1 Executive Summary

This aeronautical study was commissioned in response to the Government's expectation under the Australian Airspace Policy Statement (AAPS) for the Civil Aviation Safety Authority (CASA) to undertake regular and ongoing studies to meet its obligations under Section 13 of the Airspace Act 2007 (Act). The Office of Airspace Regulation (OAR) undertakes a risk based approach in determining which locations are studied.

The purpose of the study is to review the airspace classification within 45 nautical miles (nm) of Melbourne aerodrome, Victoria. Particular emphasis is placed on the safety of Passenger Transport (PT) operations.

1.1 Operational Context

Melbourne aerodrome is situated approximately 19 kilometres north-west of Melbourne’s Central Business District. Melbourne aerodrome (hereafter referred to as Melbourne) is a certified aerodrome operated by Australia Pacific Airports (Melbourne) Pty Ltd under a 50-year long-term lease from the Federal Government. The aerodrome caters for more than 25 million passengers (International and Domestic) passing through the terminal and over 192,900 PT flights a year.

In addition to the four major aerodromes (Melbourne, Avalon, Essendon and Moorabbin) there are 27 aerodromes within 45 nm of Melbourne. The majority of the aerodromes are privately owned and operated. Issues associated with the smaller aerodromes are covered in the stakeholder consultation, Section 7.

The aerodromes at Ballarat, Bendigo, Mangalore and Latrobe Valley are outside the scope of the study but have a high level of aviation activity. Operators at these aerodromes were invited to provide stakeholder comment.

The airspace within 45 nm of Melbourne is used by PT operators, the Department of Defence (Defence), Emergency Services, flying training organisations, charter companies, private pilots, skydiving operators, gliding clubs, balloon operators, hang gliders and recreational (ultralight and microlight) pilots.

The airspace surrounding Melbourne from the surface to Flight Level (FL) 180 comprises:

a. Class C Control Zone (CTR);
b. Class C controlled airspace;
c. Class D CTR;
d. Class E controlled airspace;
e. Class G uncontrolled airspace;
f. Restricted Areas; and
g. Danger Areas.

All of the Air Traffic Services (ATS) within the study airspace are provided by Airservices Australia (Airservices).

Melbourne airspace is covered by two radar sites, one located at Gellibrand Hill (Melbourne Approach) and one located at Mount Macedon (Melbourne Regional). Gellibrand Hill has both Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR) units. The Mount Macedon site is equipped with a SSR unit.

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1 A full list of acronyms 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.
1.2 Issues
The key issues raised by airspace users during the generative interviews, questionnaires and stakeholder forums have been identified as follows:

- Access to the Melbourne CTR by aircraft operating under Visual Flight Rules (VFR) is restricted.
- The absence of co-ordination between Moorabbin Tower and Melbourne Terminal Control Unit (TCU) restricts access for VFR flights to the Melbourne Control Area (CTA).
- The ATS delivered in the Avalon Class D airspace and the Moorabbin Class D airspace are different. This results in difficulty for flight instructors to teach students a standard set of procedures when there is no consistency in the service provided.
- The Moorabbin Flying Training Areas, Danger Areas (D314 and D315), are no longer sufficient in size for training. Housing development and Fly Neighbourly Advice (FNA) effectively reduce the useable size. Frequency management in the training area (D315), south of the Melbourne Radar boundary, is a concern.
- The Non-Directional Beacon (NDB) and Area Navigation (RNAV) Instrument Approach Procedures (IAPs) for Moorabbin are not contained within CTA. These IAPs do not meet the Civil Aviation Safety Regulation (CASR) Part 173 Manual of Standards (MOS) requirements.
- The buffers for the IAPs for Avalon are not contained within CTA and do not meet the CASR Part 173 MOS requirements.
- Airspace infringements (formally known as Violations of Controlled Airspace) occur throughout the Melbourne airspace.
- Aircraft holding at the IFR waypoint TEMPL, north of Avalon, will be contained within Class C and Class E airspace and alternate between the two classes.
- IFR training at the Cowes Navigation Aids (NavAids) is confined due to the proximity of the Restricted Areas R323A, R323B and R339.
- A review and update of all VFR reporting and approach points should be carried out. A number of points such as GMH, Academy and Mount Cottrell are now hard to identify.
- The VFR route that connects Carrum to Laverton gets congested. The VFR route follows the edge of Port Phillip Bay from Moorabbin to the Bureau of Meteorology (BOM) Tower near Laverton takes aircraft within 1 nm of the Melbourne 1,500 foot Class C CTA step.
- Three different height CTA steps intersect within a short distance of the Bacchus Marsh aerodrome.
- Rising terrain to the west (Brisbane Ranges to south-west and hills to the west and north west) and the base of the adjacent CTA restrict gliding operations at Bacchus Marsh.
- Radio communication between aircraft on the ground at the Little River aerodrome and Avalon Approach is not available.
• Aeronautical Information Publication (AIP) errors and omissions:
  o The Sunbury East aerodrome is shown on the Melbourne Visual Terminal Chart (VTC) but not the Melbourne Visual Navigation Chart (VNC) or the Melbourne Terminal Area Chart (TAC).
  o The Melbourne VTC inset incorrectly shows the western VFR route in the vicinity of the Laverton BOM Tower.
  o The vertical limits of the Restricted and Danger Areas are not depicted on the VTC Inset.
  o The Lethbridge aerodrome is not marked on the Melbourne World Aeronautical Chart (WAC). It is marked on the Melbourne VNC and the En-Route Chart Low (ERC-L2).
  o Typographical errors on the VTC Inset. The word procedures is misspelt in the two information boxes.

1.3 Findings / Conclusions
• The restricted access to the Melbourne CTR by VFR aircraft affects flying training and private pilots. A recently introduced procedure allows helicopters to transit the CTR, but not fixed wing aircraft.
• Co-ordination between Moorabbin Tower and Melbourne TCU would assist VFR flights within the Melbourne CTA.
• Consistency in the way Avalon Class D airspace and the Moorabbin Class D airspace are being controlled would assist flight instructors and students.
• The Moorabbin Flying Training Areas, Danger Areas D314 and D315, should be dis-established. Flying training organisations should utilise areas away from housing development for training.
• The Victorian Chapter of the Australian Aerobatic Club should submit an Airspace Change Proposal (ACP) to establish a Danger Area to cover the proposed aerobatic area north of Tooradin.
• A published procedure to assist radio frequency management south of the Melbourne Radar boundary would enhance operations.
• A comprehensive review of the IAPs for Moorabbin should be conducted to determine compliance with CASR Part 173 MOS requirements.
• Pilot education and promotional material may reduce the number of airspace infringements throughout the Melbourne CTR.
• Access to ILS navigation aids restricts IFR training opportunities.
• The safety of aircraft holding at the IFR waypoint TEMPL is not compromised due to the aircraft alternating between the two classes of airspace.
• Pilot education programs and providing access by VFR aircraft to the Melbourne CTA would reduce the congestion in the VFR route which connects Carrum to Laverton.
• Three different height CTA steps intersecting within a short distance of the Bacchus Marsh aerodrome contribute to the airspace infringements in the area.
The proposed introduction of a Class C airspace step, with a Lower Limit (LL) of 6,500 feet (ft) Above Mean Sea Level (AMSL) to the west of Bacchus Marsh would assist gliding operations in the area.

Radio communication difficulties between aircraft on the ground at the Little River aerodrome and Avalon Approach should be addressed.

Updating the aeronautical charts will enhance the situational awareness of pilots.

1.4 Recommendations

It is important to note that the study may make recommendations based on existing and projected data. The following comment as summarised by Chief Justice Sir Harry Gibbs of the High Court of Australia has been considered while conducting the study:

> Where it is possible to guard against a foreseeable risk which, though perhaps not great, nevertheless cannot be called remote or fanciful, by adopting a means which involves little difficulty or expense, the failure to adopt such means will in general be negligent.  

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

1. Representatives from the flying schools in the Melbourne area should meet with Airservices Australia (Airservices) to discuss options for increasing access to the Melbourne CTA and CTR by student pilots and VFR aircraft.

2. Airservices should investigate opportunities to co-ordinate VFR departures from Moorabbin with Melbourne TCU for flights within the Melbourne CTA.

3. Airservices’ Continuous Standards Improvement Section should investigate the belief that the ATS delivered in Avalon Class D airspace is different from that in Moorabbin Class D airspace.

4. Airservices should review the IAPs for Moorabbin to determine compliance with CASR Part 173 MOS requirements. The review should include options for airspace redesign.

5. The Moorabbin Flying Training Areas, Danger Areas D314 and D315, should be dis-established.

6. An ACP should be submitted by the Victorian Chapter of the Australian Aerobatic Club to establish a Danger Area for aerobatics north of Tooradin.

7. Airservices’ Safety Promotions team and CASA’s Safety Analysis, Education and Promotions Division should review the airspace infringements then formulate and deliver an educational awareness program for flying in the Melbourne basin and surrounding airspace.

8. The gliding community at Bacchus Marsh should submit an ACP to introduce a Class C step with a LL of 6,500 ft AMSL to the west.

9. The users of the Little River aerodrome should meet with Airservices to discuss options for gaining airways clearances whilst on the ground at Little River.

10. Airservices should review and update the aeronautical charts for Melbourne.

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3 Gibbs, Chief Justice Sir Harry. *Turner v State of South Australia* (1982). High Court of Australia before Gibbs CJ, Murphy, Brennan, Deane and Dawson JJ.
1.5 Next Step
Stakeholders are requested to provide feedback on the study to oar@casa.gov.au no later than **22 June 2011**. CASA will normally attribute feedback to its author, however if a request is made to not disclose your identity CASA will not publish your name. However, this is subject to CASA's obligations under the Freedom of Information Act 1982. Following the consultation and feedback period CASA will finalise and publish their final recommendations.
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2 Introduction

The Office of Airspace Regulation (OAR) within the Civil Aviation Safety Authority (CASA) has sole 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.4

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

a. protection of the environment;
b. efficient use of that airspace;
c. equitable access to that airspace for all users of that airspace; and
d. national security.’

2.1 Overview of Australian Airspace

In line with the International Civil Aviation Organization (ICAO) Annex 11 and as described in the Australian Airspace Policy Statement (AAPS), Australian airspace is classified as Class A, C, D, E and G depending on the level of service required to manage traffic safely and effectively. Class B and Class F are not currently used in Australia. The classification determines the category of flights permitted and the level of air traffic services (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.

Non-controlled aerodromes in Australia are subject to Common Traffic Area Frequency (CTAF) procedures. Pilots of aircraft operating at all registered, certified, Military and CASA designated aerodromes are required to carry and use a Very High Frequency (VHF) radio. Further information about aircraft operations at non-towered aerodromes can be found on the CASA website:


2.2 Purpose

The purpose of this aeronautical study was to conduct a risk assessment of the airspace within 45 nautical miles (nm) of Melbourne aerodrome, Victoria.

The study forms part of the OAR program of work to review Australia’s airspace as required by the Act.

The outcome of the study is to demonstrate that all sensible and practicable precautions are in place to reduce the risk to acceptable levels. For the purpose of this study, a multifaceted approach was used including quantitative and qualitative analysis consisting of:

- Stakeholder interviews;
- Industry forums;
- Questionnaires;
- Risk Assessment; and
- Site visits.

---

4 Civil Aviation Act 1988, Section 9A – Performance of Functions
2.3 Scope

The scope of the study includes identification and consultation with stakeholders to gather necessary data and information related to airspace issues within 45 nm of Melbourne aerodrome. As a minimum, this includes consultation with Regular Public Transport (RPT) operators, Charter operators, Flying Training Schools, Department of Defence (Defence), Emergency Services operators and the Aerodrome Operators.

The study’s scope must also consider CASA’s responsibilities in adopting a proactive approach to assess the Australian airspace system and its operations, and to identify and pursue airspace reform opportunities. The AAPS offers clear guidance to CASA on the Government’s airspace strategy and policy as well as processes to be followed when changing the classification or designation of particular volumes of Australian administered airspace.

The scope of this study is not intended to examine aerodrome facilities and infrastructure issues unless any weakness or failings in these areas have a significant impact on the safety of airspace operations.

2.4 Objective

The objective of this study is to examine the airspace within 45 nm of Melbourne Aerodrome to determine the appropriateness of the current airspace classification. This was accomplished by:

a. Investigating through stakeholder consultation, the appropriateness of the current airspace classification, access issues, instrument approach design\(^5\) issues, expected changes to the current traffic levels and mix of aircraft operations within the existing airspace;

b. Assessing the opportunity to adopt proven international best practice airspace systems adapted to benefit Australia’s aviation environment as required by the AAPS\(^6\);

c. Analysis of current traffic levels and mix of aircraft operations within the existing airspace in relation to the level of services provided;

d. Identifying any threats to the operations, focussing as a priority on the safety and protection of Passenger Transport (PT) services;

e. Carrying out a qualitative and quantitative risk assessment of the current airspace environment and the expected impact of any changes;

f. Identifying appropriate and acceptable risk mitigators to the known threats;

g. Reviewing extant Aeronautical Information Publication (AIP) entries for applicability;

h. Ensuring that the issues are passed onto the relative stakeholder group for their consideration; and

i. Providing assurance to the Executive Manager Airspace and Aerodromes Division of the levels of airspace risk associated within 45 nm of Melbourne Aerodrome.

The OAR issues a review of its Permanent Legislative Instruments on a bi-annual basis. Any changes to airspace determined by this study with respect to airspace classifications, air routes, prohibited, restricted or danger areas will be reflected in these Instruments.

---

\(^5\) Refer to Civil Aviation Safety Regulations (CASR) Manual of Standards (MOS) Part 173.

3 Airspace

3.1 Airspace Structure

The airspace within 45 nm of Melbourne is a mix of controlled airspace (Class C, Class D and Class E) and uncontrolled Class G. Refer to Figure 1 for an extract from the Melbourne Visual Navigation Chart (VNC).

Air Traffic Control (ATC) Towers operate at Melbourne, Avalon, Essendon and Moorabbin aerodromes. The airspace volumes are discussed in detail in Section 4.

The airspace contains a number of Restricted and Danger Areas. An explanation of terminology can be found in Annex C. Restricted Areas are discussed in detail in Section 5. Danger Areas are discussed in detail in Section 6.
3.2 Aircraft Management

Air Traffic Services (ATS) in the Melbourne basin are provided by Melbourne Terminal Area (TMA). The controllers are based in the Melbourne ATS Centre, as opposed to a Terminal Control Unit, that would be found at locations such as Perth, Sydney, Cairns or Adelaide. ATC Towers operate at Melbourne, Essendon, Avalon and Moorabbin aerodromes:

- Melbourne Tower operates 24 hours a day, 7 days a week.
- Essendon Tower is active 0615–2200 (Local) Monday–Friday and 0700–2200 (Local) on weekends. Essendon ATC is allocated the south east quadrant of the Melbourne control zone (CTR) and adjacent Class C step up to 2,000 feet (ft) Above Mean Sea Level (AMSL). Outside Essendon Tower hours, Melbourne Approach is responsible for all aircraft operating into and out of Essendon aerodrome, including the south east quadrant of the Melbourne CTR normally controlled by Essendon Tower.
- Avalon Tower is active 0700–2000 (Local) daily. It does not generally operate any airspace — this is operated by Avalon Approach (Melbourne Terminal Control Unit (TCU) 24 hours a day). Avalon Tower operates a circuit release of airspace when required. Outside Tower hours non-controlled aerodrome procedures apply.
- Moorabbin Tower is active 0800–2000 (Local) Monday–Friday and 0800–1900 (Local) on weekends. Moorabbin ATC operates the Class D airspace from the surface to 2,500 ft AMSL within the lateral boundaries of the Moorabbin CTR. Outside Tower hours non-controlled aerodrome procedures apply.

