

## Lawrence Clift Photography Sub 20Kg SUA Operations Manual



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**Commitment of Accountable Manager**

This Operations Manual describes the organisation, aircraft systems, personnel, flight operations and procedures by which Lawrence Clift Photography carries out remotely piloted aircraft systems (SUA) operations.

It is accepted that the contents of this document do not override the necessity of reviewing and complying appropriately with any new or amended regulation published from time to time by the relevant National Aviation Authorities addressed by this document.

Signed.....

Accountable Manager: Lawrence Clift  
Date: 29 October 2019

SUA Operator: Lawrence Clift Trading As Lawrence Clift Photography

Company Type: Sole Trader

Enquiries regarding the content of this document should be addressed to:

Lawrence Clift Photography, 47 Moss Side Way, Leyland, Preston, Lancs, PR26 7XU

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## **PART A: INTRODUCTION**

### **A1: Purpose**

The purpose of this document is to detail the items to be covered for the safe operation of Remotely Piloted Aircraft Systems (SUA) by Lawrence Clift Photography. At present this is the DJI Inspire 1 designated LC02 detailed in **Section A9** and **Appendix E**

### **A2: Scope**

This operations manual applies to all aircraft and personnel involved in the safe operation of SUA LC02 (DJI Inspire 1) and LC03 (Mavic Pro 2) as detailed in **Section A9** and **Appendix E**.

#### **A2.1: Safety policy and national perspective**

It is intended that Lawrence Clift Photography will use SUA commercially, in accordance with the operating procedures detailed in this Operations Manual and the safety procedures of any client the service is provided to. Commercial SUA services will be tailored to the client's needs whilst at all times making sure Lawrence Clift Photography operates within the limitations of the current Permission for Commercial Operation (**Appendix A**), the rules of the air detailed in the relevant CAA documentation (CAP393 and CAP722) and ensures adequate insurance is in place to cover the activities carried out.

#### **A2.2: Safety goals**

Lawrence Clift Photography aims to carry out SUA operations in a way that minimises the risk of damage to property or injury to pilots, crew, clients and members of the public.

#### **A2.3: Safety assurance**

The Remote Pilot (RP) is responsible for safety during SUA operations and, as such, is responsible for:

- a) Completion of an adequate site survey and risk assessment
- b) Deployment of appropriate crew to facilitate the operation
- c) Identification of on-site and local hazards
- d) Preflight aircraft checks
- e) In-flight procedures
- f) Post-flight checks
- g) Communication with land-owners, local air traffic services, police services and local authorities
- h) Completion of all appropriate equipment and pilot logs.
- i) Incident management as detailed in **Part A Section 15**.
- j) Reporting of incidents as detailed in **Part A Section 15**.

Safety responsibilities of the operations and technical manager are detailed in **section A8**.

**All SUA will be subject to the obligations identified within CAP393, CAP722, CAP1763 or the relevant rules and regulations as described by the controlling national aviation authority.**

**No flight will operate within 2 nautical miles (extending to 2.5 nautical miles if the main runway is more than 1850metres in length) of an airfield boundary. Extending in a runway protection zone 5kilometres from the threshold and 0.5kilometres either side of the runway centre line from the surface to 2000ft above the level of the aerodrome without prior granted permission of the relevant ATC unit as per CAP1763 (Article 94B).**

**A2.4: Safety training**

Lawrence Clift and anyone else involved in flight operations will undertake training in safety requirements and procedures required for SUA operations and will retain a record of all training conducted. Training may be external or in-house depending on the operational requirements.

**A3: Definitions (that may be seen in this manual or related documents)**

<b>Acronym</b>	<b>Definition</b>
AGL	Above ground level (referring to altitude)
AMSL	Above mean sea level (referring to altitude)
ATC	Air Traffic Control
ATZ	Aerodrome Traffic Zone
BNUC-S	Basic National UAS Certificate – SUA
CAA	Civil Aviation Authority
FRZ	Flight Restriction Zone
GPS	Global positioning system
MTOM	Maximum take-off mass
NOTAM	Notice to Airmen
RP	Remote Pilot
Rx	Receiver
SUA	Small unmanned aircraft
Tx	Transmitter
VLOS	Visual line of sight

**A4: Document control and amendment procedure**

The most up-to-date electronic version of all manuals will be held on the office computer under:  
My Documents > Operations Documents

The most up-to-date paper version of all manuals will be held in the Operations Documents folder.

Revisions must only be carried out by Lawrence Clift (LC) and, if appropriate, a new version number must be allocated and the revision date adjusted on the front cover. The revised document must be saved with the version number in the title and the revision date added to any changed sections in the content pages. Only current documents must remain in the parent folder. Older versions of documents must be moved to the archive folder to avoid confusion.

### **Revision procedure**

- 1) Lawrence Clift will make revisions
- 2) Save revised documents with new version number and date
- 3) Move old documents to archive folder
- 4) Print revised pages to update office paper document
- 5) Update field versions as necessary
- 6) Securely destroy old paper versions

## **A5: Referenced Documents**

The included links link to the latest versions of the documents

### **CAP393: Air Navigation Order 2016 (ANO) and Regulations**

Version 5.6 – 21 March 2019

[https://publicapps.caa.co.uk/docs/33/CAP393\\_Fifth\\_edition\\_Amendment\\_13\\_March\\_2019.pdf](https://publicapps.caa.co.uk/docs/33/CAP393_Fifth_edition_Amendment_13_March_2019.pdf)

### **CAP722 Unmanned Aircraft System Operations in UK Airspace**

Seventh Edition Version 7.3 – 4 September 2019

[https://publicapps.caa.co.uk/docs/33/CAP722\\_Edition7\\_A3\\_SEP2019\\_20190903.pdf](https://publicapps.caa.co.uk/docs/33/CAP722_Edition7_A3_SEP2019_20190903.pdf)

### **CAP382 Mandatory Occurrence Reporting Scheme**

Version 10 – December 2016

<https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=214>

### **CAP1763 Air Navigation Order 2018 and 2019 Amendments - Guidance for Small Unmanned Aircraft users**

Version 2 – 28 February 2019

<https://publicapps.caa.co.uk/docs/33/CAP1763%20New%20UAS%20guidance%20Feb%202019.pdf>

### **DJI Inspire manual/specifications**

<http://www.dji.com/inspire-1/info>

### **DJI Mavic Pro 2 – User Manual - v1.4**

[https://dl.djicdn.com/downloads/Mavic\\_2/Mavic+2+Pro+Zoom+User+Manual+V1.4.pdf](https://dl.djicdn.com/downloads/Mavic_2/Mavic+2+Pro+Zoom+User+Manual+V1.4.pdf)

### **Aviation Safety Reporting (ECCAIRS)**

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

## **ORGANISATION**

### **A6: Organisation**

Name: Lawrence Clift Photography

Lawrence Clift is a sole trader operating as Lawrence Clift Photography

Country of operation: UK

#### **Insurance Information:**

Lawrence Clift Photography operate with a minimum of £1,000,000 public liability insurance, this is EC785/2004 compliant and will be valid to cover any commercial operation

### **A7: Nominated Personnel**

**Operations Manager:** Lawrence Clift - Contact 07979 016274

**Technical manager:** Lawrence Clift

**Chief Pilot and Remote Pilot:** Lawrence Clift - BNUC-S no: 0856-14-10-01

**Observer:** Jordan Clift – Contact 07840 731767

### **A8: Responsibilities of the above-named personnel**

#### **Operations Manager**

The operations manager is responsible for the organisation of operational requirements including:

- 1) Liaison with clients and landowners
- 2) Liaison with the CAA and other entities to ensure that safety guidelines are adhered to
- 3) Briefing of the Remote Pilot (RP)
- 4) Ensuring that adequate first aid arrangements are in place to provide cover in the event of an incident.

