Merseyside Fire and Rescue Authority
CAA Operator-ID: [redacted]

Unmanned Aircraft Systems Operating Safety Case

Volume 1 - Operations Manual
Version 1.4
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Safety Statement

Merseyside Fire and Rescue Service is committed to safety as the primary consideration whilst conducting Unmanned Aircraft System (UAS) operations. The protection of employees, contractors and the general public is of paramount importance and as such, all operations will be conducted in a safe and responsible manner.

Merseyside Fire and Rescue Service embraces "just culture" and fosters an open, honest environment where employees are encouraged to voice any concerns over safety related issues so that they can be addressed immediately.

The Accountable Manager must ensure the operation of any UAS is carried out in accordance with, and abide by the requirements of ANO2016 - 2020 Amendment and UAS Implementing Regulation 2019/947 (as retained in UK Law), the conditions of this Operations Manual, the relevant PDRA, insurance policy, and the Operational Authorisation issued by the Civil Aviation Authority (CAA).

To ensure the safest operations are maintained, Merseyside Fire and Rescue Service shall implement a safety ethos by:

- Ensuring a safe working environment for all employees, contractors and the public;
- Operate UAS in a safe and responsible manner, in accordance with the legislation and the conditions detailed in the Operational Authorisation;
- Ensure that all personnel are suitably trained, current and competent to participate in operations;
- Plan, assess and execute all operations in accordance with the procedures outlined within this Operations Manual;
- Managing risk and implementing suitable mitigation where required;
- Ensure personnel do not deviate from the procedures outlined within this Operations Manual unless acting in an emergency where the relevant Emergency Procedure must be followed;
- Report any accident, serious incident, reportable occurrence or AIRPROX in a timely manner to the appropriate authority;
- Conduct equipment maintenance in accordance with the manufacturers recommendation;
- Keep up-to-date with changes in legislation by means of the CAA website and SkyWise platform, ensuring this document remains compliant at all times.

Merseyside Fire and Rescue Service, as the UAS operator hereby confirms that the intended operation(s) as described herein will comply with any applicable rules relating to it, in particular, with regard to privacy, data protection, liability, insurance, security and environmental protection.

[redacted]
Accountable Manager
Merseyside Fire and Rescue Authority

Amendment Record

The Accountable Manager is responsible for ensuring that this document remains up to date according to changes in legislation, the publications detailed within the reference documents, UAS and Company operations. This document must be made available to all personnel.

Version	Date	Amendments	Author	Signature
1.0	22/09//2021	Initial Release	PB	*(redacted)*
1.1	14/10/2021	Removal of 2 x remote pilots and updates to header and footer	PB	*(redacted)*
1.2	22/09/2021	CAP Update	CM	*(redacted)*
1.3	28/07/2022	Addition of 3 x Remote Pilots	PB	*(redacted)*
1.4	30/08/2022	Removal of 1 x Remote Pilot	CM	*(redacted)*

Reference Documents

Document	Title	Version/ Date	Link
ANO 2016/765	The Air Navigation Order 2016 (as amended)	13/04/2022	ANO 2016/765
SI No. 2020/1555	Air Navigation Order 2020 Amendment – Guidance for unmanned aircraft system users	V1.0 17/12/2020	CAP 2013
CAP1789A	The UAS Implementing Regulation; UK consolidated text	V4.0 17/08/2021	CAP 1789A
CAP722	Unmanned Aircraft System Operations in UK Airspace – Guidance	V8 05/11/2020	CAP 722
CAP 722C	UAS Airspace Restrictions Guidance and Policy	V1.0 10/12/2020	CAP 722C
CAA Website	UK Mandatory Occurrence Reporting	N/A	CAA Website
EC785/2004	Regulation (EC) No 785/2004 of the European Parliament and of the Council of 21 April 2004 on insurance requirements for air carriers and aircraft operators	V1 30/4/2004	EC785/2004
EU996/2010	Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC Text with EEA relevance	V1 12/11/2010	EU996/2010
Railways and Transport Safety Act 2003	Chapter 20 Part 5 – Aviation; Alcohol and Drugs	V1 10/07/2003	RTSA 2003
ORS4 – 1233	Small Unmanned Aircraft – Emergency Services Operations	V1.0	Exemption 4506