Within the Class G airspace, a Directed Traffic Information (DTI) service is provided by controllers to aircraft operating under Instrument Flight Rules (IFR). A flight following service is available for aircraft operating under Visual Flight Rules (VFR) where surveillance is available, depending on controller workload.

There are five Restricted Areas within 45 nm of Melbourne. Defence is the controlling authority for four of the areas and Snowy Hydro Laverton is the controlling authority for one. There are an additional five Restricted Areas adjacent to the study area for which Defence is the controlling authority. The Restricted Areas are discussed in detail in Section 5.

There are seven Danger Areas within 45 nm of Melbourne. The Danger Areas are discussed in detail in Section 6.

3.3 Surveillance

Melbourne airspace is covered by two radar sites, one located at Gellibrand Hill (Melbourne Approach) and one located at Mount Macedon (Melbourne Regional).

Gellibrand Hill has both Primary Surveillance Radar (PSR) and Secondary Surveillance Radar (SSR) units. The PSR has a range of 50 nm whilst the SSR has a range of 255 nm. Mount Macedon has a SSR unit with a range of 255 nm.

Radar coverage is reliable above 2,000 ft AMSL throughout the study airspace. Radar coverage is available to the surface, within the Melbourne CTR and to the south of Melbourne aerodrome.

7 During daylight saving time the hours are changed to: Monday, Thursday and Friday 0800–2100 (Local), Tuesday and Wednesday 0800–2200 (Local), 0800–1900 (Local) on weekends.
4 Details of Melbourne airspace managed by Airservices

Airservices manages the controlled airspace within 45 nm of Melbourne. The airspace is a complex mix of Class C (Melbourne and Essendon CTRs and Class C steps), Class D (Avalon and Moorabbin CTRs), Class E (Avalon) and numerous Restricted Areas and Danger Areas. There are over 745,000 aircraft movements within the study airspace per year.

In addition to the four major aerodromes (Melbourne, Avalon, Essendon and Moorabbin) there are 27 aerodromes within 45 nm Melbourne. Aerodromes are located at:

<table>
<thead>
<tr>
<th>Airfield</th>
<th>Airfield</th>
<th>Airfield</th>
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</thead>
<tbody>
<tr>
<td>Bacchus Marsh</td>
<td>Lethbridge</td>
<td>Riddell</td>
</tr>
<tr>
<td>Barwon Heads</td>
<td>Lilydale</td>
<td>Romsey</td>
</tr>
<tr>
<td>Ceres</td>
<td>Little River</td>
<td>St. Leonards</td>
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<tr>
<td>Coldstream</td>
<td>Melton</td>
<td>Sunbury East</td>
</tr>
<tr>
<td>Drysdale</td>
<td>Moriac</td>
<td>Tooradin</td>
</tr>
<tr>
<td>Fiskville</td>
<td>Nar Nar Goon</td>
<td>Torquay</td>
</tr>
<tr>
<td>Geelong</td>
<td>Penfield</td>
<td>Tyabb</td>
</tr>
<tr>
<td>Guildford</td>
<td>Point Cook</td>
<td>Werribee</td>
</tr>
<tr>
<td>Kyneton</td>
<td>Puckapunyal</td>
<td>Yeaburn</td>
</tr>
</tbody>
</table>

The majority of the aerodromes are privately owned and operated.

The aerodromes at Ballarat, Bendigo, Mangalore and Latrobe Valley are outside the scope of the study but have a high level of aviation activity. Operators at these aerodromes have been invited to provide stakeholder comment.

The airspace is used by PT operators, Defence, Emergency Services, flying training organisations, charter companies, private pilots, skydiving operators, gliding clubs, balloon operators, hang gliders and recreational (ultralight and microlight) pilots.

The airspace within 45 nm Melbourne managed by Airservices has been divided into 11 sections for analysis and discussion. For further information, refer to the section noted below in square brackets.

1. Melbourne CTR, from surface (SFC) to 1,500 ft AMSL [Section 4.3]
2. Class C step Lower Limit (LL) 1,500 ft AMSL [Section 4.4]
3. Class C step LL 2,000 ft AMSL [Section 4.5]
4. Class C step LL 2,500 ft AMSL [Section 4.6]
5. Class C step LL 3,500 ft AMSL [Section 4.7]
6. Class C step LL 4,500 ft AMSL [Section 4.8]
7. Class C step LL 7,500 ft AMSL [Section 4.9]
8. Class C step LL 8,500 ft AMSL [Section 4.10]
9. Moorabbin CTR from SFC to 2,500 ft AMSL [Section 4.12]
10. Avalon CTR from SFC to 2,500 ft AMSL [Section 4.14]
11. Avalon Class E steps 1,500 ft AMSL to 4,500 ft AMSL [Section 4.15]

Controlled airspace managed by Airservices can be seen in Figure 2 below. Restricted and Danger Areas managed by Airservices are covered in Section 5 and Section 6 respectively.
Figure 2: Airspace managed by Airservices within 45 nm Melbourne.
4.1 Melbourne Aerodrome

Melbourne aerodrome (hereafter referred to as Melbourne) is a certified aerodrome operated by Australia Pacific Airports (Melbourne) Pty Ltd under a 50 year long-term lease from the Federal Government. The aerodrome caters for more than 25 million passengers (International and Domestic) passing through the terminal and over 192,900 PT flights a year.

Melbourne has two runways. The main runway, designated as 16/34, is 3,657 metres long and 60 metres wide. The second runway is designated as 09/27, is 2,286 metres long and 45 metres wide. Refer to Figure 3.

Melbourne Tower operates 24 hours a day, 7 days a week.

Figure 3: Melbourne Aerodrome.

Departure and Approach Procedures (DAP) Chart effective date 18 November 2010.
4.2 Essendon Aerodrome

Essendon aerodrome (hereafter referred to as Essendon) is a certified aerodrome catering for general aviation and corporate jet operations. In September 2001 the Linfox Group and Becton acquired a 99 year lease for the aerodrome. The aerodrome caters for approximately 56,400 aircraft movements a year.

Essendon has two runways. The main runway, designated as 08/26, is 1,921 metres in long and 45 metres wide. The second runway is designated as 17/35, is 1,504 metres long and 45 metres wide. Refer to Figure 4.

Essendon Tower is active 0615–2200 (Local) Monday–Friday and 0700–2200 (Local) on weekends. Outside Essendon Tower hours, Melbourne Approach is responsible for all aircraft operating into and out of Essendon aerodrome, including the south east quadrant of the Melbourne CTR normally controlled by Essendon Tower.

Figure 4: Essendon Aerodrome.
DAP chart effective date 18 November 2010.
4.3 Melbourne Class C CTR

The Melbourne CTR is Class C airspace from the surface to 1,500 ft AMSL. The Melbourne CTR was designed to protect the arrivals and departures operating from both Melbourne and Essendon aerodromes. Above the Melbourne CTR are seven Class C airspace steps with differing Lower Limits. The steps are discussed separately in Sections 4.4 to 4.10.

Melbourne Tower and the CTR is active 24 hours a day, 7 days a week.

When Essendon Tower is active, Essendon ATC is allocated the south east quadrant of the Melbourne CTR and adjacent Class C step to 2,000 ft AMSL. Outside Essendon Tower hours, Melbourne Approach is responsible for all aircraft operating into and out of Essendon aerodrome, including the south east quadrant of the Melbourne CTR normally controlled by Essendon Tower. Due to the special nature of this non Tower operation, restrictions are imposed on the use of runways.

The western boundary of the CTR is referenced from the Melbourne Aerodrome Reference Point (ARP) and not the Distance Measuring Equipment (DME). The western boundary referenced to Melbourne ARP is in accordance with ICAO and CASA airspace design standards. The standard is applied when the distance between the ARP and DME is greater than 0.5 nm. The distance between the Melbourne ARP to the Melbourne DME is 0.795 nm. Refer to Figure 5.

![Figure 5: Melbourne CTR. (Outlined in red). Melbourne Visual Terminal Chart (VTC) effective date 18 November 2010.](image-url)
4.4 Class C step – LL 1,500 ft

The 1,500 ft AMSL Class C step extends to the south and has been designed to protect the runway 34 required navigation performance (RNP) arrival, Area Navigation (RNAV) / Global Navigation Satellite System (GNSS) and VHF Omni-Directional Radio Range (VOR) approaches and to the east to protect the Melbourne runway 27 Instrument Landing System (ILS) and Essendon runway 26 ILS approaches. Refer to Figure 6.

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Figure 6: Class C LL 1,500 ft AMSL step. (Outlined in red).
Melbourne VTC - chart effective date 18 November 2010.
Broadcast Area – 132.1

A CTAF broadcast area exists below the 1,500 ft AMSL Class C step on the southern side of Melbourne city. The broadcast area was declared to assist helicopter operators to self-separate during operations along the Yarra River. The broadcast area is contained with Class G (i.e. uncontrolled) airspace. Refer to Figure 7.

![Figure 7: Broadcast area within the Melbourne Class C LL 1,500 ft AMSL step. (Depicted by the green dashed line). Melbourne VTC - chart effective date 18 November 2010.](image)

4.5 Class C step – LL 2,000 ft

The 2,000 ft AMSL Class C step protects aircraft using the Melbourne runway 16 ILS from VFR aircraft operating to the north of Melbourne. Refer to Figure 8.

![Figure 8: Class C LL 2,000 ft AMSL step. (Outlined in red). Melbourne VTC - chart effective date 18 November 2010.](image)
4.6 Class C step – LL 2,500 ft

The eastern section of the 2,500 ft AMSL Class C step (south of Arthurs Creek) protects aircraft approaching Moorabbin from the north and facilitates separation between arrivals to Melbourne and Essendon airports. The section north of Avalon is to protect aircraft approaching Moorabbin and Essendon from the west and aircraft approaching Avalon from the north. The section east of Point Cook is to enable aircraft to remain in Class C airspace arriving to Melbourne from the south and to Essendon from the west through south to the south-east. Refer to Figure 9.

Figure 9: Class C LL 2,500 ft AMSL step. (Outlined in red). Melbourne VNC - chart effective date 18 November 2010.
4.7 Class C step – LL 3,500 ft

The 3,500 ft AMSL Class C step was designed in accordance with the applicable CASA airspace design rules, apart from the southeast and southwest “cut-outs” to enable 2500 ft AMSL steps as outlined in paragraph 4.6. Refer to Figure 10.

Figure 10: Class C LL 3,500 ft AMSL step. (Outlined in red). Melbourne VNC - chart effective date 18 November 2010.
4.8 Class C step – LL 4,500 ft

The 4,500 ft AMSL Class C step was designed in accordance with the applicable CASA airspace design rules to enable Melbourne and Essendon arriving and departing IFR traffic to be contained in Class C airspace. Refer to Figure 11.

Figure 11: Class C LL 4,500 ft AMSL step. (Outlined in red).
Melbourne VNC - chart effective date 18 November 2010.
4.9 Class C step – LL 7,500 ft

The 7,500 ft AMSL Class C step was introduced to protect Boeing 737-800 and similar performance jet aircraft and heavy International aircraft on continuous descent to runway 16. Refer to Figure 12. The step is regularly used by Boeing 737-800 and aircraft with similar performance characteristics.

Figure 12: Class C LL 7,500 ft AMSL step. (Outlined in red). Melbourne VNC - chart effective date 18 November 2010.
4.10 Class C step – LL 8,500 ft
The 8,500 ft AMSL Class C step was designed in accordance with the applicable CASA airspace design rules to enable Melbourne and Essendon arriving and departing IFR traffic to be contained in Class C airspace. The “cut-out” to the south-west is due to that airspace not being required for that purpose. Refer to Figure 13.

![Figure 13: Class C LL 8,500 ft AMSL step. (Outlined in red).
Melbourne VNC - chart effective date 18 November 2010.](image)
4.11 Moorabbin Aerodrome

Moorabbin aerodrome (hereafter referred to as Moorabbin) is a certified aerodrome operated by Moorabbin Airport Corporation under a long-term lease from the Federal Government which commenced in June 1998. Moorabbin is the main General Aviation (GA) aerodrome servicing Melbourne. With over 50 aviation organisations including over 10 flying schools, 350 aircraft and helicopters, the aerodrome offers a vast range of aviation services.

Moorabbin has five runways.

- 17L/35R is 1,335 metres long and 30 metres wide.
- 13L/31R is 1,150 metres long and 30 metres wide.
- 17R/35L is 1,240 metres long and 18 metres wide.
- 31L/13R is 1,060 metres long and 18 metres wide.
- 04/22 is 571 metres long and 18 metres wide. Refer to Figure 14.

Moorabbin Tower is active 0800–2000 (Local) Monday–Friday and 0800–1900 (Local) on weekends. During daylight saving time the hours are changed to: Monday, Thursday and Friday 0800–2100 (Local), Tuesday and Wednesday 0800–2200 (Local), 0800–1900 (Local) on weekends. Moorabbin ATC operate the Class D airspace from the surface to 2,500 ft AMSL within the lateral boundaries of the Moorabbin CTR. Outside Tower hours non-controlled aerodrome procedures apply.

Moorabbin is the busiest aerodrome in the Melbourne area with over 304,000 aircraft movements a year. The majority of aircraft movements are GA training flights.

![Figure 14: Moorabbin Aerodrome. DAP Chart effective date 18 November 2010.](image-url)
4.12 Moorabbin Class D CTR

The Moorabbin Class D CTR has a radius of 3 nm, centred on the Moorabbin ARP from the surface to 2,500 ft AMSL. Refer to Figure 15.

Moorabbin CTR was designed to segregate the Moorabbin circuit area and traffic operating to and from Moorabbin’s five runways. Above the Moorabbin CTR are Class C airspace steps with differing LL. The steps were discussed separately in Sections 4.4 to 4.10.

Moorabbin Tower and the associated CTR’s hours of activation are published in the En-Route Supplement of Australia (ERSA).

During the period from the late 1970s to 03 June 2010, Moorabbin operated as a General Aviation Aerodrome Procedures (GAAP) aerodrome. GAAP was not an ICAO designation but was employed at Moorabbin, Archerfield, Bankstown, Camden, Jandakot and Parafield to manage large volumes of VFR traffic. In February 2010, CASA released a Notice of Proposed Change (NPC 172/04) Changes to General Aviation Aerodrome Procedures (GAAP), Class D procedures, and miscellaneous air traffic procedures. The changes were introduced on the 03 June 2010 and the six GAAP aerodromes became Class D aerodromes.

A desktop review indicated that the Non-Directional Beacon (NDB) and the RNAV/GNSS Instrument Approach Procedures (IAPs) for Moorabbin are not contained within the CTR and surrounding CTA. These IAPs do not meet the Civil Aviation Safety Regulation (CASR) Part 173 Manual of Standards (MOS) requirements. The CTA and CTR are insufficient in volume to fully contain the IAPs. Most of the IAPs are unable to be redesigned to ensure containment therefore airspace redesign may be required.

Figure 15: Moorabbin Class D CTR. (Outlined in red). Melbourne VTC - chart effective date 18 November 2010.
4.13 Avalon Aerodrome

Avalon aerodrome (hereafter referred to as Avalon) is a certified aerodrome operated by Avalon Airport Australia Pty Ltd. Avalon manages international airfreight movements, particularly for freight associated with major Melbourne events, such as the Formula One Grand Prix. The aerodrome is used by three airlines – Jetstar Airways, Tiger Airlines and Sharp Airlines. Avalon is used by Qantas for the servicing and maintenance of Boeing B747 aircraft.

Avalon has one runway, designated as 18/36, which is 3,048 metres long and 45 metres wide. Refer to Figure 16.

Avalon Tower is active 0700–2000 (Local) daily. It does not generally operate any airspace — this is operated by Avalon Approach (Melbourne TCU 24 hours a day). Avalon Tower operates a circuit release of airspace when required. Outside Tower hours non-controlled aerodrome procedures apply.

