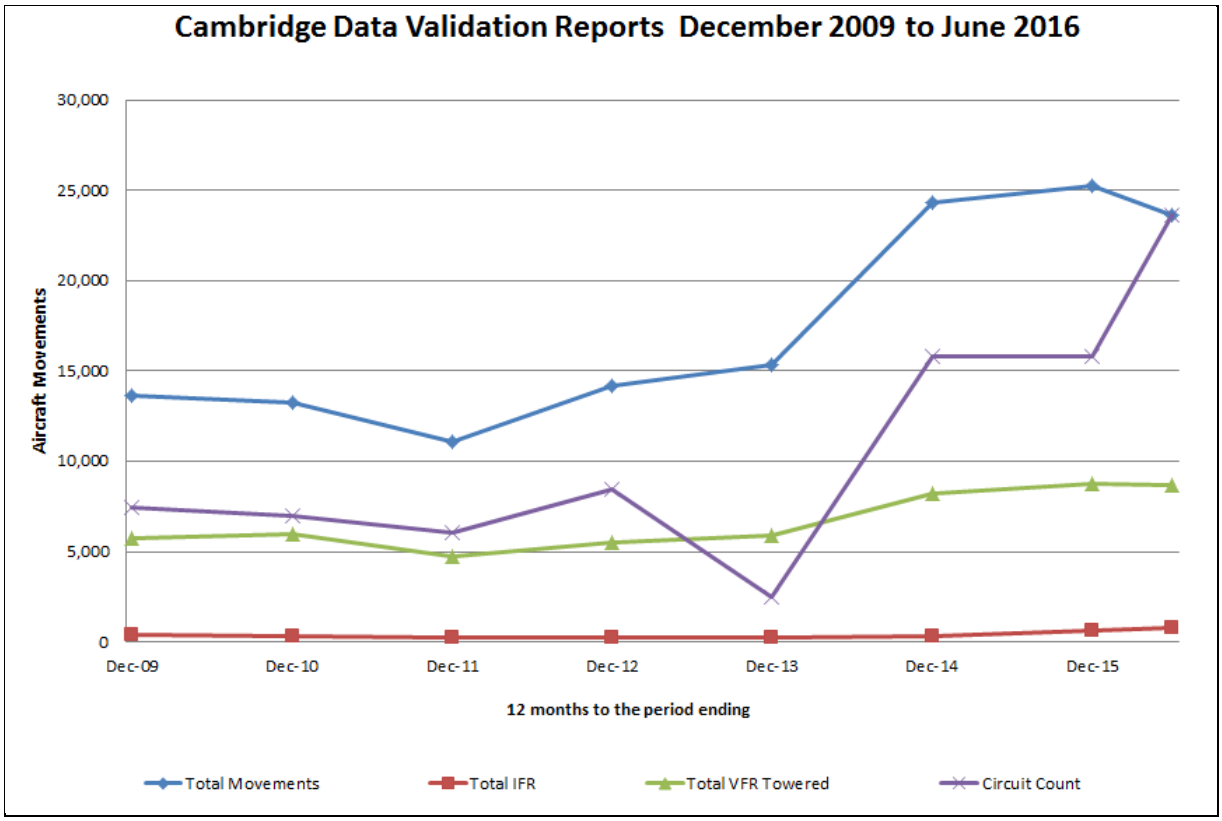

Figure 13: Airservices data validation reports – Cambridge annual aircraft IFR, VFR and circuit movements (December 2009 to June 2016).

7.3 Hobart and Cambridge Traffic Mix Review – Aircraft types by port

Data was also collected from the Airservices' Aircraft types by port report. This recorded an approximate traffic mix for Hobart and Cambridge. The data is broken down into three categories below, and the traffic mix shown as a percentage of the total aircraft movements:[21]

Hobart:

- Indicative aircraft seating capacity:
  - Less than 10 seats: 23.2%
  - 10 to 30 seats: 3%
  - 30 to 70 seats: 0.05%
  - Over 70 seats: 73.7%
- Aircraft description:
  - Helicopter: 14%
  - Piston engine aeroplane: 3.4%
  - Turbofan aeroplane: 74.4%
  - Turboprop aeroplane: 8.2%
- CASA aircraft register average aircraft type designator maximum take-off weight:[22]
  - Up to 2,000 kg: 7.5%
  - 2,001 to 5,000 kg: 11.5%
  - 5,001 to 7,000 kg: 5.1%
  - 7,001 to 14,000 kg: 2.1%
  - 14,001 to 29,000 kg:0.1%
  - Over 29,000 kg:73.7%

[21] Traffic mix based on Airservices Aircraft Types by Port December 2015 report. All ICAO type designators were identified,.

[22] Average aircraft maximum take-off weights are used to indicate aircraft size. Actual aircraft take-off weight varies between individual aircraft and is influenced by local conditions, operational requirements and payload.