#### **Technical Manager**

The technical manager is responsible for maintaining operational capability of the SUA used by Lawrence Clift Photography, including:

- 1) Coordinating SUA maintenance routines
- 2) Ensuring logs and records are maintained up-to-date
- 3) Charging batteries in line with manufacturer guidelines with reference to **section B2.7**

#### **Remote Pilot**

The RP has full responsibility for safe operation of the SUA whilst on operations. With reference to this Operations Manual the RP must:

- 1) Ensure that all pre-flight procedures have been carried out
- 2) Ensure that appropriate permissions have been obtained and CAA regulations are adhered to.
- 3) Ensure that risk assessments have been completed and approved
- 4) Define safe working areas and cordon as necessary
- 5) Liaise with crew, client, observers and public before flight to brief fully and ensure that they understand the need to be compliant with requests or orders of the RP
- 6) Wear protective / high visibility equipment as necessary
- 7) Adhere to site safety procedures as necessary
- 8) Operate the SUA in a safe, responsible and professional manner including ensuring support personnel are maintaining site security.
- 9) Fill in all logs and documentation
- 10) Download images and video to the laptop before leaving site to ensure that appropriate information has been fully recorded
- 11) On completion, correctly shutdown the SUA and equipment and check site to ensure all equipment is collected and the site is left as found.

**Observer**

- 1) Before and after flights to ensure that batteries are properly stored, charged and logged.
- 2) To remain under the control of, and in communication with, the RP at all times during flight, observing the airspace and public to facilitate the flight operation.
- 3) To inform the RP of any airspace intrusion or any issues with public entering the flight area.
- 4) To assist the RP with briefing and controlling crew members and the public.
- 5) To assist the RP with the preparation, checks and repacking of the SUA.
- 6)

**A9: Aircraft system and technical description**

The following SUA is used by Lawrence Clift Photography.

For clarity full details and technical descriptions are kept separately in **Appendix E**.

<b>SUA Name</b>	LC02
<b>Manufacturer</b>	DJI
<b>Distributor</b>	Quadcopters
<b>Model</b>	Inspire 1 (T600)
<b>Number of motors</b>	4
<b>Registration</b>	N/A
<b>Serial Number</b>	W13DBL29020713

<b>SUA Name</b>	LC03
<b>Manufacturer</b>	DJI
<b>Distributor</b>	Quadcopters
<b>Model</b>	Mavic Pro 2
<b>Number of motors</b>	4
<b>Registration</b>	N/A
<b>Serial Number</b>	163DFAX001670C

## A10: Types of Operation

The SUA is capable of being flown both outdoors and indoors. Indoors the SUA should only be flown in atti mode. Outdoors, any of the three modes can be used as appropriate with GPS/atti mode being the logical choice for most operations although atti mode can give smoother transitions for video.

### Potential areas of operation

Site	Survey photography	Survey video	Artistic photography	Artistic video
Public buildings	✓	✓	✓	✓
Private buildings	✓	✓	✓	✓
Building sites	✓	✓	✓	✓
Open countryside			✓	✓
Private events			✓	✓
Public events			✓	✓
Industrial structures	✓	✓		
Farmland	✓	✓		
Sites of environmental interest	✓	✓	✓	✓
Sporting events			✓	✓
Archaeological sites	✓	✓		

## A11: Operating limitations and conditions

Air temperature (manufacturer)	-10°C to +40°C
Wind speed	Less than 13.4m/s (30mph)
Operational ceiling	Within VLOS to a maximum of 4500ft amsl (maximum 400ft agl)
Horizontal distance	Within VLOS to a maximum of 500m from the RP
Visibility	5Km around the RP and operating area clear of cloud
Maximum speed	21.5m/s (48MPH)
MTOM	3 Kgs

Item MAVIC 2 PRO	Detail
Ceiling Height:	<400ft As per VLOS rules
Operating Radius*:	<500m VLOS rules
Maximum Operating Height:	16,404ft AMSL
Maximum Operating Range	18,000m
Maximum Endurance (with payload):	Approximately 31 Minutes
MTOW	907g
Maximum Surface Wind for Take-off*:	10m/s (19.5kts)
Maximum Operating Temperature:	40°C
Maximum Operating Speed:	20m/s (39kts)
Minimum Operating Temperature*:	0°C

Can operate in:

Dry weather, within wind tolerances.

**A12: Software and firmware update policy**

Firmware and associated flight software will be updated in line with manufacturer recommendations. Updates will be checked monthly. Firmware will only be updated by Lawrence Clift. After updates the aircraft will be flown at a test location to ensure that any updates have not affected the operational performance of the aircraft. The technical manager will ensure that all pilots are aware of changes caused by firmware updates. All firmware updates will be logged in the aircraft maintenance log.

**A13: Maintenance principles and regime**

The SUA will be inspected by the RP using the pre-flight and post-flight checklists before and after every flight. Routine maintenance will be carried out by the Technical Manager. The key maintainable parts of the SUA are the propellers, motors and batteries.

Propellers will be checked weekly for signs of stress lines and wear and replaced as necessary. Propellers will be replaced every 6 months even if there are no signs of wear and old propellers will be destroyed to ensure they cannot be used by accident.

Motors will be checked weekly for signs of bearing wear and damage in addition to pre-flight checks and replaced if movement is excessive.

Motors will be replaced after two years or 300 flight hours even if there are no signs of wear and old motors will be destroyed to ensure they cannot be used by accident.

Batteries will be checked before and after flight for signs of physical damage. Logs will be maintained of battery charging allowing changes in capacity and voltage to be observed.

Batteries will be replaced in line with manufacturer recommendations or sooner if the battery shows signs of failure and disposed of in line with current local authority recommendations.

The airframe should be checked weekly for signs of stress and wear.

**A14: Supervision of SUA operations**

The RP has full responsibility for supervising SUA operations.

**A15: Incident investigation and MOR handling**

Any significant incidents that occur during an operation must be recorded in the event log as well as the pilot logbook. If necessary, incidents must be reported to the CAA using the guidance in CAP382 (Mandatory Occurrence Reporting). With reference to Section 3 Chapter 9 of CAP722 it is important that all incidents that occur during flight are logged and if necessary reported to the CAA using the contact details in chapter 9 of CAP722.

Incidents that are likely to need reporting include **“any incident which endangers or which, if not corrected, would endanger an aircraft, its occupants or any other person”**

Examples are included in appendix B of CAP382 “The Mandatory Occurrence Reporting Scheme”. In short, any occurrence relating to the SUA operation that resulted in injury or the potential of injury to crew members, client or members of the public should be reported. Any occurrence resulting in a collision or near miss with another aircraft should be reported.

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

**A16: Flight team composition**

For most operations the flight team will compose of the RP and a spotter/camera operator. If correctly briefed, the client may act to ensure that the pilot is not disturbed and can act as an observer for the purposes of monitoring for airspace incursions and public access.

