



Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR

AC 101-10

Remotely piloted aircraft systems – operation of excluded RPA (other than model aircraft)

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.

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

Audience

This Advisory Circular (AC) applies to operators, remote pilots and other remote crew members operating excluded remotely piloted aircraft (RPA).

Purpose

Excluded RPA are unmanned aircraft that may, under certain conditions, be operated without an explicit authorisation from CASA. This AC provides guidance for operators, remote pilots and other remote crew on the requirements for safe operation of excluded RPA (other than model aircraft) and recommended training to safely operate an excluded RPA.

For further information

For further information on the operation of RPA generally, refer to the documents referenced in section 1.3 of this AC or contact a CASA-approved remotely piloted aircraft system (RPAS) training organisation. Contact details for approved training organisations are available on the CASA website via <https://www.casa.gov.au/uas-operator-certificate-holders> and searching under either 'RPAS training' or 'RPAS type training' operations.

For further information on RPAS regulatory issues, contact CASA's RPAS office at rpas@casa.gov.au.

Status

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

Version	Date	Details
v1.2	September 2016	Update to dimensions in A.1 Non-controlled aerodromes diagram.
v1.1	September 2016	Minor editorial corrections made.
v1.0	September 2016	This is the first AC to be issued on this subject.

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

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1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	Advisory Circular
AIP	Aeronautical Information Publication
ARN	aviation reference number
CAR	<i>Civil Aviation Regulations 1988</i>
CASR	<i>Civil Aviation Safety Regulations 1998</i>
CLARC	CASA Licensing and Registration Centre
ERSA	En Route Supplement Australia
HLS	helicopter landing site
NOTAM	notice to airmen
ReOC	remotely piloted aircraft operator's certificate
RePL	remote pilot licence
RPA	remotely piloted aircraft
RPAS	remotely piloted aircraft system
SOC	standard RPA operating conditions
UAS	unmanned aircraft system
UAV	unmanned aerial vehicle (obsolete term)
UOC	UAS operator's certificate (obsolete term)
VLOS	visual line of sight

1.2 Definitions

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

Term	Definition
Controlled airspace	Airspace of defined dimensions within which an air traffic control service is provided to flights in accordance with the airspace classification.
Excluded RPA	Unmanned aircraft that may, under certain conditions, be operated without an explicit authorisation from CASA (refer to regulation 101.237).
Included RPA	An RPA operation that requires authorisation in the form of a remotely piloted aircraft operator's certificate (ReOC) and/or a remote pilot licence (RePL).

REMOTELY PILOTED AIRCRAFT SYSTEMS – OPERATION
OF EXCLUDED RPA (OTHER THAN MODEL AIRCRAFT)

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 .
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.
Remote crew member	A crew member charged with duties essential to the operation of an RPA 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.
Remote pilot station	The station at which the remote pilot manages the flight of an unmanned aircraft.
Remotely piloted aircraft	An unmanned aircraft, other than a balloon or kite, where the pilot flying is not on board the aircraft.
RPA observer	A remote crew member who, by visual observation of the RPA, assists the remote pilot in the safe conduct of the flight.
Restricted area	An area declared under the <i>Airspace Regulations 2007</i> for which permission must be granted by the controlling authority before any operations in that area can occur while it is active.
Small RPA	An RPA with a gross weight of at least 2 kg but less than 25 kg.
Sport or recreation	In relation to the flight of an unmanned aircraft, a flight activity only for the pleasure, leisure or enjoyment of the remote pilot.
Unmanned aerial vehicle (UAV)	Obsolete term - refer to the RPA definition above.
Very small RPA	An RPA with a gross weight of more than 100 g but less than 2 kg.

1.3 References

Regulations

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

Document	Title
Part 99	Drug and alcohol management plans and testing
Part 101	Unmanned aircraft and rocket operations
Part 117	Representations and surveys
	<i>Civil Aviation Act 1988</i>
	<i>Aviation Transport Security Act 2004</i>
	<i>Airspace Regulations 2007</i>

Advisory material

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

Document	Title
AC 101-01	Remotely piloted aircraft systems – general
AC 101-03	Unmanned aircraft and rockets - model aircraft
AC 101-05	Remotely piloted aircraft systems – functions and duties of an RPAS maintenance controller
	En Route Supplement Australia (ERSA) available at: http://www.airservicesaustralia.com/aip/aip.asp

1.4 Forms

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

Form number	Title
Form 1162	Aviation Reference Number (ARN) Application (Individual)
Form 1170	Aviation Reference Number (ARN) Application (Organisation)

Note: Notification of certain excluded RPA operations can be made through an online form. See section 3.1.3.7 for advice.

2 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.

2.1 Overview

- 2.1.1 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.
- 2.1.2 CASA 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 some RPA 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 operations—termed 'excluded RPA' operations—are defined in regulation 101.237.

Guidance on operating 'included RPA' can be found in AC 101-01.

- 2.1.3 Section 2.2 explains the assessment criteria used to determine whether an operation is considered to be an excluded RPA operation.

2.2 Assessment of operational risk

- 2.2.1 The assessment of an operation as being an excluded 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.
- 2.2.2 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.
- 2.2.3 Figure 1 shows how these criteria are used to decide whether an operation would be an excluded RPA operation or a commercial RPA operation. The criteria are then explained in more detail in the following paragraphs.