Cambridge:

- Indicative aircraft seating capacity:
  - Less than 10 seats: 99.6%
  - 10 to 30 seats: 0.4%
  - 30 to 70 seats: 0%
  - Over 70 seats: 0%
- Aircraft description
  - Helicopter: 11.7%
  - Piston engine aeroplane: 88.1%
  - Turbofan aeroplane: 0%
  - Turboprop aeroplane: 0.2%
- CASA aircraft register average aircraft type designator maximum take-off weight:
  - Up to 2,000 kg: 76.9%
  - 2,001 to 5,000 kg: 22.6%
  - 5,001 to 7,000 kg: 0.5%
  - 7,001 to 14,000 kg: 0%
  - 14,001 to 29,000 kg: 0%
  - Over 29,000 kg: 0%

The conclusions drawn from the traffic mix review of Hobart and Cambridge over the 12 months to June 2016 are:

- The two aerodromes support aircraft in two distinct groups. For Hobart, 73.7% of traffic movements are aircraft with a maximum take-off weight of 29,000 kg and over, while 76.9% of Cambridge's movements are aircraft with a maximum take-off weight of 2,000 kg and below.
- Most of the aircraft operating into Hobart are turbine aircraft while most of the aircraft operating into Cambridge are piston engine aircraft.
- Approximately 67% of the total aircraft movements into Hobart were Airbus A321, A320 and Boeing B737, B717 aircraft types; and
- For movements at Cambridge 63% of the total aircraft movements were by Cessna C172 and C206 aircraft types.

It is clear from the review of the Airservices movement data and aircraft types by port that the main drivers of movement growth have been in the flying training sector operating from Cambridge. The use of larger turbine aircraft servicing Hobart supports the continued growth trends in passenger numbers.

7.4 Future traffic estimates

Within the 2015 Hobart Airport Master Plan, future traffic and expected growth targets were discussed. Passenger aircraft services were forecast to be 16,000 movements for the 2015 financial year. The Draft Master Plan has forecast PT aircraft movements to double from its current level of 21,133 by financial year 2035. This would require an increase of an additional 1,000 PT movements each year based on existing movements. Recent trends from 2013, 2014 and 2015 have seen the yearly total for PT movements increase by an average of over 500 PT movements each year. This falls significantly below the forecast growth described within the Hobart Airport Master Plan.

Traffic forecasting is complex and has many influences outside aviation including aerodrome infrastructure. However, based on the future estimates described within the Hobart Airport Master Plan, passenger air transport movements at Hobart would exceed the AAPS criteria threshold for annual PT aircraft in eight years (2024). This would result in Hobart exceeding the AAPS threshold criteria for both the total annual passenger count and the air transport movements for Class C airspace. An aeronautical study should be scheduled in the OAR's work program when PT movements approach the AAPS trigger criteria threshold.

In the most recent sample of traffic data taken for Hobart and Cambridge from December 2009 to June 2016 the data Indicated overall an average decline in total movements. Total aircraft movements for Cambridge saw a decline of 6.7% and Hobart saw a 2% decline of total aircraft movements. However, the average fair paying passenger for Cambridge saw an increase from for the year ending December 2015 of 462 passengers to 1,632 passengers for the year ending June 2016.

7.5 AAPS airspace criteria thresholds

The AAPS states that, 'When annual traffic levels at an aerodrome meet a threshold of any one of the criteria CASA should complete an aeronautical risk review in consultation with the public, industry and other government agencies.'

'While the criteria provide a good indicator of likely airspace classification, CASA will be able to consider public, industry and agency comments, forecast future traffic levels and any significant risk mitigators already in place or planned at the location, before finalising an airspace determination.'

Hobart exceeds the AAPS passenger criteria for Class C airspace shown in Table 1.

From December 2009 to June 2016 total PT movements for Hobart have seen an average growth of 1.9%. As of June 2016 PT movements for Hobart are 20,358 (Depicted as Air Transport Movements in Figure 10. For the same period total PT movements for Cambridge saw an average growth of 11.3%. Cambridge movements totalled 2,401 for June 2016 (Depicted as Air Transport Movements in Figure 11). These figures are well below the AAPS PT aircraft movement criteria for Class C airspace.

AAPS Criteria Thresholds	Class B	Class C	Class D
Service provided	ATC[23]	ATC	ATC
Total annual aircraft movements	750,000	400,000	80,000
Total annual PT aircraft movements	250,000	30,000	15,000
Total annual PT passengers	25 million	1 million	350,000

Table 1: Airspace criteria thresholds (AAPS 2015).

Further assessment of the total annual aircraft movements was conducted for the period ending June 2016. The total sum of annual aircraft movements for Hobart was 26,249. This figure falls below the AAPS aircraft movement criteria for Class C airspace.

The only criteria that exceeds the AAPS thresholds is the count of total annual PT passengers for Hobart at 2.3 million passengers.

Due to the close proximity of Cambridge to Hobart, it is appropriate that consideration be given to the traffic operations at Cambridge. As at June 2016, total annual aircraft movements for Cambridge were 23,587 (Refer to Figure 11). This figure is below the AAPS total annual aircraft movement threshold which is 80,000 for movements other than PT aircraft movements.

Cambridge is predominantly a GA aerodrome, with 63% of the total aircraft movements made by Cessna C172 and C206 aircraft types. However, considering the traffic as a combined quantity, the total aircraft movement figure for Cambridge and Hobart is approximately 49,836.

Considering the total annual aircraft movements, total annual passenger transport aircraft movements, total annual passengers, stakeholder consultation (section 6), future traffic estimates and aviation safety incident reports (Refer to Section 8) CASA considers Hobart's Class D (CTR and CTA) and overlying Class C CTA to be appropriate at this time.

[23] Air Traffic Control

8. INCIDENT AND ACCIDENT DATA

8.1 Aviation Safety Incident Reports (ASIRs) description

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 (CIRRIS) reports and the Australian Defence Forces' Aviation Safety Occurrence Reports (ASORs).

