

[Company Name]

## Appendix 4 - RPAS Operational Procedures (Library)

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## General

### Applicability

The RPAS Operational Procedures (Library) is available to all people conducting activities under the authority of the Remotely Piloted Aircraft Operators Certificate (ReOC). The Chief Remote Pilot 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
- appendices containing supporting documentation such as, but not limited to: copies of authorisation forms, briefing material, training syllabi, JSA, risk assessment, RPAS time in service log and defect and maintenance logs

The specific section for each RPAS will include 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.

Information included in this document may be a hard copy or electronic document, or included by reference to an external source.

The Chief Remote Pilot will ensure that all information required to safely conduct an operation is available to all persons working under the authority of the ReOC. Where online information is used, the Chief Remote Pilot will consider the availability of online connections prior to the authorisation of the operation

### Distribution Control

The Chief Remote Pilot shall annually review the contents of this document to ensure the relevance and currency of all procedures. A record of the review shall be made in the revision log of the Chief Remote Pilot's copy of the manual indicating that the review has been completed and indicating whether any amendments were required as a result of the review.

### Amendment Procedure

This is a living document that contains procedures and information relevant to the safe operation of RPAS. The procedures and information detailed will be approved and controlled by the Chief Remote Pilot. Persons working under the authority of this ReOC will be advised of any changes to this document, including the inclusion of any new procedure or information.

Where in the light of operating experience, errors are found in procedures or information these deficiencies will be reported to the Chief Remote Pilot.

Unless otherwise directed by CAAV, all changes to this document will be accepted and approved by the Chief Remote Pilot.

## Revision Log

Date	Affected sections	Summary of revision	Authorised by

## Section 1 – Company Procedures

### Specialised Operations

#### Normal Procedures

Details of what operations you intend to conduct. Within this section detail how you would walk through conducting an operation. List the steps you take in conducting that activity.

Topics within the general operating procedures could include but are not limited to:

- Contact client for details of Operation required
- General Instructions covering all types of operations
- RPAS operating procedure in accordance with your Operations Manual, Manufacturers Manuals or Instructions etc. References to these other documents is acceptable
- Third party considerations i.e.: Property/Land Owners as part of any operation
- Job planning including validation of JSA. Referencing to checklists
- Flight Authorisation. Referencing to checklists
- Clear Area for take-off and landing zones, warning signs
- Weather check both visual and Area
- Risk Control sheet completed
- Briefing of spotters and crew
- Preparing Aircraft and accessories for flight
- Pre-flight and Post flight checklists onsite and completed
- Check radio communication is suitable and operational
- Failsafe and return to home set up
- Battery check prior to flight

Should any of the operations require additional procedures not contained within the above general procedures, this should be detailed here.

Include a list of forms, checklists, assessments required for all operations. If different checks are required for the different aerial work functions, this needs to be detailed here. Reference to Appendices, hyperlink to Manufacturers Manuals, Organisations authorisations or requirements should be included

Emergency Procedures

Insert Emergency Procedures to be followed in the event of loss of control whilst inflight such as:

- Immediate action to take in the event of aircraft malfunction and possible corrective action. Include references to other manuals if applicable
- Communication plan for all personnel onsite and involved with the operation
- Report procedure if incident/accident occurs. Include reference to other documents or manuals if applicable
- Post-crash procedure
- Lost aircraft procedure
- Lost link procedure
- Reporting incident/accident/emergency to Chief Remote Pilot procedure
- Serviceability and assessment of the aircraft. How and who. Could reference a checklist or other manuals
- Emergency contacts. Could refer another manual or document
- GPS Failure. Organisations procedure. Include reference to other documents or manuals if applicable

Operations within 4 km of Uncontrolled Aerodromes

Insert procedures to be followed for operations within 4 km of uncontrolled aerodromes such as:

The relevant air traffic service frequency or frequencies, or the relevant CTAF (as applicable) must be monitored for aircraft traffic 15 minutes before the first launch and then continuously for the duration of the operation of the RPA.

For operations within a Control Zone (CTR) the appropriate air traffic control tower must be contacted by telephone and informed 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.

For operations within a CTR, any transponder fitted to the RPA must not be activated unless specifically requested to do so by air traffic control.

