<OperatorName>

**CASR Part 101**

**Operations Manual**

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Glossary

Acronyms and abbreviations

|  |  |
| --- | --- |
| Acronym / abbreviation | Description |
| **ABS** | Australian Bureau of Statistics |
| **ADS-B** | Automatic Dependent Surveillance-Broadcast |
| **AEC** | Airspace Encounter Category |
| **AGL** | Above Ground Level |
| **AIP** | Aeronautical Information Package |
| **ALA** | Authorised Landing Area |
| **ALARP** | As low as reasonably practicable |
| **AMSL** | Above Mean Sea Level |
| **ARC** | Air Risk Class |
| **AROC** | Aeronautical Radio Operator Certificate |
| **ATC** | Air Traffic Control |
| **ATSB** | Australian Transport Safety Bureau |
| **AU-STS** | Australian Standard Scenario |
| **BVLOS** | Beyond Visual Line of Sight |
| **C2** | Command and Control |
| **C3** | Command, Control and Communication Link |
| **CAA** | Civil Aviation Act |
| **CASA** | Civil Aviation Safety Authority |
| **CASR** | Civil Aviation Safety Regulations |
| **CONOPS** | Concept of Operations |
| **CRM** | Crew Resource Management |
| **CRP** | Chief Remote Pilot |
| **CTR / CTZ** | Control Zone |
| **DAA** | Detect and Avoid |
| **EMS** | Emergency and Medical Service |
| **ERP** | Emergency Response Plan |
| **ERSA** | En Route Supplement Australia |
| **EVLOS** | Extended Visual Line of Sight |
| **FLARM** | Flight and Alarm |
| **ft** | Feet |
| **GNSS** | Global Navigation Satellite System |
| **GPS** | Global Positioning System |
| **HLS** | Helicopter Landing Site |
| **HMI** | Human Machine Interface |
| **IAW** | In accordance with |
| **ICAO** | International Civil Aviation Organisation |
| **J** | Joules |
| **JARUS** | Joint Authorities for Rulemaking of Unmanned Systems |
| **JSA** | Job Safety Assessment |
| **kJ** | Kilojoules |
| **km** | Kilometre |
| **LTE** | Long Term Evolution. LTE is a 4G wireless communications standard. |
| **m** | Metres |
| **MC** | Maintenance Controller |
| **MOS** | Manual of Standards |
| **MTOM** | Maximum Take-off Mass |
| **NM** | Nautical Miles |
| **NOTAM** | Notice to Airmen |
| **OEM** | Original Equipment Manufacturer |
| **OLS** | Obstacle Limitations Surfaces |
| **OSO** | Operational Safety Objective |
| **Part 101 MOS** | Part 101 (Unmanned Aircraft and Rockets) Manual of Standards 2019 |
| **ReOC** | Remotely Piloted Aircraft Operators Certificate |
| **RePL** | Remote Pilot Licence |
| **RP** | Remote Pilot (or UAV Controller) |
| **RPA** | Remotely Piloted Aircraft (same meaning as UAV) |
| **RPAS** | Remotely Piloted Aircraft System (same meaning as UAS) |
| **RPIC** | Remote Pilot in Command |
| **RPS** | Remote Pilot Station |
| **RTI** | RePL Training Instructor |
| **SAIL** | Specific Assurance and Integrity Level |
| **SORA** | Specific Operations Risk Assessment |
| **SRP** | Senior remote pilot |
| **SRTI** | Senior RePL Training Instructor |
| **TEM** | Threat and Error Management |
| **TMPR** | Tactical Mitigation Performance Requirements |
| **UAS** | Unmanned Aircraft System (same meaning as RPAS) |
| **UAV** | Unmanned Aerial Vehicle (same meaning as RPA) |
| **VLOS** | Visual Line of Sight |
| **VMC** | Visual Meteorological Conditions |

Definitions

|  |  |
| --- | --- |
| Term | Definition |
| **Active Participants** | Those persons directly involved with the operation of the RPA or fully aware that the RPA operation is being conducted near them. They are fully aware of the risks involved with the RPA operation and have accepted these risks. They are informed on and able to follow relevant effective emergency procedures and / or contingency plans |
| **ANCA** | Aviate Navigate Communicate Administrate: conducted during flight to assist with continued safety of flight – priority of actions (used in solo RPAS operations). |
| **Atypical Airspace** | Airspace where the unmitigated risk of an encounter between an RPA and a conventionally piloted aircraft is acceptably low. This can be:   * restricted airspace (e.g. segregated / restricted areas) * airspace designated "atypical" by the competent authority * airspace where conventionally piloted aircraft do not routinely fly (e.g. within 120 m from buildings) * airspace characterisation where the collision risk between an RPA and conventionally piloted aircraft is not greater than the target level of safety of 1e-7 Mid Air Collisions (MAC) per flight hour. |
| **Beyond Visual Line of Sight (BVLOS)** | An RPAS operation whereby the RPIC is not able to maintain at all times visual unaided contact with the aircraft. |
| **CANCA** | Communicate (internally to crew) Aviate, Navigate, Communicate (externally to airspace controlling authority), Administrate (used in crewed environment). |
| **Controlled Aerodrome** | an aerodrome to which a determination under regulation 5(1)(b) of the Airspace Regulations 2007 has been made. |
| **Dangerous Goods** | Articles or substances listed as dangerous goods in the ICAO Technical Instructions, or which are classified according to those instructions. |
| **defect** | any confirmed abnormal condition of an item whether this could eventually result in a failure. In addition to imperfections that may impair the structure, composition, or function of the RPAS, the scope of this definition also includes any intermittent failure, spurious warning, or fault in the operation of a RPAS that may cause it to deviate from its manufacturer’s specifications. |
| **documented practices and procedures** | for a certified RPA operator, means the written practices and procedures of the operator, as existing or in force from time to time, that have been approved in writing by CASA. |
| **errors** | an action or inaction by an operational person that leads to deviations from organizational or the operational person’s intentions or expectations. |
| **Extended Visual Line of Sight (EVLOS)** | An RPAS operation whereby the RPIC maintains an uninterrupted situational awareness of the airspace in which the RPA operation is being conducted via visual airspace surveillance through one or more human observers, possibly aided by technology means. |
| **HLS or helicopter landing site** | means an area of land or water, or a defined area on a structure, intended to be used wholly or in part for the arrival, departure and surface movement of helicopters. |
| **Improbable** | For the purpose of this assessment, this term should be interpreted in a qualitative way as “unlikely to occur in each RPAS during its total life but which may occur several times when considering the total operational life of a number of RPAS of this type”. |
| **movement area** | That part of the aerodrome to be used for take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the aprons. |
| **Probable** | For the purpose of this assessment, this term needs to be understood in its qualitative interpretation i.e. “anticipated to occur one or more times during the entire system / operational life of an item.” |
| **relevant airspace** | each of the following:   * the no-fly zone of a non-controlled aerodrome 3 NM from the movement area * the no-fly zone of an HLS 1.5 NM diameter. |
| **relevant event** | a manned aircraft is within relevant airspace, including when the aircraft is in the course of approaching, landing at, taking off from, or manoeuvring on the movement area of the aerodrome. |
| **Remote Australian Airspace** | Airspace defined by CASA as being located in areas that have very low population density and negligible air activity so that these areas can be considered suitable for consideration for RPA BVLOS operations utilising mitigations agreed with CASA. |
| **Remote Pilot in Command (RPIC)** | The pilot responsible for the flight and all actions conducted by the operating crew in support of the flight. For BVLOS operations, the RPIC must hold an IREX or CASA approved BVLOS examination pass. Under Exemption CASA EX46/21, the RPIC does not have to be the RP controlling the RPA. |
| **risk mitigation** | the process of incorporating defences or preventive controls to lower the severity and/or likelihood of a hazard’s projected consequence. |
| **Shielded Operations** | An operation of an RPA within a specified distance, typically within 120 metres of a natural or man-made object. |
| **Viewshed Analysis** | A line-of-sight analysis for mapping the visibility of a place or area from a selected location. |
| **Visual Line of Sight (VLOS)** | An RPA is being operated within the visual line of sight of the person operating the aircraft if the person can continually see, orient and navigate the aircraft to meet the person’s separation and collision avoidance responsibilities, with or without corrective lenses, but without the use of binoculars, a telescope or other similar device. |
| **Visual meteorological conditions (below 400ft AGL)** | visibility greater than 5000 m and clear of cloud. |

Reference material

|  |  |
| --- | --- |
| Document type | Title |
| **Regulations** | Civil Aviation Safety Regulations 1998 |
| **Regulations** | Part 101 of the Civil Aviation Safety Regulations 1998 (CASR) |
| **Regulations** | Manual of Standards to Part 101 of the CASR 1998 |
| **Publication** | JARUS SORA 2.4 |

Forms

|  |  |
| --- | --- |
| Form No. | Title |
| **Form 101-01** | Application for Remote Pilot License (RePL), initial and variation |
| **Form 101-02** | Application for RPA Operators Certificate (ReOC), initial issue and variation |
| **Form 101-03** | Application for ReOC (Renewal) |
| **Form 101-04** | Application for ReOC Nominated Personnel (CEO, CRP & Maintenance Controller) |
| **Form 101-05** | Used by ReOC training Organisations to submit a course issue of RePLs |
| **Form 101-09** | Application for RPA Flight Authorisation / Approval / Permission |

Revision history

Revisions to this manual are recorded below in order of most recent first.

|  |  |  |  |
| --- | --- | --- | --- |
| Version No. | Date | Parts / Sections | Details |
|  |  | All | Updated to reflect use of FlyFreely software |
|  |  |  |  |
|  |  |  |  |

Applicability

This manual contains instructions, procedures and information for the operation and management of Remotely Piloted Aircraft Systems (RPAS). <OperatorName> requires all its operating personnel to comply with them when operating RPAS that are controlled under the authority of the <OperatorName>’s Remotely Piloted Aircraft Operator’s Certificate (ReOC).

<OperatorName>’s Chief Remote Pilot (CRP) is responsible for maintaining this document.

The document contains:

* a section that contains general and specific operational procedures
* a section for each RPAS type operated under the authority of the ReOC of <OperatorName>
* appendices containing supporting documentation, such as but not limited to copies of authorisation forms, briefing material, training syllabi, job safety assessment (JSA), risk assessment, RPAS time in service log, as well as defect and maintenance logs

The specific section for each RPAS includes the following information:

* maintenance information, such as pre/post flight checks, maintenance schedules, maintenance manuals for RPA/ground station/camera etc
* RPAS operational information, such as RPAS user manuals for RPA/ground station/camera, specific emergency procedures and battery handling.

<OperatorName>’s CRP is responsible for ensuring that all information required to safely conduct an operation is available to all persons working under the authority of the ReOC of <OperatorName> whether electronic or hard copy. <OperatorName>*’*s CRP keeps a record of each RP’s compliance declaration.

For night operations, <OperatorName> uses the accepted procedures (see Section 3.2.1.2) developed by CASA in accordance with the generic night approval CASA 01/17 - Approval — operation of RPA at night.

Nothing in this manual takes precedence over the aviation regulations or permits unsafe operation.

Distribution Control

Upon commencement, each person engaged in an operational capacity at <OperatorName> is given access to a copy of the Operations Manual suite. The person’s name, e-mail address and the copy number (if applicable) of the manual that they have been issued is added to the distribution list maintained by <OperatorName>’s CRP. The recipient then reads the manual and provides a declaration of compliance to the CRP that they understand and will abide by all requirements of the manual. This declaration is either a personal e-mail or a signature on a declaration form. All compliance declarations are kept on file by <OperatorName>’s CRP.

The CRP will keep the manual up to date at all times. When amendments are made, the CRP will provide the amendment to all manual holders and CASA.

