

Tom Sykes

SUAS OPERATIONS MANUAL

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This Operations Manual details the procedures to be followed by all personnel involved in Small Unmanned Aircraft Systems operations within the applicable organisation. It specifically covers the safety aspects of operations undertaken and the personnel conducting and assisting in those tasks.

This document satisfies all the requirements regarding National Aviation Authorities Permissions and Exemptions for Commercial Operation.

PRELIMS

Amendment Record

This document is subject to regular and routine changes and as such, an accurate record of any amendments is maintained below. Any amendments must be brought to the attention of all personnel within the organisation and acknowledged by email to the SUA Operator.

Issue Number	Amendment Date	Amendments Incorporated	Incorporated By
1.0.0	08 Apr 2019	Initial Version	Tom Sykes
1.1.0	19 May 2020	Updated reference to CAP 722 v7.3. Removed reference to SI 2019/261 and CAP 1763. Updated wording of Article 94 to include C, D, E & F. Addition of Operator ID. Updated Insurance details.	Tom Sykes

Commitment of the SUA Operator

This Operations Manual describes the organisation, aerial platforms, personnel, and procedures, which the organisation utilises throughout its Unmanned Aircraft operations. It is accepted that the contents of this document do not override the necessity of reviewing and complying with any new or amended regulations published from time to time by the relevant National Aviation Authorities (NAA's) addressed by this document.



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PART A – SAFETY

1. Purpose

The purpose of this document is to detail the items to be covered for the safe operation of Small Unmanned Aircraft Systems (SUAS) by the organisation.

2. Scope

This Operations Manual applies to all personnel involved in the utilisation of any SUAS operated by the organisation, who utilise the following SUAS at this time:

Manufacturer	SUA Model
DJI	Mavic 2 Pro

2.1 Safety Policies and National Perspective

The organisation adopts best industry practice to ensure that all its flight operations using SUAS are carried out as safely as possible. It operates an open and honest reporting culture such that all individuals understand the value of reporting all incidents, or potential incidents, throughout the organisation and wider SUAS community. A robust procedure to determine how the incident occurred and how to prevent similar incidents occurring in the future will be enacted. Those incidents (or potential incidents) that do not merit a formal Mandatory Occurrence Report (MOR) but would be of benefit to other organisations will be reported if possible, via the various forums that the organisation is aware of.

The key principles we apply to our safety culture are:

- The Remote Pilot (RP) of the SUAS takes overall responsibility for the safe operation of the platform at all times.
- Everyone has a contribution towards safety and all staff are expected to report any occurrence that they believe did, or could have, compromised safety.
- All incidents will be reported to the SUA Operator including those of a minor nature.
- The SUA Operator will be responsible for ensuring that the correct reporting procedures are adhered to.
- Good safety practices are an integral part of the continued success and wellbeing of the Organisation.

The organisation's Safety Policy is subject to regular review and is actively promoted to all members of staff.

Airworthiness: All of the organisation's SUAS are below the 20kg limitation and therefore do not require a Certificate of Airworthiness when operating in the UK FIR. However, other NAA's may have different regulations and the organisation will ensure compliance with differing requirements in other jurisdictions when undertaking work overseas.

Permission to operate: The organisation has received Permission for Commercial Operation (PfCO) from the UK Civil Aviation Authority (CAA) to allow commercial operations within the UK. Any commercial work undertaken overseas will be in accordance with the NAA regulations of that Country.

2.2 Safety Goals

The organisation's overriding safety goal is to avoid any injury, distress or damage to persons, animals or property at all times. This includes all aspects of operations and not just whilst live flying on task. Robust procedures will be in place to ensure all operations are conducted in a safe manner. If an incident does occur then set procedures will be in place to ensure these are reported in an effective and timely manner in order that staff and external organisations can learn from the incident.

2.3 Safety Assurance

All company members have a contribution to safety and are expected to report any occurrence that they believe did or could have compromised safety. A regular review of all operating and safety procedures will occur and be logged in the following circumstances:

- Every 6 months (Inserted into the Amendment Record)
- Following any incident that requires a MOR (Inserted into the Incident Log)
- Following any technical upgrades or firmware updates to SUAS (Inserted into the Technical Log)

The organisation's Incident Log is a critical part of the safety assurance process. All staff members have a responsibility to log incidents and to report them to the SUA Operator as soon as possible, initially by telephone and then followed up by an auditable email. The SUA Operator will review the Incident Log and implement any changes in procedures that it necessitates. Any changes to operating procedures must be communicated and acknowledged by all staff before they can continue to undertake operations. Additionally, external forums should be informed if possible, if it is believed that other organisations are likely to benefit from the lessons identified.

Certain incidents must be reported to the UK CAA. The Civil Aviation Publication CAP 382 (MORS) describes the necessary processes that pertain to accidents, incidents and investigations. Reportable occurrences must be reported to the UK CAA online via the ECCAIRS Portal:

www.aviationreporting.eu/AviationReporting/

Reportable occurrences are categorised as: '**any incident which endangers, or which if not corrected, would endanger an aircraft, its occupants or any other person**'.

24 hour joint AAIB & CAA Accident/Incident reporting line: **+44 (0) 1252 512299**

Occurrences that relate to UAS may include, but are not limited to:

- Loss of control/data link – where that loss resulted in an event that was potentially prejudicial to the safety of other airspace users or third parties
- Navigation failures
- Crew Resource Management (CRM) failures/confusion
- Structural damage/heavy landings
- Flight controller, SUAS programming or configuration errors
- Fire
- Any incident that injures a third party

In circumstances involving unexplained loss of control of the SUAS, such an incident would require the temporary suspension of operations (test flying is permitted) until the cause can be established.

A key element of safety assurance is safety training; both initial and annual refresher training, as safety assurance is a continual process. A further key element of assuring safety is the completion of checklists that are detailed in the Appendices section at the end of this document. The types of safety training provided by the organisation are detailed in Section 2.4.

The RP is responsible for ensuring the airworthiness state of the aircraft and the safety of its payload from arrival at the flying site until it is finally shutdown and packed away at the end of the task. The RP will follow the checklists and risk assessments as provided in Appendices C to I of this Operations Manual.

2.4 Safety Training

All staff members receive a detailed safety briefing on joining the organisation. Staff are issued with a current copy of the operations manual and the operations manual is re-issued to all staff in the event of any changes to operational or safety procedures. Safety is a continuous process. All staff will receive annual safety refresher training.

During daily operations, a safety briefing will be made by the RP for the benefit of staff and clients once the RP has completed the on-site survey assessment.

The Observer has a key role in assisting with safe operations. When joining the organisation, Observers will undertake safety training, which will cover:

- Study of this Operations Manual
- Use of the Organisation's checklist system
- Familiarisation with all equipment
- Lookout procedures (e.g. Public encroachment, aircraft encroachment, weather events, ground hazards)
- Communication (e.g. use of two-way radios, telephones, contact numbers)
- Establishment and maintenance of public safety cordon
- SUAS Launch process (including lookout)
- SUAS Landing process (including lookout)
- Emergency procedures (e.g. pilot incapacitation, fire, personal injury) as detailed in Part B, Sect 4, particularly in respect of Observer actions
- Location of, and familiarisation with the Emergency equipment

All Observers will undertake annual safety refresher training.

All staff training will be recorded in the staff-training log.

In the event that one of the Organisation's Observers is not available, it is permissible for the RP to nominate another individual to undertake the role of the Observer, provided that the nominated individual receives a full safety brief (including SUAS Failsafe operation). The safety brief will cover the essential components of the full Observer training as would be applicable to the task in hand, i.e.:

- Familiarisation with required equipment
- Lookout procedures (e.g. Public encroachment, aircraft encroachment, weather events, ground hazards)
- Communication (e.g. use of two-way radios, telephones, contact numbers)
- Establishment and maintenance of public safety cordon
- SUAS Launch process (including lookout)
- SUAS Landing process (including lookout)
- Emergency procedures (e.g. pilot incapacitation, fire, personal injury) as detailed in Part B, Sect 4, in respect of Observer actions
- Location of and familiarisation with the Emergency equipment

3. Acronyms & Abbreviations

Item	Description
AAIB	Air Accidents Investigation Branch
AFIS	Aerodrome Flight Information Service
AGL	Above Ground Level
AIC	Aeronautical Information Circular
AMSL	Above Mean Sea Level
ASL	Above Surface Level
AIAA	Area of Intense Aerial Activity
AIP	Aeronautical Information Publication
ALARP	As Low As Reasonably Practicable
AIS	Aeronautical Information Service
ANO	Air Navigation Order
ATC	Air Traffic Control
ATCU	Air Traffic Control Unit
ATM	Air Traffic Management
ATS	Air Traffic Service
ATSU	Air Traffic Service Unit
ATZ	Aerodrome Traffic Zone
ATTI	Attitude Mode (Flight Controller)
BVLOS	Beyond Visual Line Of Sight
C2L	Command and Control Link
CA	Congested Area
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CTA	Control Area
CTR	Control Zone
Con-Ops	Concept of Operations
CRM	Crew Resource Management
DA	Danger Area
DAAIS	Danger Area Activity Information Service
DACS	Danger Area Crossing Service
DPG	Diplomatic Protection Group

EASA	European Aviation Safety Agency
ECCAIRS	European Co-ordination Centre for Accident and Incident Reporting Systems
ENSF	Enhanced Non-Standard Flight (clearance)
EP	Emergency Procedure
ERF	Emergency Restriction of Flying
ESC	Electronic Speed Controller
EVLOS	Extended Visual Line Of Sight
FIR	Flight Information Region
FISO	Flight Information Service Officer
FMC	Flight Management Computer
FRC	Flight Reference Card
FOD	Foreign Object Debris
GCS	Ground Control Station
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GUI	Graphical User Interface
HIRTA	High Intensity Radio Transmission Area
HMI	Human Machine Interface
ICAO	International Civil Aviation Organisation
IOSD	Intelligent On Screen Display
IMU	Inertial Measurement Unit
Li-Po	Lithium Polymer
LS	Landing Site
MAA	Military Aviation Authority
MATZ	Military Aerodrome Traffic Zone
MOD	Ministry Of Defence
MOR	Mandatory Occurrence Report
MTOM	Maximum Take-Off Mass
NAA	National Aviation Authority
NATS	National Air Traffic Services
NOTAM	Notice to Airmen
NSF	Non-Standard Flight
NQE	National Qualified Entity
OM	Operations Manual

OS	Ordnance Survey
PfCO	Permission for Commercial Operation
PIB	Pre-flight Information Bulletin
PMU	Power Management Unit
RA(T)	Restricted Airspace (Temporary)
RP	Remote Pilot
RPA	Remotely Piloted Aircraft
RPAS	Remotely Piloted Aircraft System
RPS	Remote Pilot Station
RTH	Return To Home (Function)
SOP	Standard Operating Procedure
SUA	Small Unmanned Aircraft
SUSA	Small Unmanned Surveillance Aircraft
SUAS	Small Unmanned Aircraft System
TDA	Temporary Danger Area
TOLP	Take-Off & Landing Point
TOLS	Take-Off & Landing Site
UA	Unmanned Aircraft
UAS	Unmanned Aircraft System
UAS OSC	Unmanned Aircraft System Operating Safety Case
VFR	Visual Flight Rules
VLOS	Visual Line Of Sight

3.1 Definitions

A list of well used and useful to know definitions, related to the activities conducted in the day to day operations of the organisation are shown below:

Accident – ‘An occurrence associated with the operation of an aircraft which, in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

1. a person is fatally or seriously injured as a result of:
 - a. being in the aircraft, or,
 - b. direct contact with any part of the aircraft, including parts which have become;
 - i. detached from the aircraft, or,
 - ii. direct exposure to jet blast, except when the injuries are from natural causes, self inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew;

or

- c. the aircraft sustains damage or structural failure which adversely affects the structural strength, performance or flight characteristics of the aircraft, and would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to a single engine (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes) or minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome);

or

- d. the aircraft is missing or is completely inaccessible.’

