Giles Clark Photography

UAS Operating Safety Case

CAP722 Operations Manual version 001.1

Robert Clark, Proprietor, Giles Clark Photography
12/12/2017

This Operations Manual, in accordance with the Civil Aviation Authority's Guidelines on the use of unmanned aircraft in UK controlled airspace (CAP722), has been drafted by Robert Clark on behalf of Giles Clark Photography (GCP).

This document represents GCP's commitment to adhere to Articles 86, 87 and 166 of the ANO and CAP722 regulations, permissions and restrictions such that it can operate a UAV / UAS safely and professionally at all times. In addition, this document, having been approved by a NQE on behalf of the CAA, and signed by Robert Clark of GCP, will be regularly reviewed and updated in accordance with current legislation, technology and revised guidelines to demonstrate an ongoing comprehensive understanding of safe operating procedures

Amendment Record

Amendment No.	Date	Amended by	Signed

Acronyms and Abbreviations

NQE	National Qualified Entity
CAA	Civil Aviation Authority
PfCO	Permission for Commercial Operation
UAV	Unmanned Aerial Vehicle
UAS	Unmanned Aerial System
PL	Public Liability (Insurance)
PI	Professional Indemnity (Insurance)
PIC	Person (Pilot) in Charge (Command)
ANO	Air Navigation Order
GCP	Giles Clark Photography
RPS	Remote Pilot Station (Ground Control Station)
VLOS	Visual Line of Sight
AO	Area of Operations
SUA	Small Unmanned Aircraft
NOTAM	Notice to Airmen
MORS	Mandatory Occurrence Reporting System

Contents

1 Introduction

Giles Clark Photography is committed to providing UAV-based aerial photography in a safe and professional manner. In order to do this, besides having the skills and experience to produce high quality imagery, we strive to demonstrate an understanding of all associated risks and to comply with all restrictions, permissions and safety procedures such that we can confidently operate UAV's with a valid and current PfCO. In addition, we are committed to complying with CAP722 requirements including the operating procedures as set out in this document and to ensure that all assignments and operations are covered by the appropriate UAV-specific insurance, PL and PI insurances. Most importantly though, this document shall serve as a demonstration of GCP's ability and commitment to operate a UAV in a manner that minimizes the risk of injury to the general public, representatives of GCP, Operators or damage to property. To achieve this, all representatives of GCP, agents and marshals, or anyone who may be at risk during UAV operations, shall be fully briefed on the safety management procedures as set out in this document and shall at all times be required to comply with instructions from the PIC.

2 Organisation

a. **Organisational Structure** - Giles Clark Photography is a Sole Trader company established in 2016 as a supplier of photographic services to the Leisure Marine brokerage and charter industry. As such, to-date, under the sole management of Robert Clark, GCP has provided 3D Virtual Tour imagery and professional stills photography to some of the UK's leading Motor Yacht manufacturers, Agents and Brokers. More recently, in addition to this, GCP has been involved in providing photography and floorplans for the property market. It is our intention to expand on the services we offer with the introduction of UAV-based aerial photography and video.

b. **Nominated Personnel -** Robert Clark is currently the sole full-time representative of Giles Clark Photography. As such, he is responsible for all aspects of the company and its day-to-day operations. Currently, within the scope of our existing low-risk photographic assignments, there is a negligible requirement for additional personnel other than, occasionally, a qualified Skipper, Deckhand or Interior Designer working independently of GCP but under its instruction. However, with the introduction of UAV operations, whilst Robert Clark will continue to assume overall accountability as Operations Manager, we expect to be employing part-time contract personnel to assist in ensuring that all operational and safety procedures, as outlined in this document, are fully adhered to. Robert Clark, as Operations Manager and as the named PIC in the PfCO, will assume the role of Pilot. It is possible that some assignments (most likely the property photography assignments) will preclude the need for additional personnel. In these instances, Robert Clark will assume the role of Pilot, Operations Manager, Technical Manager, Camera Operator, Client Liaison and Safety Officer. In all other instances, where it might prove difficult to mitigate the risks, GCP will employ the services of additional personnel. Most commonly, we expect this Assistant role to primarily involve

maintaining safe control of the public and property within the Area of Operations (AO) but specific roles will be detailed in section 2d.