If the operation is carried out in a public place or involves complex flight manoeuvres or people beyond the control of the RP then an appropriate assistant must be used who is familiar with the Operations Manual and risk assessment systems employed by Peter Box. The role of the assistant will be directed by the RP and will depend on the circumstances of the operation as judged in the pre-sight survey.

If operating within 50m of people, a building or other structures; they must be under the control of the RP. How this control is established will depend on the operation and must be confirmed in writing on the Client Brief and Initial Feasibility Assessment Form before the first flight of the operation commences.

If a camera operator is used, they must be fully briefed in the failsafe systems of the SUA and how to initiate failsafe in the event of the RP becoming incapacitated. The camera operator must follow the instructions of the RP. They may give instructions to the RP to enable them to obtain the shots they require; it is the responsibility of the RP to ensure that manoeuvres requested by the camera operator are able to be safely carried out.

## **A17: Operation of multiple types of SUA**

Lawrence Clift operated a single Mavic 2 Pro and a single Inspire 1.

## **A18: Qualification requirements**

All pilots must be appropriately qualified for the aircraft they are operating and operate only in accordance with the permission for aerial operations specific to that aircraft (**see appendix A**). All pilots operating the SUA LC01 must have passed the BNUC-S™ Theory Examination and BNUC-S™ Flight Operations Examination or equivalent. All pilots must be over 18 years of age.

## **A19: Crew Health**

Crew health is critical to safe operations. If any member of support crew does not feel they are fit for operations then they must inform the RP as soon as possible. If the RP does not feel that they are medically fit to carry out flights then the flight must be postponed. If necessary, medical advice should be obtained before the crew member is allowed to resume operations. The RP must not operate the SUA under the influence of alcohol or recreational drugs. If necessary, medical advice should be obtained before operating the SUA whilst using prescription drugs.

## **A19: Mandatory Occurrence Reporting Scheme (ECCAIRS)**

Mandatory Occurrence Reporting will be completed as required by the CAA, Regulation 376/2014 (ECCAIRS) will be the compliance document and reporting occurrences that are to be reported through the ECCAIRS Reporting Portal:

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

The Air Accidents Investigations Branch (AAIB) will also be informed as required by telephone on +44 (0)1252 512299 and in accordance with the guidelines detailed on their web page at <https://www.gov.uk/guidance/report-an-aircraft-accident-or-serious-incident>

The UK Air Navigation Order states "Any incident which endangers or which, if not corrected, would endanger a drone, its occupants or any other persons" is a reportable occurrence.

## A21: Logs and records

The following logs and records should be kept to ensure compliance with CAA permission to fly in terms of logging pilot and aircraft hours.

### Pre-flight organisation:

1. The Client brief and initial feasibility assessment Form (**FORM1 appendix B**) must be completed by the client/landowner at an initial meeting. If the client is not the landowner then permission from the landowner must be obtained using FORM1.
2. The site survey and risk assessment from (**FORM2 appendix B**) must be completed by the RP. This includes site information and survey, operational details, risk assessment and permissions.

### Pre-flight checks:

The pre-flight checklist (**section B2.9**) should be followed before commencing each flight. Laminated checklists are available for use in operations.

### During flight:

Guidance in the event of emergency is available in the emergency procedures section and on laminated sheets for use in operations.

### Post-flight:

1. Follow the post-flight checklist (**section B3.6**) to ensure that the aircraft is made safe, data checked and equipment correctly cleared away.
2. Complete pilot logbook giving details of flight times, purpose, SUA and incidents.
3. The following records may also need to be completed or transferred on return to base or on site depending on the nature of the operation.
  - a. Battery recharge log
  - b. Aircraft log, including any incidents or changes made to the SUA
  - c. Incident book

## **PART B: OPERATING PROCEDURES**

### **B1: Flight planning and preparation**

#### **B1.1: Determination of the intended tasks and feasibility**

An initial meeting with the client is necessary to determine if the operation is feasible. The representative of the company should act in a professional manner and work through FORM1 with the client.

Ideally the meeting should take place at the operation site. If this is not possible then the exact location must be established and Google Earth, Skydemon Light and aeronautical charts used to assess the feasibility of the operation. Once the representative and client are satisfied that the operation is possible, time should be taken to return to base and assess any issues surrounding the operation before pricing the project and the price being agreed with the client. Terms and Conditions should be explained to the client and the client should sign FORM1 to agree to them. If necessary, deposit payment will be arranged.

#### **B1.2: Operating Site location and assessment**

The RP must carry out a site survey and risk assessment as detailed in FORM2 (**appendix B**). The operation must not proceed until all relevant areas have been completed and agreed with the client.

#### **B1.3: Risk management**

A full risk assessment must be completed using the procedure in FORM2. This should be as specific to the site as possible. Whilst there is always a degree of acceptable risk, this should be minimized to ensure the operation is as safe as possible.

Some risks (e.g. weather) cannot be accurately established until the day of operation and it is the responsibility of the RP to ensure that the flight(s) can be carried out safely. If the RP does not feel it is possible to carry out the operation safely, he must postpone the operation until it can be carried out. The RP must not bow to peer or client pressure to continue as ultimately he is responsible under CAA legislation (CAP 393 ANO 2016 Article numbers 94 and 95) for ensuring that he can carry out the flight safely.

The Operations Manager must ensure that adequate first aid arrangements are in place to provide cover in the event of an incident.

#### **B1.4: Communications**

If the operation is being carried out in an unfamiliar location the RP must ensure that he has contact details for relevant local authorities as detailed in FORM2.

If necessary the RP should provide contact details to local authorities such as local ATC. Effective communications may facilitate future operations so it is very helpful to keep the local ATC in the loop. A fully charged mobile phone should be carried to allow communications with ATC if required.

## **B1.5: Pre-notification**

During the completion of FORM2 it should be established if the operation falls into an ATZ or is in proximity to an aerodrome or military installation. If necessary the relevant ATC, authorities and the Police should be contacted to prevent issues during the operation.

Operations near nuclear installations will require special permission. Operations in London may require Non-Standard Flight Applications. This will be coordinated through the NATs online process.

## **B1.6: Site permission**

Before commencing the operation, the RP must be satisfied that all relevant permissions have been obtained. The landowner's permission should be obtained using FORM1. It is best practice to inform neighbouring landowners which may be done via the client. It is also best practice to inform owners of any land that may be overflown during the operation.

## **B1.7: Weather**

In the days approaching the operation, the client should be kept informed as to the likelihood of the flight(s) proceeding. Detailed weather forecasts should be checked the day before and on the morning of the flight. If necessary, the flight should be postponed. Even if the operation involves a fixed-date event the RP should not feel pressured to continue if he feels that safety is being compromised.

Weather should be checked using the Met Office ([www.metoffice.gov.uk](http://www.metoffice.gov.uk)) and Metcheck ([www.metcheck.co.uk](http://www.metcheck.co.uk)) websites and details recorded in FORM2.

## **B1.8: Preparation and serviceability of equipment and SUA**

Logs of the previous operation should be checked in advance to ensure that no repairs or servicing need to be carried out. The checklist in **section B2.9** should be used to ensure the equipment has been fully checked prior to commencing the operation.