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 35 NM of Hobart from 2009 to 2015 were reviewed.

8.2 Hobart airspace incidents

Table 2 shows total airspace related incidents within 35 NM of Hobart and total combined aerodrome movements for Hobart and Cambridge from 2009 to 2015.

Type of incident	Number of airspace attributed incidents						
	2009	2010	2011	2012	2013	2014	2015
Failure to comply with ATS instructions or procedures	0	0	0	0	0	1	0
Loss of Separation Assurance	0	0	1	1	1	1	1
ANSP Operational Error	0	0	0	0	0	1	0
Total Airspace Related Incidents	0	0	1	1	1	3	1
Total aircraft movements for Hobart and Cambridge (Figures 11 and 12).	42,538	43,899	41,402	37,181	39,638	49,545	52,077

Table 2: Airspace attributed incidents 2009 to 2015 (ATSB and Airservices data).

Table 2 compares the total aircraft movements with total airspace related incidents. It shows that in 2014, three incidents were recorded. This also correlates with an increase in total aircraft movements for the same period in 2014.

Between 2011 and 2015, five loss of separation assurance incidents occurred. An analysis of the incidents showed:

- One of the incidents occurred in Class G (uncontrolled) airspace and therefore not under the control of ATC. As the incident occurred outside controlled airspace, additional surveillance would not have prevented the incident.
- One incident occurred at 9,000 ft AMSL, which is within the surveillance coverage and under the jurisdiction of Melbourne Centre. Surveillance to a lower level would not have prevented the incident.
- One incident occurred at 7,000 ft AMSL, which is within the surveillance coverage. Surveillance to a lower level would not have prevented the incident.

- Two incidents occurred within the Hobart Class D CTR. Extracts from the ATSB ASIR for the two incidents stated:
    - Incident 1 (April 2015): The Cessna 172 on approach to runway 14 at Cambridge was advised by the controller to maintain visual separation with the Boeing 737 on approach to runway 12 at Hobart. The controller did pass traffic information on the Cessna 172 to the crew of the Boeing 737 resulting in a loss of separation. The Boeing 737 subsequently received a Traffic Alert and Collision Avoidance System (TCAS) Resolution Advisory on the Cessna 172 and conducted a missed approach;
    - Incident 2 (March 2013): The Cessna 172 did not adhere to an ATC sequencing instruction to follow the preceding Cessna 172. The second Cessna 172 inadvertently followed a different aircraft in the circuit resulting in the two Cessna 172s coming into close proximity. The crew of the first Cessna 172 took avoiding action to ensure separation.

The two incidents which occurred within the Hobart Class D CTR were not the result of a lack of surveillance. Additional surveillance would not have prevented either incident.

The results of the analysis of incidents at Hobart compared to other locations with similar movements, reveal that the number of loss of separation assurance incidents for the airspace around Hobart are very low.

8.3 ATSB investigations

The ATSB prioritises its investigations based on societal risk. The investigation priorities on when to investigate any incident or occurrence are outlined on the ATSB website.[24] Between 01 December 2009 and 01 June 2016, the ATSB conducted four occurrence investigations into incidents that occurred at Hobart.[25] Of these investigations, none of the incidents were airspace related.

8.4 Incident summary

The traffic levels at Hobart and Cambridge have increased. However, the numbers of incidents have remained low compared to aerodromes with similar movements and traffic mix.

Airspace related incidents for Hobart and Cambridge comprised 2.2% of the total incidents recorded. Animal/Bird strikes recorded at 31% represents the main incident occurrence type recorded.

Based on Hobart and Cambridge's combined movements compared to those aerodromes at other locations, the number of incidents is considered to be low. Stakeholder comment did not identify any airspace incidents to be an issue.

9. AIRSPACE REFORM

As required by the AAPS, this review takes into account the Government's requirement that CASA will continue the review of Australia's airspace and move towards closer alignment with the ICAO system and ensure that appropriate levels of airspace classification and air traffic services are implemented to protect aerodromes served by passenger transport services.

Paragraph 8 of the AAPS states: 'The administration of Australian-administered airspace:

- shall be in the best interests of Australia;

[24] ATSB: Terminology, investigation procedures, and deciding whether to investigate. http://www.atsb.gov.au/about_atsb/investigation-procedures.aspx

[25] ATSB Aviation safety investigations & reports webpage advanced search: Hobart, 01/12/2009 to 01/12/2015 http://www.atsb.gov.au/publications/safety-investigation-reports.aspx?mode=Aviation&location=Hobart&ods=11/10/2009&ode=01/06/2016&initialTab=2

- shall consider the current and future needs of the Australian aviation industry;
- shall adopt proven international best practice airspace systems adapted to benefit Australia's aviation environment; and
- shall take advantage of advances in technology wherever practicable.'

It is noted that some other Class D towered aerodromes at other regional parts of Australia have adopted Class E airspace below 8,500 ft AMSL where surveillance coverage is available. Locations with comparable movements include:

- Mackay aerodrome (33,044 total aircraft movements); and
- Rockhampton aerodrome (28,747 aircraft movements).

In the case of Hobart, the TWR provides a combined TWR and approach control services within Class C and D airspace from 8,500 ft AMSL and below during the TWR hours of operation. The Hobart airspace also differs significantly from other Class D towered aerodromes with the combined activity of Cambridge. Based on observations of the traffic management services currently being provided and the future growth needs of this airspace over the next eight years, it is concluded that the existing airspace architecture is appropriate.