On receipt of an amendment, the recipient (other than CASA) must:

* provide a declaration of compliance to the CRP prior to conducting operations

The CRP must retain copies of all compliance declarations on file.

If using an electronic document management system, copies of any manual not accessed directly from the system are not controlled. Additionally, <OperatorName> does not use hard copies of the manual unless it has been verified that the uncontrolled copy is the same as the current edition of the manual from the system.

The CRP must review the Operations Manual suite annually to ensure the relevance and currency of all procedures. A record of the review is always included in the revision log of the CRP’s copy of the manual indicating that the review has been completed and whether any amendments were required as a result of the review. If an amendment is required after the review, all copies are returned, amended, then redistributed to all manual holders.

Amendment Procedure

This is a living document that contains <OperatorName>’s procedures and information relevant to the safe operation of RPAS. Persons working under the authority of the ReOC of <OperatorName> will be advised of any changes to this document, including the addition of any new procedure or information in *FlyFreely*.

In the event errors are found in procedures or information by any personnel, they must be immediately reported to the CRP.

All changes (other than typographical errors) to this manual or subordinate documents, including appendices to this manual, must be notified to CASA no later than 21 days after the day the change occurred.

# General Administration

## RPAS Administration and Authorisation

<OperatorName> is a Remotely Piloted Aircraft Systems (RPAS) business based in <City, State>. We specialise in <OperatorActivities>.

## Statement of Compliance

All <OperatorName>*’*s aerial operations using RPAS must be conducted in accordance with the conditions and limitations placed on the Remotely Piloted Aircraft Operator’s Certificate (ReOC). A copy of the approved ReOC is included at Appendix B of this manual.

## Organisational Structure

Figure 1: Organisational structure

Nominated Personnel in the positions of CEO/Managing Director, CRP and MC are included in Schedule 1 of this manual.

## Accountabilities & Responsibilities

### Accountabilities of CEO/Managing Director

<OperatorName>’s CEO/ Managing Director is accountable for safety and corporate compliance. They provide the necessary resources so that all operations and maintenance can be conducted to meet company obligations, goals and objectives including finance and human resources. The CEO/ Managing Director is accountable to ensure the currency of the ReOC of <OperatorName> and that any operation conducted on behalf of the operator is conducted under the control and authority of the CRP and/or MC as identified in Schedule 1.

<OperatorName>’s CEO/ Managing Director must advise CASA of any of the following:

* changes to the operator’s name or address
* resignation, removal or extended leave of Maintenance Controller (MC) or CRP
* nomination of a new MC or CRP
* changes to the financial status of the operator (bankruptcy, liquidation etc.)
* responses to safety related surveys or questionnaires.

### Responsibilities of Chief Remote Pilot

<OperatorName>’s CRP is responsible for all operational matters and RP training affecting the safety of operations.

The role and responsibilities of the CRP are to:

* ensure that operations are conducted in compliance with the *CAA 1988,* the Regulations and the Part 101 Manual of Standards (MOS)
* maintain a record of qualifications held by each RP
* monitor and maintain operational standards and supervise RP(s) who work under the authority of the ReOC of <OperatorName>
* maintain complete and up-to-date operational documents IAW 10.03 of the Part 101 MOS.
* develop applications for approvals and permissions where required to facilitate operations
* develop checklists and procedures relating to flight operations
* be the point of contact for CASA
* notify CASA prior to any change to this manual or its schedule
* assess and authorise the appointment of SRPs
* ensure an annual review of all operational documents is completed.

### Responsibilities of Senior Remote Pilot

<OperatorName>’s Senior Remote Pilot (SRP) is responsible for all operational matters when authorised by the nominated CRP.

The role and responsibilities of <OperatorName>’s SRP are to:

* approve standard operations (e.g. excluding those that require an additional CASA, Airservices Australia or military approval) on behalf of the CRP
* ensure all RPs are following the correct procedures and checklists for their authorised tasks
* report any compliance or safety issues immediately to the CRP
* act in the role of the CRP when delegated
* abide by any conditions/restrictions placed on them by the CRP.

### Responsibilities of Type Specialist

For the purposes of this manual, the type specialist is a RP with a superior Remote Pilot Licence (RePL) rating than the CRP for which <OperatorName> intends to operate. The type specialist will advise the CRP on aspects of flight operations specifically related to type specialist requirements.

The type Specialist is responsible for:

* providing advice and guidance to the CRP for specialised type operations
* ensuring specialist operations are planned within type restrictions and countersigning flight authorisations for specified type only
* liaising with MC and providing any technical information for cause analysis, symptomatic problems, etc. related to the specific type
* instructing RPs internally to operate the specific RPA type IAW the induction requirements.

All other aspects of flight operations are still governed and overseen by the CRP as per <OperatorName>’s documented procedures.

### Responsibilities of Maintenance Controller

<OperatorName>’s MC is responsible for ensuring the maintenance of Remotely Piloted Aircraft Systems (RPAS) is in accordance with the manufacturer specifications.

The role and responsibilities of <OperatorName>*’*s MC are to:

* control all RPAS maintenance, either scheduled or unscheduled
* keep records of personnel permitted to perform maintenance on RPA including details of their training and qualifications
* develop, enforce and monitor RPAS maintenance standards
* maintain a record of RPAS defects and any unserviceability
* ensure that each item of equipment essential to the operation of <OperatorName>’s RPA is serviceable
* ensure that specialist equipment items, including payload equipment are serviceable
* maintain thorough technical knowledge of RPAS operating under the authority of the ReOC of <OperatorName>
* ensure maintenance activities are conducted in accordance with the procedures detailed in the relevant RPAS section
* investigate all significant defects in the RPAS.

### Responsibilities of Remote Pilot in Command

For the purposes of this manual, at <OperatorName>, a RP includes a holder of a CASA ‘RePL’ or ‘UAV Controllers Certificate’.

<OperatorName>’s RP of an RPA are responsible for:

* conducting flight in accordance with these procedures
* the safe operation of the RPA
* acting in accordance with these procedures
* acting in accordance with any conditions imposed on their RePL
* complying with applicable regulatory requirements and supporting documents, such as the AIP.

### Responsibilities of Camera Operators, Spotters and Others

At <OperatorName>, all camera operators, spotters and other persons involved in the operation of RPAS controlled under the authority of the ReOC of <OperatorName> have committed to complying with the procedures set out in this manual and any lawful direction given to them by a UAV controller or RPIC.

## General Operating Standards

### Fitness for Duty

At <OperatorName>, all operators are committed to providing an environment that ensures the optimal performance of any person working under the authority of the ReOC of <OperatorName>.

RP or any other person involved in the operations of RPAS must consider their fitness for duty prior to undertaking any duty under the authority of the ReOC of <OperatorName>, including, but not limited to:

* general well-being
* adequate rest (fatigue)
* alcohol consumption
* drugs and medication use
* adversely affected by stress
* mental fitness.

#### Alcohol consumption

RPs or any other person involved in the operations of RPAS under the authority of the ReOC of <OperatorName> must not perform duties under the influence of alcohol. <OperatorName> personnel must not consume alcohol less than eight (8) hours prior to RPAS operations and during any period of an operation.

As a ‘safety-sensitive aviation activity,’ operational person(s) working under the authority of the ReOC of <OperatorName> must submit to any alcohol or other drug test administered by CASA.

#### Drugs and medication use

RPs or any other person involved in the operations of RPAS under the authority of the ReOC of <OperatorName> have been instructed not to perform their duties after having consumed, used, or absorbed any drug, pharmaceutical or medicinal preparation or other substance in any quantity that will impair their ability to perform their duties.

No person working under the authority of the ReOC of <OperatorName> are permitted to perform any task if their performance can be adversely affected by medication (prescription or non-prescription). They must also advise the CRP about any medication that they are taking that may negatively impact on their performance.

No person working under the authority of the ReOC of <OperatorName> are permitted to perform any tasks under the influence of illegal drugs.

#### Fatigue management

When authorising any operation, the CRP always ensures the potential for fatigue is minimised. This includes consideration of travel time to a location, the complexity and duration of an operation, the time of day, and other environmental conditions that can impact on the performance of a person working under the authority of the ReOC of <OperatorName>.

Persons working under the authority of the ReOC of <OperatorName> must not conduct RPAS activities if, considering the circumstances of the operation, they have reason to believe that they are suffering from, or are likely to suffer from, fatigue that may impair their performance.

Persons working under the authority of the ReOC of <OperatorName> must immediately report fatigue-related concerns to the CRP who will take appropriate action to remedy the situation.

### Remote Pilot Administration

#### Remote Pilot qualifications

All RPs working under the authority of the ReOC of <OperatorName> must hold a valid UAV Controllers Certificate or a RePL issued by CASA for the type and rating of RPA being operated on behalf of the operator.

#### Remote Pilots logbook

The CRP must ensure that each RP keeps a remote pilot log to record their accumulated flight time operating RPA. These records are kept for a minimum of seven (7) years following each operation.

Within the logbook, the RP records the following:

* each RPAS operation
* RPAS type, model and unique identification mark of each RPA flown
* date, location and duration of each RPA flight.

Additionally, RPA flight time must be separated into the following operations:

* RPA flight at night
* RPA flight within visual line of sight
* RPA flight extended beyond visual line of sight
* RPA flight beyond visual line of sight.

Lastly, for any flight time in simulated operation of an RPAS, including the type of RPAS operations performed, the CRP must check and countersign the RP logbooks prior to commencing commercial operations. The CRP will also conduct regular checks of the logbooks, at least every <specify number of months> months.

#### Remote Pilots to be competent

<OperatorName>’s RPs are required to become familiar with this manual and any policies and procedures.

It is the CRP’s responsibility to ensure that RPs and all other persons working under the authority of the ReOC of <OperatorName> are competent prior to conducting commercial operations.

### Flight Conduct

#### Flight authorisation

Each RPAS operation must be authorised by the CRP via *FlyFreely*. If an operation is solely conducted by the CRP, a signed JSA form can be taken as a flight authorisation.

A flight authorisation expires on any change of the following:

* the RPA
* the crew
* the location
* change to authorised times.

The CRP will re-authorise any operation that extends beyond a two-week timeframe.

The CRP may delegate this responsibility to SRPs or type specialists at his/her discretion. Persons who have delegations under this manual can be found in Appendix M. SRPs will not authorise flight authorisations where they are the RP, unless acting in the role of CRP.

#### Persons permitted to operate RPA

Only those persons checked in accordance with section 5 of this manual and authorised by the CRP may operate an RPA under the authority of the ReOC of <OperatorName>.

#### Handover/takeover procedures

In normal operations, the handover of RPA controls from one RP to another while the RPA is in flight is not permitted.

Operations where the handover of control is required between RPs must be approved by the CRP and conducted in accordance with the Handover/Takeover Procedures detailed in section 2.5 of this manual.

#### RP briefing including emergency procedures

Where an operation involves more than one person,the RP must provide a safety brief to each person involved in the operation. The safety briefing provides details of the actions and responsibilities of everyone involved in the operation (Appendix I).

#### Use of checklists

Checklists are used to ensure the safe operation of RPAS. These checklists include, but are not limited to:

* JSA
* Pre-Operational Briefing Checklist
* Pre-Flight Checklists
* Post-Flight Checklists

Checklists are to be used in all relevant <OperatorName>’s operations and activities. All checklists can be found in *FlyFreely*.

## RPAS Documentation and Instructions

As the Remotely Piloted Aircraft System (RPAS) includes a number of unique operational requirements, each element has an interface with other elements in the RPAS. The main elements of the RPAS working under the authority of the ReOC of <OperatorName> are:

* the RPA
* the RPA ground station
* the role specific software
* aircraft launch and recovery equipment
* the payload and role equipment
* ancillary operational equipment.

Each element of the RPAS working under the authority of the ReOC of <OperatorName> is operated in accordance with the manufacturer’s instructions as contained or referenced in the supporting operational and maintenance documents for each RPAS configuration.

