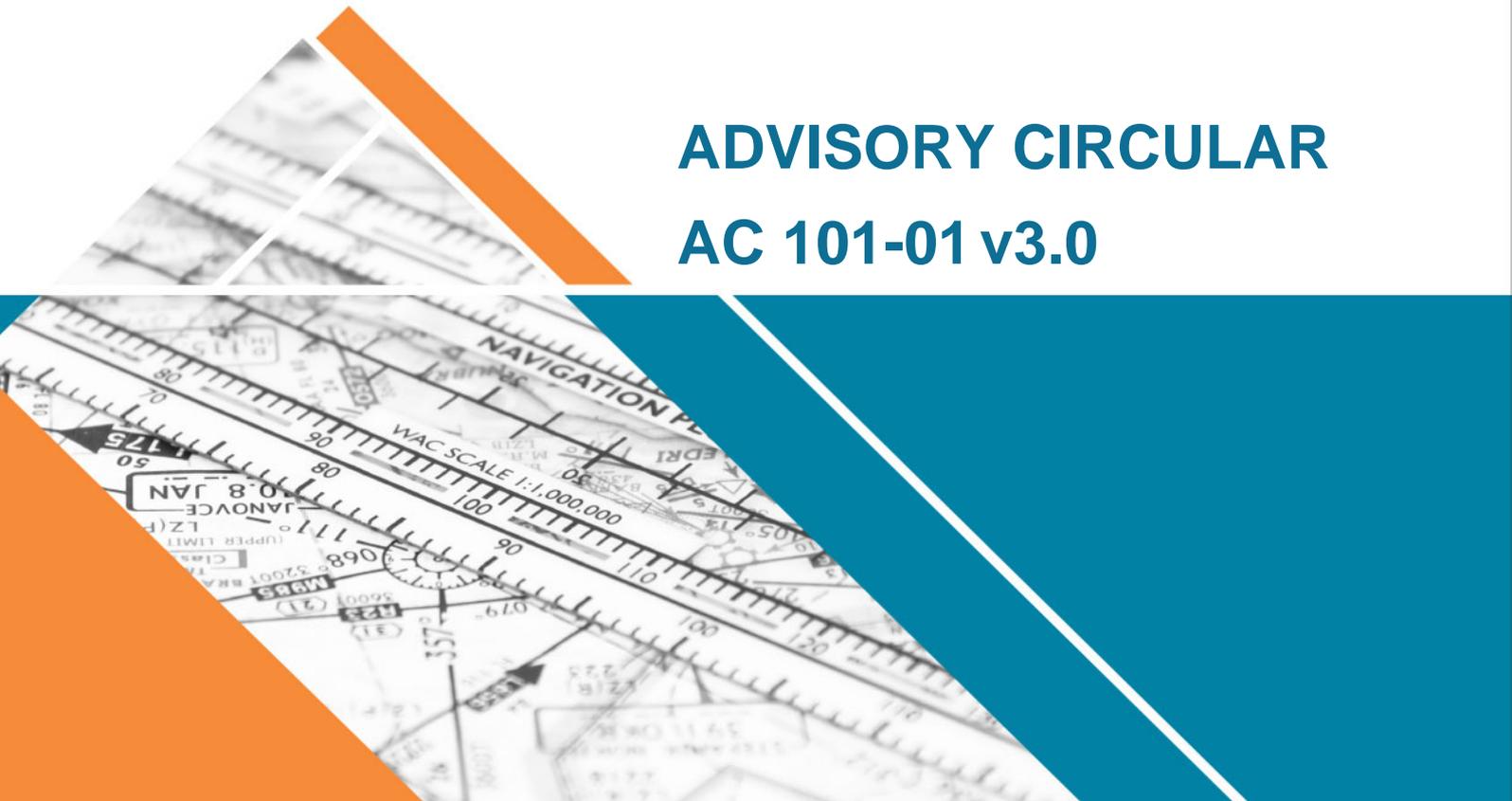




ADVISORY CIRCULAR AC 101-01 v3.0



Remotely piloted aircraft systems - licensing and operations



Date December 2019
File ref D19/460393

Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material. While this AC may describe a means of compliance with the legislation, alternative procedures demonstrating an equivalent or greater level of safety may be acceptable on a case-by-case basis.

Advisory Circulars should always be read in conjunction with the relevant regulations.

Audience

This Advisory Circular (AC) will be of interest to:

- remotely piloted aircraft (RPA) operator's certificate (ReOC) holders and applicants
- unmanned operator's certificate (UOC) holders
- remote pilots and other remote crew members
- unmanned aerial vehicle (UAV) controller certificate holders and crew
- other support personnel involved in remotely piloted aircraft systems (RPAS) operations.

Purpose

This AC was developed by the Civil Aviation Safety Authority (CASA) to provide guidance to RPA operators, remote crew, manufacturers and maintainers. It describes the categorisation of RPA and general requirements for use of RPAS. It also provides guidance to operators and crew on the safe and legal operation of RPA in all classes of airspace.

This AC does not provide guidance for autonomous aircraft (that is, any unmanned aircraft that cannot be managed on a real-time basis during flight).

Although this AC may be of interest to all operators of unmanned aircraft, it is essential that operators of 'excluded RPA' operate in accordance with the applicable regulations and read the guidance contained in AC 101-10 and model aircraft operators read and follow the guidance in AC 101-03, for.

Unless specified otherwise, all subregulations, regulations, divisions, subparts and parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Notice

It is essential that operators and crew involved in RPAS operations understand that they are operating within the national aviation system and that they have an obligation to be aware of information and regulatory requirements relating to aviation operations. Such information includes, but is not limited to:

- Part 101 of the *Civil Aviation Safety Regulations 1998 (CASR)*
- all relevant requirements listed in the regulations table at section 1.3 of this AC
- AIP, ERSA and aeronautical charts issued by Airservices Australia.

For further information

For further information, or if in doubt as to whether any proposed operation requires a ReOC, contact CASA's RPAS Office by email at rpas@casa.gov.au.

Status

This version of the AC is approved by the Manager, RPAS Branch.

Note: Changes made in the current version include the addition of a new Annex A.

Version	Date	Details
v3.0	December 2019	New Annex A - Remote Pilot Licence (RePL) Training Course - CASA guidance added.
v2.1	July 2018	Removal of the approach and departure diagrams for non-controlled aerodromes. Changes to the dimensions of the approach and departure paths for controlled aerodromes depicted in Appendix A and several textual changes to support the revised diagram and to reflect the latest legislative instruments. Inclusion of advice relating to legislative instruments made in 2017.
v2.0	December 2016	This is the second AC to be published on this subject and replaces AC 101-1(0). This AC has been completely re-written to take into account amendments to Part 101 and to bring it up to date with current CASA procedures.
v1.0(0)	July 2002	Initial AC on this subject.

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1 Reference material

1.1 Acronyms

This AC describes the general requirements for non-recreational use of RPA. It is consistent with the work currently being developed by the International Civil Aviation Organization (ICAO) and that of other regulatory bodies. To this end, the terms and definitions are consistent with those used by ICAO as found in Annex 2, Rules of the Air, to the Convention on International Civil Aviation (the Chicago Convention).

The acronyms and abbreviations used in this AC are listed in the table below. Other acronyms in general use within the aviation industry can be found in the Aeronautical Information Publication (AIP) at General (GEN) 2.2. All operators, remote pilots and crew associated with remotely piloted aircraft should familiarise themselves with that information.

Acronym	Description
AC	advisory circular
ADF	Australian Defence Force
ADS-B	automatic dependent surveillance - broadcast
AIP	Aeronautical Information Publication
AIP-ENR	AIP – En Route (a section of AIP-Book)
AIP-ERSA	AIP – En Route Supplement Australia
AIP-GEN	AIP – General (a section of AIP-Book)
AGL	above ground level
AOC	air operator's certificate
ARN	aviation reference number
ATC	air traffic control
ATS	air traffic services
ATSB	Australian Transport Safety Bureau
BVLOS	beyond visual line of sight
CAO	Civil Aviation Order
CAR	<i>Civil Aviation Regulations 1988</i>
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
CLARC	CASA Licensing and Registration Centre
CofA	certificate of airworthiness
CRP	chief remote pilot
CTAF	common traffic advisory frequency

Acronym	Description
DAMP	drug and alcohol management program
EVLOS	extended visual line of sight
FPV	first person view
FRE	flight radio endorsement
GCS	ground control station
HLS	helicopter landing site
ICAO	International Civil Aviation Organization
LAT	latitude
LONG	longitude
MOS	manual of standards
NAA	National Aviation Authority
NOF	NOTAM office
NOTAM	notice to airmen
OAR	Office of Airspace Regulation
OEM	original equipment manufacturer
ReOC	RPA operator certificate
RePL ¹	remote pilot licence
RPA	remotely piloted aircraft
RPAS	remote piloted aircraft system
RPS	remote pilot station
RTCA	radio technical commission for aeronautics
SOCs	standard RPA operating conditions
SSR	secondary surveillance radar
TAC	terminal area chart
UAS	unmanned aircraft system
UAV	unmanned aerial vehicle (obsolete term)
UOC	UAV operator's certificate (obsolete term)
VLOS	visual line of sight
VNC	visual navigation chart

¹ The acronym 'RePL' is used by CASA in its guidance and safety promotional materials to distinguish it from the manned aviation recreational pilot licence (RPL) acronym. As such, a reference to an RPL training course in the Part 101 regulations should be read as a reference to a RePL training course.

Acronym	Description
VTC	visual terminal chart
WAC	world aeronautical chart

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below.

Term	Definition
Aeronautical data originator	An organisation that can submit notice to airmen (NOTAM) information to Airservices Australia.
Australian flight information region	The region for which Australia provides flight information and search and rescue services.
Autonomous aircraft	An unmanned aircraft that does not allow pilot intervention during all stages of the flight of the aircraft
Autonomous operation	An operation of an unmanned aircraft that does not allow pilot intervention during all stages of the flight of the aircraft.
Beyond visual line of sight operation	An operation in which the remote crew does not have direct visual contact with the aircraft.
Command and control link	The data link between the remotely piloted aircraft and the remote pilot station for the purposes of managing the flight.
Contracting State	A country that has signed the Convention on International Civil Aviation.
Controlled airspace	Airspace of defined dimension within which an air traffic control service is provided to flights in accordance with the airspace classification.
Conversion training	The training that the aircraft operator requires remote pilots to complete before assigning them to duty on an RPA.
Detect and avoid	The capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action to comply with the applicable rules of flight.
Excluded RPA	An RPA operated under prescribed conditions for commercial purposes that does not require a CASA authorisation in the form of an RPA operator's certificate (ReOC) and/or a remote pilot licence (RePL). (See regulation 101.237 for details).
Extended visual line of site operation	An operation, available to approved operators and remote pilots only where, at times, the remote pilot does not have direct visual sight of the RPA; however, with assistance from trained RPA observers, the remote pilot is able to ensure safe operation of the RPA.
First person view	A visual method for controlling an RPA from the remote pilot station via an on-board camera. FPV equipment can only be used as an adjunct to visual observation during visual operations.
Hand-over	The act of passing piloting control from one remote pilot station to another, or to another remote pilot at the same remote pilot station.
Included RPA	A non-regulatory term for RPA operations that require authorisation in the form of a ReOC and RePL.

Term	Definition
Large RPA	An RPA (other than an airship) with a gross weight of more than 150 kg or a remotely-piloted airship with an envelope capacity of more than 100 m ³ .
Landowner or occupant	The person or organisation that has control over access to an area of land on an ongoing basis.
Lost link	The loss of control link contact with the remotely piloted aircraft such that the remote pilot can no longer manage the aircraft's flight.
Medium RPA	An RPA with a gross weight of at least 25 kg but not more than 150 kg or a remotely piloted airship with an envelope capacity of 100 m ³ or less.
Micro RPA	An RPA with a gross weight of 100 g or less.
Model aircraft	An aircraft that is used for sport or recreational purposes and which cannot carry a person.
Operational control	The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of safety of the aircraft and the regularity and efficiency of the flight.
Operator (the ReOC holder)	A person, organisation or enterprise engaged in, or offering to engage in, an RPAS operation.
Outside controlled airspace	Airspace of defined dimensions within which an air traffic control separation service is not provided to pilots (Class G airspace).
Pilot (verb)	To manipulate the flight controls of an aircraft during flight time.
Populated area	Generally, a built-up, urban or suburban area where people live and work
Populous area	An area in relation to the operation of an unmanned aircraft that has a sufficient density of population for some aspect of the operation, or some event that might happen during the operation (in particular, a fault in, or failure of, the unmanned aircraft) to pose an unreasonable risk to the life, safety or property of somebody who is in the area, but is not connected with the operation (see section 4.2.11).
Pre-flight inspection	A set of manufacturer-recommended functional tests of systems and components to be performed before any launch.
Protected airspace	Prohibited, restricted and danger areas (refer to <i>Airspace Regulations 2007</i>).
Radio line of sight	An operation where the remote crew maintains control of the RPA by a direct electronic point-to-point contact between a transmitter and a receiver.
Remote crew member	A crew member charged with duties essential to the operation of a remotely piloted aircraft system during flight time.
Remote pilot	The person who manipulates the flight controls of a remotely-piloted aircraft, or who initiates and monitors the flight, and is responsible for its safe conduct during flight time.
Remotely piloted	Controlling an aircraft from a pilot station that is not on board the aircraft.
Remotely piloted aircraft	An unmanned aircraft, other than a balloon or kite, where the pilot flying is not on board the aircraft.

Term	Definition
Remotely piloted aircraft system	A set of configurable elements consisting of a remotely piloted aircraft, its associated remote pilot station(s), the required command and control transmitters and receivers, and any other system elements as may be required at any point during flight operation.
Remote pilot station	The station at which the remote pilot manages the flight of an unmanned aircraft.
RPA observer	A remote crew member who, by visual observation of the RPA and the adjacent airspace, assists the remote pilot in the safe conduct of the flight.
RPAS aerial work	Any flight activity carried out by an RPAS other than the carriage of passengers.
State aircraft	Aircraft of any part of the Defence Force (including any aircraft that is commanded by a member of that Force during duties as such a member and aircraft used in the military, customs or police services of a foreign country).
Segregated airspace	Airspace of specified dimensions allocated for exclusive use to a specific user(s).
Small RPA	An RPA with a gross weight of at least 2 kg but less than 25 kg.
Squawk identification	A secondary surveillance radar (SSR) transponder function that air traffic control uses to positively identify aircraft.
Unmanned aerial vehicle	Obsolete term - refer to 'remotely-piloted aircraft' definition.
Unmanned aircraft system	An aircraft and its associated elements that are operated with no pilot on board, including both remotely piloted and autonomous aircraft systems.
UAV control station or ground control station	Obsolete term – refer to 'remote pilot station': The station at which the remote pilot/UAV controller manages the flight of an unmanned aircraft.
Very small RPA	An RPA with a gross weight of more than 100 g but less than 2 kg.
Visual line-of-sight operation	An unmanned aircraft operation in which the remote pilot operating the remotely piloted aircraft can continually see, orient and navigate the aircraft to meet their separation and collision avoidance responsibilities, with or without corrective lenses, but without the use of binoculars, a telescope or other similar device.