10. SUMMARY OF ISSUES

The following issues were identified:

- Hobart and Cambridge aerodromes are in such close proximity that they affect each other. The aerodromes are located within 1 NM of each other and share a runway designation (12/30). This close proximity occasionally presents traffic complexities and therefore needs to be considered when assessing the Hobart CTR.
- Hobart's TWR provides combined TWR and procedural (non-surveillance) approach control services within Class C and D airspace from the surface to 8,500 ft AMSL during the hours of operation. The Hobart TWR facility provides an airways clearance delivery and surface movement control function at Hobart and a TWR and approach function for Hobart and Cambridge.
- There are a number of traffic crossover points located just outside 35 NM from Hobart. Inbound traffic from the Australian mainland is directed via the IFR waypoint CLARK. The basic route structure for Hobart provides laterally displaced arrival and departure routes, with crossovers designed to be done inside the terminal airspace. In recent years it became practice between Hobart TWR and en route to process Brisbane and Sydney arriving traffic via CLARK when runway 12 is in use. This mode significantly increases workload and complexity in the en route Tasmania sector as there are consequential route crossovers between Melbourne, Sydney and Brisbane bound traffic. However this management mode significantly simplifies the TWR traffic pattern with no crossovers in the terminal airspace.
- Airline stakeholders provided comment on the potential efficiency benefit and improved predictability if Airservices introduced STARs to facilitate both visual and instrument arrivals into Hobart;
- Airservices controllers manage workload by the division of control responsibility into two sectors: the Tasmania sector and the Huon sector. These sectors usually operate in a combined configuration, however with little warning the combined sectors can present on occasion, unpredictable levels of activity, resulting in rapid increases in controller workload for short periods. It is these occasions where the sectors maybe de-combined.
- Airspace users reported that on occasion they experienced delays in receiving airways clearances and general inefficiencies in the use of the airspace due to the reported claims of over servicing of Class D procedures by Hobart TWR.

- GA stakeholders believed that improvements to airspace access and efficiency could be achieved by increasing the level of surveillance available to ATC for separation in lieu of the existing procedural separation standards.
- Hobart has one runway which does not have a parallel full-length taxiway. Aircraft operating from Hobart therefore require backtracking on the runway. This results in longer runway occupancy times, increased delays and reduces the efficiency of traffic flow.
- Changes made to Hobart airspace in 2012 resulted in the Hobart Class C step being moved from 30 DME to 35 DME. This move of an airspace boundary provided an improved descent profile for jet operators and helped reduce workload for the aircrew.
- Comments regarding the 30 DME to 35 DME step change were also received from recreational airspace users. They highlighted that the change presented an impediment to their ability to climb safely above terrain while remaining clear of controlled airspace. The Tasmanian Hang Gliding and Paragliding Association have submitted an airspace change proposal.
- The stakeholder comments received highlighted that occasionally the TWR frequency experienced congestion and over transmission occurrences

11. FINDINGS AND CONCLUSIONS

- An 73% increase in traffic movements occurred at Cambridge between December 2009 and June 2016. Hobart's total traffic movements saw a decline between December 2011 and December 2012 of 24.2%. Hobart has recovered with steady growth in total aircraft movements from December 2012 to June 2016 of 14%. Considering the period of December 2009 to June 2016, Hobart has seen an overall decline of traffic movements of 9.3%.
- The total annual PT passenger movements for Hobart (2.3 million) has exceeded the Class C airspace criteria threshold (1 million) in the Australian Airspace Policy Statement 2015 (AAPS). This requires CASA to complete an aeronautical risk review – hence this aeronautical study[26].
- Between December 2012 and June 2016, the average growth for PT movements have averaged at 2%. Based on this growth rate, PT movements would not exceed the next AAPS airspace criteria threshold (30,000 PT movements) until 2023 – 2024.
- The annual number of airspace related incidents[27] at Hobart has remained low. Between December 2009 and June 2016 there were seven recorded airspace related incidents. No injuries were recorded.
- There is a broad range of aircraft traffic mix and performance at Hobart and Cambridge aerodromes.
- Airline scheduling results in peaks between 09:00-13:00 and 15:00-19:00. These are the periods where congestion and delays are reported to occur.
- Current IFR traffic departing Hobart using runway 12, results in the Melbourne bound traffic remaining on the direct route via Launceston. The Sydney and Brisbane bound traffic are tracked to the fly-by waypoint at KAREN and NUNPA (Flinders Island). There is no outbound route crossover. Arriving aircraft for runway 12 via the CLARK waypoint, 31 NM to the northwest of Hobart creates two conflict points with outbound traffic during the climb phase.

[26] AAPS https://infrastructure.gov.au/aviation/aaps/files/Australian_Airspace_Policy_Statement_2015.pdf

[27] An airspace related incident is one that occurs whilst an aircraft is airborne. Airspace related incidents exclude mechanical issues.

- Traffic inefficiencies were observed as a result of these conflict points. This appears to create increased workload and traffic co-ordination for the Melbourne en route and Hobart TWR controller.

12. RECOMMENDATIONS

CASA applies a precautionary approach when conducting aeronautical studies and therefore the following recommendations are made:

Recommendation 1:
The existing airspace classification and architecture (apart from the one CTA step lower limit change, which is already the subject of an airspace change proposal) is appropriate and should remain unchanged.