If differences exist between the manufacturer’s instructions and the operator’s operational or maintenance procedures, the procedures that provide a higher safety standard always prevail.

If any person conducting operations under the authority of the ReOC of <OperatorName> identifies a difference between the operator’s and manufacturer’s procedures, they must report the difference to the CRP / MC (as appropriate).

## RPAS Serviceability Prior to Operation

Pre-flight and post flight checks are mandated for all operations. RPs must record the completion of these checks in *FlyFreely*. All defects found in the RPAS must be recorded on the Maintenance section of *FlyFreely*.

RPs must ensure that all defects or outstanding maintenance actions detailed in the Maintenance Log have been addressed prior to operation of the RPAS.

## Method of Recording Hours in Service and Defects

RPs must ensure that ‘time in service’ is recorded in the RPAS Aircraft Flight Log (Flight History tab in *FlyFreely),* while all defects and maintenance are recorded in the RPAS Maintenance and Defect Log (Maintenance History tab in *FlyFreely)*. Section 4 of this manual details the procedures for recording of RPAS defects and maintenance requirements for each RPAS Type operated by <OperatorName>. Time in service is the time between motor(s) start up to motor(s) shutdown.

## Maintenance Control of RPAS

The maintenance control of all RPAS, operated under the authority of the ReOC of <OperatorName> is the responsibility of the operator. Each RPA operated under the ReOC of <OperatorName> is identified in Appendix A.

## Generic Risk Register

<OperatorName> is required to develop a generic risk register before any operation is conducted under the authority of the ReOC of <OperatorName>. The generic risk register is reviewed annually, and effective additional controls implemented into <OperatorName>’s practices/procedures. When it is deemed that a risk is expired or obsolete, they are removed from the register. The generic risk register can be found in *FlyFreely*.

## Aeronautical Radio Usage

Operations where an aeronautical radio is required:

* within 3 NM of the movement area of a controlled aerodrome at any height
* above 400 ft in controlled airspace
* when operating an RPA that has a MTOW >2 kgs in controlled airspace
* when directed by CASA.

The RP must monitor the applicable air band frequency for all operations.

The CRP will determine for each operation whether a radio is required as part of the Flight Authorisation and JSA.

If the carriage and use of a radio is required, the operation is only permitted if the RPs and/or spotters hold one of the following Radio qualifications (minimum) prior to operating:

* 1. an aeronautical radio operator certificate
  2. a flight crew licence
  3. an air traffic control licence
  4. a military qualification equivalent to a licence mentioned in items (b) or (c)
  5. a flight service licence.

Procedures for the use of radios are detailed in Appendix E1.10.

The CRP must not authorise an operation unless the requirements of this section have been met.

## Accident and incident reporting

All persons working under the authority of the ReOC of <OperatorName> must report any accident, incident or near miss to the CRP.

Certain incidents and accidents that relate to RPA operations must also be reported to the Australian Transport Safety Bureau (ATSB). The CRP is responsible for notifying the ATSB of these events. The events are categorised as either an Immediately Reportable Matter (IRM) or Routinely Reportable Matter (RRM) in accordance with the AIP ENR 1.14 as detailed below.

|  |  |
| --- | --- |
| Immediately Reportable Matters | Routinely Reportable Matters |
| * Make a report as soon as is reasonably practicable by telephone on 1800 011 034 * Follow up with a written report within 72 hours | * Submit a written report within 72 hours |

In the event that an operation results in an immediately or routinely reportable matter, the CRP and RPIC must take reasonable steps to preserve any flight planning and operational data, telemetry logs and RPAS components which may assist in validating the cause of the incident.

## Record keeping requirements

The following records must be kept for a minimum of seven (7) years, in accordance with Chapter 10 of the Part 101 MOS:

* RPAS operational record
* RPAS operational release
* RPAS operational log
* RPAS technical log, and
* records of qualification and competency.

If an electronic record is created, <OperatorName> will ensure it is unalterable after the record has been made. <OperatorName>’s CRP confirms record keeping requirements for each operation.

## Transportation of Dangerous Goods

Carriage of Dangerous Goods by RPAS, is not permitted unless approved by CASA on the ReOC of <OperatorName>.

RPAS are subject to the requirements of the dangerous goods legislation, which are covered in section 23 of the CAA 1988 and in Part 92 of the Regulations.

RPAS are not permitted to carry dangerous goods unless in compliance with section 23 of the CAA and Part 92 of the CASR.

# Procedures

## General procedures

All operations conducted under the authority of the ReOC of <OperatorName> are carried out within the limitations and conditions as detailed in this manual or any other permission, exemption or approval issued by CASA. Appendix C of this manual contains all current permissions, exemptions and approvals held by the operator.

<OperatorName>’s feasibility process is covered from section 2.1.1 to 2.1.8.

### Compliance with CASA legislation

The first step of <OperatorName>’s feasibility process is to determine whether the operation can be conducted in compliance with the aviation legislation, which also takes into consideration all applicable Federal, State or Territory legislation.

In determining whether an operation under the authority of the ReOC of <OperatorName> is in compliance with such legislation, <OperatorName>’s CRP considers the following:

* are operations in accordance with the conditions listed on the ReOC of <OperatorName> or other regulatory Approval, Permission, or Exemption?
* will operations be conducted above 400 ft AGL?
* will operations be conducted in controlled airspace or restricted airspace?
* will operations be conducted within 3 NM of any aerodrome (including any HLS or ALA listed in ERSA)?
* will operations be conducted within the approach or departure path of a runway or over a movement area?
* will operations be conducted over a populous area?
* will operations be conducted closer than 30 metres from any person (including subjects) who is not directly involved in the operation of the RPAS?
* will operations be conducted beyond VLOS?
* will operations be conducted at night, in cloud, or in conditions other than Day VMC?
* are operations prohibited by any other Local, State or Federal Regulation?
* will operations create a hazard to another aircraft, another person or property?

### Third-party considerations

The RP always conducts pre-operational stakeholder engagement to identify third parties that may be affected by its operations and takes the necessary precautions to reduce risk to said third parties. <OperatorName> operates with complete respect for third parties, including:

* property/landowners, including lessees
* the general public
* public not involved in RPAS operations
* organisations that may be affected by the operation.

### Job Safety Assessment

A JSA (Appendix N3) must be performed by the RP during the feasibility planning phase to determine whether the operation is viable regardless of the number of flights at the same location.

As a minimum, the JSA includes:

* gathering the necessary maps and charts (either hard copy or electronic) for the area
* determining the weather is suitable for the RPAS and the operation
* reviewing the Notice to Airmen (NOTAM) related to the operations area
* the possibility of a person moving into the area of operation or landing area during flight
* footpaths, or other rights of way
* suitable take-off and landing areas (including alternate landing area)
* ability to maintain 30 m separation from the public
* obstructions (buildings, trees etc.)
* possible radio interference (power lines, antennas etc.)
* ability to maintain visual line of sight
* RP’s ability matches location/task
* permission from landowner
* privacy considerations
* local restrictions, bylaws
* need for signage.

### Validation of the JSA

For an initial JSA a number of assumptions are made about the proposed operation, the RP validates them at the location prior to any operations (e.g., forecast weather/wind, location of persons etc.).RPs must record any of the following on the JSA:

* variations that exist to the initial JSA assumptions
* new risks or hazards that have been identified at the location
* new risks or hazards that may occur during the operations at the location.

The completed JSA is retained in *FlyFreely*. <OperatorName>'s CRP is to ensure the finalised JSA it is kept as a record of the operation for a period of at least seven (7) years.

### Approval, Permission or Exemption

<OperatorName>’s CRP is responsible for applying to CASA for any aviation related Area Approval, Permission and/or Exemption required for an RPAS operation. Such requests are always accompanied by an appropriate safety case and risk assessments to support the proposed operation.

Appendix C of this manual contains all valid approvals, permissions and/or exemptions that permit operations under the authority of the ReOC of <OperatorName>.

### Threat and Error Management (TEM)

<OperatorName> manages any threat by:

* adhering to maintenance requirements and standards
* complying with operational requirements
* diligence to the JSA requirements and checks
* thorough pre-flight inspections
* application of appropriate site controls.

<OperatorName> manages any errors by:

* training and currency of RPs to identify and react to errors in a timely manner
* prioritising tasks: aviate, navigate and communicate
* RPAS maintenance and configuration attention
* employing a no-blame philosophy with regard to incident reporting debriefs.

<OperatorName> considers TEM in all aspects of standard operating procedures. Risk Assessment is the key activity to identify and mitigate potential issues to standard operations. Job-specific TEM is identified as an item for consideration on the JSA at both the initial and on-site stage.

Common job-specific TEM issues are dealt with in the JSA. Common threats/errors and responses to manage threats and errors include:

* loss of control and flyaway: toggle controller options (GPS / Atti / Manual), invoke return to home, radio broadcast
* low flying aircraft in conflict: abort operations and land, radio broadcast
* loss of visual line of sight: hover (cease operating the controls), move to be in line of sight
* crash, damage to RPA and/or battery: the battery may be unstable and explode/catch fire; area shall be monitored for at least 15 minutes prior to recovery.

### Hazardous Operations

RPs are responsible for ensuring the RPA is not operated in such a way as to create a hazard to another aircraft, person or property. RPs aim to operate the RPA at least 500 ft vertically or 1500 m horizontally from any airborne conventionally piloted aircraft.

### Risk Assessment

A risk assessment must be conducted for any risk that has not been adequately mitigated by existing risk control measures and procedures. If an assumption made in the initial JSA is no longer valid, or if a RP identifies a new risk, these matters are considered and detailed in the JSA.

If a RP is unable to mitigate the risk using an existing procedure or an additional control in the generic risk register, a Risk Assessment must be completed by the RP in accordance with Appendix N2 of this manual.

## Normal procedures - General

In addition to the operational procedures detailed for a specific RPA in the relevant user’s manual, normal procedures at <OperatorName> are detailed in Appendix E.

## Normal procedures - RPAS type specific

In conjunction with the normal procedures detailed in Section 2 of this manual, type specific instructions detailed in Appendix F are also completed for all operations. The specific section for each RPAS includes the following information:

* maintenance information, such as pre/post flight checks, maintenance schedules, maintenance manuals for RPA/ground station/camera etc.
* RPAS operational information, such as RPAS user manuals for RPA/ground station/camera etc.

## Emergency Procedures – Generic

Procedures for Emergency Operations are detailed in Appendix H. In addition to the Emergency Procedures (EP’s) detailed for a specific RPA in the relevant user’s manual, the procedures detail how an emergency situation is handled by RPAS operational crew. The initial action principle should be used in all cases once the EP action has been completed. That is:

* Aviate, Navigate, Communicate, Administrate (ANCA) for solo RPAS Operations, and
* Communicate (between crew) Aviate, Communicate (externally to ATC/relevant stakeholder) and Administrate (CANCA used for crewed operations).

## Hand-Over Take-Over (HOTO) procedure

### Normal Operations

#### Airborne RPA

HOTO in flight must be conducted following the procedures below:

Wherever possible, a change of RP shall only be conducted while the aircraft is in a safe aircraft state/flight profile (e.g. hover for multicopter or orbit for fixed wing). The RP taking over shall determine the time and RPA position and shall advise the RP flying when they are ready to take control.

#### HOTO brief

A HOTO during normal operations must be proceeded by a HOTO brief. This brief should include:

* aircraft present location
* aircraft endurance
* aircraft flight mode
* aircraft orientation
* if in automated flight, the next aircraft action
* hazards that may affect the safety of the flight
* identity, location and duties of crew members
* location of any relevant ground/air risks

#### HOTO terminology

The RP flying is to relinquish control of the aircraft using the term "handing over", the RP not flying is to confirm taking control of the aircraft using the term "taking over"

#### Systems scan and controllability check

Upon receiving control of the RPA, the pilot taking over shall confirm that the RPA is operation as anticipated. The RP handing over is not to leave the RP station until the RP taking over has confirmed that they have control of the RPA.