1.3 References

Regulations

Regulations are available on the Federal Register of Legislation <https://www.legislation.gov.au/>

Document	Title
Part 21 of CASR	Certification and airworthiness requirements for aircraft and parts
Part 47 of CASR	Registration of aircraft and related matters
Part 61 of CASR	Flight crew licensing
Part 99 of CASR	Drug and alcohol management plans and testing

Document	Title
Part 45 of CASR	Display of nationality marks, registration marks and aircraft registration identification plates
Part 101 of CASR	Unmanned aircraft and rockets
Part 172 Manual of Standards	Manual of Air Traffic Services
Regulation 2 of the <i>Civil Aviation Regulations 1988 (CAR)</i>	Interpretation
Part 4A of CAR	Maintenance
Regulation 42CA of CAR	Maintenance schedule—primary, intermediate, restricted or limited category aircraft
Regulations 42CB of CAR	Maintenance—experimental aircraft
Civil Aviation Order (CAO) 20.18	Aircraft equipment – basic operational requirements Instrument 2014
CASA Instrument 01/17	<i>Approval – Operation of RPA at night</i>
CASA Instrument 96/17	<i>Direction – operation of certain unmanned aircraft</i>
CASA Instrument EX156/17	<i>Exemption, approval and direction – operation of model aircraft – members of Model Aeronautical Association of Australia</i>
<i>Civil Aviation Act 1988</i>	
<i>Transport Safety Investigation Act 2003</i>	
Transport Safety Investigation Regulations 2003	
<i>Airspace Act 2007</i>	
<i>Airspace Regulations 2007</i>	
<i>Privacy Act 1988</i>	
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	

Advisory material

CASA's Advisory Circulars are available at <http://www.casa.gov.au/AC>

Document	Title
AC 21-10	Experimental Certificates
AC 21-13	Australian-designed aircraft - type certification
AC 101-03	Unmanned aircraft and rockets – model aircraft
AC 101-10	Remotely piloted aircraft systems – operation of excluded RPA (other than model aircraft)
CAAP 92-2	Guidelines for the establishment and operation of onshore Helicopter Landing Sites

ICAO and other documents

Document	Title
ICAO Document 10019	Manual on Remotely Piloted Aircraft Systems (RPAS)
Convention on International Civil Aviation (the Chicago Convention)	Article 8, Pilotless aircraft
Chicago Convention	Annex 2, Rules of the Air
Chicago Convention	Annex 8, Airworthiness of Aircraft
ISO 31000	Risk management
Radio Technical Commission for Aeronautics (RTCA) DO-320	Operational Services and Environmental Definition (OSED) for Unmanned Aircraft Systems
RTCA DO-304	Guidance Material and Considerations for Unmanned Aircraft Systems
En Route Supplement Australia (ERSA)	available at: http://www.airservicesaustralia.com/aip/aip.asp
CASA Office of Airspace Regulation (OAR)	OAR Operations Manual

Advisory websites

Document	Title
CASA Drug and alcohol management program (DAMP)	available at: https://www.casa.gov.au/operations/standard-page/drug-and-alcohol-management-plans
CASA safety management	available at: https://www.casa.gov.au/landing-page/safety-management
General information regarding privacy	available at: www.oaic.gov.au
Queensland Information Commissioner Privacy and drone technology page	available at http://www.oic.qld.gov.au/about/news/privacy-and-drone-technology

1.4 Forms

CASA's forms are available at <http://www.casa.gov.au/forms>

Form number	Title
Form 101-01	Remote Pilot Licence (RePL)
Form 101-02	Application for RPA Operator's Certificate (ReOC) Initial Issue and Variation
Form 101-03	Application for RPA Operator's Certificate (ReOC) Subsequent Issue
Form 101-04	Application for RPA Operator's Certificate (ReOC) Nominated Personnel Approval
Form 101-05	RePL Training - Notification of Results
Form 1162	Aviation Reference Number (ARN) Application (Individuals)
Form 1170	Aviation Reference Number (ARN) Application (Organisations)

2 Introduction

2.1 Classification of unmanned aircraft

2.1.1 The International Civil Aviation Organization (ICAO) defines unmanned aircraft as:

- unmanned aircraft systems (UAS)
- model aircraft
- rockets
- unmanned free flight balloons.

2.1.2 Unlike the ICAO classification, CASA classifies unmanned aircraft as:

- UAS
- rockets
- unmanned free flight balloons.

2.1.3 CASA's classification hierarchy, focusing on the UAS path, is shown in Figure 1.

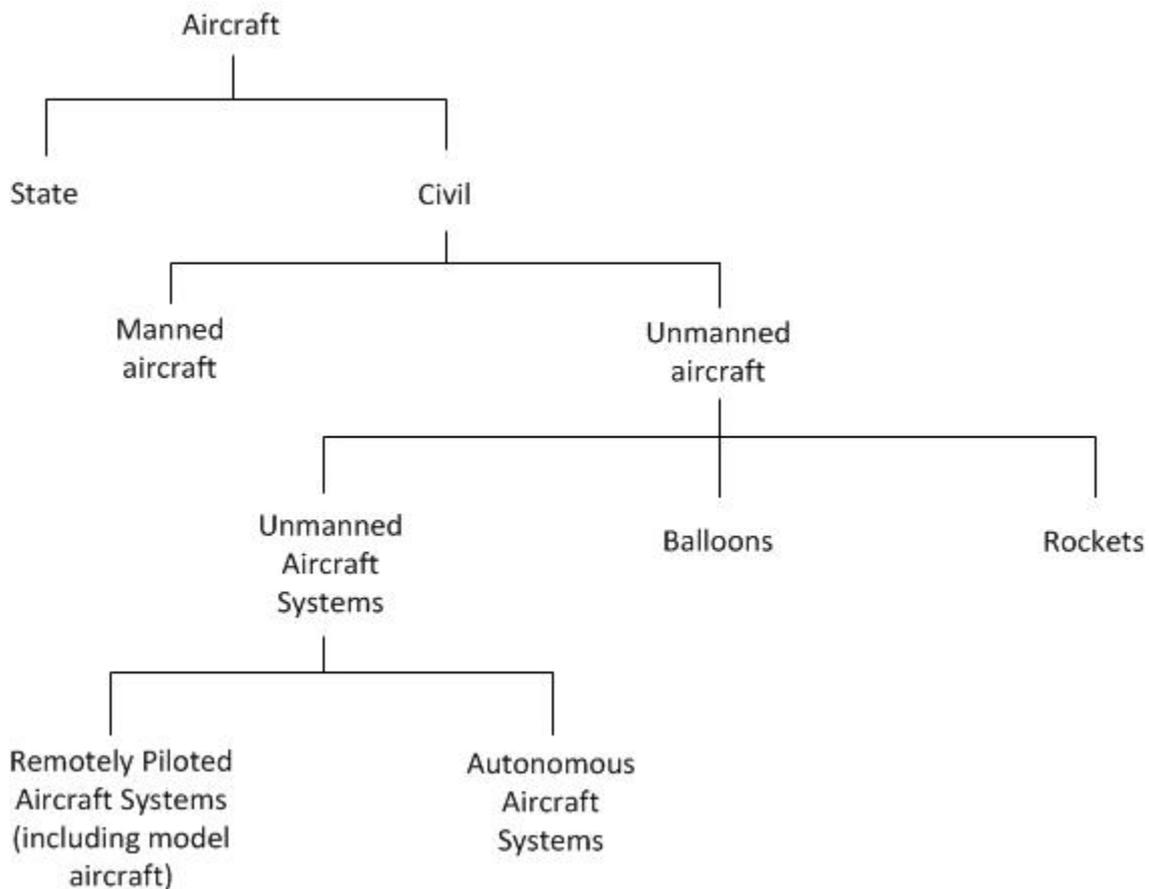


Figure 1: CASA's classification hierarchy for unmanned aircraft

2.1.4 State aircraft and Australian Defence Force RPAs

2.1.4.1 Unmanned aircraft operated by the Australian Defence Force (ADF) are defined by *the Civil Aviation Act 1988 (the Act)* as 'State aircraft' and operate under Defence

regulations. A 'Regulator-to-Regulator' agreement exists between CASA and the Defence Airworthiness Authority to ensure that both civil and Defence regulations move towards harmonisation.

- 2.1.4.2 While the ADF will hold airworthiness boards to determine issues relating to civil contractors and the particular Defence service will exercise its own requirements, CASA's standards are expected in the first instance.
- 2.1.4.3 A civilian operator is required to have a CASA approval for operations that are conducted for the ADF in Australian civil airspace. The development of a mission plan is a joint effort between the contractor, ADF and CASA, with CASA providing final approval.

2.1.5 Civilian aircraft

2.1.5.1 Within civilian aircraft, UAS are further classified as either:

- remotely piloted aircraft systems (RPAS)
- autonomous aircraft systems.

Remotely piloted aircraft systems

2.1.5.2 RPAS are a subset of UAS that are piloted by a remote pilot. RPAS include, but are not necessarily limited to:

- the RPA
- a remote pilot station (RPS)
- the command and control (C2) data-link.

2.1.5.3 Aircraft that are conventionally thought of as 'model aircraft' are considered by CASA to be RPA. Model aircraft are defined by purpose as an RPA used for sport or recreation.

Autonomous aircraft systems

2.1.5.4 While there are various degrees of automation in UAS, an autonomous operation is one in which there is no ability for the pilot to intervene in the conduct of the flight. This does not include lost link situations. However, CASA's current focus is on RPA operations, which are, by definition, operations that are not autonomous operations.

2.1.5.5 Autonomous operations may be approved but will be considered on a case-by-case basis and require the submission of an acceptable safety case to CASA. If operators are considering autonomous operations, they should contact CASA, at rpas@casa.gov.au, as early as possible in the planning stages.

A note on automation

2.1.5.6 Automation—as opposed to autonomy—can assist in reducing the amount of human intervention required and can improve the quality, accuracy and precision of an RPA operation. The ability to automate some aspects of the RPA operation can result in a safer overall operation, as well as introducing some different risks (e.g. understanding exactly what each automated function does and how they relate to one another).

2.2 International regulation of unmanned aircraft

2.2.1 Article 8, Pilotless Aircraft, of the Convention on International Civil Aviation (the Chicago Convention) stipulates that:

No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization.

2.2.2 All UAS are subject to the provisions of Article 8 of the Chicago Convention. Australia, as a signatory to the Chicago Convention, has created specific regulations to authorise unmanned aircraft operations in Australian territory. However, only RPA will be able to integrate into the civil aviation system in the foreseeable future as the remote pilot's functions and responsibilities are, at this stage, considered essential to the safe and predictable operation of the aircraft as it interacts with other aircraft and the air traffic management system.

3 Types of RPA operations

This Chapter will help you to:

- understand how CASA categorises RPA operations
- identify the type of operation you plan to conduct
- find the right guidance for different types of RPA operations.

3.1 Overview

- 3.1.1 Operators and pilots of all RPA are operating within the national aviation system and must therefore operate their RPA safely and in accordance with the relevant regulations that govern aircraft operations.
- 3.1.2 RPAS operations may pose safety risks to other airspace users and to the people and property over which they fly. These risks must be kept at an acceptable level.
- 3.1.3 A suitable baseline level of aviation risk is that demonstrated by the conventionally-piloted/manned aircraft industry. It is CASA policy that the RPAS sector demonstrate a level of safety that is similar to that currently achieved in the conventionally-piloted/manned aircraft sector.
- 3.1.4 CASA acknowledges that a 'one-size-fits-all' approach to RPAS policy and regulation is not always appropriate and has determined that RPA operations conducted under strict conditions present a low level of risk to other airspace users, other people and property. As such, CASA has determined that certain RPA, in particular circumstances, can be operated safely in Australian airspace without requiring CASA authorisations in the form of a remote pilot licence (RePL) and an RPA operator's certificate (ReOC). These low-risk operations—termed 'excluded RPA' operations—are defined in regulation 101.237.
- 3.1.5 All other operations are considered to be 'included RPA'. CASA manages the risks of these operations by requiring the operator and remote pilot to be authorised; that is:
- the operator must hold an RPA operator certificate (ReOC) - see Chapter 6
 - the remote pilot must hold a remote pilot licence (RePL) - see Chapter 7.
- 3.1.6 Section 3.2 explains the assessment criteria used to determine whether an operation is considered to be an included RPA or excluded RPA operation.

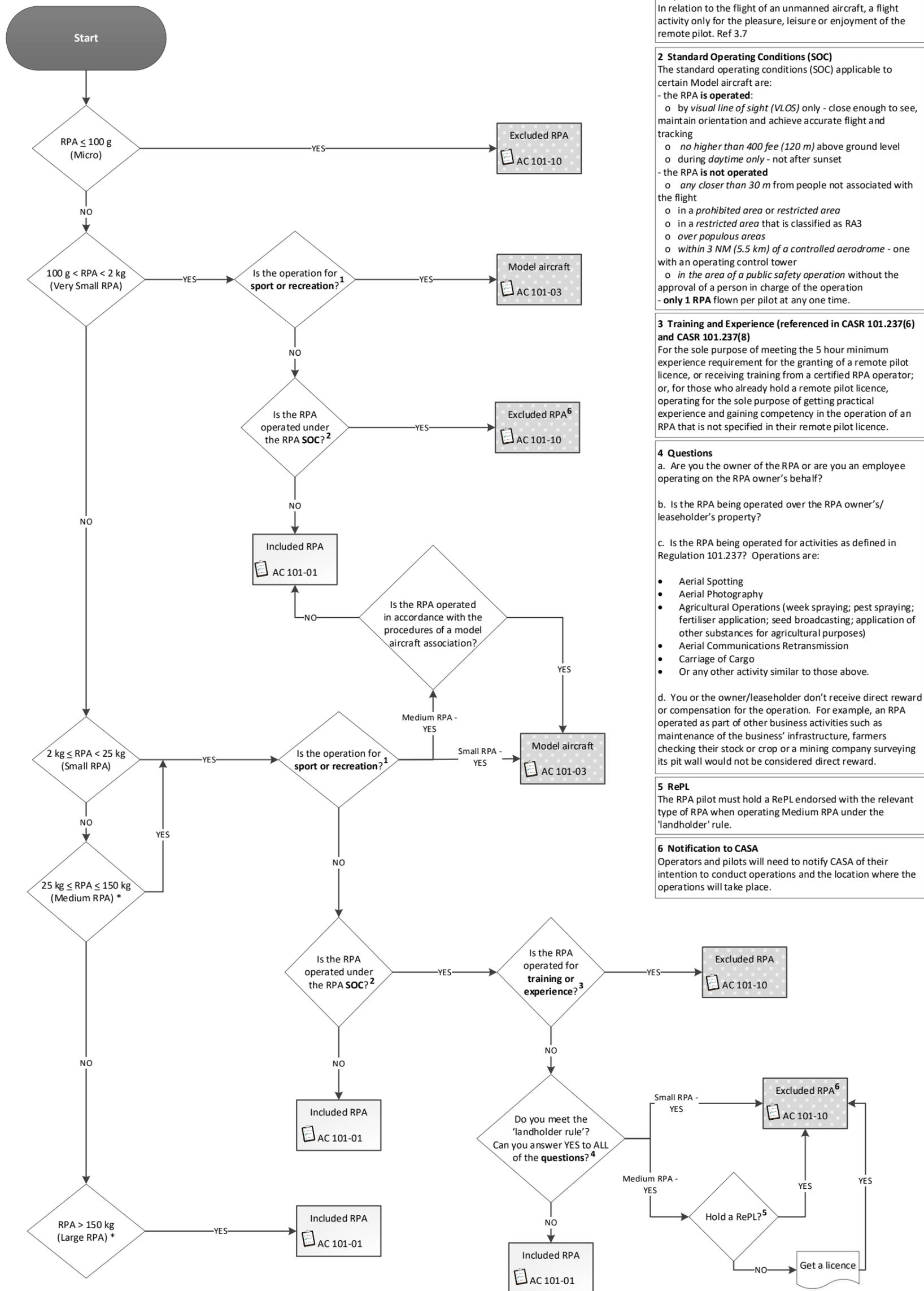
3.2 Assessment of operational risk

- 3.2.1 When considering requests for RPAS-related authorisations and approvals CASA will consider the whole remote system, not just the aircraft.
- 3.2.2 The assessment of an operation as either an excluded or included RPA operation depends on a number of criteria:
- gross weight of the RPA
 - whether the flight is for sport or recreational purposes
 - whether the flight complies with the standard operating conditions.

3.2.3 For some RPA weight categories, a flight that is compliant with the standard operating conditions is further assessed for:

- meeting training or experience rules
- compliance with the 'landholder' rules.

3.2.4 Figure 2 shows how these criteria are used to decide whether an operation would be an included or excluded RPA operation. The criteria are then explained in more detail in the following paragraphs.



* For airships, Medium RPA ≤ 100 m³ ; Large RPA > 100 m³ envelope capacity.

Figure 2: Decision flow chart to determine eligibility as an excluded RPA²

² Figure adapted courtesy of the copyright holder, the Australian Association for Unmanned Systems (AAUS).