Aircraft - Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the Earth’s surface.

Air Navigation Order - CAP 393 Air Navigation: The Order and the Regulations include the ANO and the Rules of the Air Regulations.

Autonomous Operation - An operation during which an unmanned aircraft is operating without pilot intervention in the management of flight.

Commercial Operation – Any operation of an aircraft other than for public transport; which is available to the public or which, when not made available to the public, is performed as a contract between an operator and a customer, where the latter has no control over the operator, in return for remuneration or other valuable consideration.

Concept of Operations - describes the characteristics of the organisation, system, operations and the objectives of the user.

Congested Area - In relation to a city, town or settlement, means any area which is substantially used for residential, industrial, commercial or recreational purposes.

Day - the time from half an hour before sunrise until half an hour after sunset (both times exclusive), sunset and sunrise being determined at surface level.

Danger Area - airspace which has been notified as such within which activities dangerous to the flight of aircraft may take place or exist at such times as may be notified.

Detect and Avoid - The capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action.

Extended Visual Line-Of-Sight Operation - an operation in which the RP and RPA Observer(s) maintain direct unaided visual contact with the RPA sufficient to monitor the craft's flight path in relation to other aircraft, persons, vessels, vehicles and structures to avoid collisions.

Ground Control Station – See RPS.

Graphic User Interface – A method of inputting data and commands into a computer by interacting with graphical icons on a screen, either by touch or via a peripheral device. It may also output data to the user.

Handover - The act of passing piloting control from one RP/RPS to another.

Highly Automated - Systems that still require inputs from a human operator but which can implement the action without further human interaction once the initial input has been provided.

Human Machine Interface – The element(s) of the RPS that physically interact with the RP to receive input data and commands and that outputs sensory data and flight telemetry for the RP to control the RPA and gather the mission data.

Intelligent On Screen Display – The GUI element of the HMI for a DJI manufactured RPA.

Lost Link - The loss of command and control link contact with the remotely-piloted aircraft such that the RP can no longer manage the aircraft's flight.

Knot – is a unit of speed equal to one nautical mile (1.852km) per hour, approximately 1.151mph.

Nautical Mile – is a unit of distance that is approximately one minute of arc of latitude. 1.15 miles = 1 nautical mile.

Night - the time from half an hour after sunset until half an hour before sunrise (both times inclusive), sunset and sunrise being determined at surface level.

Operator - A person, organisation or enterprise engaged in or offering to engage in an aircraft operation.

Pilot - The person in direct control of the UA; See RP.

Pilot in Command – The role title if the RP is also the RPAS commander.

Pre-flight Inspection - the inspection carried out before flight to ensure that the aircraft is fit for the intended flight.

Remote Pilot - A person charged by the operator with duties essential to the operation of an RPA and who manipulates the flight controls, as appropriate, during flight time.

Remotely Piloted Air System - A RPA, its associated RPS, the required C2L and any other material relevant to the operation of the RPAS.

Remote Pilot Station - The component of the remotely-piloted aircraft system containing the equipment used to pilot the RPA.

Remotely-Piloted Aircraft - An UA which is piloted from an RPS.

Remotely-Piloted Aircraft System - An RPA, its associated RPS, the required C2L and any other components as specified in the type design.

Reportable Occurrence - Any incident which endangers or which, if not corrected, would endanger an aircraft, its occupants or any other person.

RPA Observer - A trained and competent person designated by the operator who, by visual observation of the RPA, assists the RP in the safe conduct of the flight.

RPAS Commander - A trained and competent person who is responsible for the conduct and safety of a specific flight and for supervising the person in direct control of the RPAS. His/Her duties are equivalent to those of an Aircraft Commander.

Safety - The state in which risks associated with aviation activities, related to, or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

Safety Management System - A systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.

Serious Incident - An incident involving circumstances indicating that there was a high probability of an accident and associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked or, in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time it comes to rest at the end of the flight and the primary propulsion system is shut down

Small Unmanned Aircraft - Any unmanned aircraft, other than a balloon or a kite, having a mass of not more than 20 kg without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight.

Small Unmanned Surveillance Aircraft - A small unmanned aircraft which is equipped to undertake any form of surveillance or data acquisition.

Unmanned Aircraft - An aircraft which is intended to operate with no human pilot on board, as part of an UAS. Moreover, a UA:

- is capable of sustained flight by aerodynamic means;
- is remotely piloted and/or capable of degrees of automated or autonomous operation;
- is reusable;
- is not classified as a guided weapon or similar one-shot device designed for the delivery of munitions.

Unmanned Aircraft System - Comprises individual 'System Elements' consisting of the UA and any other System Elements necessary to enable flight, such as an RPS, C2L and Launch and Recovery Element. There may be multiple UAs, RPS or Launch and Recovery Elements within a UAS.

Visual Flight Rules – procedures to navigate and avoid collisions without reference to navigational instruments.

Visual Line-Of-Sight Operation - An operation in which the RP maintains direct unaided visual contact with the RPA sufficient to monitor the crafts flight path in relation to other aircraft, persons, vessels, vehicles and structures to avoid collisions.

3.2 CAA CAP 393 Regulatory Articles

The currently relevant excerpts from the CAA regulatory articles contained within the Air Navigation Order, pertaining to operations of SUAS are listed below in order to help provide additional clarity and context through this OM (In addition to the regulations show below, from November 2019 there is a requirement within Article 94 [C-F] to ensure that the correct certificates are held for both the SUA Operator and each individual RP):

3.2.1 Article 94

Small Unmanned Aircraft Requirements

(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 remote pilot of a small unmanned aircraft may only fly the aircraft if reasonably satisfied that the flight can safely be made.

(3) The remote pilot 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) Intentionally Blank (Articles Removed)

(5) The SUA operator must not cause or permit a small unmanned aircraft to be flown for the purposes of commercial operations, and the remote pilot of a small unmanned aircraft must not fly it for the purposes of commercial operations, except in accordance with a permission granted by the CAA.

Article 94A

Small Unmanned Aircraft: height restrictions on flights

(1) If the permission or permissions that are required under this article for a flight, or a part of a flight, by a small unmanned aircraft have not been obtained—

(a) the SUA operator must not cause or permit the small unmanned aircraft to be flown on that flight or that part of the flight; and

(b) the remote pilot must not fly the small unmanned aircraft on that flight or that part of the flight.

(2) Permission from the CAA is required for a flight, or a part of a flight, by a small unmanned aircraft at a height of more than 400 feet above the surface

(3) But permission from the CAA is not required under paragraph (2) if—

(a) the flight, or the part of the flight, takes place in a flight restriction zone at a protected aerodrome, and

(b) permission for the flight, or the part of the flight, is required under paragraph (4) from an air traffic control unit or a flight information service unit.

(4) Permission for a flight, or a part of a flight, by a small unmanned aircraft in the flight restriction zone of a protected aerodrome is required—

(a) from any air traffic control unit at the protected aerodrome, if the flight, or the part of the flight, takes place during the operational hours of the air traffic control unit;

(b) from any flight information service unit at the protected aerodrome, if the flight, or the part of the flight, takes place during the operational hours of the flight information service unit and either—

(i) there is no air traffic control unit at the protected aerodrome, or

(ii) the flight, or the part of the flight, takes place outside the operational hours of the air traffic control unit at the protected aerodrome;

(c) from the operator of the protected aerodrome, if—

(i) there is neither an air traffic control unit nor a flight information service unit at the protected aerodrome; or

(ii) the flight, or the part of the flight, takes place outside the operational hours of any such unit or units at the protected aerodrome.

(5) In this article, “operational hours”, in relation to an air traffic control unit or flight information service unit, means the operational hours—

(a) notified in relation to the unit, or

(b) set out in the UK military AIP in relation to the unit.

(6) In this article and article 94B, “protected aerodrome” means—

- (a) an EASA certified aerodrome,
- (b) a Government aerodrome,
- (c) a national licensed aerodrome, or
- (d) an aerodrome that is prescribed, or of a description prescribed, for the purposes of this paragraph.