Aircraft Manuals			
Make/ Model	**Title**	**Version/ Date**	**Link**
DJI Matrice 300 RTK	User Manual 1.6	November 2020	www.dji.com
DJI Mavic 2 Enterprise Advanced	User Manual 1.0	March 2021	www.dji.com

Acronyms and Abbreviations

AAIB	Air Accident Investigation Branch	**IMU**	Inertial Measurement Unit
AFIS	Aerodrome Flight Information Service	**MATZ**	Military Aerodrome Traffic Zone
AIAA	Area of Intense Air Activity	**METAR**	Meteorological Terminal Aviation Routine
AIP	Aeronautical Information Publication	**mg**	Milligrams
AIS	Aeronautical Information Service	**mL**	Milliliters
ALARP	As Low As Reasonably Practicable	**MORS**	Mandatory Occurrence Reporting Scheme
ANO	Air Navigation Order	**MTOM**	Maximum Take-Off Mass
AMSL	Above Mean Sea Level	**NATS**	National Air Traffic Service
ATC	Air Traffic Control	**NOTAM**	Notice to Airmen
ATCU	Air Traffic Control Unit	**OA**	Operational Authorisation
ATZ	Aerodrome Traffic Zone	**OM**	Operations Manual
CAA	Civil Aviation Authority	**OSC**	Operating Safety Case
Cam-Op	Camera Operator	**OS**	Ordnance Survey
CAP	Civil Aviation Publication	**PDRA**	Pre-Defined Risk Assessment
Con-Ops	Concept of Operations	**PIB**	Pre-Flight Information Bulletin
CU	Command Unit	**PMU**	Power Management Unit
DAA	Detect And Avoid	**RAE**	Recognised Assessment Entity
ENSF	Enhanced Non-Standard Flight	**RP**	Remote Pilot
EP	Emergency Procedure	**RTH**	Return to Home
ESC	Electronic Speed Controller	**SI**	Statutory Instrument
FIR	Flight Information Region	**STS**	Standard Scenario
FIS	Flight Information Service	**TAF**	Terminal Aerodrome Forecast
FOD	Foreign Object Debris/ Damage	**TOLS**	Take-Off/ Landing Site
FRC	Flight Reference Card	**UA**	Unmanned Aircraft
FRZ	Flight Restriction Zone	**UAS**	Unmanned Aircraft Systems
GPS	Global Positioning System	**UKAB**	United Kingdom Airprox Board
HIRTA	High-Intensity Radio Transmission Area	**UKFAT**	United Kingdom Frequency Allocation Table
iOSD	Intelligent On-Screen Display	**VLOS**	Visual Line of Sight

Definitions

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

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

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

c) the aircraft is missing or is completely inaccessible.

Accountable Manager
A nominated person who has the authority for ensuring that all activities are carried out in accordance with the applicable requirements and regulations. The accountable manager is also responsible for establishing and maintaining an effective Management System.

Assembly of people
Gatherings where persons are unable to move away due to the density of the people present.

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

Maximum Take-Off Mass
This MTOM is the maximum mass defined by the manufacturer or the builder, in the case of privately built UAS, which ensures the controllability and mechanical resistance of the UA when flying within the operational limits.
The MTOM should include all the elements on board the UA:
(a) all the structural elements of the UA;
(b) the motors;
(c) the propellers, if installed;
(d) all the electronic equipment and antennas;
(e) the batteries and the maximum capacity of fuel, oil and all fluids; and
(f) the heaviest payload allowed by the manufacturer, including sensors and their ancillary equipment.

Night
The hours between the end of civil evening twilight and the beginning of morning civil twilight.

Operational Authorisation
A document issued by the CAA that authorises the operation of an unmanned aircraft system, subject to the conditions outlined within the authorisation, having taken into account the operational risks involved.