Recommendation 2:
CASA should continue to monitor aircraft and passenger movements and incidents at Hobart over the next 24 months to determine whether the trend for growth continues. An aeronautical risk review should then be conducted if necessary.

Recommendation 3:
To improve efficiencies and predictability, taking into account PBN requirements Airservices should continue redesign work for flight routes into and out of Hobart, make improvements to existing TIFPs and introduce STARs into Hobart.

13. REFERENCES

- Airspace Act, 2007 http://www.comlaw.gov.au/Details/C2007A00038
- Airspace Regulations http://www.comlae.gov.au/ComLaw/Legislation/Act1.nsf/0/CBB21AA2AFCE9CA7CA2573970008AB2F/$file/0382007.pdf
- *Australian Airspace Policy Statement 2015.*
- Aeronautical Information Publication – effective 26 May 2016.
- Hobart Departure and Approach Procedures – effective 26 May 2016.
- Designated Airspace Handbook – effective 26 May 2016.
- En Route Supplement Australia – effective 26 May 2016.
- Hobart Visual Terminal Chart – effective 26 May 2016.
- Hobart Visual Terminal Chart – effective 18 November 2010.
- Hobart Visual Navigation Chart – effective 26 May 2016.
- En Route Chart Low (L1) – effective 26 May 2016.
- Terminal Area Chart (TAC3) Hobart – effective 26 May 2016.
- Hobart Airport website, arrival and departures.
- 2015 Hobart Airport Preliminary Draft Master Plan.
- Hobart Airport Master Plan – effective 18 December 2015
- Airservices 2014 Hobart, Cambridge and Launceston Airports Aircraft Noise Information Report Q4 http://www.airservicesaustralia.com/wp-content/uploads/Q4_2015_Hobart_Cambridge_Launceston_ANIR.pdf
- Airservices Airspace Research Application Trigger Criteria Summary Reports December 2009 to June 2016.
- ATSB Aviation safety investigations & reports webpage advanced search: Hobart, 01/12/2009 to 01/12/2015.
- ATSB: Terminology, investigation procedures, and deciding whether to investigate. http://www.atsb.gov.au/about_atsb/investigation-procedures.aspx
- Civil Aviation Safety Regulation (CASR) Manual of Standards (MOS) Part 173.
- ICAO: Guidance Material on Comparison of Surveillance Technologies.

ANNEX A – ACRONYMS AND ABBREVIATIONS

Acronym / abbreviation	Explanation
AAPS	Australian Airspace Policy Statement 2015
Act	*Airspace Act 2007*
ADS-B	Automatic Dependent Surveillance-Broadcast system
AIP	Aeronautical Information Publication
Airservices	Airservices Australia
AMSL	Above Mean Sea Level
AOPA	Aircraft Owners and Pilots Association
ARA	Airspace Research Application
ASA	Aviation Safety Advisor
ASIR	Aviation Safety Incident Report (recorded by ATSB)
ATC	Air Traffic Control
ATI	Air Transport Inspector
ATS	Air Traffic Service
ATSB	Australian Transport Safety Bureau
CAR	Civil Aviation Regulation 1988
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation 1998
CIRRIS	Corporate Integrated Reporting and Risk Information System
CTR	Control Zone
CTA	Control Area
DA	Danger Area
DAH	Designated Airspace Handbook
DAP	Departure and Approach Procedures
Defence	Department of Defence
DME	Distance Measuring Equipment
DTI	Directed Traffic Information
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERSA	En Route Supplement Australia
FIS	Flight Information Service
FL	Flight Level
FOI	Flying Operations Inspector
FPL	Flight Plan
ft	feet
GA	General Aviation
GNSS	Global Navigation Satellite System (navigation aid)
GPS	Global Positioning System (navigation aid)
hrs	hours
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
ILS	Instrument Landing System (navigation aid)
kg	kilograms
km(s)	kilometre(s)
kt(s)	knot(s)
LL	Lower level
MHz	MegaHertz
MOS	Manual of Standards

Acronym / abbreviation	Explanation
MTOW	Maximum Take Off Weight
NavAid	Navigation Aid
NM	nautical miles
NOTAM	Notice to Airmen
OAR	Office of Airspace Regulation
PBN	Performance Based Navigation
PT	passenger transport
RA	Restricted Area
RAPAC	Regional Airspace and Procedures Advisory Committee
RFDS	Royal Flying Doctor Service
RPT	Regular Public Transport
SFC	Surface
SIIMS	Safety Investigation Information Management System
STARs	Standard Arrival Routes
SVFR	Special Visual Flight Rules
TCAS	Traffic Alert and Collision Avoidance System
TIFPs	Terminal Instrument Flight Procedures
TWR	Tower
VFR	Visual Flight Rules
VHF	Very High Frequency
VIS	Visibility
VMC	Visual Meteorological Conditions
VNC	Visual Navigation Chart
VOR	VHF Omni-Directional Radio Range
VTC	Visual Terminal Chart
WAM	Wide Area Multilateration

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	Instrument Flight Rules (IFR) only. All aircraft require a clearance from Air Traffic Control (ATC) and are separated by ATC. Continuous two-way radio and transponder required. No speed limitation.
B	Not currently used in Australia.	
C	In control 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 Hobart, 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 takeoff and landing. All aircraft require continuous two-way radio and are speed limited to 200 kt IAS at or below 2,500 ft 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 are provided with traffic information on all VFR. ▪ VFR receives traffic on all other aircraft but are 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	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