It is the responsibility of the RP to ensure that the SUA is in a fit state to fly. This will include checking that batteries are correctly charged for the SUA, laptop and photographic equipment and that the correct equipment is brought to the site.

The equipment list generated with FORM2 should be checked before departure to avoid mistakes later.

## **B2: On Site Procedures and Pre-flight Checks**

### **B2.1: Site survey**

A site survey should be carried out and a map generated prior to the operation using **FORM2**. Any potential hazards should be identified and marked on the map and included in the risk assessment. Access should be agreed and areas identified for parking, equipment assembly and launch. The site should be re-assessed on the day of operation to ensure that there have been no changes.

### **B2.2: Selection of operating area and alternate**

A safe launch area should be identified and the return-home area for the SUA cleared and, if necessary, cordoned to avoid people entering it. The technical manual states that with 6 or more satellites DJI flight controllers should have an accuracy of + or – 2 metres. As a result an area of at least 3 metres radius around the take-off point should be identified and, if necessary, cordoned off with poles and tape. It may be appropriate to use existing boundaries (e.g.) fences as part of this cordon.

The RP should clearly identify the operating area.

### **B2.3: Crew briefing**

Any support crew and, if appropriate, persons who are to be under the control of the RP must be briefed by the RP on site. This should include final allocation of roles, a synopsis of the flight and emergency procedures. If persons under control of the RP are to be overflown they must be made aware of what to do in the event of a loss of control of the craft (**see Emergency Procedures B4.1**).

### **B2.4: Cordon procedure**

In the event of an operation that involves members of the public it is essential to use at least one member of support crew. If it is possible to cordon a launch area this must be done using cones and tape. At launch the SUA must be at least 30 metres from any person not under control of the RP and after launch, 50 metres. If cordoning is not possible, sufficient crew must be employed to maintain the landing areas clear at all times.

The support crew should ensure that members of the public do not enter the landing area and that the RP is not disturbed during flight.

### **B2.5: Communications**

If appropriate, communications should be maintained with local ATC. It is best practice to notify the ATC before the operation and after all flights are complete.

Communications with crew members will normally take place face to face. If the distance between crew members is too great to facilitate this, an appropriate and legal two-way radio system must be used.

## **B2.6: Weather checks**

The RP and any ground crew should be vigilant for any changes in weather which should be checked in advance using [www.metcheck.com](http://www.metcheck.com) and [www.metoffice.gov.uk](http://www.metoffice.gov.uk). The area 500m around and up to 400 feet above the RP should be clear of cloud and visibility should be clear for 5Km around. A final wind speed check should be carried out using an anemometer on the day of operation and if necessary before each flight.

## **B2.7: Charging and fitting batteries**

Lithium polymer batteries will be stored, transported and charged in lipo-safe bags.

Batteries should be changed as necessary during operations. Once the SUA enters first level low voltage protection the RP has approximately one minute to safely land. The SUA should be returned to the landing area. On second level low voltage the SUA will begin to descend and attempt to land. This descent can be controlled by the RP; SUA pitch and roll remain operative to enable a safe landing area to be found. It is recommended that the RP lands as soon as the SUA enters first level low voltage or earlier (see **Appendix D** for details).

On removal of the battery, the temperature of the battery and motors should be checked. Hot batteries (lipo batteries should not increase significantly in temperature during normal operation) should be placed to one side in a safe place to cool down and voltage should be carefully checked before recharging to ensure the battery is safe to use. Hot batteries should not be charged.

It is possible to recharge on site using a charger attached to the vehicle or accessible power supply. Batteries must not be charged in the vehicle but the cable should be extended away from the vehicle preferably downwind and on a hard, non-flammable surface. The charger should only be set up by a crew member who has been trained in its use and the battery being charged should be monitored. Details for entry into the battery log should be recorded. The fire extinguisher should be accessible and support crew should be briefed on how to operate it. Lithium-polymer batteries can become unstable. The two main causes of this are damage during a crash and improper charging. Any battery that is noticeably swelling should be placed in a safe place. There have been occasions when lithium polymer batteries have burst into flame. If a battery is involved in a crash it should not be used for the remainder of the operation until it has been checked by the Technical Manager even if it appears undamaged and the SUA is operational.

On battery replacement, the SUA should be given a brief pre-flight check before a new flight is started. If possible the RP should use this opportunity to take a break as continuous flight requires extreme concentration.

## **B2.8: Loading of equipment**

Equipment to be loaded onto the SUA should be carefully attached by the RP in line with the manufacturer's guidelines and the training received into the different configurations of the SUA. This will include correct connection of the camera mount to the airframe and flight computer as well as correct connection of the camera to the mount. Equipment loaded on the SUA must not raise the mass of the aircraft above the MTOM stated in **Appendix E**. If appropriate, safety lanyards should be added as an additional security feature.

All equipment should be checked for functionality before the operation commences.

## B2.9: Preflight Checks on the SUA and equipment

Carry out the following checks when preparing the SUA and Transmitter:

### SUA:

	Checked
1. Airframe is sound and properly	
2. Electronic components are secured	
3. Motors are securely mounted	
4. Propellers are securely attached	
5. Undercarriage is correctly attached	
6. Battery is correctly attached	
7. Video downlink is securely	
8. Hub cover is correctly attached	
9. Camera mount and camera are	
10. GPS unit is mounted correctly	N/A
11. Compass unit on leg is correctly	
12. Centre of gravity is correct	
13. Battery voltage is correct (all cells	

Sections B2.9 to B4.3 and Appendix D should be printed and laminated for ease of

### Transmitter:

	Checked
1. All switches and sticks are functional and secure	

### Ground station (if used):

	Checked
1. Check AV channel is functional	
2. Check connections to LCD	
3. Check client connections if appropriate	

### Operational:

	Checked
1. Check visibility	
2. Check wind speed and weather	
3. Cordon take off area if necessary	
4. Check alternative landing areas	
5. Follow flight procedures as detailed in <b>section B3</b> .	

## B3: Flight Procedures

### B3.1: Start

Once pre-flight checks are complete, the following sequence should be followed:

- a) Place SUA at take-off point in the desired orientation
- b) Switch on Tx and make sure throttle is at lowest point and Tx in GPS mode
- c) Switch on camera if necessary
- d) Warn crew **“clear props”** to inform the SUA is live.
- e) Attach flight battery and wait for successful initiation sequence
- f) Monitor LED for green flashing indicating that heading is set
- g) Monitor LED until full GPS is acquired (one red LED flash or none)
- h) RP should move to operating point
- i) Inform crew **“starting motors”**
- j) Start motors using double stick command and release
- k) Motors should stop after 3 seconds
- l) Restart motors and set throttle to at least 10%

### B3.2: Take-Off

- a) Inform crew **“Taking-off”**
- b) Raise SUA to 2m above take-off point
- c) Check response to Tx
  - i) Gentle throttle movement to check ascent/descent
  - ii) Gentle rudder movement to check yaw
  - iii) Gentle aileron movement to check left and right cyclic
  - iv) Gentle elevator movement to check forward and backwards cyclic
- d) Commence flight keeping a careful eye on proximity to people and structures
- e) The flight timer will log all time that the throttle is above zero