c. **Responsibilities and Duties of the Person in Charge -** Robert Clark, as the PIC, assumes overall accountability for safe UAS operations at all times including (but not limited to) pre-flight checks, safety, flight regulations, NOTAMs and permissions, safe transportation and liaison with the client, the flight team and the public in compliance with the guidelines set out in CAP722. He may employ assistants and/or appropriate operational personnel from time-to-time but will ensure that in all instances, safety standards are maintained and regulations, permissions and operational procedures are fully understood by all involved. If conditions are unsuitable for UAV operations for whatever reason e.g. unsuitable weather, technical failure, battery management, illness, fatigue, uncontrolled public access, occupied airspace, failure to obtain required permissions etc. or if the PIC is not entirely satisfied that all safety conditions or measures have been observed, he reserves the right to postpone or cancel the assignment as appropriate without question.
It is the PIC's sole responsibility to be familiar with and to take all reasonable steps to satisfy the guidance set out in Articles 86, 87 and 166 in the ANO (CAP722) as follows:

Pre-flight action by commander of aircraft other than EU-OPS aeroplanes

Article 86

(1) This article applies to the commander of any aircraft except for the commander of an EU-OPS aeroplane intending to commence a commercial air transport flight.

(2) A commander must, before taking off on a private flight, an aerial work flight or a public transport flight, take all reasonable steps so as to be satisfied of the matters specified in paragraph (3).

(3) The matters referred to in paragraph (2) are that—

(a) the flight can safely be made, taking into account the latest information available as to the route and aerodrome to be used, the weather reports and forecasts available and any alternative course of action which can be adopted in case the flight cannot be completed as planned;

(b) either—

(i) the equipment which must by or under this Order be carried in the circumstances of the intended flight is carried and is in a fit condition for use; or

(ii) the flight may commence under and in accordance with the terms of a permission granted to the operator under article 41(3);

(c) the aircraft is in every way fit for the intended flight, and that where a certificate of maintenance review is required by article 25(2) to be in force, it is in force and will not cease to be in force during the intended flight;

(d) the load carried by the aircraft is of such weight, and is so distributed and secured, that it may safely be carried on the intended flight;

(e) in the case of a flying machine or airship—

(i) sufficient fuel, oil and engine coolant (if required) are carried for the intended flight, and that a safe margin has been allowed for contingencies; and

(ii) in the case of a public transport flight, the instructions in the operations manual relating to fuel, oil and engine coolant have been complied with;

(f) in the case of an airship or balloon, sufficient ballast is carried for the intended flight;

(g) any pre-flight check system established by the operator and set out in the operations manual or elsewhere has been complied with by each member of the crew of the aircraft; and

(h) in the case of a balloon, the balloon will be able to land clear of any congested area.

Commander to be satisfied that flight can be safely completed

Article 87

The commander of a flying machine must, before take-off, take all reasonable steps so as to be satisfied that it is capable of safely taking off, reaching and maintaining a safe height and making a safe landing at the place of intended destination having regard to—

(a) the performance of the flying machine in the conditions to be expected on the intended flight; and

(b) any obstructions at the places of departure and intended destination and on the intended route.

Small unmanned aircraft

Article 166

(1) A person must not cause or permit any article or animal (whether or not attached to a parachute) to be dropped from a small unmanned aircraft so as to endanger persons or property.

(2) The person in charge of a small unmanned aircraft may only fly the aircraft if reasonably satisfied that the flight can safely be made.

(3) The person in charge of a small unmanned aircraft must maintain direct, unaided visual contact with the aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions.

(4) The person in charge of a small unmanned aircraft which has a mass of more than 7kg excluding its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight, must not fly the aircraft—

(a) in Class A, C, D or E airspace unless the permission of the appropriate air traffic control unit has been obtained;

(b) within an aerodrome traffic zone during the notified hours of watch of the air traffic control unit (if any) at that aerodrome unless the permission of any such air traffic control unit has been obtained; or

(c) at a height of more than 400 feet above the surface unless it is flying in airspace described in sub-paragraph (a) or (b) and in accordance with the requirements for that airspace.

(5) The person in charge of a small unmanned aircraft must not fly the aircraft for the purposes of aerial work except in accordance with a permission granted by the CAA.

Equally, it is the PIC's responsibility to be familiar with and adhere to the guidelines set out in Articles 94 and 95 of the ANO (CAP393) as follows:

Small unmanned aircraft

Article 94

(1) A person must not cause or permit any article or animal (whether or not attached to a parachute) to be dropped from a small unmanned aircraft so as to endanger persons or property.

