

**CASR Part 101**

**Sample Operations Manual**

**Version**

**Review Date**

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Glossary

Acronyms and abbreviations

|  |  |
| --- | --- |
| Acronym / abbreviation | Description |
| AGL | Above Ground Level |
| AIP | Aeronautical Information Package |
| ALA | Authorised Landing Area |
| ALARP | As low as reasonably practicable |
| AROC | Aeronautical Radio Operator Certificate |
| ATSB | Australian Transport Safety Bureau |
| ATC | Air Traffic Control |
| BVLOS | Beyond Visual Line of Sight |
| CAA | Civil Aviation Act |
| CASA | Civil Aviation Safety Authority |
| CASR | Civil Aviation Safety Regulations |
| CRP | Chief Remote Pilot |
| ERSA  | En Route Supplement Australia |
| EVLOS | Extended Visual Line of Sight |
| HLS | Helicopter Landing Site |
| IAW | In accordance with |
| JSA | Job Safety Assessment |
| MOS | Manual of Standards |
| NM | Nautical Miles |
| NOTAM | Notice to Airmen |
| OLS | Obstacle Limitations Surfaces |
| RePL | Remote Pilot Licence |
| ReOC | Remotely Piloted Aircraft Operators Certificate  |
| RP | Remote Pilot (or UAV Controller) |
| RPIC | Remote Pilot in Command |
| RPA | Remotely Piloted Aircraft (same meaning as UAV)  |
| RPAS | Remotely Piloted Aircraft System (same meaning as UAS) |
| RTI | RePL Training Instructor |
| SORA | Specific Operations Risk Assessment |
| SRP | Senior remote pilot |
| SRTI | Senior RePL Training Instructor |
| TEM | Threat and Error Management |
| UAS | Unmanned Aircraft System (same meaning as RPAS) |
| UAV | Unmanned Aerial Vehicle (same meaning as RPA) |
| UOC | Unmanned Aerial Vehicle Operators Certificate |
| VLOS | Visual Line of Sight |
| VMC | Visual Meteorological Conditions |

Definitions

|  |  |
| --- | --- |
| Term | Definition |
| ANCA | Aviate Navigate Communicate Administrate: conducted during flight to assist with continued safety of flight – priority of actions (used in solo RPAS operations). |
| 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. |
| 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. |
| 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. |
| 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. |
| 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. |
| risk mitigation | the process of incorporating defences or preventive controls to lower the severity and/or likelihood of a hazard’s projected consequence. |
| 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 |
| Part 101 of CASR | Part 101 of the Civil Aviation Safety Regulations 1998 (CASR) |
| Part 101 MOS | Manual of Standards to Part 101 of the CASR 1998 |

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 |
| 1.0 | June 2020 |  | First Issue |
|  |  |  |  |
|  |  |  |  |

Applicability

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

**{ABC RPA}**’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 **{ABC RPA}**
* 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.

***{ABC RPA}***’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 **{ABC RPA}** whether electronic or hard copy. ***{ABC RPA}****’*s CRP keeps a record of each RP’s compliance declaration.

For night operations, **{ABC RPA}** uses the accepted procedures (Appendix xx) 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 ***{ABC RPA}*** 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 ***{ABC RPA}***’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 ***{ABC RPA}***’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, ***{ABC RPA}*** 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 ***{ABC RPA}***’s procedures and information relevant to the safe operation of RPAS. Persons working under the authority of the ReOC of ***{ABC RPA}*** will be advised of any changes to this document, including the addition of any new procedure or information via <insert means for advising personnel of changes>.

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

***{ABC RPA}*** is a Remotely Piloted Aircraft Systems (RPAS) business based in ***<Insert location>***. We specialise in ***<Insert details of what you proposed to do with your ReOC>***.

## Statement of Compliance

All ***{ABC RPA}****’*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

***<insert an organisational chart similar to the sample below>***

Figure 1: Organisational structure

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

## Accountabilities & Responsibilities

### Accountabilities of CEO/Managing Director

***{ABC RPA}***’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 ***{ABC RPA}*** 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.

***{ABC RPA}***’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

***{ABC RPA}***’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 **{ABC RPA}**
* 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 RePL Training Instructor

***{ABC RPA}***’s SRTI is responsible for all theory and operational training operations under the authority of the ReOC of {**{ABC RPA}**.

The roles and responsibilities of ***{ABC RPA}***’s SRTI are to:

* ensure that all training operations are conducted in accordance with section 6 of this manual
* maintain a record of training courses conducted
* ensure all records are kept IAW the Part 101 MOS
* conduct regular checks of nominated instructors in both theory and operational aspects
* adhere to any requirements set out in the Part 101 MOS.

### Responsibilities of RePL Training Instructor

***{ABC RPA}***’s RePL Training Instructor is to:

* ensure that all training is conducted IAW this manual, the Part 101 MOS and Part 101 of CASRs
* adhere to any requirements set out by the SRTI.

### Responsibilities of Senior Remote Pilot

***{ABC RPA}***’s Senior Remote Pilot (SRP) is responsible for all operational matters when authorised by the nominated CRP.

The role and responsibilities of ***{ABC RPA}***’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 ***{ABC RPA}*** 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 **{*ABC RPA}***’s documented procedures.

### Responsibilities of Maintenance Controller

***{ABC RPA}***’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 **{*ABC RPA}****’*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 ***{ABC RPA}***’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 **{ABC RPA}**
* 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 ***{ABC RPA}***, a RP includes a holder of a CASA ‘RePL’ or ‘UAV Controllers Certificate’.

***{ABC RPA}***’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 ***{ABC RPA}***, all camera operators, spotters and other persons involved in the operation of RPAS controlled under the authority of the ReOC of **{ABC RPA}** 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 ***{ABC RPA}***, all operators are committed to providing an environment that ensures the optimal performance of any person working under the authority of the ReOC of **{ABC RPA}**.

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 **{ABC RPA}**, 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 ***{ABC RPA}*** must not perform duties under the influence of alcohol. ***{ABC RPA}*** 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 ***{ABC RPA}*** 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 **{ABC RPA}** 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 **{ABC RPA}** 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 **{ABC RPA}** 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 **{ABC RPA}**.

Persons working under the authority of the ReOC of **{ABC RPA}** 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 **{ABC RPA}** 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 **{ABC RPA}** 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

***{ABC RPA}***’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 {ABC RPA} are competent prior to conducting commercial operations.

### Flight Conduct

#### Flight authorisation

Each RPAS operation must be authorised by the CRP and recorded on a Flight Authorisation Form, which is in Appendix I. 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 **{ABC RPA}**.

#### 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 - Appendix I
* Pre-Operational Briefing Checklist - Appendix I
* Pre-Flight Checklists – RPA, ground station & role equipment specific
* Post-Flight Checklists - RPA, ground station & role equipment specific.

Checklists are to be used in all relevant ***{ABC RPA}***’s operations and activities.

## 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 **{ABC RPA}** 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 **{ABC RPA}** 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 **{ABC RPA}** 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 the Flight Log (Appendix I). All defects found in the RPAS must be recorded on the Defect/Maintenance Log (Appendix I).

RPs must ensure that all defects or outstanding maintenance actions detailed in the Defect/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 and all defects and maintenance are recorded in the RPAS Maintenance and Defect Log. Section 4 of this manual details the procedures for recording of RPAS defects and maintenance requirements. 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 **{ABC RPA}** is the responsibility of the operator. Each RPA operated under the ReOC of **{ABC RPA}** is identified in Appendix A.

## Generic Risk Register

***{ABC RPA}*** is required to develop a generic risk register before any operation is conducted under the authority of the ReOC of {ABC RPA}. The generic risk register is reviewed annually, and effective additional controls implemented into***{ABC RPA}***’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 <specify where>.

## 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:

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

Procedures for the use of radios are detailed in Appendix E.