(7) The “flight restriction zone” of a protected aerodrome is to be determined for the purposes of this article in accordance with the following table—

Type of protected Aerodrome	The ‘Flight Restriction Zone’
<p>A protected aerodrome which is-</p> <p>An EASA certified aerodrome, A Government aerodrome, A national licensed aerodrome,</p> <p>And which has an aerodrome traffic zone.</p>	<p>The flight restriction zone consists of –</p> <p>The aerodrome traffic zone at the aerodrome, Any runway protection zones at the aerodrome, And Any additional boundary zones at the aerodrome</p>
<p>A protected aerodrome which is-</p> <p>An EASA certified aerodrome, A Government aerodrome, A national licensed aerodrome,</p> <p>But which does not have an aerodrome traffic zone.</p>	<p>The flight restriction zone consists of the airspace extending from the surface to a height of 2,000 feet above the level of the aerodrome within the area bounded by a circle centred on the notified mid-point of the longest runway and having a radius of two nautical miles.</p> <p>But if the longest runway does not have a notified mid-point, the mid-point of that runway is to be used instead for the purposes of determining the flight restriction zone.</p>
<p>A protected aerodrome that is prescribed, or of a description prescribed, under paragraph (6)(d).</p>	<p>The flight restriction zone consists of the zone that is prescribed for the purposes of this paragraph.</p>

Article 94B

Small Unmanned Aircraft: restrictions on flights that are over or near aerodromes

- (1) This article makes provision about the meaning of expressions used in the definition of “flight restriction zone” in article 94A that applies in relation to a protected aerodrome which is—
- (a) an EASA certified aerodrome,
 - (b) a Government aerodrome, or
 - (c) a national licensed aerodrome, and which has an aerodrome traffic zone.
- (2) Subject to paragraph (4), there is one runway protection zone for each runway threshold of each runway at the aerodrome.
- (3) A “runway protection zone”, in relation to a runway threshold at the aerodrome, is the airspace extending from the surface to a height of 2,000 feet above the level of the aerodrome within the area bounded by a rectangle—
- (a) whose longer sides measure 5 km;
 - (b) whose shorter sides measure—
 - (i) 1 km (except in the case of Heathrow Airport);
 - (ii) 1.5 km, in the case of Heathrow Airport; and February 2019 | CAP 1763
www.caa.co.uk
 - (c) which is positioned so that—
 - (i) one of the shorter sides of the rectangle (“side A”) runs across the runway threshold, and
 - (ii) the two longer sides of the rectangle are parallel to, and equidistant from, the extended runway centre line as it extends from side A out to, and beyond, the runway end to which the runway threshold relates.
- (4) There is no runway protection zone—
- (a) for any runway threshold at the London Heliport;
 - (b) for any runway threshold that is prescribed, or of a description prescribed, for the purposes of this paragraph.
- (5) The “runway threshold” of a runway at the aerodrome is the location that, for the purpose of demarcating the start of the portion of the runway that is useable for landing, is—
- (a) notified as the threshold of the runway, or
 - (b) set out as the threshold of the runway in the UK military AIP.
- (6) The “extended runway centre line”, in relation to a runway at the aerodrome, is an imaginary straight line which runs for the length of the runway along its centre and then extends beyond both ends of the runway.
- (7) An “additional boundary zone” is the airspace extending from the surface to a height of 2,000 feet above the level of the aerodrome within any part of the area between—
- (a) the boundary of the aerodrome, and
 - (b) a line that is 1 km from the boundary of the aerodrome (the “1 km line”), that is neither within the aerodrome traffic zone nor within any runway protection zone at the aerodrome.
- (8) The 1 km line is to be drawn so that the area which is bounded by it includes every location that is 1 km from the boundary of the aerodrome, measured in any direction from any point on the boundary.

Article 94C

Certain small unmanned aircraft: registration as an SUA operator

- (1) Subject to the following provisions of this article, the CAA must issue a certificate of registration as an SUA operator to a person, or renew that person's certificate of registration as an SUA operator, if the person—
 - (a) has applied to the CAA, in such manner as the CAA may require, to be registered as an SUA operator,
 - (b) has supplied such information and evidence as the CAA may require, and
 - (c) has, in the case of an individual, attained the age (if any) that is prescribed.
- (2) Subject to paragraph (3), a certificate of registration may relate—
 - (a) to a particular description of small unmanned aircraft;
 - (b) to a particular description of flights by small unmanned aircraft.
- (3) No certificate of registration is to be issued in relation to—
 - (a) small unmanned aircraft with a mass of less than 250 grams without their fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of their flight, or
 - (b) flights by small unmanned aircraft of that description.
- (4) A certificate of registration issued, or renewed, under this article is valid for the period shown on the certificate, subject to—
 - (a) article 253, or
 - (b) the SUA operator notifying the CAA, in such manner as the CAA may require, that the SUA operator surrenders the certificate.
- (5) The CAA is not required to accept applications for certificates of registration under this article before 1st October 2019.

Article 94D

Certain small unmanned aircraft: requirement for registration as SUA operator

- (1) This article applies to a flight by a small unmanned aircraft only if it has a mass of 250 grams or more without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight.
- (2) The SUA operator must not cause or permit the small unmanned aircraft to be flown unless—
 - (a) the CAA has issued the SUA operator with a certificate of registration which is valid for that flight at the time of the flight, and
 - (b) the SUA operator's registration number is displayed on the aircraft in the manner (if any) that is prescribed.
- (3) The remote pilot of the small unmanned aircraft must not fly it unless the remote pilot has reasonably formed the view that the SUA operator complies with the requirements in paragraph (2) in relation to that flight.
- (4) In this article— “certificate of registration” means a certificate issued under article 94C; “registration number” means the ten digit registration number assigned by the CAA in relation to an SUA operator's registration under article 94C.

Article 94E

Certain small unmanned aircraft: competency of remote pilots

- (1) Subject to the following provisions of this article, the CAA must issue an acknowledgement of competency to an individual, or renew that individual's acknowledgement of competency, if the individual—
- (a) has applied to the CAA, in such manner as the CAA may require, for an acknowledgement of competency,
 - (b) has supplied such information and evidence as the CAA may require,
 - (c) has undertaken such training as the CAA may require, and
 - (d) has undergone such tests as the CAA may require.
- (2) That training or those tests may relate to matters which include—
- (a) the practical operation of small unmanned aircraft;
 - (b) matters connected with the operation of small unmanned aircraft (such as respect for privacy, data protection, safety, security and environmental protection).
- (3) Subject to paragraph (4), an acknowledgement of competency may relate—
- (a) to a particular description of small unmanned aircraft;
 - (b) to a particular description of flights by small unmanned aircraft.
- (4) No acknowledgement of competency is to be issued in relation to—
- (a) small unmanned aircraft with a mass of less than 250 grams without their fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of their flight, or
 - (b) flights by small unmanned aircraft of that description.
- (5) An acknowledgement of competency issued, or renewed, under this article is valid for the period shown on the acknowledgement, subject to article 253.
- (6) The CAA may issue an acknowledgement of competency subject to such conditions as it deems appropriate.
- (7) The CAA is not required to accept applications for acknowledgements of competency under this article before 1st October 2019.

Article 94F

Certain small unmanned aircraft: requirement for acknowledgement of competency

(1) This article applies to a flight by a small unmanned aircraft only if it has a mass of 250 grams or more without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight.

(2) The remote pilot of the small unmanned aircraft must not fly it unless the CAA has issued the remote pilot with an acknowledgement of competency which is valid for that flight at the time of the flight.

(3) The SUA operator must not cause or permit the small unmanned aircraft to be flown unless the SUA operator has reasonably formed the view that the remote pilot of the aircraft complies with the requirements in paragraph (2) in relation to that flight.

(4) In this article “acknowledgement of competency” means an acknowledgement issued under article 94E.

Article 94G

Meaning of “remote pilot” and “SUA operator”

In this Order—

- (a) the “remote pilot”, in relation to a small unmanned aircraft, is an individual who—
 - (i) operates the flight controls of the small unmanned aircraft by manual use of remote controls, or
 - (ii) when the small unmanned aircraft is flying automatically, monitors its course and is able to intervene and change its course by operating its flight controls;
- (b) the “SUA operator”, in relation to a small unmanned aircraft, is the person who has the management of the small unmanned aircraft.”.

3.2.2 Article 95

Small Unmanned Surveillance Aircraft

(1) The SUA operator must not cause or permit a small unmanned surveillance aircraft to be flown in any of the circumstances described in paragraph (2), and the remote pilot of a small unmanned surveillance aircraft must not fly it in any of those circumstances, 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 SUA Operator or the Remote Pilot 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 remote pilot of the small unmanned surveillance aircraft or a person under the control of the remote pilot 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.

4. Document Control and Amendment Process

This is a controlled document. The SUA Operator is responsible for amending the document and will maintain the amendment record located at the beginning of the document. The document will be reviewed annually or as necessary in response to any changes in operating procedures or NAA regulations. The SUA Operator will sign each version of the Operations Manual and will sign off all amendments. For major changes, a copy will also be sent to the CAA for their information and approval.

5. Referenced Documents

REFERENCE	TITLE	ISSUE	DATE
CAP 382	Mandatory Occurrence Reporting (MORS)	10	Dec 2016
ECCAIRS	ECCAIRS Portal: www.aviationreporting.eu/AviationReporting/		
CAP 393	Air Navigation: The Order and the Regulations (ANO)	5.6	21 Mar 2019
CAP 722	Unmanned Aircraft System Operation in UK Airspace – Guidance	v7.3	4 Sep 2019
DJI Mavic 2 Pro Manual	DJI Mavic 2 Pro User Manual	V2.0	28 Nov 2019

6. Company Profile and Organisation

Organisation Name:	Tom Sykes
SUA Operator:	Tom Sykes
Operator ID:	OP-KGBYTJF

7. Insurance Information

The organisation has 3rd party public liability insurance as outlined below:

Broker:	Flock Cover
Underwriter:	Allianz
Policy Expires:	18 May 2021
Telephone:	+44(0)1234 480260
Policy Number:	D-PF-T-243301

A copy of the Insurance certificate is at Appendix N.

8. Nominated Personnel

RP & Observer:	Tom Sykes
Qualifications:	ICARUS 2019/033P
Telephone:	07843 254957
Email:	tomesykes@gmail.com

9. Responsibilities

The organisation will be utilising SUAS in the following areas:

Aerial Photography: The RP can operate as the Pilot and Camera Operator when stills are being captured if necessary. At least one Observer may be required depending on the nature of the task and number of personnel involved.

Aerial Cinematography: Operating a video camera usually requires the full attention of the Camera Operator, therefore when using video/film cameras the organisation will aim to operate a minimum crew of two persons – RP and Camera Operator. The Camera Operator can control the camera using a Smart Phone/Tablet or separate dedicated screen linked to the SUAS via datalink. This is not to interfere with the RP's operation of the platform. The minimum crew requirements form part of the pre-task and on-site risk assessments and team composition will be organised to reflect the risks/hazards identified. If deemed safe and suitable, the RP may elect to conduct the operation as a one-man crew; if this decision is made then the RP is to ensure that the operation is conducted with the same safety margins as those which would normally be present if two crew were available. The manpower employed during any operation is to be appropriate to the hazards identified, the complexity of the operation itself and the environment/equipment in use.

Surveys: Depending upon the nature of the task and the site at which operations are being conducted, the RP may act as Pilot and Camera Operator. If deemed necessary in the pre-task or on-site assessments, it may be necessary to utilize a RP and separate Camera Operator. At least one observer will be required at all times depending upon the nature of the task and number of personnel involved. The Camera Operator may act as Observer for the purposes of Take-Off, Landing and Site Security if deemed appropriate; A separate Observer is not mandatory.