Figure 16: Avalon Aerodrome.
DAP Chart effective date 18 November 2010.
4.14 Avalon Class D CTR

The Avalon Class D CTR is active from the surface to 2,500 ft AMSL. Above the Avalon CTR is Class E airspace with a LL of 2,500 ft AMSL and an upper limit of 4,500 ft AMSL. Above the northern half of the Avalon CTR are three Class C airspace steps with differing LL. Refer to Figure 17. The steps were discussed separately in Sections 4.4 to 4.10.

The IAPs are contained within the CTR however the VOR and the RNAV/GNSS IAPs do not meet the CASR Part 173 MOS requirements of having the approach plus buffers contained. The CTA and CTR are insufficient in volume to fully contain the IAPs. Most of the IAPs are unable to be redesigned to ensure containment therefore airspace redesign may be required.

The following information was provided by Airservices:

- Instrument Approach VOR-Y and VOR-Z for Runway 18
  Although the Intermediate Approach Fix (IF) tolerance areas are contained within controlled airspace, there is less than the 500 ft vertically required buffer at 1 nm from the CTR boundary.
• Instrument Approach VOR Runway 36
  Although the Step Down Fix (SDF) tolerance area is contained within
  controlled airspace, there is less than the 500 ft vertically required buffer at 1
  nm from the CTR boundary.

• Instrument Approach RNAV/(GNSS) Runway 18
  Although the Final Approach Fix (FAF) tolerance area is contained within
  controlled airspace, there is less than the 500 ft vertically required buffer at 1
  nm from the CTR boundary.

• Instrument Approach RNAV/(GNSS) Runway 36
  Although the IF tolerance area is contained within controlled airspace, there is
  less than the 500 ft vertically required buffer at 1 nm from the CTR boundary.

4.15 Avalon Class E steps
The Avalon Class E steps were declared to protect Instrument approaches to the
aerodrome. The airspace is active 24 Hours a day, 7 days a week to an upper limit of
4,500 ft AMSL. Refer to Figure 18.

![Map of Avalon Class E steps](image-url)

**Figure 18: Avalon Class E. (Outlined in red).**
Melbourne VTC - chart effective date 18 November 2010.
5 Details of airspace architecture – Restricted Areas

5.1 Puckapunyal aerodrome

Puckapunyal is a Military aerodrome located approximately 41 nm to the north of Melbourne. The aerodrome is not available for public use. Puckapunyal has one runway, designated as 03/21 which is 700 metres long and has a bitumen surface. Refer to Figure 19 below.

A helicopter landing site is located adjacent to the Military hospital and its primary use is the movement of patients by air ambulance.

5.2 Restricted Areas

The declaration of a Restricted Area creates airspace of defined dimensions within which the flight of aircraft is restricted in accordance with specified conditions. Clearances to fly through an active Restricted Area are generally only withheld when activities hazardous to the aircraft are taking place, or when military activities require absolute priority. Restricted Areas are mainly declared over areas where military operations occur. However, Restricted Areas have also been declared to cater for communications and space tracking operations or to control access to emergency or disaster areas. Restricted Areas are generally promulgated at specified times and dates. For example, a temporary Restricted Area may be declared for special events where there may be a public safety issue – such as the Avalon Air Show or the Olympic Games. Temporary Restricted Areas are discussed in detail in section 5.11.
5.3 R350 – Puckapunyal

The Puckapunyal Restricted Area (R350) is active 24 Hours a day, 7 days a week, from the surface to FL200, refer to Figure 20 below. The Area was declared to protect aircraft from live firing exercises. The controlling authority is the Army Range Control Officer (RCO), Puckapunyal.

![Figure 20: Puckapunyal aerodrome and associated Restricted Areas. (Outlined in red). Melbourne VNC - chart effective date 18 November 2010.](image)

5.4 R352 – Puckapunyal

The Puckapunyal Restricted Area (R352) is active via a Notice to Airmen (NOTAM), from the surface to 3,000 ft AMSL, refer to Figure 20 above. The Area was declared to protect aircraft from live firing exercises. The controlling authority is the Army RCO, Puckapunyal. The airspace was not activated between 01 June 2010 and 24 January 2011.

5.5 R351A / B – Graytown

The Graytown Restricted Areas (R351A and R351B) are outside the area of the study, however as they adjoin a Restricted Area contained in the study, they are included for completeness. Refer to Figure 20 above.

R351A is active 24 Hours a day, 7 days a week from the surface to FL200. The Restricted Area was declared to protect aircraft from live firing activities. The controlling authority is the Army RCO, Graytown.

R351B is active via NOTAM and is active from FL200 to FL500. The Restricted Area was declared for live firing activities. The controlling authority is the Army RCO, Graytown. The airspace was not activated between 01 June 2010 and 24 January 2011.

The Puckapunyal and Graytown Restricted Areas are in close proximity to Mangalore aerodrome which is the base for a large flying training facility. The Restricted Areas do not hinder flying training operations.
5.6 **R374 – Swan Island**

The Swan Island Restricted Area is a circle of 1 nm radius, extending from the surface to 1,500 ft AMSL, refer to Figure 21 below. The Area is active 24 hours a day, 7 days a week and was declared to protect aircraft from live firing activities. The controlling authority is the Army RCO, Swan Island.

![Figure 21: Restricted Area R374. (Outlined in red).](image)

Melbourne VTC - chart effective date 18 November 2010.

5.7 **R323A / B – Western Port**

Western Port Restricted Areas (R323A and R323B) were declared to protect aircraft from artillery from the West Head gunnery range, refer to Figure 22 below. The Areas are active via NOTAM. The controlling authority is the Navy, Her Majesty’s Australian Ship (HMAS) Cerberus. R323A has been activated 31 times between 01 January 2010 and 01 November 2010. R323B has been activated 30 times between 01 August 2010 and 24 January 2011.

![Figure 22: Restricted Areas R323A and R323B. (Outlined in red).](image)

Melbourne VNC - chart effective date 18 November 2010.
5.8 R332 – Hanns Inlet

Hanns Inlet Restricted Area is a circle of 1.50 nm radius, extending from the surface to 2,000 ft AMSL, refer to Figure 23 below. The Area is active daily from 0800–2300 (Local) and was declared to protect aircraft from radar flares. The controlling authority is the Navy, HMAS Cerberus.

Figure 23: Restricted Area R332. (Outlined in red).
Melbourne VTC - chart effective date 18 November 2010.

5.9 R321 – Laverton

The Laverton Restricted Area is a circle of 0.30 nm radius centred on the Laverton Gas Peaking Power Station, refer to Figure 24 below. The Restricted Area extends from the surface to 2,900 ft AMSL, is active 24 hours a day, 7 days a week and was declared to protect aircraft from the heat plume from the power station. The controlling authority is Snowy Hydro Laverton.

Figure 24: Restricted Area R321. (Outlined in red).
Melbourne VTC - chart effective date 18 November 2010.
5.10  R339 – Cape Schanck

The Cape Schanck Restricted Area (R339) is outside the area of the study, however as it adjoins Restricted Area R323A, it is included for completeness. Refer to Figure 25 below. The Restricted Area is active via NOTAM with vertical lower limit specified in the NOTAM. The Area was declared for Military operations and has an upper limit of FL550. The controlling authority is the Navy, HMAS Cerberus. R339 has been activated 33 times between 01 January 2010 and 24 January 2011.

![Figure 25: Restricted Area R339. (Outlined in red). Melbourne VNC - chart effective date 18 November 2010.](image)

5.11  Temporary Restricted Areas

Airspace may be declared a Restricted Area on a temporary basis. For the period 01 July 2008 to 30 June 2010, 43 Temporary Restricted Areas were declared within 45 nm Melbourne. A summary of Temporary Restricted Areas can be broken down into the following categories.

<table>
<thead>
<tr>
<th>Reason for declaring Temporary Restricted Area</th>
<th>Number declared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airshow / Aerobatic Display</td>
<td>24</td>
</tr>
<tr>
<td>Bushfires</td>
<td>5</td>
</tr>
<tr>
<td>Sports event (Grand Prix / World Cycling Championships)</td>
<td>3</td>
</tr>
<tr>
<td>Military Exercise</td>
<td>3</td>
</tr>
<tr>
<td>Police activity / Exercise</td>
<td>3</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 1: Summary of Temporary Restricted Areas declared 01 July 2008 to 30 June 2010

In January 2011, a Temporary Restricted Area was introduced within 3 nm of Point Cook to enable RAAF Museum aircraft to practice aerobatic manoeuvres. Refer to Figure 26.

In addition to all of the recorded evidence (Safety Incident Reports held in civil and Defence databases), anecdotal evidence (unrecorded) was provided to the Victorian Regional Airspace and Procedures Advisory Committee (RAPAC) in late 2010 by the Point Cook Museum pilot. The challenges of conducting air show practice with transiting aircraft in the area were described as problematic and were a safety concern. A number of incidents related to both disrupted displays and other separation breakdowns between museum and general aviation aircraft. It was decided at the Victorian RAPAC and later approved by the OAR for the formation of a Temporary Restricted Area to be activated for the periods of air show practice on the basis of safety. The Temporary Restricted Area is activated three times per week by NOTAM.
Figure 26: Point Cook Temporary Restricted Area
Melbourne VTC - chart effective date 18 November 2010
6 Details of airspace architecture – Danger Areas

6.1 Danger Areas

The declaration of a Danger Area defines airspace within which activities dangerous to the flight of aircraft may exist at specified times. Approval for flight through a Danger Area outside controlled airspace is not required. However, pilots are expected to maintain a high level of vigilance when transiting Danger Areas. Danger Areas 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.

6.2 D314 – Moorabbin

The Moorabbin Danger Area D314 extends from the surface to the base of controlled airspace at 4,500 ft AMSL. Refer to Figure 27 below. The area was established for flying training activities and is active during daylight hours. The controlling authority is CASA OAR.

![Figure 27: Danger Area D314. (Outlined in red). Melbourne VTC - chart effective date 18 November 2010.](image)
6.3 D315 – Moorabbin

The Moorabbin Danger Area D315 extends from the surface to 7,500 ft AMSL. Refer to Figure 28 below. The upper limit of the Danger Area is 1,000 ft below the base of the overlying controlled airspace step at 8,500 ft AMSL. The area was established for flying training activities and is active during daylight hours. The controlling authority is CASA OAR.

![Figure 28: Danger Area D315. (Outlined in red). Melbourne VTC - chart effective date 18 November 2010.](image)

An area designated for aerobatic flight is contained within the lateral boundaries of D315. Refer to Figure 29 below. The area has vertical limits from 1,500 ft AMSL to the base of controlled airspace at 8,500 ft AMSL. The upper limit of the aerobatic area extends 1,000 ft above the surrounding Danger Area and therefore the vertical limits are shown on the VTC.

![Figure 29: Aerobatic Area within Danger Area D315. (Outlined in red). Melbourne VTC - chart effective date 18 November 2010.](image)
In June 2008, the Victorian RAPAC agreed to relocate the aerobatic area due to urban growth. A suitable area approximately 5 nm east of the current location was identified. The proposed area is 3 nm in diameter centred on S38°09'38" E145°35'24". The vertical limits of the proposed aerobatic area are to be from 1,500 ft AMSL to the base of the Class C airspace LL of 8,500 ft AMSL. Refer to Figure 30 below.

The proposed aerobatic area is outside the designated Danger Area (D315). To alert pilots of the aerobatic activity, a Danger Area should be promulgated. To designate a Danger Area, an Airspace Change Proposal (ACP) will need to be raised and industry consulted.

The OAR has a process in place by which changes to the Australian airspace architecture are proposed, assessed and approved. This process is called the Airspace Change Process. The proponent for any change (i.e. Flying Club / airlines / etc) should complete an ACP as the first step in requesting a change in airspace architecture.

6.4 D322A – St Leonards

The St Leonards Danger Area D322A extends from the surface to an upper limit notified by NOTAM. Refer to Figure 31 below. The area was established for Unmanned Aerial Vehicle (UAV) testing activities and is active via NOTAM. The controlling authority is Aerosonde Port Phillip Bay.
6.5 D322B – Port Phillip Bay

The Port Phillip Bay Danger Area D322B extends from the surface to an upper limit notified by NOTAM, but not above 4,000 ft AMSL. Refer to Figure 32 below. The area was established for UAV testing activities and is active via NOTAM. The controlling authority is Aerosonde Port Phillip Bay.

6.6 D383 – Point Cook

The Point Cook Danger Area D383 extends from the surface to the base of the overlying CTA steps. Refer to Figure 33 below. The area was established for flying training activities and is active during daylight hours. The controlling authority is the Point Cook aerodrome operator.
The Point Cook Danger Area contains two aerobatic areas. Refer to Figure 33 above. The first area has been promulgated as a Temporary Restricted Area and is covered in Section 5.11.

The second aerobatic area lies in the south west corner of the Danger Area and is used by Royal Melbourne Institute of Technology (RMIT) and Military aircraft. The area is used from 500 ft AMSL up to the base of CTA (4,500 ft AMSL). RMIT mainly use the aerobatic area between 3,000-4,500 ft AMSL, the area is also used by the Military to conduct low level aerobatics.

6.7 D389 – Tooradin

The Tooradin Danger Area D389 extends from the surface to the base of the overlying CTA step, 8,500 ft AMSL. Refer to Figure 34 below. The area was established for parachute jumping operations and is active daily from 0900—2300 (Local). The controlling authority is Commando Skydivers.
6.8 D399 – Bacchus Marsh

The Bacchus Marsh Danger Area D399 extends from 4,500 ft AMSL to 5,500 ft AMSL and is contained within the overlying Class C CTA step. Refer to Figure 35 below. The area was established for glider flying activities and is active via NOTAM. The area has been activated eight times since August 2010. The controlling authority is Airservices Australia, Melbourne.

The Danger Area is activated by NOTAM at the discretion of the Melbourne Centre Manager and is subject to traffic requirements. A Letter of Agreement between Melbourne Centre and the Bacchus Marsh Gliding Club allows glider access to the airspace once the Danger Area has been activated. The terms of operation within the Danger Area are:

*Within D399 Bacchus Marsh gliders will not be provided with an Air Traffic Control, Flight Information or Alerting Service. Normal Class G Services will be provided to other aircraft within D399.*

Access for the gliders is implicit with activation of the Danger Area. As the gliders are not transponder equipped and therefore are not displayed on the ATC radar displays, other aircraft are warned of the possible presence of the gliders and offered routes to avoid the area. This airspace around Bacchus marsh is discussed further at 7.4.16.

![Figure 35: Danger Area D399. Melbourne VTC - chart effective date 18 November 2010.](image)

6.9 Temporary Danger Areas

Airspace may be declared a Danger Area on a temporary basis. For the period 01 July 2008 to 30 June 2010, 5 Temporary Danger Areas were declared within 45 nm Melbourne. A summary of Temporary Danger Areas can be broken down into the following categories.

<table>
<thead>
<tr>
<th>Reason for declaring Temporary Danger Area</th>
<th>Number declared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military Exercise</td>
<td>4</td>
</tr>
<tr>
<td>Airshow</td>
<td>1</td>
</tr>
</tbody>
</table>

*Table 2: Summary of Temporary Danger Areas declared 01 July 2008 to 30 June 2010*
7 Consultation

OAR representatives sought input from a number of operators and stakeholders who operate in and around Melbourne. Stakeholder interviews were conducted during October and November 2010. Stakeholders invited to provide input for the study are listed in Annex D.

7.1 CASA

CASA employs Aviation Safety Advisors (ASAs) throughout Australia as an integral mechanism for providing safety promotion, training and educational material to the various industry segments. ASAs liaise with local operators, and discuss airspace issues. Consultation was also conducted with CASA Flying Operations Inspectors (FOI) who oversee local operations. Feedback from the ASAs and FOIs has been considered during compilation of this study.