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 **{ABC RPA}** 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, ***{ABC RPA}*** will ensure it is unalterable after the record has been made. **{ABC RPA}**’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 **{ABC RPA}**.

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 **{ABC RPA}** 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.

***{ABC RPA}***’s feasibility process is covered from section 2.1.1 to 2.1.8.

### Compliance with CASA legislation

The first step of ***{ABC RPA}***’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 **{ABC RPA}** is in compliance with such legislation, **{ABC RPA}**’s CRP considers the following:

* are operations in accordance with the conditions listed on the ReOC of **{ABC RPA}** 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. **{ABC RPA}** 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 I) 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 returned to **{ABC RPA}** ’s CRP who keeps it as a record of the operation for a period of at least seven (7) years.

### Approval, Permission or Exemption

***{ABC RPA}***’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 **{ABC RPA}**.

### Threat and Error Management (TEM)

***{ABC RPA}*** 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.

***{ABC RPA}*** 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.

***{ABC RPA}*** 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 D 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 **{ABC RPA}** 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:

***<insert procedures, checklists and assessments for HOTO in flight, including establishing stable flight, hand over in a benign area, in an orbit, or landed, as applicable>***

#### HOTO brief

***<insert procedures, checklists and assessments for conducting a HOTO brief, covering RPA location Altitude, Speed, Distance & Direction to home, Return Home Plan, current systems status, endurance remaining, time of last aviation radio call & next due at time, any other aircraft / RPAS in the area and their callsign, any problems of RPAS incurred or current issues, latest weather, forecasted weather etc.>***

#### HOTO terminology

***<insert terminology personnel have been instructed to use, definitions and clarify any ambiguous language, such as: HOTO ‘handing over control’, ‘Taking over control,… I have control’ etc.>***

#### Systems scan and controllability check

***<insert procedures, checklists and assessments for conducting systems scan and controllability check, confirming all in working orders before handing off RP departs RP station etc.>***

### HOTO - emergency situations

**<insert procedures, checklists and assessments for HOTO when RP is incapacitated (conducted only when medical emergency evident prevents RPIC from continuing controlling duties, or if a technical issue is used to determine whether the most experienced RP can safely conduct HOTO to gain safe control of RPA etc.>**

### HOTO Training

***<insert procedures, checklists and assessments for HOTO training or reference relevant appendix>.***

# 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 ***{ABC RPA}*** 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 Appendix G.

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, ***{ABC RPA}*** would need an approval from CASA.

#### Authorised personnel

Operations at night are only conducted by the CRP or authorised RPs named below, 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.

Table 1: Authorised personnel

|  |
| --- |
| Remote pilots authorised for night operations |
| **Name in full** | **ARN** | **Training completion date** | **Currency end date** | **Signed** |
| William James Bones | 1012345 | 29/09/16 | 29/12/16 |  |
|  |  |  |  |  |
|  |  |  |  |  |

#### 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 ***{ABC RPA}***, 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

***>insert operations procedures in Appendix G for operations within areas around controlled aerodromes >***

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

***>insert procedures in Appendix G for operations within 3 NM of controlled aerodromes, below 400 ft, which include, tethered operations, indoor operations etc. (tethered operations maybe required when within 3 NM of an active towered aerodrome)>***

**Tethered operations**

If a tether system is required to conduct an operation, the CRP will authorise that using the flight authorisation form (Appendix I), and it is to be conducted in accordance with the approved procedures in Appendix G.

**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.

## 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. Procedures for these operations are within appendix G.

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, procedures can be found in Appendix G.

### 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 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, procedures can be found in Appendix G.

## 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

***<select one of the following>***

* + - * 1. ***{ABC RPA}*** does not operate above 400 ft AGL.
				2. ***{ABC RPA}*** can perform operations above 400 ft AGL, if the operation has been authorised by CASA, procedures can be found in Appendix G.

##  Operations over populous areas

***<select one of the following>***

* + - * 1. ***{ABC RPA}*** does not operate over a populous area.
				2. ***{ABC RPA}*** can perform operations over a populous area, if the operation has been authorised by CASA, procedures can be found in Appendix G.

## EVLOS Operations

***<select one of the following>***

* + - * 1. ***{ABC RPA}*** does not conduct EVLOS operations.
				2. ***{ABC RPA}*** may conduct EVLOS operations if the operation has been authorised by CASA, procedures can be found in Appendix G.

## Operations Beyond Visual Line of Sight (BVLOS)

***<select one of the following>***

* + - * 1. ***{ABC RPA}*** does not conduct BVLOS operations.
				2. ***{ABC RPA}*** may conduct BVLOS operations if the operation has been authorised by CASA, procedures can be found in Appendix G.

## 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. Procedures for dropping or discharging items from an RPA can be found in Appendix G.

## Other specialised procedures as applicable

# RPAS Maintenance

## Scope of maintenance

***{ABC RPA}*** 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 4.1.4 below.

The MC is responsible for ensuring that, where maintenance schedules have been developed for an RPAS, this schedule is located ***<insert the location of maintenance schedules>***.

### 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 ***<insert the location of variations in the maintenance schedules>***.

The MC reviews each schedule every ***<insert the period for schedule reviews>*** to ensure the most current instructions are in use.

### ‘On Condition’ maintenance

All components of an RPAS working under the authority of the ReOC of {ABC RPA}, 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 on the Defect and Maintenance Log (Appendix I).

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 {ABC RPA}:

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

The content of these checklists is detailed in each specific RPAS section (Appendix F).

## Maintenance Procedures

### Maintenance Instructions

All maintenance on RPAS operating under the authority of the ReOC of {ABC RPA} 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

A 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 {ABC RPA} 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. All other defects must be treated as ‘open’ until the MC has assessed and rectified the defect.

The MC must be immediately notified when a defect is identified in the field that cannot be rectified by the RP. In these situations, the MC consults with the RP on the action that will be taken to remedy the defect.

In situations where a defect cannot be rectified, RPs must suspend the RPAS operation and notify the client of the situation. Under no circumstances is an aircraft to be operated if there is an open RPAS defect.

## 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 {ABC RPA} to report defects as they occur and record any maintenance, they have conducted on the RPAS.

Defects and maintenance are recorded on the Defect and Maintenance Log (Appendix I). All open defect items are closed prior to flight.

RPs are responsible for forwarding the Defect and Maintenance Logs to the MC as follows:

* for open defects – as soon as practicable
* for defects rectified by the RP – as soon as possible upon return to the operating base.

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 MC is required to file the Defect and Maintenance Log for each element of the RPAS and keep this record for seven (7) years after the last day the RPA was operated.

**Note:** The Pre/Post Flight Check is recorded on the RPAS Time in Service Log rather than the Defect and Maintenance Log.

## RPAS Time in Service Log

RPs must use the RPAS Time in Service Log (Appendix I) to record details of the flight times and the Pre/Post-Flight Checks conducted on each RPA.

When an RPAS Time in Service Log becomes full, RPs must transfer the cumulative total of flight hours to a new RPAS Time in Service Log and forward the completed RPAS Time in Service Log to the MC.

The MC must file the RPAS Time in Service Log for each RPA operated under the authority of the ReOC of {ABC RPA} and keep this record 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 person carrying out the maintenance or another person nominated by the MC is responsible for carrying out a flight test of the aircraft to verify that it operates correctly in all available modes.

Flight test requirements for each RPAS type working under the authority of the ReOC of {ABC RPA} are developed by the MC in consultation with the CRP to take into account the capabilities, operating modes and tasking of the RPAS.

Details of the flight test requirements for each RPA are detailed in the relevant RPAS section in Appendix F.

All RPAS test flights are to be authorised by ***{ABC RPA}***’s CRP and logged.

# ReOC Crew Induction / Internal Training

Training requirements for those persons working under the authority of the ReOC of **{ABC RPA}** 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 2: Nominations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Full name | Measure of Competency (qualification) | Type of training permitted | Date approved | Contact |
|  |  |  |  |  |
|  |  |  |  |  |

## 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 ***{ABC RPA}***. 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 ***{ABC RPA}***’s ReOC.