Weight classes

3.2.5 RPA are separated into the following weight classes:

- **micro:** gross weight of 100 g or less
- **very small:** gross weight of more than 100 g and less than 2 kg
- **small:** gross weight of at least 2 kg and less than 25 kg
- **medium:** gross weight of at least 25 kg and less than or equal to 150 kg (or, for airships, an envelope of 100 m³ or less)
- **large:** gross weight greater than 150 kg (or, for airships, more than a 100 m³ envelope).

Sport or recreational purposes

3.2.6 'Sport or recreational purposes' means operating an RPA as a hobby or for pleasure and where the operation does not generate a direct commercial outcome of any sort (for the pilot or any third party).

3.2.7 The use of an RPA for any sport or recreational operation defines the RPA as a 'model aircraft'.

Standard operating conditions

3.2.8 The standard operating conditions (SOC) applicable to excluded RPA are:

- the RPA **is operated:**
 - o by *visual line of sight (VLOS)* only - close enough to see, maintain orientation and achieve accurate flight and tracking
 - o *no higher than 400 ft (120 m)* above ground level (see *SOC note 1*)
 - o during *daytime only* – effectively, not before sunrise or after sunset
- the RPA **is not operated**
 - o *any closer than 30 m* from people not associated with the flight³
 - o in a *prohibited area* or *restricted area* (see *SOC note 2*)
 - o in a *restricted area* that is classified as RA3 (see *SOC note 3*)
 - o *over populous areas* (see *SOC note 4*)
 - o *within 3 NM (5.5 KM)* of the *movement area of a controlled aerodrome* – one with an operating control tower (see *SOC note 5*)
 - o *in the area of a public safety operation* without the approval of a person in charge of the operation (see *SOC note 6*)
- **only 1 RPA** flown per pilot at any one time.

³ Any person who is not charged with duties essential to the safe operation of a remotely piloted aircraft.

SOC notes:

1. Height limit of 400 ft (120 m) referenced to a point on the ground immediately below the RPA at all times during the flight, except in the vicinity of aerodromes as described at paragraph 4.2.10.7.

2. Prohibited area—area of airspace where the operation of all civil aircraft is prohibited. There are no permanently prohibited areas, but temporary ones are notified in notices to airmen (NOTAMs)—see section 4.3. Since there is no prospect of operating in these areas when they are active, no controlling authority contact details are published.

3. Restricted areas are temporary and permanent prescribed areas of airspace in which flight may be permitted, but only with the express permission of the controlling authority for that area. There are three categories of restricted areas (RA1, RA2, RA3). Permission to operate in a restricted area is as follows:

- Excluded RPA subject to the SOC may apply to the controlling authority for permission to operate within these areas. Controlling authorities are not obliged to grant permission or to give specific reasons for declining the request for access.
- Approved operations will be subject to any conditions imposed by the controlling authority. Failure to comply with the conditions is a failure to comply with the regulations and would be treated as such.
- The locations of permanent and temporary restricted areas are marked on aeronautical charts, and contact details for controlling authorities are published in the En Route Supplement Australia (ERSA) of the Aeronautical Information Publication (AIP) at section PRD-1.
- Temporary restricted areas are notified by NOTAM (see section 4.3).

4. Populous areas - for RPA operations, does not have its common meaning. Rather, it is defined in the regulations as:

...an area [that] has a sufficient density of population for some aspect of the operation, or some event that might happen during the operation (in particular, a fault in, or failure of, the aircraft...) to pose an unreasonable risk to the life, safety or property of somebody who is in the area but is not connected with the operation.

For example, if a rotorcraft-type RPA is flying at a relatively low height (i.e. 100 ft) directly above a single person not associated with the flight, it may be considered to be operating in a populous area due to the fact that a complete loss of power may cause injury to the person below. This interpretation would apply equally to higher flight over small or large public gatherings, or over built-up areas where there is a greater risk to property.

It is the responsibility of remote pilots operating RPA to ensure the flight does not take place unless it is compliant with the 'populous area' rule and to take sufficient precautions when operating in the vicinity of people and property.

5. Operation in controlled airspace

- Micro RPA may be operated in controlled airspace, including within 3 Nm (5.5 km) of a controlled aerodrome, but must remain below 400 ft/120 m, but must remain outside the approach and departure paths.
- Very small excluded RPA may be operated in controlled airspace more than 3 Nm (5.5 km) from the runways, taxiways and aprons (ie, the movement area) of a controlled aerodrome (although it is simpler to measure from the aerodrome boundary).
- Excluded RPA must not be flown above 400 ft/120 m.
- Small and medium excluded RPA (other than model aircraft) are permitted to fly in controlled airspace (not above 400 ft/120 m or within 3 Nm/5.5 km of a controlled aerodrome) provided the pilot holds a relevant (radio) qualification (see subregulation 101.280 (2)).
- Operators of included RPA are also restricted to operating more than 3 Nm/5.5 km from a controlled aerodrome but may apply to CASA to operate in this area and/or above 400 ft/120 m. CASA will liaise with ATC for the purposes of subregulation 101.080(1).
- Rules for the operation of small and medium model aircraft in controlled airspace are explained in AC101-03.

6. Public safety operation - includes a fire brigade, rural fire service, police or other public safety or emergency operation (e.g. bush fires, traffic accidents).

Note:

As of 20 October 2017, excluded (and recreational⁴) RPA operators must also comply with CASA Direction 96/17. The effect of this direction is that RPA must not be operated within 3 Nm/5.5 km of a non-controlled aerodrome (one without an operating traffic control tower) if there is a manned aircraft in the vicinity operating to or from the aerodrome. Excluded RPA operators must not commence a flight and must land if the RPA is already in flight, if they become aware of a manned aircraft. Once the manned aircraft has landed or departed, Excluded RPA operations can commence or recommence.

Certified RPA operators must also remain outside the 3 Nm area around non-controlled aerodromes and HLS unless operating under a CASA general or specific approval for this purpose.

Training or experience

3.2.9 The regulations permit certain training and experience activities to qualify as excluded RPA operations. These situations are described in subregulations 101.237(6) and (8) and allow remote pilots to do any of the following under the SOC:

- *gain the experience* needed to meet the 5-hour minimum experience requirement for the grant of a RePL, or for those who already hold a RePL, to get practical experience and gain competency in the operation of an RPA not specified in their RePL
- *receive training* from a certified RPA operator.

⁴ Some alleviations are available to members of the MAAA under CASA EX156/17.

Landholder rule

- 3.2.10 The 'landholder rule' requires that the operation be compliant with all of the following:
- the remote pilot is the owner of the RPA or is an employee operating the aircraft on the RPA owner's behalf
 - the RPA is being operated over the owner's property or property leased by the owner
 - the RPA is being used for activities defined in regulation 101.237:
 - o aerial spotting
 - o aerial photography
 - o agricultural operations (e.g. weed spraying, pest spraying, fertiliser application, seed broadcasting or application of other substances for agricultural purposes)
 - o aerial communications re-transmission
 - o carriage of cargo
 - o any other activity similar to those listed above
 - the remote pilot or the owner/leaseholder do not receive direct reward or compensation for the operation.

3.3 Getting the right advice for your RPA operation

3.3.1 The decision flow chart in Figure 2: Decision flow chart to determine eligibility as an excluded RPA, can be used to determine whether an RPA operation is considered to be an 'included', excluded or model aircraft RPA operation. Advice on 'included' operations is provided in Chapter 4. Directions to advice on other RPA operations are noted in the following sections.

3.3.2 Micro RPA

3.3.2.1 Micro RPA operations are always categorised as excluded RPA operations, requiring neither ReOC nor RePL authorisations (see AC 101-10). They are, nonetheless, subject to the general rules regarding RPA operations (Subparts 101.A to C).

3.3.3 Very small RPA

- 3.3.3.1 Authorisations are generally not required when using very small RPA. The risks associated with aircraft of this size have been determined to be low when they are operated for sport or recreational purposes (see section 3.3.7), or in accordance with the SOC, and are therefore treated as excluded RPA operations (see AC 101-10).
- 3.3.3.2 Operation of a very small RPA in a way that doesn't comply with the SOC or Subpart 101.G will require the operator to hold a ReOC (see Chapter 6) and the remote pilot to hold a RePL (see Chapter 7). The general operating conditions that apply to these 'included' RPA operations are described in section 4.1.

3.3.4 Small RPA

3.3.4.1 The rules are slightly more complex for small RPA. The risks are still assessed as being low when these RPA are used for sport or recreational purposes (see section 3.3.7), but

for other operations, an authorisation is required unless the operation meets the criteria mentioned below.

- 3.3.4.2 Additional criteria are used to assess operational risk of small RPA operating under the SOC. Such operations are only considered to be excluded operations if they also meet either the 'training or experience' rule or the 'landholder rule'. For operations that comply with the landholder rule, operators and pilots have to meet requirements relating to ownership, flight activity and remuneration. They are also required to notify CASA of their intention to conduct operations.
- 3.3.4.3 Operation of small RPA in a way that doesn't comply with both the SOC and one of the additional criteria for an excluded RPA operation will require the operator to hold a ReOC (see Chapter 6) and the remote pilot to hold a RePL (see Chapter 7). The general operating conditions that apply to these operations are described in section 4.1.

3.3.5 Medium RPA

- 3.3.5.1 Medium RPA used for sport or recreation must only be flown under the approved procedures of a model aircraft association. Authorisations are required for medium RPA flown for commercial purposes, unless they meet the requirements of the 'training or experience' or 'landholder' rules and are flown under the SOC. The only difference to the small RPA class is that for medium RPA flown under the landholder rule, the remote pilot must also hold a RePL.

3.3.6 Large RPA

- 3.3.6.1 All operations involving a large RPA are 'included' operations, requiring ReOC (see Chapter 6) and RePL authorisations (see Chapter 7). The general operating conditions that apply to these aircraft are described in section 4.1.

3.3.7 Model aircraft

- 3.3.7.1 All large (>150 kg) civil RPA are considered to be 'included' RPA, whether or not they are operated for sport or recreation, and as such are regulated by the additional provisions for remotely piloted aircraft (Subpart 101.F). This requires the operator to conduct operations as described in this AC, and includes the requirement for the operator to hold a ReOC (see Chapter 6) and the remote pilot to hold a RePL (see Chapter 7). The general operating conditions that apply to included RPA operations are described in section 4.1.
- 3.3.7.2 RPA used for sport or recreational purposes that weigh 150 kg or less are considered to be operating privately and are regulated by the provisions for model aircraft (Subpart 101.G):
- Medium (25-150 kg) model aircraft do not need to comply with the SOC but do need to operate in accordance with the procedures of a CASA-approved model aircraft association.
 - Very small and small model aircraft (> 100 g and < 25 kg) do not currently need to operate in accordance with the SOC or the procedures of an approved model aircraft association. However, CASA recognises that these operations may present similar levels of risk as commercial RPA operations and will work with model

aircraft associations to ensure that risks posed by these model aircraft are addressed in the future by equivalent mitigations.

Guidance on flying model aircraft (RPA for sport or recreation) can be found in AC 101-03. Further information may be obtained from the Model Aeronautical Association of Australia (MAAA), Australian Miniature Aerosports Association (AMAS), and other model flying associations and clubs.

Warning

Unauthorised persons operating RPA outside of the conditions applicable to excluded RPA are in breach of the law and may be subject to enforcement action by CASA.

4 Included RPA operations

4.1 General operating conditions

- 4.1.1 Included RPA operations, need to comply with the general operating conditions that apply to the holder of a ReOC (see Chapter 6) or RePL (see Chapter 7).
- 4.1.2 Only RPA that are included in the ReOC holder's approved operations manual, and those of the category, weight class and type (if above 25 kg) endorsed in a holder's RePL, may be operated.
- 4.1.3 Unless otherwise approved, the holder of a ReOC or RePL must also adhere to the following conditions:
- the RPA **is operated**:
 - o by *visual line of sight (VLOS)* only - close enough to see, maintain orientation and achieve accurate flight and tracking
 - o *no higher than 400 ft/120 m* above ground level
 - the RPA **is not operated**:
 - o *any closer than 30 m* from people not associated with the flight
 - o *any closer than 15 m* from people who have consented to the RPA operating close to them
 - o autonomously
 - o within 3 Nm/5.5 km of a controlled aerodrome
 - o in a *prohibited area* (see note 1)
 - o at night, unless in accordance with CASA 01/17
 - o in or out of cloud
 - o *over populous areas* (see note 2)
 - o over the movement area or within the approach and departure paths of an aerodrome without approval from CASA.
 - **only 1 RPA** may be flown per pilot at any one time.

4.2 General operational matters

- 4.2.1 When conducting RPA operations, the most important considerations are:
- the safety of other aircraft in the airspace
 - the safety of people and property on the ground
 - the safety of the crew.
- 4.2.2 Particular care should be taken in areas where low-level manned aircraft operations take place, especially in the vicinity of beaches and scenic areas (e.g. helicopters on shark patrol). Operators, their pilots and observers should be acutely aware that low-flying aircraft may suddenly appear with little warning. Even relatively noisy aircraft may not be heard by the remote crew due to such things as wind, the RPA's motors and other noises.

4.2.3 Operators should also make crew aware of 'cognitive tunnelling', where the remote pilot is so focused on the task at hand that extraneous events and noises are not perceived until it's too late to take corrective action.

4.2.4 Restricted areas

4.2.4.1 These are temporary and permanent prescribed areas of airspace in which flight may be permitted, but only with the express permission of the controlling authority for that area. Permission to operate in a restricted area is as follows:

- Approved operations will be subject to any conditions imposed by the controlling authority. Failure to comply with the conditions is a failure to comply with the regulations and would be treated as such.
- The locations of permanent and temporary restricted areas are marked on aeronautical charts and contact details for controlling authorities are published in ERSA.

4.2.5 Communications

4.2.5.1 Operations with very small RPA below 400 ft/120 m and further than 3 Nm/5.5 km from a controlled aerodrome are not required to use aeronautical radio, although CASA recommends that remote pilots with radio qualifications monitor the relevant frequency if there is a chance that the operation may infringe these restrictions.

4.2.5.2 The company operations manual should address how communications between any crew and the remote pilot will be managed. It should also detail how communications with any third parties (e.g. air traffic control [ATC] and other aircraft) would be handled in the event of the loss of the primary communication channels.

4.2.6 Transponders and aircraft surveillance

4.2.6.1 If a secondary surveillance radar (SSR) or an automatic dependent surveillance - broadcast (ADS-B) transponder is required for the operation, it should meet the standards of subsection 9C of Civil Aviation Order (CAO) 20.18. The remote pilot should have the capability to:

- turn the transponder on and off
- manually select modes and SSR/ADS-B codes
- squawk identification as directed by ATC.

4.2.6.2 If fitted, the transponder should be switched to ON/ALT whenever the RPA is airborne for ATC surveillance and separation purposes, and detection by aircraft fitted with airborne collision avoidance systems. The default code is 7000; it should be used unless air traffic services (ATS) requires a different code.

4.2.6.3 In the event of a lost link, the transponder should either automatically select code 7400 or the pilot should have capability to select it manually. The time between the lost link event and the manual or automatic selection of 7400 should be agreed with ATC before undertaking the operation to allow for minor drop-outs of the control link.

4.2.6.4 A dedicated hexadecimal code may be assigned by Airservices, with prior arrangement, for use with the particular RPA where SSR/ADS-B codes cannot be selected while the RPA is in flight.

4.2.7 Meteorological conditions

4.2.7.1 For VLOS operations, meteorological conditions must permit unaided visibility of the RPA, the surrounding airspace and the ground beneath so that the remote pilot can avoid collisions and infringements of the regulations. This implies, and requires, the pilot to keep the RPA clear of cloud.⁵

4.2.7.2 For operations other than VLOS, weather minima for RPA flights should be determined by the RPA operator and published in their approved operations manual, taking into account the equipment and capabilities of each specific RPAS, the qualifications and experience of the remote pilot and the class of airspace in which the flight is conducted.

4.2.8 Recommendation for RPA conspicuity

4.2.8.1 RPA should be painted or patterned for maximum visibility. This may involve the use of high gloss, high visibility paint and contrasting colours and, where practicable, suitable collision avoidance lighting, such as strobe lights.