Night Operations: The RP may operate SUAS in certain roles outside of daylight hours according to the appropriate local nautical timings. Due to the reduced Situational Awareness and Human Factors issues which operating at night presents, only those crew members who are deemed suitably qualified and experienced personnel (SQEP) at night operations may act as RP.

A daylight Site-Survey MUST be completed in adequate light conditions prior to any night operations and the RP and crew must ensure that any obstructions or hazards, which are identified, are briefed thoroughly, prior to the commencement of operations. SUAS that are to be utilized at night are to be equipped with additional lighting in order to aid the RP with orientation and to aid in the avoidance of collisions with other air users. This may include the use of external lighting sources to aid in illuminating the SUAS whilst airborne. The primary and, if designated, the alternate landing site(s) must also be illuminated in order that they are easily identifiable by the RP and crew during operations.

Additional areas of utilisation: Any additional areas of utilisation that arise during day-to-day operations will be assessed by the organisation prior to their acceptance and an appropriate team deployed after conduct of a thorough pre-task survey. All operations outside the scope of those mentioned above must be approved by the SUA Operator prior to deployment. Any exemptions required by the relevant NAA must be granted prior to undertaking the task and it must be confirmed that appropriate Insurance cover is in place. These additional types of operations may include Search and Rescue (SAR), Thermal Surveys and 3D mapping. This is not an exhaustive list and it is imperative that the RP is aware that they remain responsible in all cases for the safety of personnel, equipment and third parties throughout, in accordance with the responsibilities outlined below.

The responsibilities aligned to these types of task are as follows:

SUA Operator: The SUA Operator is responsible for the safe operation of the organisation. They will review all task requests in detail and conduct a thorough assessment of the proposal including a pre-task survey of the site. Once content that the task is achievable they will then assign a crew complement commensurate with the safety requirements. As a minimum this will involve a RP and, ideally, an observer but if deemed necessary for larger crowds, additional observers and or security may be deployed. Note: If the SUA Operator is not available to conduct the task review/assessment, this responsibility may be devolved to individual RPs.

Remote Pilot(RP): The nominated RP will be responsible for:

- Ensuring they have read and understood the latest version of the Operations Manual
- Conducting a thorough pre-site survey (Appendix C) of the task location
- Checking relevant NOTAMS and Navigational Charts
- Contacting relevant Air Traffic Control or Airspace Utilisation Authorities
- The specific requirements of the task and that they are competent to conduct the flight
- Conducting a risk assessment (Appendix F) and survey of any other safety precautions necessary
- The RP will be responsible for all pre-flight checks (Appendix G) of the SUAS including a thorough check of the Flight, Battery and Maintenance Logs (Appendix J,K,L respectively)
- Providing a thorough brief to all personnel assisting in the task (i.e. Flight crew, Client, Observers etc.)

Camera Operator: Note that the Camera Operator may act as Observer when operating as a two-person crew, in addition to the responsibilities outlined below:

- Responsibility for controlling the camera/sensors during the SUAS flight
- Keeping all camera equipment in good working order including but not limited to:
 - Checking battery power is sufficient to complete the flight (if applicable)
 - Check the camera memory is sufficient to record the new data for the flight
 - Check camera settings are correct – settings – mode – operation
 - Confirming the camera is appropriately mounted and attached to the SUAS

Observer: An observer is required to be present on all tasks if deemed necessary by the SUA Operator and/or the RP. In addition to the general tasks detailed in Para 2.4 the observer's responsibilities also include:

- Keeping an active lookout through a 360° arc around the flight area, checking for potential flying incursions such as military or civilian aircraft, birds or recreational radio control aircraft. If seen by the observer they should indicate clearly to the RP the heading, direction and speed and what the hazard is. The RP will then take appropriate action
- Prevent members of the public or other site users interfering with the flight
- Keep the Take-Off and Landing Point (TOLP) clear of people and animals prior to take-off and landing and indicate its state clearly to the RP when required
- In the event of a 'fly away' the Observer should note the SUSA flight path, speed and height and help the RP report this data to the local police and any relevant Air Traffic Control Authorities

Contract Personnel: Depending upon the nature of the task, additional personnel may be required to ensure safe and efficient completion. These may include Camera Operators and support personnel. Where appropriate, any additional personnel required for the task are to receive a thorough briefing from the RP and are to be informed of the Safety and Incident Reporting Procedures in place. They must also be informed of the appropriate communication procedures to be used, should they believe that the safe operation of the SUAS or the safety of any person, property or livestock are or are about to be compromised.

Site Support Personnel: With some projects it may be deemed necessary to hire extra personnel to keep equipment and personnel safe. They are, however, not part of the primary flight crew but are integral to the smooth running of the operation. They are not to be in contact with the RP during the flight and they would not be expected to take on any of the roles and responsibilities detailed above.

10. Aircraft Systems and Technical Descriptions

This section of the Operations Manual details the SUSA utilized by the organisation.

Manufacturer	SUA Model
DJI	Mavic 2 Pro

See Appendix B for additional SUAS details.

All flight operations are supported by laptop computers and/or tablets running Apple OSX, Windows, Android or iOS respectively. These devices are used for flight planning (including web access to briefing information), checklist completion, downloading and viewing captured footage and for some operations, connection to the SUAS prior to flight in order to amend flight parameters then post-flight for data logging and diagnosis. Laptop and Desktop computers operated by the organisation are also used outside of flight operations for performing software and firmware upgrades (see Para 12). Please note that portable devices may be used in conjunction with any Light Bridge/Wi-fi equipped SUAS during flight in order to access the camera feeds, telemetry and execute certain in-flight commands such as RTH or Auto-Land

11. Operating Limitations and Considerations

The organisation operates in compliance with the ANO (CAP393), CAP722 and the limitations specified by the manufacturer of the SUAS at all times.

Particular credence is given to the limitations and regulations currently described in the following articles of the ANO:

- Article 94 – Small Unmanned Aircraft
- Article 95 – Small Unmanned Surveillance Aircraft
- Article 241 – Endangering Safety of any Person or Property

Except in circumstances whereby a permission issued by the CAA amends said articles.

OPERATING SPECIFICATIONS: ALL SUAS	LIMITATION
Maximum Distance from RP	500m
Maximum Operating Height (ASL)	400'
Maximum Operating Altitude (AMSL)	5000'

OPERATING SPECIFICATIONS: DJI Mavic 2 Pro	LIMITATION
Maximum Wind Speed	20 Kts
Maximum OAT	40°C
Maximum Continuous Flight Time	31 minutes
Maximum Take Off Mass	907g
Maximum Speed	37 Kts

Please Note: An operational ceiling of 5,000' AMSL is recommended. Flying the SUAS above this level will significantly increase battery usage and is likely to affect the aircraft's overall performance. In the event that flying above 5,000' AMSL is proposed, a full-length test flight in a clear area is mandatory, prior to commercial operations, in order to assess battery life and aircraft performance. The RP must ensure that safety is not compromised when operating at higher altitudes due to increased Density Altitude, and resultant decrease in both lift available and thrust margin.

12. Types of Operations

The organisation operates across the UK and throughout the world where the CAA's PfCO is recognised as an Acceptable Means of Compliance for Commercial SUAS Operations. Services provided include but are not limited to Film, Video, Photography, Thermal Image Capture, Infrared Image Capture, Structural Inspections, Aerial Surveys, Building and Site Inspections/ Surveys, Agricultural Surveys and Aerial Imaging. All SUAS will be subject to the obligations identified within CAP393, CAP722 or the relevant rules and regulations as described by the controlling NAA.

13. Software and Firmware Update Policy

Software and firmware is published as and when it is deemed necessary by the manufacturer. The implementation of new software always introduces risk. The advantages of implementing the new software and its features have to be balanced with the risk of abnormal system operation. The organisation's policy is to monitor manufacturers' websites for the publication of new software. This is done at approximately monthly intervals, or as required. A period of approximately 4 weeks is recommended between update download and implementation to any of the organisation's SUAS to allow other users to adopt the software and identify any potential 'bugs'. Internet forums will be checked to see if any issues have resulted from the implementation of the new software. The software release notes will be examined and a decision as to whether to upload the update is then made by the SUA Operator.

After any update, the SUAS is taken to an open field area for testing. The test will include all normal flight operations (including Failsafe) and, where applicable to the SUAS, will also test any new features in the software as described in the software release notes. All updates will be recorded in the Maintenance Log (Appendix L).

14. Maintenance Principles and Regime

The RP is responsible for ensuring the airworthiness state of the aircraft at all times. The RP is to follow all checklists and risk assessments as provided in the Appendices of this Operations Manual. Upon completion of the flying task, the RP is to complete the post-flight checklist and the flight, battery and maintenance logs. On returning from the flying site, the SUAS will be inspected in accordance with the embarkation checklist in preparation for the next operation. Particular attention is made to moving parts:

- Each propeller is checked for damage and dirt and replaced/cleaned as required.
- Each motor is checked for any looseness of the shaft, or any tightness when rotated through 360 degrees. Motor temperature should also be checked immediately upon landing to ensure no motor is 'running hot' which can be an indicator of impending failure. Any motor(s) failing these checks are to be replaced.
- Each battery has a visual inspection to see if there is any visible damage or swelling of the cells. Damaged batteries will be taken out of service and be disposed of appropriately.
- A visual inspection is to be made of all exposed wiring and remedial action taken as necessary if damage is found.
- A visual inspection is to be made of the camera gimbal and any necessary remedial action taken.

In the event that the RP is concerned about any specific maintenance item, this is to be discussed with the SUA Operator before the next mission and appropriate rectification conducted. If required, the manufacturer or the distributor will be consulted. In addition, the organisation will monitor the manufacturer's website(s) in order to be aware of any specific maintenance issues that have been noted and the recommended rectification action(s) undertake

15. Supervision of SUA Operations

The Remote Pilot of the SUAS takes overall responsibility for the safe operation of the SUAS at all times.

The SUA Operator (if different from the RP) will ensure that operations are planned coordinated and delivered in such a way that any regulatory requirements and limitations as laid down in any relevant permissions are adhered to.

16. Incident Investigation, Reporting and MOR Handling

The Incident Log (Appendix M) is a critical part of the safety assurance process. All staff members have a responsibility to log incidents in the Incident Log and to report them to the SUA Operator as soon as possible, preferably by telephone, followed by an auditable email. The SUA Operator will review the Incident Log and formulate any remedial action that may be required. Any changes to operating procedures must be promulgated to, and acknowledged by all staff, preferably by email. Additionally, the CAA should be informed if it is believed that others are likely to experience a similar situation.

