Sky High Drones

Operations Manual

IMPORTANT NOTE

This is an example operations manual. You will be given access to the template used to create this manual once you have passed the theory exam.

Version 1.0 - Issued DD/MM/YYYY

Accountable Manager - Joseph Bloggs

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1. Part A - Introduction

1.1 Introduction

The purpose of the document is to detail the procedures to be followed for all Sky High Drones commercial flight operations. It has been developed to satisfy the requirements of the United Kingdom Civil Aviation Authority (CAA) for UAS Operators to comply with the Air Navigation Order 2016 and the specific terms and conditions set out in any permissions or exemptions for Commercial Operations granted by the CAA. All personnel involved in Sky High Drones UAS Operations will be familiar with this manual and will comply at all times with the operational instructions and procedures set out within it.

1.2 Definitions

The following acronyms have been used in this document.

ACRONYM	MEANING
AGL	Above ground level
AMSL	Above Mean Sea Level
ANO	Air Navigation Order
ATC	Air Traffic Control
ATZ	Aerodrome Traffic Zone
CAA	UK Civil Aviation Authority
CAP	Civil Aviation Publication
FISU	Flight Information Service Unit
FRZ	Flight Restriction Zone
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
MOR	Mandatory Occurrence Reporting
MTOM	Maximum Take-Off Mass
NAA	National Aviation Authority
NOTAM	Notice to Airmen
PfCO	Permission for Commercial Operations
RTH	Return to Home
UAS	Unmanned Aircraft System
VLOS	Visual Line of Sight

1.3   Document Control and Amendment Process

This operations manual is a controlled document. Joseph Bloggs trading as Sky High Drones (hereinafter referred to as Sky High Drones) will maintain an amendment record which identifies the current version. It is the responsibility of all Sky High Drones staff to ensure that they maintain a current version of this document to ensure that flight operations are compliant with current organisational and UK National Aviation Authority legislation.

Sky High Drones uses the 'Skywise' smartphone and tablet application to help ensure awareness of and thereby compliance with any updates from the CAA.

Any amendments to this document must be approved by the accountable manager Joseph Bloggs and these sections must be promptly distributed to the relevant Sky High Drones staff.

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

Joseph Bloggs

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1.4   Amendment Record

This document is subject to regular changes and as such, any significant amendments are recorded below. All amendments must be brought to the attention of all personnel within the organisation.

VERSION NUMBER	AMENDMENT DATE	AMENDMENT NARRATIVE	INCORPORATED BY
1.0	DD/MM/YY	First Edition	Joseph Bloggs

1.5 Referenced Documents

REFERENCE	TITLE	ISSUE	DATE
CAP 393	The Air Navigation Order 2016	5.6	21/03/2019
CAP 1763	Air Navigation Order 2018 and 2019 Amendments - Guidance for Small Unmanned Aircraft users	2.0	28/02/2019
CAP 722	Unmanned Aircraft System Operations in UK Airspace - Guidance	8	05/11/2020
CAP 382	Mandatory Occurrence Reporting	10	Dec 2016
EU 2015/1018	EU mandatory reporting guidance	1.0	Dec 2015
Dronedesk	Dronedesk Support Documentation	N/A	N/A
UAS Manual	DJI Mavic 2 Pro/Zoom User Manual	2.2	July 2020

1.6   Commitment of the Accountable Manager

This Operations Manual describes the organisation, aircraft systems, personnel, flight operations and procedures by which Sky High Drones carries out its commercial unmanned flight 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:

Joe Bloggs

Joseph Bloggs   Date: DD/MM/YYYY
Accountable Manager

Organisation

1.7   Organisation Details

Business Name:	Joseph Bloggs trading as Sky High Drones
Business Type:	Sole Trader
Accountable Manager:	Joseph Bloggs
UAS Operator:	Joseph Bloggs
Operator ID:	OP-ABCDEF12
Remote Pilot(s):	Listed in 1.9 below

1.8   Structure of Organisation and Management Lines

Sky High Drones conducts flight operations using personnel in the following roles:

- Accountable Manager
- UAS Operator
- Remote Pilot(s)
- Visual Observer (potentially client)
- Payload Operator (optional)
- Other Support Personnel (optional)

The Accountable Manager is responsible for all organisational decisions and all Sky High Drones crew and other staff report directly to the accountable manager. The UAS Operator is the person or entity responsible for the overall management of all Sky High Drones UAS. The Remote Pilot is the person responsible for operating the flight controls of the small unmanned aircraft. The roles of UAS Operator and Remote Pilot are, for the time being, fulfilled by one person, hereinafter referred to as the Remote Pilot. The Visual Observer, Payload Operator and any other support personnel report directly to the Remote Pilot.

The UAS Operator will comply with the provisions of the Air Navigation Order 2016 Article 94D (UAS Operator Registration) and will ensure that any Remote Pilots employed by or contracted to Sky High Drones comply with the provisions of the Air Navigation Order 2016 Article 94F (Remote Pilot acknowledgement of Competency).

1.9   Nominated Personnel

The table below lists all qualified Remote Pilots, payload operators, visual observers and other support personnel employed by or contracted to Sky High Drones.