4.2.9 Precautions for automated flight

4.2.9.1 Particular care should be taken when inserting flight plans into the ground control station (GCS) for automated operations. There have been instances where incorrect or corrupt information has resulted in a crash or loss of the RPA. Transferring way points from one program or application to another can cause errors, as can corrupt or outdated software. Automated flights should be constantly monitored to identify any deviations from the intended flight path, and rapid remedial action taken to fix the problem or terminate the flight to avoid creating an unnecessary hazard.

4.2.10 RPA operational requirements outside controlled airspace

4.2.10.1 The job safety assessment for any planned operation should include the following areas:

- aerodromes
- helicopter landing sites (HLS).

4.2.10.2 Operations may be conducted below 400 ft/120 m above ground level (AGL) near (< 3 Nm/5.5 km) non-controlled aerodromes, but not over the movement area or in the approach and departure paths, unless specifically approved by CASA. Those operating near aerodromes without a specific approval must land or not launch in the event of manned aircraft operations being conducted at the aerodrome.

4.2.10.3 Operators can apply to CASA to be approved for conducting operations near non-controlled aerodromes while manned aircraft are operating, and/or in the approach and

⁵ In accordance with regulation 101.073.

departure paths. The application must include the operator's proposed procedures. Any approval will be subject to conditions.

4.2.10.4 A thorough specific operation risk assessment is required with the application. This includes liaising with aerodrome operators and local operators of manned aircraft, and addresses any residual risk issues such as 'return-to-home' functions and uncommanded climbs.

4.2.10.5 Depending on the level of manned aircraft activity at the aerodrome a NOTAM may need to be issued detailing the RPAS operation in such circumstances, depending on the level of manned aircraft activity at the aerodrome.

Note, however, that an RPAS operation during periods of moderate or frequent manned operations is very unlikely to meet the requirement to NOT create a hazard to other aircraft (under Regulation 101.055) or an obstruction under 101.075(4).

4.2.10.6 Operators must be approved by CASA for operations above 400 ft/120 m outside controlled airspace⁶.

4.2.10.7 The datum for operations in the vicinity of aerodromes should be the aerodrome elevation. Aerodrome elevations are included in ERSA and available from aerodrome operators.

4.2.10.8 In some places, controlled airspace overlies non-controlled airspace with less than 500 ft between the ground and the control area. These areas are tinted purple on visual terminal charts (VTCs). In these places, RPA should not be flown higher than 100 ft below the overlying control area. This entails flying at a height lower than the general 400 ft limit, depending on the location.

4.2.10.9 Communication requirements for Class G operations are described in AIP-ENR, including the procedures for common traffic advisory frequency (CTAF) and broadcast areas (see paragraphs 4.2.10.12 and 4.2.10.13). When within 10 Nm of a certified or registered aerodrome or within 3 Nm/5.5 km of other non-controlled aerodromes, remote pilots with relevant radio qualifications should monitor the relevant aeronautical radio frequency and make broadcasts as required.

Note: In the vicinity of an aerodrome with a CTAF, or inside a broadcast area, broadcasts are only required if the RPA operation is likely to conflict with another aircraft.

4.2.10.10 Radio use is not required for operations below 400 ft/120 m outside controlled airspace, but suitably qualified remote pilots should use their best judgement as to whether broadcasts or responses to transmissions by other stations would enhance the safety of their operations.

4.2.10.11 Many non-controlled aerodromes, particularly certified and registered aerodromes, appear in ERSA. However, some aerodromes are listed only in ERSA with their name and location code. Not all of these aerodromes are marked on aeronautical charts, and some aerodromes do not appear on charts or in ERSA, so operators should check using satellite pictures or ask someone with local knowledge to identify any nearby non-controlled aerodromes or HLS.

⁶ In accordance with regulation 101.085.

Broadcast areas

4.2.10.12 The lateral and vertical boundaries of broadcast areas are depicted on aeronautical charts. The vertical boundaries of broadcast areas can be:

- surface to 5,000 ft above mean sea level
- surface to the base of control area – if 8,500 ft or less
- surface to a nominated level.

4.2.10.13 Remote pilots operating within a broadcast area are to maintain a listening watch on the relevant CTAF. They may also need to make broadcasts in accordance with standard aviation communication procedures when operating near aerodromes.

Position reporting

4.2.10.14 If required, position reporting to other traffic should be referenced to the RPA position (not the remote pilot position) relative to an aerodrome, navigation aid, prominent ground feature, etc.

4.2.10.15 When an RPA is operated at a non-controlled aerodrome normally used by manned aircraft, launch and recovery will need to comply (as appropriate) with the normal procedures that apply to that aerodrome or a notice to airmen (NOTAM) issued with the relevant details of the non-standard activities (refer to Section 4.3).

4.2.11 Populated and populous areas

4.2.11.1 A populous area is defined as:

an area in relation to the operation of an unmanned aircraft that has a sufficient density of population for some aspect of the operation, or some event that might happen during the operation (in particular, a fault in, or failure of, the unmanned aircraft) to pose an unreasonable risk to the life, safety or property of somebody who is in the area but is not connected⁷ with the operation.⁸

4.2.11.2 An area within an urban environment may be deemed as 'non-populous' for the duration of an RPA operation if certain conditions are met. For example, an oval devoid of people could be used to photograph real estate from across the road through the use of oblique photography; or the area around a power pole within an urban area, set up as a demarcation zone with appropriate 'temporary workplace' signage may be used. Nonetheless, it is the operator's responsibility to ensure that any demarcation zone is suitably placarded, and an observer is in place to ensure that there are no encroachments on that area.

4.2.11.3 When considering RPA operations over populated areas, the safety of people and property on the ground (or water) is paramount. The risk of injury or damage resulting from RPA operations should be addressed in the operator's risk assessment and the job safety assessment.

⁷ 'Connected with the operation of the RPA' only refers to members of the remote flight crew who have direct responsibility for the safe conduct of the flight.

⁸ Refer to regulation 101.025.

- 4.2.11.4 For certificated RPA, approval to operate over densely populated areas will be dependent on the safety case provided to CASA by the operator. The assessment will need to demonstrate that the risk mitigations put in place by the operator make the area effectively 'non-populous'.
- 4.2.11.5 As a guide to what may be considered an 'unreasonable risk', operators may look at the level of other risks that the community accepts (e.g. from motor vehicles or as casual observers of sports like cricket and golf), provided that a person who may be at risk could reasonably be expected to understand and perceive the risks involved when in the vicinity of RPA operations.
- 4.2.11.6 Operations over a populated area should only take place if conducted at an altitude that would prevent the RPA injuring people or damaging property in the event of an aircraft or system failure.⁹ This is particularly important when planning to operate at large public or private events (e.g. cricket, football, tennis, sports events, demonstrations, shows and exhibitions). The requirement for the RPA to clear the area would generally preclude rotorcraft from flying over crowds/groups of people.
- 4.2.11.7 The alleviation in subregulation 101.245 (3) that permits RPA operations less than 30 m from a person should only be exercised with explicit consent from the individuals involved and only after they have been personally briefed on the risks associated with close proximity RPA flight. Even then, the RPA must remain at least 15 m from the person.¹⁰ Operations closer than 15 m to a person require CASA approval.

Flight testing

- 4.2.11.8 RPA flight testing cannot to be carried out over populated areas. (See 'Specialised Operations' in section 5.1 for further requirements).

4.3 Use of NOTAMs

- 4.3.1 A NOTAM is used to alert pilots and crews about activities that may be hazardous to aviation operations. Part 175 provides for individuals or organisations to be approved to promulgate NOTAMs if authorised in writing by CASA.
- 4.3.2 ReOC holders seeking to have a NOTAM issued should provide the details to the CASA RPAS office. The RPAS office will then draft the NOTAM and pass it on to the NOTAM office (NOF) for issue.
- 4.3.3 If the operator has approval to issue a NOTAM request, the operator should state the approval instrument number in Field E of the NOTAM and include details of a company contact in the release field. Operators should forward a copy of the approval instrument issued by CASA to the NOF in the first instance.
- 4.3.4 The text of the NOTAM for RPAS operations should include as much operational information as possible to convey the scope of the operation, using the relevant NOTAM form on the Airservices website, including:

⁹ In accordance with regulation 101.280.

¹⁰ In accordance with regulation 101.245.

- the words 'unmanned' and the callsign
 - latitudes and longitudes of the operating area
 - operations area description (e.g. east of Woop-Woop, or bearing [magnetic] and distance [NM] from a significant feature or datum, such as an aerodrome reference point)
 - size of the aircraft and visibility provisions (e.g. small, low potential for visual sighting)
 - broadcast frequencies and times, if applicable
 - periods of activity
 - planned operating levels.
- 4.3.5 NOTAMs should be provided to CASA's RPAS office at least 48 hours before the commencement of the operation and during normal business hours (0800-1700 AEST, Monday to Friday).
- 4.3.6 For subsequent events, the operator should be ready to provide a copy of the instrument to the NOF (if required).
- 4.3.7 CASA will advise Airservices Australia when an operator is to be considered as an 'aeronautical data originator'. To gain this approval, the operator will need to arrange and undertake the relevant training with CASA. Operators should contact the RPAS office for more information.

4.4 Flight logging

- 4.4.1 Flight and technical logging requirements will be published in the Part 101 Manual of Standards (MOS). Until the MOS is available, operators and pilots should record the following information in a suitable form.
- 4.4.2 Aircraft information:
- aircraft identification
 - total time in service for the aircraft
 - total flight time for the aircraft, if different
 - operating weight for the aircraft
 - defects and abnormalities that affect operations
 - actions taken to remedy the defects and abnormalities recorded
 - operational equipment and fail safes fitted to the aircraft that are unserviceable.
- 4.4.3 Flight operational information:
- identification of the RPA used
 - the date of the flight
 - for each crew member assigned to the flight:
 - o the crew member's name
 - o the duties assigned to the crew member for the flight
 - for the flight:
 - o the place of departure/arrival
 - o the time the flight ends
 - o the duration of the flight

- o certification of pre-flight 'fit-to-fly' check
- o certification of post-launch stability and control check
- the amount of fuel/energy available on board the RPA and at the RPS when the flight ends
- incidents and observations (if any) relevant to the flight
- the serviceability status of safety critical aircraft systems
- the purpose of the flight
- whether the flight was a VLOS flight, an EVLOS flight or BVLOS flight.¹¹

4.5 Changes to supplied information

4.5.1 Changes to the ReOC holder's organisation or practices and procedures need to be notified to CASA. These requirements will also be published in the Part 101 MOS.

4.6 Emergency procedures

4.6.1 The RPA mission plan should detail the emergency procedures to be followed in the event of an emergency, such as:

- engine/propeller failure
- loss of data link
- loss of control
- failure of navigation equipment
- airframe damage.

4.6.2 Emergency procedures may include the use of recovery or fail-safe devices, such as parachutes, that help to mitigate the risk of injury to people or damage to property. CASA encourages the use of such recovery devices when they are available for the RPA type.

Note: Where an RPA is fitted with a recovery device such as a ballistic parachute system, including a pyrotechnic charge, it must be compliant with dangerous goods regulations (Part 92). The relevant area or panel on the RPA should be clearly marked to warn crew of the potential danger.

4.6.3 A mission plan should be prepared for each flight of an RPA. The plan should include information about the local area and any hazards. It should also contain procedures about planned emergency flight profiles in the event of a lost data link. Depending on system capabilities, these profiles should include either an:

- RPA automated transit to a pre-designated recovery area, followed by an automated recovery
- or
- RPA automated transit to a pre-designated recovery area, followed by activation of a flight termination system.

Note: Prior to the implementation of these procedures the lost link SSR/ADSB code should be either automatically or manually selected and transmitted in line with pre-defined procedures.

¹¹ Only specifically approved operators and remote pilots may carry out EVLOS and BVLOS operations.

4.6.4 The RPAS data link should be continuously and automatically monitored while the RPA is in flight, and a real-time warning should be displayed to the remote pilot in the case of failure.

4.6.5 In the case of a lost control data link, other than intermittent loss of signal or during programmed periods of outage, the pilot should:

- advise ATS (if applicable) and any aircraft in the vicinity
- execute recovery procedures.

Note: The parameters that determine acceptable intermittent loss of signal and total loss will be pre-determined by the manufacturer and documented in the operations manual.

4.6.6 In controlled airspace, the operator and ATS should agree how much time can elapse before the pilot must notify ATC of the loss of link.

4.7 Reporting

4.7.1 To help CASA and the Australian Transport Safety Bureau (ATSB) to monitor the safety of RPA operations, the RPA operator should report incidents and accidents for analysis and evaluation.

4.7.2 These include:

- a failure to respond to flight commands from the RPS
- failure of the flight control unit (i.e. inertial measurement unit, global positioning system, inertial navigation system etc.)
- failure of the lost link program
- in-flight collision with another aircraft, structure or person
- RPA structural failures
- near misses with other aircraft
- any damage caused by collisions/handling.

4.7.3 Such instances should be reported in accordance with ATSB requirements (see website at <http://www.atsb.gov.au/>).

Immediate notification of accidents and serious incidents

4.7.4 Accidents and serious incidents must be immediately notified to the ATSB in accordance with section 18 of the *Transport Safety Investigation Act 2003*.

Written notification of accidents, serious incidents and incidents

4.7.5 Written notifications must be submitted within 72 hours of an accident, serious incident or incident, in accordance with section 19 and regulation 2.6 of the *Transport Safety Investigation Act 2003*. The written notification should contain as much information about the accident, serious incident or incident as is within the knowledge of the person at the time of submitting the notification.

4.8 Other considerations

4.8.1 'Included' RPA operations are also subject to the following general considerations.

4.8.2 Legal restrictions

- 4.8.2.1 CASA regulations do not grant an RPA operator any rights against the owner or occupier of any land on or over which operations are conducted. They do not prejudice the property rights of a person in respect of any injury or damage to property caused directly or indirectly by an RPAS operation.
- 4.8.2.2 Compliance with CASA regulations does not absolve the operator from compliance with any other regulatory requirements that may exist under Commonwealth, State or local law.

4.8.3 Surveillance and enforcement

- 4.8.3.1 As with other sectors of the aviation industry, RPA operators will be subject to oversight, surveillance and enforcement by CASA. Oversight and surveillance can be in the form of safety audits of the company's facilities, aircraft and procedures, and on-site checks of flying operations.
- 4.8.3.2 Non-compliance with regulations will be investigated and operators found to be in breach may be subject to safety and/or enforcement action.

4.8.4 Privacy

- 4.8.4.1 CASA does not consider privacy concerns when issuing approvals.
- 4.8.4.2 CASA strongly recommends operators include relevant privacy provisions in their operations manuals (refer to the *Privacy Act 1988*). Related, useful material can be found on the 'privacy and drone technology' page of the Queensland Information Commissioner (see section 1.3).
- 4.8.4.3 The following materials can be found also on the Office of the Australian Information Commissioner's website at www.oaic.gov.au:
- fact sheet 7: (ten steps to protect others' personal information)
 - guide to privacy impact assessments
 - information sheet 18: taking reasonable steps to make individuals aware that personal information about them is being collected
 - privacy checklist for small business.

4.8.5 Aviation security

- 4.8.5.1 Remote crew members operating an RPA from a security-controlled airport, should take into account the applicable aviation security requirements for access to airport operational areas. Refer to the Department of Infrastructure and Regional Development's [transport security](#) web pages for further information.

4.8.6 Drug and alcohol management program (DAMP) and testing

- 4.8.6.1 Remote flight crew are considered to be involved in 'safety sensitive aviation activities' and, as such, they can be subject to random drug and alcohol testing under Part 99. Operators and crew should make themselves familiar with their rights and obligations

under the regulations. Information on random drug and alcohol testing can be found on the [CASA website](#) under Safety Management.

- 4.8.6.2 Currently, only operators of large RPA are required to develop and implement a drug and alcohol management program (DAMP); however, other operators may choose to adopt CASA's standard DAMP. Refer to CASA's [DAMP information](#) or contact CASA's RPAS office for specific information.