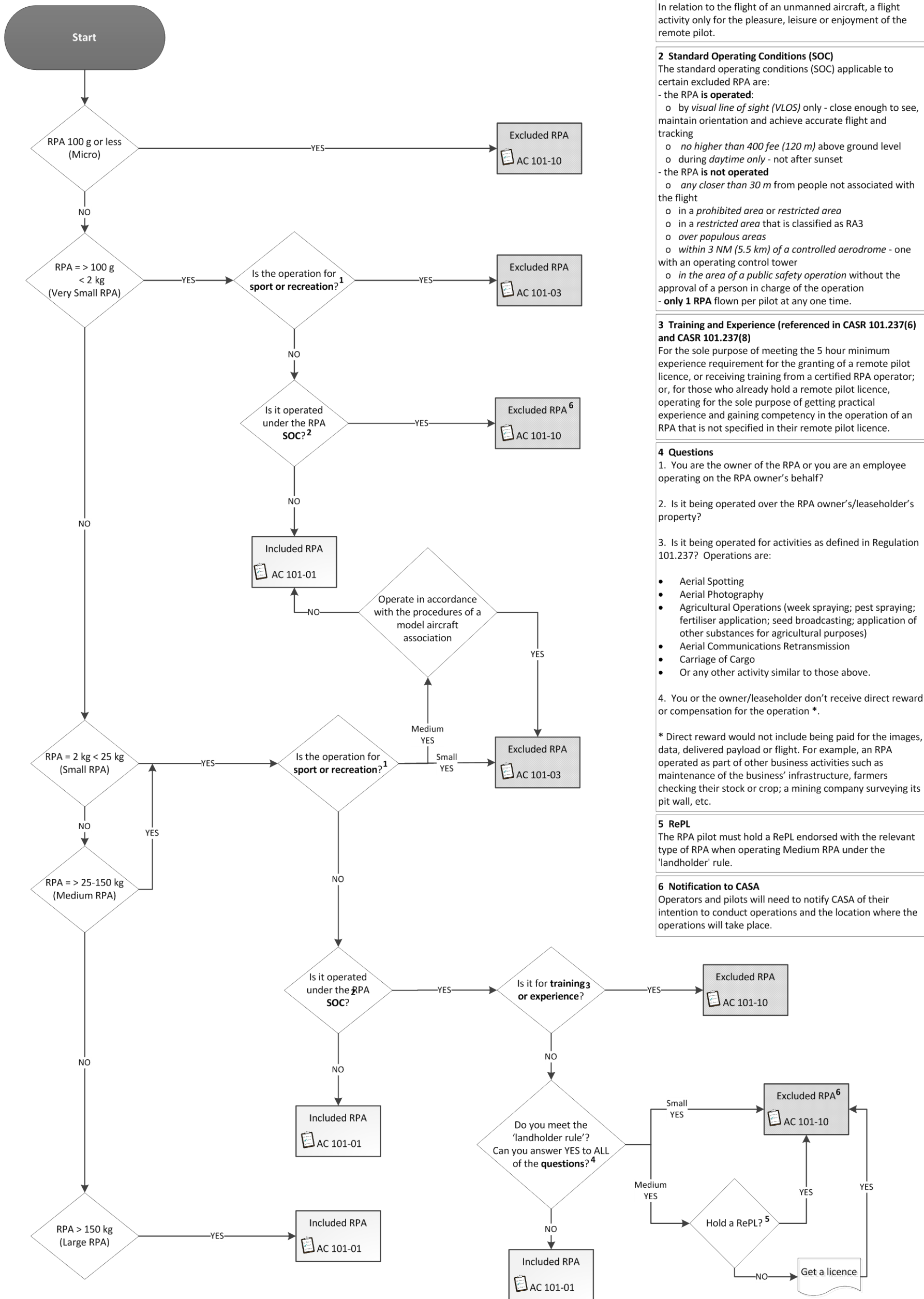


Figure 1: Decision flow chart to determine eligibility as an excluded RPA¹

¹ Figure adapted courtesy of the copyright holder, the Australian Association for Unmanned Systems (AAUS).

Weight

2.2.4 RPA are separated into the following weight categories:

- **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

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

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

Guidance on operating model aircraft can be found in AC 101-03.

Standard operating conditions

2.2.7 Standard operating conditions (SOC) apply to many excluded RPA. The SOC 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 120 m (400 feet)* above ground level (see *SOC note 1*)
 - o during *daytime only* - not after sunset
- the RPA **is not operated**
 - o *any closer than 30 m* from people not associated with the flight²
 - 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 5.5 km (3 NM)* 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.

² Any person who is not charged with duties essential to the safe operation of a remotely piloted aircraft.

SOC notes:

1. Height limit of 120 m (400 ft) – referenced to a point on the ground immediately below the RPA at any time during the flight.

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 3.2.2. Since there is no prospect of operating in these areas when they are active, no controlling authority contact details are published.