### B3.3: Flight

- a) Manoeuvre the SUA to obtain the necessary footage taking care to maintain appropriate distance from people and structures.
- b) Monitor flight time as well as the LED indicating the current status of the aircraft.
- c) Low voltage LED warnings are detailed in **Appendix D**

### B3.4: Landing

- a) Manoeuvre the SUA at a safe altitude over the take-off point
- b) Inform crew **“Landing”**
- c) Check that the take-off point is clear
- d) Slowly descend the SUA to land
- e) Execute double stick command to stop the motors

### B3.5: Shut-down

- a) Wait for propellers to stop spinning
- b) Approach SUA and disconnect flight battery
- c) Switch Tx off

d) Inform crew **“SUA is safe”**

### B3.6 Post-flight Checklist

On completion of each flight this checklist must be followed:

	Checked
1. Check battery cell voltages are still balanced	
2. Check aircraft for any sign of wear or failure	
3. Complete logs as necessary or record details for later	
4. Remove storage media from camera and if necessary transfer to laptop to show client	
5. If further flights are necessary, replace battery and repeat pre-flight checklist	
6. Place used batteries separately from fresh batteries	
7. If no further flights ensure all equipment is properly packed away	
8. Check site to ensure it is left as found	

### B3.7 Emergency procedure checklist

In the event of an incident causing injury or fatality:

	Checked
1. Make the SUA safe by removing flight battery if possible	
2. Administer first aid as necessary	
3. Contact emergency services if necessary	
4. Any injured person remains the priority until they are stabilized and if necessary paramedics have taken control	
5. Monitor the flight battery for swelling	
6. Take witness statements if appropriate	
7. Photograph the scene to show position of the SUA	
8. Ensure any footage is retained to show as evidence	
9. Log the details of the accident and report as necessary	

In the event of an incident where there is no injury:

	Checked
1. Make the SUA safe by removing the flight battery	
2. Monitor the flight battery for swelling	
3. Take witness statements if appropriate	
4. Photograph the scene to show the position of the SUA	
5. Ensure any footage is retained to show as evidence	
6. Log the details of the accident and report as necessary	
7. Complete mandatory occurrence report as necessary	

After any accident or incident the RP should ensure that all appropriate logs are completed and that, if appropriate, the incident is reported through the mandatory occurrence reporting system

detailed in **section A15**. No further flights should be carried out until the cause of the incident is established and any risk of re-occurrence is mitigated.

## **B4: Emergency Procedures**

### **B4.1: Appropriate to the SUA and Control System**

#### **Mitigation Measure - DJI failsafe**

LC02 uses the DJI failsafe system. In the event of Tx signal loss it will carry out the following:

- a) hover for 3 seconds
- b) ascend to 60 metres (or remain at current height if over 20 metres)
- c) move to a position over the “home” point
- d) hover for 15 seconds
- e) descend at a rate of 0.5 m/s and auto-land
- f) Switch off motors after 3 seconds

The SUA can then be shut-down as described in **section B3.5**.

#### **Mitigation Measures – DJI distance limits**

All DJI systems can be restricted to preset distance limits to prevent fly-away. It is recommended that the distance and height limit are set to the minimum distance required to carry out each project whilst allowing enough movement to manoeuvre the aircraft into emergency landing areas.

**If at any time the craft descends in an uncontrolled manner the RP should shout “HEADS” to warn crew members. The briefing should include what action the crew should take on hearing the shout. The response may vary by operation.**

#### **Loss of primary control frequency or transmitter battery failure**

In the event of loss of control frequency, including Tx failure or Tx battery failure, the aircraft will enter failsafe as described above. At this point it is the responsibility of the pilot/crew to maintain the take-off area clear.

#### **Malicious or accidental interference with control frequency**

In the event of interference with the control frequency, it is highly likely that the aircraft will enter failsafe and return to base. If that is not the case then the incident should initially be treated as a fly-away as described below. Once the aircraft is safely recovered, the cause of the interference should be investigated and reported appropriately.

#### **Loss of power or aircraft battery failure**

In the event of power loss to the flight controller or motors, the aircraft will enter uncontrolled vertical descent. As a result it is important that the area below the aircraft is maintained clear and that people in the area are aware of the potential risk. Redundancy is possible in the case of SUA with 6 or more propellers and, if appropriate, is detailed in **Appendix D**. If possible the “HEADS” warning should be given.

#### **Pilot incapacitated**

In the event of the RP becoming incapacitated whilst the SUA is in flight the nearest crew member should take the transmitter and switch it off. This will initiate the above return to base

failsafe and the crew should monitor the SUA until it has safely landed and shut down the SUA as described in B3.5.

#### **Aircraft Incursion**

If another aircraft is seen and appears to be entering or approaching the operating area the RP should descend the SUA until it is clear there is no risk and may then continue the operation or land in the take-off area and wait if necessary.

#### **Propeller or motor failure**

On loss of a propeller or motor it is likely the SUA will enter uncontrolled vertical descent. In this case the priority is the safety of the public, client and crew so the key mitigation is avoiding the presence of crew or public below the flight path. Redundancy is possible in the case of SUA with 6 or more propellers and, if appropriate, is detailed in **Appendix D**. If possible the “HEADS” warning should be given.

#### **Total electronic failure**

If this occurs it is likely that the SUA will crash. If injury occurs it should be ascertained if emergency services are needed and first aid carried out as necessary. As soon as is appropriate the SUA must be made safe by disconnecting the flight battery. Once the situation has been dealt with the incident must be logged and reported appropriately. If possible the “HEADS” warning should be given.

#### **“Fly-away”**

**Fly away is heavily mitigated by the distance limiting feature of the DJI Inspire. The RP should ensure that an appropriate maximum distance and height are programmed for each operation up to a maximum of 500m horizontally and 400 feet (122m) altitude.**

In the event of a “fly-away” the RP should log the direction, speed and altitude of the SUA and immediately contact the Police and local ATC to inform them. If safe to do so the SUA should be tracked until it lands under second-level low battery protection.

#### **Ground control station failure**

Not applicable as there is no ground control station.

## **B4.2: Fire**

The RP must place the fire extinguisher in a safe, visible location near the take-off area. The only potential source of fire is the lithium-polymer flight battery and this is only likely in the event of impact damage. If the SUA is damaged in a crash, if possible the flight battery must be disconnected and removed and placed in an open area away from flammable objects. The battery should be monitored for swelling and the crew warned to stay clear. In the event of a fire, the extinguisher should be used to minimize flame. If possible the battery should be allowed to burn itself out. Care should be taken as further cells may ignite and lithium-polymer batteries can burn very fiercely. Protective gloves should be worn when handling damaged batteries.

## **B4.3 Incidents**

In the event of an incident the RP should ascertain if injuries have occurred.

In the event of injury, the casualty is the priority. If necessary, emergency services should be contacted.

**In the event of an incident causing injury or fatality:**

- a) Make the SUA safe by removing flight battery if possible
- b) Administer first aid as necessary
- c) Contact emergency services if necessary
- d) Any injured person remains the priority until they are stabilized and if necessary paramedics have taken control
- e) Take witness statements if appropriate
- f) Photograph the scene to show position of the SUA
- g) Ensure any footage is retained to show as evidence
- h) Log the details of the accident and report as necessary

**In the event of an incident where there is no injury:**

- a) Make the SUA safe by removing the flight battery
- b) Monitor the flight battery for swelling
- c) Take witness statements if appropriate
- d) Photograph the scene to show the position of the SUA
- e) Ensure any footage is retained to show as evidence
- f) Log the details of the accident and report as necessary

After any accident or incident the RP should ensure that all appropriate logs are completed and that, if appropriate, the incident is reported through the mandatory occurrence reporting system detailed in **section A15**. No further flights should be carried out until the cause of the incident is established and any risk of re-occurrence is mitigated.