4.8.7 Frequency spectrum management

- 4.8.7.1 Airservices Australia is responsible for the Aeronautical Radiofrequency Spectrum within Australia and its Territories. Airservices Australia is able to provide a frequency assignment service as a first step to obtaining a radio communication apparatus license to operate a radio transmitter within the aeronautical bands. Assignment can be made for radio communications, links, navigation aids, surveillance and landing systems.
- 4.8.7.2 The frequency band allocated for aeronautical VHF communications is 118-137 MHz.
- 4.8.7.3 Airservices Australia is also responsible for the radiofrequency spectrum used for aeronautical high frequency (HF) and ultra-high frequency (UHF) communication, navigational aids and landing system.

4.8.8 Environment

- 4.8.8.1 CASA strongly recommends that operators address obligations under the *Environment Protection and Biodiversity Conservation Act 1999* in their operations manuals.

4.8.9 Noise abatement

- 4.8.9.1 RPA operators are subject to applicable local noise abatement requirements—such as operating hour limitations and flight path/altitude restrictions—in the area of operation. Details of noise abatement procedures, including 'Fly Neighbourly' areas, are published in ERSA.

Note: Local authorities may have their own additional noise abatement by-laws.

4.8.10 Insurance

- 4.8.10.1 CASA strongly recommends that operators discuss with an insurer the potential liability for any damage to third parties resulting from RPAS operation and consider taking out suitable insurance.

5 Specialised RPA operations

5.1 Approval for specialised operations

- 5.1.1 Before using an RPA for a particular task, ReOC holders should first assess whether the flight/mission is within the scope of their approved operations (see paragraph 4.1.3), or whether they require additional CASA approval. Where the proposed operation is outside the ReOC holder's authorisation, operators should follow the steps required to gain approval as shown in Appendix C.
- 5.1.2 Requests for approval should be submitted via email to the CASA RPAS office (rpas@casa.gov.au) and should be accompanied by a robust safety case. To ensure timely processing and an accurate estimation of costs, details of the purpose, scope of the operations and a risk assessment should be included in the application.
- 5.1.3 Applications should be submitted as early as possible to allow time for CASA to assess and estimate the costs of processing (this process can take up to four weeks). There may be delays if all the required information is not included when the application is submitted. CASA is unable to make any assessment or provide any significant advice without first providing an estimate of costs and receiving payment. When payment has been made, a meeting with CASA's RPAS office staff should take place as soon as practicable to begin the actual approval process.
- 5.1.4 Area approvals will be considered by CASA's Office of Airspace Regulation (OAR) to determine whether to designate a temporary danger area or temporary restricted area, or to change a permanent airspace classification. This is necessary to address any residual risk after the application of other risk mitigations.
- 5.1.5 The OAR airspace change proposal process is defined in the OAR operations manual, which can be accessed through the [CASA website](#). Staff in the CASA RPAS office will coordinate with the OAR, as required.
- 5.1.6 When issuing approvals, CASA may impose limitations on the operation of an RPA in order to ensure that the RPA will pose no greater threat to the safety of air navigation than posed by a similar operation involving a manned aircraft. Such limitations may include, among other things:
- altitudes
 - geographical restrictions
 - radio broadcast requirements
 - the provision of observers
 - the timing of operations
 - pilot qualifications, experience and competency in relation to the operator's procedures.

5.2 Specialised operational matters

5.2.1 Extended visual line of sight operations

- 5.2.1.1 Extended visual line of sight (EVLOS) is an operational category in which the remote pilot does not have direct visual sight of the RPA. However, with assistance from trained RPA observers (persons who demonstrate competency via the operator's approved training requirements) the remote pilot is still able to ensure safe operation of the RPA.
- 5.2.1.2 EVLOS operations are not routinely permitted. CASA requires operators to conduct a case-by-case safety risk assessment and mitigation strategy prior to any application for approval to operate EVLOS.
- 5.2.1.3 In EVLOS operations, operators should be satisfied that all areas of the intended operational airspace will be visible at all times, by at least one of the remote crew during the operation. This assessment should take into account physical obstacles and meteorological conditions. RPA observers are to alert the remote pilot to any incoming traffic, and the remote pilot is to take the necessary actions to manage the flight and avoid collisions.
- 5.2.1.4 At least one of the RPA observers, or the remote pilot, must have direct visual sight of the airspace around the RPA and be able to communicate with the remote pilot continually in order to assist with collision avoidance responsibilities.¹² When the aircraft is out of sight the observers must be acutely aware of the aircraft's location and have the surrounding airspace and ground below it in direct visual sight.
- 5.2.1.5 Both operators and remote pilots require CASA approval to conduct EVLOS operations.¹³ Any approval will contain conditions to ensure the safety of other airspace users and people and property on the ground, including the situations and length of time that the aircraft may not be directly visible.

Electronic aids

- 5.2.1.6 Electronic aids (i.e. on-screen or moving map displays) can be beneficial to improving situational awareness of the local airspace environment for the remote pilot during EVLOS operations and, where available, may be used as risk mitigation tools. Such displays may be used as an additional aid to safety, but cannot be used instead of, or to replace, direct eye contact in VLOS operations.

First person view

- 5.2.1.7 First person view (FPV) may be used in EVLOS operations as an aid to obstacle avoidance. The RPA observers or the remote pilot must be able to see the aircraft without electronic aids, the airspace around it and the ground beneath to ensure that the operation remains compliant with the regulations.

¹² In accordance with regulation 101.073.

¹³ In accordance with regulation 101.029. (It should be noted that, CASA is working towards giving general approvals for EVLOS to operators who meet all the conditions for EVLOS in the Part 101 MOS when it comes into effect.)

Note: FPV would not be an acceptable solution for visually separating RPAS from other airspace users in a safety case for approval of beyond visual line of sight (BVLOS) operations.

5.2.2 Beyond visual line of sight operations

- 5.2.2.1 BVLOS operations are not routinely permitted. CASA requires operators to conduct a case-by-case safety risk assessment and mitigation strategy prior to any application for approval to operate BVLOS.
- 5.2.2.2 Applicants will need to demonstrate how the proposed operation can be conducted at an equivalent level of safety to manned operations. Particular attention should be paid to:
- aircraft controllability
 - fail-safe mechanisms
 - collision risk mitigation
 - navigation accuracy
 - height keeping accuracy
 - whether any technical solutions or procedures have been certified/assessed by the manufacturer of the RPA to meet design assurance requirements.
- 5.2.2.3 CASA will apply conditions to an approval for BVLOS operations, and all flights must be conducted in accordance with the conditions specified in the approval.
- 5.2.2.4 The OAR may have to declare a permanent or temporary restricted or danger area for the operations. However, in considering a request for such restrictions, the OAR must take into account, among other things, the impact of the proposed flights on the operations of other aircraft with respect to access to airspace. The OAR is unlikely to approve a request for restricted areas where it would significantly limit the ability of other operators to use the airspace.

Equipment requirements

- 5.2.2.5 CASA will require the following equipment to be fitted to the RPA and operable for a BVLOS flight¹⁴:
- **position lights** (navigation lights)¹⁵ - should be turned on at all times, while the RPA is in motion (including taxi, launch, flight, and recovery).
 - **anti-collision or strobe lights** - should be turned on at all times the RPA is in flight (unless otherwise directed by CASA or ATS).
 - **landing lights** - should be turned on during recovery (if fitted).
 - **transponders** - an approved SSR transponder or ADS-B out unit may be required (Some flights below 400 ft/120 m may be exempt). Subsection 9C of CAO 20.18 specifies the standards for Mode S transponder equipment. The transponder should be switched to ON/ALT at all times the RPA is airborne.
 - **aeronautical radio** - RPA communication architecture should allow the remote pilot to have direct communications with ATS, regardless of the aircraft's location.

¹⁴ In accordance with regulations 101.073 and 101.300.

¹⁵ Position, anti-collision, strobe and landings lights, where required, should be demonstrably effective, but do not have to meet the standards of manned aircraft.

The normal published aeronautical very high frequencies should be used for communications with ATS.

- **navigation equipment** - the RPA should have the navigation capability to comply with the tracking requirements of the airspace classification in which the RPA is being operated, and an acceptable level of design assurance.
- **any additional equipment** that the operator has included in its safety case for the approval of the operation.

5.2.3 RPA operations in controlled airspace

5.2.3.1 Pilots of RPA operating above 400 ft/120 m in controlled airspace or within 3 Nm/5.5 km of the associated aerodrome must be able to comply with ATS clearances, and their aircraft should meet the equipment requirements applicable to the class of airspace within which they are operated.¹⁶

Preparation for controlled airspace operations

5.2.3.2 The ReOC holder must obtain approval for controlled airspace operations from CASA and ATS, and operations must be conducted in accordance with any conditions on the approval. The initial application should be made to rpas@casa.gov.au. CASA will coordinate the approval with ATS.

5.2.3.3 Operators will need to have suitable procedures in their operations manual, and pilots will need to have the relevant training certification from the ReOC holder.¹⁷

5.2.3.4 Advice on any performance requirements or limitations unique to the RPA should be provided as part of the application.

5.2.3.5 Each approval, or letter of agreement, should outline specific procedures for:

- flight plan filing
- ground RPA operations
- launch and recovery
- integration of RPA into the local traffic pattern
- local airspace restrictions
- communications requirements
- noise abatement procedures
- traffic priority
- RPA contingency procedures.

5.2.3.6 Designated 'safe areas' are to be established by the operator, on advice from ATS, for RPA emergency holding and flight termination. A meeting between the operator, ATS and CASA may be required to establish the specifics relating to different phases of flight.

¹⁶ Refer to AIP-ENR 1.1.

¹⁷ In accordance with regulations 101.070 and 101.072. (Remote pilots receive certification from the ReOC holder when they complete the operator's approved training course for this purpose.)

Flight clearance

- 5.2.3.7 The remote pilot should not request or accept any clearance (i.e. area, departure, altitude, holding pattern) that the RPA is not capable of meeting within its designed flight envelope.

Flight termination procedures

- 5.2.3.8 Specific flight termination procedures developed by the ReOC holder and executed by the remote pilot should be agreed with ATS before undertaking the operation. At a minimum, the following information should be briefed:
- pre-programmed loss-of-C2 link flight profile-including actions to take should the control link not be re-established within an agreed timeframe (e.g. squawk code 7400 if transponder is equipped and enabled)
 - flight termination capabilities
 - RPA performance under termination conditions.
- 5.2.3.9 RPA should not be operated within controlled airspace without an operable flight termination system or one that provides automated recovery to a predetermined recovery area.
- 5.2.3.10 In the event of communications failure between the remote pilot and ATS, the remote pilot should squawk SSR code 7600 (if possible) and attempt to establish alternative communications. Pending re-establishment of communications with ATS, the RPA should be controlled in accordance with the last acknowledged instruction, or the operational conditions contained in the approval. If communications with ATS are not re-established, the RPA flight should be safely aborted.

Flight notification

- 5.2.3.11 Where an RPA flight is to be conducted in airspace shared with manned aircraft, flight notification will be required and should be filed in accordance with normal procedures, unless otherwise agreed with ATS. The flight plan should indicate that the aircraft is unmanned and provide as much detail as possible concerning the nature of the flight.
- 5.2.3.12 Flight plan call signs are to consist of seven characters and include the prefix UX with any aircraft type designator (e.g. 'UXSCE04' meaning 'Unmanned Scan Eagle 4'). Call signs will need to be agreed with ATS.

Coordinating with ATS

- 5.2.3.13 Unless ATS only requires radio frequency monitoring, a condition of the approval will be that all remote crew members communicating on aeronautical frequencies hold a flight radio endorsement (FRE), or a relevant qualification in accordance with regulation 101.285. Where agreed with ATS or the ADF, mobile telephone or other means may be used, but as a contingency only in the event of the loss of very high frequency (VHF) radio communications.

5.2.3.14 Communication requirements may vary according to the class of airspace in which the flight will occur. These are described in Aeronautical Information Publication En-Route (AIP-ENR).¹⁸

Position reporting

5.2.3.15 RPAs operating in controlled airspace should be continuously monitored by the remote pilot for adherence to the approved flight plan or clearance. Position reporting to ATS should be the RPA position (not the remote pilot position) relative to an appropriate aerodrome, navigation aid, ground feature, etc.

Flight deviations

5.2.3.16 Requests for deviations from the flight plan or clearance must be made by established procedures to the appropriate ATC unit. For RPA equipped with automated launch, flight and recovery systems, the remote pilot should monitor RPA system status and compliance with ATS clearances, performing flight path corrections as required and/or directed by ATS.

RPA operations at or near controlled aerodromes

5.2.3.17 CASA and ATS permission is required to operate at or within 3 Nm/5.5 km of a controlled aerodrome¹⁹, being an aerodrome at which the control tower is *operating*. Outside tower hours, controlled aerodromes are treated as non-controlled aerodromes, although some may have special airspace arrangements. Such aerodromes, tower hours and procedures are listed in AIP ERSA.

5.2.3.18 It is the responsibility of the remote pilot and ReOC holder to determine whether there are any other aerodromes within 3 Nm/5.5 km of their proposed area of operation. This can be done through:

- a review of ERSA and aeronautical maps and charts, noting that not all aerodromes appear in or on these publications
- satellite imagery
- consultation with local government bodies
- consultation with landholders, other operators and pilots in the area.

5.2.3.19 Where there are other aerodromes or HLS within 3 Nm/5.5 km, the operator and remote pilot will need to also comply with CASA 96/17 with respect to operating while manned aircraft are using the aerodrome/HLS.

5.2.3.20 The height reference for controlled aerodromes is the aerodrome's elevation.

5.2.3.21 If operations are planned from a security-controlled aerodrome, operators should also take into account the requirements for access to operational areas and the aviation security requirements that apply to security-controlled aerodromes.²⁰

¹⁸ Note that this is a different publication to the En Route Supplement Australia (ERSA).

¹⁹ In accordance with regulation 101.080.

²⁰ For further information, refer to the Department of Infrastructure and Regional Development at <http://www.infrastructure.gov.au/transport/security/aviation/asi/asics>.

Military controlled airspace and military controlled aerodromes

5.2.3.22 Operations planned for military airspace require liaison with the ADF. Contact the local military ATC unit using the contact details in ERSA or, in instances where the controlling authority is not an ATC unit, airspace@defence.gov.au. Defence will then arrange direct liaison authority with the unit that will provide the details and approval. Defence will require a minimum of 10 working days to process the request.

5.2.4 Dropping, discharging and dispensing operations

5.2.4.1 Australian state and local government regulatory requirements should be met for the dropping or dispensing of chemicals or other materials. Local jurisdictions issue their own chemical licences to cover these activities. It is the responsibility of the operator to ensure that the appropriate approvals are obtained from local authorities before conducting such operations.

5.2.4.2 To be satisfied that the operator can carry out the proposed operations safely, suitable procedures will need to be included in the company operations manual for CASA to approve.²¹

5.2.4.3 Dropping and discharging operations may present a heightened risk to other people, property or other aircraft. Remote pilots conducting dropping, discharging or dispensing operations should have sufficient flight experience under supervision in such operations prior to any solo operations.

5.2.5 Flight test authorisation

5.2.5.1 RPA with a gross weight of more than 2 kg and all RPA flown outside the SOCs for flight testing, or aircraft research and development, will require a flight test authorisation from CASA.

5.2.5.2 Areas for RPA flight test and certification flights may be approved by CASA and included in the conditions of a ReOC, or in a separate area approval.²² These areas will normally be established outside of controlled airspace.

5.2.5.3 Under the operating approval, such flights will be required to be conducted in accordance with any conditions imposed by CASA.²³ Flights will need to be flown by licensed and well-experienced remote pilots.

5.3 International RPA operations

5.3.1 ICAO requirements

5.3.1.1 Paragraph 3.1.2 and Appendix 4 of Annex 2 to the Chicago Convention contains requirements with respect to international operations as follows:

²¹ In accordance with regulation 101.090.

²² Refer to regulation 101.030.

²³ Refer to regulation 11.056.