7.2 Air Navigation Service Provider

Airservices is the sole Air Navigation Service Provider (ANSP) for the Melbourne area. Interviews were conducted with Tower staff at Melbourne, Essendon, Moorabbin and Avalon as well as with Enroute staff and the Melbourne TCU. The following issues were raised:

7.2.1 Avalon: Aircraft holding at the IFR waypoint TEMPL will be contained within Class C and Class E airspace and alternate between the two classes whilst holding. This causes issues for the Controllers as they will provide a full separation service to the pilot whilst in Class C airspace, then provide a reduced service whilst in Class E. In practice, ATC provide a full separation service to aircraft holding at TEMPL, therefore the safety of the aircraft is not compromised.

Melbourne TCU considers that the airspace design is overly complex and the consideration required in respect of service levels adds unnecessarily to workload.

7.2.2 Ultralight aircraft: Ultralight aircraft such as the Jabiru and other composite constructed planes are not displayed on the Primary Radar screen very well. Transponder equipped aircraft display quite well, but most of the small aircraft are difficult to identify.

VFR aircraft not fitted with an engine driven electrical system capable of continuously powering a transponder are operating in the Class G and E airspace in the Melbourne Basin. Transponders are required for all aircraft in Class E airspace except for VFR aircraft not fitted with an engine driven electrical system (Ref: CASA Instrument 316/98).  

7.2.3 Departures: All Melbourne departures are cleared to 5,000 ft AMSL on auto-release procedures. Aircraft planning to overfly Melbourne need to plan to be at least 6,000 ft AMSL, or 6,500 ft AMSL for VFR aircraft.

7.2.4 Radar Advisory Service boundary: The south eastern boundary of the Radar Advisory Service (40 nm Melbourne) does not cover the bottom corner of the Moorabbin training area (D315). Extending the boundary to 45 nm

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8 CASA Instrument 316/98 can be found on the CASA website:
Melbourne is not possible with the current equipment as it is too far for the current display to identify aircraft.

**7.2.5 Co-ordination between Moorabbin and Melbourne:** The co-ordination for VFR flight between Moorabbin and Melbourne TCU ceased more than 10 years ago. Aircraft requiring a clearance into Melbourne CTA must go via Class G airspace, then contact Melbourne TCU and request a clearance. If the aircraft has not submitted a flight plan, it increases workload as they have no prior knowledge of the flight. In addition, by the time the aircraft requesting clearance has contacted the TCU, it is often too late for the aircraft to be able to climb to get above the Melbourne and Essendon traffic.

Re-introduction of coordinated clearances for VFR flights into or through the Melbourne CTR would require the re-establishment of a stand alone coordination position in the Moorabbin Tower during core hours and an increased coordination workload for Melbourne TMA controllers. To facilitate this, Airservices would require three extra staff.

**7.2.6 Flight Safety:** Airservices Safety Promotions team are available to attend Safety Seminars or Industry forums to inform pilots of ATC clearances and what pilots can do to assist ATC to allow them to gain an airways clearance.

**7.3 Defence**
Defence has no issues with Melbourne airspace.

**7.4 Other Airspace users**
OAR representatives sought input through stakeholder forums which were conducted at Moorabbin, Essendon and Ballarat. Interviews with Airline representatives, charter operators, Emergency Service providers and other individuals who were unable to attend the forums were held in October and November. The following issues were identified:

**7.4.1 Access to the Melbourne CTR by VFR aircraft.** Access to the Melbourne CTR is quite restricted. Commercial pilot students are required to gain experience in CTA procedures. Students are often not given access to the Melbourne CTA but are instructed to remain outside controlled airspace. Controllers are often too busy and cite their workload for denying clearances. Controller numbers are seen as an issue as one controller can be working on two different frequencies.

In 2008-2009 there were times, where ATC would advise the provision of an air traffic service was not available via NOTAM, due to a lack of controllers. This impacted Yarra Valley skydiving operations which could only proceed for a defined time period or not at all, when the outage occurred. Due to staffing issues, and not knowing if controllers were going to be available for the roster, notification was always very short.

Access to the CTA for VFR flights is rarely given. Flying schools would like a preferred route which would enable students access to the CTA to gain experience. The preferred route could be implemented in consultation with Melbourne flying schools and Airservices to provide a mutually beneficial route. The schools do not object to being vectored, instructed to hold, wait or be delayed, this would enhance the training experience for the students.

Access to Essendon is usually via Doncaster Shoppingtown, Albert Park Lake or West Gate Bridge. Albert Park Lake VFR approach point for entry into
Essendon is sometimes not available. Aircraft are sent to either Station Pier or to the West Gate Bridge. The change in route does not seem to be runway specific.

A VFR route overhead Melbourne aerodrome to Sunbury would assist flights to the north west. Aircraft could track overhead Melbourne Airport and cross the runway intersection. This would keep aircraft away from the runway centrelines and open up access to the CTR.

The “Three Tanks” VFR Route (Sunbury Water Tanks – Melbourne – Essendon) is no longer promulgated. Recently the route has been used by helicopters but is not available to fixed wing aircraft.

[CASA Comment: During discussions with Melbourne TCU staff, it was learnt that a helicopter VFR corridor – called “The Sunbury Corridor” has been instigated. The Corridor was promulgated via NOTAM and appeared in the 18 November 2010 edition of ERSA under the Flight Procedures section for Melbourne. The corridor has been made available to helicopters only, as the helicopters have the ability to stop an approach and hover if required to permit an aircraft to land at Melbourne.]

There is no co-ordination for VFR flights between Moorabbin Tower and Melbourne TCU. Aircraft requiring a clearance into Melbourne CTA must go outside of controlled airspace, then contact Melbourne TCU to request a clearance. If the aircraft has not submitted a flight plan, it makes co-ordination difficult for Melbourne TCU as they have no prior knowledge of the flight. In addition, by the time the aircraft requesting clearance has contacted the TCU, it is often too late for the aircraft to be able to climb to get above the Melbourne and Essendon traffic.

7.4.2 Airspace Congestion: The main cause of congestion in the airspace is due to weather. Operations at Melbourne can be restricted to one runway (usually Runway 34). Single runway operations reduce the capacity of the aerodrome and related airspace significantly. Some airlines believe that departures on runway 27 could still be operationally possible in most weather conditions, thus relieving some of the pressure on the main runway.

7.4.3 Radar Information Service: The service is available the majority of the time, upon request. Pilots are given a full Radar Information Service (RIS) or a snapshot of the traffic prior to the service being terminated due to controller workload. Stakeholders commented that controller workload is noticeable when the controller is monitoring two frequencies.

7.4.4 Avalon: The Class E airspace causes confusion. The perception among pilots is that Avalon controllers are controlling the area as Class C airspace and not Class E. An example is VFR traffic is being issued with clearances and told to squawk transponder codes. It makes it difficult to instruct students in Class E procedures.

The Avalon Class D airspace and the Moorabbin Class D airspace are being controlled differently. There is no consistency between the two pieces of airspace. It is difficult to teach students a standard set of procedures when there is no consistency.

[CASA Comment: The operations at Moorabbin and Avalon are quite different. Avalon is a mixture of Class D and Class E airspace with a surveillance service provided by a remote TMA. The service at Moorabbin is provided by the Tower
without surveillance and reliant on visual separation and monitoring of aircraft flight paths.

The clearances which are applied at Moorabbin cannot be utilised at Avalon. The AIP ENR 12.3.1 states clearances by establishment of two-way communication are only applicable when an aircraft establishes two-way communications with a Class D Tower. A full clearance must be given by the Avalon Approach as it is not a Class D Tower.

Aircraft holding at the IFR waypoint TEMPL will be contained within Class C and Class E airspace and alternate between the two classes. Refer Figure 36 below. This causes issues for ATC as they will provide a full separation service to the pilot whilst in Class C airspace, then provide a reduced service whilst in Class E. In practice, ATC provide a full separation service to aircraft holding at TEMPL, therefore the safety of the aircraft is not compromised.

![Figure 36: Avalon airspace and the holding pattern at TEMPL.](image)

**7.4.5 D314 Training Area:** The Danger Area (D314) at Moorabbin is impractical for use as a flying training area due to the size of the area, the volume of traffic and the continued housing development in the area.

[CASA Comment: The flying training that can be undertaken in D314 is limited due to its size and proximity to built up areas. There is no legislative requirement for flying training areas to be depicted on aeronautical charts. Flying schools must specify the areas used for flying training in their Operations Manuals. This report recommends that Danger Area D314 be dis-established.]

**7.4.6 D315 Training Area:** The Danger Area (D315) at Moorabbin is no longer sufficient in size for training and consequently the area is getting
congested. The Aerobatic Area and the Fly Neighbourly Advice⁹ (FNA) contained within the Danger Area significantly reduce the useable size. The area is subject to urban sprawl and there are less areas to practice forced landings. The congestion means training aircraft are being forced into a smaller area (further south) towards Tooradin.

The upper limit of the Danger Area is 1,000 ft below the base of the overlying controlled airspace step of 8,500 ft AMSL. This reduces the useable size of the training area, though anecdotal evidence suggests training aircraft rarely operate above 6,000 ft AMSL.

[CASA Comment: Flying schools should be encouraged to identify different areas for flying training away from built up areas and specify the area in their Operations Manuals. If flying schools identify different areas for flying training then the level of congestion in the area currently used for flying training (D315) will be reduced. This report recommends that Danger Area D315 be dis-established.]

Frequency management south of the Melbourne Radar boundary is a concern. Refer Figure 37 below. The bottom corner of the training area has aircraft operating on one of three different frequencies (120.0 – Area Frequency, 135.7 – Melbourne Radar and 124.2 – Tooradin CTAF).

[CASA Comment: The issue was raised during discussions with Melbourne TCU staff. It is not feasible for Melbourne Radar to increase their boundary to 45 DME Melbourne to encompass the entire training area. CASA ASAs and FOIs may be able to facilitate an appropriate resolution to the issue. Dis-establishing D315 should reduce the confusion regarding which frequency is to be monitored.

The Melbourne Visual Pilot Guide would be an ideal platform to create awareness of frequency management in the area.]

⁹ A copy of the Fly Neighbourly Advice can be found in Annex E.
Airspace infringements: Airspace infringements (formally known as Violations of Controlled Airspace) occur when an aircraft enters controlled airspace or Restricted Areas without a clearance. During the period 01 July 2008 – 30 June 2010, 295 airspace infringements occurred within 45 nm Melbourne. Refer Figure 38 below. The two areas marked on the chart show the highest numbers of airspace infringements. Area 1 (around Avalon) show 75 infringements, which is 25% of all infringements. Area 2 (around the 1,500 ft Class C step to the north of Point Cook) has 38 infringements which is 12% of all infringements.

[CASA Comment: The high number of airspace infringements around Avalon may be due to the change in the activation of the previous Class C airspace during the reporting period. Details of the airspace infringements have been forwarded to the CASA ASAs. Pilot education to prevent airspace infringements will be incorporated into future Safety Seminars.

The base of the CTA to the north of Melbourne is an area of concern for airspace infringements due to the high terrain, low level of the steps and the proximity of traffic arriving and departing Melbourne.

[CASA Comment: Airservices and CASA have developed a Safety Bulletin to inform pilots of the hazards when using the area around Sunbury. The Safety Bulletin can be downloaded from the Airservices website: http://www.airservicesaustralia.com/flying/safety/bulletins/docs/20100916_Sunbury-Bolinda_Area_Airspace_Infringements.pdf The educational material and Safety Seminars should assist in reducing the number of incidents.]

![Map of Airspace Infringements](image)

Figure 38: Airspace Infringements 01 July 2008 – 30 June 2010.
Melbourne VNC - chart effective date 03 June 2010

The airspace infringements to the east of the CTR are the result of traffic climbing too early when tracking north west or descending too late when tracking south east along the VFR route. The VFR route from Kilmore – Whittlesea – Sugarloaf Reservoir leads to airspace infringements. The chart has a recommendation that aircraft “Fly at VFR cruising altitudes cloud permitting”. Whilst flying south, aircraft may be at 3,500 ft AMSL and enter the Class C 2,500 ft AMSL step prior to reaching Sugarloaf Reservoir. Adding a comment on the chart to draw pilot’s attention to the Class C 2,500 ft AMSL step may prevent infringements.

Infringements occur to the east of the Melbourne CTR, near She Oak Hill. The infringements are due to aircraft climbing too early when departing Essendon
and enter the 1,500 ft AMSL Class C Step or aircraft travelling to Essendon are descending too late from the 3,500 ft AMSL Class C Step and enter the 1,500 ft AMSL Class C Step.

During the consultation process, a proposal was received with three suggestions to reduce the controlled airspace to the north west of Melbourne which could reduce the airspace infringements and provide improved access to the local aerodromes. Refer to Figure 39.

![Figure 39: Suggested change to Class C Step north west of Melbourne.](image)

[CASA Comment: The proposals to amend the Class C steps were forwarded to Airservices’ Procedures and Design Section for comment. Preliminary analysis suggests that once the required lateral and vertical tolerances are applied to the instrument approaches it is highly unlikely that a step of 2,000 ft AMSL or 2,500 ft AMSL as proposed would provide the necessary control area protection to aircraft on the Melbourne runway 16 ILS. It is unlikely the proposed changes would provide the required protection to aircraft operating on runway 16 or runway 09.]

### 7.4.8 Standard Instrument Arrivals (STARs) / Standard Instrument Departures (SIDs)

Altitude restrictions occasionally cause issues. Approaching from the IFR waypoint CANTY or from the Mildura direction for runway 34, there is a requirement to be at 9,000 ft AMSL by 20 nm of Melbourne. Aircraft are then required to be at 6,000 ft AMSL before crossing the Runway 27 centreline. It would be beneficial to be able to stay higher as this is more efficient. Refer to Figure 40.
CASA Comment: The requirement to be at 9,000 ft AMSL by 20 nm of Melbourne is to allow departing aircraft to fly over the top of inbound aircraft. In addition, if it was made higher for that runway the aircraft are then too high if there is a runway change which can occur at short notice. The requirement makes the airspace set-up standard for all runways rather than variations in requirements for different runway scenarios which can lead to errors. The design criteria is one altitude requirement only at a waypoint (in this case 9,000 ft crossing at the IFR waypoint BUNKY – which is common to all runway arrivals from CANTY) which is specifically designed to avoid such errors.

All Melbourne departures are cleared to 5,000 ft AMSL on auto-release procedures. Aircraft planning to overfly Melbourne need to plan to be at least 6,000 ft AMSL for IFR aircraft, or 6,500 ft AMSL for VFR aircraft.

Moorabbin operators in un-pressurised aircraft are not given clearance to descend below 6,000 ft AMSL until south of Melbourne. Once clearance to descend is given, there are either problems with a high descent rate which affects passenger comfort, or in aircraft which have lower undercarriage operating speeds, problems trying to slow the aircraft down so that the crew can lower the landing gear in the Moorabbin circuit.

7.4.9 IFR Training: Restricted access to ILS aids make IFR training difficult. Access to the Essendon ILS is available via a booking system where pilots contact the Melbourne Traffic Manager to book a time slot. When the Essendon ILS is not available, the Avalon ILS is the only option available to pilots in the Melbourne area. As the Avalon ILS is privately owned it is more expensive for
pilots to use than the Essendon ILS. Bank-run aircraft flying into Essendon prevent access to the ILS between 1700 and 1900 weekdays. Training organisations have made contact with the Melbourne Traffic Manager (as per ERSA entry) to investigate whether the Melbourne Runway 27 ILS could be used outside of peak periods. The flying schools were told that it is not possible.