Remote Pilots		Support Personnel	
Name	**NQE Course Completed**	**Name**	**Role**
Joseph Bloggs Flyer ID: FLY-XYZABC	The UAV Academy LTD 0516/1853	Bertha Bloggs	Observer

1.10   Responsibilities and Duties of the Remote Pilot

The Remote Pilot is responsible for the crew and the UAS whilst flight operations are being conducted. These responsibilities include:

- Conduct planning and risk assessments for each operation using the Dronedesk application
- Ensuring that the Remote Pilot and crew are fit and capable of safely conducting the planned operation
- Monitoring their own medical status and competency
- Ensuring that the aircraft is operated within all and any limitations set out in the Sky High Drones commercial operations permission issued by the relevant National Aviation Authority
- Maintaining direct, unaided visual line of sight sufficient to monitor the aircraft's flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions
- Ensuring that the aircraft system is in a fully airworthy condition
- Operating within the herein specified operating limitations for the aircraft
- Ensuring that the operation is not likely to compromise the privacy or welfare of the crew or any others
- Updating pilot, aircraft and other logbooks and records on Dronedesk on a timely basis
- Only operating if reasonably satisfied that the flight can safely be made taking account of the prevailing weather conditions, obstructions and other hazards
- Utilising all relevant checklists and ensuring that pre-flight procedures have been completed before each flight
- Maintaining flight safety awareness
- Maintaining currency for each UAS type they are qualified to operate

1.11   Responsibilities and Duties of Support Personnel

1.1.1   Visual Observer

A Visual Observer is normally used for Sky High Drones flight operations. It is acceptable for Sky High Drones Remote Pilots to utilise client personnel to act as a visual observer provided they have been properly briefed and accept the responsibilities of this role.

- During a flight, maintain constant situational awareness of the area of operations, possible incursions, take-off and landing sites, access points
- Ensure they are briefed by the Remote Pilot on a flight-by-flight basis to ensure they are aware of their responsibilities for standard and emergency procedures
- Assist the Pilot with flight planning as appropriate
- Assist with equipment deployment and testing in the field
- Deal with any public enquiries
- During a flight, provide to the pilot periodic updates on flight status from the ground control display
- Ensure the site remains secure and safe
- Assist the Pilot with any weather checks during flight
- Assist Pilot with any emergency situation as directed

1.1.1   Payload Operator

The Sky High Drones Remote Pilot may select to operate the payload during the planned flight operations. However, in certain circumstances, it may be necessary to utilise a separate payload operator. In these situations, a suitably briefed, competent payload operator will be required to:

- Communicate with Remote Pilot and Visual Observer throughout the planned flight operation
- Ensure that the payload is correctly positioned during any take-off or landing procedures to avoid damage

1.1.1   Other Support Personnel

Additional personnel may be assigned to fulfil the roles or visual observers, crowd control, technical assistants etc. These additional support personnel will be properly briefed to fulfil their appointed roles.

1.12   Area of Operation

Sky High Drones UAS operations will be conducted in the United Kingdom and in accordance with any geographic or other limitations stipulated in the granted commercial operations permission. Sky High Drones UAS operations may include aerial photography, aerial videography, structural surveys, infrared surveys, mapping and photogrammetry surveys.

1.13   Operating Limitations and Conditions

All Sky High Drones UAS operations are subject to the operating limitations set out in Articles 94, 94A, 94B, 94C, 94D, 94E, 94F, 94G & 95 of the Air Navigation Order 2016 (Amendment 2019 - CAP 1763) unless specified otherwise in the granted commercial operations permission.

Specifically, Sky High Drones Remote Pilots will not fly the UAS above 400' of the surface (Article 94A) and will not operate within the FRZ of any protected airfield without prior permission for such flight being given by either the ATC or FISU, in accordance with the specific conditions set out in Article 94A. FRZs are shown in the Dronedesk application which should be checked before each and every UAS Operation.

Sky High Drones UAS will be operated within the limitations and conditions set out in the commercial operations permission with due regard to Article 241 of the Air Navigation Order 2016 for every flight operation.

Operational Control

1.14   Supervision of Operations

The UAS Operator is responsible for the overall supervision of operations, both ground-based and airborne. The Remote Pilot is responsible for all operational decisions whilst the aircraft is engaged in flight operations.

1.15   Accident Prevention and Flight Safety Programme

Sky High Drones is committed to the safe operation of UAS and will actively investigate any occurrence, incident or accident it is involved in to identify any causal factors and take actions to help prevent repetition. Any relevant safety-related information will be shared using the European Coordination Centre for Accident and Incident Reporting System (ECCAIRS) which is an [online portal](). Sky High Drones will comply with the requirements set out in Regulation (EU) No. 376/2014.

An Accident is defined as: '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:

> a person is fatally or seriously injured as a result of direct contact with any part of the aircraft, including parts which have become detached from the aircraft, except when the injuries are from natural causes, self-inflicted or inflicted by other persons; or,

> 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; or, the aircraft is missing or is completely inaccessible'.

A Serious Incident is defined as: '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 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.'

NOTE: The difference between an accident and a serious incident lies only in the result.