Remote Pilot
A natural person responsible for safely conducting the flight of an unmanned aircraft by operating its flight controls, either manually or, when the unmanned aircraft flies automatically, by monitoring its course and remaining able to intervene and change the course at any time.

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

Serious Incident
An incident involving circumstances indicating that there was a high probability of an accident and associated with the operation of an aircraft which[...] in the case of 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.

Unmanned Aircraft (UA)
Any aircraft operating or designed to operate autonomously or to be piloted remotely without a pilot on board.

Unmanned Aircraft observer
A person, positioned alongside the remote pilot, who, by unaided visual observation of the unmanned aircraft, assists the remote pilot in keeping the unmanned aircraft in VLOS and safely conducting the flight.

Unmanned Aircraft System (UAS)
An unmanned aircraft and the equipment to control it remotely.

UAS Operator
Any legal or natural person operating or intending to operate one or more UAS.

Uninvolved Persons
Persons who are not participating in the UAS operation or who are not aware of the instructions and safety precautions given by the UAS operator.

Visual Line-Of-Sight
A type of UAS operation in which,the remote pilot is able to maintain continuous unaided visual contact with the unmanned aircraft, allowing the remote pilot to control the flight path of the unmanned aircraft in relation to other aircraft, people and obstacles for the purpose of avoiding collisions.

PART ONE - POLICY

1.0 Introduction

This Unmanned Aircraft System Operating Safety Case, together with any associated appendices and enclosures, details the Concept of Operations (Con-Ops) for the use of any UAS within the UK (Scottish and London FIR) by Merseyside Fire and Rescue Service. This document must be read and fully understood by all personnel involved in the operation of UAS and must accompany the Remote Pilot (RP) on every operation either in physical or digital form.

This document will be subject to regular governance and updated in conjunction with any updated reference material published. As a minimum, this document is to be reviewed annually by the Accountable Manager and published for the attention of all personnel. Any changes to this document are to be reflected in the record of amendments accordingly.

The operating procedures contained within this document must be followed and wilful violation will constitute a breach of this document, rendering the individual liable for disciplinary proceedings and/ or cessation of employment.

The purpose of the Operational Authorisation is to provide the following services:

Aerial Photography: The production of still images across the electromagnetic spectrum including but not limited to thermography and photogrammetry.

Aerial Videography: The production of video footage across the electromagnetic spectrum including but not limited to thermography and photogrammetry.

Mapping / Autonomous flight management: The use of automated flight patterns to photograph specified areas to produce 3D models either as visible light models or 'Light Imaging, Detection and Ranging' (LIDAR). This will be achieved through pre-programmed, automated flight patterns over the pre-arranged, operationally-specified areas.

All flights must be:

Within VLOS of the RP, unless operating under the UA observer procedures or the Emergency Service exemption. ;

Completed in the day unless complying with the requirements for night flights;

In compliance with the minimum separation distances in the OA unless operating under the Emergency Service exemption. ;

Within the operational envelope of the aircraft;

All queries relating to this document should be directed to the Accountable Manager.

[redacted]
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1.1 Safety Management System

All personnel involved in the operation of UAS for Merseyside Fire and Rescue Service are responsible for safety assurance and must ensure that procedures contained herein are adhered to.

The principles of our Safe System of Work includes:

1. Qualified Remote Pilot training, competency and currency;
2. Unmanned Aircraft System are maintained and operated safely;
3. Operating Procedures and checklists are adhered to;
4. A conscientious approach to Operational Planning and Risk Management;
5. Compliance with the regulations and industry best-practice

The Remote Pilot is responsible for ensuring that all operations are conducted in accordance with this Operations Manual and that risks are managed to a level deemed As Low As Reasonably Practicable (ALARP). A documented risk assessment must be completed prior to any UAS operation and included in the operational planning. A further 'dynamic' risk assessment should be conducted where necessary.

It is the responsibility of all personnel to actively manage risk and ensure safe operations. The ideal standard of zero accidents is the objective of all operations, and every effort will be made to minimise risk to ALARP.