7.4.10 IFR Training at Cowes: The Restricted Areas (R323A, R323B and R339) restrict the use of the Navigation Aids (NavAids) at Cowes for IFR training. Refer to Figure 41 below. Reducing the size or raising the lower limit of R323A would increase the area available for instrument flying training around the Cowes NavAids. A block release of the restricted airspace would allow additional IFR Training at Cowes and also increase the accessibility of the airspace.

[CASA Comment: The OAR has discussed the issue with Defence. The Restricted Areas have been promulgated to protect aircraft from live firing exercises at West Head. In 2009, Defence conducted a comprehensive audit of all Restricted Airspace in Australia. Due to the level of activity at West Head, there is no scope to raise the lower limit of R323A or to reduce the lateral boundaries of the Restricted Areas. Defence have indicated that activity at the facility will increase and the Restricted Areas will be activated more often than they are currently being activated.

The NavAids at Wonthaggi are nearby and could be used instead of the Cowes NavAids].

![Figure 41: Restricted Areas in the vicinity of the Cowes and Wonthaggi NavAids. Melbourne VNC - chart effective date 18 November 2010.](image)

7.4.11 Port Philip Bay VFR route: The VFR route along the northern edge of Port Philip Bay from Moorabbin to the Bureau of Meteorology (BOM) Tower gets congested.

The route takes aircraft within 1 nm of the Melbourne 1,500 ft Class C CTA step. Refer to Figure 42 below. Eastbound aircraft are flying at 1,500 ft AMSL and westbound aircraft are flying at 2,500 ft AMSL.
AIP Enroute 1.1 Section 18.12 states the VFR tolerances which must be applied for VFR powered flights within Class G in the vicinity of controlled airspace:

- ⇒ 0–2,000 ft Above Ground level (AGL) ± 1 nm (± 2 nm by night)
- ⇒ 2,001–5,000 ft AGL ± 2 nm (± 3 nm by night)
- ⇒ 5,001–10,000 ft AGL ± 4 nm (± 5 nm by night)

Furthermore, there is an error on the Melbourne VTC Inset. The inset incorrectly shows the VFR route in the vicinity of the Laverton BOM Tower. Refer to Figure 42 below. The VFR route is depicted as going half way between the BOM Tower and the Restricted Area R321. The route is correctly depicted on the main VTC going over the Laverton BOM Tower.

Figure 42: VTC Inset incorrectly showing VFR Route near R321. Melbourne VTC - chart effective date 18 November 2010.

7.4.12 AIP Errors: A review of the AIP charts reveals a number of omissions and errors in addition to the VFR route near the Laverton BOM Tower:

- The two information boxes relating to the VFR route in the Melbourne VTC Inset incorrectly spell the word “procedures”.
- The vertical limits of the Restricted and Danger Areas are not depicted on the VTC Inset.
- The Sunbury East aerodrome is not depicted on the Melbourne VNC.
- The Lethbridge aerodrome is not depicted on the Melbourne WAC.
- Typographical errors on the VTC Inset.

7.4.13 VFR approach and reporting points: A review and update of all VFR reporting and approach points should be carried out. A number of points such as GMH, Academy and Mount Cottrell are now hard to identify.

The Moorabbin VFR approach point “GMH” is hard to identify due to the surrounding development. A more easily identifiable approach point would be beneficial.

Mount Cottrell should be deleted as a tracking point as it is hard to identify. Aircraft are often instructed to “track via Mount Cottrell”. Students and low-time pilots often misidentify the point.

The VFR approach point Brighton is often misidentified as Sandringham. Visual markers would assist pilots in correctly identifying the VFR approach points.
CASA Aviation Safety Advisors and Flying Operation Inspectors may be able to facilitate an appropriate resolution to the issue.

7.4.14 VFR track Moorabbin – Sugarloaf Reservoir. Marking a recommended VFR route to Moorabbin from the Sugarloaf Reservoir may assist itinerant and low time pilots navigating through the area.

[CASA Comment: During discussions with other stakeholders it was stated that marking the route on the VTC may cause head to head traffic over the VFR approach point “Academy”. Some stated that there were sufficient features along the route and that marking the route on the VTC was not necessary.]

7.4.15 Frequency congestion and management - Ballarat. The number of aircraft conducting IFR training around the Yarrowee NavAids is significant. Promulgating a broadcast area to cover Yarrowee and Ballarat would be beneficial.

[CASA Comment: The issue is being investigated by the Victorian RAPAC. Any change will need to consider the ramifications on the already congested Ballarat CTAF]

7.4.16 Bacchus Marsh aerodrome. Bacchus Marsh has an active aviation community with over 50 light and recreational aircraft and over 55 gliders. The gliders are launched by a mechanical winch. Itinerant aircraft overfly the aerodrome which contributes to congestion. It would be beneficial if aircraft conducting navigational exercises used the township and not the aerodrome as a navigational waypoint.

Three Class C Steps with varying bases of 2,500 ft, 3,500 ft and 4,500 ft AMSL lie within a short distance of Bacchus Marsh. Figure 43 below. This airspace design may result in airspace infringements.

![Figure 43: CTA steps in the vicinity of Bacchus Marsh. Melbourne VTC - chart effective date 18 November 2010.](image-url)
Rising terrain to the west (Brisbane Ranges to south-west and hills to the west and north west) restrict gliding operations at Bacchus Marsh. Due to weather patterns, the gliders are very restricted for height, and therefore cannot utilise wave lift. The glider pilots often cannot use the maximum thermal height for safe return to the aerodrome due to the overlaying CTA steps. The introduction of a Class C step with a base of 6,500 ft AMSL would greatly increase access to the gliding community. Preliminary advice from Airservices indicates that the step would not impact instrument approaches to, or departures from Melbourne. Refer to Figure 44 below. The gliding community at Bacchus Marsh is encouraged to submit an ACP to introduce a Class C step with a base of 6,500 ft AMSL.

![Figure 44: Proposed CTA step to the west of Bacchus Marsh. Melbourne VTC - chart effective date 18 November 2010.](image)

7.4.17 Balloons gaining ATC clearances south of Melbourne city. Balloons usually travel as a group, with one carrying a serviceable transponder. Issues arise if the transponder equipped balloon lands and one or more balloons continue flying.

7.4.18 Skydiving adjacent to the VFR light aircraft lane: Concerns were raised of a skydiving organisation operating close to the VFR light aircraft lane in the vicinity of Elwood, near Point Ormond. See Figure 45 below. The skydiving is close to a residential area and the VFR light aircraft lane.

A skydiving trial was run by Melbourne Skydiving Centre between the months of February and May 2010. The trial was very successful and as such the Port
Phillip City Council requested an expression of interest to appoint a permanent operator.

Skydive the Beach has been awarded a three year licence by the Port Phillip City Council to skydive into Moran Reserve, Elwood. Operations were scheduled to commence in January 2011 but have been delayed pending a review.

![Image of Point Ormond and Elwood](image)

Figure 45: Point Ormond and Elwood.
Melbourne VTC - chart effective date 18 November 2010.

7.4.19 Class D clearances at Little River aerodrome. The Little River aerodrome is located inside the Avalon CTR. Refer to Figure 46 below. Communication between aircraft on the ground at Little River and Avalon Tower is not available. Pilots have been contacting the Avalon Tower by telephone to obtain a Class D clearance prior to departing Little River. Avalon Tower staff have always accommodated the requests effectively and this process has resulted in the ability to gain a suitable clearance when required.

Since the introduction of Avalon Approach (18 November 2010) the situation has been further complicated. Pilots are unable to contact Avalon Approach by radio or telephone whilst on the ground at Little River, therefore airways clearances are difficult to obtain.

A number of options are available to resolve the issue:

1. The installation of a VHF radio communications repeater at or near Little River.

2. The aerodrome operator and Airservices work to negotiate a procedure relating to departure approvals from Little River.

Modifications to the airspace (i.e. modifying the CTR boundary to exclude Little River and the associated circuit area) are unable to be made due to CASR Part 173 MOS requirements and the effect on the Avalon IAPs.
Figure 46: Little River Aerodrome.
Melbourne VTC - chart effective date 18 November 2010.
8 Summary of Incidents and Accidents

8.1 Electronic Safety Incident Reports

Electronic Safety Incident Reports are an electronically submitted air safety occurrence report, which forms part of the Electronic Safety Incident Report (ESIR) system, maintained by Airservices, which permits systemic analysis and trend monitoring.

During the 01 July 2008 to 30 June 2010, 1,616 ESIR reports were recorded by Airservices regarding incidents in the airspace 45 nm surrounding Melbourne.

These incidents have been defined by the OAR into the following groups:

<table>
<thead>
<tr>
<th>Type of Incident</th>
<th>Number of Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to comply with ATS instructions or procedures</td>
<td>391</td>
</tr>
<tr>
<td>Runway Incursions</td>
<td>303</td>
</tr>
<tr>
<td>Airspace infringements</td>
<td>295</td>
</tr>
<tr>
<td>Loss of Separation Assurance / Breakdown of Separation</td>
<td>97</td>
</tr>
<tr>
<td>Traffic Alert and Collision Avoidance System (TCAS) Resolution Advisory</td>
<td>37</td>
</tr>
<tr>
<td>Go around</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 3: ESIRs within 45 nm Melbourne (01 July 2008 to 30 June 2010)

8.2 Aviation Safety Incident Reports

All accidents and incidents involving Australian registered aircraft, or foreign aircraft in Australian airspace must be reported to the Australian Transport Safety Bureau (ATSB). 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.

During the period 01 July 2008 to 30 June 2010, 1,613 ASIRs were submitted to the ATSB for the airspace 45 nm surrounding Melbourne.

These incidents have been defined by the OAR into the following groups:

<table>
<thead>
<tr>
<th>Type of Incident</th>
<th>Number of Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airspace infringements</td>
<td>295</td>
</tr>
<tr>
<td>Failure to comply with ATS instructions or procedures</td>
<td>290</td>
</tr>
<tr>
<td>Runway Incursions</td>
<td>257</td>
</tr>
<tr>
<td>Loss of Separation Assurance</td>
<td>71</td>
</tr>
<tr>
<td>Go around</td>
<td>13</td>
</tr>
<tr>
<td>TCAS Resolution Advisory</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 4: ASIRs within 45 nm Melbourne (01 July 2008 to 30 June 2010)

The incidents raised as ASIRs correspond to approximately 0.22% of aircraft movements within 45 nm Melbourne. Airservices and CASA regularly review ASIR and ESIR data to identify trends and to develop educational material and awareness programs.
9 Airspace Reform

As required by the AAPS, this study takes into account the Government’s requirement that CASA will continue the reform of Australia’s airspace and move towards closer alignment with the ICAO system and the adoption of international best practice. This includes the adopting of proven international airspace systems adapted to benefit Australia’s aviation environment.

Paragraph 7 of the AAPS states: ‘The administration of Australian-administered airspace:

- shall be in the best interests of Australia;
- 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.’

Whilst no two aerodromes are exactly alike, this study has endeavoured to find aerodromes with comparable movement figures and environment—a primary aerodrome with busy satellite aerodromes close by. The study has investigated the airspace architecture surrounding:

- Vancouver, British Columbia (BC), Canada;
- Manchester, United Kingdom (UK); and
- Memphis, United States of America (USA).

9.1 Vancouver

Airspace classification, airspace architecture, and Air Traffic Management procedures detailed in the Nav Canada AIP were reviewed in an effort to determine if the airspace system used in the vicinity of Vancouver aerodrome, BC, would benefit the aviation environment in the vicinity of Melbourne.

Vancouver aerodrome (hereafter referred to as Vancouver) is located 4.5 nm southwest of Vancouver city. Within 40 nm of Vancouver there are six major aerodromes (including three International aerodromes); eight major water aerodromes, 18 smaller aerodromes and 19 helicopter landing sites.

The majority of traffic at Vancouver consists of domestic and international scheduled PT and charter flights. Helicopter and seaplane flights attribute to approximately 7.55% of all movements. ATS is available 24 hours a day.

293,877 aircraft movements and 16,779,709 terminal and transit passengers at Vancouver were recorded for the 2010 calendar year, compared with 196,228 and 26,128,118 at Melbourne. Vancouver has three runways, designated as 08L/26R; 08R/26L and 12/30.

The Vancouver CTR is Class C from Surface to 2,500 ft AMSL with Class C overlying the CTR up to FL125. Between FL125 and FL180, Class B airspace is utilised. Class A airspace exists above FL180.

Within 40 nm of Vancouver, every ICAO classification of airspace is utilised. The airspace surrounding Vancouver is depicted in Figure 47.

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11 NavCanada Designated Airspace Handbook: [http://www.navcanada.ca/NavCanada.asp?Language=EN&Content=ContentDefinitionFiles%5CPublications%5CAeronauticalInformationProducts%5CDAH%5Cdefault.xml](http://www.navcanada.ca/NavCanada.asp?Language=EN&Content=ContentDefinitionFiles%5CPublications%5CAeronauticalInformationProducts%5CDAH%5Cdefault.xml)
**Surveillance**
Primary and Secondary Surveillance Radar is available to ATC at Vancouver.

In Vancouver city, 11 multi-lateration receivers have been installed around the harbour, supplementing radar coverage for controllers at the Vancouver ATC and the airport tower. Providing radar coverage of the entire harbour is impractical, as it is flanked by mountains and tall buildings. The multi-lateration stations are expected to be in operational use in early May 2011.

![Vancouver Airspace Chart](image)

**Airspace Comparison**
There are a number of differences, in terms of airspace, between Melbourne and Vancouver:

1. The use of Class G airspace at lower levels at Vancouver;
2. The use of Class F airspace at Vancouver;
3. The extensive use of Class E airspace at Vancouver;
4. The use of Class B airspace at Vancouver; and
5. Transponder usage.

**Class G**
The majority of the airspace surrounding Vancouver is controlled (Class A – E). Class G airspace exists at lower levels, usually from SFC to 700 ft AGL or from SFC to 1,200 ft AGL.

The Class G airspace surrounding Melbourne has various upper limits from 1,500 ft to 8,500 ft AMSL. The amount of Class G airspace allows access to the majority of the Melbourne basin by VFR and ultralight aircraft.
Class F
In Canada, Class F airspace is described in terms of horizontal and vertical dimensions, effective for a specified period of time. Class F airspace may be restricted airspace, advisory airspace, military operations areas or danger areas, and can be controlled airspace, uncontrolled airspace or a combination of both.

ICAO describes Class F as uncontrolled airspace where IFR and VFR flights are permitted. All IFR flights receive an air traffic advisory service and all flights receive a flight information service if requested.

Class F airspace is not currently used in Australia, however anecdotal evidence suggests that the service provided in Australian Class G is similar to ICAO Class F.

Class E
Class E airspace surrounds Vancouver with a base ranging from 700 ft AGL to 2,000 ft AGL. Specific volumes of Class E are designated as Transponder Airspace.

Class B
Class B is utilised as middle layer of CTA between FL125 and FL180. The use of Class B airspace provides a separation service for all aircraft, including VFR.

Transponder usage
Transponders are required to be carried and used within all Class A, Class B and Class C airspace surrounding Vancouver. Class D and Class E airspace attributed to Abbotsford, Vancouver and Vancouver Harbour are designated as transponder airspace.

9.2 Manchester
Airspace classification, airspace architecture, and Air Traffic Management procedures detailed in the UK AIP were reviewed in an effort to determine if the airspace system used in the vicinity of Manchester aerodrome, UK, would benefit the aviation environment in the vicinity of Melbourne.

Manchester aerodrome (hereafter referred to as Manchester) is located 7.5 nm south-west of Manchester city. The majority of traffic at Manchester consists of domestic and international scheduled PT and charter flights. ATS is available 24 hours a day.

172,515 aircraft movements and 18,724,889 terminal and transit passengers at Manchester were recorded for the 2009 calendar year, compared with 196,228 and 26,128,118 at Melbourne. Manchester has two runways designated as 05L/23R and 05R/23L.