# AppendicesAppendix A: Copy of CAA Permission for Commercial Operations.

## 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 **Lawrence Clift Trading As Lawrence Clift Photography** (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) Multicopter / 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 Lawrence Clift Trading As Lawrence Clift Photography 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 13/11/2019 until and including 13/11/2020 unless previously varied,



suspended or revoked.

for the Civil Aviation Authority

Date: 13/11/2019

Ref: 20191113Lawrence Clift Trading As Lawrence Clift PhotographyPAndEUAS652

Certificate Number: 4

SSC Technical Services 0330 022 1908 / [uavenquiries@caa.co.uk](mailto:uavenquiries@caa.co.uk)

Distribution: Lawrence Clift Trading As Lawrence Clift Photography (01772621421 / 07979016274, [lawrenceclift@blueyonder.co.uk](mailto:lawrenceclift@blueyonder.co.uk));

**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: Client brief and initial feasibility assessment – FORM1**

<b>Lawrence Clift Photography</b>	<b>47 Moss Side Way</b>	
	<b>Leyland</b>	<b>01772 621421</b>
	<b>Preston</b>	<b>07979 016274</b>
	<b>Lancs PR26 7XU</b>	

Customer Details	
Name	
Company	
Address	
Postcode	
Telephone	
Mobile phone	
Email	

Site Details		
Site address (if different to above)		
Postcode		
Permission	The customer owns the site and is able to give permission	
	The customer does not own the site but can obtain written permission	
	The customer does not know who owns the site	
Description of site		

<b>Potential hazards customer is aware of</b>	

Operation Details	
<b>Description of customer requirements</b>	
<b>Product to be delivered (photos, video, edited, unedited etc.)</b>	
<b>Method of delivery (DVD, email, online etc.)</b>	
<b>Timescale of operation (fixed date, variable date)</b>	
<b>Timescale for delivery of final product (immediate, fixed date, etc.)</b>	

Quote	
<b>Price Quoted (Please see full quote for details)</b>	
<b>Reference number</b>	

Permissions				
<b>Land Owner: I give Lawrence Clift Photography permission to carry out commercial operations at the site detailed overleaf.</b>	<b>Name</b>		<b>Date</b>	
	<b>One form of contact</b>			
	<b>Position with regard to site</b>			
<b>Customer: I agree to the</b>	<b>Signed</b>		<b>Date</b>	

<b>price quoted by Lawrence Clift Photography and accept that I own no rights to the imagery until the agreed price is paid in full.</b>				
	Print Name			

**Appendix B: Site survey and risk assessment – FORM2**

Lawrence Clift Photography	47 Moss Side Lane Leyland Preston Lancs PR26 7XU	01772 621421 07979 016274
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1) Customer Details	
Name/Company	
Reference No.	

2a) Site inspection			
Site address			
Postcode or 6 figure grid ref.		Altitude above mean sea level (ft)	
Paste map to show site location			
Access, parking and facility details			

**2b) Site Details**

**Paste detailed site map below. Mark to show obstacles, hazards, public access, parking, objective, proposed take-off area and secondary landing areas and any other points of interest. Mark any areas that need to be cordoned. Add risks to site specific risk assessment if appropriate.**

**Map observations:**

**Key risks:**

**Notes from site survey on the day:**

<b>2c) Operation details</b>	
<b>Date</b>	
<b>Arrival time</b>	
<b>Flight times(s)</b>	
<b>Departure time</b>	
<b>Details of flights and objectives</b>	
<b>Equipment needed to achieve the objectives (SUA, cameras, cordon equipment, chargers etc.)</b>	<b>(Please attach detailed loading list for each SUA to be used)</b>

<b>2d) Notifications</b>		
<b>Authority to Notify</b>	<b>Notification sent?</b>	<b>Permission received?</b>

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## 2e) Task Specific Risk Assessment

Probability:		Severity:		Risk Factor = Probability x Severity Low Risk = 1 to 5 Medium = 6 to 11 High = 12 +	The following guidelines should be applied to risk factors after control measures have been applied:  Risk factor after control measures: 1 – 5 OK to proceed  Risk factor after control measures: 6 – 11 Further control measures should be applied. Seek further guidance from the Operations Manager if unsure.  Risk factor after control measures: 12+ Unacceptable - Do not proceed									
5	Very Likely	5	Fatality			Major Env. Incident								
4	Likely	4	Major Injury			Severe damage								
3	Probable	3	Medical Injury			Damage								
2	Possible	2	Minor Injury			Small Impact								
1	Very Unlikely	1	No Injury			No Env. Impact								
Relevant Legislation:														
Hazard	Risk	Risk Factor Before Control					Control Measure	Risk Factor After Control						
Access & Egress to Site	Plant or Vehicle Overturning / Collision Slips, Trips, Falls Damage to Environment	Probability	5					Access Route adhered to. Good Housekeeping by all Personnel on Site.	Probability	5				
			4							4				
			3			9				3				
			2							2				
			1							1				
			0	1	2	3	4			5	0	1	2	3
		Severity					Severity							
SUA coming into contact with solid objects.	The SUA will break up and flying objects may injure pilot in charge or personnel	Probability	5					The pilot in charge and other personnel will stay a minimum distance of 10m from structures at all times while operating the SUA. Operations closer than 10 metres should be carefully planned before commencing flight.	Probability	5				
			4							4				
			3							3				
			2			6				2				
			1							1				
			0	1	2	3	4			5	0	1	2	3
		Severity					Severity							
Hazard	Risk	Risk Factor Before Control					Control Measure	Risk Factor After Control						
Manual Handling	Back Injuries						An assessment of the load must be carried out prior to any lift taking place.							