A Reportable Occurrence is defined as: 'Any incident which endangers or which, if not corrected, would endanger an aircraft or any other person.'

All reportable occurrences will be reported using the ECCAIRS online reporting portal found at [www.aviationreporting.eu](). Guidance on reportable incidents is available in EU 2015/1018. Accidents and serious incidents will also be reported to the Air Accident Investigation Branch by emailing enquiries@aaib.gov.uk or calling 01252 512 299.

Any 'flyaway' aircraft must be immediately reported to the local police and the local Air Traffic Control by the UAS Operator. The relevant contact information for ATC can be identified using the Integrated Aeronautical Information Publication (IAIS) which can be found on the [National Air Traffic Services (NATS) Aeronautical Information Service (AIS) page](). This information MUST be recorded on the Pre-Site Assessment Form.

An Airprox is a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. Any such situations should be reported by the UAS Operator using the online reporting form, which can be found on the [Airprox Board Website]().

1.16   Flight Team Composition

Sky High Drones normally operates with a minimum two-person team consisting of a Remote Pilot and a Visual Observer. An additional payload operator may be utilised if required to complete a specific flight operation. Circumstances may also require additional support staff such as spotters to assist the visual observer or crowd control personnel to maintain a cordon.

It is permissible to operate without a nominated Visual Observer for operations where the risks of airborne or ground incursions have been assessed to be acceptably low.

1.17   Operation of Multiple Types of UAS

Sky High Drones Remote Pilots may operate multiple types of UAS provided that they have passed an NQE or RAE Flight Operations Assessment for that category of aircraft and that they are trained, current and fully conversant with the systems, capabilities and operational limitations of each aircraft. Sky High Drones Remote Pilots are forbidden from simultaneously piloting multiple UAS.

1.18   UAS Operated

UAS MAKE AND MODEL	SERIAL NUMBER
DJI Mavic 2 Pro	DF18268GFG808

Full aircraft details, including Operating Limitations, may be found in Appendix B.

1.19   Qualification Requirements

All Sky High Drones Remote Pilots must be at least eighteen years of age, hold a valid Certificate of Recommendation issued by a CAA National Qualified Entity or a General VLOS Certificate issued by a CAA Recognised Assessment Entity. Remote Pilots must be current on the intended UAS to be deployed for the planned flight operation.

Remote Pilots employed by or contracted to Sky High Drones must comply with the provisions of the Air Navigation Order 2016 Article 94F (Remote Pilot acknowledgement of Competency).

1.20   Crew Health

Crew health is critical to safe flight operations. If any member of the crew does not feel fit for operations, they should inform the pilot as soon as possible.

If the Remote Pilot does not feel fit to carry out flights, then the flight must be postponed, or another suitably qualified pilot should take their place. If necessary, medical advice should be obtained before a crew member is allowed to resume operations. If necessary, medical advice should be obtained before operating the UAS whilst using prescription drugs.

Sky High Drones personnel, support staff, and those having any supervisory duties are to ensure that they are not suffering from the effects, or after-effects, of alcohol or drugs (prescribed or purchased) when reporting for duty. No alcohol is to be consumed for the 10 hours immediately prior to being liable for flying duties. Additionally, that personnel directly involved with UAS flight safety are to minimise their intake of alcohol during the 24 hours before commencement of such activities.

Sky High Drones flight operations team members should not operate more than ten hours in any twenty-four-hour period.

Remote Pilot and Crew should use the following mnemonic as an aid to assessing crew health prior to any UAS operation: -

  I' - Illness - is the pilot suffering from any illness?

  M - Medication - is the pilot currently taking any drugs?

  S - Stress - is the pilot overly worried about other factors in their life?

  A - Alcohol - Has the pilot consumed any alcohol within the last 8 to 24 hours?

  F - Fatigue - Has the pilot had sufficient sleep?

  E - Eating - Has the pilot had sufficient hydration, sustenance and correct nutrition?

1.21   Logs and Records

All Sky High Drones Remote Pilots must keep an accurate account of their personal flight time, the UAS flight time and any maintenance or incident log information.

Eye in The Sky Services uses the Dronedesk application to manage all documentation related to operations and to maintain pilot, aircraft, maintenance, battery and incident logs.

All pre-site and on-site assessments must be accurately recorded and kept for a minimum of thirty-six months. Remote pilots are responsible for checking the aircraft and maintenance logs before flight operations commence to ensure that they are familiar with any updates, upgrades or repairs.

1.22   Dronedesk

Eye in The Sky Services uses the Dronedesk system to maintain all records relating to its operations.

Dronedesk is an online, web-based application which provides information from industry standard data sources to assist in the planning of operations. Log books and other records associated with operations are also maintained in Dronedesk.