The Manchester CTR is Class D from Surface to 3,500 ft AMSL with Class A overlying the CTR up to FL195. The Control Zone and Control Area are depicted in Figure 48.

Laterally, the CTR is a polygon approximately 20 nm long and 20 nm wide. Adjacent to the north, east and southern CTR boundaries are Class D steps 1,500 ft AMSL.
2,500 ft AMSL, and 2,000 ft AMSL respectively up to 3,500 ft AMSL. To the west is Liverpool CTR.

Approximately 90 aerodromes/landing sites are located within 45 nm of Manchester, including Liverpool aerodrome.

**Surveillance**

PSR and SSR sites provide surveillance coverage to the surface at Manchester.

**Liverpool**

Liverpool aerodrome is located 20 nm to the west of Manchester. The majority of traffic at the aerodrome consists of domestic scheduled and charter flights, including International flights. ATS is available 24 hours a day.

79,298 aircraft movements and 4,884,494 terminal and transit passengers at Manchester were recorded for the 2009 calendar year\(^\text{16}\).

Liverpool CTR is Class D from surface to 2,500 ft AMSL with Class D overlying the CTR from 2,500 ft AMSL to 3,500 ft AMSL. Overlying this Class D is Class A, from 3,500 ft to FL195.

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\(^{16}\) Civil Aviation Authority’s UK Airport Statistics for 2009.

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![Figure 48: Control Zone and Control Area Chart – Manchester (6 May 2010)](image-url)

**Airspace Comparison**

There are two significant differences, in terms of airspace, between the Melbourne and Manchester aerodromes:

1. The Melbourne CTR is Class C whereas the Manchester CTR is Class D; and
2. Class A airspace overlays Melbourne from FL180 whereas Class A airspace overlays Manchester from 3,500 ft AMSL.
Class C and Class D
The key difference between Class C and Class D airspace is in Class D airspace, VFR flights are not separated (from any aircraft) by ATC, whereas in Class C airspace IFR flights are separated from VFR flights. It is therefore reasonable to suggest that without VFR traffic operating in Class D airspace the airspace operates similarly to Class C.

According to the Civil Aviation Authority’s UK Airport Statistics for 2009, of the 172,515 movements recorded at Manchester a possible 211 were VFR flights (total of air taxi, local, test and training, aero club, and private flights). This equates to approximately 0.12 percent.

Considering that Manchester is effectively an IFR traffic mix and the key difference between Class C and Class D airspace only exists when VFR traffic are operating, it is reasonable to suggest that the Manchester CTR (Class D minus VFR traffic) is functioning similar to the Melbourne CTR (Class C).

Class A
Only IFR aircraft are permitted in Class A airspace. In Australia, Class A is established in all airspace above FL180 on the east coast and over capital city aerodromes and above FL245 elsewhere.

Considering the amount of VFR traffic operating in the wider Melbourne area, and the lack of VFR traffic operating at Manchester aerodrome, it is reasonable to suggest the current level of Class A over Melbourne (FL180) is more suitable to the Melbourne aviation environment than having Class A at 3,500 ft AMSL.

9.3 Memphis
Airspace classification, airspace architecture, and Air Traffic Management procedures detailed in the Federal Aviation Administration (FAA) Regulations 17. Federal Aviation Regulations (FAR) 71, 73, 77 and 91 were reviewed in an effort to determine if the airspace system used in the vicinity of Memphis aerodrome would benefit the aviation environment in the vicinity of Melbourne.

Memphis International Airport (hereafter referred to as Memphis) is located 4.5 nm south-east of the Memphis Central Business District (CBD). The majority of traffic at the aerodrome consists of domestic and international scheduled PT and charter flights. ATS are available 24 hours a day.

158,850 passenger aircraft movements and 5,039,905 terminal and transit passengers at Memphis were recorded for the 2009 calendar year18, compared with 196,228 and 26,128,118 at Melbourne. Memphis Airport also is an integral element in the freight network and is serviced by most of the major freight operators and makes up for an estimated 60,000 additional movements in 2009.

The Memphis CTR is Class B from SFC to 10,000 ft AMSL with Class E overlying the CTR up to FL180. Class A airspace exists from FL180 and above. The Control Zone and Control Area are depicted in Figure 49, below.

Memphis has four runways, designated as 18R/36L; 18C/36C; 18L/36R and 09/27. The airspace is tailored in a keyhole fashion to ensure protection of the instrument approaches. To the northwest of Memphis there are three general aviation airports within 20nm of Memphis, however they are in Class G airspace between SFC to 1,800 ft. Memphis aerodrome acts as a transport hub to the domestic and international aircraft network and as a result is open 24 hours.

17 FAA Regulations: http://www.faa.gov/regulations_policies/faa_regulations/
18 Research and innovative Technology Administration Bureau of transportation Statistics: http://www.bts.gov/
There are approximately 31 additional aerodromes located within 30 nm of Memphis.

**Transponder carriage**

Transponders are required to be carried and used within 30 nm of a Class B aerodrome such as Memphis. Although it is theoretically possible to operate within Class B airspace without a transponder, it is almost never done in practice. The exception would require the concurrence of the controlling agency which would not normally be forthcoming.

**Surveillance**

Primary and Secondary Surveillance Radar is available to ATC at Memphis.

![Figure 49: Control Zone and Control Area Chart – Memphis](Source: www.SkyVector.com - 2011)

**9.4 Conclusion**

The current Melbourne airspace architecture works well for the volume and mix of traffic. Adopting either of the three foreign airspace models (Vancouver, Manchester or Memphis) could decrease the efficiency and restrict the access to the airspace. Melbourne is the only aerodrome of the four that were studied that does not have parallel runways.
• **Low Level Class E airspace.** The introduction of Class E airspace at Melbourne above 700 ft AGL is not practicable without adequate surveillance. All aircraft operating in Class E would need to be identifiable to ATC to reduce the risk of mid-air conflicts. Access to the airspace would not be enhanced.

If the current transponder exemption is revoked, significant industry opposition to the removal would be experienced. As most transponders are designed for powered aircraft (i.e. aircraft with an engine driven electrical system), they tend to draw a lot of power. New models available since 2002 are lighter, require less power and can be operated by batteries as the sole power source. Further advances in technology, particularly batteries, may allow the carriage and use of transponders by aircraft without an engine driven electrical system. This may allow consideration of the withdrawal of the exemption.

• **Low Level Class A airspace.** The introduction of Class A airspace at Melbourne above 3,500 ft AMSL would force VFR aircraft to remain at lower levels and bring them into conflict with terrain particularly to the east and west of Melbourne. The weather conditions surrounding Melbourne (particularly in Winter) would significantly restrict VFR operations.

• **Class B airspace.** The introduction of Class B airspace into the Melbourne CTR may increase VFR access, however it may also reduce the efficiency of the airspace as all aircraft would be separated from each other.

• **Designated Transponder Area.** Introducing a Designated Transponder Area within 30 nm of Melbourne would prevent access to the airspace by aircraft that currently utilise the airspace. The owners of balloons; gliders; ultralight; microlight and antique aircraft would be affected.
10 Airspace Risk and other Airspace Matters

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:

a. protection of the environment;
b. efficient use of that airspace;
c. equitable access to that airspace for all users of that airspace;
d. national security.’

This section addresses the requirements of Section 3 of the Act.

10.1 Modelling Methodology Outline

For the purpose of this study, CASA applied the United States’ FAA collision formula to assess the risk of midair collisions at various aerodromes within the 45 nm of Melbourne. The airspace at these aerodromes is Class G airspace where non-controlled aerodrome procedures are applicable.

The data used for this analysis was obtained from site visits, aerodrome operators and Airservices. The assessment utilised a wide range of inputs from findings resulting from site visits, evaluation of ESIR and ASIR data and stakeholder interviews. The purpose of this approach is to ensure that all reasonable and practical mitigators have been considered or are in place to guard against foreseeable risks.

10.2 Airspace Risk Assessment

10.2.1 Controlled Airspace

In controlled airspace, ATC acts to prevent conflicts from occurring by arranging separation and segregation between aircraft, often long before they would have come into direct conflict. IFR flights are separated from other IFR flights in all classes of controlled airspace and from VFR flights in Class C. Information on VFR flights is given to IFR flights in Class D and known VFR aircraft in Class E.

ATC utilise a number of mitigators to reduce the risk of midair conflicts in controlled airspace. Aircraft operating in Class C and Class E airspace must have a serviceable transponder which enables the aircraft to be identified by radar and monitored by a third party including medium to large IFR aircraft by Airborne Collision Avoidance Systems (ACAS) as required by CASA regulations. General exemptions against the requirement for carriage of SSR transponders (Transponder exemption) are in force for aircraft certified without an engine-driven electrical system; e.g. balloons, ultralight aircraft, gliders and antique aircraft\(^\text{19}\).

ATC use SIDs, STARs and air routes as effective traffic management strategies to separate and segregate aircraft in CTA.

Aircraft operating in controlled airspace must have a serviceable VHF radio. The controlled airspace surrounding Melbourne has radar surveillance 24 hours a day. The aircraft equipment requirements that are needed to operate within Melbourne’s controlled airspace and the intervention of a third party means that the likelihood of a midair conflict between two aircraft within the controlled airspace is low.

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\(^{19}\) Aeronautical Information Publication (AIP) Book (GEN 1.5, 6.2.1)
10.2.2 Non-controlled Airspace

In non-controlled airspace, ATC provide a Flight Information Service (FIS) to IFR aircraft, including traffic information on other IFR aircraft. VFR aircraft receive a FIS, on request and ATC workload permitting. A Surveillance Information Service (SIS) is available within surveillance coverage. A Directed Traffic Information (DTI) service is provided by controllers to aircraft operating under IFR. A flight following service is available for aircraft operating under VFR where surveillance is available, depending on controller workload.

For the purpose of this study the FAA collision formula was utilised to model and evaluate the collision risk at the various aerodromes within Class G airspace. The FAA collision formula is contained within the Establishment and Discontinuance Criteria for Airport Traffic Control Towers report.\(^{20}\)

The expected number of collisions at non-towered aerodromes is given by:

\[
\text{Collisions} = 2.635 \times \frac{\text{Number of Movements}}{1,000,000}
\]

The estimated number of occupants per aircraft is assumed to be two. This assumption is based on the fact that the majority of aircraft in this area are light aircraft or are involved with flying training.

This data was compiled in a risk profile, known as an FN curve and plotted on logarithmic graph paper to show the likely annual probability of midair collisions.

Societal risk analysis is essentially a process of determining frequency and severity, which may be described as ‘how often will it happen and how bad will it be when it does?’ Frequency is often measured in terms of accidents per year (or years per accident) or in terms of risk per distance travelled, journeys or travel hours. Severity may be measured in terms of fatalities, injuries, damage to aircraft and property, etc.\(^{21}\)

Advice from risk engineers is that behavioural studies have shown that people will tolerate levels of risk up to 100 times (i.e. two orders of magnitude) above the level that they consider acceptable before they will assess a situation as dangerous enough to require some corrective action. Within these two orders of magnitude, from the Acceptable Risk Line to the Scrutiny Line, risks will be tolerated provided they have been made As Low As Reasonably Practical (ALARP).\(^{22}\)

The Scrutiny Zone is one in which society will tolerate risks that are voluntary, such as private flying, mountaineering etc., or where the risks are involved with occupations that it regards as essential, such as oil rig workers, fire fighters, military personnel etc., and it is not feasible to reduce the risk down to the ALARP range. CASA would not expect fare paying passengers to be exposed to this level of risk.\(^{23}\)

The FN curve showed that all aerodromes in Class G airspace, within 45 nm of Melbourne, would plot below the scrutiny line. The only exception was the Point

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\(^{20}\) The report can be viewed on the FAA website: [http://www.faa.gov/regulations_policies/policy_guidance/investment_criteria/media/establish_atct.pdf](http://www.faa.gov/regulations_policies/policy_guidance/investment_criteria/media/establish_atct.pdf)


\(^{22}\) Ibid, Page 14.

\(^{23}\) Ibid, Page 16.
Cook aerodrome. The Point Cook aerodrome is subject to a separate Aeronautical Study and outside the terms of reference of the Melbourne Aeronautical Study.

CASA is of the opinion that provided all reasonable precautions are in place in Class G airspace, risks are appropriately mitigated at all of the localities.

10.2.3 Estimated Traffic Mix and Movement Data

The aircraft using the Melbourne airspace range from large and medium passenger jets (such as the Airbus A380, Boeing 747 and Boeing 737), medium size turbo-prop aircraft including the De Havilland DHC8, Saab SF340, and the Beechcraft BE-200 King Air.

A range of light single-engine and twin-engine aircraft operate throughout the Melbourne airspace including a variety of helicopters. The airspace is also utilised by gliders, balloons, ultralights and powered parachutes.

A brief summary of the estimated traffic mix and movement numbers utilising Airservices’ Airspace Research Application (ARA) data, figures from aerodrome operators and flying organisations are shown in Table 5.

A movement is classified as a take-off or a landing.

The traffic has been broken down into the following categories:

**Key:**
- VFR including gliders, ultralight, microlight and helicopters
- IFR includes IFR training flights, private IFR flights and RPT operations
- * Figures obtained through Airservices
- # Figures obtained through Airservices
- * Estimate only (provided by aerodrome operator or industry)

<table>
<thead>
<tr>
<th>Aerodrome</th>
<th>VFR Movements (Ex-Circuits)</th>
<th>IFR Movements (Ex-Circuits)</th>
<th>Total Movements</th>
<th>FAA Non-Towered Estimated conflicts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melbourne #</td>
<td>32</td>
<td>196,196</td>
<td>196,228</td>
<td>-</td>
</tr>
<tr>
<td>Essendon #</td>
<td>31,558</td>
<td>23,703</td>
<td>56,091</td>
<td>-</td>
</tr>
<tr>
<td>Avalon #</td>
<td>1,342</td>
<td>6,525</td>
<td>11,407</td>
<td>-</td>
</tr>
<tr>
<td>Moorabbin #</td>
<td>99,224</td>
<td>11,531</td>
<td>287,921</td>
<td>-</td>
</tr>
<tr>
<td>Bacchus Marsh *</td>
<td>8,000</td>
<td>100</td>
<td>8,100</td>
<td>1.73E-04</td>
</tr>
<tr>
<td>Barwon Heads</td>
<td>No movement data available.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceres *</td>
<td>730</td>
<td>-</td>
<td>730</td>
<td>1.40E-06</td>
</tr>
<tr>
<td>Coldstream *</td>
<td>6,700</td>
<td>1,600</td>
<td>8,300</td>
<td>1.82E-04</td>
</tr>
<tr>
<td>Drysdale *</td>
<td>350</td>
<td>-</td>
<td>400</td>
<td>3.23E-07</td>
</tr>
<tr>
<td>Fiskville</td>
<td>Previously 1 – 2 movements per month. Aerodrome is currently unserviceable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geelong *</td>
<td>2,190</td>
<td>30</td>
<td>2,220</td>
<td>1.30E-05</td>
</tr>
<tr>
<td>Guildford</td>
<td>No movement data available.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyneton *</td>
<td>1,800</td>
<td>-</td>
<td>1,800</td>
<td>8.54E-06</td>
</tr>
</tbody>
</table>

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24 Point Cook aerodrome is a military operated aerodrome where prior permission is required to operate (24 hours notice). Activities at Point Cook are protected by Restricted Areas and Danger Areas.

Aeronautical Study of Melbourne - Draft for Industry Comment - March 2011 Version: 0.2
### Table 5: Traffic mix for Melbourne airspace over a 12 month period (Dates varied).