For operations within Class G airspace only unless directed otherwise, the location of the RPA must be transmitted using call sign 'Unmanned RPA' 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.

For operations at a non-controlled aerodrome marked on aeronautical charts, the location of the RPA must be transmitted using call sign 'Unmanned RPA' on the relevant CTAF 15

minutes before the first launch and then at 15 minute intervals for the duration of the operation of the RPA.

The chief remote pilot must ensure that the RPA is not flown, within 500 feet vertically and within 1500 metres horizontally of any aircraft.

The operator must ensure that in the period from 15 minutes before the RPA is launched to the time that the RPA lands, at least one person who is trained as an observer in accordance with the operator's Operations Manual:

- is in a location that enables that person to assist with traffic avoidance; and
- has continuous two way communication with the remote pilot of the RPA

The chief remote pilot must ensure that the RPA is equipped and operated with an active fail safe mode that will ensure that, in the event of a data-link loss with the RPA or any loss of control of the RPA, the RPA will:

- adjust altitude to the minimum safe level to provide obstacle clearance and minimum potential for collision with other aircraft, in any case not above 400 feet AGL;
- transit to a predefined safe landing or flight termination area; and
- land or otherwise terminate the flight.

Operations outside of day VMC conditions – Specifically at night

[Insert procedures to be followed for operations outside of day VMC conditions – Specifically at night such as:](#)

Unless otherwise permitted by a separate instrument of approval from CAAV all operations at night must only be undertaken in class G airspace below 400ft AGL with the aircraft remaining within visual line of sight at all times.

Operations at night must only be conducted by the chief remote pilot or authorised remote pilots named below who have completed training and testing in the operation of an RPA at night and who are current on type. Information on training and testing can be found in the [ReOC holder's operations manual](#).

Name in full	Training completion date	Currency end date	Signed
<i>e.g., William James Bones</i>	<i>29/09/16</i>	<i>29/12/16</i>	

Operations at night must only be conducted in conditions that would otherwise be considered VMC. Assessment of any operations should include a detailed review of the forecasted weather conditions on the day to ensure VMC requirements can be met. Additionally, an onsite assessment must be undertaken by the chief remote pilot/remote pilot to ensure the operation will be within VMC. Note: cloud base heights can be difficult to discern at night and can drop rapidly, so extreme caution should be taken where operations are conducted where low cloud base is anticipated.

Operations at night must only be conducted where a Job Safety Assessment has been completed and signed off by the chief remote pilot. All Job Safety Assessments must include an onsite recce which has been conducted in day VMC. This recce should be used to identify any obstacles or hazards that would not be apparent to a pilot flying at night such as powerlines or building antenna's etc.

All take-off and landing areas must be illuminated to near daylight conditions to assist the pilot in safe take-off and landing.

The RPA must be fitted with the following equipment; all equipment noted below must be checked as part of any pre-flight procedure and should be included within ABC's RPA maintenance program. [Operators should amend their pre-flight checks and maintenance procedures 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 indicates a positive satellite lock has been achieved by the RPA. Where the manufacturer does not specify a number of satellites to gain lock then the aircraft shall 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 to say distance and bearing from the operator and a height above ground level. Note: Where an RPA [uses Above Mean Sea Level \(AMSL\) data then the operator must have a means to readily convert AMSL data to Above Ground Level \(AGL\) data.](#)
- Sufficient lighting to ensure positive identification of the RPA once in flight, and to ensure that the orientation and direction of the aircraft can be determined visually by the Pilot in Command. [This might be high output coloured LED's fitted to the arms/wing tips of the RPA.](#)

During the JSA process consideration must be given if rain or if a thunderstorms is observed or reported within 5km of the operational location.

The chief remote pilot must ensure that the RPA is not flown, within 500 feet vertically and within 1500 metres horizontally of any aircraft.