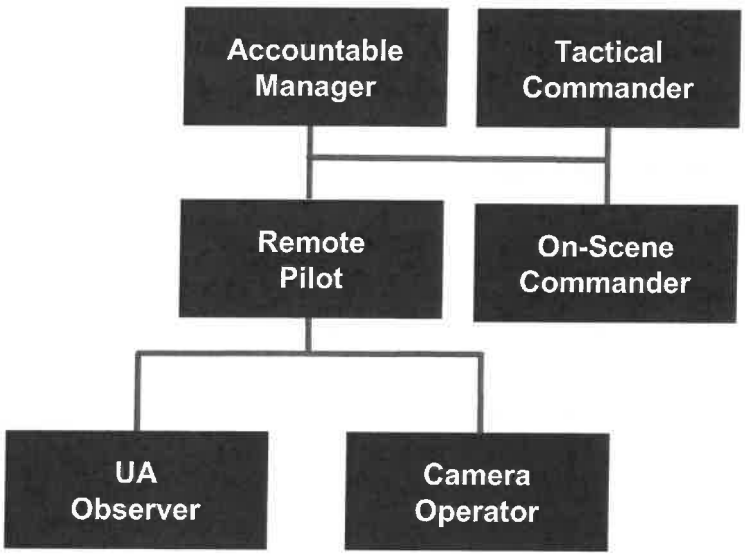
Safety is the responsibility of all personnel whilst accountability for all operations remains with the Accountable Manager. Personnel are expected to display the moral courage to report all concerns for the conduct of operations which are deemed unsafe.

Personnel are also required to monitor for the publication of amendments to the reference documents, safety notices and any other relevant information published by the CAA. This is achieved through the CAA SkyWise system, which each individual is responsible for monitoring.

2.0 Organisation

2.1 Structure

The below diagram depicts the hierarchical structure of Merseyside Fire and Rescue Service detailing specific roles associated with UAS operations. The roles and responsibilities of personnel employed during operations are also included which defines the requirement of these roles. Not every deployment will require the complete spectrum of personnel and a single individual may assume a number of different roles dependent on circumstance.



2.2 Role and Responsibilities

2.2.1 Accountable Manager

[redacted] is the nominated Accountable Manager for Merseyside Fire and Rescue Service and is responsible for the following:

- Ensure the Operations Manual remains compliant with legislation and amended where necessary;
- Maintain overall responsibility for the safe conduct of all operations;
- Provide approval to operate in accordance with operational planning and risk assessment;
- Ensure that all operations are performed to the required standard;
- Ensure continual compliance with data management policy.

2.2.2 Remote Pilot

[redacted] is nominated as the Primary Remote Pilot for Merseyside Fire and Rescue Service, however any individual who meets the necessary training and qualification requirements may operate as a Remote Pilot and are responsible for the following:

- Operate in strict compliance with the procedures contained within this document, the Operational Authorisation and direction of any ATC/ FIS;
- Obey the limitations contained UKPDRA01;
- Follow the guidance contained with CAP 722;
- Ensure the UA is in an airworthy condition to operate;
- Conduct operational planning and risk management in accordance with the procedures contained within this document;
- Ensure that they are fit to operate in accordance with the IMSAFE model.

2.2.3 Unmanned Aircraft Observer

Any individual who meets the qualification and training requirements may be a UA observer. The UA observer takes the responsibility to maintain direct, unaided VLOS with the aircraft, sufficient to avoid collisions so the RP can focus on the iOSD to frame shots. The responsibility to ensure the safety of the flight remains with the RP at all times.

The UA Observer is responsible for the following:

- Maintain direct unaided visual contact with the aircraft sufficient to monitor the flight path in relation to other aircraft and uninvolved persons to avoid collisions;
- Stand directly adjacent to the RP while performing their duties;
- Alert the RP to the position of the aircraft in relation to any other aircraft and uninvolved persons.
- Alert the RP in the event of an emergency;
- Ensure that they are fit to participate in operations in accordance with the IMSAFE model.