<table>
<thead>
<tr>
<th>Aerodrome</th>
<th>VFR Movements (Ex-Circuits)</th>
<th>IFR Movements (Ex-Circuits)</th>
<th>Total Movements</th>
<th>FAA Non-Towered Estimated conflicts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lethbridge *</td>
<td>2,000</td>
<td>-</td>
<td>2,000</td>
<td>1.05E-05</td>
</tr>
<tr>
<td>Lilydale</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little River *</td>
<td>260</td>
<td>-</td>
<td>260</td>
<td>5.64E-08</td>
</tr>
<tr>
<td>Melton</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moriac</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nar Nar Goon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penfield *</td>
<td>2,650</td>
<td>-</td>
<td>2,650</td>
<td>1.85E-05</td>
</tr>
<tr>
<td>Point Cook</td>
<td>An Aeronautical Study of the Point Cook aerodrome is currently being conducted.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puckapunyal *</td>
<td>Military Aerodrome. No public movements.</td>
<td>2,000</td>
<td>1.05E-05</td>
<td></td>
</tr>
<tr>
<td>Riddell</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romsey *</td>
<td>740</td>
<td>25</td>
<td>765</td>
<td>1.54E-06</td>
</tr>
<tr>
<td>St. Leonards *</td>
<td>100</td>
<td>-</td>
<td>100</td>
<td>2.64E-06</td>
</tr>
<tr>
<td>Sunbury East *</td>
<td>20</td>
<td>90</td>
<td>110</td>
<td>3.19E-08</td>
</tr>
<tr>
<td>Tooradin *</td>
<td>7,000</td>
<td>1,400</td>
<td>8,400</td>
<td>1.86E-04</td>
</tr>
<tr>
<td>Torquay *</td>
<td>10,400</td>
<td>-</td>
<td>10,400</td>
<td>2.85E-04</td>
</tr>
<tr>
<td>Tyabb *</td>
<td>15,600</td>
<td>-</td>
<td>15,600</td>
<td>6.41E-04</td>
</tr>
<tr>
<td>Werribee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Werribee - Aerochutes *</td>
<td>5,000</td>
<td>-</td>
<td>5,000</td>
<td>6.59E-05</td>
</tr>
<tr>
<td>(Operating below 1,500 ft AMSL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yeaburn *</td>
<td>45</td>
<td>15</td>
<td>60</td>
<td>9.49E-09</td>
</tr>
</tbody>
</table>

Note: The Geelong aerodrome is scheduled to close in mid 2011. The Fiskville aerodrome is currently unserviceable and will either be upgraded to a serviceable standard or it will be closed permanently. A decision on the future of the Fiskville aerodrome is pending.

For the purpose of this study it is assumed that movement numbers for the aerodromes Barwon Heads, Nar Nar Goon, Melton, Guildford, Moriac and Riddell are low. These aerodromes are privately owned and information about the usage is therefore difficult to obtain. From stakeholder interviews and the site visit to the area, CASA believes that the movement numbers for these aerodromes are lower than those assessed in Table 5. Therefore from all available information the risk at these aerodromes seems to be low, and if all reasonable precautions are in place, the risk of a VFR conflict with an IFR aircraft is low.

The Lilydale aerodrome is privately owned with a flying school, charter operator and an aviation maintenance facility. Anecdotal evidence describes the aerodrome as “busy”, however actual movement figures have not been received from the aerodrome operator. It is unlikely the movements at Lilydale are greater than the aerodromes assessed in Table 5.
10.2.4 Data Review
Following a review of stakeholder feedback, ASIRs and ESIRs for Melbourne (see Section 8) the reports indicate that there are no issues with the current airspace classification and it is operating safely. As described in Sections 7, 8 and 10.1.2 of this report, data supporting this conclusion was gathered from the following sources:

- Airservices;
- Royal Australian Air Force (RAAF);
- CASA (ASAs and FOIs);
- Melbourne airspace users;
- ATSB;
- Bureau of Infrastructure, Transport and Regional Economics;
- AIP;
- Airline schedules; and
- Aerodrome operators.

10.2.5 Conclusion
The airspace around the above aerodromes is Class G, which is overlaid by Class C, and in some instances Class E. Due to radar surveillance, third party intervention and other risk mitigators utilised by ATC (SIDs, STARs, air routes and transponder carriage), the risk in the controlled airspace (Class C, Class D and Class E) is considered to be ALARP.

In summary, CASA’s evaluation is that all reasonable precautions are in place, as has been established during the site visits and stakeholder interviews. CASA therefore has reason to believe that the risk within the Melbourne area is ALARP.

10.3 Environment
The OAR Environmental Specialist reviewed the Melbourne Basin airspace to examine if there are current aircraft environmental impacts associated with:

- noise
- gaseous emissions
- interactions with birds and wildlife, and

Should an Airspace Change Proposal be lodged as an outcome of this aeronautical study which results in changes in aircraft traffic patterns, the above environment issues will require assessment.

Noise
The ERSA and AIP DAP entries note applicable aircraft noise abatement procedures (NAPs). Where NAPs need to be amended, Airservices or the aerodrome operator consults the aviation and local communities for advice. NAPs are established for the following aerodromes:

- Avalon
- Essendon
- Geelong
- Kyneton
- Melbourne
- Moorabbin
- Tyabb
An overview of the management of aircraft noise at Melbourne Airport ( overseen by the Department of Infrastructure and Transport) is entitled ‘Melbourne Airport and Aircraft Noise and the Facts’ prepared by the Melbourne Airport. Details on the Regulations concerning aircraft noise can be found on the Airservices website: http://www.airservicesaustralia.com/aviationenvironment/noise/default.asp

Fly Neighbourly Advice 5 within the Moorabbin Training Area is established to raise pilots’ awareness of noise sensitive areas to the south east of Moorabbin Aerodrome. Refer to Figure 50, Annex E.

The aircraft patterns around Moorabbin have not changed since the transition from GAAP to Class D as the aircraft continue to arrive via the VFR approach points. Suburbs which are not underneath the usual approach routes into Moorabbin have not experienced an increase in aircraft noise.

**Gaseous emissions**

Aircraft fuel use and associated gaseous emissions are unlikely to be influenced by the current airspace architecture. Evidence to date does not indicate that the airspace architecture is unnecessarily extending the time in air to reach a destination with resultant fuel inefficiencies. It is more likely that the procedures conducted within the existing airspace architecture may be the reason for fuel efficiencies/inefficiencies.

**Bird and wildlife aircraft interaction and EPBC issues**

A review of relevant data sets indicate that aircraft activity in the Melbourne Basin airspace has not been identified that may have a significant adverse impact on protected parks and wildlife pursuant to the EPBC Act. The Department of Sustainability, Environment, Water, Population and Communities Protected Matters Search Tool identified 3,214 items protected under the EPBC Act, none of which would be directly affected by aviation operations in the Melbourne Basin.

10.4 **Efficient use of the airspace**

A Class C ATC Tower and radar approach service is available within controlled airspace within 45 nm of Melbourne, from the surface to FL180. The controlled airspace around Melbourne has been designed to protect the safety of airspace users through separation from terrain and the containment of IAPs. A Class C radar ATC service applied to the reported level of traffic, in this airspace, is good practice.

Stakeholders report that the Avalon Class E airspace is being serviced as Class C airspace. For example, VFR traffic is being issued with clearances and told to squawk transponder codes. The efficiency of the Avalon Class E airspace should be improved by the introduction of a radar separation service from the 18 November 2010, but it is too early to draw a conclusion.

10.5 **Equitable Access**

Access to the controlled airspace surrounding Melbourne is available to all aircraft complying with the requirements of Class C, D or E (see Annex B). Access by VFR aircraft to the Melbourne CTR is quite restrictive. Controllers are often “too busy” or cite “workload” for denying clearances. Controller numbers are seen as an issue as it is common practice for one controller to work on two different frequencies simultaneously. The absence of co-ordination between Moorabbin Tower and Melbourne TCU has seen an increase in the number of VFR flights being denied a clearance to the Melbourne CTR.

25 A copy of Melbourne Airport and Aircraft Noise and the Facts document can be found at: http://www.melbourneairport.com.au/Media/docs/MEL_AirCraftNoise2010-1cc99754-9603-4f30-b5a2-791b52e94fa0-1.PDF
11 Summary of Issues

The key issues raised by airspace users during the generative interviews, questionnaires and stakeholder forums have been identified as follows:

- Access to the Melbourne CTR by aircraft operating under VFR is restricted.
- The absence of coordination between Moorabbin Tower and Melbourne TCU restricts access for VFR flights to the Melbourne CTA.
- The ATS delivered in the Avalon Class D airspace and the Moorabbin Class D airspace are different. This results in difficulty for flight instructors to teach students a standard set of procedures when there is no consistency in the service provided.
- The Moorabbin Flying Training Areas, Danger Areas (D314 and D315), are no longer sufficient in size for training. Housing development and FNA effectively reduce the useable size. Frequency management in the training area (D315), south of the Melbourne Radar boundary, is a concern.
- The NDB and RNAV IAPs for Moorabbin are not contained within CTA. These IAPs do not meet the CASR Part 173 MOS requirements.
- The buffers for the IAPs for Avalon are not contained within CTA and do not meet the CASR Part 173 MOS requirements.
- Airspace infringements occur throughout the Melbourne airspace.
- Limited access to ILS navigation aids make IFR training difficult.
- Aircraft holding at the IFR waypoint TEMPL, north of Avalon, will be contained within Class C and Class E airspace and alternate between the two classes.
- IFR training at the Cowes NavAids is confined due to the proximity of the Restricted Areas R323A, R323B and R339.
- A review and update of all VFR reporting and approach points should be carried out. A number of points such as GMH, Academy and Mount Cottrell are now hard to identify.
- The VFR route that connects Carrum to Laverton gets congested. The VFR route follows the edge of Port Phillip Bay from Moorabbin to the BOM Tower near Laverton takes aircraft within 1 nm of the Melbourne 1,500 foot Class C CTA step.
- Three different height CTA steps intersect within a short distance of the Bacchus Marsh aerodrome.
- Rising terrain to the west (Brisbane Ranges to south-west and hills to the west and north west) and the base of the adjacent CTA restrict gliding operations at Bacchus Marsh.
- Radio communication between aircraft on the ground at the Little River aerodrome and Avalon Approach is not available.
- AIP errors and omissions:
  - The Sunbury East aerodrome is shown on the Melbourne VTC but not the Melbourne VNC or the Melbourne TAC.
The Melbourne VTC inset incorrectly shows the western VFR route in the vicinity of the Laverton BOM Tower.

The vertical limits of the Restricted and Danger Areas are not depicted on the VTC Inset.

The Lethbridge aerodrome is not marked on the Melbourne WAC. It is marked on the Melbourne VNC and the ERC-L2 Chart.

Typographical errors on the VTC Inset. The word *procedures* is misspelt in the two information boxes.

### 12 Findings and Conclusions

- The restricted access to the Melbourne CTR by VFR aircraft affects flying training and private pilots. A recently introduced procedure allows helicopters to transit the CTR, but not fixed wing aircraft.
- Co-ordination between Moorabbin Tower and Melbourne TCU would assist VFR flights within the Melbourne CTA.
- Consistency in the way Avalon Class D airspace and the Moorabbin Class D airspace are being controlled would assist flight instructors and students.
- The Moorabbin Flying Training Areas, Danger Areas D314 and D315, should be dis-established. Flying training organisations should utilise areas away from housing development for training.
- The Victorian Chapter of the Australian Aerobatic Club should submit an ACP to establish a Danger Area to cover the proposed aerobatic area north of Tooradin.
- A published procedure to assist radio frequency management south of the Melbourne Radar boundary would enhance operations.
- A comprehensive review of the IAPs for Moorabbin should be conducted to determine compliance with CASR Part 173 MOS requirements.
- Pilot education and promotional material may reduce the number of airspace infringements throughout the Melbourne CTR.
- Access to ILS navigation aids restricts IFR training opportunities.
- The safety of aircraft holding at the IFR waypoint TEMPL is not compromised due to the aircraft alternating between the two classes of airspace.
- Pilot education programs and providing access by VFR aircraft to the Melbourne CTA would reduce the congestion in the VFR route which connects Carrum to Laverton.
- Three different height CTA steps intersecting within a short distance of the Bacchus Marsh aerodrome contribute to the airspace infringements in the area.
- The proposed introduction of a Class C airspace step, with a Lower Limit of 6,500 ft AMSL to the west of Bacchus Marsh would assist gliding operations in the area.
- Radio communication difficulties between aircraft on the ground at the Little River aerodrome and Avalon Approach should be addressed.
• Updating the aeronautical charts will enhance the situational awareness of pilots.

13 CASA Recommendations

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

1. Representatives from the flying schools in the Melbourne area should meet with Airservices to discuss options for increasing access to the Melbourne CTA and CTR by student pilots and VFR aircraft.

2. Airservices should investigate opportunities to co-ordinate VFR departures from Moorabbin with Melbourne TCU for flights within the Melbourne CTA.

3. Airservices’ Continuous Standards Improvement Section should investigate the belief that the ATS delivered in Avalon Class D airspace is different from that in Moorabbin Class D airspace.

4. Airservices should review the IAPs for Moorabbin to determine compliance with CASR Part 173 MOS requirements. The review should include options for airspace redesign.

5. The Moorabbin Flying Training Areas, Danger Areas D314 and D315, should be dis-established.

6. An ACP should be submitted by the Victorian Chapter of the Australian Aerobatic Club to establish a Danger Area for aerobatics north of Tooradin.

7. Airservices’ Safety Promotions team and CASA’s Safety Analysis, Education and Promotions Division should review the airspace infringements then formulate and deliver an educational awareness program for flying in the Melbourne basin and surrounding airspace.

8. The gliding community at Bacchus Marsh should submit an ACP to introduce a Class C step with a LL of 6,500 ft AMSL to the west.

9. The users of the Little River aerodrome should meet with Airservices to discuss options for gaining airways clearances whilst on the ground at Little River.

10. Airservices should review and update the aeronautical charts for Melbourne.

14 Next step

Stakeholders are requested to provide feedback on the study, no later than 22 June 2011. CASA will normally attribute feedback to its author, however if a request is made to not disclose your identity CASA will not publish your name. However, this is subject to CASA’s obligations under the Freedom of Information Act 1982.