Position	Organisation
AOPA Office	Aircraft Owners and Pilots Association (AOPA)
ATC Line Manager	Airservices Australia
ATC Sector Controllers	Airservices Australia
Hobart TWR Manager	Airservices Australia
Business Readiness Manager	Airservices Australia
Initiatives Delivery	Airservices Australia
Aerodrome Inspector (AI)	CASA, Air Navigation, Airspace and Aerodrome Branch
Air Transport Inspector (ATI)	CASA, Operations Division
Flying Operations Inspector (FOI)	CASA, Operations Division
Aviation Safety Advisor (ASA)	CASA, Safety Analysis & Education Division
Defence Liaison Manager	Department of Defence
Operations Coordinator	Hobart Airport
Managing Director	Par-Avion (Airlines of Tasmania)
Chief Flight Instructor	Par-Avion Flight Training
Head of Safety & Compliance	Qantas Airways
Secretariat	Regional Airspace and Procedures Advisory Committee
General Manager	Rotor-Lift Aviation
Instructor	Rotor-Lift Aviation
Pilot RFDS South Eastern Section	Royal Flying Doctor Service
Senior Safety Officer	Tasmanian Hang Gliding and Paragliding Association
Head of Training and Checking	Tiger Airways
Regional Flight Operations Manager	Virgin Australia

ANNEX D – DEFINITIONS AND EXPLANATION OF TERMS

Restricted Area: The declaration of a Restricted Area (RA) creates airspace of defined dimensions within which the flight of aircraft is restricted in accordance with specified conditions. Clearances to fly through an active RA are generally only withheld when activities hazardous to the aircraft are taking place, or when military activities require absolute priority. RAs are mainly declared over areas where military operations occur. However, RAs have also been declared to cater for communications and space tracking operations or to control access to emergency or disaster areas. RAs are generally promulgated at specified times and dates. For example, a temporary RA may be declared for special events where there may be a public safety issue – such as the Avalon Air Show or the Commonwealth Games.

Danger Area: The declaration of a Danger Area (DA) defines airspace within which activities dangerous to the flight of aircraft may exist at specified times. Approval for flight through a DA outside controlled airspace is not required. However, pilots are expected to maintain a high level of vigilance when transiting DAs. DAs are primarily established to alert aircraft on the following:

- Flying training areas where student pilots are learning to fly and / or gather in large numbers;
- Gliding areas where communications with airborne gliders might be difficult;
- Blasting on the ground at mine sites;
- Parachute operations;
- Gas discharge plumes; and
- Small arms fire from rifle ranges.

ANNEX E – STAKEHOLDER CONSULTATION/FEEDBACK REGISTER

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
1	Local Operator	Flying school and charter	The report noted there was a reduction in movements in Hobart, however this was due to the bankruptcy of light charter aircraft operator based at Hobart. The number of passengers into the airport has grown, as have the number of IFR jet movements. There is an overall growth in traffic across both airports during this period. The report doesn't make this distinction directly and due to the nature of the two airports they should be considered as one entity	Noted.	June 2016 movement data added to report.	The study did consider the movements of both aerodromes together. Hobart's overall movements experienced a decline between December 2011 and December 2012. Movements continued increase to 26,000. The data does support that in that time period, the traffic mix changed and other aircraft types were introduced into Hobart. These larger aircraft support the incremental growth in movements but it also demonstrated the clear growth in passengers.
			Cambridge Airport does have lights, and is used for night operations, including flying training.	Noted.	Details regarding runway lighting at Cambridge have been amended.	
			The report doesn't comment as to the cost to fix the TASWAM system, as was told to Industry, would be providing surveillance coverage to Hobart/Launceston. There are numerous RAPAC meeting comments made that industry were told (as a consequence of the ministerial directive)	Noted. Airservices was invited to respond with further detail.	*Airservices provided the following response:* Because each WAM is designed to meet certain objectives in a particular airspace environment, with constraints of	

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
					geography, site determination and the availability of communications, a detailed analysis would need to be undertaken before any accurate cost estimate could be provided. There are also ongoing staffing costs to provide the service, including the provision of an additional console. To determine levels of air traffic service provision nationally, a risk based approach is employed, and this is dependent on the volume and complexity of air traffic in a particular airspace. Based on the current complexity of air traffic Airservices will continue to employ the surveillance coverage available in the area to manage operational risk, and there is currently no intent to provide a surveillance approach service H24 at Hobart.	

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
			Comment was also made in reference to the Ministers Direction with regards to surveillance. Claims have been made that Airservices have ignored this directive and gone for a solution which did not meet the design requirements of what the minister at the time directed.	Noted. Airservices was invited to respond with further detail.		*Airservices provided the following response:* *Airservices considers the surveillance to be adequate for the current volume of traffic, as demonstrated in this report. Airservices is evaluating the use of ADS-B below 7,000 ft AMSL with the current ADS-B coverage. Airservices is seeing an increase in surveillance effectiveness as IFR aircraft equip to meet the ADS-B mandate and as VFR aircraft voluntarily equip with ADS-B.*
2	Industry Stakeholders	Page 23 (Section 6.3)	Cambridge Airport does have lights, and is used for night operations, including flying training.	Noted.	Report amended.	
		Page 5 and page 36	Stakeholder comment highlighted an error regarding the reports reference to the number of traffic crossover points located just outside 35 NM from Hobart. The report indicated that the use of waypoint CLARK acted as a single feeder waypoint forcing traffic crossovers that occurs within CTA. Stakeholder comments suggests the basic route structure for Hobart provides laterally displaced arrival and departure routes, with	Noted.	Report amended.	Comments were considered and verified. Report has been updated.