3. Restricted areas can be temporary and permanently 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:

- Operators of excluded RPA subject to the SOC may apply to the controlling authority for permission to operate within RA1 and RA2 areas when the areas are active. 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 restricted areas are marked on aeronautical charts. Restricted area activation times and contact details for controlling authorities are published in En Route Supplement Australia (ERSA) of the Aeronautical Information Publication (AIP). Guidance on accessing these charts and documents is set out in section 3.2.
- Temporary restricted areas are notified by NOTAM.

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. ~30 m/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. Similarly, an RPA operating over a large public gathering at a higher level (e.g. 120 m/400 ft) would pose an unreasonable risk to the safety of the people below because, in the event of a systems failure, it may not be able to clear the area. This interpretation would apply equally to higher flight 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 appropriate 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 5.5 km (3 NM) of a controlled aerodrome, but must remain below 120 m/400 ft.
- Very small excluded RPA may be operated in controlled airspace more than 5.5 km (3 NM) from the boundary of a controlled aerodrome, but not above 120 m/400 ft.
- Small and medium excluded RPA (other than model aircraft) are permitted to fly in controlled airspace (not above 120 m/400 ft or within 5.5 km/3 NM of a controlled aerodrome) provided the pilot holds a relevant (radio) qualification (see subregulation 101.280 (2)).
- Rules for the operation of small and medium model aircraft in controlled airspace are explained in AC 101-03.

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

Training or experience

2.2.8 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 remote pilot's licence (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.

Landholder rule

2.2.9 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 or leaseholder's property
- the RPA is being used for activities defined in regulation 101.237, specifically:
 - 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.

2.3 Getting the right advice for your RPA operation

The decision flow chart in Figure 1 can be used to determine whether an RPA operation is considered to be a commercial, excluded or model aircraft RPA operation. Advice on excluded RPA operations is provided in Chapter 3. Directions to advice on other RPA operations is noted in the following sections.

2.3.1 Micro RPA

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

2.3.2 Very small RPA

- 2.3.2.1 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/recreational purposes (see section 2.3.6), or in accordance with the SOC, and are therefore treated as excluded RPA operations.
- 2.3.2.2 Operation of a very small RPA in a way that doesn't comply with the SOC (i.e. an included/commercial operation) requires the operator to hold a ReOC and the remote pilot to hold a RePL (see AC 101-01).

2.3.3 Small RPA

- 2.3.3.1 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 2.3.6) but, for other operations, an authorisation is required unless the operation meets the criteria mentioned below.
- 2.3.3.2 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 will have to meet requirements relating to ownership, flight activity and remuneration. They will also be required to notify CASA of their intention to conduct operations.
- 2.3.3.3 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 and the remote pilot to hold a RePL (see AC 101-01).

2.3.4 Medium RPA

- 2.3.4.1 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. 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.

2.3.5 Large RPA

2.3.5.1 All large (>150 kg) civil RPA are considered to be included RPA, even if operated for sport or recreation, and as such are regulated by the additional provisions for remotely piloted aircraft (Subpart 101.F). Requirements for the operation of large RPA are described in AC 101-01, including the requirement for the operator to hold a ReOC and the remote pilot to hold a RePL.

2.3.6 Model aircraft

2.3.6.1 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 (> 100g and < 25 kg) are required to operate in accordance with the model aircraft rules described in AC 101-03.³

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.

2.3.7 Warning!

Some activities, such as aerial photography, may be classed as recreational or commercial operations, depending on additional considerations. Remote pilots and operators must ensure that their flight activity meets the definition of 'sport or recreation' or the 'landholder' rules. If not, the operator and remote pilot must adhere to the SOCs and operate only very small RPA.⁴ Operations outside of these conditions require CASA operator and remote pilot authorisations. 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.

³ CASA intends to develop harmonised regulations for commercial RPA operations and model aircraft in the future.

⁴ In accordance with regulation 101.237.

3 Putting the rules into operation

This Chapter describes the rules for excluded RPA operations, including:

- operational matters
- accessing aeronautical information publications
- flight logging
- emergency procedures
- reporting requirements when things go wrong
- general considerations.

3.1 Excluded RPA operational matters

Excluded RPA operators and pilots should familiarise themselves with the following operational matters.

3.1.1 Requirements and exemptions

3.1.1.1 Excluded RPA may be operated without specific authorisations from CASA—neither a ReOC or a RePL is required—but they must still be operated in accordance with:

- the general Part 101 regulations applicable to excluded RPA (see Appendix B)
- any explicit conditions relating to the flight of particular excluded RPA.

3.1.1.2 Whereas a ReOC or RePL holder may apply to CASA for an exemption against the regulations, operators and pilots who intend to operate excluded RPA are not eligible to apply for exemptions against the relevant regulations. Any operation conducted outside the regulations and conditions applying to an excluded RPA is, by definition, not an excluded RPA operation. With this in mind, operators and pilots should be aware that Part 117 contains severe penalties for a person misrepresenting that they hold civil aviation authorisations.

3.1.2 Hazardous operation prohibited (regulation 101.055)

3.1.2.1 All excluded RPA operations must be conducted in a way that doesn't create a hazard to another aircraft, another person or property. It is essential that operators and pilots of all RPA understand that, despite any privileges available under the regulations, it is a strict liability offence to:

...operate an unmanned aircraft in a way that creates a hazard to another aircraft, another person, or property.