The functional scope and data flow provided by Dronedesk is set out in the diagram below. Additional information can be found at the Dronedesk website https://dronedesk.io/.
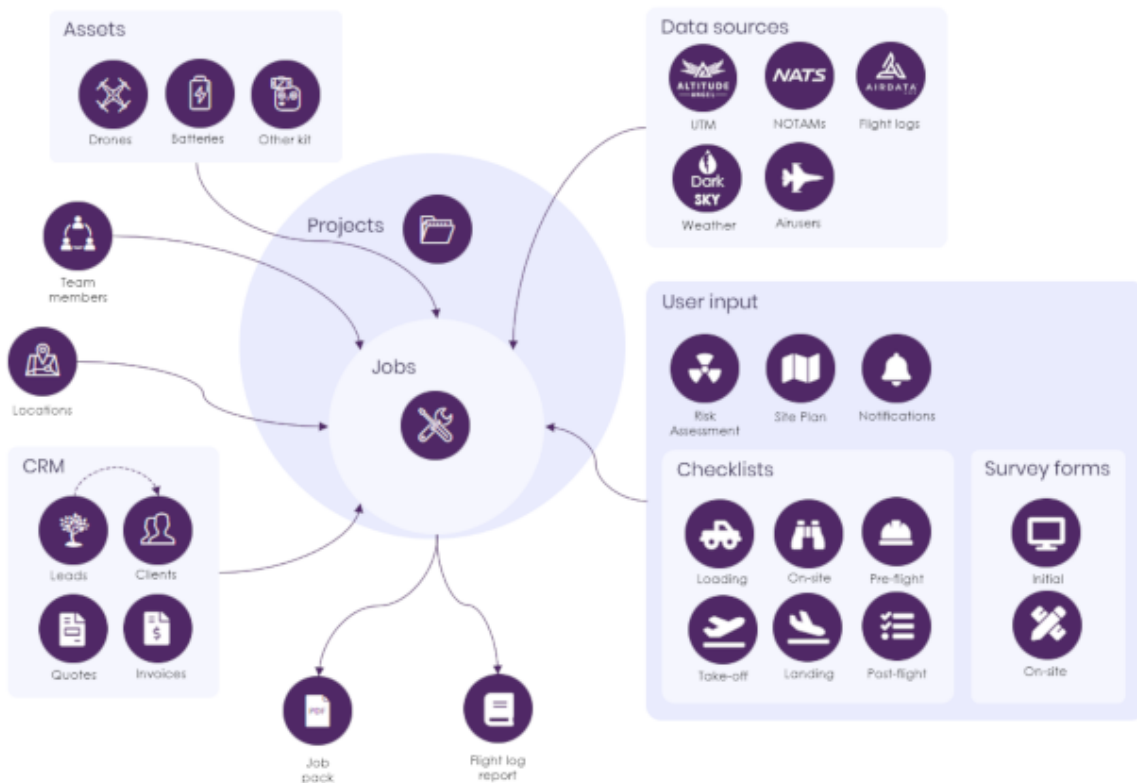
2. Part B – Operating Procedures

Flight Planning and Preparation

2.1 Determination of the Intended Tasks and Feasibility

The [Dronedesk](#) 'Lead' function allows the recording of initial client details in preparation for a more detailed assessment of the feasibility of the completion of the assignment.

The client must be made aware of the regulatory, safety and practical constraints associated with UAS operations. The Accountable Manager or Remote Pilot is responsible for ensuring that the client fully understands these constraints.

Once the operating site has been identified and the likely timing of the operation ascertained, the Remote Pilot and/or UAS Operator will conduct an initial desk-based survey of the site. The purpose of this desktop activity is to ascertain the surrounding area, its locality in respect of airspace classifications, local airfields, congested areas, etc.

The feasibility of these intended tasks should be thoroughly discussed with the customer and it must be clearly stressed that Sky High Drones can and will only operate in accordance with the issued commercial operations permission and reserves the right to suspend or cancel any planned flight operations over safety concerns.

2.2 Operating Site Location and Assessment

The proposed operating site location must be thoroughly assessed by the Eye in The Sky Services Remote Pilot. The Remote Pilot will utilise [Dronedesk](#) and any other appropriate resources to determine and document the following factors:

- Airspace classification type and required provisions (Class A, C, D or G)
- Determine whether the operating site is within a Protected Aerodrome FRZ
- Any other nearby Protected Aerodromes or other aircraft operations
- Industrial hazards such as live firing, gas venting, high-intensity radio transmissions
- Check whether there are any local bylaws affecting the operation
- Physical obstructions such as wires, masts, buildings etc.
- Extraordinary restrictions such as segregated airspace around prisons, nuclear establishments etc. (suitable permission may be needed)
- Residential and recreational activities
- Public access
- Permission from the landowner or another custodian with delegated authority

2.3 Risk Management

A site safety assessment must be completed by the Remote Pilot for each assignment. The risk assessment should be as specific to the site as possible. While there is always a degree of acceptable risk, it should always be minimised to ensure the flight 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 pilot to ensure that the flight can be conducted safely.

The Sky High Drones Remote Pilot will use the Dronedesk risk assessment to record Hazards which affect normal flight operations. Potential mitigating factors should also be recorded. The Risk Matrix should be used to determine if a proposed Flight Operation has an acceptable level of risk.

If the UAS Operator feels that the operation cannot be conducted safely, then the operation should be postponed until risks are mitigated. Under CAA legislation (Air Navigation Order 2016, Article 94) the Remote Pilot is ultimately responsible to ensure a flight can be conducted safely. The Remote Pilot must not submit to peer or client pressures to fly in conditions that he feels are unsafe.