2.2.4 Camera Operator

Any individual who meets the qualification and training requirements may be a Cam-Op. The Cam-Op may operate any sensor installed or attached to the UA and assist the RP in maintaining control of the operating site; maintaining situational awareness for persons, vehicles, vessels and structures not under the control of the RP.

The Cam-Op is responsible for the following:

- Operate the sensor equipment;
- Liaise with the RP to allow the photo or video to be captured safely;
- Providing additional visual contact with UA to ensure safe proximities are maintained from other aircraft and uninvolved persons.
- Inform the RP of any hazard approaching the area of operations;
- Adhere to the control measures contained within the operational planning and risk assessment;
- Ensure that they are fit to participate with operations in accordance with the IMSAFE model.

2.2.5 On-Scene Commander

The On-Scene Commander for Merseyside Fire and Rescue Service is designated as the Incident Commander present holding the rank of a minimum of Watch Manger at the scene, whereby it is likely to involve serious harm, damage, disruption or risk to human life or welfare, essential services, the environment or national security. They are responsible for the provision of authorisation for a Remote Pilot to operate the aircraft beyond a distance of 1000 metres under the Emergency Services exemption.

2.2.6 Tactical Commander

The Tactical Commander for Merseyside Fire and Rescue Service is designated as an officer holding the rank of a minimum of Station Manager. They are responsible for the provision of authorisation for a Remote Pilot to operate the aircraft beyond a distance of 2000 metres under the Emergency Services exemption.

2.3 Flight Crew

Merseyside Fire and Rescue Service, as the UAS Operator, is responsible for determining the composition of the flight crew. The composition of the flight Crew will be dependent on the technical complexity, geographic location and environmental factors of the operation.

A Pre-planned operation would identify the composition of the flight team based on the operating environment and task complexity however, a response to an emergency situation whereby it is beyond the scope of business-as-usual operations, and is likely to involve serious harm, damage, disruption or risk to human life or welfare, essential services, the environment or national security would necessitate a tactical decision based on available resources as well as the aforementioned factors.

The JDM and NDM will be used to assess the requirement and situation. The justification for the use of the Emergency Services Exemption should be recorded on the incident log together with the details of the personnel providing such authorisation.

If the planning and risk assessment shows that the workload on the RP may have a detrimental effect on the safety assurance of an operation, then extra flight crew or resources must be utilised to ensure the risks are deemed ALARP.

All flight crew personnel must be briefed by the Remote Pilot regarding their involvement, specific duties and responsibilities to the extent that they fully understand the requirements of the role.

2.4 Qualification Requirements

2.4.1 Remote Pilot

In order to operate as a Remote Pilot, the individual must have the following:

- An NQE Approved Certificate of Competence in Remote Pilot Theoretical Knowledge/ General Airmanship Syllabus and;
- An NQE Approved Certificate of Practical Flight Assessment for the weight class and type of aircraft or;
- An RAE Approved General Visual Line of Sight Certificate;

- Remote Pilot Logbook with evidence of a minimum flight time of two hours within the last three months. A RP logbook sample is provided as an appendix to this document however, other methods of recording are also accepted;
- Be approved to operate under the OA by the Accountable Manager and appear in the Register of Approved Remote Pilots.

2.4.2 UA Observer

Although no formal qualification is required to operate as a UA Observer, the individual must:

- Be capable of performing the tasks expected;
- Receive a flight crew brief and understand their duties.

2.4.4 Cam-Op

Although no formal qualification is required to operate as a Cam-Op, the individual must:

- Be capable of performing the tasks expected;
- Receive a flight crew brief and understand their duties.

2.5 Operation of Multiple UA

All operations conducted by Merseyside Fire and Rescue Service will utilise UAS with a MTOM of between 0-25kg. The Remote Pilot must ensure that they familiarise themselves with the differences in operational envelope, specification and capability between differing aircraft. All Aircraft Systems must be assessed for airworthiness and deemed safe to operate.

Technical specifications for each aircraft is included in the relevant FRC, however, are not considered as a substitute for the manufacturers published user manual; therefore both should be read and understood. The RP must only operate the aircraft in suitable operating conditions as detailed within the technical specifications.