### HOTO - emergency situations

In the event of RP incapacitation while in command of an RPA (where the RP is unable to complete a standard HOTO procedure), the most senior qualified RP, or in absence of a qualified RP, a crew member trained and briefed for emergency operation of the RPA, in the vicinity of the RP station is to immediately take control of the RPA and take steps to safety land the RPA as soon as possible.

In the event of an emergency that dictates a more senior RP in the vicinity of the RP station take control of the RPA to prevent escalation of the emergency, the senior RP, upon becoming aware of the emergency, shall announce "senior pilot taking over" at which time the RP flying shall immediately relinquish control of the RPA.

### HOTO Training

Prior to undertaking multi-crew (RP) operations, the RP is to complete HOTO training carried out by the CRP or their delegate. Completion of HOTO training is to be recorded in the RP's personnel records.

# Specialised RPAS Operations

The specialised operations detailed below are conducted subject to authorisation (however described) by CASA, and unless otherwise stated in the authorisation, all other relevant CASA regulations apply.

Operations within Prohibited or Restricted areas are subject to the approval of the authority controlling the area.

Copies of all permissions, exemptions and approvals held by<OperatorName> can be found in Appendix C of this manual.

Unless otherwise authorised by CASA, RPs must ensure the RPA is not operated:

* within 30 m of personnel not involved in the operation
* at night, in cloud or in conditions other than Day VMC
* within 3 NM from the movement area of a controlled aerodrome
* within the approach and departure paths of a controlled aerodrome
* over the movement area of any aerodrome (as listed in ERSA)
* beyond visual line of sight or extended visual line of sight
* above 400 ft AGL
* over a populous area.

If authorisation is granted to operate within these areas, the operation is only permitted if all of the conditions of the relevant authorisation can be met. Specific details of specialised procedures, including any specific training requirements or competency standards for RPs in will be found in Appendix G if required.

For all specialised operations, the CRP is responsible for ensuring that the RPA is equipped and operated with an active fail-safe mode that, in the event of a data-link loss with the RPA or any loss of control of the RPA, will ensure that the RPA:

* adjusts altitude to the minimum safe level to provide obstacle clearance and minimum potential for collision with other aircraft, in any case not above 400 ft AGL (unless authorised)
* transits to a predefined safe landing or flight termination area, and
* lands or otherwise terminates the flight.

RPs must ensure that, in the period from 15 minutes before the RPA is launched to the time that the RPA lands, at least one (1) person who is trained as an observer in accordance with this manual:

* is in a location that enables that person to assist with traffic avoidance
* has continuous two-way communication with the RP of the RPA.

The CRP must conduct a risk assessment for all specialised operations in accordance with Appendix D prior to authorising the operation. If all risks are satisfactorily mitigated, the CRP must record any special operational requirements on the flight authorisation form prior to authorising the operation.

## Operations Near People

RP’s must ensure an RPA is not operated within 30 m laterally of any person who is not directly involved in the control or navigation of the RPA. Persons being filmed or photographed, such as actors, athletes or members of the public, are not considered essential to the control and navigation of the RPA and, hence, are not exempt from the 30 m requirement.

Unless authorised by the CRP (using the Flight Authorisation Form) and consent has been given by the person(s), the CRP may authorise the RP to operate an RPA within 30 m laterally, but no closer than 15 m laterally of a person(s). Authorisation to operate down to 15 m laterally of a person is only given when in accordance with the following procedure.

### Risk mitigation requirements

Any operation within 30 m laterally of non-operational personnel must include the following risk mitigators as a minimum:

* a dual parallel redundant battery system with duplicated battery mountings
* demonstrated ability to fly safely with one (1) motor inoperative at the maximum take-off weight for the operation
* GPS hold and return-to-home function must be operational with a minimum reception of at least seven (7) GNSS satellites.

### Risk Assessment

For operation within 30 m of non-operational personnel, the CRP, in addition to all other normal operational requirements, is responsible for performing a detailed risk assessment that specifically considers the increased risk of operations in close proximity of people. The risk assessment is not limited to, but may include, the following:

* speed of the machine
* size of the machine
* speed of the non-operational personnel
* non-operational personnel’s awareness of the RPA’s position at all times
* flight path in relation to non-operational personnel
* number of non-operational personnel involved
* position of controller in relation to RPA and non-operational personnel
* environment, wind, sun, lighting etc.
* possibility of GPS shadows or turbulence around buildings
* available safe options in event of control issues.

Once the risks for a particular operation have been identified, the CRP must implement sufficient strategies to mitigate the risks. Mitigation strategies are not limited to, but may include, the following:

* safety Crew to assist controller
* restricted flight and duty times
* use of smaller or lighter RPA
* restrictions on flight profile
* reduced maximum wind speed
* different propellers
* propeller guards
* vertical separation
* RPA speed restrictions
* reduced number of non-operational personnel within 30 m of RPA
* pre-determined plan of action in case of control or other issues.

If a risk cannot be mitigated to a value that meets an acceptable level of safety, or it is not possible to comply with a condition within this manual or any other instrument issued by CASA, the CRP must not permit the operation to proceed.

The CRP is also responsible for considering the overall risk where multiple risk factors have a high score.

### Consent from third parties

Operations within 30 to 15 metres of (a) person(s) requires the consent of each person.

**Note:** A body corporate or any other entity cannot give such consent on behalf of any individual. It is the responsibility of the CRP or RP to obtain the consent.

When seeking consent, the persons must be informed of the aviation regulation 101.245 CASR (1998) and any additional risks identified that may be attributed to the operation of the RPA within 30 m laterally of a person. A written briefing must be provided to each person, who is then asked to sign a consent form attached to that briefing.

## Operations at night, in cloud or in conditions other than Day VMC

### RPAS Night Operations

All operations at night must be conducted in class G airspace below 400 ft AGL, with the aircraft remaining within visual line of sight at all times. To operate in controlled airspace at night, <OperatorName> would need an approval from CASA.

#### Authorised personnel

Operations at night are only conducted by the CRP or authorised RPs named in *FlyFreely*, and who have completed training and testing to operate an RPA at night and are current on type. Information on training and testing can be found at Appendix L. Procedures for managing authorised personnel can be found in Appendix N7.

#### Night flying procedure

Operations at night must only be conducted in conditions that would otherwise be considered VMC. Assessment of any operation always includes a detailed review of the forecasted weather conditions on the day to ensure VMC requirements can be met. Additionally, an onsite assessment is undertaken the CRP/RPs to ensure the operation will be within VMC.

All JSAs for night operations include an onsite recce which has been conducted in day VMC. This recce is used to identify any obstacles or hazards that would not be apparent to a pilot flying at night, such as powerlines or building antennas etc.

The CRP endeavours to ensure that all take-off and landing areas are always illuminated sufficiently to facilitate the pilot to conduct a safe take-off and landing. Remote Pilots in Command (RPIC) must reduce the illumination of the RPAS controller status screen to assist in preserving their night vision.

RPA used in operations at night must be fitted with the equipment listed below, which is checked as part of any pre-flight procedure and included within our RPA maintenance program. All pre-flight checks and maintenance procedures have been adjusted to accommodate this:

* serviceable GPS for the purpose of providing accurate data to the GPS hold and GPS return to home function
* telemetry data which indicate a positive satellite lock has been achieved by the RPA. Where the manufacturer does not specify a number of satellites to gain lock, our aircraft will not fly with less than seven (7) satellites positively acquired
* telemetry data which indicates to a base station, which is co-located with the pilot in command, the RPA’s position in three-dimensional airspace, that is, t, distance and bearing from the operator and a height above ground level
* sufficient lighting not only to ensure positive identification of the RPA once in flight, but also that the orientation and direction of the aircraft can be determined visually by the RPIC. At , we use high output coloured LEDs fitted to the arms/wing tips of the RPA.

A night operation must not be conducted if it is raining or thunderstorms are observed or reported within five (5) kilometres of the operational location.

## Operations within controlled airspace

For operations within Controlled airspace/Control Zone (CTR), the RP will contact the appropriate air traffic control tower by telephone and inform them of the location and intention of the RPA operation at least 15 minutes before the first launch of the RPA, and then again at the end of the operation. Other risk treatments may include monitoring the applicable airspace frequencies, issuing NOTAMs, consulting with other airspace users and the control tower etc.

For operations within a CTR, a RP must not activate a transponder / ADS-B fitted to the RPA unless specifically requested to do so by air traffic control.

When operating within controlled airspace, radio procedures set out in section 1.11 of this manual must be followed by RPs.

### Operations within 3NM of a Controlled Aerodrome

Operations within 3 NM of a controlled aerodrome as defined in ERSA requires approval from Airservices Australia (through CASA), including controlled aerodromes located in restricted airspace. Airservices Australia provides a traffic impact and risk assessment for operations at aerodromes that are controlled by Airservices Australia. Operations within 3 NM of a military controlled aerodrome require a letter of agreement with the local airspace management unit/squadron.

The CRP will send an application to CASA at least 21 days before the intended date(s) of operation. Applications must always focus on a safety-based outcome to satisfy CASA’s requirements.

#### General Procedures

Where an operation is specifically approved by CASA, remote pilots are to follow the conditions listed on the issued instrument and specific local procedures for operation 3 NM of a controlled aerodrome Procedures IAW section 4.04 of the Part 101 MOS.

#### Procedures IAW section 4.04 of the Part 101 MOS

Section 4.04 of the Part 101 MOS permits flight within 3nm of a controlled aerodrome without specific CASA approval when the operation is contained in accordance with the requirements prescribed by the section (indoor or tethered operations).

**For indoor operations, RPs must:**

* ensure that a containment area is identified for which it is physically impossible for the RPA to escape and fly away under any circumstance; and, that if the RPA collides with any part of the containment area, no material from the RPA or containment area can move or escape and cause injury to a person outside the area.
* ensure that they do not infringe any provision of RPA Regulations concerning proximity of an RPA to people within or outside the containment area.

**For tethered operations**

* does not intend to undertake tethered operations at this time.

## Operations within 3NM of non-controlled aerodromes

RPs must not operate an RPA within the relevant airspace of a non-controlled aerodrome unless the operation has been authorised by the CRP.

When any RPIC becomes aware that airborne manned aircraft are flying to or from a non-controlled aerodrome (relevant event), they must:

* not launch within the relevant airspace of that aerodrome
* immediately ensure the RPA is safely manoeuvred away from the path of the manned aircraft and land as soon as safely possible
* cease operation of the RPA until the manned aircraft has either cleared the area or has landed at the non-controlled aerodrome.

**Note:** However, the operator may continue to operate if the RPA operation is indoors, or, tethered in accordance with sub-section 9.05(3) of the Part 101 MOS and Section 3.3.1.2 of this manual.

To provide greater situational awareness, all RPs must monitor an aviation radio on the applicable air traffic frequency, and, unless directed otherwise, to transmit the location of the RPA using call sign ‘Unmanned’ (then call sign) on the appropriate air traffic frequency 15 minutes before the first launch and then at 15 minute intervals for the duration of the operation of the RPA. These frequencies are also monitored for the times previously stated.

## Operations in the approach or departure paths of an aerodrome

### Controlled aerodrome

RPs are responsible for ensuring the RPA is not operated at any altitude in the approach or departure path of a controlled Aerodrome (as defined in section 4.05 of the Part 101 MOS). The CRP is responsible for ensuring that operations are not planned or approved for such areas. If the operation has been authorised by CASA, normal procedures will be supplemented with the conditions contained in the issued instrument.