Certain incidents are categorised as 'major incidents'. Such incidents include any incident that:

- Involve personal injury of a staff member or a third party
- Results in serious damage to the SUAS
- The RP or any other member(s) of the operational team believes a significant risk to health and safety was posed

Certain incidents must be reported to the UK CAA. The MORS (CAP 382) describe the necessary processes that pertain to accidents, incidents and investigations. Reportable occurrences must be reported via the following webpage, using the 'ECCAIRS' System:

<http://www.aviationreporting.eu/>

Reportable occurrences are categorised as any incident which endangers or which, if not corrected, would endanger an aircraft, its occupants or any other person.

24 hour CAA & AAIB Joint Accident/Incident reporting line: **+44 (0)1252 512299**

Occurrences that relate to SUAS may include, but are not limited to:

- Loss of control/data link – where that loss resulted in an event that was potentially prejudicial to the safety of other airspace users or third parties
- Navigation failures including those induced by Human Factors
- Pilot station configuration changes/errors
- Anomalies during transfer to/from launch control/mission control stations
- Critical/In Flight Display failures
- Crew Resource Management (CRM) failures/confusion
- Structural damage/heavy landings
- Flight controller or UAS programming or configuration errors
- Any incident that injures a third party

17. Flight Team Composition

Mandatory (minimum of one, RP as noted below):

RP First Name	RP Surname
Tom	Sykes

Optional: Camera Operator
Spotter/Observer

If for any reason a qualified Observer is not available, clients may be used if they are on-site and have conducted all the prerequisite briefings detailed in Paras 2.4 and 8. Pre-Site surveys will highlight potential issues and determine if extra support personnel are needed in order to safely and efficiently complete the required flying task.

18. Operation of Multiple types of SUAS

The organization may operate a number of different SUAS and the most appropriate SUAS will be selected for each mission on a case-by-case basis. In every case, when determining the appropriate SUAS to deploy, the following factors are to be considered:

- Mission Type
- Sensor Requirement
- Weather Conditions
- Operating Area

The aim of selecting the most appropriate SUAS is to minimize the risk to equipment and 3rd parties, particularly when operating in congested areas or in/around high value assets. The RP is to ensure that they are familiar with ALL of the functionality inherent in the system they are operating at the time, with particular attention being made to any Failsafe or RTH methodology and Flight Controller nomenclature. The RP is responsible for ensuring that they maintain adequate practice to remain competent in the operation of all SUAS. The SUA Operator is to ensure that all staff Members who are involved in the operation of SUAS are allocated sufficient time and resource to remain competent and qualified. If at any time, an employee or the SUA Operator deems that competency is not being maintained/achieved, it is to be noted in the incident Log and a suitable, auditable refresher training course is to be undertaken in-house without prejudice to the affected employee(s).

19. Qualification Requirements

All personnel operating SUAS for and on behalf of the organisation must have the following qualifications/achievements or their equivalent (the completion of UK Military Flying Training and subsequent award of Combat Ready Status, held for a minimum of 3 years qualifies the RP for exemption from the requirements for any Ground School/Theory Examination):

- CAA Approved SUA Theory Course
- CAA Approved SUA Flight Test, completed in appropriate weight category & aircraft class

20. Crew Health

All Flight Crew members have a responsibility to report to the RP or SUA Operator if they feel unwell before or during flying operations. The RP must not operate if they do not feel confident that they are well enough to conduct the flight safely. The organisation reserves the right to ask the staff member to supply a 'Statement of Fitness for Work' certificate following a period of illness if required. The Statement will be issued by the staff member's GP and will indicate whether the employee is fit for work, not fit for work, or fit to work with reasonable adjustments to their working practices. Staff members must advise the SUA Operator if any prescription drugs are currently prescribed which may affect the abilities of the team member to operate in a safe and responsible manner.

Operating SUAS under the influence of alcohol is strictly prohibited and the organisation reserves the right to request a suitable test to ensure that any RP is fit to operate in a safe and responsible manner. In all cases, all crewmembers must be under the legal 'Drink-Drive' limit prior to the operation of any SUAS or related equipment.

Crew fatigue can lead to serious accidents. No Flight Crew member shall take part in flying operations if they are excessively fatigued. There are many factors that can contribute to fatigue such as personal factors, additional work responsibilities, recent illness, high work load, long duty times etc. It is the responsibility of all staff members to ensure they have adequate rest. The RP will discuss Crew Health and Safety at the Crew Briefing held on site prior to any flying operations. This will include a plan for rest and refreshment breaks.

21. Logs and Records

The logs and records that are required are shown in the Appendices J-P:

Appendix	Content
J	Flight records
K	Battery Log
L	Maintenance log
M	Incident Log
N	Insurance Schedule
O	Flight Briefing
P	ECCAIRS Offline Form

PART B – OPERATING PROCEDURES

1. FLIGHT PLANNING/PREPARATION

The following section details the flight planning and preparation procedures employed by the organisation prior to, during and upon completion of each individual task. They prescribe the *minimum* information which needs to be ascertained during the pre-task decision making process in order to ensure that any hazards presented to 3rd parties, property and/or livestock are kept as low as reasonably practicable (ALARP).

1.1 Determination of intended task and feasibility

The majority of tasks will be initiated in response to a customer request. In the case of a customer request, the feasibility of the task will be assessed by the RP and/or the SUA Operator during the Pre-Site Survey in order to ensure that the customer's expectations are satisfied, whilst maintaining safe operations within Visual Line of Sight (VLOS) operating criteria. The RP will include in his/her pre-site and on-site survey, the use of various resources which may include but are not limited to Google Earth, appropriate aviation maps/charts, computer planning software, weather forecast websites etc.

Where necessary, modifications to the task will be agreed with the customer in order to ensure successful capture of the highest quality data whilst reducing operating risk. Once modifications to the plan have been completed, the task will be re-assessed as required by the RP to ensure that the mission aims can be achieved whilst maintaining safe operations within VLOS operating criteria. Some tasks will be initiated internally for testing, training, competency, demonstration and marketing purposes. In all cases, tasks are assessed prior to conduct in order to ensure the highest standards of safety are met and maintained at all times. If it is deemed necessary for safe operation and Pre-Flight Risk Assessment Analysis, a formal site visit may be requested/ conducted in order to determine the feasibility of the task. Any additional Risk Mitigation Procedures can then be discussed with the client as part of the Pre-Flight Planning procedures, prior to deployment. The client will be held responsible for covering all costs associated with a formal site visit if it is required in addition to the standard Pre-Flight Planning procedures.

1.2 Operating Site Location and assessment

The RP will conduct a Pre Site Survey and complete the Pre Site Survey checklist (Appendix C). Consideration will be given to:

- Local airspace and specific provisions (e.g. Controlled Airspace, Flow Arrows, etc.)
- Other aircraft operations (local aerodromes or known operating sites)
- Hazards associated with industrial sites or activities such as live firing, gas venting, high-intensity radio transmissions etc.
- Local bylaws
- Obstructions (wires, structures, buildings etc.)
- Extraordinary restrictions such as restricted airspace around prisons, nuclear establishments etc. (unless suitable permission(s) has been granted)
- Habitation and recreational activities
- Public access.
- Permission from landowner
- Likely operating site and alternative sites
- Weather conditions for the planned task

1.3 Risk Management

The RP takes overall responsibility for the safe operation of the SUAS at all times. All operations will take place under conditions where the combination of airspace segregation, VLOS operation (500m/400'ASL), relatively low aircraft mass and operating within the appropriate regulatory frameworks combine to mitigate risk to ALARP.

Site conditions may introduce further risks (e.g. potential for collision with trees/buildings) and these risks are to be considered during the Pre Site and On Site Surveys; Checklists and Risk Assessment forms cover the areas to be considered and must be completed prior to the commencement of flying operations. A formal risk assessment document (Appendix F) will be completed for all work undertaken.

The SUAS operation must not present a risk to persons or property greater than that for an equivalent manned aircraft operation. In assessing risk and mitigating factors, SUAS flight must not take place if the risk to persons cannot be mitigated or reduced to ALARP.

Where required, a full risk assessment will be conducted using an appropriate framework/process, in association with the intended Flight Crew and, if appropriate, the Client. This formal risk assessment is to be held on file as an auditable record of conduct and subsequent outcome of the Risk Assessment and Mitigation Process.

1.4 Communications

Where the planned operation is within an Air Traffic Zone (ATZ) or restricted airspace the RP must liaise with the controlling authority prior to conducting SUAS operations. Contact numbers for any affected ATC units are to be noted on the Pre-Site and On Site Survey forms for ready access if required. The Flight Crew are to inform the relevant authority when SUAS operations commence *and* cease and must comply with any stipulations for operations directed by said controlling authority.

1.5 Pre-notification

During the Pre-Site survey consideration should be given to whether a Notice to Airmen (NOTAM) should be promulgated by the organisation in order to advise other users of the task. If the flight is to be performed within an ATZ or near to any aerodrome or aircraft operating site then their contact details are to be obtained and notification of the intended operation is to be provided prior to takeoff. In certain locations it may be necessary to inform the local police of the intended operation to avoid interruption or concerns from the public.

1.6 Site Permissions

At all times the RP will ensure that landowner's permission has been granted for the takeoff and landing areas, preferably in writing.

1.7 Weather

All attempts are to be made to source a suitable weather forecast, covering the area and duration of the task in order to ensure the task can be conducted safely. Forecasts can be sought from a number of sources including:

- UK Met Office
- Checkwx.com
- BBC Weather
- Accuweather.com
- Metcheck.com

In all cases, the RP is to ensure that the local weather is suitable for the flight before commencing SUAS operations.

1.8 Preparation and serviceability of equipment

The Flight Crew are to utilise the Embarkation and Arrival checklist (Appendix D) to ensure that all appropriate equipment is transported to the site in a serviceable condition and that the SUAS is safely prepared for the flying task. The RP is responsible for ensuring the airworthiness state of the aircraft and the safety of its payload at all times including during transportation to/from operating locations and suitable storage sites.

2. SITE SURVEY

The RP is to conduct a site survey on arrival at the intended operating site. The RP will use the On-Site Survey checklist (Appendix E) to ensure that a comprehensive assessment of potential hazards and risks is completed. Although the RP is ultimately responsible for safe operation, the Observer and/or Client may assist the RP in the site survey as this additional input may serve to enhance the effectiveness of the survey process and aid in risk mitigation.