If additional aircraft systems are acquired whether permanent or temporary, a FRC must be compiled prior to the operation.

2.6 Role training and currency

All RP operating under the OA must ensure they have a RP logbook showing a minimum of 2 hours flight time in the last three months. This can comprise of both commercial and training flights, to ensure that the human element of the system can perform its tasks competently and safely. Individual flight times must be recorded, as opposed to the accumulated total of flight time at any given period.

Training for the use of the Emergency Services Exemption must be conducted prior to operating a UA in such circumstances. The training programme incorporates the supervised operation of all UAS which a RP would be required to operating in the course of their duties to a maximum distance of 3000 metres from the CU. Prior authorisation for such training event should be obtained from the Tactical Commander, however for the planning for such training event should reflect that of a Pre-Planned operation.

Such training event should be conducted within a controlled training environment and reflect a scenario of which the exemption is likely to utilised. Such training should include:

- Preparing the aircraft and ancillary equipment for rapid deployment
- Rapid operational planning
- Assembly and functional checks of the aircraft
- Operating the aircraft out of VLOS of the RP
- Emergency Procedures (including loss of video link, pilot re-orientation and RTH)
- Rehearsal of procedures between RP and UA Observer

Such training event should also be used to assess the ability of the C2 and information gathering of the control room staff to ensure that adequate exposure to the appropriate information tools is obtained. A review of the training event will be conducted to ascertain any failings in the rapid deployment process and highlight additional training requirements.

It is vital to the success of any operation that the RP has a level of skill that exceeds the requirements of the mission. This is to ensure that the RP and the aircraft are capable of dealing with an unexpected change in conditions, sudden appearance of a hazard or technical malfunction.

RP training should conduct dedicated training flights which include practice in various flight modes, emergency procedures, distances, heights, orientation and separation distances from objects that have a difficulty equal to or greater than the conditions for the proposed operation. This promotes the development of flight skill, situation resolution and aircraft behaviour familiarity.

2.7 Flight Crew Health

Merseyside Fire and Rescue Service requires all operational employees to undergo routine medical/ eye examinations to maintain operational fitness. It is the responsibility of all personnel to declare any conditions which could affect their ability to participate in operations. All members of the flight crew must self-assess their fitness to participate before the operation commences using the IMSAFE mnemonic and confirm their eyesight meets the requirements for driving a car in the UK.

If glasses or contact lenses are needed to meet the requirements, then they must be used to operate the aircraft. All flight crew must be able to read (with glasses or contact lenses where necessary) a car number plate made after 1st September 2001 from a distance of 20 meters.

If there are any concerns or doubts as to the health of a flight crew member, the operation must be re-assessed to ascertain whether it can still be conducted safely. Operations must be postponed if there is not a satisfactory level of safety assured. Flight crew members must make it known to the other member(s) as soon as they notice any adverse physical or psychological symptoms.

Crew members must not take or be under the effects of any drug, medicine, or psychoactive substance unless it is:

- Medication that is prescribed to an individual by a medical professional that is safe to take and drive a vehicle/ operate machinery;
- Caffeine, if taken in normal doses in drinks with no noticeable ill effects;
- Nicotine, if taken in normal doses with no noticeable and immediate ill effects;

- Paracetamol/Ibuprofen/aspirin if taken as indicated on the instructions;
- Hay-fever medication that is safe to take and drive/operate machinery; the individual must have taken it previously with no noticeable ill effects.

I	**Illness**	Is the crew member suffering from any illness or symptoms of an illness which might affect them in flight?
M	**Medication**	Is the crew member currently taking any drugs (prescription or over-the-counter)?
S	**Stress**	Is the crew member overly worried about other factors in their life? The psychological pressures of everyday living can be a powerful distraction and consequently affect a crew member's performance.
A	**Alcohol**	The crew member should consider their alcohol consumption within the last 8 to 24 hours. Alcohol limit for RPs is 20mg of alcohol per 100ml of blood as per the Railways and Transport Safety Act 2003.
F	**Fatigue**	Has the crew member had sufficient sleep and adequate nutrition?
E	**Eating**	Has the crew member had proper hydration, sustenance, and correct nutrition suitable for the proposed activity.