As part of the JSA process the CRP must consider the safety benefit associated with having at least one person who is trained as an observer in accordance with the operator's Operations Manual:

- is in a location that enables that person to assist with traffic avoidance; and
- has continuous two way communication with the remote pilot of the RPA

The CRP must ensure that the RPA is equipped and operated with an active fail safe mode that will ensure that, in the event of a data-link loss with the RPA or any loss of control of the RPA, the RPA will:

- adjust altitude to the minimum safe level to provide obstacle clearance and minimum potential for collision with other aircraft, in any case not above 400 feet AGL;
- transit to a predefined safe landing or flight termination area; and
- land or otherwise terminate the flight.

Operations between 30m and 15m - Non-company personnel

[Insert procedures to be followed for operations between 30m and 15m - Non-company personnel such as:](#)

Any operation within 30 metres of non-operational personnel requires the following equipment as a minimum.

The RPA should have:

- a dual parallel redundant battery system with duplicated battery mountings
- demonstrated ability to fly safely with one 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 7 GNSS satellites.

As part of the procedure for operation within 30m of non-operational personnel the Chief Remote Pilot must, in addition to all other normal operational requirements, perform 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 must consider, 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 to a particular operation have been identified the Chief Remote Pilot must implement sufficient strategies to mitigate the risks. Mitigation strategies are not limited to but 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 30m of RPA
- pre-determined plan of action in case of control or other issues.

If the 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 the operations manual and any other instrument issued by CAAV the task should not proceed.

The Chief Remote Pilot must also consider the overall risk where multiple risk factors have a high score.

Consent of third parties

Any operation within 30 to 15m of a person(s) requires the consent of each individual. The Chief Controller should note that a body corporate or any other entity cannot give such consent on behalf of any individual.

When seeking consent all individuals should be informed of the CAAV regulation as written, and any additional risks identified by the operator that may be attributed to the operation of the RPA within 30m of a person. Whilst not a requirement, CAAV recommends that a written briefing is provided to each person, and each person is asked to sign a consent form attached to the briefing. Gaining written consent in this way will ensure that should an incident or accident occur, the operator can demonstrate to any investigating authority that they had operated within the intent of the regulation.

Cargo Handling – Delivery Flights

BVLOS Operations

- **Equipment requirements for BVLOS Ops**
- **Mission Route Planning for BVLOS Ops**
- **BVLOS Loss link procedures**
- **BVLOS GPS loss procedures**
- **BVLOS Crash procedures**

## Section 2 – Details of RPA Operated

*There should be a separate section created for each RPA operated*

### Pre-flight & Post-flight Check

Could refer to the Manufacturers User Manual or any pre-flight or post-flight checklists the organisation has developed

### Maintenance Schedule

Could refer to the Manufacturer's User Manual or any pre-flight or post-flight checklists the organisation has developed

### RPAS Maintenance & Operational Manual(s)

Copy of RPA Flight are manual is kept in hardcopy in the office or can be also obtained from the web links.

Aircraft type	Title	Web link
Eg. DJI Phantom2	User manual v1.4	<a href="http://www.dji.com/product/phantom-2/download?www=v1">http://www.dji.com/product/phantom-2/download?www=v1</a>
	Quick Start Guide v1.2	List link
	Firmware update v1.3	List link
	Online tutorials	List link

If maintenance is performed and you intend to conduct Test Flights, details of the requirements and procedure could be included here. Reference to any manuals or checklists could be included.

### Battery Management

An Organisational Policy for battery care should be detailed here. This could include references to Manufacturers Guidelines. Other considerations could include but are not limited to:

- Battery Care and Charger Use
- Battery Ratings
- Storage
- Replacement/Disposal
- Battery Register/Log

## APPENDIX 1 - Flight Authorisation Form

Task		
Date	Location	RPAS System
Task Description		

RP	2 <sup>nd</sup> RP	Observer / Crew
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Operation details		
Local Area Frequencies	Emergency Contact Number	
Notes (special operational procedures, permissions, etc.)		

Flight Authorisation		
Chief Remote Pilot		Date
Remote Pilot		Date

## APPENDIX 2 - Pre-Operational Briefing

The following briefing is to be given by the Remote Pilot to all persons involved in the RPAS operation. The Remote Pilot is also responsible to ensure the emergency contact telephone numbers are to hand.