(2) The person in charge of a small unmanned aircraft may only fly the aircraft if reasonably satisfied that the flight can safely be made.

(3) The person in charge of a small unmanned aircraft must maintain direct, unaided visual contact with the aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions.

(4) The person in charge of a small unmanned aircraft which has a mass of more than 7kg excluding its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight, must not fly the aircraft—

(a) in Class A, C, D or E airspace unless the permission of the appropriate air traffic control unit has been obtained;

(b) within an aerodrome traffic zone during the notified hours of watch of the air traffic control unit (if any) at that aerodrome unless the permission of any such air traffic control unit has been obtained; or

(c) at a height of more than 400 feet above the surface unless it is flying in airspace described in sub-paragraph (a) or (b) and in accordance with the requirements for that airspace.

(5) The person in charge of a small unmanned aircraft must not fly the aircraft for the purposes of commercial operations except in accordance with a permission granted by the CAA.

Small unmanned surveillance aircraft

Article 95

(1) The person in charge of a small unmanned surveillance aircraft must not fly the aircraft in any of the circumstances described in paragraph (2) except in accordance with a permission issued by the CAA.

(2) The circumstances referred to in paragraph (1) are—

(a) over or within 150 metres of any congested area;

(b) over or within 150 metres of an organised open-air assembly of more than 1,000 persons;

(c) within 50 metres of any vessel, vehicle or structure which is not under the control of the person in charge of the aircraft; or

(d) subject to paragraphs (3) and (4), within 50 metres of any person.

(3) Subject to paragraph (4), during take-off or landing, a small unmanned surveillance aircraft must not be flown within 30 metres of any person.

(4) Paragraphs (2)(d) and (3) do not apply to the person in charge of the small unmanned surveillance aircraft or a person under the control of the person in charge of the aircraft.

(5) In this article, "a small unmanned surveillance aircraft" means a small unmanned aircraft which is equipped to undertake any form of surveillance or data acquisition.

d. **Responsibilities and Duties of Support Personnel** – For the purposes of photographing or videoing properties for the Real Estate market, it is unlikely that the PIC will be supported by anyone other than perhaps a general assistant with responsibilities for ensuring a safe AO. Assuming that all pre-flight checks and permissions have been carried out appropriately by the PIC, an assistant's role would be to ensure that the AO remains clear of any personnel who may not have been suitably briefed. Or, indeed, to brief any members of the public entering the AO on the appropriate separation requirements (as set out in Article 95 of the ANO CAP393 detailed above), emergency procedures and potential dangers. In addition, the assistant would be required to monitor the airspace and AO for possible unforeseen hazards such as approaching aircraft, other UAV's, helium balloons etc. and to advise the Pilot accordingly. The assistant will share responsibility during flight operations for the management and control of the take-off and landing areas (inc. a secondary landing area where appropriate) ensuring that any separation indicators such as hazard tape, laminated signs etc. are strictly observed. In a more comprehensive scenario (as detailed in paragraph (e) below) it might be necessary to employ a much larger flight team. In this scenario, the PIC will be responsible only for the safe piloting of the UAV whilst his team might include an Object Vessel Captain, Deck Hand, Chase Vessel Skipper, Director of Photography, on board assistant and a shore-based assistant. The assistants' responsibilities will be as with the previous scenario but with the possibility that the secondary landing site might be shore-based. The other team members are self-explanatory but all will share responsibility for monitoring the AO for possible hazards.

e. **Area of Operation (AO**) - These are likely to fall into two categories; 'Marine' and 'Properties'.