### Camera operators, spotters and others

***{ABC RPA}*** records details on any person who obtains a qualification or a competency in relation to the safe operation of an RPA. ***{ABC RPA}*** 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. ***{ABC RPA}***’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 **{ABC RPA}**.

## 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 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.

# RPL Training Organisation

Table 3: Definitions for this section

|  |  |
| --- | --- |
| ***aeronautical knowledge component*** | the theory component of a RePL training course, as mentioned in subparagraph 101.295 (2) (a) (iii) of CASR. |
| ***aeronautical knowledge standards*** | means the standards and requirements for the aeronautical knowledge component of a RePL training course as defined in section 2.05 of the Part 101 MOS. |
| *automated operation* | for an RPA, means that after take-off and until it lands, the RPA either:* flies a predetermined flight path programmed into the RPAS before take-off; or
* changes its flight path or configuration in flight solely because of dynamic updating of pre-programmed turning, way point data, or configuration settings; and

**Note:** Dynamic updating involves electronically changing an RPA’s flight path without the manual operation of command and control levers or switches.* is not subject to any manual operation.
 |
| ***category*** | for an RPA, means 1 of the following: * the aeroplane category
* the helicopter (multirotor class) category
* the helicopter (single rotor class) category
* the powered-lift category.
 |
| ***Complexity*** | refers to whether the RPA: * is generally operated in automated mode, or manual mode, or has a liquid-fuel system; and
* is of a particular design and make, including of a design and make that:
* stems from a common basic design; and
* is essentially similar in different models.
 |
| ***curriculum*** | A representation of the lessons or training periods from an operator’s ***syllabus*** and the duration over which they will be conducted in order to achieve a specific training outcome. |
| ***Examiner*** | for a small, very small, medium or large RPA, or for GELP assessments, means 1 of the following:* the chief remote pilot of a certified RPA operator who is qualified as a RePL training instructor; or
* a RePL training instructor who is authorised by the chief remote pilot in accordance with the RPA operator’s documented practices and procedures.
 |
| ***manual operation*** | for an RPA, means the use, by the remote pilot, of a manual mechanism that is part of the RPAS, in order to exercise control over the RPA, including by reconfiguring the RPA. |
| ***practical competency component*** | the component of a RePL training course for the manual or automated operation of a category of RPA that an applicant for a RePL proposes to operate, as mentioned in subparagraph 101.295 (2) (b) (i) of CASR. |
| ***practical competency standards*** | the standards and requirements for the practical competency component of a RePL training course as defined in section 2.05 of the Part 101 MOS. |
| ***RePL training course*** | is the expression used to denote an RPL training course as defined in the CASR Dictionary. |
| ***RePL training course instructor*** | a training instructor for a RePL training course who satisfies the requirements of section 2.30 of the Part 101 MOS. |
| ***RePL training organisation*** | a person certified as an RPA operator under regulation 101.335 of CASR whose operations include the conduct of a RePL training course. |
| ***RePL training organisation’s procedures*** | a RePL training organisation’s documented practices and procedures for paragraph 101.335 (1) (d) of CASR. |
| ***RePL training unit*** | means a unit of aeronautical knowledge or a unit of practical competency for a RePL training course: * prescribed in Schedules 2 and 3 of the *Part 101* MOS, for the purposes of the definition of ***RPL training course*** in Part 1 of the CASR Dictionary; and
* contained in Schedules 4 and 5 of the *Part 101* MOS respectively.
 |
| ***RePL training unit content*** | for a ***RePL training unit***, means the content for the RePL training unit: * mentioned in column 2 of an item in an Appendix of Schedules 2 and 3 of the *Part 101* MOS; and
* described for the corresponding unit in Schedules 4 and 5 of the *Part 101* MOS, respectively.
 |
| ***RPL training course*** | see RePL training course. |
| ***Size*** | refers to whether the RPA is of a particular size, being: * Micro, <250g
* Very Small, >250g - <2kg
* Small, >2kg – <25kg
* Medium, >25kg - <150kgs
* Large, >150kg.
 |
| ***syllabus*** | in relation to a ***RePL training course***, is a summarised description of all academic content, such as lessons or training periods, which is approved by CASA to be conducted by the operator. The syllabus specifically indicates what ***RePL training unit content*** is included in each lessons or training period. |
| ***theory component of a RePL training course*** | means the aeronautical knowledge component of the course. |
| ***type*** | for an ***RPA***, means an RPA of a particular: * category; and
* size; and
* complexity.
 |
| ***unit code*** | for a ***RePL training unit***, being as follows: |

##  RePL Training Course

### RePL training overview

*[ABC RPA]* will be operating as an RePL training provider and will be providing RePL training for the following RPAS Categories:

* *[Initial & Upgrade / Upgrade] [Aeroplane] [<7kg / <25kg / Medium / Large]*
* *[Initial & Upgrade / Upgrade] [Multi-rotor] [<7kg / <25kg / Medium / Large]*
* *[Initial & Upgrade / Upgrade] [Helicopter] [<7kg / <25kg / Medium / Large]*
* *[Initial & Upgrade / Upgrade] [Powered-lift] [<7kg / <25kg / Medium / Large]*

The practical competency component of *[ABC RPA]*’s RePL training course will provide training in *[the automated operation mode / both the automated operation mode and the manual mode]* for the relevant category of RPA.

### RePL syllabus of training

*[ABC RPA]*’s RePL training complies with the Part 101 Manual of Standards defined units of aeronautical knowledge and units of practical competency for an RePL training course in accordance with the following RePL syllabus of training.

Prior to operating, changes to the *[ABC RPA]* RePL syllabus of training must be approved by CASA.

***<Insert syllabus here or reference to Appendix>***

### RePL training course curriculum

The following RePL training course curriculums have been approved by CASA. The individual lessons within each course curriculum may be rearranged as per operational requirements but reduction of the overall course duration or the removal of lessons or training periods from a course must be documented and submitted to CASA for approval. The CRP will record the approval of such a change within the course record of each student attending that course.

For an RePL training course including the Aeronautical knowledge standards - Common units, there can be no less than 15 hours of contact time with an RePL training instructor during the aeronautical knowledge component of the RePL training course.

No part of the practical competency component of an RePL training course may be delivered by a RePL training instructor who is not in the physical presence of the person being trained.

### [Initial & Upgrade / Upgrade] Aeroplane [<7kg / <25kg / Medium / Large]

***<Insert curriculum here>***

###  [Initial & Upgrade / Upgrade] Multi-rotor [<7kg / <25kg / Medium / Large]

***<Insert curriculum here>***

###  [Initial & Upgrade / Upgrade] Helicopter [<7kg / <25kg / Medium / Large]

***<Insert curriculum here>***

###  [Initial & Upgrade / Upgrade] Powered-lift [<7kg / <25kg / Medium / Large]

***<Insert curriculum here>***

## Nominated RePL instructors and examiner requirements

### RePL instructor qualifications

All RePL instructors conducting *[ABC RPA]*’s RePL training course must have one or more of the following instructional qualifications:

* a pilot instructor rating issued under Part 61; or
* a Certificate IV in Training and Assessment; or
* a tertiary level qualification in teaching that is recognised as such by a State or Territory government; or
* a certificate of completion or equivalent in the Principles and Methods of Instruction course; or
* ***<optional - Insert interim instructional qualification or experience requirement for operations prior to 10 October 2020>.***

### RePL instructor experience

RePL Instructors must have a minimum of ***<Insert minimum hours here, the number cannot be less than 20>*** logged hours of non-training operational experience under a ReOC, operating each of the RPAS categories for which they will be conducting practical RePL training.

### RePL examiner experience

Examiners must have ***<insert appropriate length of experience here>*** experience in RPA operations to be an examiner for each relevant RPAS type.