- a. RPA shall not be operated without the appropriate authorisation from the State from which the departure is made
- b. RPA shall not be operated across the territory of another State, without special authorisation issued by each State, in which the flight is to operate. This authorisation may be in the form of agreements between the States involved
- c. RPA shall not be operated over the high seas, without prior coordination with the appropriate ATS authority
- d. The authorisation and coordination referred to above (b and c), shall be obtained prior to departure if there is a reasonable expectation, that the aircraft may enter the airspace concerned
- e. RPA shall be operated in accordance with conditions specified by the State of registry and the State(s) in which the flight is to operate. Any conflicting operational rules will need to meet the more exacting standard.

5.3.2 Flight outside CASA's territorial jurisdiction

- 5.3.2.1 Operators will need an 'in-and-out of Australia' approval in their ReOC to fly to and from Australia and its territories outside the twelve-mile territorial limit.²⁴ This will allow the operator to fly throughout the Australian flight information region and not be restricted to Australian territory.
- 5.3.2.2 Any approval given by CASA would need to consider ICAO guidance until formal international standards are published.²⁵ Operators should contact CASA's RPAS office if they think they will need this approval.

5.3.3 International operators

- 5.3.3.1 International operators who want to fly RPA into or out of Australian territory should contact CASA's RPAS office in the first instance. CASA will ask you for the following information:
 - a comprehensive description of the planned operations
 - details of the aircraft to be flown (i.e. the performance characteristics)
 - a copy of the company operations manual and the flight and maintenance manual for the aircraft
 - a copy of the risk assessment for the event, based on ISO 31000 principles
 - a copy of the remote pilots' and operator's RPAS credentials
 - any national aviation authority (NAA) approvals that permitted the mission in that authority's jurisdiction.

Note: This information will be verified with the appropriate NAA.

²⁴ In accordance with Section 3 of the Act.

²⁵ Refer to the Manual on Remotely Piloted Aircraft Systems (Document 10019) available from ICAO.org for further information.

5.3.4 Verification and scrutineering

- 5.3.4.1 CASA will conduct verification and scrutineering of international operators before any operations are conducted in Australian territory. To cover these requirements, international operators are requested to position their mission team in Australia, or arrange for CASA inspectors to visit their facilities, with sufficient time to allow testing and demonstration flying, including emergency procedures.

6 RPA operator's certificate

6.1 Overview

- 6.1.1 A ReOC is similar to the air operator's certificate (AOC) for traditional aviation operations. Like the AOC, it authorises the holder to conduct included (most commercial) operations using the type(s) of RPA and under the conditions endorsed on the certificate.
- 6.1.2 Those who held a UOC prior to 29 September 2016 continue to be authorised as if they hold a ReOC under the amended regulations. Conditions on a UOC continue to be force. UOC holders will be gradually migrated to the ReOC system through renewal procedures or in the event of the certificate having to be re-issued.
- 6.1.3 A ReOC is required for any operation that is not an excluded RPA operation, including for:
- all RPA operating outside of the SOCs, other than micro RPA and model aircraft operations
 - RPA weighing more than 2 kg whether or not flying under the SOCs, unless meeting the 'landholder' criteria.
 - all operations with a large RPA.

Note: Model aircraft are, by definition, used for sport and recreation and do not require a ReOC

- 6.1.4 The benefit of having a ReOC is that it permits a range of RPA operations—subject to approval—that are unavailable to other operators (see 'Specialised operations' in Chapter 5).

If you are still unsure whether a proposed operation requires a ReOC, contact CASA's RPAS office (rpas@casa.gov.au).

6.2 RPA operator's personnel

- 6.2.1 Figure 3 shows the relationships between the chief remote pilot (CRP), remote pilot and other members of the remote crew. CASA requires the RPA observer and other remote crew to be trained and certified as competent in their roles by the ReOC holder, in accordance with the organisation's approved documented procedures. These personnel will not be directly authorised by CASA.

Note that in all cases, ReOC holders must be approved to conduct the type of operations flown by their remote pilots.²⁶

²⁶ In accordance with regulation 101.029 and 101.335

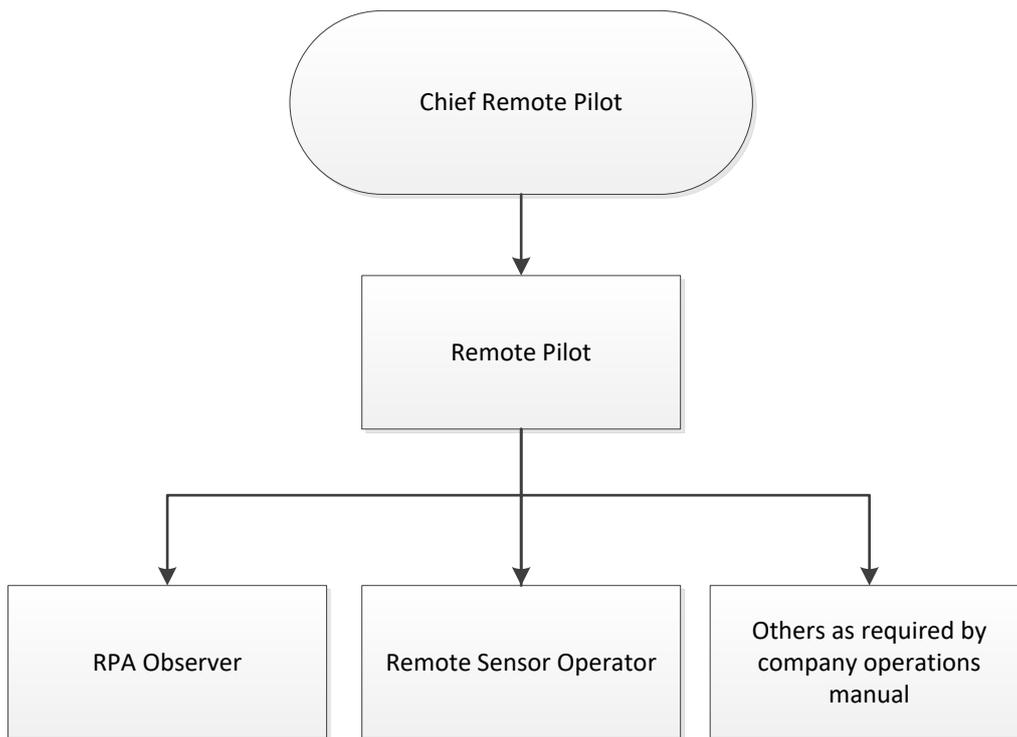


Figure 3: Remote crew organisational structure

6.2.2 Chief remote pilot

6.2.2.1 All ReOC holders must either personally qualify to be, or employ, a CRP.²⁷ Currently there are no additional training or experience requirements for the position of company CRP. However, to be considered suitable, the person would need to have a RePL and advanced knowledge and experience commensurate with the operator's planned operations.²⁸ However, the company must demonstrate to CASA that the person intending or proposed to occupy the position can effectively carry out the functions and duties of the CRP required by regulation 101.342, specifically:

- ensuring the operator's RPA operations are conducted in accordance with the civil aviation legislation
- maintaining a record of the qualifications held by each person operating an RPA for the operator
- monitoring the operational standards and proficiency of each person operating an RPA for the operator
- maintaining a complete and up-to-date reference library of the operational documents required by CASA, under paragraph 101.335 (1) (d) for the types of operations conducted by the operator.

6.2.2.2 A flight test of the chief remote pilot is also required and can be carried out by CASA or an approved delegate.

²⁷ In accordance with paragraph 101.335 (1) (f).

²⁸ .

6.2.3 Remote pilot

- 6.2.3.1 Any other remote pilots working for the operator must hold a RePL and be trained in the company's operational procedures.

6.2.4 RPA observers and other remote crew

- 6.2.4.1 CASA does not authorise other remote crew members. RPA observers and other remote crew should complete an operator's course of training appropriate to their function, in accordance with the syllabus and program in the operator's approved operations manual.
- 6.2.4.2 Competency standards and training for intercommunication among RPAS crew (e.g. between an RPA observer and remote pilot) is the responsibility of the operator. Training procedures and standards must be included in the operations manual.²⁹
- 6.2.4.3 RPAS operators must maintain records that show the training delivered to, and the level of competency of, personnel in non-regulated roles.³⁰ This should be consistent with the requirements in the approved company operations manual.

6.3 Training obligations of a ReOC holder

- 6.3.1 To ensure the unmanned aircraft community conducts safe RPA operations, operators and remote pilots should keep up-to-date with the development of technology and procedures. Operators should also ensure they and their remote crew are appropriately trained and competent in conducting RPA operations.
- 6.3.2 Operators should determine the training required for their RPA crew and detail this in their operations manual. If a remote pilot does not fly within any currency timeframe identified in the operations manual for the RPA, a refresher program of theory and practical flying should be conducted. Some of the practical training may be done in a simulator.
- 6.3.3 ReOC holders will require approved training procedures to conduct conversion training. This training is limited to the operators' personnel, unless they also have a training organisation approval on their ReOC.

6.4 RPAS training organisations

- 6.4.1 Operators must obtain approval from CASA to conduct RPAS training for the general public.³¹ Operators intending to conduct training should familiarise themselves with the guidance below.
- 6.4.2 RPAS training organisations have obligations related to the licensing of remote pilots (see Chapter 7). CASA, together with industry, has defined a set of remote pilot training requirements specifically designed for RPAS operations. This includes basic aviation

²⁹ In accordance with subregulation 101.335 (1).

³⁰ In accordance with regulation 101.272.

³¹ In accordance with regulations 101.335 and 101.340.

knowledge and skills, and specialist RPAS knowledge and skills. Adoption of these standards by RPAS training organisations will ensure that appropriate RPA safety levels are attained.

- 6.4.3 The guiding principles behind the CASA requirements for RPAS training and licensing are drawn from International Civil Aviation Organization (ICAO) Doc. 10019.
- 6.4.4 Until the Part 101 Manual of Standards comes into effect, CASA will work with training organisations to ensure that training standards reflect those that CASA proposes will be mandated in the final MOS.³²
- 6.4.5 Training should be carried out using the category and weight class of an RPA the person intends to fly. Test candidates will not need to demonstrate manual flight control of an RPA that can only be flown using automated piloting techniques. However, a candidate will need to demonstrate competency in both manual and automated flight for automated systems that rely on manual control in the event of a loss or degradation of the autopilot.
- 6.4.6 Students should undertake thorough practical training in the operation and control of an RPA in flight. The training should enable the remote pilot to demonstrate control of a specific RPA throughout its design parameters and varied operating conditions, including dealing appropriately with abnormal flight, emergencies and system malfunctions.

6.4.7 Instructor training and skills

- 6.4.7.1 Instructor training programs should be completed by all who provide instruction to the RPAS industry sector. Instructors should be competent in conducting RPAS training and may be appointed as ground or flight instructors, or both.
- 6.4.7.2 There is currently no formal RPAS flight instructor qualification or syllabus of training. However, to carry out RPA instruction a person should have considerable RPA or model aircraft flying experience in the relevant category and hold a RePL endorsed with the applicable category and weight class of RPA to be flown.
- 6.4.7.3 Instructors should ideally have at least one of the following qualifications:
 - a Certificate IV in Training and Assessment (TAE40110) or equivalent
 - a pass in a Principles and Methods of Instruction (PMI) course³³
 - hold or have held a military or civil flight instructor qualification.
- 6.4.7.4 Depending on the type of operation, the operator may, on advice from the CRP, approve RePL holders with lesser experience to be instructors provided suitable risk mitigation strategies are in place.

³² Note that these standards may be amended, at a later date, as ICAO develops standards and recommended practices for remote pilot licences over the next couple of years.

³³ CASR Part 141 training organisations can deliver this training. Suitable Part 141 operators can be found by conducting a search using the AOC search facility on the CASA website home page.

6.4.7.5 CASA may impose additional requirements for the delivery of the course and the instructors as a condition of the training authorisation for organisations training pilots to operate larger or more complex aircraft, or training for higher-risk flight activities.

6.4.8 Synthetic training devices

6.4.8.1 CASA encourages the use of simulators and synthetic training devices appropriate to the type of RPA to be flown. For smaller, simple RPA, use of simulators may reduce the time spent actually flying the RPA before the person becomes competent. However, applicants will still require 5 hours flight time experience to qualify for a RePL.

6.4.8.2 Simulators are essential for large complex RPA. As with conventional aircraft, simulators reduce the risks associated with training, allowing pilots to practice normal operations as well as abnormal and emergency procedures in a safe, controlled environment.

6.4.8.3 CASA requires³⁴ RPAS training organisations to maintain records³⁵ of:

- results from the applicant's aeronautical theory examination
- results and notes from the practical flight training element of the course
- accrued training hours for the applicant on the RPA type used in the flying training (see 'Log books' in Chapter 7).

6.5 Preparing a ReOC application

6.5.1 Figure 4 depicts the steps involved in preparing a ReOC application. Before applying for a ReOC, applicants should consider the type(s) of operations planned and the category and size of RPA to be used. Once this is done, contact CASA's RPAS office for advice before compiling the required manuals and completing the application form.

Manuals

6.5.2 Procedures for the proposed operations need to be documented in the operator's manuals. The following manuals are required in an application for a ReOC and for the operator's library of operational documents:

- operations manual
- RPAS flight manuals
- RPAS maintenance manuals.

6.5.3 A sample operations-manual for RPAS is provided on the CASA website.³⁶ Applicants for a ReOC can develop their own operations manual by amending or adding extra information to suit their proposed RPA type(s) and planned operations.

6.5.4 The level of detail and complexity in these manuals will depend on the systems operated and the type of operations conducted. For example, the RPAS flight manual and maintenance manual may be a single document for simple aircraft.

³⁴ Under regulation 101.272.

³⁵ Record keeping retention periods will be published in the Part 101 MOS.

³⁶ <https://www.casa.gov.au/standard-page/get-your-rpa-operators-certificate>

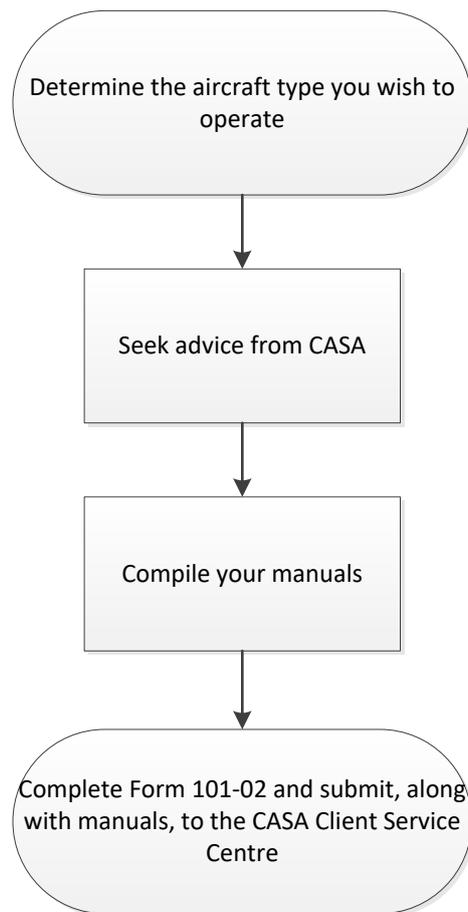


Figure 4: Steps in preparing a ReOC application

Chief Remote Pilot

- 6.5.5 Each operator must be, or employ, a qualified chief remote pilot.³⁷ Information about obtaining a RePL and qualifying as a chief remote pilot can be found in Chapter 7. The name, contact details and experience of the person nominated to be chief remote pilot must be included in the operator's application, along with the names of the CEO/Managing Director and the maintenance controller—noting that they can be the same person. These details should be included in form 101-04.³⁸

6.6 Submitting a ReOC application

- 6.6.1 The required manuals and application forms (101-02, 101-04) should be submitted electronically to the CASA Permissions Issue Team at regservices@casa.gov.au, or an industry delegate³⁹.

³⁷ In accordance with regulation 101.340.

³⁸ Note that the functions and duties of a maintenance controller can be found in AC101-05.

³⁹ See 'Applying for a ReOC through an industry delegate' on the CASA website at: <https://www.casa.gov.au/aircraft/standard-page/commercial-unmanned-flight-gaining-your-remotely-piloted-aircraft-pilot>.