Following the consultation and feedback period CASA will finalise and publish their final recommendations.
15 References

The following publications were referred to or used during the compilation of this report:

  [Link]

- Airspace Act, 2007
  [Link]

- Airspace Regulations
  [Link]


- Civil Aviation Safety Regulations Part 173, Manual of Standards:
  [Link]

  [Link]

- FAA, Aeronautical Information Manual: [Link]

- FAA, Federal Aviation Regulations: [Link]

- Melbourne Airport and Aircraft noise – The Facts
  [Link]

- Notice of Proposed Change (NPC 172/04) Changes to General Aviation Aerodrome Procedures (GAAP), Class D procedures, and miscellaneous air traffic procedures.
  [Link]

- Operations at non-towered aerodromes booklet (CASA):
  [Link]

- Safety Bulletin: Airspace Infringements in the Sunbury/Bolinda Area (Airservices)
  [Link]

- Aeronautical Information Publication – effective 18 November 2010
- En Route Supplement Australia – effective 18 November 2010
- En Route Chart Low 2 – effective date 18 November 2010
- Melbourne Visual Navigation Chart – effective date 18 November 2010
- Melbourne Visual Terminal Chart – effective date 18 November 2010
- Terminal Area Chart 3 – effective date 18 November 2010
- Departure and Approach Procedure charts
- Report into CTAF versus CTAF(R) by the Ambidji Group Pty Ltd.
  [Link]

- National Airspace System Implementation Group, Concept, version 5.0
- National Airspace System (NAS) Australia, 14 December 2001

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Annexes:
A. Acronyms
B. Australian Airspace Structure
C. Definitions and Explanation of Terms
D. Stakeholders
E. Moorabbin Training Area Fly Neighbourly Advice
### Annex A – Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>AAPS</td>
<td>Australian Airspace Policy Statement</td>
</tr>
<tr>
<td>ACAS</td>
<td>Airborne Collision Avoidance System</td>
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<td>Act</td>
<td>Airspace Act 2007</td>
</tr>
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<td>ACP</td>
<td>Airspace Change Proposal</td>
</tr>
<tr>
<td>AGL</td>
<td>Above Ground Level</td>
</tr>
<tr>
<td>AIP</td>
<td>Aeronautical Information Publication</td>
</tr>
<tr>
<td>AIRAC</td>
<td>Aeronautical Information Regulation and Control</td>
</tr>
<tr>
<td>Airservices</td>
<td>Airservices Australia</td>
</tr>
<tr>
<td>ALARP</td>
<td>As Low As Reasonably Practical</td>
</tr>
<tr>
<td>AMSL</td>
<td>Above Mean Sea Level</td>
</tr>
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<td>ANSP</td>
<td>Air Navigation Service Provider</td>
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<td>ARP</td>
<td>Aerodrome Reference Point</td>
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<td>ARA</td>
<td>Airspace Research Application</td>
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<tr>
<td>ARM</td>
<td>Airspace Risk Model</td>
</tr>
<tr>
<td>ASA</td>
<td>Aviation Safety Advisor</td>
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<tr>
<td>ASIR</td>
<td>Aviation Safety Incident Report (recorded by ATSB)</td>
</tr>
<tr>
<td>ATC</td>
<td>Air Traffic Control</td>
</tr>
<tr>
<td>ATS</td>
<td>Air Traffic Services</td>
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<tr>
<td>ATSB</td>
<td>Australian Transport Safety Bureau</td>
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<td>BC</td>
<td>British Columbia</td>
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<tr>
<td>BOM</td>
<td>Bureau of Meteorology</td>
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<td>Civil Aviation Safety Authority</td>
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<td>Civil Aviation Safety Regulations 1998</td>
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<tr>
<td>CTA</td>
<td>Control Area</td>
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<tr>
<td>CTAF</td>
<td>Common Traffic Advisory Frequency</td>
</tr>
<tr>
<td>CTAF(R)</td>
<td>Common Traffic Advisory Frequency (Radio required)</td>
</tr>
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<td>CTR</td>
<td>Control Zone</td>
</tr>
<tr>
<td>DAP</td>
<td>Departure and Approach Procedures</td>
</tr>
<tr>
<td>Defence</td>
<td>Department of Defence</td>
</tr>
<tr>
<td>DME</td>
<td>Distance Measuring Equipment</td>
</tr>
<tr>
<td>DTI</td>
<td>Directed Traffic Information</td>
</tr>
<tr>
<td>EPBC Act</td>
<td>Environment Protection &amp; Biodiversity Conservation Act 1999</td>
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<td>ERC-L</td>
<td>En-Route Chart - Low</td>
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<td>ERSA</td>
<td>En-Route Supplement of Australia</td>
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<td>Electronic Safety Incident Report (recorded by Airservices)</td>
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<tr>
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<td>Federal Aviation Administration (United States of America)</td>
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<td>FAF</td>
<td>Final Approach Fix</td>
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<td>FIS</td>
<td>Flight Information Service</td>
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<td>FL</td>
<td>Flight Level</td>
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<tr>
<td>FN Curve</td>
<td>Frequency / Severity Risk curve</td>
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<td>Fly Neighbourly Advice</td>
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<td>Flying Operations Inspector</td>
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<td>ft</td>
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<td>General Aviation</td>
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<td>GAAP</td>
<td>General Aviation Aerodrome Procedures</td>
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<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System (navigation aid)</td>
</tr>
<tr>
<td>HDS</td>
<td>Hours of Daylight Saving</td>
</tr>
<tr>
<td>HMAS</td>
<td>Her Majesty’s Australian Ship</td>
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<tr>
<td>IAS</td>
<td>Indicated Air Speed</td>
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<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<td>IF</td>
<td>Intermediate Approach Fix</td>
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<td>IFR</td>
<td>Instrument Flight Rules</td>
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<td>ILS</td>
<td>Instrument Landing System (navigation aid)</td>
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<tr>
<td>kt(s)</td>
<td>knot(s)</td>
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<td>LL</td>
<td>Lower Limit</td>
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<tr>
<td>MOS</td>
<td>Manual of Standards</td>
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<td>NAPs</td>
<td>Noise Abatement Procedures</td>
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<td>NAS</td>
<td>National Airspace System</td>
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<td>Acronym</td>
<td>Explanation</td>
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<tr>
<td>NavAid</td>
<td>Navigation Aid</td>
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<tr>
<td>nm</td>
<td>Nautical Miles</td>
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<td>NOTAM</td>
<td>Notice to Airmen</td>
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<td>NPC</td>
<td>Notice of Proposed Change</td>
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<td>OAR</td>
<td>Office of Airspace Regulation</td>
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<tr>
<td>PSR</td>
<td>Primary Surveillance Radar</td>
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<td>PT</td>
<td>Passenger Transport</td>
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<tr>
<td>RAAF</td>
<td>Royal Australian Air Force</td>
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<td>RAPAC</td>
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<td>RMIT</td>
<td>Royal Melbourne Institute of Technology</td>
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<td>RNAV</td>
<td>Area Navigation</td>
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<td>RNP</td>
<td>Required Navigation Performance</td>
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<td>RPT</td>
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<td>SDF</td>
<td>Step Down Fix</td>
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<td>SFC</td>
<td>Surface</td>
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<td>SIDs</td>
<td>Standard Instrument Departures</td>
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<td>SIIMS</td>
<td>Safety Investigation Information Management System</td>
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<td>SIS</td>
<td>Surveillance Information Service</td>
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<td>SP</td>
<td>Special Procedure</td>
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<td>SSR</td>
<td>Secondary Surveillance Radar</td>
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<td>STARs</td>
<td>Standard Instrument Arrival</td>
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<td>SVFR</td>
<td>Special Visual Flight Rules</td>
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<td>TAC</td>
<td>Terminal Area Chart</td>
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<tr>
<td>TCAS</td>
<td>Traffic Alert and Collision Avoidance System (a proprietary term, often used in lieu of ACAS)</td>
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<td>TCU</td>
<td>Terminal Control Unit</td>
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<tr>
<td>TMA</td>
<td>Terminal Area</td>
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<td>Transponder exemption</td>
<td>Exemption against the requirement for carriage of SSR transponder for aircraft certified without an engine–driven electrical system</td>
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<tr>
<td>UAV</td>
<td>Unmanned Aerial Vehicle</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>USA</td>
<td>United States of America</td>
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<td>VFR</td>
<td>Visual Flight Rules</td>
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<tr>
<td>VHF</td>
<td>Very High Frequency</td>
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<td>VIS</td>
<td>Visibility</td>
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<tr>
<td>VMC</td>
<td>Visual Meteorological Conditions</td>
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<tr>
<td>VNC</td>
<td>Visual Navigation Chart</td>
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<tr>
<td>VOR</td>
<td>VHF Omni-Directional Radio Range (navigation aid)</td>
</tr>
<tr>
<td>VTC</td>
<td>Visual Terminal Chart</td>
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<td>WAC</td>
<td>World Aeronautical Chart</td>
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## Annex B – Australian Airspace Structure

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
<th>Summary of Services/Procedures/Rules</th>
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<tbody>
<tr>
<td>A</td>
<td>All airspace above Flight Level (FL) 180 (east coast) or FL 245</td>
<td>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.</td>
</tr>
<tr>
<td>B</td>
<td>IFR and Visual Flight Rules (VFR) flights are permitted. All flights are provided with ATS and are separated from each other. Not currently used in Australia.</td>
<td>All aircraft require a clearance from ATC to enter airspace. All aircraft require continuous two-way radio and transponder. IFR are 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)*.</td>
</tr>
<tr>
<td>C</td>
<td>In control zones (CTRs) of defined dimensions and control area steps generally associated with controlled aerodromes</td>
<td>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)*.</td>
</tr>
<tr>
<td>D</td>
<td>Towered locations such as Bankstown, Jandakot, Archerfield, Parafield and Alice Springs.</td>
<td>All aircraft require a clearance from ATC to enter airspace. For VFR flights this may be in an abbreviated form. As in Class C airspace all aircraft are separated on take off and landing. All aircraft require continuous two-way radio and are speed limited to 200 kt IAS at or below 2,500 ft 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.</td>
</tr>
<tr>
<td>E</td>
<td>Controlled airspace not covered in classifications above</td>
<td>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.</td>
</tr>
<tr>
<td>F</td>
<td>IFR and VFR flights are permitted. All IFR flights receive an air traffic advisory service and all flights receive a flight information service if requested. Not currently used in Australia.</td>
<td>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.</td>
</tr>
<tr>
<td>G</td>
<td>Non-controlled</td>
<td>* 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.</td>
</tr>
</tbody>
</table>

* 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 – Definitions and Explanation of Terms

**Prohibited Area:** The declaration of a Prohibited Area defines an area through which aircraft may not fly. Prohibited Areas have activity times and lateral and vertical limits.

**Restricted Area:** The declaration of a Restricted Area creates airspace of defined dimensions within which the flight of aircraft is restricted in accordance with specified conditions. Clearances to fly through an active Restricted Area are generally only withheld when activities hazardous to the aircraft are taking place, or when military activities require absolute priority. Restricted Areas are mainly declared over areas where military operations occur. However, Restricted Areas have also been declared to cater for communications and space tracking operations or to control access to emergency or disaster areas. Restricted Areas are generally promulgated at specified times and dates. For example, a temporary Restricted Areas 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 defines airspace within which activities dangerous to the flight of aircraft may exist at specified times. Approval for flight through a Danger Area outside controlled airspace is not required. However, pilots are expected to maintain a high level of vigilance when transiting Danger Areas. Danger Areas 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.

**Fly Neighbourly Advice:** A Fly Neighbourly Advice (FNA) is a voluntary code of practice negotiated between aircraft operators and communities or authorities (e.g. a National Park) that have an interest in reducing the disturbance caused by aircraft within a defined area. FNAs were introduced in Australia in 1994 as a tool to reduce the effects of aviation on environmentally sensitive areas within uncontrolled airspace. FNAs are in use in other parts of the world for similar reasons.

**Special Procedure:** A Special Procedure (SP) is a mutually agreed 'procedure' for aircraft operations in a particular area. Like a FNA, a SP is negotiated between aircraft operators and communities or authorities (e.g. a National Park) that have an interest in reducing the disturbance caused by aircraft within that area.

**General Aviation Aerodrome Procedures:** General Aviation Aerodrome Procedures (GAAP) were not an ICAO designation but were employed at the high density General Aviation aerodromes at Moorabbin, Archerfield, Bankstown, Camden, Jandakot and Parafield to manage the large volumes of VFR traffic. On the 03 June 2010 the six GAAP aerodromes transitioned to become Class D aerodromes.
Annex D – Stakeholders
The following organisations were invited to provide input to the study.

<table>
<thead>
<tr>
<th>Position</th>
<th>Organisation</th>
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</thead>
<tbody>
<tr>
<td>Aviation Safety Advisor</td>
<td>Safety Analysis &amp; Education Division, CASA</td>
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<tr>
<td>Flying Operations Inspector</td>
<td>Operations Division, CASA</td>
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<tr>
<td>Senior Defence Advisor</td>
<td>Department of Defence</td>
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<tr>
<td>Regulatory Services Manager,</td>
<td>Airservices Australia</td>
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<tr>
<td>Safety and Environment</td>
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<tr>
<td>Chief Instructor</td>
<td>Adventure Airsports</td>
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<tr>
<td>Chief Flying Instructor</td>
<td>Aerial Extras</td>
</tr>
<tr>
<td>Chief Instructor</td>
<td>Aerial Skydives</td>
</tr>
<tr>
<td>Chief Flying Instructor</td>
<td>Aerochute International</td>
</tr>
<tr>
<td>Chief Pilot</td>
<td>Aerovision</td>
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<tr>
<td>President</td>
<td>Aircraft Owners and Pilots Association</td>
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<tr>
<td>Director</td>
<td>Airlines of Tasmania</td>
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<tr>
<td>Chief Flying Instructor</td>
<td>Airsports Flying School</td>
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<td>Alliance Airlines</td>
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<tr>
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<td>Australasian Jet</td>
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<tr>
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<td>Australian Air Express</td>
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<tr>
<td>Secretary</td>
<td>Australian Airports Association</td>
</tr>
<tr>
<td>President</td>
<td>Australian and International Pilots Association</td>
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<tr>
<td>Victorian &amp; Tasmanian Delegate</td>
<td>Australian Balloon Federation</td>
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<tr>
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<td>Australian Federal Police - Melbourne</td>
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<tr>
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<td>Australian Federation of Air Pilots Association</td>
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<td>Australian Parachute Federation</td>
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<td>Chief Instructor</td>
<td>Australian Skydive</td>
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<tr>
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<tr>
<td>Chief Flying Instructor</td>
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<tr>
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<td>Bacchus Marsh School of Aviation</td>
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<tr>
<td>Chief Pilot</td>
<td>Baycity Seaplanes</td>
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<tr>
<td>President</td>
<td>Beaufort Gliding Club</td>
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<tr>
<td>Chief Pilot</td>
<td>Bendigo Aviation</td>
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<tr>
<td>Chief Flying Instructor</td>
<td>Bendigo Flying Club</td>
</tr>
<tr>
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<td>Commando Skydivers Incorporated</td>
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<td>Direct Air / National Aerospace Training</td>
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<td>Chief Pilot / Chief Flying</td>
<td>Geelong Aviation &amp; Flight Training</td>
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<td>Geelong Gliding Club</td>
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<td>Geelong Helicopters</td>
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<td>Geelong Sports Aviators</td>
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<td>Victorian Airfields and Airspace Officer</td>
<td>Gliding Federation of Australia</td>
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<td>Golden Plains Flying School</td>
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<td>Position</td>
<td>Organisation</td>
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<td>--------------------------------------------------------</td>
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<tr>
<td>President / Chief Flying Instructor</td>
<td>Goulburn Valley Soaring</td>
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<tr>
<td>Aerodrome Manager</td>
<td>Greater Shepparton City Council</td>
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<tr>
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<td>Chief Pilot</td>
<td>Helicopter Resources Pty Ltd</td>
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Annex E – Moorabbin Fly Neighbourly Advice

The following extract from the 18 November 2010 edition of ERSA:

15. FN 5 – Moorabbin Training Area – Fly Neighbourly Advice

15.1 The City of Casey has adopted a Fly Neighbourly Advice for aircraft operating within the designated Danger Areas AM/D 314 and AM/D 315 commonly referred to as the “Moorabbin Training Area”.

15.2 The Moorabbin Training Area is approximately defined as an area bounded by a line from Moorabbin Aerodrome to Pearcedale, then coastal to Koo-wee-rup, Pakenham to Moorabbin Aerodrome. Refer to Figure 50 below.

15.3 Pilots of aircraft operating in the Moorabbin Training Area are requested to avoid the following urban areas: Hampton park / Lyndhurst / Cranbourne, and within circles of one nautical mile (1 nm) of Cardinia and Five Ways joined tangentially (see map), or not to operate below 2,000 ft over these areas.

15.4 Pilots are requested to minimise aerobatic manoeuvres below 3,000 ft in the aerobatic area east of Berwick – Cranbourne Road and north of Ballarto Road, due to noise sensitivity.

15.5 In addition, pilots are requested to observe the following recommendations:

a. no air training activity in the Moorabbin Training Area after 1000, (1100 hours HDS), and

b. farm and other buildings should not be used as reference points for training manoeuvres.

[Note: HDS refers to Hours of Daylight Saving. Victoria’s period of daylight saving commences each year in October and concludes in March or April the following year.]

Figure 50: Moorabbin Fly Neighbourly Advice.
Extract from ERSA – effective date 18 November 2010.