3.1.2.2 The maximum fine that a court could impose on an individual is currently \$9,000. However, operators and pilots should be aware that the *Civil Aviation Act 1988*, the *Aviation Transport Security Act 2004* and aviation security regulations also contain criminal offences for interference with the safe conduct of air transport or reckless flying, which may result in up to 2 years imprisonment.

3.1.2.3 The hazardous operation regulation applies to the dropping or discharging of anything from an RPA. The dropping and discharging of solid objects, liquids chemicals and gases is permitted, but only if they do not constitute a hazard to other aircraft, people or

property. In addition, operators and pilots must ensure that they have any applicable and required State, Territory and local authority approval to carry out any dropping or dispensing operation, whether it is conducted on private or public land.

3.1.3 Notifying CASA of planned operations

Situations when you must notify CASA

3.1.3.1 Operators and pilots of very small RPA for hire or reward and operators and pilots taking advantage of the 'landholder' rules will need to notify CASA of their intention to conduct operations and the location where the operations will take place.

Who must notify CASA?

3.1.3.2 Sole traders (i.e. operators who fly their own RPA) only need to make one notification (as an operator).

3.1.3.3 An operator who employs a pilot (or pilots) will need to submit a notification on their own behalf and ensure that each pilot who flies for them has also notified CASA.

3.1.3.4 The online notification forms for operators and pilots are slightly different. Pilots and operators should be aware that they are all individually responsible for the safety of RPA operations.

When to notify CASA

3.1.3.5 Notify CASA five business days before the *first* operation. Because operators and pilots require an aviation reference number (ARN) before they can notify CASA, sufficient time must be allowed beforehand for the issue of an ARN (see Appendix C for instructions on how to obtain an ARN).

3.1.3.6 Notification is nominally a one-off process, although any changes to supplied details must be notified within 21 days. A renewal notice will be sent out by CASA after two years to ensure details in the system are up-to-date and that the person is still active in the industry.

3.1.3.7 The online notification system can be accessed via the [RPAS landing page](#) on the CASA website.

Record of notification

3.1.3.8 A copy of the notification receipt email (paper or electronic) should be available for inspection at the location of flight operations.

3.1.4 Aircraft identification

3.1.4.1 Operators who are required to notify CASA should either:

- attach to, or insert into, their aircraft a fire-proof identification 'plate'
- or
- write the identification details in indelible ink on the aircraft.

3.1.4.2 The identification information should include the operator's name (or trading name) and their ARN. Specific aircraft identification, for the owner's aircraft management purposes, may also be included.

3.1.4.3 Any identification need only be in place during flight time.

3.1.5 Operation near non-controlled aerodromes

3.1.5.1 When flying an excluded RPA near a non-controlled aerodrome, the remote pilot must ensure that it is:

- not operated on or above runways or taxiways
or
- flown in the approach and departure paths for the aerodrome.⁵

3.1.5.2 The approach and departure paths are not simply imaginary extensions of the runways, but include all areas from which an aircraft may approach or depart the aerodrome (see appendices A.1 and A.2). For some aerodromes with helicopter, agricultural, ultralight or sports operations, this may mean that aircraft may come and go from unexpected angles. Aircraft flying under 'instrument flight rules' may also appear suddenly from low cloud, sometimes even unaligned with a runway, when conducting a 'non-precision circling approach'.

3.1.5.3 Generally, the 120 m/400 ft height restriction is in reference to the point immediately below the RPA at all stages of a flight. However, in the vicinity of aerodromes, remote pilots should reference their height to the aerodrome elevation. The elevation of aerodromes can be found in ERSA or, for those not listed in ERSA, by referencing the RPA elevation on the ground at a point as close to the aerodrome as possible.

3.1.5.4 The safety of RPA operations can be improved by using observers near and in communication with the RPA pilot to warn of arriving or departing manned traffic.

3.1.5.5 At aerodromes where there are regular public transport or large charter aircraft operations, RPA pilots should ensure that the RPA lands or remains on the ground:

- from the moment the manned aircraft begins to taxi for departure and until it has departed the area
- at least ten minutes before the arrival of the aircraft.

3.1.5.6 The best way to achieve these safety margins is to communicate with operators of manned aircraft and to share information about the RPA operation. RPA pilots who understand aeronautical communications should monitor the local very high frequency (VHF) radio frequency for broadcasts by arriving and departing traffic to help reduce the danger of a collision with a manned aircraft.⁶

3.1.5.7 Appendix A.1 shows the areas around non-controlled aerodromes of greatest risk, including maximum altitudes relative to runways and areas where RPA flying is not permitted.

⁵ See regulation 101.075.

⁶ Only holders of aeronautical radio qualifications may transmit on aeronautical frequencies.

3.1.5.8 Operators and pilots should note the grey racetrack-shaped area that extends with 4 km arcs out from the runway thresholds of the runway strip and parallel to the edges of the runway. Flight by RPA is restricted to below 45 m (150 ft) in this area.

3.1.5.9 Flight is prohibited in the black areas at any height.

Note: The requirements apply to each runway on aerodromes that have more than one runway (including grass and gravel strips) and will overlap in such cases.