- 6.6.2 In submitting applications to CASA, the CSC will conduct an administrative assessment and estimate the time and cost for processing and assessing the application. The CSC will then send the applicant an invoice for payment, based on the estimate, which must be paid before the formal assessment process by CASA's RPAS team can commence.

6.7 Assessment of application

- 6.7.1 The formal assessment will include:
- a review of the applicant's manuals
 - interviews with the person(s) who have been designated as the chief remote pilot and the RPAS maintenance controller
 - a demonstration of the RPAS under the proposed operating procedures
 - an inspection of the facilities, documentation (e.g. flight and technical logs) and a review of the proposed maintenance procedures.

Note: the inspection may not be required for small operations.

6.8 Issue of a ReOC

- 6.8.1 CASA will issue successful applicants with a ReOC including the permission 'RPAS Aerial Work', which permits the operator to conduct RPA operations under the general operating conditions (see section 3.2.8).⁴⁰ A ReOC does not confer on the holder any other privileges, and operators must also ensure that they meet any other Commonwealth, State, Territory and local laws applicable to their activities.

6.9 Updating your ReOC

- 6.9.1 ReOC holders may be approved to carry out 'included' operations in general, but their approved manuals must include specific procedures for the types of operations they plan to conduct. Appendix C depicts the process for determining whether an additional approval is needed and whether a particular task can be carried out by the operator.
- 6.9.2 Different flight activities and RPA types may be added to the ReOC at a later date, and this will require suitable procedures to be added to the approved operations manual. Any changes to the manuals must be accepted by CASA.

⁴⁰ RPAS aerial work does not include passenger-carrying operations.

7 Remote pilot licensing and qualifications

This Chapter provides the information necessary for an applicant to obtain a RePL and describes the various limitations and permissions that may be attached to a RePL. It also provides details of additional qualifications that a RePL holder may require for specialised operations.

7.1 RPA categories and weight classes for a RePL

7.1.1 For the purposes of licensing, RPA are divided into a number of categories:

- aeroplane
- helicopter (single-rotor class)
- helicopter (multi-rotor class)
- airship
- powered lift (hybrid aeroplanes with vertical take-off capability).

7.1.2 RPA are also divided into weight classes:

- **micro:** with a gross weight of 100 g or less
- **very small:** with a gross weight of more than 100 g and less than 2 kg
- **small:** with a gross weight of at least 2 kg and less than 25 kg
- **medium:** with a gross weight of at least 25 kg and less than or equal to 150 kg
- **large:** with a gross weight greater than 150 kg (or > 100 m³ envelope for airships).

7.1.3 Initial training can be done with CASA-approved training organisations. A list of current RPAS training organisations can be found on the RPA landing page on the CASA website.

7.1.4 CASA will issue a RePL to a person who qualifies as a remote pilot. Based on that person's experience and further training, the operating organisation (the ReOC holder) can assign its crew to meet operational requirements. The criteria for each remote crew position should be set out in the company operations manual. ⁴¹

7.2 RePL application process

7.2.1 Existing UAV controller's certificate holders

7.2.1.1 Holders of unmanned aerial vehicle (UAV) controller's certificates continue to be authorised to exercise the privileges of that qualification under the amended Part 101. UAV controller certificate holders can transfer at any time to a RePL on request. A certificate holder seeking a variation to their flying privileges (e.g. adding an approval or removing a limitation) will be automatically issued a RePL. Both controller's certificate holders and RePL holders are subject to the conditions set out in regulation 101.300.

⁴¹ In accordance with regulation 101.335.

7.2.2 Applicant with no aeronautical qualifications

7.2.2.1 An applicant for a RePL with no aeronautical qualifications should complete the following steps:

- a. apply for an Aviation Reference Number (ARN) (refer to Appendix B)
- b. study the relevant aeronautical knowledge theory and pass the exam(s)
- c. undergo practical RPA training, pass a practical test and gain at least five hours flight experience
- d. apply for a RePL (CASA Form 101-01 for direct applications or Form 101-05 when applying through a training organisation).

7.2.3 Applicant with previous aeronautical qualifications

7.2.3.1 Applicants who already hold a pass in an aeronautical knowledge examination⁴², CASA-issued pilot qualification or an acceptable overseas or military equivalent qualification need only complete steps (c) and (d).

Note: CASA may conduct a flight test with a person seeking a RePL based on overseas or military qualifications. This will include a knowledge test and a test on flight rules and air law.

7.2.3.2 To obtain a RePL, an RPAS training organisation must submit forms 101-01 and 101-05 to CASA Flight Operations and Licensing (clarc@casa.gov.au) on behalf of the applicant, accompanied by evidence of training results and a radio qualification, if applicable.⁴³

7.2.4 Application to fly beyond visual line of sight operations

7.2.4.1 An applicant for a licence to fly beyond visual line of sight (BVLOS) operations must pass at least one of the following exams:⁴⁴

- an aeronautical knowledge examination for an instrument rating under Part 61
- the former instrument theory examination (IREX) under Part 5 of the *Civil Aviation Regulations 1988 (CAR)*
- an approved examination for this purpose.⁴⁵

Note: Currently, BVLOS operations can only be conducted by CASA-approved operators on a case-by-case basis.

7.3 Log books

7.3.1 A log book is a practical method of recording flight hours as evidence of flying experience. Remote pilots who choose to use a log book should record the flight time, location, flight rules and a short description of any tasks performed.

⁴² The minimum requirement is for a Part 61 RPL theory examination. Converted RA-Aus RPL holders will meet the Part 61 standard.

⁴³ In accordance with regulation 101.290.

⁴⁴ In accordance with regulation 101.295.

⁴⁵ At the time of publication of this AC, there are no other approved examinations. An examination tailored specifically for RPAS BVLOS operations will be created once a syllabus of training has been written and included in the Part 101 MOS.

- 7.3.2 A sample RPA flying hours log book can be found on the RPA webpage of the [CASA website](#). This format can be printed and formed into a hard-copy document and maintained as evidence of hours accrued.
- 7.3.3 An electronic log book may be used, but it should include an auditing functionality that ensures the veracity and accuracy of the data entered.
- 7.3.4 A traditional pilot's log book may be used and can be purchased from an aviation store and used as a permanent record of RPA flying hours. Remote pilot hours can be logged in a separate column in the traditional pilot's log book, but traditional and RPA hours cannot be aggregated.

7.4 RePL permissions

- 7.4.1 A RePL is issued with certain permissions endorsed on it, depending on:
- the RPA weight and category type the person has qualified to fly
 - the operations that the remote pilot plans to conduct.
- 7.4.2 To ensure that the remote pilot is competent to operate different types of RPA, CASA requires pilots to undergo training and demonstrate competency in the RPA category and weight class that they will fly.⁴⁶ For RPA weighing less than 25 kg, a generic grouping is endorsed on the RePL (e.g. multi-rotor, < 7 kg; aeroplane, < 25 kg).
- 7.4.3 As indicated previously, in the interests of aviation safety, CASA may limit some RePL holders to operations with RPA weighing less than 7 kg.

Conversion training

- 7.4.4 Conversion training is required to fly RPA in a different category or weight class. This training can be conducted by:
- a CASA approved RPAS training organisation
 - ReOC holders with approval to operate the applicable type of RPA (only for the removal of the 7 kg condition on a RePL for their own personnel)
 - the original equipment manufacturer (OEM) or an approved agent of an OEM, provided they hold a ReOC with training approval.

7.4.5 Operational approvals

- 7.4.5.1 RePL holders may be eligible to conduct a range of operations, depending on the approvals attached to their licence. Other operations outside of the general operating conditions (see paragraph 4.1.3) may be conducted provided ReOC holders have suitable procedures in their approved Operations Manual and remote pilots have achieved competency under the operator's training program relevant to the operation to be flown.
- 7.4.5.2 Normally approvals will be issued to ReOC holders who will ensure that their remote pilots are suitably trained to operate under the particular conditions of the approval.

⁴⁶ In accordance with subregulation 101.295 (2).

Additional approvals are required for the following operational types above the standard ReOC privilege:

- operations in controlled airspace above 400 ft/120 m
- operations at controlled aerodromes
- operations on or over the movement area, or in the approach and departure paths, of certified or registered non-controlled aerodromes
- operations with more than one RPA at any one time
- EVLOS operations
- BVLOS operations (including flight in other than visual meteorological conditions).

7.4.5.3 Some approvals relate to a design feature of the RPAS. These are:

- automated flight (usually issued with the initial RePL, as required)
- manual flight (usually issued with the initial RePL, as required)
- liquid-fuel propulsion for aircraft over 25 kg take-off weight⁴⁷.

7.4.5.4 Applicants for these types of approvals may need to demonstrate their knowledge and practical skills in a flight test, noting that CASA may ask an applicant to meet other requirements as a condition of the approval (e.g. knowledge of an operator's procedures for carrying out the type of flight activity proposed).

7.4.5.5 All approvals can be issued with the initial RePL or added later.

Note: Ongoing approvals for airspace and aerodrome activities will not be issued until standards for aeronautical knowledge examinations on these topics are published in the proposed Part 101 MOS.

7.5 Aeronautical radio

7.5.1 Visual flight in controlled airspace

7.5.1.1 Generally, no radio qualification is required to operate an RPA below 400 ft/120 m AGL when more than 3 NM/5.5 KM from the boundary of a controlled aerodrome. In other situations, a radio qualification may be required, as described in the following sections.

7.5.1.2 For operations above 400 ft/120 m in controlled airspace or within 3 Nm/5.5 km of a controlled aerodrome, remote pilots must hold one of the following (*relevant*) qualifications:⁴⁸

- a. an aeronautical radio operator certificate
- b. a flight crew licence
- c. an air traffic control licence
- d. a military qualification equivalent to a licence mentioned in paragraph (b) or (c)
- e. a flight service licence.

⁴⁷ RPL training courses assume electric propulsion of RPA. Remote pilots of liquid-fuelled very small and small RPA should make themselves familiar with the topics and competencies set out in Appendix D.

⁴⁸ In accordance with regulation 101.300.

- 7.5.1.3 Notwithstanding this, CASA may require a specific radio qualification in approvals for operations in circumstances where there may be a heightened risk of collision with other aircraft.

7.5.2 Visual flight in non-controlled airspace

- 7.5.2.1 A relevant radio qualification is required for flights above 400 ft/120 m AGL outside controlled airspace, unless the operation is more than 3 NM/5.5 KM from the movement area of a non-controlled aerodrome.
- 7.5.2.2 Notwithstanding this requirement, a radio qualification may not be required for flights that take place within an area approved by CASA. This will depend on the type of operation being undertaken and the likelihood of conflict with manned aviation.

Lanes of entry, restricted areas and other areas of low-flying manned traffic

- 7.5.2.3 CASA may require certain operations in the vicinity of restricted areas or lanes of entry, or other areas where manned flights take place at low altitudes to be operated only by remote pilots with suitable radio qualifications. This may be an aeronautical radio operator certificate, or other equivalent relevant qualification, including the flight radio endorsement.⁴⁹
- 7.5.2.4 Aeronautical radio training leading to an aeronautical radio operator certificate qualification may be obtained from suitably approved RPAS training providers or traditional flying schools.

7.6 Flight proficiency and currency

- 7.6.1 There are no CASA requirements for continuing flight proficiency or currency for RePL holders. However, remote pilots should maintain their proficiency and currency through regular practice, which may consist of RPA flying supplemented by computer-based simulator time.
- 7.6.2 Lack of proficiency or currency that led to an accident or incident might later be determined to be hazardous operation (101.055) if it was reasonable to assume that the RPA could have been competently controlled in the circumstance by a remote pilot of higher proficiency or with more currency.
- 7.6.3 ReOC holders should include proficiency and currency requirements in their documented practices and procedures for all personnel undertaking duties essential to the safe operation of the company's RPAS.

⁴⁹ In accordance with subregulation 101.285(3).

8 Design, certification and maintenance

8.1 Design and certification of large RPA

- 8.1.1 Under subregulation 101.255 (1), a person may only operate a large RPA if a restricted certificate of airworthiness (CofA) or an experimental certificate has been issued under Subpart 21.H.
- 8.1.2 ICAO standards for international air operations (crossing international borders or over the high seas outside Australia's territory) require an aircraft to have a standard certificate of airworthiness, certifying that the aircraft complies with the applicable airworthiness requirements under Annex 8, Airworthiness of Aircraft to the Chicago Convention. RPAS today are in a unique situation, where the technology and capability of unmanned systems have outpaced the ability for the aviation community, NAAs and ICAO to develop a comprehensive suite of dedicated airworthiness standards. An RPAS may, however, be issued a special certificate of airworthiness in the restricted or experimental category.

8.2 Special certificates of airworthiness

- 8.2.1 Special certificates of airworthiness, which include experimental certificates, are issued to permit the operation of aircraft that do not meet the requirements of the Annex 8, Airworthiness of Aircraft, to the Chicago Convention, but are capable of safe operations under defined operating conditions and purposes. These conditions will be specified on the certificate.

8.2.2 Experimental certificates of airworthiness

- 8.2.2.1 Regulation 21.191 lists the purposes for which an experimental certificate may be issued. For more information on experimental certificates, please read [AC 21-10](#).

Note: An experimental certificate is generally limited in duration and is not intended to be used as a permanent operating category for commercial operations.

8.2.3 Restricted certificate of airworthiness

- 8.2.3.1 For an RPAS to be issued a restricted CofA, the aircraft must have been type certificated in the restricted category.⁵⁰
- 8.2.3.2 Regulation 21.025 lists the purposes for which an applicant can apply for a type certificate for an aircraft in the restricted category. Under paragraph 21.025(1)(a), an applicant is entitled to a type certificate in the restricted category for one of those purposes if the aircraft:
- can reasonably be expected to be safe for its intended use when it is operated under the conditions limiting its intended use
 - the aircraft either:

⁵⁰ In accordance with regulation 21.185.

- o meets the airworthiness requirements of the normal, utility, acrobatic, commuter or transport category, except those requirements that CASA considers are inappropriate for the special purpose for which the aircraft is to be used
- or
- o is of a type that has been manufactured in accordance with the requirements of, and accepted for use by, the Defence Force, or an armed force of Canada, the United Kingdom or the United States of America, and has been later modified for the special purpose operation or operations.

Applicable airworthiness standards

8.2.3.3 The process of determining the certification basis involves both CASA and the applicant and is specific to each application for a restricted type certificate. This is further described in [AC 21-13](#). Because RPA are not manned, there are some additional standards that do not have a current manned aircraft equivalent. The applicant should consider implications for the following RPA systems (this list is not exhaustive) when proposing an applicable airworthiness standard:

- command and control link (C2)
- detect and avoid equipment (DAA)
- ground control station (GCS)
- flight termination system (FTS)
- automated recovery system (ARS).

8.2.3.4 RPAS fall into the ‘special classes of aircraft’ under subregulation 21.017 (2). The subregulation designates the portions of Parts 22, 23, 25, 27, 29, 31, 32, 33, 35 and the Part 21 MOS that CASA considers to be appropriate for the RPAS.

8.2.3.5 Where possible, CASA will leverage existing manned aircraft standards and practices in order to apply a risk-based approach to certification requirements for the aircraft type, its intended mission, area of operation, its control method, and intended airspace. This approach is based on the risk to persons on the ground and other airspace users when compared to an equivalent manned aircraft, and then tailored for the risk of the proposed aircraft operation.

For example, a 150 kg RPA flying below 400 ft/120 m in non-populous areas will pose less risk to persons on the ground and other airspace users than a 5,000 kg RPA flying in Class C airspace over a populous area. The applicable airworthiness standards would reflect this difference in risk.

8.2.3.6 Subregulation 21.017 (2) allows for type design approval with a certification basis drawn from any source design, airworthiness and production standards deemed acceptable by CASA. This includes the use of industry standards or new special conditions where applicable.

Restricted certificate of airworthiness

- 8.2.3.7 An RPAS that has been type certificated in the restricted category is entitled to a special certificate of airworthiness in the restricted category subject to the requirements specified in regulation 21.185.