### RePL instructor licencing

RePL Instructors must only provide RePL training on the RPAS category and weight that appears on their RePL, *[ABC RPA]*’s ReOC and approved by the CRP in accordance with table in section 5.4.7.

### RePL instructor induction training

All RePL instructors must complete *[ABC RPA]*’s RePL instructor induction training found at Appendix *[insert* *relevant Appendix here]*.

***<Optional - The RePL instructor must demonstrate to the Senior RePL Training Instructor (SRTI) a minimum of three lessons containing aeronautical knowledge units and three lessons containing practical competency units prior to being approved as an RePL Instructor.>***

### RePL instructor currency requirements

***<Optional - All RePL instructors must have been assessed by the SRTI, conducting one lesson containing aeronautical knowledge units and one lesson containing practical competency units in the previous 12 months. The CRP must maintain a record this assessment for a period of 7 years.>***

RePL Instructors must also meet the currency requirements for Remote Pilots in accordance with ***<insert section for remote pilot currency here>***.

### RePL instructor/examiner nomination

Only a CRP who meets the requirements in section 5.4 or employees who meet the requirements in section 5.4 and who have been authorised by the Chief Remote Pilot in the table below may conduct RePL training instruction and examination.

Table 4: Record example

|  |
| --- |
| Employees authorised as RePL Instructors and/or examiners |
| **Name in full** | **ARN** | **RePL Categories authorised for training** | **RePL Examiner** | **Date authorised** |
| *William James Bones*  | *1012345*  | *Aeroplane <7kg**Multi-rotor <25kg* | *Yes* | *29/01/20* |
|  |  |  |  |  |
|  |  |  |  |  |

## RePL training course administration

### Training material amendment policy

Any proposed changes or improvements to a RePL training course lesson plans, lessons or other training related documents are required to be submitted to the CRP or SRTI for review.

### RePL instructor handbook

A guide for RePL instructors on the intent, focus and outcomes of each lesson can be found in ***<insert*** ***relevant location or appendix here>***.

The RePL instructor handbook contains the following:

* Lesson plans
* ***<optional - An RePL instructor’s guide to RPAS theory and practical lesson structure and delivery methods>***
* ***<optional - Exam/flight test examiners guide>.***

### Approved RPAS for RePL training

Aircraft to be operated for practical RePL training and supporting role equipment of the RPAS must be appropriate for the licence being applied for. The RPAS must be able to conduct all practical flight manoeuvres required for the student to meet the practical competency standards. The following RPA models are approved by the CRPfor RePL training:

* *MR <7kgs –* *[examples only - DJI Mavic, P4P, Inspire, Yuneec, Parrot bepop etc.]*
* *MR <25kgs –* *[examples only - M600, Alta 8, MD4-1000… etc.]*

### Operational training areas

The following locations are intended to be used for operational training:

* ***<insert address of relevant locations here>***

A comprehensive risk assessment must be completed and reviewed annually for RePL training areas. Additionally, each location listed above must have a flight authorisation and job safety assessment completed in accordance with the feasibility assessment procedure in section ***<insert relevant section here>***.

Job safety assessments for all operational training areas are to be stored at ***<insert location here>***.

### Course completion

A student is deemed to have successfully completed *[ABC RPA]*’s RePL training course by achieving all of the following:

* passed the aeronautical knowledge examination (if required – See section 5.6.2)
* been assessed as competent in the relevant practical competency units
* passed the relevant flight test
* remedied any knowledge deficiencies.

Each student who successfully completes *[ABC RPA]*’s RePL training course must be issued with a certificate of course completion. The certificate must:

* identify the RPA training organisation and the student
* identify the RePL training course completed, and when it was completed by the student; and
* be signed and dated by the CRP of the organisation.

A template certificate of course completion can be found at ***<insert location here>***.

### Notification to CASA

*[ABC RPA]* will notify CASA when a student successfully completes *[ABC RPA]*’s RePL training course through the [CASA Portal](https://b2cprodcasa.b2clogin.com/7a64fa9e-f7a3-429d-a668-d7ebd6feefdc/b2c_1_aem_signup_signin/oauth2/v2.0/authorize?client_id=1b856dec-abf8-4d54-ac33-9471f4cad8fc&redirect_uri=https%3A%2F%2Fmy.casa.gov.au%2F&response_mode=form_post&response_type=code%20id_token&scope=openid&state=OpenIdConnect.AuthenticationProperties%3DxT0Ufu44Eeq1j3qyTw0X3dwkI1QfkdXzQeJzo7lzmU4148hxvDlttREvFR6_hIoalhyDBADlm72jwucc1bhc2eMZZKOOlVYGFxDtbyDaR5oSnsk3N-K-w3lBmvI4TBK6kT_HcfFklhSmjQdeRQ7zIBKhzq9bizfYRgGMIKwJICJnnlfEVd2autuodciwqfVzUGceCh7RfxPD1LI21IN3uynJISyz_ehIW4bFCX3-0vDdWAmJ3pGhkeyAcGVJ2Boo32MRGqXgfQ4ZiVXq-9HqFF6Sh340wdZcWDUPXKh83CG4PY_Bni_mDNHoPUBBVWE2EPAHvn0NH9mpdFdqsP6-Ku0U33dJmcYqzMhgJMz_scNJc7Ystatw4m0gixHCVVzZ&nonce=637253707188729886.NmJjNmU0YWMtMWY3OC00MTZlLWExNDMtMDgwNjBiNmYzNTI1YWNhYzc5OTItZDYyNy00N2YwLWEwMzMtMjJhODJiMzVjMzU3), or, when the Portal is not available, by submitting the applicable form.

For students who are applying for an initial RePL and do not need to conduct the theory component of the RePL course, the applicable form must be used.

RePL application forms can be found here <https://www.casa.gov.au/drones/documents-and-forms>.

## RePL aeronautical knowledge examination

### RePL examination requirement

To pass the theory component of *[ABC RPA]*’s RePL training course, the student must pass an RePL aeronautical knowledge examination.

Where no units of aeronautical knowledge are conducted in a RePL training course, there is no requirement for the student to sit an aeronautical knowledge examination.

### RePL examination questions

The CRP is responsible for maintaining 4 unique sets of questions. Each question set must be such that, while the same topics may be the subject of questions in some or all of the sets, no questions may appear in a set:

* in exactly the same form or presentation as in any other set; or
* as requiring exactly the same answer, from exactly the same range of choices, as in any other set.

For an RePL training course which includes the aeronautical knowledge standards - Common units, the exam must be a minimum of 80 questions. The exact number will be determined by the specific units of aeronautical knowledge conducted.

Where the common units of the aeronautical knowledge component are not conducted, the minimum number of exam questions will be determined by the specific units of aeronautical knowledge conducted.

The RePL aeronautical knowledge examinations can be found in appendix *[insert relevant appendix here]*.

### RePL examination conduct

To pass the aeronautical knowledge component of a RePL training course an applicant must pass the RePL examination. The minimum mark for the examination is 85%.

***<Optional - The specifics of each RePL aeronautical knowledge examination including duration, marking process and permitted documents is detailed on the individual examination cover sheet.>***

The following applies to all exams:

* examinations, each comprising one of the unique sets of questions, must be randomly rotated:
	+ for each RePL training course; and
	+ for each examination which an applicant is re-sitting.
* the duration of each examination must be 15 minutes, plus 1 minute per question in the exam
* the examination must be supervised by an examiner
* students caught being coached or prompted by any person during the examination will automatically fail and have to re-sit a different exam
* the examination must be a closed-book examination, except for any documents concerning RPAS that are:
	+ authored by CASA and published on its website; or
	+ authored by AA and published on its website.
* immediately after the examination, the exam must be handled in a way such that no part of the examination can be retained physically or electronically by a student.

### RePL examination marking & knowledge deficiency report (KDR)

Each RePL aeronautical knowledge examination must be assessed by a RePL examiner.