3.1.6 Operation near manned traffic

3.1.6.1 To ensure the safety of both the RPA and manned aircraft operation, RPA pilots should land their aircraft or move it to a safe location any time that a potential conflict may develop between the manned aircraft and the RPA.

3.1.6.2 In situations where a helicopter and an RPA are operating in semi-public spaces—such as school and football grounds or local open spaces (e.g. on agricultural show days)—the RPA operator should apply the same limitations described in appendix A.2 for regular helicopter landing sites (HLS). Where this is not possible, the RPA operator must liaise with the helicopter operator prior to flight to avoid creating a collision hazard.

3.1.7 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. 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 evasive action.

Lanes of entry

3.1.7.2 Most major centres in Australia with large, controlled aerodromes and nearby smaller ones have lanes of entry to facilitate visual flight through complex airspace. There may be low-flying traffic in such airspace and remote pilots should take precautions to avoid becoming a hazard to manned aircraft. CASA recommends the use of an observer in these areas (see subsection 4.2). Lanes of entry are marked on visual aeronautical charts.

Helicopter landing sites

3.1.7.3 Appendix A.3 lists HLS with instrument-guided approaches for which a full 5.5 km exclusion area applies at all heights.

3.1.8 First-person view (FPV) and indoor operations

3.1.8.1 The regulation requiring the RPA to be kept in visual line of sight by the person flying the aircraft means that first-person view operations are not permitted. This does not exclude another crew member using FPV to help guide the remote pilot to complete a task.

- 3.1.8.2 The need to keep the RPA more than 30 m from people not associated with the operation of the aircraft, to avoid populous areas and to not create a hazard to other people or property would generally rule out Excluded RPA operations indoors.

3.1.9 Carriage of dangerous goods

- 3.1.9.1 Some RPA operations may be subject to the carriage of dangerous goods regulations. Operators should familiarise themselves with the requirements. See the CASA website at <https://www.casa.gov.au/safety-management/landing-page/dangerous-goods> for information.

3.2 Accessing aeronautical information publications

RPA pilots need to avoid flying in some airspace, or have approval from ATC or the area's controlling authority before flying in other areas (see SOC notes 1 and 2). To do this, pilots must be aware of 'designated' airspace (control zones, restricted airspace etc.) and be able to identify such areas in relation to their proposed RPA flight.

3.2.1 Aeronautical charts

- 3.2.1.1 To determine whether a proposed operation would enter restricted airspace, pilots will need to refer first to the information contained in aeronautical charts. Hard copy visual charts are available from Airservices Australia and can be ordered online. Remote pilots may also use commercially available flight planning and navigational programs from approved data providers.
- 3.2.1.2 Once the identification number of an area of airspace, or the aerodrome associated with controlled airspace, is identified from a chart, pilots can determine the activation times, controlling authority for the area, and contact details by consulting the ERSA. Pilots and operators of RPA must comply with any conditions imposed by the controlling authority when conducting the flight.
- 3.2.1.3 The structure of airspace, particularly near busy aerodromes, can be very complex. A close inspection of the chart around the proposed flight area is necessary to determine airspace restrictions. RPA pilots should refer to the legend on charts to determine the type of airspace for each operation they conduct.
- 3.2.1.4 Prohibited areas are usually only associated with large Defence manoeuvres and exercises and will usually be announced in the media. If an RPA operation is planned nearby such an event, check NOTAMs or contact Defence liaison personnel to see where flights are permitted or not permitted.

3.2.2 NOTAMs

- 3.2.2.1 A NOTAM is used to alert aircraft pilots of potential hazards along a flight route or at a location that could affect the safety of aviation.
- 3.2.2.2 NOTAMs can be obtained by registering with the National Aeronautical Information Processing System (NAIPS) on Airservices Australia's Flight Briefing website.

3.2.3 RPAS app

- 3.2.3.1 CASA is developing a free RPAS App that will allow operators to see prohibited and restricted areas relative to their planned flight path. This will make it easy to find out who controls the area and who to approach for permission to fly in the area. CASA will notify the RPAS industry and public when the app is available.

3.3 Flight logging

- 3.3.1 RPA operators should maintain aircraft records that show:

- time-in-service
- maintenance history
- any defects and abnormalities that affect operations
- any incidents or accidents
- any other useful information that may affect the safety of future flights with the RPA.

3.4 Emergency procedures

- 3.4.1 The RPA mission plan should detail the 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.

- 3.4.2 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 99). The relevant area or panel on the RPA should be clearly marked to warn crew of the potential danger.

- 3.4.3 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.

- 3.4.4 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.

3.5 Accident and incident reporting

3.5.1.1 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.

3.5.1.2 These include:

- a failure of the RPA 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.

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

3.5.2 Immediate notification of accidents and serious incidents

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

3.5.3 Written notification of accidents, serious incidents and incidents

3.5.3.1 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.

3.6 General considerations

3.6.1.1 Excluded RPA operations are subject to the following general considerations.

3.6.2 Legal restrictions

3.6.2.1 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.

3.6.2.2 Pilots and operators of excluded RPA must ensure that their activities are compliant with other applicable State and Territory laws that are not directly inconsistent with Commonwealth aviation legislation.