2.4 Communications

All Sky High Drones flight team members should ensure that they have recorded contact numbers for the following services:

- Local air traffic control
- Local aerodromes or aircraft operating organisations
- Local police station (Usually 101)
- All crew personnel and client staff
- Event Organiser (if appropriate)

Dronedesk normally lists these contact numbers automatically. Any additional contact information may be found using Google and other online resources and then documented in Dronedesk. Additional airfield contact and other information may be found using the UK Integrated Aeronautical Information Package (IAIP) website.

The Job report produced by Dronedesk includes 'What-Three-Words' coordinates for the operating location to facilitate any communication with the emergency services.

2.5 Pre-notification

If any flight operation is planned to take place within the FRZ of a Protected Airfield, then the Remote Pilot must comply with the provisions of Article 94A of the Air Navigation Order 2016 with respect to seeking permission from the Protected Airfield prior to the Operation taking place.

The Protected Airfield contact details for ATC, FISU or Airfield Operator (as appropriate) should be obtained and permission for the intended flight operation requested at least twenty-four hours in advance. Further notification to the Protected Airfield immediately prior to take-off may also be required.

In certain circumstances, particularly if members of the public are likely to be within visual range, it may be necessary to inform the local police of the intended flight operations to avoid interruption or concerns from the public.

In all cases, anyone within 50 metres of the planned flight path must be under the explicit control of the Remote Pilot and be adequately briefed. These persons must be able to:

- Choose to participate or not with the planned flight operation
- Understand the risks posed to them inherent with the planned flight operation
- Have reasonable safeguards instituted for them during the planned flight operation
- Not have restrictions placed on their engagement with the purpose of the event or activity

2.6 Site Permission

The Sky High Drones UAS Operator should obtain landowner or custodian permission for the area from which it is intended to operate (take-off and landing) before any planned flight operations take place. This permission must be noted on the pre-site or on-site assessment forms and should be obtained in writing wherever possible.

The UAS Operator must be mindful in the planning of the operation of the need to seek landowner or custodian permissions and to avoid committing trespass as a result of an UAS failure when overflying property.

2.7   Weather Forecasts

The Sky High Drones Remote Pilot should obtain detailed weather forecasts and predicted GNSS satellite coverage and availability for the specific flight operation location at least twenty-four hours in advance of any planned flight operation. Dronedesk includes a weather forecast for the operation location. Additional sources which are acceptable are:

- Met Office
- XC Weather
- Windy
- UAV Forecast
- Airfield TAFs and METARs

The Sky High Drones Remote Pilot is responsible for ensuring that the remotely piloted aircraft system is operated within the specific limitations as detailed in the UAS Operating Limitations set out in Appendix C.

2.8   Preparation and Serviceability of Equipment

The Sky High Drones Remote Pilot is responsible for checking that the remotely piloted aircraft system and any required equipment is in a 'fit for purpose' condition at least twenty-four hours before any planned flight operations take place.

The Remote Pilot should examine the aircraft and maintenance logbooks on Dronedesk to ensure that they are fully familiar with any issues, upgrades, updates, modifications or repairs recently completed on the aircraft.

On-Site Procedures and Pre-flight Checks

2.9   Site Assessment

The Sky High Drones Remote Pilot must complete an On-Site assessment of the operating location to confirm the physical details uncovered by the Pre-Site assessment. The On-Site assessment findings should be recorded in [Dronedesk](#), however this may be done after the operation has been completed. Unexpected factors must be assessed and any required mitigation addressed. In all cases, Eye in The Sky Services Remote Pilots must comply with the limitations stated on the commercial operations permission.

2.10   Selection of Operating Area and Alternate

The Sky High Drones Remote Pilot should select an appropriate operating location, alternate and emergency landing site. The operating location should be selected based on the following factors:

- Operating site size and shape
- Operating site surroundings such as trees, power lines etc.
- Operating site surface and gradient

In selecting operating areas, due consideration must be given to ensuring that distances from people, vehicles, vessels and structures not under the control of the Remote Pilot, as set out in this Operations Manual and the commercial operations permission.

2.11   Cordoning Procedure

The Sky High Drones Remote Pilot will determine the need for cordoning (including warning signage) during the Pre-Site and On-Site assessments. Additional staff may be required to maintain these safety cordons or to control public access to the operating site.

2.12   Communications

All Sky High Drones flight team members must remain within the audible range of each other during flight operations. If operating location and conditions dictate, two-way radios should be utilised to ensure that communication is maintained. The Visual Observer must always be situated next to the Remote Pilot. All communication with the Remote Pilot should be directed through the visual observer to avoid unnecessary distractions.

If the planned flight operation is to be conducted in the vicinity of other flight operations, sufficient communications must be established to ensure that all relevant parties are informed immediately prior to commencement and at the conclusion of any flight operation.

2.13   Weather Checks

Immediately prior to flight operations, the actual on-site weather conditions should be assessed and documented. As a minimum, the following should be recorded:

- Maximum wind speed including gusts
- Outside air temperature
- Global Positioning Satellite availability

These factors should be considered in relation to the operating limitations of the UAS. Refer to the relevant limitations of the UAS for further guidance set out in Appendix B. Under no circumstances should any Sky High Drones UAS be operated outside the documented limitations.