### Non-controlled aerodrome

RPs may operate an RPA in the approach or departure paths of a non-controlled aerodrome, provided a relevant event is not taking place and the CRP has authorised the operation. If the RP becomes aware of a relevant event, the instructions in section 3.4 of this manual must be followed.

## Operations over the movement area of an aerodrome

RPA must not be operated over the movement area of an aerodrome. If the operation has been authorised by CASA, normal procedures will be supplemented with the conditions contained in the issued instrument.

## Operations in Prohibited, Restricted or Danger Areas

### Prohibited and Restricted Airspace

RPs are responsible for ensuring the RPA is not operated in restricted or prohibited airspace unless otherwise permitted by the authority controlling the airspace. All operations are conducted in accordance with any conditions imposed by the controlling authority. The CRP is responsible for ensuring that operations are not planned or approved for such areas without the permission of the controlling authority.

Where permission has been obtained to operate in restricted or prohibited airspace, the CRP details the conditions of this approval on the JSA prior to authorising the operation.

### Danger areas

RPs must ensure that consideration is given to specific risks associated with identified danger areas. The CRP must conduct a risk assessment prior to any operation within a danger area.

## Operations above 400 ft AGL

<OperatorName> does not operate above 400 ft AGL.

## Operations over populous areas

<OperatorName> does not operate over a populous area.

## EVLOS Operations

<OperatorName> does not conduct EVLOS operations.

## BVLOS Operations

<OperatorName> does not conduct BVLOS operations.

## Dropping or Discharging items

The RP is responsible for ensuring nothing is dropped or discharged from an unmanned aircraft in a way that creates a hazard to another aircraft, a person, or property.

# RPAS Maintenance

## Scope of maintenance

<OperatorName> has maintenance schedules (Appendix F) that provide for the routine repair, servicing and testing (preventative maintenance) of the RPAS.

The maintenance schedules consider the mechanical, avionic, and computer-based systems (including software and firmware) associated with the:

* RPA and their power sources, such as batteries, fuel cells etc.
* RPAS support equipment, including transmitter/receiver equipment, radio devices, and any other item of plant or equipment associated with the operations or use of the RPA
* RPA role equipment and their fittings, such as cameras, electronic sensing devices etc.

### Maintenance to be in Accordance with Schedules

All maintenance carried out on RPAS is scheduled in accordance with the manufacturer’s specifications where that information exists and is relevant.

If a manufacturer does not provide details concerning the scheduling of maintenance, or the information is not relevant, the MC must have:

* developed a schedule for the maintenance based on best practice standards and document it in a RPAS maintenance schedule
* placed the item ‘on condition’ in accordance with section 4.1.3 below.

The MC is responsible for ensuring that, where maintenance schedules have been developed for an RPAS, this schedule is located in FlyFreely.

### Variation of Maintenance Schedules

If the existing maintenance schedule is deemed deficient, the MC is responsible for varying the maintenance scheduling to ensure the ongoing reliability of the RPAS.

The MC must not permit the maintenance schedule to be of a lesser standard than the manufacturer’s specifications. All variations to the maintenance schedule are recorded in *FlyFreely.*

The MC reviews each schedule every 12 monthsto ensure the most current instructions are in use.

### ‘On Condition’ maintenance

All components of an RPAS working under the authority of the ReOC of <OperatorName>, including those on a maintenance schedule, are subject to ongoing ‘on condition’ monitoring through Pre-flight and Post-flight inspections.

The Pre-flight and Post-flight inspections conducted are used to identify damage, wear, malfunction or unserviceability, and any defects found during these inspections. These are recorded in *FlyFreely* for each flight conducted.

The MC is responsible for monitoring the failure rate of each RPAS component that is ‘on condition’ or subject to a maintenance schedule to ensure the schedule is effective in minimising unserviceable items and operational disruptions.

### Minimum Requirements for Maintenance Schedules

The maintenance schedules include the following items for each RPAS operated under the authority of the ReOC of <OperatorName>:

* Pre-flight Inspection Checklist
* Post-Flight Inspection Checklist
* Periodic/Post-Maintenance Checklist.

The content of these checklists is detailed in FlyFreely. Specific instructions on setting up schedules and checklists can be found in Appendix N.

## Maintenance Procedures

### Maintenance Instructions

All maintenance on RPAS operating under the authority of the ReOC of <OperatorName> must be carried out in accordance with manufacturer’s instructions for that specific aircraft type. The manuals are listed in Appendix F.

### Repair or Replacement of Components

Components must be repaired or replaced when they show signs of unserviceability, abnormality or damage unless the damage is insignificant to the operation of the RPAS (e.g. scratches or cosmetic damage).

### Firmware/Software Updates

RPA and control system software is only updated after the version has been confirmed stable. A post-maintenance test flight, in a controlled and safe location, is always conducted as part of the maintenance activity whenever a software or firmware update is applied.

Should an issue arise with new software / firmware version, the component is rolled back to the previous stable version before the RPAS is used in commercial operations. A notification is then sent to the MC to inform other operators using the same software update.

Records of firmware or software updates must be documented in the maintenance log and include details of any test flights and version numbers relevant to the update.

## Maintenance Authorisation

### Maintenance Personnel to be Authorised

The MC may authorise the following persons to conduct maintenance on RPAS:

* RPs who have completed the induction programme (LIMITED to maintenance tasks listed in 4.3.2)
* manufacturers of RPAS items and their approved service agents
* organisations and service providers assessed by the MC as competent to provide RPAS maintenance services.

### Remote Pilot Maintenance Authorisation

RPs who have completed the induction programme are authorised to conduct the following maintenance:

* replacement of propellers
* pre-flight and post-flight inspections
* replacement and charging of batteries
* fitting and removal of payloads and role equipment.

## Defects

All defects identified in any part of ***an*** RPAS (RPA, transmitter/receiver, role equipment etc.) working under the authority of the ReOC of <OperatorName> must be recorded as soon as they are identified and prior to further operation of the RPAS.

During operations, RPs can only rectify those defects that they have been authorised to repair. Any defect is to be treated as unserviceable until the MC has assessed it and any unserviceability has been rectified.

In situations where a defect cannot be rectified in the field, RPs must suspend the RPAS operation. Under no circumstances is an aircraft to be operated while the aircraft is unserviceable.

The serviceability status of all RPA are displayed in FlyFreely and are detailed in the RPA’s *maintenance history* tab.

Details on adding defects can be found in Appendix N8 .

## Recording of Defects and Maintenance

It is the responsibility of all person(s) involved in the operation of an RPAS working under the authority of the ReOC of <OperatorName> to report defects as they occur and record any maintenance, they have conducted on the RPAS.

Defects and maintenance are recorded in *FlyFreely*. All open defect items should be closed prior to flight.

It is the responsibility of the MC to review all defects and, where necessary, adjust the RPAS Maintenance Plan to enhance the serviceability of RPAS components and improve the reliability of RPAS operations.

The *FlyFreely* maintenance system builds the Defect and Maintenance Log for each element of the RPAS and this record will be kept for seven (7) years after the last day the RPA was operated.

**Note:** The Pre/Post Flight Check is recorded against the relevant mission in *FlyFreely*.

## RPAS Time in Service Log

RPs must use FlyFreely to record details of the flight times and the Pre/Post-Flight Checks conducted on each RPA. FlyFreely creates a Time in Service Log for each RPA.

*FlyFreely* retains the RPAS Time in Service Log for each RPA operated under the authority of the ReOC of <OperatorName> and this record will be kept for seven (7) years after the last day the RPA was operated.

For RPA that have a maximum gross weight above 25 kgs, individual in-service times for engines, motors, rotors and propellers must be recorded.

## Flight Tests

Following all maintenance and before final sign-off for completion of a maintenance task, the MC may opt to schedule a flight test to check the serviceability of the equipment. This may be carried out by the MC or a person nominated by the MC.

Test flights must be conducted in accordance with the following requirements:

* The test flight location should be a controlled environment, clear of obstacles and suitable for landing quickly in the event of poor dynamics or control difficulty.
* The test flight will consist of a manual launch, a short flight utilising both manual and automated flight, hover and recovery within the test area.
* The MC may request additional checks / manoeuvres as required
* The test flight will be conducted by a properly licenced, qualified and experienced operator.

All RPAS test flights are to be authorised by <OperatorName>’s CRP and logged.

# ReOC Crew Induction / Internal Training

Training requirements for those persons working under the authority of the ReOC of <OperatorName> include general training with regards to this manual, RPAS equipment, and specific operational activities that the person will be involved in, such as specialised operations. All crew operating under the authority of the ReOC are obliged to undergo induction training prior to being involved in RPAS operations.

## Persons Permitted to Conduct Training

The CRP and person(s) nominated by the CRP below are permitted to provide internal training. The CRP ensures that appropriate measures of competency are in place to ensure the effectiveness of training that has been provided.

Table 1: Nominations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Persons Permitted to Conduct Training | | | | |
| **Full name** | **Measure of Competency (Qualification)** | **Type of Training Permitted** | **Date Approved** | **Contact Details** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

## Record Keeping

The CRP is responsible for keeping all records of all training and proficiency checks (including flight tests) conducted by and on any person involved in operations under the authority of the ReOC of <OperatorName>. All training records must be kept for a minimum of seven (7) years*.*

## Induction and type Training Requirements

### Remote pilots

All RPs must complete the following induction training prior to commercial operations:

* Policy and Procedure training in accordance with Appendix J
* RPAS type training as specified in Appendix K on the types of RPA that the RP is to operate under <OperatorName>’s ReOC.
* *FlyFreely* familiarisation training in accordance with Appendix N

### Camera operators, spotters and others

<OperatorName>records details on any person who obtains a qualification or a competency in relation to the safe operation of an RPA. <OperatorName>also provides a copy of this record to the person, prior to exercising any privileges attributable to the qualification or competency. This record is kept for seven (7) years after the day the person ceases employment*.*

## Remote Pilot Training for Specialised Operations

Training requirements for specialised operational activities (e.g. above 400 ft AGL operations, BVLOS etc.) are detailed in Appendix G if required. <OperatorName>’sSpecialised Operations are detailed in section 3 of this manual.

## Remote Pilot Night VLOS Training Requirements

All RPs must complete Night VLOS training in accordance with Appendix L prior to operating an RPA in any night VLOS operations conducted under the authority of the ReOC of <OperatorName>.

## Senior Remote Pilot Training Requirements

The CRP is responsible for the training and evaluation of the SRP in accordance with Appendix M. An evaluation is conducted annually to ensure proficiency and competency of the SRP.

The CRP maintains a record of the training and evaluation conducted in the RPs training records.

## Remote Pilot recurrent training

All RPs must complete theory and practical training annually, IAW Appendix J and Appendix K respectively.

The CRP maintains a record of the training and proficiency checks in the RPs training records.

An evaluation conducted on an SRP IAW section 5.6 satisfies the requirements under this section.

1. Schedule 1
   1. RPAS Operating types

|  |  |
| --- | --- |
| **Manufacturer** | INSERT |
| **Model / Type** |  |
| **Maximum Take-off Weight** |  |
| **Identity(ies) / Serial Number(s)** | Serial One  Serial Two |

|  |  |
| --- | --- |
| **Manufacturer** |  |
| **Model / Type** |  |
| **Maximum Take-off Weight** |  |
| **Identity(ies) / Serial Number(s)** |  |

|  |  |
| --- | --- |
| **Manufacturer** |  |
| **Model / Type** |  |
| **Maximum Take-off Weight** |  |
| **Identity(ies) / Serial Number(s)** |  |

* 1. Key Personnel

Table 2: Key personnel

|  |  |  |  |
| --- | --- | --- | --- |
| Nominated Position | Name | ARN | Date Approved  (from Form 101-04)  (Form 101-08 if IOD) |
| **Chief Remote Pilot** | <CRPName> | <CRPARN> | <CRPApproveDate> |
| **Maintenance Controller** | <MCName> | <MCARN> | N/A |
| **CEO / Managing Director** | <CEOName> | <CEOARN> | N/A |

1. Copy of RPA Operator’s Certificate

INSERT ONCE OBTAINED

1. Permissions, Exemptions and Approvals

Below is a list of <OperatorName>’s permissions, exemptions, and approvals. Copies are available in *FlyFreely.*

Table Instrument List

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument Number** | **Commencement Date** | **Expiry Date** | **Instrument Title** |
| **CASA 01/17** | 22/02/2017 | - | Approval — operation of RPA at night |
|  |  |  |  |
|  |  |  |  |

1. Risk Assessment
   1. Overview

Risk assessment is an essential part of <OperatorName>’s risk management strategy and is used to determine what risks are tolerated, mitigated (controlled), or in some cases, avoided. The process is initiated when:

* an assumption on risk in the JSA is no longer valid
* the JSA identifies a new risk, or
* a new operation is undertaken which requires a permission, approval or exemption from CASA or other State or Federal authorities.