2.1 Selection of an Operating Area and Alternate Landing Site

As SUAS are relatively small aircraft; A clear and open operating area should be selected to ensure that the SUAS remains at least 30m from any person, hazard or obstruction during the takeoff and landing process. It is permissible for Flight Crew such as the RP and Observer to be within 5m during these procedures if required. Careful consideration must always be given to the VLOS operating criteria with particular attention given to the ability to maintain visual contact with the SUAS at all times. Where possible, an alternate operating area should be identified in case the primary site becomes unavailable for some reason (e.g. spectators, vehicles etc.).

2.2 Crew Briefing

All Flight Crew will receive a safety and task briefing prior to the commencement of operations. This will take place after the On-Site Survey has been completed by the RP. Standard briefing items which are to be included in the Pre-Flight Briefing are, as a minimum:

- Purpose and scope of task
- Emergency procedures
- Safety considerations
- Lookout procedure
- Communications (including radio communications if required)
- Management of public/spectators
- Weather conditions
- Crew Health and Safety
- Any special considerations resulting from the On-Site Survey

A copy of the recommended Flight Briefing is at Annex O.

2.3 Cordon Procedure

Consideration must be given to the minimum distance criteria with regards to members of the public (30m separation during takeoff and landing). In conjunction with the Flight Crew, the RP is to determine the cordon area at the start of the operation, as required by the Arrival Checklist. Where necessary, a taped off cordon will be laid out to provide public/spectators with a visible 'do not cross' line. The RP is responsible for ensuring a minimum 30m separation during takeoff and landing, however the Observer is also responsible for keeping the RP informed of any public incursion during that transition period.

2.4 Communications

During any tasking, local contact numbers for the following will be listed if applicable

- ATC or any applicable/relevant Airspace Control Authority
- Police
- Fire
- Ambulance
- Coastguard
- Landowner
- Local Authority (Council etc.)

Before flying operations commence the RP is to conduct a check of the integrity of the Global Positioning System (GPS) signal to determine which flight mode is to be selected for flight. When the situation requires and safety dictates, licensed (if required due to local regulations) 2-way radios will be used to allow efficient communications between members of the Flight Crew and other persons employed by the organisation.

2.5 Weather

Weather is to be continually monitored whilst on site by the Flight Crew. In showery conditions, the RP will monitor rainfall radar if possible; The SUAS is to be landed and appropriately protected from the weather prior to the arrival of rain. A hand-held anemometer will be used to monitor wind speed as well as Outside Air Temperature and Wind Chill. Flight in conditions of rainfall, high wind gusts or in the vicinity of thunderstorms is not permitted. The RP is to take into account the possibility of turbulence around buildings or large ground features when conducting flight operations.

2.6 Charging and Fitting of Flight Batteries

All SUAS employed by the organisation utilise Lithium-Polymer batteries as a main power source. The following precautions are to be taken when handling:

- Batteries are to be removed from the SUAS equipment before charging
- Batteries are only to be charged in an open, well ventilated area (not in a vehicle)
- Where possible, batteries are to be charged and stored in a 'LiPo Safe' bag
- Batteries must be allowed to cool to ambient temperature prior to charging
- A CO2 or Dry Powder fire extinguisher should be located nearby
- The manufacturer's recommended charge rate is NEVER to be exceeded
- Batteries which show visible signs of 'puffing' are to be quarantined immediately and disposed of appropriately

3. FLIGHT PROCEDURES

For all stages of flight, the RP will utilise a copy of the relevant SUAS Flight Reference Cards (FRCs) as an aide memoire to ensure all checks are complete. In general, the various stages of flight comprise of the following:

3.1 Pre-Flight

Prior to flight, the RP must:

- Verify that Flight Crew are adequately briefed, have completed all required checklists and that suitable cordons and safety equipment are in place
- Ensure that Flight Crew and relevant 3rd parties are specifically briefed on the commands that may be utilised during the operation, the meaning of those commands and actions required upon hearing those commands, if any
- Ensure land owners permission has been granted for operations to commence
- Ensure 3rd parties are a safe distance away in accordance with the PfCO.
- Ensure timings are in keeping with any clearances or NOTAMs issued. Most ATC units will require an update via telephone prior to launch.
- Conduct a final check to ensure that the SUAS is airworthy and safe to operate. This is to be conducted prior to and after each flight and is to be documented each time in the aircraft log book

3.2 Start

This is defined as the moment the RP takes the SUAS to the TOLP for the purpose of starting a flight. Prior to engaging any power with the SUAS and equipment, a final check is to be made to ensure the TOLP and surrounding area are clear in accordance with the PfCO. The start sequence documented in the SUAS Operating Manual/FRCs will then be followed, paying particular attention to battery and Flight Controller Status indications. The observer(s) are to position themselves in a suitable location to assist the RP with the launch. The RP will give the command '*Starting*' so as to alert Flight Crew members and 3rd parties that the rotors are about to start turning. All Flight Crew members are to make note of the start time at this point in case of failure of SUAS based Flight Logging.

3.3 Take-Off

Where practical the RP/Crew are to stand at a safe distance behind the SUAS, with the take-off direction away from them. It is not a requirement to take off into wind but it is recommended. It is desirable for all 3rd parties to be positioned behind the pilot at this stage and in all cases, a minimum of 30m away from the SUAS. Immediately prior to launch, a final check is to be made to ensure that the TOLP is clear of obstructions or hazards including people/animals, at which point the RP will give the command '*Taking Off*' so as to alert all Flight Crew members and 3rd parties. The RP is to ensure he has a clear path for the SUAS during this transition phase. Once the SUAS is in a safe hover position the RP will perform a brief flight check to ensure the aircraft is responsive to all relevant commands. At this stage if there is any doubt as to the integrity of the control of the SUAS then it is to be landed immediately. If the SUAS begins to drift then a re-calibration of the compass and or IMU (if appropriate) should be conducted. If satisfied that the controls are working in the correct manner the RP will inform the Flight Crew he is content to continue the task by calling '*continuing*'.

3.4 In-Flight

The RP and Flight Crew are to remain alert for any other aircraft operations or unforeseen/unexpected hazards that could present a risk of Aerial Collision. All 3rd parties are to remain a minimum of 50m from the SUAS during this phase. All Flight Crew are to be aware of the initiation process for any fail-safe and the loss of control procedure in case of RP incapacitation and/or loss of control.

3.5 Landing

Prior to commencement of the landing procedure, the Flight Crew are to ensure that any 3rd parties are moved to a minimum distance of 30m clear of the RP and the cordon area, ideally behind the RP. When conducting the landing procedure, the RP is to give the command '*landing*'. In the event of the RP losing control, the Flight Crew will initiate the fail-safe procedure as briefed by the RP.

3.6 Shutdown

The SUAS is still to be considered 'live' and remains a possible danger until the battery is disconnected and the transmitter is switched off. The RP will power down the aircraft, making a note of the time and ensure it is safe prior to its removal from the landing area. The RP is to conduct a thorough check of the aircraft's airworthiness at this point. All equipment is to be collected immediately after shutdown and stored appropriately in order to prevent loss due to distraction. The battery is to be removed, allowed to cool to ambient temperature and placed in to a 'LiPo Safe' bag if possible, immediately after its inspection, if it is not to be charged on site for further use. All relevant flight information is to be recorded in the flight and battery log. If operating within an ATZ or restricted airspace then the Flight Crew are to ensure that the relevant authorities are contacted and informed that the SUAS is on the ground. The landowner should also be contacted upon cessation of the flying.

4. SUAS EMERGENCY PROCEDURES

SUAS Emergency Procedures (Immediate Actions) are to be committed to memory prior to the conduct of any flight operations. Immediate actions are detailed in the relevant aircraft's FRC's; A copy of which is to be available to the Flight Crew at all times during live operations.

4.1 SUAS Battery Failure

The control systems utilized means that a loss of battery power is likely to be either:

- Catastrophic (if a total power loss is experienced).
- Contained (e.g. if the battery voltage is allowed to drop too far the SUAS will enter automatic landing mode, landing at its current position or completing an auto RTH and Landing if applicable).

In any event of SUAS power loss, the RP is to declare '*UAV FAIL*' in order to warn any persons in the operating area.

4.2 Transmitter Battery Failure

All SUAS will be programmed to failsafe RTH if the signal is lost from the transmitter. If this occurs, the RP is to declare '*UAV Return To Home FAILSAFE*'.

4.3 Motor Failure / Prop Failure

In the unlikely event that a single prop/motor should fail in flight then it is highly likely that control of the SUAS will be lost or compromised. If any control remains the RP should endeavour to manoeuvre the SUAS away from Persons, Livestock and Structures then land immediately, operating the kill switch/sequence and any Speed Reduction Systems as the situation dictates. In this event, the RP is to declare '*UAV FAIL*' in order to warn any persons in the operating area.

4.4 Loss of Control Frequency

After 3 seconds of transmitter signal loss, the SUAS will RTH Failsafe. If this occurs, the RP is to declare '*UAV Return To Home FAILSAFE*'.

4.5 Loss of GPS Signal

Upon the loss of the GPS Signal the RP should decide whether it is appropriate and safe to continue flight operations in ATTI or Manual modes. If he is not content that safe flight can be maintained he is to land the SUAS ASAP and investigate the cause further. Reporting any technical anomalies as required to the SUA Operator and ensuring that the details are recorded in the Aircraft Technical Log.

4.6 Malicious or accidental interference with control frequency

If any control remains, the RP should endeavour to steer the SUAS away from Persons, Livestock and Structures then land immediately, operating the kill switch/sequence and any Speed Reduction Systems as the situation dictates. In this event, the RP is to declare '*UAV FAIL*' in order to warn any persons in the operating area.

4.7 SUAS Uncontrolled Flyaway

If the RP suspects an uncontrolled flyaway he should immediately alert the Flight Crew and any 3rd parties in the area by declaring '*FLYAWAY*'. If any control remains the RP should endeavour to manoeuvre the SUAS away from Persons, Livestock and Structures then land immediately, operating the kill switch/sequence and any Speed Reduction Systems as the situation dictates. If there is no response from the SUAS then the Flight Crew are to note the time, heading, height and speed, estimate the endurance of the SUAS and notify Police and/or Air Traffic Control (ATC) authorities as appropriate. *See: Reporting, Part A Section 15*

4.8 Operator Incapacitation

A nominated person (either Flight Crew or Client) must be briefed on how to set the RTH Failsafe in the event of the RP being unable to continue the flight. With a GPS lock of 6 satellites or more the SUAS will automatically RTH and land itself at the recorded TOLP (or dynamic home point if equipped). With less than 6 GPS Satellites locked, the SUAS will automatically land in situ. The person who triggered the SUAS to RTH is to ensure sure the TOLP is clear of people/animals while the SUAS is completing RTH and auto landing. In this event, the person triggering the RTH is to declare '*UAV Return To Home FAILSAFE*'.