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 remote pilot 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	

*Any additional requirements for this operation must be added*

## APPENDIX 3 - Policy and Procedure Training Syllabus

- Manuals
- Specific procedures including briefing requirements
- Conduct of Job Safety Assessments (JSA) and Risk Management
- Maintenance procedures and authorisations
- Safety and risk management strategies and WH&S
- Crew co-ordination and support crew duties

## APPENDIX 4 - RPAS Type Training Syllabus

### **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

### **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
- Non-normal procedures
- Safety

## APPENDIX 5 - Job Safety Assessment

Company				Date	
Task		Location		Check the following and address as needed	
Sketch of area (if necessary)				Maps and charts available and checked	
				Weather, within limits for RPA and operation	
				Airspace classification and requirements	
				NOTAMs	
				Possibility of public moving into area	
				Footpath/right of way	
				Landing area including alternate	
				Ability to maintain 30M of public	
				Obstructions (buildings, trees) ('Return to Home' height setting)	
				Possible interference (Powerlines/antennas)	
				Ability to maintain visual line of sight	
				Remote Pilot'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:					



- (a) the RPA meets the equipment requirements for an N-VLOS flight.
- (b) a risk assessment is completed taking into account night visual conditions.

## **2.2 Night Operations**

- (a) Perform all normal manoeuvres under N-VLOS conditions using either manual control or an AFMS.
- (b) Orient and navigate the RPA efficiently and safely at distance.
- (c) Maintain an effective lookout for other aircraft and take appropriate action to maintain separation and prevent conflict.

## **2.3 Night Landing**

- (a) Lands the RPA safely and without damage within N-VLOS tolerances.

## **3 Range of variables**

- (a) Various payloads and RPA configurations
- (b) Operations both in dark conditions and under artificial illumination
- (c) Various weather conditions

## **4 Underpinning knowledge of the following:**

- (a) RPA equipment requirements
- (b) Human performance considerations
- (c) Night operation considerations
- (d) Knowledge of rules and considerations under artificial illumination
- (e) N-VLOS operational requirements for operations at a controlled or non-controlled aerodrome (if required)

## **N-VLOS-P: Night visual line of sight - Practical**

### **Flight test requirements**

- 1.1 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 clause 2 and competency, in the units of competency mentioned in clause 3, by performing manoeuvres with an aircraft in the category he or she wishes to operate, within the accuracy/tolerances specified clause 3.
- 1.2 For subclause 1.1, a sustained deviation outside the applicable flight tolerance is not permitted.
- 1.3 For Schedule 3, if sufficient cross-wind 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.
- 1.4 Note that flight tests elements for VLOS approval may be combined into a single test or conducted over a number of flights.

### **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 chief remote pilot:
  - RPA requirements for night flight
  - Additional considerations for RPA flight at night (compared to a flight during the day)

- Applicable rules and considerations for flight at night under bright lights
- Knows the definition of 'night' for aviation purposes.
- Describe the considerations for carrying out an N-VLOS flight at a controlled or non-controlled aerodrome (if applicable)
- Understands some of the visual illusions and human performance limitations that may eventuate with N-VLOS flight.

### **Practical flight standards**

- Ensures the aircraft is fit to fly and equipped for night flight
- Competently conducts all normal manoeuvres at night competently manually or with AFCS as applicable
- Under manual or automated control is able to orient and navigate the aircraft efficiently and safely at a distance from the control station
- Maintains an effective look-out for other aircraft and takes appropriate action to maintain separation and prevent conflict.

### **N-VLOS-T: Night visual line of sight - Theory**

#### **2. Flight at night Theory test**

- 2.1 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.
- 2.2 Define 'night' for aviation purposes.
- 2.3 Describe the aircraft equipment requirements for an N-VLOS.
- 2.4 Describe the considerations for carrying out an N-VLOS flight at a non-controlled aerodrome.
- 2.5 Describe the additional considerations for coping with equipment failures at night.

#### **3 Human Performance**

- 3.1 Explain the relevant human performance and physiological limitations for the conduct of RPAS operations at night.
  - 3.1.1 Describe dark adaptation of the eye and how long the eye takes to fully adapt to night conditions.
  - 3.1.2 Describe the why lights have a red filter during night operations.

#### **4 Risk Assessment – Night Operations**

- 4.1 Describe and list any special precautions a remote pilot might take for a night operation.