2.14   Loading of Equipment

During all flight operations, the Sky High Drones Remote Pilot is responsible for ensuring that all payloads are correctly and securely attached to the UAS in compliance with the relevant operating manual. In particular, the Remote Pilot should pay special attention to the:

- Secure fixing of any payloads, power sources or removable components
- Centre of gravity location and balance limitations
- Maximum permissible take-off mass
- Expected flight endurance as a result of the fitted payload

2.15   Preparation and Assembly of the UAS

It is the responsibility of the Remote Pilot to ensure that the preparation of the aircraft before any flight is completed in accordance with the manufacturer's directions and any additional operating procedures set out in this Operations Manual.

2.16   Pre-Flight Checks

Pre-Flight checks must be conducted by the Remote Pilot using the UAS specific Pre-Flight Checklist defined in Dronedesk.

Checks must include the security of articles on the aircraft, including propellers, propeller guards, the gimbal and the camera. Checks pre-flight also refer to battery charge levels and also to settings based on the flight controller, relative to maximum altitude and distance. Only when the above points are checked and satisfactory, can the start-up procedure commence. Immediately after take-off, the Remote Pilot is required to check the controls to ensure the aircraft responds correctly to control inputs.

2.17 Crew Briefing

The crew briefing will outline the responsibilities of the team to ensure the safe and effective implementation of the survey. While the pilot will have ultimate responsibility for overall safety in the course of the flight he will be concentrating on the flying and will have limited awareness of anything else happening across the extent of the survey site, so it will be down to the observer and spotters to ensure that there is no conflict between the UAS and persons, vehicles, or other aircraft.

General Briefing: the briefing will be undertaken on site in advance of the start of the operation and will cover the following:

- It will outline the general procedures, and explain what will be happening in the course of the survey (particularly to new team members who may not be familiar with the use of UAS);
- It will go through the procedures preceding and during the flight, and any warnings that may be made in the event of an emergency;
- It will highlight any specific and relevant perceived risks that have been identified by the risk assessment and by the initial site survey;
- Identification badges and fluorescent vests will be issued if required
- It will outline the extent of the survey area, the extent of operations for each individual flight, and the take-off areas so that they can keep themselves clear of the flight area, and also keep away any other people approaching;
- It will outline procedures for keeping members of the public away from the flight area (such as cordoning) and also how far they need to be kept away;
- It will provide and instruct on specific equipment that they will use, such as flash jackets and hard hats. They will be informed where a first aid kit and fire extinguisher can be found.
- It will establish communication procedures be that hand signals or use of mobile phones or radios
- It will provide Instruction on the use of hand signals between observer and spotter;
- It will provide instruction on the individual responsibilities of the team members
- The observer will be instructed on emergency procedures and would include being able to bring the UAS back (Go Home function) in the event of the incapacitation of the pilot, and the emergency procedures in the event of an incident (injury or flyaway). The observer will be provided with copies of emergency numbers in the event of an incident.
- Check that the crew are happy to proceed.

3.   Flight Procedures

The Remote Pilot must be confident that the flight can be made safely before commencing. All relevant safety measures need to be in place and involved personnel made aware of the imminent launch. Any local operating procedures need to be complied with.

3.1   Start-Up

- Position the aircraft level and clear of any obstructions facing away from the Remote Pilot and approximately 3 metres away from any nearby flight team members.
- Switch on the control transmitter and the mobile device being used for image monitoring and telemetry display.
- Call "ARMING AIRCRAFT" and then arm the flight battery.
- Launch the aircraft application on the mobile device.
- Confirm that the aircraft has successfully run the diagnostic program, has connected to the ground station, has sufficient satellite coverage and has recorded the current "home"
- Check that the charge state indicated for the battery is at an acceptable level
- Call "STARTING MOTORS" and then start the motors using combined stick commands (both control sticks on the control transmitter to the bottom inner corners).

3.2   Take-Off

- Make a final check on UAS status and look around to ensure the area is clear
- Call "TAKING-OFF"
- Manual take-off
    - Move throttle stick forwards to lift off
    - Return throttle stick to the neutral (centre) position when aircraft is 2-3 metres above ground level to stop ascent and stabilise in the hover
- Automatic take-off
    - Tap the take-off icon on the ground station application then follow on-screen instructions to initiate take off.
    - Once UAS is stable in the hover advance throttle stick to climb to 2-3 metres
- Perform control check for pitch, roll and yaw to ensure correct operation
- A final check of aircraft system status before the start of a mission

3.3   In-Flight

- Maintain Visual Line of Sight at all times
- Ensure Visual Observer is within audible range
- Regularly check UAS status for battery remaining, GNSS satellites acquired and for any warning messages
- Maintain good look-out, supplemented by the Visual Observer, for any air or ground incursions or other unexpected hazards