Within ***<insert appropriate timeframe here>*** of completing an aeronautical knowledge examination, the examiner should provide each sitting student with their result in writing and, where appropriate, a KDR (see Appendix ***<insert relevant appendix here>*** for KDR form). In circumstances where a result and/or KDR cannot be provided within ***<insert appropriate timeframe here>***, it must be provided in writing within 7 days of completing the exam.

A KDR form is to be provided to all students who achieved a result of less than 100%. The KDR form must inform the student of the items of the aeronautical knowledge units with respect to which the student answered examination questions incorrectly by listing each incorrect answer as a knowledge deficiency. The KDR form cannot reference the exact exam question which was answered incorrectly. Each knowledge deficiency is remedied only if, after an oral examination, the student has satisfied either the examiner or the CRP that the knowledge that was the subject of the KDR has been satisfactorily understood and that this satisfaction has been recorded on the KDR form.

On completion of the KDR process, the examiner must sign the KDR form and make a copy to be added to the student’s course record, this record must be kept for a period of seven (7) years.

### RePL examination not yet competent (NYC) policy

A student who achieved less than 85% must not re-sit an examination until all knowledge deficiencies identified in the KDR form are remedied.

***<Optional - If a student does not pass the examination on the first attempt or at a second attempt, they must sit an interview with an examiner who will provide the student a written plan of study for the student to follow before a third attempt.>***The examiner must state in writing that if the student doesn’t pass on the third attempt, they will need to repeat the aeronautical knowledge component of the RePL training course. This plan is to be signed by both the student and the examiner.

If a student does not pass the examination on the third attempt no further attempts must be made without the student repeating the aeronautical knowledge component of the RePL training course and at least 14 days having passed since the previous attempt.

### RePL examination security

By providing a declaration of compliance to the CRP in accordance with the Distribution Control policy in section ***<insert relevant section here>***, each employee is agreeing to comply with the examination security procedures below.

*[ABC RPA]* employees must ensure that the 4 unique sets of questions for examinations, and each examination question within a set is not disclosed to students of *[ABC RPA]*’s RePL training courses outside of the exam conditions defined in the RePL examination conduct section ***<insert relevant section here - 5.6.2>***.

When stored physically or digitally, the 4 unique sets of questions for examinations must not be accessible to anyone who hasn’t agreed to comply with these examination security procedures.

This policy applies in all cases, except when a request for a copy of the examination or any question is made in writing by CASA.

### RePL examination amendment policy

All aeronautical knowledge examinations are to be reviewed annually.

*[ABC RPA]* may without CASA approval modify up to 10% of the total number of multiple questions in any 12-month period. Any modifications made to the examinations must be kept as a written record for five (5) years, of which questions were modified, date of the modification and why. These records are held ***<insert location here>***.

Amendments beyond 10% of the total number of questions in any 12-month period will require the exam to be submitted to CASA for approval prior to using it in an RePL training course.

## *[Optional]* Simulator training

*[ABC RPA]* will utilise simulators to achieve lesson objectives which are unable to be practically conducted and assessed due to unsafe flight conditions, variables required not being present, or being deemed not reasonable for reasons related to safety.

### Approved simulators

*[ABC RPA]* will use ***<insert name type of simulators to be used>*** for RePL training.

Procedures and policy for use of *[ABC RPA]*’s simulators can be found within ***<insert relevant Appendix here>***.

### RPA flying experience

The use of a simulator to gain RPA flying experience does not account towards the required minimum 5 hours required under RPA standard operating conditions as per CASR 101.295(2)(c).

## RePL flight test

### RePL flight test conduct

The specifics of each flight test including tested behaviours, marking process, permitted documents and equipment are to be detailed in the individual flight test and its cover sheet. A student must successfully demonstrate his or her understanding of the knowledge requirements and competency in all flight test behaviours in order to have been deemed to have passed the RePL flight test.

Only one student is to be assessed by one examiner at a time.

The RePL Flight tests can be found in appendix ***<insert relevant appendix>***.

### Flight test not yet competent (NYC) policy

In the event an applicant (student) fails a flight test, the applicant may re-attempt the complete flight test but only after completing such additional remedial training as is specified in writing by the flight test examiner on the flight test record. The specified additional remedial training must be based on the deficient competencies which resulted in the applicant failing the flight test.

## RePL Training course record keeping

### RePL examination record keeping

Each student’s aeronautical knowledge examination as completed, must be retained for no less than 12 months.

A Examination Record (see Appendix ***<insert relevant appendix here – See Appendix N>***) must be completed for each aeronautical knowledge examination conducted and retained as hard copy or stored digitally, with the course record for not less than seven years.

### RePL flight test record keeping

Each student’s flight test paper must be digitally recorded or stored as a hard copy with their student record for not less than seven years. This includes any records relating to additional training required due to deficiencies that led to a failed flight test.

## Examination Record

Table 5: Example of Examination

|  |  |  |  |
| --- | --- | --- | --- |
| Course ID  | Exam ID | Examiner | Exam Date |
|  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Applicant’s name | Applicant’s ARN | Attempt No. | Result | KDRs completed |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
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|  |  |  |  |  |

## RPL training course codes

Table 6: RPL training course codes

|  |
| --- |
| Aeronautical knowledge standards - Common units |
| **RBAK** | Basic aviation knowledge for RPAS |
| **RACP** | Airspace, charts and aeronautical publications for RPAS |
| **RBMO** | Basic meteorology for RPAS operations |
| **REES** | Electrical and electronic systems for RPAS |
| **RHPF** | Human performance for RPAS |
| **RKOP** | RPAS knowledge — operations and procedures |
| **RORA** | Operational rules and air law for RPAS |
| **RAFM** | Automated flight management systems for RPAS — knowledge |

Table 7: Aeronautical knowledge standards

|  |
| --- |
| Aeronautical knowledge standards - Category/type specific units |
| **RBKA** | RPA that is an aeroplane — aircraft knowledge and operation principles |
| **RBKM** | RPA that is a multirotor — aeronautical knowledge and operation principles |
| **RBKH** | RPA that is a helicopter — aeronautical knowledge and operation principles  |
| **RBKP** | RPA that is a powered-lift aircraft — aircraft knowledge and operation principles |
| **REFE** | RPA with liquid-fuel system — knowledge |

Table 8: Practical competency standards

|  |
| --- |
| Practical competency standards - Common units |
| **GEL** | General English language proficiency |
| **RC1** | Perform pre- and post-operation actions and procedures for RPAS |
| **RC2** | Energy management for RPAS |
| **RC3** | Manage crew, payload and bystanders for RPAS operation |
| **RC4** | Navigation and operations of RPAS |
| **RNT** | Non-technical skills for operation of RPAS |
| **RAF** | Automated flight management systems for RPAS — operation |
|  |  |

Table 9: Practical competency standards

|  |
| --- |
| Practical competency standards - Category/type specific units |
| **RA1** | RPA that is an aeroplane — ground operation and launch |
| **RA2** | RPA that is an aeroplane — normal operation |
| **RA3** | RPA that is an aeroplane — land and recover |
| **RA4** | RPA that is an aeroplane — advanced manoeuvres |
| **RA5** | RPA that is an aeroplane — abnormal and emergency operations |
| **RM1** | RPA that is a multirotor — control on ground, launch, hover and landing |
| **RM2** | RPA that is a multirotor — normal operations |
| **RM3** | RPA that is a multirotor — advanced manoeuvres |
| **RM4** | RPA that is a multirotor — abnormal situations and emergencies |
| **RH1** | RPA that is a helicopter — control on ground |
| **RH2** | RPA that is a helicopter — launch, hover and landing |
| **RH3** | RPA that is a helicopter — normal operation |
| **RH4** | RPA that is a helicopter — advanced manoeuvres |
| **RH5** | RPA that is a helicopter — abnormal situations and emergencies |
| **RP1** | RPA that is a powered-lift category aircraft — control on ground, launch, hover and landing |
| **RP2** | RPA that is a powered-lift category aircraft — transition to and from vertical flight |
| **RP3** | RPA that is a powered-lift category aircraft — climb, cruise & descent |
| **RP4** | RPA that is a powered-lift category aircraft — advanced manoeuvres |
| **RP5** | RPA that is a powered-lift category aircraft — manage abnormal situations at altitude and near the ground |
| **RLF** | Medium or large RPA with a liquid-fuel system — operation |