Figure 2 below details <OperatorName>’s safety risk management process including the following key areas:

* communication and consultation
* establishing the context
* risk assessment
* risk treatment
* monitoring and review.

safety risk management process

Figure 2: The safety risk management process (Clothier, 2013)

* 1. Communication and consultation

Where possible, any person affected by a risk is identified and consulted with at each stage of the risk management process. <OperatorName>’s consultation process requires sharing information and aims to provide the genuine opportunity for all persons affected by the risk to be part of the decision-making process.

Clear, open and transparent consultation is a key element in <OperatorName>’s successful risk management practices.

* 1. Establishing the context

In addition to communication and consultation, <OperatorName>firmly believes that the context of a risk should be established in terms of its compliance with legislative standards and operational/organisational environment. The following steps are undertaken to establish the context:

1. **Topic Objectives –** clearly articulate the specific objectives of the RPAS activity that is undertaken, including locations, proposed time of operations etc.
2. **External Environment –** identify and consider what additional matters may need to be considered. This may include the identity of key stakeholders, legal/regulatory requirements from other State or Federal authorities, technical matters relevant to the risk, other activities or sensitivities that may impact on the risk etc.
3. **Internal Environment –** identify and consider if there are any special internal requirements that need to be considered, including staff training, human factors, reliability and suitability of equipment etc.
4. **Stakeholders –** all stakeholders that may be impacted on the risk are identified. This may include the client, other airspace users, members of the public, public interest groups, owners and occupiers of buildings, and Local, State or Federal authorities etc.
   1. Risk Assessment - Risk Identification

<OperatorName>identifies risks in terms of what, why and how things occur so further analysis of the risk can be undertaken. This step aims to identify any risks arising from the operating environment and generate a comprehensive list of risks that could impact on those objectives.

For some activities, especially safety related activities, hazard identification is the first step when identifying risks. <OperatorName> deems a ‘**hazard’** a situation that poses a level of threat to life, health, property or the environment, or a form of potentially damaging energy.

Risks are identified using the following tools:

* audits or physical inspections
* accident / incident reports
* brainstorming
* decision trees
* history
* interview / focus groups
* personal or organisational experience
* scenario analysis
* strengths, weaknesses, opportunities and threats (SWOT) analysis
* survey or questionnaires.

Some questions <OperatorName> asks when identifying risks include:

* when, where, why, and how are the risks likely to occur?
* what is the source of each risk?
* who is likely to be affected by the risk?

Identified risks are documented on <OperatorName>’s Risk Control Worksheet in *FlyFreely*.

* 1. Risk Assessment - Risk Analysis

The objective of this step is to determine what might cause the hazard to eventuate and identifying its likelihood and consequence. A risk matrix has been established (Table 6) to ensure different hazards can be prioritised in order of their level of risk. During this step, current control measures in place are factored in to determine the initial risk level, before any additional control measures are considered.

**Note:** When assessing risks, the worst case feasible should be assessed. For hazards identified through a reactive process, this should be the potential risk not the actual consequence of the event. As an example, if a hazard of lack of training results in minor damage to the RPA on landing, assess the risk of substantial damage to the RPA (worst case feasible), not the minor damage that actually occurred.

The risk assessment matrix is an example of a qualitative tool used to assess consequence and likelihood. Consequence (Table 4) and Likelihood (Table 5) values are used to derive a Risk Rating (Table 6). The alpha-numeric rating scale is applied consistently for each activity evaluated and the detailed consequence descriptions are considered in the context of the activity that is being assessed.

* 1. Risk Assessment - Risk Evaluation

Once the risks have been assessed, and the initial risk level is determined, consideration needs to be made to evaluate whether further controls are necessary to reduce the risk to a level that is **As Low As Reasonably Practicable (ALARP).**

The ALARP principle recognises there is no such thing as absolute safety. It provides that not all risk can be eliminated but gives a framework for helping determine whether further control measures are required. The ALARP principle is shown in an inverted triangle, with the greatest magnitude of risk at the top and the lowest magnitude at the bottom. The triangle is split into three regions:

* **Intolerable region.** Risks cannot be justified unless extraordinary circumstances exist, such as the risk of not conducting the operation is more than the risk associated with the operation.
* **Tolerable region.** This is also known as the ALARP region. Risks in this region are only tolerable if the cost of further control measures is grossly disproportionate to the benefit gained.
* **Broadly acceptable region.** The level of risk is regarded as negligible or so unlikely that further measures to reduce risk are usually not required.

Figure 3: The ALARP approach

* 1. Risk Treatment

If further risk reduction is needed to reduce the risk to an acceptable or tolerable level, additional control measures are determined. While it is more common to reduce the likelihood of a risk, the consequence of a risk can be reduced. In most cases, each control will reduce either the likelihood or consequence but rarely both. As an example, the worst feasible consequence of a medium sized RPA (between 25 kg and 150 kg) suffering a mid-air collision with a manned aircraft is catastrophic. Effective training, following procedures and establishing radio communications between the two pilots are control measures which reduce the likelihood, but do not alter the consequence *if* the risk eventuated. Insurance can reduce the level of risk to the ReOC holder; however such a control is regarded as transferring the risk rather than actually reducing it.

Once additional control measures have been developed but before they are implemented, the **residual risk** is assessed to determine if the risk with the additional control measures will fall into the tolerable or broadly acceptable region. The same risk matrix is used to ensure consistency of the risk assessment.

Additional control measures should be determined based on the **hierarchy of controls** where elimination of the hazard is the most effective and PPE is the least effective control.

Figure 4: Hierarchy of controls

* **Elimination** of the hazard is the most effective as it completely removes it, however is not always practical.
* **Substitution** of the hazard includes replacing the hazard with something else. To be effective, the new activity should not produce another hazard.
* **Engineering controls** do not remove the hazard, but they isolate people or the equipment which may be damaged from it.
* **Administrative controls** change the way people work, for example through procedures, training or warning signs.
* **PPE** is the least effective control but sometimes the only one available. An example is the use of hearing protection when working near large RPAs.
  1. Monitor and Review

The last step in <OperatorName>’s Risk Management process is to monitor and review the effectiveness and performance of the risk treatment options, strategies, and the management system and changes which may affect it as follows:

* Once the additional controls have been embedded, a review of their effectiveness should be conducted to ensure the expected residual risk rating remains accurate.
* Risk registers are dynamic, so additional controls, once implemented and reviewed for effectiveness, should be moved over to the existing controls.
* identification, assessment, and treatments are reviewed to ensure the risks remain relevant, continue to be managed, and that any new or emerging risks are identified and managed.
* Should any accidents or incidents occur which were covered by risks on a risk register, a review should be carried out on the effectiveness of the existing controls and further consideration applied to additional control measures.

As good practice, <OperatorName>conducts a complete review of the risk register every 12 months.

* 1. Risk Assessment Matrix – Level of Risk

Table 4: Consequence values

|  |  |  |
| --- | --- | --- |
| **Value** | **Consequence** | **Meaning** |
| **A** | Catastrophic | * Catastrophic incident * Fatality * Equipment destroyed * More than $100,000 impact * Threatens the ongoing existence of the organisation |
| **B** | Hazardous | * Major incident * Serious injury * Major equipment damage * $50,000 - $100,000 impact * Major impact to the organisation’s ability to provide services * A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely |
| **C** | Moderate | * Serious incident * Injury to persons * $10,000 - $50,000 impact * A significant reduction in safety margins, a reduction in the ability of the ReOC holder to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency |
| **D** | Minor | * Nuisance * Minor injury * $2,000 - $10,000 impact * Operating limitations required * Use of emergency procedures to manage |
| **E** | Negligible | * Less than $2,000 impact * Few consequences, managed through normal procedures |

Table 5: Likelihood

|  |  |  |
| --- | --- | --- |
| **Value** | **Likelihood** | **Meaning** |
| **5** | Frequent | Likely to occur many times (has occurred frequently) |
| **4** | Occasional | Likely to occur sometimes (has occurred infrequently) |
| **3** | Remote | Unlikely to occur, but possible (has occurred rarely) |
| **2** | Improbable | Very unlikely to occur (not known to have occurred) |
| **1** | Extremely Improbable | Almost inconceivable that this event will occur |

Table 6: Risk rating

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | **Consequence** | | | | |
|  | | 5 | 4 | 3 | 2 | 1 |
| **Likelihood** | | Catastrophic | Hazardous | Moderate | Minor | Negligible |
| 5 | Frequent | 10 | 9 | 8 | 7 | 7 |
| 4 | Occasional | 9 | 8 | 7 | 6 | 6 |
| 3 | Remote | 8 | 7 | 6 | 5 | 4 |
| 2 | Improbable | 7 | 6 | 5 | 4 | 3 |
| 1 | Extremely improbable | 6 | 5 | 4 | 3 | 2 |

|  |  |  |
| --- | --- | --- |
| **Risk level** | **Acceptance level** | **Actions** |
| High | CEO | Activity must be suspended.  Risk considered unacceptable and requires new concept of operation |
| Medium | Chief Remote Pilot | Risk should be mitigated to ALARP.  Activity can continue only after acceptance from chief remote pilot or senior manager. |
| Low | Chief Remote Pilot | Risk is acceptable and activity may continue providing due consideration has been given to the activity. |

1. Normal Procedures
   1. General

In addition to the operational procedures detailed for a specific RPA in the relevant User’s Manual, the procedure for Normal Operations at <OperatorName> is detailed below.

* + 1. Flight authorisation

Complete a mission plan (combined flight authorisation, JSA and pre-operational brief) in *FlyFreely* and submit to the CRP. *FlyFreely* will notify the RP once thee mission has been approved, and the mission will become available to execute in the app. Full details of the approval (including any additional conditions imposed by the CRP) are available in *FlyFreely*.

* + 1. JSA Validation (on-site)

Validate the hazards identified during the mission planning process by confirming there are no new risks identified, or adding/amending risks as required. This is completed in *FlyFreely*.

* + 1. Pre-operational Briefing

If the operation requires more than one person, conduct a pre-operational briefing IAW Appendix I.

* + 1. Set up operational area

Identify the landing and take-off areas, place all signs and cones out in most likely areas where public will approach at a distance of at least 30 metres. Place firefighting equipment First Aid kit in known location. Clear landing / take-off areas by removing obstructions or laying down launch pad.

* + 1. Weather check and NOTAMS

Check current and forecast weather conditions related to the operation via NAIPS. Ensure VMC minima can be achieved. If any NAIPS, Notam or AIS briefings were produced for the operation, these are kept on file for seven (7) years (All Notam selected within *FlyFreely* will be automatically stored within the mission record).

* + 1. Assembly

Assemble RPAS and equipment required to conduct operation. Inspect RPAS IAW manufacturers requirements and confirm serviceability.

* + 1. Prepare for flight

Move the RPAS to the landing / take-off areas. Set the spotters (if required) to their assigned locations and confirm positive communication. Confirm air band radio frequencies correct and conduct general area broadcast if required.