3.6.3 Surveillance and enforcement

3.6.3.1 RPA operators, as with other sectors of the aviation industry, 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.

- 3.6.3.2 Non-compliance with regulations will be investigated and operators found to be in breach may be subject to safety and/or enforcement action.

3.6.4 Drug and alcohol testing

- 3.6.4.1 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.

3.6.5 Noise abatement

- 3.6.5.1 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.

3.6.6 Insurance

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

4 Personnel training

This Chapter describes the recommended training (and in a few situations, the licensing requirements) to be a remote pilot. It also provides advice on briefing RPA observers and other remote crew.

4.1 Remote pilots

All remote pilots should undergo training to learn how to fly an RPA safely and without creating a hazard to other aircraft, people and property. There is no formal training requirement for pilots of excluded RPA, with the exception of medium RPA being used for 'landholder rule' operations (see section 4.1.3). However, CASA strongly recommends that all pilots of excluded RPA consider getting instruction from a qualified trainer not only in practical flight, but also in the knowledge required to understand aeronautical publications and the procedures relating to operations in the national aviation system.

4.1.1 Training

- 4.1.1.1 Training should be carried out using the actual RPA—or at least an RPA of the same category (i.e. multi-rotor, helicopter, aeroplane etc.) and weight class—that the pilot plans to operate post-training.
- 4.1.1.2 CASA considers that five hours flight time is the minimum necessary to gain a basic level of competency for any category of RPA.⁷
- 4.1.1.3 The pilot should be taught to control their RPA within its design parameters and in varied operating conditions, including:
 - dealing appropriately with variable weather (e.g. strong winds)
 - abnormal flight situations
 - emergencies
 - system malfunctions.
- 4.1.1.4 Pilots should be able to demonstrate good manual flight control of their RPA. Pilots should also be competent in all automated flight modes for RPA that can only be flown using automated piloting techniques. It is important for the pilot to be competent in both manual and automated flight for RPA that rely on manual control in the event of a loss or degradation of the autopilot.
- 4.1.1.5 When training or practising, pilots should consider keeping the RPA more than the prescribed 30 m from people and property until they are able to control the aircraft competently.
- 4.1.1.6 Pilots of excluded RPA should maintain and improve their flying skills with continued practice, particularly launches/take-offs and landings, as well as simulated real-world jobs (in a safe location). To some extent, flight simulators can also help to improve flying skills.
- 4.1.1.7 A log book is a practical method of recording flight hours as a means of providing evidence of flying experience and competence. Remote pilots who choose to use a log

⁷ Refer to paragraph 101.295 (2) (c).

book should record the flight time, location, aircraft used, any training done and a short description of any tasks performed.

- 4.1.1.8 A [sample log book to record RPA flying hours](#) can be found on the CASA website. This format can be printed and formed into a hard-copy document.

Training organisations

- 4.1.1.9 A list of CASA-approved training organisations is available on CASA's website at <https://www.casa.gov.au/aircraft/standard-page/uas-certificate-holders>

- 4.1.1.10 Model aircraft clubs also offer practical, hands-on training for members who fly helicopter and aeroplane-type RPA. Clubs can be found via:

- The Model Aeronautical Association of Australia (<http://www.maaa.asn.au/>)
- Australian Miniature Aerospots Association (www.amas.org.au).

4.1.2 Other considerations

- 4.1.2.1 The loss of control of an RPA, particularly rotorcraft and multi-rotor, can be sudden and recovery very difficult even for experienced remote pilots. It is therefore important for remote pilots to assess the risks of unexpected abnormal operations and environmental conditions, and be able to take precautions to prevent an accident.

- 4.1.2.2 An accident or incident involving an RPA flown by a person may attract CASA enforcement under the 'hazardous operation' regulation if that incident or accident created a relevant hazard.⁸

4.1.3 Licensing exception – medium RPA for 'landholder rule' operations

- 4.1.3.1 Owners/occupiers of land may use their own RPA to carry out a range of flight activities relating to the management of the land (see paragraph 2.2.9). However, for medium RPA, the remote pilot must be trained and licensed (i.e. hold a RePL) to fly under the 'landholder rules'.

- 4.1.3.2 The training must be an approved training course delivered by a CASA-approved training organisation. Refer to the RePL chapter in AC 101-01 for more information on training and qualifying for a remote pilot licence.

- 4.1.3.3 Before applying for a RePL, the applicant must have an aviation reference number (ARN). Instructions for obtaining an ARN are provided in Appendix C.

4.2 RPA observers and other remote crew

- 4.2.1 Any person who will act as an observer—to assist the remote pilot to avoid creating a hazard during flight of the RPA—should also be trained and thoroughly briefed on how they will alert the remote pilot to situations when hazards arise.

- 4.2.2 Simple procedures should be discussed and agreed before launch to ensure each person involved knows what action to take in the event of a potentially hazardous situation arising. This may include procedures and expressions such as 'land

⁸ Refer to regulation 101.055.

immediately at the RPA's current location' or 'return to home (the location of the remote pilot) now'.