of Equipment & Materials Incorrect lifting techniques applied	Muscle Strains Damage to the load	<table><tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td>9</td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> <p>Severity</p>	5						4						3			9			2						1						0	1	2	3	4	5	The weight of the load must be known before any lift is attempted. Know your own personal limitations. Consideration must be made as to the suitability of a mechanical means of lifting the object. Lifting of the load should be carried out in line with any guidance provided with the load. Consider a team lift or the use of a mechanical aid.	<table><tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td>3</td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> <p>Severity</p>	5						4						3						2						1			3			0	1	2	3	4	5																																				
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Struck by Falling objects from height	Injuries to Staff Damage to property Injuries to members of the public	<table><tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td>6</td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> <p>Severity</p> <table><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> <p>Severity</p>	5						4						3						2			6			1						0	1	2	3	4	5	2						1						0	1	2	3	4	5	Ensure all equipment in use is serviceable and fit for purpose. Ensure that all members of staff have received the training required to operate any equipment in use. Establish an exclusion zone around the works. All works must cease if an unauthorized person enters.	<table><tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td>2</td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> <p>Severity</p> <table><tr><td>2</td><td></td><td>4</td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> <p>Severity</p>	5						4						3						2						1		2				0	1	2	3	4	5	2		4				1						0	1	2	3	4	5
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Losing control of the SUA (1)	Batteries Going flat	<table><tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td>9</td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> <p>Severity</p>	5						4						3			9			2						1						0	1	2	3	4	5	Red Warning light flashes on the transmitter and SUA well in advance to allow landing.	<table><tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td>4</td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> <p>Severity</p>	5						4						3						2		4				1						0	1	2	3	4	5																																				
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Losing control of the SUA (2)	Transmitter signal loss “fly away”	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td>6</td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2			6			1						0	1	2	3	4	5	Severity							SUA has automatic return to base on signal loss. RP to ensure software distance limits have been applied correctly.	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td>4</td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2		4				1						0	1	2	3	4	5	Severity						
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Losing control of the SUA (3)	Malicious interference with transmitter signal or GPS signal	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td>3</td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2						1			3			0	1	2	3	4	5	Severity							RP and/or crew to check locality for susRPious behaviour.	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td>3</td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2						1			3			0	1	2	3	4	5	Severity						
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Losing control of the SUA (4)	Propeller or motor failure	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td>6</td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2			6			1						0	1	2	3	4	5	Severity							RP and crew members to be 10m from the SUA flight path during flight. RP to shout “DOWN-DOWN-DOWN” on failure.	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td>4</td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2		4				1						0	1	2	3	4	5	Severity						
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Proximity of other aircraft	Collision with other air users	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td>5</td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2						1					5	0	1	2	3	4	5	Severity							RP to check NOTAMs and surrounding airspace before operation. RP to inform ATC and local police if necessary and obtain ATC permissions if required. RP/crew to maintain strict watch on local airspace.	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td>3</td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2						1			3			0	1	2	3	4	5	Severity						
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Battery damage	Battery fire	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td></td><td>6</td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2			6			1						0	1	2	3	4	5	Severity							<p>Powder fire extinguisher on site.</p> <p>If SUA is damaged through crash/collision, follow emergency procedures.</p> <p>RP/Crew should not approach damaged batteries if swelling or puncturing is noticed.</p>	<table><tr><td rowspan="6">Probability</td><td>5</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td>4</td><td></td><td></td><td></td></tr><tr><td>1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td colspan="7">Severity</td></tr></table>	Probability	5						4						3						2		4				1						0	1	2	3	4	5	Severity						
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<b>2f) Final checks (to be completed one day before operation)</b>	
<b>NOTAMs and airspace checked? Details if appropriate</b>	<p>Airspace classification:</p> <p>NOTAMs:</p> <p>ATC contact details:</p> <p>Local police contact number:</p>
<b>Weather checked? Details</b>	<p>Visibility:</p> <p>Temperature:</p> <p>Wind:</p> <p>Precipitation:</p> <p>Humidity:</p>
<b>All permissions obtained? Details</b>	
<b>Equipment checked before departure? Details of any issues</b>	
<b>Other</b>	

## Appendix C: Records for each flight

			<b>EMBARKATION CHECKLIST</b>		
ITEM	ACTION / CHECK	TICK	ITEM	ACTION / CHECK	TICK
Airframe	Check Condition & Airworthiness		Ground Station & Leads	Check Condition & Functionality	
Camera Mount	Check Condition & Functionality		Camera Monitor & Leads	Check Condition & Functionality	
Flight Controller / Transmitter(s)	Check Functionality		A / V Receiver & Leads	Check Condition & Functionality	
			Telemetry Receiver & Leads	Check Condition & Functionality	
ITEM	ACTION / CHECK	TICK	Laptop & Leads	Check Condition & Functionality	
Camera(s) & Lens(s)	Check Condition & Functionality		Mobile Phone & Emergency No's	Check Condition & Functionality	
Camera Connection Leads	Check Condition		Anemometer	Check Condition & Quantity	
Camera Memory Cards	Check Condition & Space		First Aid Kit & Fire Extinguisher	Check Condition & Contents	
			Crew Identification	Check Requirements & Quantity	
Camera Attachment Bolt	Check Condition		Fluorescent Jacket(s) / Hard Hats	Check Condition & Quantity	
			Two Way Radios	Check Condition, Charge & Function	
ITEM	ACTION / CHECK	TICK	Clothing (Boots, Coat, Gloves)	Check Condition	
Multi Function Battery Charger	Check Condition & Functionality		Air Navigation Map	Check Condition	
Required Charger Leads	Check Condition		Checklists, Manuals & Logbooks	Check Condition & Current	
Battery Checker	Check Functionality		Notepad & Pens	Check Condition	
ITEM	ACTION / CHECK	TICK	Site Assessment Form	Check Condition	
Screwdrivers (Flat / Cross Drive)	Check Condition		Signs, Safety Tape, Cones	Check Condition & Quantity	
Allen Keys	Check Condition		ITEM	ACTION / CHECK	TICK
Pliers (Standard / Long Nose)	Check Condition		Flight Battery Packs	Charge & Check Condition	
Cable Ties (Various Sizes)	Check Condition & Quantity		Transmitter Battery Packs	Charge & Check Condition	
Side Cutters	Check Condition		Camera Battery Packs	Charge & Check Condition	
Nylock Propeller Nuts	Check Condition & Quantity		Ground Station Battery	Charge & Check Condition	
Spare Props. (Tractor & Pusher)	Check Condition & Quantity		Charger Battery Packs	Charge & Check Condition	
Small Socket Set	Check Condition		Mobile Phone Battery	Charge & Check Condition	

1	<b>ARRIVAL CHECKLIST</b>		
2	ITEM	ACTION / CHECK	TICK
3	SITE SURVEY	CARRY OUT SITE SURVEY WITH OBSERVER	
4	FLIGHT PLAN / BRIEF	CONFIRM FLIGHT PLAN & BRIEF CREW, OBSERVER & CLIENT	
5	AIRFRAME	UNLOAD & CHECK AIRFRAME FOR ANY DAMAGE IN TRANSIT	
6	CAMERA	ATTATCH TO PLATFORM & FIT SAFETY LANYARD	
7	A/V CONNECTION	INSERT A/V PLUG AND SECURE	
8	PROPELLERS	CHECK SECURING NUTS FOR TIGHTNESS (Replace if Removed)	
9	CALIBRATION PLATFORM	POSITION AS REQUIRED & ENSURE LEVEL WITH SPIRIT LEVEL	
10	GROUND STATION	SETUP, SWITCH ON AND TEST OPERATION	
11	A/V MONITOR	SETUP, SWITCH ON AND TEST OPERATION	
12	CREW IDENTIFICATION BADGES	ISSUE AS REQUIRED	
13	HARD HAT / FLOURESCENT JACKETS	ISSUE AS REQUIRED	
14	TWO WAY RADIOS	ISSUE AS REQUIRED	
15	FIRST AID KIT	POSITION TO BE EASILY ACCESSIBLE & INFORM CREW OF LOCATION	
16	FIRE EXTINGUISHER	POSITION TO BE EASILY ACCESSIBLE & INFORM CREW OF LOCATION	
17	CREW / HELPERS	POSITIONAS REQUIRED TO MAINTAIN SAFE FLYING ZONE	
18	CORDENS, SIGNS & SAFETY TAPE	SETUP AS REQUIRED TO MAINTAIN SAFE OPERATION	

### 1 Aircraft, Pilot and Crew Flight Logs

ORGANISATION NAME

BATTERY CHARGE LOG FOR G-UAV...  
(EXAMPLE ONLY)

[illegible]

03/08/2012

DOCUMENT BCL V1.0

See sections B2.9 and B3.6 for pre-flight and post-flight checklists

[illegible][illegible]

## Appendix D: Aircraft systems

### LC02 – DJI Inspire 1 (T600) Serial Number - W14DCA23030816



### LC03 – DJI Mavic Pro 2 Serial Number - 163DFAX001670C



**Low voltage:** The craft can either land in the current position, or flying home to the starting point and lands with the help of GPS. I always land with the battery showing a minimum of 30% available. This is for added safety of the UAV, the battery and in case anything untoward may happen towards the end of the flight.