4.9 Aircraft Incursion

Observers or any personnel involved in SUAS operations who see or spot an incursion by another aircraft are to warn the RP ASAP. The RP is to take any required action to avoid the aircraft that has entered into the SUAS airspace and consideration made to reporting an AIRPROX via the relevant method.

4.10 Public/3rd Party Incursion

Observers or any personnel involved with SUAS operations who see or spot an incursion by a member of the public or 3rd party are to warn the RP ASAP. The RP is to take action as required in order to maintain a minimum separation of 50m from the member of public or 3rd party who has entered the operating area. When it is safe to do so, a member of the flight crew will then approach the member of the public or 3rd party to remove them from operating area or to bring them under the control of the flight crew. The flight will re-commence only when safe to do so.

4.11 Fire

In the event of a fire on board the SUAS;

In the air; It is to be landed As Soon As Possible in a safe area then an attempt made to fight the fire if appropriate. An attempt may be made to disconnect and isolate the power source from the Aircraft if safe to do so. The safety of 3rd parties and Flight Crew are paramount at all times and personal safety must not be prejudiced in order to prevent further damage to the SUAS. If necessary, a nominated member of the Flight Crew is to ensure that all personnel are a safe distance away from the source of fire and the relevant Emergency Services contacted.

Note: The smoke/fumes from any fire involving electronic equipment and composite materials may be toxic and/or hazardous to health. Where possible, remain upwind of any fire and outside of any smoke/particle clouds generated.

On the ground; An attempt should be made to fight the fire if appropriate. An attempt may also be made to disconnect and isolate the power source from the Aircraft if safe to do so. The safety of 3rd parties and Flight Crew are paramount at all times and personal safety must not be prejudiced in order to prevent further damage to the SUAS. If necessary, a nominated member of the Flight Crew is to ensure that all personnel are a safe distance away from the source of fire and the relevant Emergency Services contacted.

Note: The smoke/fumes from any fire involving electronic equipment and composite materials may be toxic and/or hazardous to health. Where possible, remain upwind of any fire and outside of any smoke/particle clouds generated.

Appendix A – Permission for Commercial Operation (PfCO)

CIVIL AVIATION AUTHORITY

Air Navigation Order 2016



PERMISSION – Small Unmanned Aircraft / Small Unmanned Surveillance Aircraft.

1. The Civil Aviation Authority, in exercise of its powers under articles 94(5) and 95(2)(a) of the Air Navigation Order 2016 ('the Order'), as amended, hereby permits **Tom Sykes** (the SUA operator), to operate small unmanned aircraft (see Note 1) of the class(es) listed in paragraph 2 below, for the purposes of commercial operations and for operations over or within 150 metres of any congested area.
2. This permission is applicable to the following class(es) of small unmanned aircraft:
 - (a) Multirotor / Helicopter.
3. This Permission is granted subject to the following conditions, namely, that the small unmanned aircraft shall not be flown:
 - (a) Other than by persons employed by or contracted to **Tom Sykes** whilst being holder(s) of an appropriate recommendation issued by a UK National Qualified Entity for remote pilot competency, or an alternative existing aviation qualification determined to be acceptable to the CAA (CAP722 refers);
 - (b) Unless there is insurance cover for the small unmanned aircraft that meets the requirements of EC Regulation No. 785/2004;
 - (c) Unless the small unmanned aircraft is maintained within the direct, unaided Visual Line of Sight (VLOS) of the remote pilot, out to a maximum horizontal range of 500 metres unless a lesser control link radio range has been specified by the manufacturer;
 - (d) At a height exceeding 400 feet above the surface, unless permitted to do so under article 94A(3) of the Order;
 - (e) Within the flight restriction zone (see Note 2) of a protected aerodrome, unless in receipt of the appropriate permission as required within article 94A of the Order.
 - (f) Over or within 150 metres of an organised open-air assembly of more than 1,000 persons;
 - (g) Within 50 metres of any person, vessel, vehicle or structure that is not under the control of the SUA operator or the remote pilot, except that during take-off and landing this distance may be reduced to 30 metres;
 - (h) Unless it is equipped with a mechanism that will cause the small unmanned aircraft to land in the event of disruption to or a failure of any of its control systems, including the radio link, and the remote pilot has ensured that such mechanism is in working order before the aircraft commences its flight;
 - (i) Unless the remote pilot is reasonably satisfied that any load carried by the small unmanned aircraft is properly secured, that the aircraft is in a safe condition for the specific flight, and that the flight can safely be made taking into account the wind and other significant weather conditions; and
 - (j) Unless the flights are conducted in accordance with the current operations manual of the SUA operator, to include a site safety assessment, as well as records of each flight undertaken. The SUA operator must maintain records of each flight made pursuant to this permission, and must make such records available to the Civil Aviation Authority on request.
4. Flights at night shall only be conducted in accordance with the approved Ops Manual procedures. Prior to flying operations, a daylight reconnaissance and site safety assessment including aircraft flight-paths within the surrounding area, shall be undertaken to identify, address and record any hazards, restrictions and obstacles. The launch site shall be provided with adequate illumination and the aircraft shall be equipped with adequate conspicuity lighting. Flights shall only commence when the weather conditions are suitable for continuous VLOS operations.
5. Any occurrences that take place while the said aircraft is being operated under this Permission shall be reported in accordance with Regulation (EU) No 376/2014 (the Occurrence Reporting Regulation).
6. This permission shall have effect from **04/06/2020 until and including 13/05/2021** unless previously varied, suspended or revoked.



for the Civil Aviation Authority
Date: 04/06/2020
Ref: 20200604Tom SykesPAndEUAS8871
Certificate Number: 2
SSC Technical Services 0330 022 1908 / uavenquiries@caa.co.uk
Distribution: Tom Sykes (07843 254957, tomesykes@gmail.com);

Note 1: 'Small unmanned aircraft' means any unmanned aircraft, other than a balloon or a kite, having a mass of not more than 20 kg without its fuel but including any articles or equipment installed in or attached to the aircraft at the commencement of its flight.

Note 2: The "flight restriction zone" of a protected aerodrome can be determined by reference to the table contained within ANO 2016 article 94A, paragraph 7.

Note 3: SUA operators and remote pilots should be aware that the collection of images of identifiable individuals, even inadvertently, when using surveillance cameras mounted on a small unmanned surveillance aircraft, may be subject to the General Data Protection Regulation and the Data Protection Act 2018. Further information about these regulations and the circumstances in which they apply can be obtained from the Information Commissioner's Office and website: <https://ico.org.uk/for-the-public/drones/>

Note 4: SUA operators and remote pilots must be aware of their responsibilities regarding operations from private land and any requirements to obtain the appropriate permission before operating from a particular site. In particular, they must ensure that they observe the relevant trespass laws and do not unwittingly commit a trespass whilst conducting a flight.

Appendix B – Aircraft Guidance Notes

1. DJI Mavic 2 Pro

DETAIL	DJI Mavic 2 Pro	Notes
Airframe Make	DJI	
Airframe Model	Mavic 2 Pro	
Span / Diameter	354mm	
MTOM	907g	
Motor Type	Electric	
Number of Motors	4	
Engine Size	Not Listed by DJI	
Power	LiPo	
Battery size	15.4v / 3850mAh	
Propeller size	21cm	
Flight Control System	DJI proprietary flight control system for Mavic 2 Pro	
Flight Control Tx Details	DJI Mavic 2 Pro Controller 2.4/5.8GHz	
Flight Control Receiver	Built-In	

Appendix C – Pre Site Survey Checklist

SITE NAME		Job Number	
Client/Contact No.		Billing Address	
Email Address			
Job Location(s)		Type of Work Required	
Vehicle Access		Task Date (Flexible?)	

ITEM	ACTION	FINDING
AIRSPACE	Airspace Type (A,C,D,E,G)	
TERRAIN	Type of Terrain (Flat/boggy/rough etc.)	
PROXIMITIES	Other Aircraft (Aerodromes, Model Flying Sites, Heli Pads etc.)	
HAZARDS	Live Firing, High Intensity Radio Transmissions, Gas Venting etc.	
RESTRICTIONS	Nuclear Power Stations, Prisons etc.	
SENSITIVITIES	Recreational areas, Local By Laws	
OBSTRUCTIONS	Wires, Buildings, Masts, Other	
PEOPLE	Local Habitation	
PERMISSION	Local Authority, Land Owner	
LIVESTOCK	Local Farms/Nature Reserve Restrictions	
ACCESS	Right of Way, Gates, Footpaths, Bridleways	
ALTERNATE	Alternative operation / TOLP	
RISK REDUCTION	How can any risks be mitigated?	
WEATHER	24 Hour Forecast, Local forecast	
NOTAMS	Any Applicable NOTAMs / NOTAM Submission Required?	
LOCAL AIR TRAFFIC	Do Local ATC need to be contacted	

Appendix D – Embarkation / Arrival / Departure Checklist

ADMIN	EMBARKATION	DEPARTURE	NOTES
Ops Manual & FRC's			
Log Books			
Aeronautical Chart(s)			
Job Paperwork Folder			
Hi-Viz			
Travel Documents?			
Generator			
Generator Fuel			
Rx LightBridge/TV			
Kettle & Brew Kit			
Thermos Flasks			
Food/Snacks/Drinks			
Adequate Clothing			
Laptop & Charger			
iPad(s) / Cables			
Warning Signs			
TOLP Set-Up (6x Cones & Tape/Rope)			
Tool Box			
Anemometer			
First Aid Kit & Accident Book			
Fire Extinguisher & Fire Blanket			

**Note – This is not a list of required items but a checklist to enable items to be ‘counted in’ and ‘counted out’ prior to and upon completion of each commercial job.*

Appendix D – Embarkation / Arrival / Departure Checklist

SUAS / EQUIPMENT	EMBARKATION	DEPARTURE	NOTES
<i>DJI Mavic 2 Pro SUA</i>			
Transmitter(s)			
Batteries (mAh/No)			
Charger(s)			
SMART Device(s)			
SMART Device Charger(s)			

Appendix E – On Site Survey Checklist

Job Number		Date	
Client/Contact No.		Wind Speed	
Pilot		Temp °C	
Observer		Location	