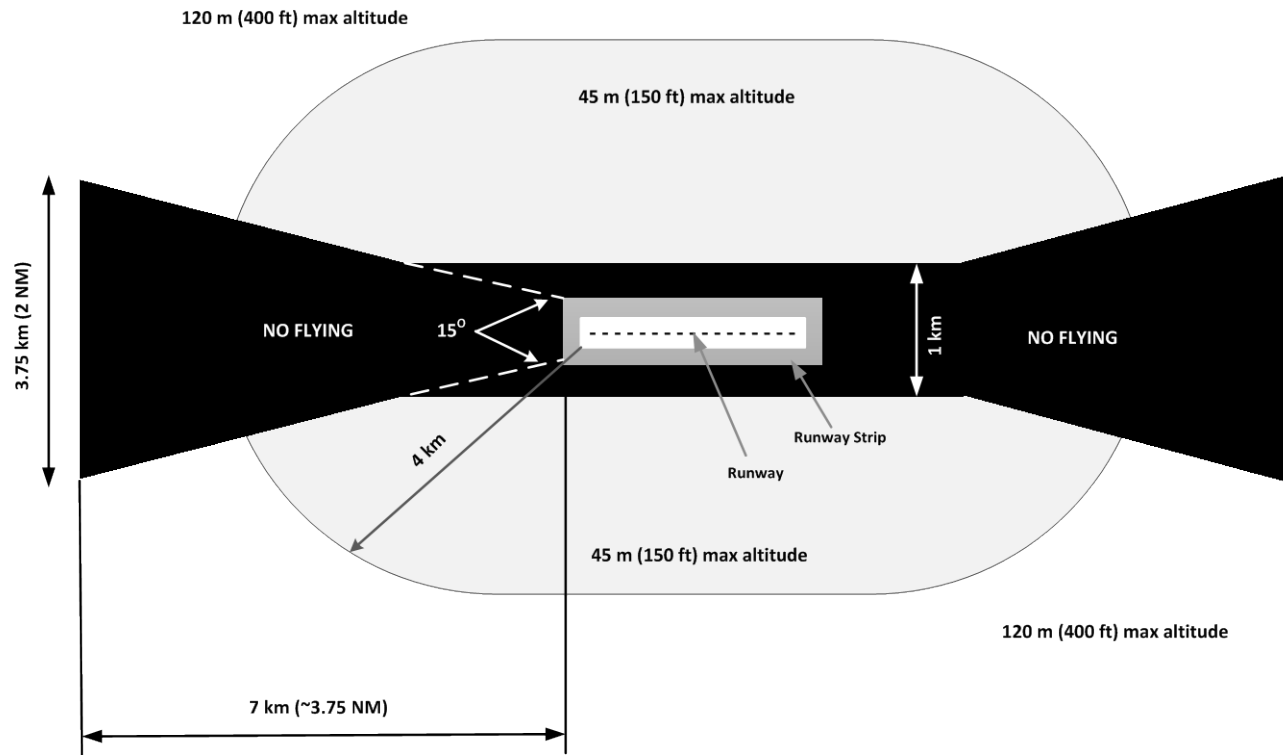
- 4.2.3 The use of an observer does not relieve remote pilots from their primary responsibility to ensure safe flight of the RPA.

Appendix A

Part 101 approach and departure paths

A.1 Non-controlled aerodromes

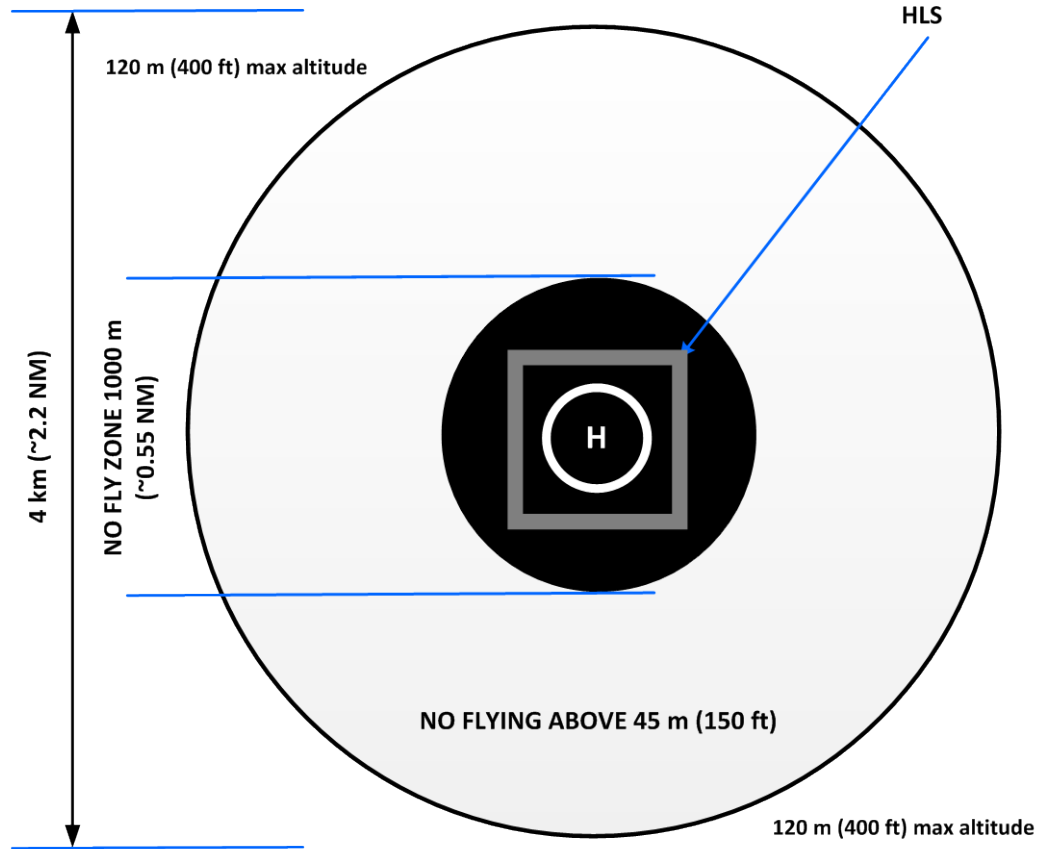
RPA not to be flown in the black area and otherwise not above 150 ft in the 4 km grey racetrack-shaped area⁹.