1. Schedule 1

RPAS Operating types

***<insert the following information for each type, configuration operated, Qty per airframe>***

|  |  |
| --- | --- |
| Manufacturer |  |
| Model / Type |  |
| Maximum Take-off Weight |  |
| Identity(ies) / Serial Number(s)  | *(e.g. Phantom 1, ABC1, etc.)* |

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

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

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

Table 10: Key personnel

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nominated Position | Name | ARN | Date Approved(from Form 101-04)(Form 101-08 if IOD) |  |
| Chief Remote Pilot | *<insert the relevant information for nominated personnel>* |  |  |  |
| Maintenance Controller |  |  | N/A |  |
| CEO |  |  | N/A |  |
|  |  |  |  |  |

1. Copy of RPA Operator’s Certificate

***<insert a copy of the RPA Operator certificate> front and back page***

1. Permissions, Exemptions and Approvals

Below is a list of ***{ABC RPA}***’s permissions, exemptions and approvals. Copies are available on our website ([***www.abcrpa.com.au***](http://www.abcrpa.com.au)), under ***<insert pathway to copies>***.

1. Risk Assessment
	1. Overview

Risk assessment is an essential part of ***{ABC RPA}***’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 ***{ABC RPA}***’s safety risk management process including the following key areas:

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



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. ***{ABC RPA}***’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 ***{ABC RPA}***’s successful risk management practices.

* 1. Establishing the context

In addition to communication and consultation, ***{ABC RPA}***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

***{ABC RPA}***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. ***{ABC RPA}*** 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 ***{ABC RPA}*** 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 ***{ABC RPA}***’s Risk Control Worksheet detailed in Table 23 (Appendix I).

* 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 13) 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 11) and Likelihood (Table 12) values are used to derive a Risk Rating (Table 13). 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 ***{ABC RPA}***’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, ***{ABC RPA}***conducts a complete review of the risk register every 12 months.

* 1. Risk Assessment Matrix – Level of Risk

Table 11: 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 12: 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 13: Risk rating

|  |  |
| --- | --- |
|  | **Consequence** |
|  | A | B | C | D | E |
| **Likelihood**  | Catastrophic | Hazardous | Moderate | Minor | Negligible |
| 5 | Frequent | 5A | 5B | 5C | 5D | 5E |
| 4 | Occasional | 4A | 4B | 4C | 4D | 4E |
| 3 | Remote | 3A | 3B | 3C | 3D | 3E |
| 2 | Improbable | 2A | 2B | 2C | 2D | 2E |
| 1 | Extremely improbable | 1A | 1B | 1C | 1D | 1E |

|  |  |  |
| --- | --- | --- |
| **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 ***{ABC RPA}*** is detailed below.

* + 1. Flight authorisation

Complete flight authorisation form located in Appendix I and submit to the CRP with the initial JSA/planning documents. Confirm the CRP has authorised the operation prior to continuing and have the flight authorisation on-site (paper/electronic copy).

* + 1. JSA Validation (on-site)

Validate the hazards identified during the job planning process by confirming there are no new risks identified. This may also require the risk control worksheet to be validated. JSA and risk worksheet located in Appendix I.

* + 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.

***<insert references, procedures, checklists and assessments>***

* + 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.

* + 1. Assembly

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

***<insert references, procedures, checklists and assessments>***

* + 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 the RPAS specific instructions. Confirm clear air for launch, confirm go / no-go criteria. Announce take-off.

***<insert information and/or procedures, checklists and assessments on onsite and landing checklists>***

* + 1. Controllability Check

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

***<insert references, procedures, checklists and assessments>***

* + 1. Radio communication

Maintain listening watch on applicable frequency and broadcast every 15 minutes during operation.

***<insert procedures, checklists and assessments for internal, external and back-up communications>***

* + 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 the RPAS Specific Instructions 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.

***<insert procedures, checklists and assessments for record logs, power down equipment, serviceable items checklist, task completed as requested etc.>***

* + 1. Post-flight Administration

Record any defects and update time in service log for aircraft. Record any battery management requirements IAW this manual and/or the specific RPAS instructions. Record flight hours in RP logbooks. Disassemble RPAS and pack up operational equipment and area for departure.

***<insert references, procedures, checklists and assessments>***

1. RPAS Type Specific Procedures
	1. DJI Phantom 4

***<insert a separate section for each RPA operated>***

* + 1. Pre-flight & Post-flight Check

***<insert references to Manufacturer’s User Manual, pre-flight and/or post-flight checklists>***

* + 1. Specific Emergency procedures

***<insert*** any type specific emergency procedures>

* + 1. 2.2 Maintenance Schedule

***<insert references to Manufacturer’s User Manual, pre-flight and/or post-flight checklists>***

* + 1. 2.3 RPAS Maintenance & Operational Manual(s)

***<insert links to Manufacturer’s Manuals>***.

Table 14: Sample

|  |  |
| --- | --- |
| Title  | Web link  |
| User manual v1.4  | http://www.dji.com/product/phantom-2/download?www=v1  |
| Quick Start Guide v1.2 |  |
| Firmware update v1.3  |  |
| Online tutorials |  |

* + 1. Battery management

***<insert battery management procedures or links to Manufacturer’s Manual>***

1. Specialised Procedures

BVLOS – Reserved.

EVLOS – Reserved.

* 1. Tethered Flight within 3 NM of controlled aerodromes
		1. Tether system and components
			1. Overview of system

The tether system used is <insert type of system and manufacturer>

* + - 1. Minimum crew required

The minimum crew to operate is a remote pilot and second person as the tether operator.

* + - 1. Training required for crew to operate under the ReOC

All crew will perform a minimum of (five) 5 successful tethered operations in a training environment prior to conducting commercial tethered operations. Theory training is also conducted, in which each remote pilot must correctly calculate the length of the tether for 5 different locations. (Refer to part C of the operations manual)

* + - 1. RPA used

The RPA used will be <drone>.

* + - 1. Minimum Equipment List

Tether unit, detachable landing gear attachment, tether manual, tether weight plates etc.

* + 1. Common phraseology

While conducting tethered operations, the following words and phrases in each respective section are to be used.

* + - 1. Remote pilot commands

Table 15: Remote pilot commands

|  |  |
| --- | --- |
| **Challenge** | **Response** |
| Taking off, release tether | Copy taking off |
| Release tether | Releasing tether |
| Retract tether | Retracting tether |
| Hold tether | Holding tether |
| Landing, retract tether | Copy landing |
| Slow release / retract | Slowing release / retract |
| Speed up release / retract | Speeding up release / retract |
|  |  |

* + - 1. Tether operator commands

Table 16: Tether operator commands

|  |  |
| --- | --- |
| **Challenge** | **Response** |
| Stop climbing  | Stopped |
| Stop descending  | Stopped |
| Proceed on task | Copy (climbing/descending/moving) |
|  |  |

* + - 1. Emergency commands (common terms)

Table 17: Emergency commands

|  |  |
| --- | --- |
| **Challenge** | **Response** |
| STOP STOP STOP | Copy stop |
|  |  |

* + 1. Pre-flight planning
			1. Areas of operation

These operations are not permitted in the black shaded areas shown below. The grey and white areas indicate where operations of a tethered RPA are permitted provided that the maximum length of the tether does not breach the obstacle limitation surfaces (OLS) and/or is a maximum of 150 ft (45 m). Outside 3 NM and within the black or cross-hatched area, the maximum length is 150 ft (45 m), or, 300 ft (90 m) respectively.