3.4   Landing

- Check that the landing area is clear
- Call "RETURNING TO LAND" to make your intentions known
- Fly the UAS back to overhead the landing area and hover at approximately 3 metres
- Rotate the UAS if necessary so that the front faces away from the Remote Pilot
- If the area remains clear call "LANDING"
- Manual landing
    - Move throttle stick backwards and control the rate of descent until touchdown
    - Hold throttle stick fully back until motors stop
- Automatic landing
    - Tap the landing icon on the ground station then follow on screen instructions to initiate landing
    - Motors will stop automatically a few seconds after landing has been made

3.5   Shutdown

- Approach the aircraft and switch off the intelligent flight battery
- Call "AIRCRAFT SAFE"
- Remove the aircraft from the landing zone.
- Record flight data to later be used to update pilot and aircraft log books
- Switch off the control transmitter and ground station
- Debrief crew if necessary

3.6   Night Operations

In addition to normal daytime operations, the following procedures will be adhered to during night operations or low-light operations:

- Prior to any operations at night or during low-light, a daytime site survey must be performed. Hazards should be recorded, particularly those which may be difficult to identify in low-light.

- All crew members will be suitably attired with high visibility clothing that is light reflective.

- Each crew member will carry a torch and at least one high-powered torch between them that will be used to scan the flight area and help illuminate any obstacles during operations.

- The Visual Observer will assist the Remote Pilot in identifying all obstacles and will make use of a high-powered torch in performing this duty.

- As part of the pre-flight briefing, all hazards noted during the site survey should be illuminated and pointed out to crew members.

- As part of pre-flight checks, the Remote Pilot should ensure all LEDs on the aircraft are functioning and clean so that visibility is not impeded.

- A take-off/landing site will be clearly marked and the Remote Pilot will ensure it is suitably illuminated for the duration of the operation.

- The Remote Pilot will determine whether the operational VLOS needs to be reduced and logged prior to launch.

4. Emergency Procedures

4.1 Aircraft Failure

If Remote Pilot has any reason to believe that the aircraft is not operating normally or cannot be fully under the control of the Remote Pilot, he should:

- Call "EMERGENCY – AIRCRAFT FAILURE" to warn crew and people nearby
- Try to ascertain the cause of the problem and rectify if possible
- If control is restored, then land as quickly as possible in a safe location
- If control is not restored invoke RTH function
- If UAS crashes pick up the fire extinguisher and move to the crash site as quickly as possible
- Monitor for any signs of LiPo battery fire and be prepared to use the extinguisher to prevent the spread of the fire
- Assess and deal with any damage to property or injuries and report as appropriate

4.2 Loss of Data Link

In the event of a loss of data link between the Ground Station and the UAS the Remote Pilot should:

- Call "EMERGENCY – RETURN TO HOME" to warn crew and people nearby
- The UAS should automatically invoke RTH routine
- Ensure the landing area is clear
- Monitor UAS as it executes RTH

4.3 Fly-Away

- Call "EMERGENCY – FLYAWAY" to warn crew and people nearby
- Instruct all nearby crew to visually track the UAS
- If control not recovered raise transmitter above head and repeatedly use Combined Stick Control input to attempt to shut down motors
- If the UAS continues to fly-away make note of flight path, estimated flying time and then notify any relevant local parties, including the most appropriate ATC unit and the Police

4.4 Aircraft Fire

- Call "EMERGENCY – FIRE" to warn crew and people nearby
- Execute an emergency landing at the most suitable landing area. (visual observer may be able to offer guidance)
- Use fire suppression equipment to control any ensuing fires. Avoid inhaling any toxic fumes.

4.5 Pilot Incapacitation

In the event that the Remote Pilot is incapacitated and therefore unable to operate the aircraft:

- The Remote Pilot or Visual Observer (if present) should activate the RTH function and call "FAILSAFE" to warn crew and people nearby.
- Remote Pilot or Visual Observer (if present) should clear the landing area of any items or equipment and people
- Monitor the UAS executing the RTH
- Disarm battery once aircraft has landed and shut-down

4.6 Crew Incapacitation

In the event that a key member of the crew is incapacitated:

- The Remote Pilot should immediately terminate the operation and either land the UAS as quick as possible or activate the RTH function and call "FAILSAFE" to warn crew and people nearby.
- If RTH has been invoked the Remote Pilot or a third crew member should clear the landing area of any items or equipment and people
- Monitor the UAS executing the RTH
- Attend to the incapacitated crew member as appropriate

4.7   Air Incursion

Should any crew members notice an incursion into the flight operations area by another aircraft:

- The Remote Pilot should be immediately informed by the crew member calling "AIRCRAFT INCURSION" and pointing or verbalising the location of the incursion

- The Remote Pilot will assess the risk of collision and if necessary take whatever avoiding action most reduces or eliminates this risk. This will generally be to descend the UAS as quickly as possible. However, a judgement must be made by the Remote Pilot

- Operations will only be resumed when the other aircraft has cleared the area

4.8   Ground Incursion

Should any crew member notice an incursion into the flight operations area by a person, animal, vehicle or any other ground-based hazard:

- The Remote Pilot should be immediately informed by the crew member calling "GROUND INCURSION" and pointing or verbalising the location of the incursion

- The Remote Pilot will assess the risk of collision and if necessary take whatever avoiding action most reduces or eliminates this risk. This will generally be to or to fly the UAS away from the point of incursion and/or descend the UAS to land as quickly as possible. However, a judgement must be made by the Remote Pilot.