* + 1. Pre-flight checks

Conduct the pre-flight checklist located in *FlyFreely*. Confirm clear air for launch, confirm go / no-go criteria. Announce take-off.

* + 1. Controllability Check

Check each control input gives the correct response from the RPA immediately after take-off and before transiting.

* + 1. Radio communication

Maintain listening watch on applicable frequency and broadcast every 15 minutes during operation. When operating in controlled airspace the operator will call the tower 15 mins before launch to notify of the operation and the radios monitored only during flight.

* + 1. Pre-landing checks

Confirm direction of approach to landing area, inform crew, confirm approach and landing area is clear from hazards. Confirm correct system configuration for landing, Announce landing. If in doubt of a safe approach or landing, conduct a ‘go-around’ and land at alternate site if required.

* + 1. Post-flight Checks

Conduct the post-flight checks located in *FlyFreely* after each sortie. Contact any controlling authority and advise them if the RPA is on the ground. Conduct general area broadcast notifying the end of operations.

* + 1. Post-flight Administration

Complete mission in *FlyFreely*. Make a declaration regarding the serviceability of the RPA used via the app. Disassemble RPAS and pack up operational equipment and area for departure.

1. RPAS Type Specific Procedures
   1. DJI Phantom 4
      1. Pre-flight & Post-flight Check

Manufacturer checklists are to be used. Refer to the latest versions of the RPAS Type User Manual for a copy of the checklist.

* + 1. Specific Emergency procedures

Aircraft specific emergency procedures are contained in the RPAS Type User Manual.

* + 1. Maintenance Schedule

<OperatorName> has adopted the manufacturer's maintenance recommendations as the aircraft maintenance schedule. Refer to the latest versions of the RPAS Type User Manual.

* + 1. RPAS Maintenance & Operational Manual(s)

The current versions of the RPAS Type aircraft user and maintenance manuals are available from the manufacturer's website:

* + 1. Battery management

Refer to the RPAS Type user manual.

1. Specialised Procedures
   1. Tethered Flight

Reserved

* 1. EVLOS

Reserved

* 1. BVLOS

Reserved

1. Emergency Procedures

The following EPs are completed upon identifying the fault or failure.

* 1. Low battery (RPA/transmitter)
* Initiate "Return to Home" (RTH) procedure
* Confirm is battery is sufficient to return to home; if not, abort RTH and land at first suitable location.
  1. GPS Loss
* Immediately maintain directional control
* If not over safe landing area:
  + Climb to lowest safe altitude
  + Manoeuvre aircraft to a safe area
* Land aircraft as soon as possible in safe location
  1. Loss of control situations
* Attempt to regain control (follow manufacturer procedures)
* Advise all aircraft in the vicinity of an "uncontrolled RPA" including last known position, altitude and heading
* Call relevant authorities where required
* Inflight shutdown when safe to do so

**Before emergency shutdown is conducted**, consideration must be given to the location of the RPA, and any risk of collision with persons or property. It is critical that the shutdown procedure is not conducted over an area where there is risk that the RPA will contact persons or property on descent to the landing area.

* 1. Lost aircraft procedures
* Initiate "Return to Home" (RTH) procedure
* If unable to RTH:
  + advise all aircraft in the vicinity of an "uncontrolled RPA" including last known position, altitude and heading
  + conduct inflight shutdown when safe to do so
  + call relevant authorities where required

**Before emergency shutdown is conducted**, consideration must be given to the location of the RPA, and any risk of collision with persons or property. It is critical that the shutdown procedure is not conducted over an area where there is risk that the RPA will contact persons or property on descent to the landing area.

* 1. Manned aircraft enters flight area of RPAS operations

If a manned aircraft enters the vicinity of flight operations the Remote Pilot shall execute the following procedure:

* Make a radio broadcast of the appropriate frequency detailing the position of the RPA;

If the altitude and track of the manned aircraft is not unlikely to cause the RPA to come within 500ft vertically or 1500m horizontally of the manned aircraft:

* Immediately reduce the height of the RPA (unless the manned aircraft is at an altitude lower than the RPA); and
* Immediately manoeuvre the RPA out of the track of the manned aircraft.
  1. Unknown RPA entering operational area
* Manoeuvre aircraft to a safe area
* Land aircraft as soon as possible in safe location
  1. Non-company person enters flight area of RPAS operations
* Manoeuvre aircraft away from non-company personnel
* Land aircraft as soon as possible in safe location
  1. Radio fail
* Immediately change to alternate radio / radio system where available
* Where radio communication cannot be re-established, continue to make radio broadcasts prefixed with "transmitting blind"
* Land aircraft as soon as possible in safe location
  1. Bird hazard in area
* Task an observer (where available) to monitor the flight pattern of the bird(s) who is to advise the RPIC immediately if the bird(s) appears to be moving towards or tracking the aircraft.

If bird is actively tracking aircraft:

* Land aircraft as soon as possible in safe location

If bird is looking to attack:

* Rapid ascent (in fixed wing aircraft add full roll)
* Rapid descent
* Land aircraft as soon as possible in safe location

As the RPA is unlikely to be able to outrun a bird, it is necessary that avoidance manoeuvres are implemented as soon as possible.

* 1. Emergency procedures resulting in a crash
* Shut down motors
* Establish a safe perimeter
* Inspect battery for swelling or damage
* Report incident to Chief Remote Pilot
* Record incident on aircraft log
  1. Battery fire on ground
* Establish a safe perimeter from the battery
* Smother the battery with dirt or sand
* Extinguish flames with water or any extinguisher

Note: Further venting and fire may occur as additional cells within the battery enter thermal runaway. Avoid smoke and fumes emitted and continue to monitor the battery fire until completely extinguished.

* 1. Battery fire in flight
* Land aircraft as soon as possible in a safe location
* Establish a safe perimeter from the battery
* Smother the battery with dirt or sand
* Extinguish flames with water or any extinguisher

Note: Further venting and fire may occur as additional cells within the battery enter thermal runaway. Avoid smoke and fumes emitted and continue to monitor the battery fire until completely extinguished.

* 1. Lift production failure
* If aircraft can be landed safely, land immediately in a safe location
* If safe landing not possible, manoeuvre the RPA into a clear area (if control allows)
* Execute emergency motor stop
* Carry out post impact procedures (1.1.2.3)

If time permits, all persons in the vicinity should be warned of the impending impact.

Where lift production is likely to cause reduced separation with manned aircraft a "mayday" broadcast should be made to warn the manned aircraft of the situation.

* 1. Loss of orientation
* Execute Return to Home

If automated return to home is not available:

Multicopter (state)

* Increase aircraft height to clear obstacles
* Apply full forward pitch momentarily and observe direction (orientation)

Fixed wing (state)

* Increase aircraft height to clear obstacles
* Apply full left roll momentarily and observe direction (orientation)
  1. Failure of Orientation Lighting at Night
* Execute Return to Home
* If operating in the vicinity of piloted aircraft, make radio broadcast warning of unlit RPA
* Land aircraft as soon as possible
  1. Failure of Landing Area Lighting at Night
* Activate standby landing area lighting (if available)
* Land aircraft as soon as possible

If standby landing area lighting is not available:

Alternate Landing Area – Lighting Available

* Land aircraft as soon as possible at alternate landing area

No Illuminated Alternate Landing Area Available

* Confirm automated landing position is clear of obstacles
* Execute Return to Home
  1. Loss of Night Vision of Remote Pilot in Command (temporary)

Single crew operations

* Execute Return to Home
* If operating in the vicinity of piloted aircraft, make radio broadcast advising of aircraft tracking

Multi crew operations

* Confirm with spotter that aircraft location is clear of obstacles
* Hold aircraft in present location until night vision resumes
  1. Inclement Weather
* Manoeuvre aircraft around weather if possible
* Land aircraft as soon as possible in safe location
  1. Incapacitated Pilot (multi crew operations)

If second company remote pilot in vicinity of ground control station:

* Immediately assume control of aircraft
* Manoeuvre aircraft to a safe area
* Assess condition of incapacitated pilot and initiate emergency response as required
* Land aircraft as soon as possible in safe location

If no company remote pilot in vicinity of ground control station:

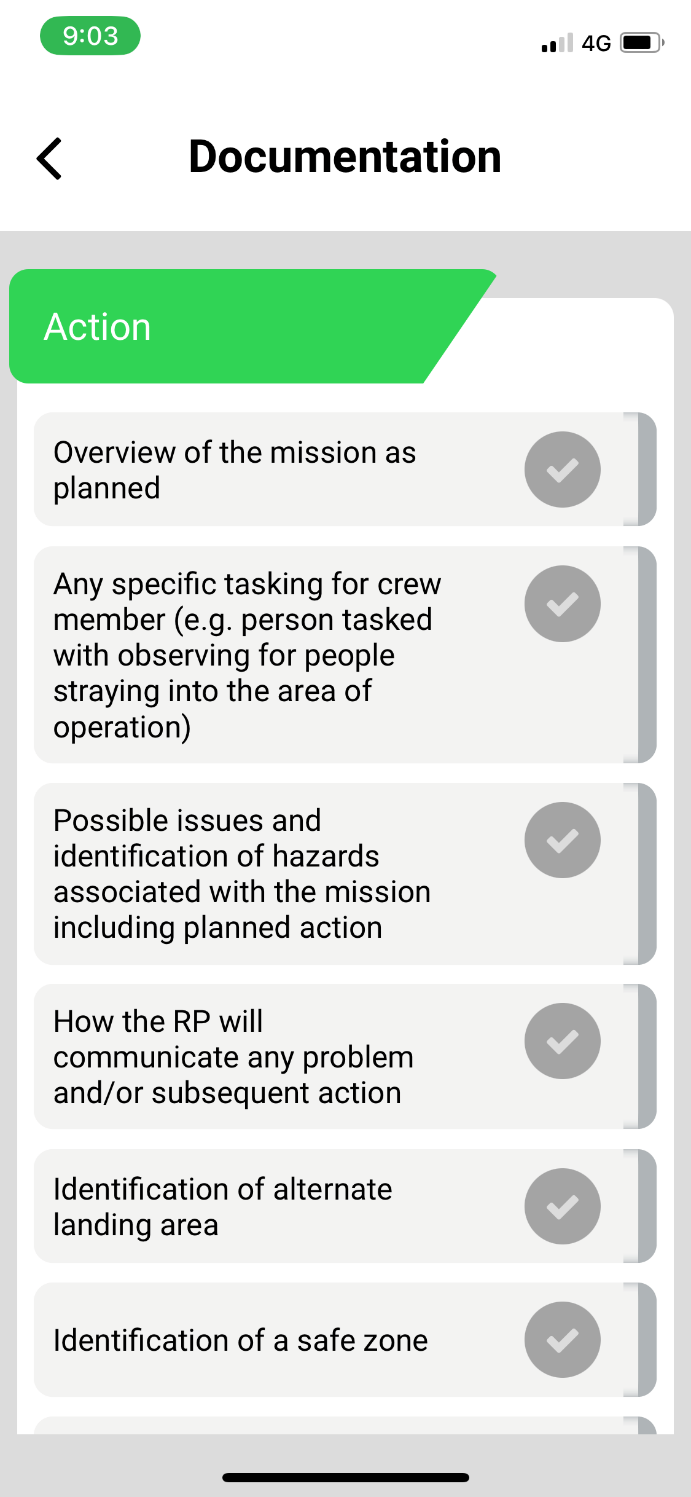
* Nearest crew member initiate "Return to Home" (RTH) procedure
* Assess condition of incapacitated pilot and initiate emergency response as required

**Abnormal Aircraft procedures are found in the aircraft checklist.**

**Any aircraft that suffers loss of control, is missing or has crashed must be reported to the Chief Remote Pilot immediately.**

1. Forms
   1. Pre-Operational Briefing

The following briefing is given by <OperatorName>’s RP to all persons involved in the RPAS operation. The RP is also responsible for ensuring the emergency contact telephone numbers are at hand. <OperatorName> uses this form when more than one person is used on an RPAS job so that the person briefing is able to cover off all requirements of the task, as well as crew roles/responsibilities and actions required.