i) Marine operations will cover the acquisition of video and stills photography of motor yachts, sailing yachts and power boats either inshore (coastal), under way, anchored or berthed in a marina. In each of these scenarios, the RPS (Remote Pilot Station) might be located on an appropriate chase vessel, on board the object vessel or shore-based. During pre-flight planning, consideration will be given to the selection of a suitably uncongested area in which to carry out UAV photography of a vessel under way (possibly at speed) and at sea. It is unlikely that in these instances a person or object not under our control will stray into the AO. That said, VHF radio communication with the Skipper / Captain of the object vessel or, indeed, the vessel unknowingly entering the AO, will enable the Pilot or his flight team to take avoiding action. Careful consideration will be given to the pre-flight planning and choreography of these assignments to ensure that all camera positions and boat movements are predetermined. Also, bearing in mind that the RPS might be on a moving vessel, a 'return-to-home' option might not be available and a secondary shore-based emergency landing area within VLOS will have to be carefully selected, demarcated and monitored. Some boats will be photographed whilst on a fixed mooring – usually within a marina complex. In this scenario, the RPS will be a fixed shore-based position within the marina and can therefore easily be demarcated, monitored and controlled. However, besides the usual checks, consideration will of course be given to the likelihood of tall masts, radio frequencies and the possibility that other boats might manoeuvre into the AO.

ii) Property operations will be much simpler. These assignments are generally for the purposes of Estate Agent listings and, as such, the AO can be described simply as any dwelling or plot of land. As such, besides the requisite checks of controlled or restricted airspace, consideration will be given to land-ownership permissions, local public spaces or thoroughfares, overhead wires, trees etc. Being that most properties will be privately owned, demarcation and monitoring of a dedicated take-off and landing site or general control of people, animals and objects within the AO should not present a problem.

f. **Type of Operation** – As detailed above, the type of operation is likely to fall into one of two categories; Marine or Property.

i) In the Marine scenario, certainly whilst operating at sea in open water, besides the usual airspace checks, permission is likely to be required from the appropriate authority governing the body of water on which the operation is being carried out and, as the size of the AO is largely

unrestricted, specific consideration will need to be given to VLOS constraints. This of course will be addressed in the pre-flight planning but careful communication will be necessary to prevent the object vessel and the chase vessel (RPS) exceeding a predetermined separation distance thus potentially losing VLOS. Similarly, pre-flight planning will take into consideration the possibility that the secondary landing site is always within an achievable distance bearing in mind that it might not be possible to land back on the chase vessel (or direct control of the UAV may have been lost). Careful monitoring of developing weather conditions is essential in this scenario (in any scenario) and it is quite possible that a night-time flight is necessary.

ii) Whilst photographing properties, maintaining VLOS is not likely to be a problem and whilst the weather is unlikely to deteriorate sufficiently rapidly to cause loss of control, consideration will be given to turbulence and urban corridors causing unexpected updrafts or downdrafts or the likelihood of lightning. It might be necessary to operate at night and particular care will be taken during pre-flight checks to ensure that there are no overhead wires or obstacles that might infringe either a controlled or an emergency 'return-to-home'.

g. **Supervision of SUA Operations** – It won't be any one person's responsibility to supervise the flight team but it will be made clear to all involved that any signs of fatigue, illness, intoxication or any visible deterioration in professionalism or ability to operate safely, must be reported immediately and appropriate action taken.

h. **Accident Prevention and Flight Safety Programme** – CAP722 and CAP393 stipulate various operating parameters designed to minimise the likelihood of accidents; UAV's up to 7kg restricted to a maximum flying height of 400' above the point of take-off. The separation requirements; a minimum of 150 metres from a congested area, a minimum of 150 metres of an organised open-air assembly of more than 1000 people or a minimum of 50 metres from any person, vessel, vehicle or structure which is not under the control of the PIC. During take-off and landing a separation requirement of 30 metres from any person (excluding the Pilot or PIC) must be maintained. Observation of these very concise restrictions combined with a professional and meticulous approach to pre-flight planning, obtaining permissions, checking airspace restrictions, submitting appropriate requests (NOTAMs, Military Low Flight Booking Cell etc.) and taking appropriate action in a logical, conscientious and structured way will ensure that GCP are seen to be taking appropriate measures to prevent accidents. However, should an accident occur, it will be reported to MORS using Airprox form CA1094 and detailed in GCP's Incident Log (see section? page?) for in-house review and analysis.

i. **Flight Team Composition** – (see section 2d above; **Responsibilities and Duties of Support Personnel**) GCP is a Sole Trader managed by Proprietor Robert Clark. Unless otherwise stated, Robert Clark will act as the PIC / Pilot and any additional team

personnel will be selected and revised on a per-assignment basis. If, in time, GCP's workload dictates that a regular cohesive team can be named and detailed, the Operations Manual will be updated accordingly. From the outset, a detailed log of flight team members, Skippers, Captains and Deck Hands will be maintained (see section? page?)