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
			crossovers designed to be done inside the terminal airspace. Further comments went on to suggest that given the increased availability of surveillance coverage in recent years it became practice between TWR and En Route to process Brisbane/Sydney arriving traffic via CLARK when RWY 12 is in use. This mode significantly increases workload and complexity in the En Route TAS sector as there are consequential route crossovers between Melbourne/Sydney/Brisbane bound traffic. However this management mode significantly simplifies the TWR traffic pattern with no crossovers in the terminal airspace.			
		Page 6 and page 37	Comment received from stakeholders highlighted the reports comment that "Current IFR traffic departing Hobart using runway 12, results in the Melbourne bound traffic remaining on the direct route. The Sydney and Brisbane bound traffic are tracked to the fly-by waypoint at CLARK. The CLARK waypoint is approximately 31 NM to the northwest of Hobart. This creates two conflict points with outbound traffic during the climb phase." Feedback from stakeholder suggested this was incorrect. Melbourne bound traffic off RWY 12 routes via Launceston. Sydney and Brisbane bound traffic off RWY 12 routes via waypoint KAREN and NUNPA (Flinders Island). The is no route crossover.	Noted	Recommendation added	Comment has been clarified with Airservices. Comments have been amended within the report.

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
		Page 5 and page 36	Stakeholder comment was provided regarding the following reported issue. "Airservices controllers manage workload by the division of control responsibility into two sectors: the Tasmania sector and the Huon sector. These sectors can be combined, however with little warning the combined sectors can present on occasion, unpredictable levels of activity resulting in rapid increases in controller workload for short periods." Comments suggested it would be more accurate if the report reflected the following; "The TAS and HUO sectors are virtually always operated combined although it is possible for them to be de-combined. Airservices does not currently resource these sectors to be operated de-combined for more than half an hour, nor are the controllers familiar or confident with operating the sectors de-combined. Workload on the combined sectors can, however, increase rapidly although usually it is possible to predict these peaks in the short term with reasonable reliability."	Noted	Report will be amended to reflect this	Comment has been clarified with Airservices. Comments have been amended within the report.
		Chapter 7 Page 26-30	A stakeholder raised the observation that the Aeronautical Study of Hobart did not consider the annual distribution of traffic volumes in respect to seasonal influences. It was suggested by the stakeholder that this influence my inflate traffic density at certain times of the year and as a result increase risk.	Traffic data collected is annualised but is also considered in conjunction with the Airspace Criteria thresholds (AAPS 2015) and Incident and Accident data.	No further action.	CASA considered seasonal influences in conjunction with other qualitative and quantitative data. No further action.

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
		Section 4.4 Surveillance, Page 16-18	Stakeholder comment received claimed that the study misunderstood the nature of the Tasmanian surveillance system architecture. In particular the ADS-B coverage is, in fact, both excellent and highly redundant. The IFR ADS-B mandate from 2017 will ensure that all IFR aircraft are within reliable surveillance coverage at all times when within the Hobart terminal airspace.	Noted.	CASA sought to have the surveillance component reviewed by Airservices. Study has addressed this appropriately.	Airservices is evaluating the use of ADS-B below 7,000 ft AMSL with current ADS-B coverage. There are currently no plans to increase the multilateration/SSR coverage in the Hobart area. Airservices is seeing an increase in surveillance effectiveness as IFR aircraft equip to meet ADS-B mandate and as VFR aircraft voluntarily equip with ADS-B.
		Recommendation 3	Stakeholder comment received relating to recommendation 3: *To improve efficiencies and predictability, taking into account PBN requirements Airservices should continue redesign work for flight routes into and out of Hobart, make improvements to existing Terminal Instrument Flight Procedures (TIFPs) and introduce STARs into Hobart.* Stakeholder commented that there are some significant problems with the introduction of RNP1 SIDs and STARs into a non-surveillance environment such as Hobart. It was added that these problems would be rectified if and work well in a well surveilled environment.	Noted. CASA referred to Airservices.		Refer to the answer to 'Question 1' in the list of questions from CASA to Airservices below.

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
3	CASA Questions to Airservices	The following general questions were raised from other industry stakeholders. These questions were presented to Airservices seeking further detail.	**1.** In terms of air route design, can Airservices confirm that the basic route structure for Hobart provides a laterally displaced arrival and departure routes with crossovers designed to be done inside or outside the terminal airspace?	Noted.	Report amended.	**Airservices response:** *Yes, it is Airservices intention that route structures for Hobart will provide laterally displaced arrival and departure routes with crossovers minimised as far as practicable*.
			2. Can Airservices confirm that Hobart TWR and Melbourne En Route agree to process only Brisbane/Sydney arriving traffic via CLARK when RWY 12 is in use?			**Airservices response:** *Currently, traffic processing off published routes is negotiated tactically between tower and enroute. Airservices plans to implement a route structure that minimises crossovers through the use of segregated flight paths to reduce complexity. The most appropriate point will be determined via modelling.*
			3. Can Airservices confirm that by operating in this mode of using waypoint CLARK significantly increase the workload and complexity in the En Route TAS sector as a result of route crossovers between Melbourne/Sydney/Brisbane-bound traffic and the inbound traffic from Sydney/Brisbane?			**Airservices response:** *Currently, traffic processing off published routes is negotiated tactically between tower and enroute, with both units having responsibility to*