Figure 5: Area of operation

Figure 6: Illustration above to be applied for multiple runway aerodromes

* + - 1. Military Controlled aerodromes

Within restricted airspace at a military controlled aerodrome, a valid letter of agreement (LOA) permitting tethered operations must be obtained from the controlling authority. At all times, the operator must ensure that a clearance has been obtained from the controlling authority prior to taking off.

* + - 1. Calculating the maximum length of tether

ABC Drones must calculate the actual length of tether permitted by using the following formula and referenced table:

**Length of tether permitted (actual) = T
Length of tether permitted as per MOS chapter 4 = a
Elevation of tether ground attached point** (google earth must be used) **= b
Aerodrome reference point (ARP) elevation = c** (reference table in section 1.8)

Equation: T = *a – (b – c)*

Example: Where the tether ground attachment point is 250 ft AMSL; the aerodrome elevation is 200 ft AMSL: and the location is assumed to be in the grey area with a maximum tether length of 150 ft.

T = 150 - (250 - 200)
T = 150 - (50)
T = 150 - 50
T = 100 ft

Therefore, the maximum length of the tether permissible is 100 ft.

* + - 1. Risk assessment and flight authorisation

The risk assessment developed for these operations needs to consider the environment in which the RPA is operating. There are still inherent risks for low flying aircraft. It is mandatory that an appropriately qualified crew member monitor an aviation radio while conducting these operations.

All operations conducted IAW this appendix must be approved by the CRP.

* + - 1. NOTAMs

The CRP must ensure that a NOTAM has been raised for each operation performed IAW these procedures. The NOTAM must be submitted to rpas@casa.gov.au at least 48 hours prior to the operation.

* + 1. Checklists

Provide the procedure to set up the tether system.

This can be the manufacturer's procedure or an internally developed process to instruct the remote pilot on setting up.

* + - 1. Pre-flight

Below is an example of a pre-flight procedure:

1. Confirm NOTAM is active
2. Check serviceability of tether components
3. Layout tether line to the take-off / landing point
4. Attach tether to RPA and confirm correct by second independent inspection
5. Note maximum height and: set tether length.
6. Proceed on task using common phraseology as per section 1.2.

**Note:** Include any further steps or alterations.

* + - 1. Landing/post flight

[Below is an example of a pre-flight procedure]:

1. Confirm intention to land with crew
2. Commence tether retract and monitor
3. Announce “hold tether” when the RPA is just above the landing area
4. Pilot in command to announce when it is safe for crew to approach RPA once landed
5. Inspect tether for any damage and pack up if necessary.

**Note:** Include any further steps or alteration

* + 1. Limitations

Provide a list of any manoeuvring limitations / restrictions.

* + - 1. Limitations in flight

Table 18: Limitations in flight

|  |  |
| --- | --- |
| Vertical speed | 3 m/s |
| Horizontal speed | 5 m/s |
| Lateral distance from tether point | 15° or 10 metres |
| Flight time (may be reduced) | Less 10% |
| Minimum tether line strength | Weight of RPA x a certain factor, or prescribed strength  |
| Sighting | Operation must be visual line of site |
| NOTAM | NOTAM must be confirmed prior to take-off |

**Note:** Examples provided are subjective and not necessarily actual limitations required.

* + 1. Emergency procedures
			1. Tether retract unit inoperable

-If tether operator announces "stop stop stop"
- Pilot must keep RPA in stable position
- Tether operator to manually wind tether line and control descent

* + - 1. RPA lost link

- Pilot announces, "lost link, hold tether"
- Tether operator "holding tether" and await further commands from pilot
- If link cannot be re-established, tether operator will manually wind in RPA

* + - 1. RPA flight controller failure

- Pilot announces, "flight control failure" and provides heading and direction
- If safe to do so, tether operator will manually wind in RPA.

* + - 1. List any additional relevant emergency procedures
		1. Maintenance procedures

The tether unit and components are to be inspected before and after each flight. Additionally, a complete check of the winding unit and pay-out of tether must be completed every 50 flights / 25 hours (or more restrictive minimum criteria specified by OEM).

* + 1. ARP elevation data

Google earth elevation datums.

Table 19: Airservices Australia controlled aerodromes.

| No. | Name | Code | ARP elevation (c) | No. | Name | Code | ARP elevation (c) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | Sydney | YSSY | 4 m | 15. | Archerfield | YBAF | 6 m |
| 2. | Bankstown | YSBK | 6 m | 16. | Maroochydore | YBSU | 4 m |
| 3. | Canberra | YSCB | 571 m | 17. | Rockhampton | YBRK | 8 m |
| 4. | Albury | YMAY | 161 m | 18. | Mackay | YBMK | 4 m |
| 5. | Coffs Harbour | YCFS | 2 m | 19. | Hamilton Island | YBHM | 4 m |
| 6. | Tamworth | YSTW | 407 m | 20. | Cairns | YBCS | 1 m |
| 7. | Melbourne | YMML | 113 m | 21. | Adelaide | YPAD | 5 m |
| 8. | Essendon | YMEN | 79 m | 22. | Parafield | YPPF | 14 m |
| 9. | Moorabbin | YMMB | 15 m | 23. | Perth | YPPH | 17 m |
| 10. | Avalon | YMAV | 10 m | 24. | Jandakot | YPJT | 29 m |
| 11. | Hobart | YMHB | 2 m | 25. | Broome | YBRM | 17 m |
| 12. | Launceston | YMLT | 166 m | 26. | Karratha | YPKA | 10 m |
| 13. | Brisbane | YBBN | 0 m | 27. | Alice Springs | YBAS | 545 m |
| 14. | Coolangatta | YBCG | 6 m | 28. | Camden | YSCN | 68 m |

Table 20: Australian military-controlled aerodromes

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Name | Code | ARP elevation (c) |
| 1 | Amberley | YAMB | 26 m |
| 2 | Darwin | YPDN | 32 m |
| 3 | East sale | YMES | 6 m |
| 4 | Edinburgh | YPED | 17 m |
| 5 | Gingin | YGIG | 82 m |
| 6 | Nowra | YSNW | 108 m |
| 7 | Pearce | YPEA | 41 m |
| 8 | Point cook | YMPC | 2 m |
| 9 | Richmond | YSRI | 21 m |
| 10 | Tindal | YPTN | 135 m |
| 11 | Townsville | YBTL | 5 m |
| 12 | Williamstown | YWLM | 6 m |

1. Emergency Procedures

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

* 1. Low battery (RPA/transmitter)

***<insert procedures, checklists and assessments for partial loss, intermittent loss, complete loss>***

* 1. GPS Loss

***<insert procedures, checklists and assessments for partial loss, intermittent loss, complete loss>***

* 1. Loss of control situations

***<insert procedures, checklists and assessments for C2 link loss-partial-intermittent-complete loss, servo fail, IMU fail, motor fail>***

* 1. Lost aircraft procedures

***<insert procedures, checklists and assessments for uncommanded fly away>***

* 1. Loss of VLOS

***<insert procedures, checklists and assessments for visual loss of sight>***

* 1. Manned aircraft enters flight area of RPAS operations

***<insert procedures, checklists and assessments for a situation in which a manned flight enters the flight area of an RPAS operation>***

* 1. Non-company person enters flight area of RPAS operations

***<insert procedures, checklists and assessments for a situation in which a non-company person enters the flight area of an RPAS operation>***

* 1. Radio fail

***<insert procedures, checklists and assessments for handling a radio fail, including aviation radio and internal crew radio >***

* 1. Environmental emergency procedures

***<insert procedures, checklists and assessments for environmental emergencies, such as birds, unexpected clement weather conditions etc.>***

* 1. Emergency procedures resulting in a crash

***<insert procedures, checklists and assessments for post-crash, injured person, ground fire started by RPA, lost/unfound RPA etc.>***