Graphical user interface

Description automatically generated

Figure Pre-operational briefing in FlyFreely

1. Policy and Procedure Training Syllabus

<OperatorName> provides this training to any person who is proposing to act in any capacity as crew operating under the ReOC of <OperatorName>. Each person undergoes training and <OperatorName>’s CRP signs them off in the following areas:

* Knowledge of Organisations Operations Manual
* Knowledge of Normal operations:
  + Planning requirements (NAIPS, flight plans, NOTAMS etc.)
  + Forms required for general operations (Section 2 in the Operations Manual)
  + Briefing requirements IAW pre-op briefing form
  + Roles and responsibilities of assigned crew position
  + Emergency procedures (Section 2 in the Operations Manual).
* Conduct of JSAs and Risk Management
* Maintenance procedures and internal authorisations
* Safety and risk management strategies and WH&S
* Crew co-ordination and support crew duties (to include Crew Resource Management CRM and Aviation Risk Management AVRM training-recommended)
* Specialist operations training (night VLOS, tethered ops, RPAS operations within 3 NM from towered aerodrome, BVLOS, EVLOS etc.)
* Crew actions and applicability to the Civil Aviation Safety Regulations (CASR) 1988 Vol 3 part 101
* Use of FlyFreely covering the following topics shown in Appendix N

1. RPAS Type Training Syllabus
   1. Ground / Theory

* description of RPAS and components
* handling of RPAS and transportation
* handling and charging of LiPo batteries
* assembly/disassembly of the system including camera
* detailed explanations on the use of the transmitter and operating frequencies, limitations
* flight controls, sound and light signals
* manual and reversionary modes
* pre-flight inspection
* problem solving, fault analysis
* pre- and post-flight procedures
* crew management and responsibilities
* crew co-ordination (standard phraseology)
* use of operating software
* use of ancillary equipment.
  1. Flight Exercises
* range check
* take-off and landing
* practical flight exercises (normal automatic control)
* practical flight exercises (backup manual control)
* automatic safety features
* camera operation
* all Emergency procedures (may talk through on relevant EPs that cannot be simulated safely during flight)
* specialised RPAS training (night VLOS, EVLOS, BVLOS as applicable)
* safety.

1. Night VLOS Training Syllabus
   1. N-VLOS-DS: Night visual line of sight - Description of training
      1. Unit description

This unit describes the skills and knowledge required to operate an RPA at nighttime.

* + 1. Elements and performance criteria
       1. Pre-flight preparation

The RP confirms that:

1. The RPA meets the equipment requirements for an N-VLOS flight.
2. A risk assessment is completed taking into account night visual conditions.
   * + 1. Night Operations
3. Perform all normal manoeuvres under N-VLOS conditions using either manual control or an AFMS.
4. Orient and navigate the RPA efficiently and safely at distance.
5. Maintain an effective lookout for other aircraft and take appropriate action to maintain separation and prevent conflict.
   * + 1. Night Landing
6. Lands the RPA safely and without damage within N-VLOS tolerances.
   * 1. Range of variables
7. Various payloads and RPA configurations.
8. Operations both in dark conditions and under artificial illumination.
9. Various weather conditions.
   * 1. Underpinning knowledge of the following:
10. RPA equipment requirements.
11. Human performance considerations.
12. Night operation considerations.
13. Knowledge of rules and considerations under artificial illumination.
14. N-VLOS operational requirements for operations at a controlled or non-controlled aerodrome (if required).
    1. N-VLOS-P: Night visual line of sight - Practical
       1. Flight test requirements

A person operating under a night visual line of sight (N-VLOS) approval must demonstrate his or her knowledge of N-VLOS flight requirements as set out in L2.2 and competency, in the units of competency mentioned in L2.3, by performing manoeuvres with an aircraft in the category he or she wishes to operate in, within the accuracy / tolerances specified in L2.3.

For L2.3, a sustained deviation outside the applicable flight tolerance is not permitted.

For L2.3, if sufficient crosswind conditions do not exist at the time of the flight test then, providing the examiner is satisfied the applicant’s achievement records indicate that competency has been achieved during training, the element may be excluded from the flight test.

**Note:** Flight tests elements for VLOS approval may be combined into a single test or conducted over a number of flights.

* + 1. Knowledge requirements

The applicant must demonstrate his or his knowledge of the privileges and limitations of the rating and of the following topics to the CRP:

1. RPA requirements for night flight.
2. Additional considerations for RPA flight at night (compared to a flight during the day).
3. Applicable rules and considerations for flight at night under bright lights.
4. Knows the definition of ‘night’ for aviation purposes.
5. Describes the considerations for carrying out an N-VLOS flight at a controlled or non-controlled aerodrome (if applicable).
6. Understands some of the visual illusions and human performance limitations that may eventuate with N-VLOS flight.
   * 1. Practical flight standards
7. Ensures the aircraft is fit to fly and equipped for night flight.
8. Competently conducts all normal manoeuvres at night competently manually or with an automated mode as applicable.
9. Under manual or automated control, is able to orient and navigate the aircraft efficiently and safely at a distance from the control station.
10. Maintains an effective look-out for other aircraft and takes appropriate action to maintain separation and prevent conflict.
    1. N-VLOS-T: Night visual line of sight - Theory
       1. Flight at night Theory test

* Enumerate the additional considerations needed to operate and RPA during an N-VLOS flight (compared to a flight during the day) under the following conditions:
  + under bright lights
  + in an otherwise dark area.
* Define ‘night’ for aviation purposes
* Describe the aircraft equipment requirements for an N-VLOS
* Describe the considerations for carrying out an N-VLOS flight at a non-controlled aerodrome
* Describe the additional considerations for coping with equipment failures at night.
  + 1. Human Performance

Explain the relevant human performance and physiological limitations for the conduct of RPAS operations at night:

* describes dark adaption of the eye and how long the eye takes to fully adapt to night conditions
* describes why lights have a red filter during night operations.
  + 1. Risk Assessment – Night Operations

Describe and list any special precautions a RP might take for a night operation.

1. Senior Remote Pilot (SRP) Training and Authorisation
   1. Unit description

This unit describes the skills and knowledge required to be appointed as an SRP.

* 1. Experience requirement

Prior to appointment as a SRP, the Remote Pilot must:

* Have at least 10 hours operating RPA above 250 grams of which:
  + At least 2 hours shall be on the aircraft type to be operated by pilots under the control of the SRP
  + Hold an Aeronautical Radio Operators Certificate or higher aviation radio qualification
* Where the SRP's role involves night operations, has at least two (2) night flights
* Where the SRP's role involves BVLOS operations, has at least two (2) BVLOS flights
* Where the SRP's role involves operations within 3nm of controlled aerodromes, has at least two (2) flights operated within 3 NM of a controlled aerodrome.
  1. Training

<OperatorName>’s SRP training covers the following areas:

* company’s Operations Manual
* CASA legislation
* basic aeronautical knowledge
* aeronautical information products (maps/charts, ERSA, AIP)
* weather interpretation
* RPAS limitations
* communication with CASA
* risk management understanding and procedure
* *FlyFreely* mission approval procedures (See Appendix N)
  1. Assessment

<OperatorName>’s SRP assessment is made up of the following items:

* + 1. Scenario activity

A standard RPAS operation which may or may not require permission from CASA. The scenario should be presented as a complex operation in which multiple risks need to be identified and mitigated against. An example of <OperatorName>’s SRP assessment scenario can be found here:  
[https://knowledge.flyfreely.io/srp-assessments#example-srp-assessment-scenarios](https://knowledge.flyfreely.io/srp-assessments%23example-srp-assessment-scenarios)

* + 1. Exam questions

A minimum of 15 questions are created and cover each of the following key areas:

* Roles and responsibilities of SRP
* Part 101 Vol 3 of the Civil Aviation Safety Regulations (CASR 1998)
* Part 101 Manuals of Standards
* Aeronautical publications
* Interpreting VTC, including symbols, area frequencies, aerodromes, airspace class and vertical limits, and PRD areas
* Decode terminal area forecast and NOTAM
* VMC conditions
* ERSA
* Company RPAS procedure
* Knowledge of risk identification
* Risk management process
* RePL categories
* Emergency procedures.
  1. Approved Senior Remote Pilots

A list of approved Senior Remote Pilots is maintained in *FlyFreely.* See Appendix N for Senior Remote Pilot management procedures within *FlyFreely*.

* 1. Delegation

If required for an SRP to act in the role of CRP, a suitable handover of critical information and conditions must be conducted. The CRP may, at any time, revoke the delegation of their roles and responsibilities. The form used to delegate the role of CRP can be found below:

* + 1. SRP delegation form

Table 7: SRP delegation form example

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Senior Remote Pilot Delegation Form** | | | | | | |
| **Start date of delegation** | |  | | | | |
| **End date of delegation** | |  | | | | |
| **Restrictions on delegation** | |  | | | | |
| **Any other specific requirements** | |  | | | | |
| **SRP Name** |  | | **Sign** |  | **Date** |  |
| **CRP Name** |  | | **Sign** |  | **Date** |  |
| **Handover/takeover brief** | | | | | | |
| **Applications in progress and status** |  | | | | | |
| **Current/Upcoming tasks** |  | | | | | |
| **Internal training to be conducted** |  | | | | | |
| **RPAS serviceability** |  | | | | | |
| **Ancillary equipment serviceability** |  | | | | | |
| **Remote pilots/crew status** |  | | | | | |

* 1. Audit procedure
     1. Internal audit procedure

An internal audit procedure has been developed to ensure proficiency and standardisation.

* + - 1. Post delegation audit 6 months from approval
* CRP to proficiency line check one RP who has been checked by the SRP in the previous 6 months (if applicable)
* Review of at least three JSA signoffs (if applicable)

1. FlyFreely Familiarisation Training
   1. Mission Approval Procedure

* How to set approval checklist  
  <https://knowledge.flyfreely.io/how-to-create-an-approval-checklist>
* How to perform an approval  
  <https://knowledge.flyfreely.io/how-to-approve-a-mission>
  1. Risk Assessment Procedure

<https://knowledge.flyfreely.io/risk-assessment-procedure>

* Where to find the generic risk assessment
* How to perform a risk assessment
* How to attach a hard copy Risk Assessment
  1. JSA Procedure

<https://knowledge.flyfreely.io/jsa-procedure>

* How to perform a JSA
* How to validate JSA in the Field App
* How to validate a hard copy of the JSA
  1. Senior Remote Pilot Management Procedure

<https://knowledge.flyfreely.io/adding-a-senior-remote-pilot-srp>

* How to add a senior remote pilot to the list of key personnel
  1. Document Amendment Procedure

<https://knowledge.flyfreely.io/document-amendment-procedure>

* Managing authority documents
* How to acknowledge new version of documents
  1. CASA Instrument Management Procedures

<https://knowledge.flyfreely.io/casa-instrument-procedure>

* How to add a CASA instrument & create a workflow
* Creating and editing workflows
  1. Night Operation Procedures
* How to set up a night operations workflow  
  <https://knowledge.flyfreely.io/night-operation-procedure>
  1. Maintenance Management Procedures
* How to set up a maintenance schedule:  
  <https://knowledge.flyfreely.io/setting-up-an-rpa-maintenance-schedule>
* How to create an ‘on condition’ checklist:  
  <https://knowledge.flyfreely.io/creating-editing-forms>
* How to log a defect:  
  <https://knowledge.flyfreely.io/completing-a-maintenance-request>