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
						manage their own workload appropriately. Airservices plans to implement a route structure that minimises crossovers through the use of segregated flight paths to reduce complexity.
			4. If crossovers are to occur where would Airservices controllers prefer the crossover, within the En Route airspace or within the terminal airspace of Hobart?			**Airservices response:** *Independent modelling will help to identify the conflict pairs and will inform decision making on the appropriate positions for any required crossovers*
			5. Can Airservices confirm that Departures for Melbourne off Hobart RWY 12 are routed via Launceston? And Sydney and Brisbane bound traffic departing Hobart RWY 12 are routed via waypoint KAREN and NUNPA (Flinders Island)?			**Airservices response:** *These are the current published routes. Future routes are to be developed that will standardise traffic processing for all departures.*
			6. With the route redesign work currently underway for Hobart, will Airservices consider the crossover points being separated using PBN track spacing requirements for aircraft to reach or leave levels prior to the crossing tracks area of			**Airservices response**: *Airservices confirms that this will be considered with respect to ICAO SID/STAR*

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
			conflict by design? (This may reduce ATC and pilot transmissions to establish and release requirements while addressing potential frequency congestion).			*phraseology.*
			7. Does Airservices operate the TAS and HUO sectors as combined sectors in all occasions?			**Airservices response:** Current staffing is based on TAS and HUO sectors operating in a combined configuration for normal daily operations. Notwithstanding, Airservices recently reconfigured HUO to be split during busy summer months.
			8. Are there any occasions where these sectors might be de-combined? Why might this occur?			**Airservices response:** See previous response.
			9. What would be required for Melbourne Centre to provide surveillance approach services at Hobart H24 to the surface?			**Airservices response**: A risk based approach is employed to determine levels of air traffic service provision nationally, and this is dependent on the volume and complexity of air traffic in a particular airspace. Airservices will

No.	Stakeholder / Commentator	Reference	Comment	CASA response	Action	Response
						continue to employ the surveillance coverage available in the area to manage operational risk, and there is currently no intent to provide a surveillance approach service H24 at Hobart.
			10. What is the approximate cost in providing this type of service?			**Airservices response:** **<u>Surveillance</u>**: Radar: As previously provided, the cost of installing and commissioning ground based radar surveillance equipment to serve Hobart is considerable, with costs in the order of $10 - $12 million to install, with ongoing costs of $140,000 per annum. **WAM:** Because each WAM is designed to meet certain objectives in a particular airspace environment, with constraints of geography, site determination and the availability of

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						communications, a detailed analysis would need to be undertaken before any accurate cost estimate could be provided. **<u>Console and staff</u>**: Procedural approach services are provided to both Hobart and Launceston outside of tower hours. Any change to operations in Hobart would require an assessment of the like-type services provided in Launceston. It is anticipated that the additional resources required are one discrete Eurocat console, and ten controllers. Note: • These figures are based on the need to man the new console 0600-2200 local (in addition to current night-time requirements) which would require a minimum of four controllers

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						per day (two morning shifts and two afternoon shifts). • Daytime approach services could not be combined with any other types of service (i.e. enroute control over Tasmania). • If surveillance approach services were provided at both Hobart and Launceston, it is assumed that these services would be run concurrently on the same console. • Existing staffing within the affected group are not sufficient to cover the additional console therefore the new console is considered stand-alone. • Annual leave requirements for the additional staff have been factored

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						in. • There would be no staff savings in either Hobart or Launceston towers. In addition to the above: • a more in-depth assessment would need to be completed on the resources required to transition to the new mode of operations which would include items such as procedures development, training and supervision. • A safety assessment on the appropriateness of running two surveillance approach services simultaneously with day-time traffic levels would need to be completed. • Should the two approach services need to be de-

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						combined for short periods, it is expected that this could be achieved via the use of existing infrastructure, (with the inclusion of the additional console) however should the two services be required to operate independently on a permanent basis, a separate review would be required. However, to determine levels of air traffic service provision nationally, a risk based approach is employed, and this is dependent on the volume and complexity of air traffic in a particular airspace. Based on the current complexity of air traffic Airservices will continue to employ the surveillance coverage available in the area to manage operational risk, and there is currently no intent to provide a surveillance approach

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						service H24 at Hobart.
			11. What are the technical limitations on TASWAM surveillance that prevents it being used to the surface?			**Airservices response:** Broadly, the issue is with the RU geometry. Additional RUs may help, but the communication network design (and reliability) does not support the standards required for surveillance terminal area operations (for the multilateration component). This is not a level of air traffic service delivery intended in Tasmania based on the current volume and complexity of traffic flows.
			12. How long would it take to solve any technical limitations of the existing TASWAM system so it may provide effective surveillance to the surface?			**Airservices Response**: It is estimated that it will take approximately 12 months and there are no plans to do so.
			13. The use of electronic surveillance at lower levels would enhance the efficiency of the airspace. What plans does Airservices have to increase the effectiveness of the electronic surveillance in the vicinity of Hobart?			*Airservices provided the following response:* Airservices is evaluating the use of ADS-B below 7,000 ft

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						AMSL with the current ADS-B coverage. Airservices is seeing an increase in surveillance effectiveness as IFR aircraft equip to meet the ADS-B mandate and as VFR aircraft voluntarily equip with ADS-B.