* 1. Emergency procedures during night VLOS conditions

***<insert procedures, checklists and assessments for loss of RPA orientation lights, loss of landing area lights, RPIC blinded by lights etc.>***

* 1. Emergency contact and reporting requirements

***<insert procedures, checklists and assessments for contacts during an emergency and reporting lines and requirements>***

1. Forms

I1 - Flight Authorisation Form

I2 - Pre-operational Briefing Form
I3 – Job Safety Assessment

I4 - Risk assessment worksheet

I5 - Time in service log

I6 - Defect and maintenance log

I7 - Policy and procedure training syllabus

I8 - RPA Type training syllabus

I9 - NVLOS training syllabus

* 1. RPAS operational release

Table 21: RPAS operational release example

|  |
| --- |
| **Task/job number:** |
| Date/time of the operation |  | Location (specific or coordinates) |  |
| RPAS type/model |  | Unique RPA ID(s) |  | Is it serviceable? | Y | N |
| RPA controller |  | Maximum Height |  |
| VLOS |  | EVLOS |  | BVLOS |  |
| RPIC (name/ARN) | 2nd RP (name/ARN) | Observer / Crew(name/ARN) |
|  |  |  |
| Task Description (nature and purpose of the operation) |
|  |
| Normal procedure |  | Specialised Procedure |  | Has CASA issued an instrument for this operation? | Y | N | Do you have a copy with you? | Y | N |
| Local area frequencies |  |
| Emergency contact numbers |  |

|  |
| --- |
| **Restrictions/limitations applied *(CRP to complete)*** |
|  |
| Flight Authorisation | Approved?(circle applicable) | YES | NO |
| CRP ARN |  | Sign: | Date: |
| RPIC ARN |  | Sign: | Date: |

|  |  |  |  |
| --- | --- | --- | --- |
| **Post flight actions *(RPIC to complete)*** | **Were there any changes to the details above?** | **YES** | **NO** |
| *If yes, record changes here:* |
| Has the *time in service log* been finalised? | YES | NO |

Task details:

***>insert items such as: Flight Path(s), Area of Operation boundaries, duration of flights, Max Altitude, time of day/night, task requirements, other specific requirements>***

CRP notes:

***<insert items to be confirmed or completed before flight (NOTAM active, contact tower, consent of person gained, seek out landholder, establish comms VHF/UHF, conduct crew check, weather & any relevant NOTAMs checked via NAIPS, No-Fly areas, extra signage needed, revise CASA instrument before operations commence etc.)>***

Revised authorisation details:

***insert items to be confirmed or completed if the operation requires re-authorisation due to changes with crew, operational, environment, equipment etc. (refer to guidance for further detail)***

* 1. Pre-Operational Briefing

The following briefing is given by ***{ABC RPA}***’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. ***{ABC RPA}*** 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.

Table 22: Pre-operational briefing

|  |  |
| --- | --- |
| **Action** | **✓** |
| Overview of the mission as planned |  |
| Any specific tasking for crew member (e.g. person tasked with observing for people straying into the area of operation) |  |
| Possible issues and identification of hazards associated with the mission including planned action |  |
| How the RP will communicate any problem and/or subsequent action |  |
| Identification of alternate landing area |  |
| Identification of a safe zone |  |
| Action following an incident |  |
| Notes/comments specific to mission |  |
| Emergency contact numbers |  |
|  |  |
|  |  |
| ***<add any other relevant information as needed>*** |  |

* 1. Job Safety Assessment (JSA)

|  |  |  |  |
| --- | --- | --- | --- |
| Company |  | Date |  |
| Task/Job number: | Location (physical address / Lat Long coordinates): | Check the following and address as needed: |
|  |
| ✓Sketch of area / 3rd party mapping images  | Maps and charts available and checked |  |
| Weather, within limits for RPA and operation |  |
| Airspace classification and requirements, 100ft buffer underneath controlled airspace available |  |
| NOTAMs |  |
| Possibility of public moving into area |  |
| Footpath/right of way |  |
| Landing area including alternate |  |
| Ability to maintain 30 metres of public |  |
| Obstructions (buildings, trees) (‘Return to Home’ height setting) |  |
| Possible interference (Powerlines/antennas) |  |
| Ability to maintain visual line of sight |  |
| RP’s ability matches location/task |  |
| Permission of any landowners |  |
| Privacy |  |
| Local restrictions/by laws |  |
| Signage placement |  |
| Jobs specific threat and error management |  |
|  |  |
| RP |  | Signature |  |  |  |
| Crew |  |  |  |
| Comments: |

Table 23: JSA

* 1. Risk Assessment Worksheet

Table 24: Risk assessment worksheet

|  |
| --- |
| **<*Insert organisation name*> Risk register** |
| Reference number | Date entered in register | Hazard  | Risk description | Existing controls | Initial risk | Additional controls | Residual risk  | Risk owner | Review due date |
| Likelihood | Consequence | Risk rating | Likelihood | Consequence | Risk rating |
| *01* | *23/5/20* | *Weather*  | *Bad weather results in the loss of control of the RPA and subsequent collision with terrain* | * *Only RePL holders conducting flights*
* *Risk assessment required before each flight*
* *Operations manual requires consideration of weather conditions*
 | *2 - Improbable* | *B – Hazardous* | *2B - Medium* | * *Prescriptive limits on wind and visibility to be determined and entered in Operations Manual*
 | *1 – Extremely Improbable* | *B – Hazardous* | *1B - Low* | *Chief remote pilot* | *23/8/20* |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

* 1. RPAS Time in Service Log (part 2 of the RPAS technical log)

Table 25: RPAS time in service log

RPAS model/type \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ unique ID \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Date | Pilot | Pre-flight inspection completed (Initials) | Post-flight inspection completed (Initials) | Is the RPA unserviceable? | If yes, what is the nature of the unserviceability | Time in service this operation | Total time in service |
| Brought forward |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
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* 1. Defect and Maintenance Log (part 1 of the RPAS technical log)

Table 26: Defect and maintenance log

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RPA Type** |  | **RPA model** |  | **Unique ID** |  |
| **ID of RPA in previous configuration** |  | **Maximum gross weight** |  | **Minimum gross weight** |  | **Is any failsafe equipment unserviceable** | **Y** **(complete A-C below)** | **N** |
| **A – Description of equipment** |  | **B – explanation of unserviceability** |  |
| **C – Precautions or limitations for operation** |  |
| **Defect Number** | **Description of defect or maintenance required**  | **Name, Date****Signature** | **Rectification and confirm if the RPA is serviceable (MC to complete)** | **Name, Date****Signature** | **Next service due (date/operational time)** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
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1. Policy and Procedure Training Syllabus

***{ABC RPA}*** provides this training to any person who is proposing to act in any capacity as crew operating under the ReOC of {ABC RPA}. Each person undergoes training and ***{ABC RPA}***’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.
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 subclause 2.2 and competency, in the units of competency mentioned in subclause 2.3, by performing manoeuvres with an aircraft in the category he or she wishes to operate in, within the accuracy / tolerances specified in subclause 2.3.

For subclause 1.1, a sustained deviation outside the applicable flight tolerance is not permitted.

For subclause 2.3, 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

***<Detail any minimum experience required to be appointed as SRP e.g. 25 hours PCID, five (5) night flights, operated within 3 NM of controlled aerodrome etc.>***

* 1. Training

***{ABC RPA}***’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.
	1. Assessment

***{ABC RPA}***’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. ***{ABC RPA}***’s can be found <insert location>.

* + 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

Table 27: Approved Senior Remote Pilots sign off sheet

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name of SRP | ARN | Date of approval | Review date | CRP signature |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

* 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 28: SRP delegation form example

|  |  |
| --- | --- |
| 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 |  |
| Additional items | (May add extra lines and items if required) |

* 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>
* continuing audit procedure.