8.3 Registration and marking of large RPA

8.3.1 Registration

- 8.3.1.1 CASA requires that the operator of a large RPA must register their aircraft under Part 47. This applies to both experimental certificate and restricted category aircraft. See the [CASA website](#) for information on registering an aircraft.

8.3.2 Marking

- 8.3.2.1 All Australian aircraft must comply with the aircraft marking requirements of Part 45.⁵¹ As RPA may not be able to comply with standard marking requirements, regulation 45.065 allows that a person can apply to CASA for approval for the RPA to operate with different markings. CASA and the applicant will work together to determine appropriate alternative marking requirements.

8.4 Maintenance of RPA

8.4.1 Flying without satisfying safety requirements

- 8.4.1.1 All RPA operate under subsection 20AA (4) of the Act and require that:

- an owner, operator or hirer (other than the Crown)
- a pilot of an Australian aircraft

must not start a flight in the aircraft or permit a flight in the aircraft to start, if one or more of the following apply:

- there is outstanding a requirement imposed by or under the regulations in relation to the maintenance of the aircraft
 - the aircraft will require maintenance before the flight can end
 - there is a defect or damage that may endanger the safety of the aircraft or any person or property
- or
- the aircraft is unsafe for flight.

8.4.2 ReOC requirements

- 8.4.2.1 All included RPA must be maintained in accordance with the requirements set out in the RPAS maintenance manuals (see section 6.5).⁵²

⁵¹ See the CASA website at <https://www.casa.gov.au/standard-page/casr-part-45-display-nationality-and-registration-marks-and-aircraft-registration>.

⁵² See Division 101.F.4.

8.4.3 Large RPA – experimental certificate

8.4.3.1 Large RPA must be maintained in accordance with Part 4A of CAR. The registration holder for a class B experimental aircraft must maintain the aircraft in accordance with any conditions noted on the experimental certificate.⁵³

8.4.4 Large RPA – restricted category aircraft

8.4.4.1 The design approval holder must give at least one set of instructions for continuing airworthiness to the owner of each aircraft.⁵⁴

8.4.4.2 The maintenance schedule (i.e. the instructions for continuing airworthiness) developed during the certification process is the approved maintenance schedule for the aircraft.⁵⁵

⁵³ See regulation 42CB of CAR.

⁵⁴ See subregulation 21.050 (2).

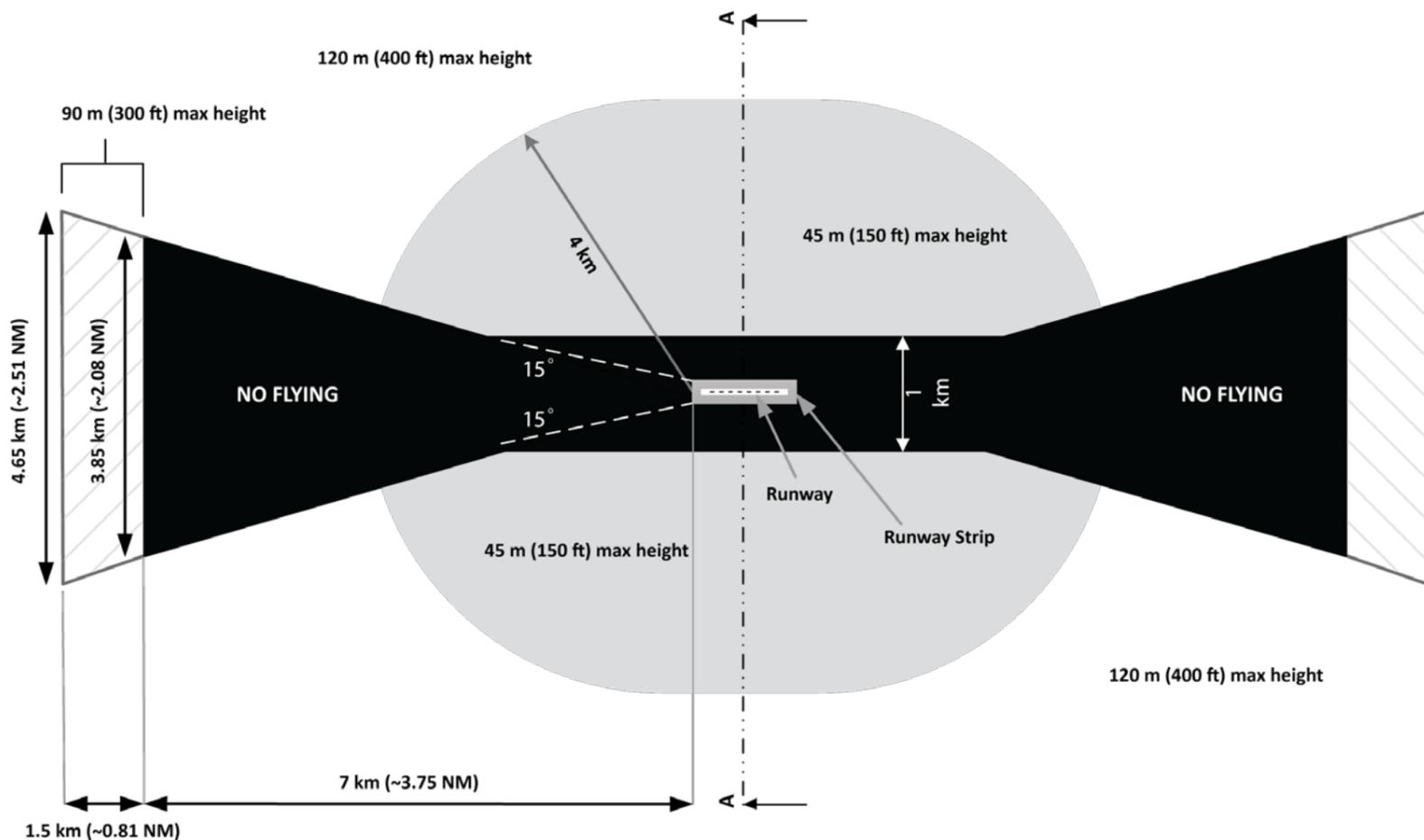
⁵⁵ Under regulation 42CA of CAR,

Appendix A

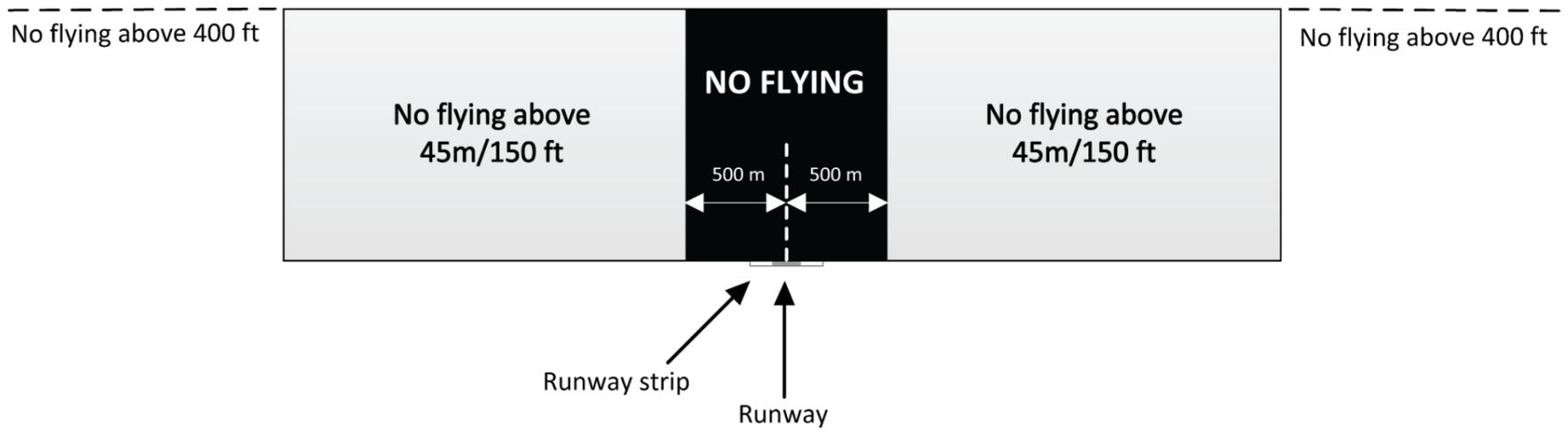
Part 101 approach and departure paths for controlled aerodromes (for regulation 101.075)

A.1 Controlled aerodrome approach and departure paths

- A.1.1.1 RPA are not to be flown in areas shaded black and are not to be flown above 45 m/150 ft (based on the aerodrome elevation) in the 4 km grey-shaded racetrack-shaped area. These are strict limits and suitable buffers should be used to ensure the RPA does not enter the restricted airspace zones. The restrictions apply to each runway of the aerodrome, including any, and each, cross runway.
- A.1.1.2 Licensed pilots and certified operators may operate in the black area and above 45m/150 ft in the grey area provided they hold, and comply with, a CASA approval for this purpose (CASA co-ordinates with ATS).
- A.1.1.3 Near the extremes of the approach and departure paths the RPA must remain below 300 ft until more than 8.5 km (~4.5 NM) from the runway threshold to ensure separation with aerodrome traffic. Outside these areas, the general 400-foot limit applies.



Controlled aerodromes approach and departure paths



Section through A-A

Figure 5: Controlled aerodromes approach and departure paths
(Heights referenced to aerodrome evaluation. Diagram not to scale.)

A.1.2 Multiple or cross runways

A.1.2.1 Figure 6 depicts the application of the no fly and restricted height zones to multiple or cross runways.

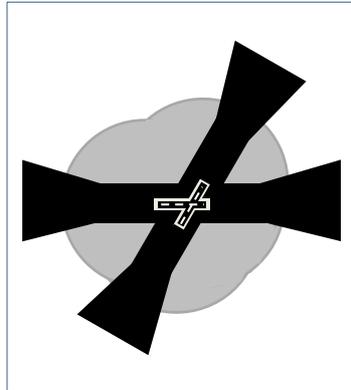


Figure 6: Example for cross runways

Appendix B

Instructions for obtaining an aviation reference number (ARN)

B.1 Applying for an ARN

- B.1.1 An ARN is a unique identifier, similar to an account number or customer number and it should be quoted whenever CASA is contacted. The number on an authorisation (e.g. licence or certificate) is, in most cases, the ARN belonging to the entity that holds that authorisation.
- B.1.2 An ARN can be obtained by completing Form 1162 (for individuals) or Form 1170 (for organisations) and submitting it, together with a clear and legible copy of one item of identification, in a scanned jpeg file to CASA Flight Operations and Licensing (clarc@casa.gov.au)
- B.1.3 Acceptable forms of identification are a birth certificates (full or extract), passport or Australian Citizenship Certificate. The identification supplied is to be in English and be clear and legible. It is not necessary to supply certified copies of identification documents.
- Note:** A driver's licence is not acceptable identification.
- B.1.4 Access to the form and detailed information is available at: <https://www.casa.gov.au/standard-page/arn-applications>

Appendix C

RPA operational approval process

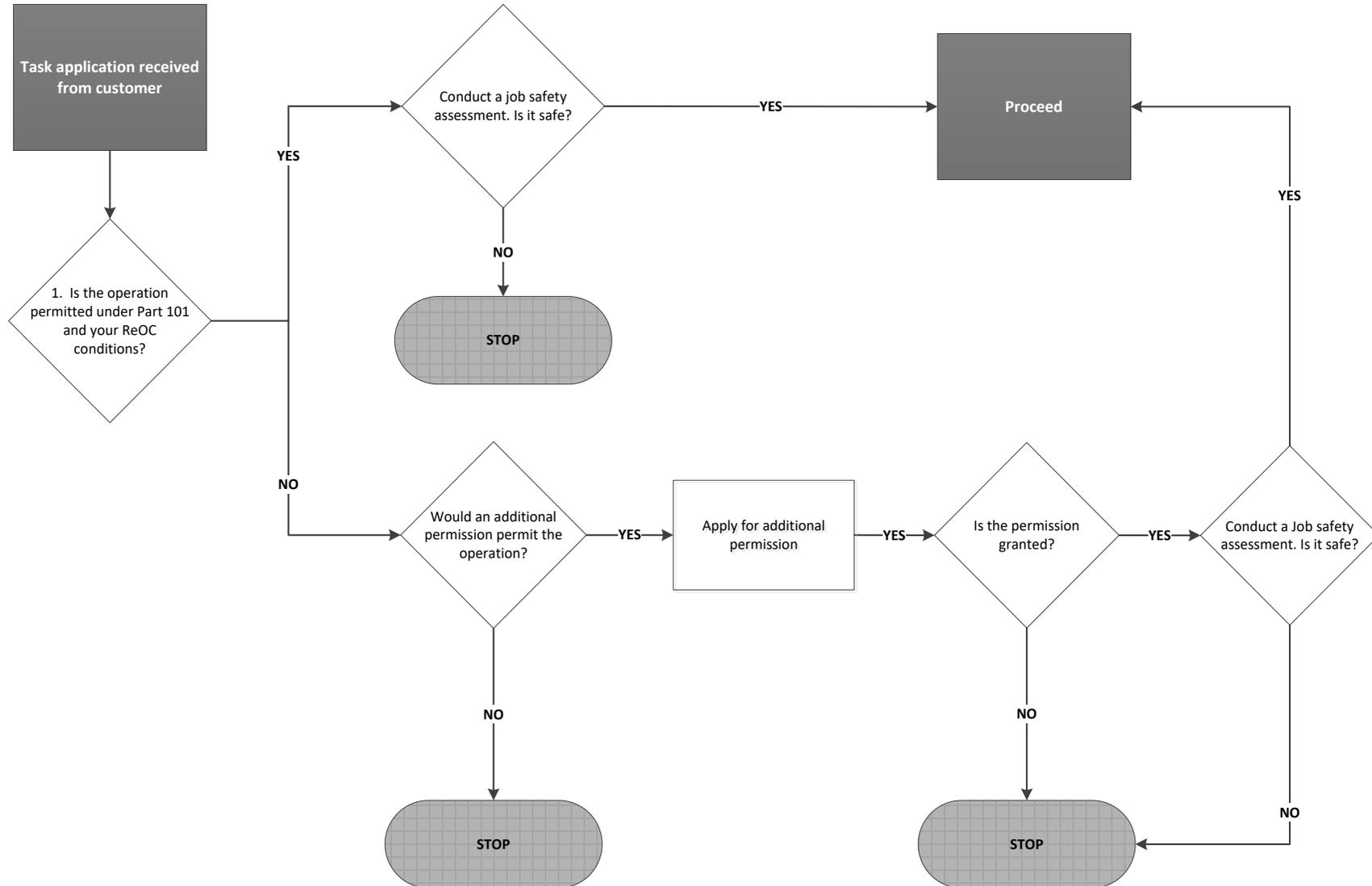


Figure 7: RPA operational approval process

Appendix D

Knowledge and skills for VLOS operations using very small and small RPA with liquid-fuelled engines⁵⁶

⁵⁶ A 'type approval' is required for any RPA that has a maximum gross weight above 25 kg.

D.1 Knowledge

- a. Characteristics and operation of liquid-fuelled engines:
 - i. the way a liquid-fuel engine works
 - ii. systems associated with a liquid-fuelled engine
 - iii. the differences between two and four-stroke engines
 - iv. the effect of increasing altitude and temperature on engine performance
 - v. fuel/air mixture considerations
 - vi. abnormal and emergency situations related to liquid-fuelled engines
 - vii. the effect of fuel burn on weight and balance.

D.2 Practical operation standards

- a. conducting fuel checks before the RPA is operated
- b. confirming the required amount of fuel required to complete the operation with a reasonable reserve
- c. engine handling and monitoring when the RPA is on the ground and during an operation of the RPA
- d. monitoring fuel use during an operation of the RPA and managing the RPA to ensure that the RPA does not run out of fuel during the operation
- e. adjusting the fuel mixture when the RPA is on the ground and during an operation of the RPA to achieve stated fuel burn rates or optimal engine performance
- f. refuelling aircraft safely and completing relevant post-fuelling checks
- g. completing operational and technical log with respect to fuel
- h. remedies for engine problems.