⁹ Note that 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 an aerodrome, including gravel and grass strips and cross runways.

A.2 Non-instrument helicopter landing sites

RPA not to be flown in the black circle (1 km diameter) and otherwise not above 45 m (150 ft) in the grey shaded circle (4 km diameter)¹⁰



¹⁰ Note that these are strict limits and suitable buffers should be used to ensure the RPA does not enter the restricted airspace zones. The HLS depicted is not to scale.

A.3 Instrument approach - helicopter landing sites

A.3.1 The following places have HLS with instrument approaches:

- Charlie 1 (YCLN)
- Facing Island (YFLD)
- Gosford District Hospital (YXGS)
- Lithgow Medical (YXLG)
- Maclean Hospital (YXMA)
- Merriwa Hospital (YXMW)
- Mossman Hospital (YXMO)
- Newcastle Westpac Base (YXFV)
- Seabuoy (YSBY)
- Tully Hospital (YXTU)
- Victor Island East (YVIE)
- Victor Island West (YVIW)
- Westmead Hospital (YWST)
- Wollongong Hospital (YXWL).

Unless otherwise approved by CASA, a 5.5 km (3 NM) exclusion zone applies to these HLS.

Appendix B

Regulations relevant to the operation of excluded RPA Part 101 and Part 117

B.1 General requirements

- 101.020 - Exemption from certain other provisions of the CAR
- 101.025 - Meaning of *populous area*
- 101.035 - Requirements in this Part to give information to CASA
- 101.048 - Performance of duties during flight time—remotely piloted aircraft

B.2 Subpart 101.B—General prohibition on unsafe operation

- 101.050 - Applicability of this Subpart
- 101.055 - Hazardous operation prohibited

B.3 Subpart 101.C—Provisions applicable to unmanned aircraft generally

- 101.060 - Applicability of this Subpart
- 101.065 - Operation in prohibited or restricted area
- 101.073 - Operation must generally be within visual line of sight
- 101.075 - Operation near aerodromes
- 101.090 - Dropping or discharging of things
- 101.097 - Autonomous aircraft—launch or release without approval prohibited

B.4 Subpart 101.F—Remotely piloted aircraft

- Division 101.F.1—General
- 101.235 - Application of Subpart 101.F
- 101.237 - Meaning of *excluded RPA*
- 101.238 - Meaning of *standard RPA operating conditions*
- 101.252 - Certain RPA—requirement for remote pilot licence
- 101.270 - Certain RPA—requirement for RPA operator's certificate
- 101.272 - Certain RPA—requirement to keep records or give information to CASA
- 101.285 - Use of aeronautical radio
- 101.370 - Compliance with RPA operator's practices and procedures
- Division 101.F.5—Operation of very small RPA for hire or reward
- 101.371 - Requirement to give notice before operating an excluded RPA, other than a model aircraft, under subregulations 101.237(3), (4) and (7)
- 101.372 - Notice to operate an excluded RPA, other than a model aircraft, under subregulations 101.237(3), (4) and (7)
- 101.373 - Notification of changes in relation to operating very small RPA for hire or reward etc.
- 101.374 - Database of notifications

B.5 Part 117—Representations and surveys

- 117.005 - What this Part is about
- 117.010 - Misrepresentations about holding certain civil aviation authorisations
- 117.015 - Safety related surveys or questionnaires—holders of certain civil aviation authorisations

Appendix C

Instructions on how to obtain an aviation reference number (ARN)

C.1 Applying for an ARN

- C.1.1 An ARN is a unique identifier that CASA uses (similar to an account number or customer number). This number should be quoted whenever an operator contacts CASA. The number on an authorisation (e.g. licence or certificate) is, in most cases, the ARN belonging to the person or entity that holds that authorisation.
- C.1.2 An ARN can be obtained by completing Form 1162 (for individuals) or Form 1170 (for organisations) and submitting it to CASA, together with a scanned, legible copy of one item of identification in a jpeg file. The form should be submitted to the relevant email address printed on the form.
- C.1.3 Acceptable forms of identification are birth certificates (full or extract), current passport or an Australian Citizenship Certificate. The identification supplied must be in English. It is not necessary to supply certified copies of identification documents. A driver's licence is not acceptable identification.