ITEM	CHECK	FINDING
OBSTRUCTIONS	MASTS, WIRES, BUILDINGS, TREES, RIVERS, CANALS,	
VIEW LIMITATIONS	Anything that may impair VLOS?	
PEOPLE	Crowd control Required?	
LIVESTOCK	Animals, Wildlife	
TERRAIN	Flat, Sloped, Rough, Wet, Icy	
PUBLIC	Public Access? Signage Required?	
AIR TRAFFIC	Clearance Required/Gained?	
PROXIMITY	Adequate Separation from buildings, obstructions etc.	
TAKE OFF AREA	Where is the safest convenient position	
LANDING AREA	Where is the safest convenient position	
EMERGENCY AREA	Where is the safest convenient position	
HOLDING AREA	Where is the safest convenient position	
PERMISSION	Landowner's permission confirmed?	
BRIEF/ COMMUNICATIO	Brief Crew and Client(s). Issue Radios if Required	

CONTACT	NUMBERS	NOTES
LOCAL ATC		
LOCAL POLICE		
LOCAL HOSPITAL		
OBSERVER		

PILOT		
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Appendix F – Risk Assessment Proforma

Risk Assessment Proforma (Only those risk not identified in the Operations Manual will be assessed unless stated)

Workplace		Assessment Number	
Task/Activity		Assessment Number	
Date Conducted		Date Reviewed	
Assessment Team		Date Reviewed	
1. Hazard (Something with the potential to cause harm/damage. How will it potentially be realised and what is the potential Injury/damage?)		2. At Risk	
3. Existing Control Measures		7. Further Control Measures available	
Risk		Risk	
4. Severity		8. Severity	
5. Probability		9. Probability	
6. Risk		10. Risk	
Further Actions (Further control Measures that could be implemented at the planning stage to help improve safety).			
Additional Comments (Actions identified by personnel on site, in order to make the task safer).			
Authorised by the Accountable Manager		Dated:	
Name(Print):		Signed:	
Probability(Columns 5 & 9)		Risk Rating(Columns 6 & 10) Severity x Probability	
1. Very Unlikely		1 to 5 Low Risk Acceptable Risk	
2. Unlikely		6 to 14 Medium Risk Continue but mitigate risks where possible	
3. Likely		15 to 25 High Risk Unacceptable - Find further mitigations	
4. Very Likely			
5. Virtually Certain			
Severity(Columns 4 & 8)			
1. No Injury			
2. Minor Injury			
3. >3 Day Absence			
4. Major Injury			
5. Death			
E - Employees			
C - Contractors			
V - Visitors			
P - Public			
A - All			

Appendix G – Pre Flight Checklist

ITEM	ACTION/CHECK
AIRFRAME	Check for damage, wear, tightness of fittings, condition and secure, check props, secure camera, fit aerals if reqd
CAMERA	Remove lens cap and Gimbal Lock, ensure Memory Card installed & Power Up if applicable
AIRFRAME	Place Airframe on Level Ground at TOLP
BATTERIES	Note Battery Number in Battery Log, fit battery securely into airframe
TRANSMITTERS	Turn on Appropriate Flight Control and Gimbal Control Tx
VRX/ GROUNDSTATION	Turn on Groundstation Equipment if applicable
AIRFRAME	RP to Call "CLEAR PROPS" Connect Main Power/Switch on SUAS. Check levels on Battery and confirm via Groundstation/Telemetry. Wait for Diagnostic Tests to complete iaw User Manual and confirm GPS Lock/number of Satellites if Utilising GPS/GPS ATTI Modes for flight. Complete <u>Compass and IMU Calibrations as appropriate</u>
GIMBAL CHECK	Test gimbal functions as appropriate to platform. Ensure leveling operates as expected and full and free movement with no snagging of cables
VIDEO DOWNLINK	Ensure vRx/Groundstation is operating as expected and relevant image/telemetry is being displayed
CAMERA	Check Camera Secured, video Downlink operating and Memory Card Installed
PEOPLE	Ensure all Crew and 3 rd Parties are in a safe location/ position relative to the SUAS
TIME	Note time and confirm it is within any set clearances
POWER UP	Call "STARTING" and engage the SUAS Start Sequence

Appendix H – In Flight Checklist

ITEM	ACTION/CHECK – After Take-Off
TAKE OFF	Take one Final look around, check with Observer if all Clear then call “TAKE-OFF”
AIRCRAFT	Conduct Handling Check in the Low Hover: Abnormal Handling Characteristics – Call “ABORTING” & Land Immediately. Handling Characteristics OK – Call “CONTINUING”
ITEM	ACTION/CHECK – Routine
IPAD/GROUNDSTATION	Monitor Battery Levels (Tx/SUAS/ Groundstation)
AIRCRAFT	Monitor Status LEDS to confirm Flight Controller Mode and Battery level
ITEM	ACTION/CHECK – Pre-Landing
CAMERA	Stop Recording if required.
Landing Point	Confirm TOLP Clear and call “LANDING” NB; If not clear, direct Observer to clear the area or select alternate site.

Appendix I – After Landing / Post Flight Checks

ITEM	ACTION/CHECK
AIRCRAFT	Note Battery Level, Turn Off and remove Call “SAFE”
TRANSMITTERS	Turn Off all Tx’s and Groundstation Equipment
INCIDENTS	Any incidents to be reported to the SUA Operator if required
LOG BATTERY USAGE	Record all details in Battery Log
LOG AIRCRAFT FLIGHT	Record Flight into Aircraft Log Book
LOG FLIGHT	Record Flight time in Pilots Log Book
COMMUNICATIONS	Inform ATC/Controlling Authority that tasking complete, If applicable
AIRFRAME	Check Airframe for damage, loose items, wear & tear, check props. Stow and secure appropriately
REVIEW	Review Data and Discuss further actions with Crew/Client as required

Appendix N – Insurance Schedule



FlyCovered Pay As You Fly+ UAS Insurance Schedule

Important Notes:

You, the insured shown in Item 1 of this schedule has a FlyCovered Pay As You Fly+ UAS Insurance Policy that is valid during the period of insurance shown in Item 2 of this schedule. In respect of the UAS specifically identified in Item 3 of this schedule you are eligible to select and book insured flying days on a per flight basis.

During the **period of insurance**, the **UAS** is covered for physical loss or damage, inclusive of theft, whilst on the **ground** or in **transit**. In addition to this cover, the **policy** provides a total of 30 **insured flying days** per **policy** in respect of all **UAS** whilst in **flight** provided all **insured flying days** are selected and booked through **your** FlyCovered account prior to each **flight**. **You** have the option to purchase additional **insured flying days** once the total of 30 days per **policy** has been reached. **UAS spares** are covered for physical loss or damage, inclusive of theft, during the **period of insurance** whilst on the ground or in **transit** by any means of conveyance.

Please refer to **your certificates of insurance**, which are issued upon the **administrator's** confirmation of booked **insured flying days** and for details and effective times of cover on those days and the **UAS you** are insured to fly.

Full details relating to the selection and booking of **insured flying days** can be found in the FlyCovered Pay As You Fly+ Insurance Policy.

Regulation (EC) No 785/2004 of the European Parliament

This **policy** provides the necessary coverage required in accordance with Regulation (EC) No 785/2004 of the European Parliament and of the Council of 21 April 2004. The **insurer** will not be liable in any way if **you** fail to purchase insurance cover for the required limits of liability. For clarification, please contact the **administrator**.

Headings are inserted for the purpose of convenient reference only and are not to be considered part of this **schedule**. Otherwise, wherever words or phrases appear in bold in this **schedule** they will have the meanings shown in the Definitions section of the policy wording.

POLICY NUMBER: 80000000259

Item 1. COMPANY NAME OR TRADING NAME AND ADDRESS:

Tom Sykes
47 Knowlands
Highworth
Swindon
Wiltshire
SN6 7NB

Item 2. PERIOD OF INSURANCE:

Start date: 2020-06-06 00:01:00 local standard time at **your** address

Expiry date: 2021-06-05 23:59:59 local standard time at **your** address

Appendix O – Flight Briefing

Crew Briefing:

TASK: (Job Type; Photography, Filming, Surveying etc)

--

Weather: (Nearest METAR/TAF)

Max Wind Speed/Gust:

Aircraft Wind Limit:

--	--	--

Airspace Type: (Controlled/Uncontrolled, MATZ/ATZ etc) **Nearest ATC Tel Number:**

--	--

NOTAMS: (If Applicable)

Other Restrictions: (eg. Max Height)

--	--

Aircraft Type:

Crew:

	Pilot:
	Camera:
	Other:

Safety Brief: (Example) ***Read out loud to the Examiner/Client***

Control Brief: 'Today we are flying a drone which could potentially be dangerous. Please do not approach the aircraft during take-off or landing. While the aircraft is in the air, please be aware of it at all times. If you hear me shout 'UAV FAIL' at any time, please find the aircraft in the sky and avoid it, as it might be deviating from its planned flight route and I might not have control of it.'

Read out loud to the Examiner/Client if working alone

Pilot Incapacitation: 'In the event of me becoming unwell during the flight, press and hold this button (Show it to the Examiner/Client). The controller will beep and the aircraft will return to the landing/take-off point. Keep this area clear until the aircraft lands and then deal with any medical emergency(ies).'

Appendix P – ECCAIRS Offline Reporting Form



AVIATION SAFETY REPORTING

When and where

UTC Date - Time	<input type="text"/>	-	<input type="text"/>	Location of occurrence	<input type="text"/>
Local Date - Time	<input type="text"/>	-	<input type="text"/>	World region	<input type="text"/>
	(YYYY/MM/DD)		(HH:MM)	State/area	<input type="text"/>

What

Headline	<input type="text"/>
Narrative language	<input type="text"/>
Narrative	<input type="text"/>

Severity

Injury level	<input type="text"/>	Highest damage	<input type="text"/>
		(to aircraft)	

Aircraft information

State of registry	<input type="text"/>	Aircraft category	<input type="text"/>	<input type="text"/>	<input type="text"/>
Aircraft registration	<input type="text"/>	Manufacturer	<input type="text"/>		
Serial number	<input type="text"/>	Model	<input type="text"/>		
Year built	<input type="text"/>	Other (specify)	<input type="text"/>		

Flight details

	Country	ICAO code	Other (specify)
Last departure point	<input type="text"/>	<input type="text"/>	<input type="text"/>
Planned destination	<input type="text"/>	<input type="text"/>	<input type="text"/>
Operation type	<input type="text"/>	<input type="text"/>	<input type="text"/>
Flight phase	<input type="text"/>	Occ. on ground	<input type="text"/>

Operational information

Weather relevant	<input type="text"/>	Airspace class	<input type="text"/>	Current flight rules	<input type="text"/>
Weather conditions	<input type="text"/>				

Form: General Aviation on Personal Behalf

Version 2.4 - September 2017

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Use Adobe Reader DC © to compile this form

Submit this form on www.aviationreporting.eu