**Signal Loss:** The UAV will return to the flight starting point and will land automatically although the RP can resume full control if required. The height for flight repatriation can be changed depending on the environment and infrastructure to counter collision. Full control may be regained by pressing the “H” (home) button on the T/X.

## Aircraft specifications

Item	LC02	LC03
Manufacturer	DJI	DJI
Model	Inspire 1 (T600)	Mavic 2 Pro
MTOM	2.9 Kg (including battery)	907 g
Flight test mass	2.8 kG	907 g
Diameter	581mm	Unfolded: 322x242x84mm (l x w x h)
Number Engines	4	4
Fuel/Battery	TB48 LiPo 6S	LiPo 4S
Battery Size/Voltage	5700mAh 22.8 V	1800 mA = 3.83 V
Propeller Size	32.5mm	220mm
Control Frequency	5.725~5.825GHz 2.400~2.483GHz	2.400 - 2.483 GHz; 5.725 - 5.850 GHz
Telemetry frequency	2.4GHz 100mW	2.400 - 2.483 GHz 5.725 - 5.850 GHz
Manufacturer rec. Operating temp.	-10° to 40° C	-10° to 40° C
Wind speed	Maximum 13.4m/s (30mph)	29–38 kph
Operating distance	<500m VLOS	<500m VLOS
Maximum altitude	4500ft amsl	6000m amsl
Operating altitude	<400ft agl (122m)	<400ft agl (122m)

## **Appendix E insurance details**

Lawrence Clift Photography will operate with a minimum of £1,000,000 public liability insurance, this is EC785/2004 compliant and will be valid to cover any commercial operation

## Appendix F: BNUC-s certificate



### FORM 6 – BASIC NATIONAL UAS CERTIFICATE

<b>Certification Number</b>	BNUC-S™ 0856-14-10-01
<b>Name of BNUC-S™ Pilot</b>	Lawrence Edward Clift
<b>Address</b>	47 Moss Side Way, Leyland, Lancashire, PR26 7XU, UK
<b>Telephone</b>	+44 (0)7979 016 274
<b>email</b>	lawrenceclift@blueyonder.co.uk

#### QUALIFICATION

Commander	✓	Pilot	✓
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#### OPERATION

VLOS	✓	E-VLOS	N/A
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#### COMPETENCY ASSESSED

BNUC-S™ : Manual Operation (0-20kg)	✓	BNUC™ : Manual Operation (20-80kg)	N/A
BNUC-S™ : GCS Operation (0-20kg)	✓	BNUC™ : Manual Operation (80-150kg)	N/A
		BNUC™ : Ground Station Operation (20-150kg)	N/A
		BNUC™ : Water Operations (fixed-wing only)	N/A

#### CONDITIONS

1) BNUC-S™ Pilots are subject to:

- any conditions of the Schedule of Applicable Organisations or other conditions that may be imposed by letter, email or telephone
- any NAA or other conditions that may be imposed by letter, email or telephone

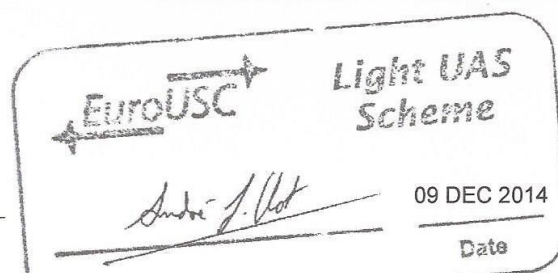
2) The BNUC-S™ Pilot

- maintain a log of flight time, take-off and landing time, duration, and make these records available for inspection
- maintain a log of flight time, take-off and landing time, duration, and make these records available for inspection



#### RECOGNITION

The above named individual has been assessed by EuroUSC™ as holding the Basic National UAS Certificate having demonstrated the level of competency required pursuant to this certificate.



Official Stamp



**FORM 6 – BASIC NATIONAL UAS CERTIFICATE**

**Name of Holder:** Lawrence Edward Clift

**Certification Number:** BNUC-S™ 0856-14-10-01

**SCHEDULE OF APPLICABLE ORGANISATIONS**

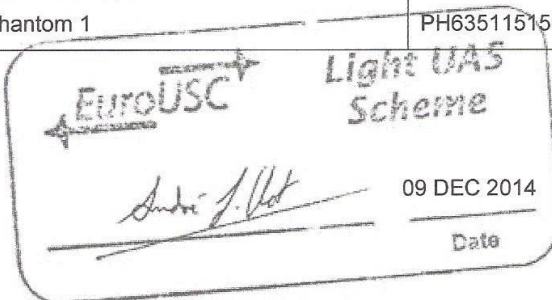
LUASS™ Registration	Organisation Name	Approved Operations Manual
C0709	Lawrence Clift Photography	Lcom01 – Version 1.3 – 05.11.14

**END OF SCHEDULE OF APPLICABLE ORGANISATIONS**

**SCHEDULE OF APPLICABLE AIRCRAFT SYSTEMS**

LUASS™ Registration	ICAO Designator	NAA Reference	Aircraft Make and Model	Serial Number
UAV0747	G	N/A	DJI Phantom 1	PH635115150

**END OF SCHEDULE OF AIRCRAFT SYSTEMS**



## Appendix G Air Navigation Order – Articles 94 and 95

Small unmanned aircraft: permissions for certain flights

94A.

(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’
-----------------------------	-------------------------------

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.

The flight restriction zone consists of—

- (a) the aerodrome traffic zone at the aerodrome,
- (b) any runway protection zones at the aerodrome,
- and
- (c) any additional boundary zones at the aerodrome.

A protected aerodrome which is—

- (a) an EASA certified aerodrome,
- (b) a Government aerodrome, or
- (c) a national licensed aerodrome, but which does not have an aerodrome traffic zone.

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. 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.

A protected aerodrome that is prescribed, or of a description prescribed, under paragraph (6)(d).

The flight restriction zone consists of the zone that is prescribed for the purposes of this paragraph.

Interpretation of expressions used in the definition of “flight restriction zone”

94B. (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
- (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.

#### Certain small unmanned aircraft: registration of SUA operator

94C. (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.

#### Certain small unmanned aircraft: requirement for registration as SUA operator (effective 30 November 2019)

94D. (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.

#### Certain small unmanned aircraft: competency of remote pilots

94E. (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.

Certain small unmanned aircraft: requirement for acknowledgement of competency (effective 30 November 2019)

94F. (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.

Meaning of “remote pilot” and “SUA operator”

94G. 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.”.

Small unmanned surveillance aircraft

95. (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.