- Operations will only be resumed when the incursion has been cleared or has been brought under the control of the Remote Pilot.

5. Part C – Training & Currency

Sky High Drones maintains records of all staff training and assessments. No staff members will be permitted to become an active member of the flight team until adequate training has been completed.

5.1 Remote Pilot Training Programme

In addition to obtaining a Remote Pilot qualification recognised by the relevant National Aviation Authority, all and any Remote Pilots employed by or contracted to Sky High Drones will be trained and assessed to the following program:

- Pre-Site and On-Site assessment procedures
- Remotely piloted aircraft system assembly procedures
- Pre-Flight and Post-Flight checklist procedures
- Safe power source management
- Safe take-off and landing procedures
- Basic flight manoeuvres
- Emergency procedures
- Correct record keeping procedures

5.2 Remote Pilot Currency

All Sky High Drones Remote Pilots should endeavour to ensure that they log at least two hours of flight time every three calendar months. If that is not possible the remote pilot should carry out flights for up to an hour before undertaking their next commercial task to ensure everything is in order.

5.3 Support Personnel Training Programme

All Sky High Drones support personnel will be trained by a suitable member of the flight team to the following program:

- Air and ground encroachments and correct procedures
- Emergency procedures relevant to the person's role
- Operating procedures relevant to the person's role

6.   Part D - Appendices

6.1   Appendix A – Copy of CAA Standard Permission

Below is a copy of the current Standard Permission for Sky High Drones

6.2   Appendix B - UAS Specifications and Limitations

6.2.1   DJI Mavic 2 Pro

UAS Specifications

Manufacturer	Da-Jiang Innovations (DJI)
Airframe Model	Mavic Pro 2
Airframe Type	Multirotor - quadcopter
Span	354mm (Diagonally motor to motor)
Flying Weight	907g (Fully assembled, ready to operate)
Propulsion Type	4 x Electric brushless motors
Power Source	Intelligent Flight Battery – 4S 3850mAh LiPo 15.4v
Flight Management System	Onboard flight control system with manually operated DJI radio control transmitter or automated waypoint flying using the transmitter and tablet running the DJI GO App connected to the controller via a Lightning lead.
Command and Control Frequency	2.4GHz @ 100mW
Video and telemetry transmission frequency	2.4GHz @ 100mW

UAS Limitations

Maximum Operating Ceiling	19685 feet (6000 m) Above Mean Sea Level
Maximum Operating Endurance	31 minutes (Dependent on conditions)
Maximum Airspeed	72kph (45mph) in S-Mode
Maximum Take-off Mass	Not specified by the manufacturer
Maximum Operating Outside Air Temperature	40° Celsius
Minimum Operating Outside Air Temperature	-10° Celsius
Maximum Wind Speed Incl. Gusts	38kph (23mph)
Maximum Ascent Speed	5 metres per second - S mode
Maximum Descent Speed	3 metres per second
Weather Limitations	Not to be operated in precipitation or fog
Maximum Operating Range	CE Compliant: 3.1 miles (5.0 km)
Geofencing and Firmware Restricted No-Fly Zones	Manufacturer imposes no-fly zones via firmware updates. User controlled geofencing may also be set up. Full details here.

6.2.2   UAS Operating Instructions

All Remote Aircraft Pilots should read, be familiar and follow the guidance and instructions set out in the manufacturer's user manual.

Checklists

All checklists are defined in Dronedesk. These must be used by Remote Pilots for all operations.

Power System Management

The Mavic 2 utilises Intelligent Flight Batteries. The intelligent flight battery incorporates smart charge and discharge functions, temperature sensing, overcharge, overcurrent and short circuit protection combined with battery condition and level indicators, battery error history and a power switch.

Only DJI approved battery chargers for the Mavic 2 should be used. Whilst the control transmitter and intelligent flight battery chargers have been integrated into one unit for convenience, it is recommended that only one battery is charged at a time. Batteries should be charged in well ventilated areas with suitable fire suppression equipment to hand.

Firmware updates

Firmware updates may be required periodically as notified by the UAS manufacturer. Follow the firmware update instructions which may be downloaded from the manufacturer's website.

All update information such as version numbers and new functions must be recorded in the aircraft maintenance logbook. Any updated UAS must then undergo a full flight test before being returned into service. This flight test should be conducted by a named Remote Pilot and must confirm proper operation in all flight modes used for Sky High Drones operations. The flight test(s) must be recorded in both the Aircraft Log and the Maintenance Log which are maintained in Dronedesk.

Systems with identified issues to firmware or software should be grounded until the problem can be rectified.

Repairs and Maintenance

Any maintenance or repairs must be recorded in the Maintenance Log which is maintained in Dronedesk. The Mavic 2 is a factory sealed unit and in-house maintenance should be limited to the exterior components, such as landing legs, rotors, gimbal and attachment points. Any repairs to the control system, GPS or other avionics must be performed by a DJI recommended repairer. Any replacement parts must be DJI branded and sourced from an authorised DJI distributor.