2.8 Accident Procedure

In the event of any accident or incident, the priority is the preservation of life and public safety.

In the event of injury or fire, the emergency services must be notified. The severity of the incident will dictate the requirement for the immediacy and method of the notification. First aid should be administered by personnel with the appropriate qualifications or as otherwise directed by the emergency services.

Regardless of the severity, all injuries sustained whilst conducting UAS operations are to be reported to the Accountable Manager. A medical examination may be required in order to accurately record the extent of the injury sustained.

In order to assist the production of an incident report, the following information must be obtained where necessary:

- Photographic and/ or diagrammatic evidence
- Witness Statement(s)
- UA Video footage (Recoverable from UA)
- UA Flight Record (Recoverable from the UA)
- Aircraft Damage Reports
- Vehicle/ Structural Damage Reports

Once all the available evidence and information has been obtained, an incident report together with accompanying evidence should be submitted to the relevant authority within the required reporting time limitations.

Merseyside Fire and Rescue Service understands and embraces Just Culture; it is essential that all reports submitted to the Accountable Manager are honest and accurate to ensure that information is sufficient for the investigating body to carry out their investigation. Full cooperation is vital and aids in the continued effort towards safer aviation.

Accidents, Serious Incidents, Reportable Occurrences and AIRPROX are defined in the Definitions Section, Regulations (EU) 996/2010, and the UK AIRPROX Board Website. Knowledge of MORS and reportable occurrences is important for any member of the flight crew.

Merseyside Fire and Rescue Service, must report any occurrences related to UA operations which are considered to have endangered or might have endangered, any aircraft (including the subject unmanned aircraft) or any person or property via the ECCAIRS2 portal: e2.aviationreporting.eu

Merseyside Fire and Rescue Service must file an AIRPROX report if the criteria for reporting are met via the UK AIRPROX Board website: www.airproxboard.org.uk and notify the local ATC (if applicable).

The AAIB must be informed of any accident or serious incident via their 24h reporting hotline, Tel: 01252512299.

2.9 Data Management

The Accountable Manager is responsible for maintaining records of each flight made under the Operational Authorisation and ensures that operational documentation and training records are securely filed in accordance with data management legislation and company policy for a minimum of 3 years.

The following documents must be available to the Civil Aviation Authority upon request for audit purposes:

- Remote Pilot Logbooks
- Operational Planning Documentation
- Insurance documentation
- Operations Manual and FRC
- Maintenance Records
- Incidents Reports

2.10 Security and Privacy

All aircraft in use by Merseyside Fire and Rescue Service utilise a control and video transmission system which operates in compliance with the United Kingdom Frequency Allocation Table (UKFAT). The Remote Pilot must assure the security of the data connection between the CU and UA prior to the operation.

The use of optical sensors or any other sensor is governed by the Data Protection Act and as such, the Remote Pilot and Cam-Op must carefully consider the application of any payload in relation to an individual's privacy. In addition, all Merseyside Fire and Rescue Service personnel are responsible for the appropriate handling, storage and transmission of personal data; including visual data captured.

All aircraft, CU and other data storage devices are stored in a manner which prevents unauthorised personnel from access, or otherwise interfering with any element of the system.

PART TWO - OPERATING PROCEDURES

3.0 Operations

All operations by Merseyside Fire and Rescue Service must be conducted in accordance with the procedures contained within this document, the OA and UKPDRA01, unless operating under the Emergency Services exemption. CAP 722 also contains relevant guidance which the Remote Pilot must adhere to. A copy of the OA, whether in physical or digital form must accompany the Remote Pilot on every operation.

3.1 Operating Limitations

All Flights must be:

- Completed during the Day, unless following the requirements in Section 3.10 Night Operations;
- Within VLOS of the RP or UA observer, unless operating under the Emergency Services exemption;
- To a height of no more than 400ft (120m) from the surface (unless operating with 50m horizontal distance from and no higher than 15m above an obstacle which exceeds 105m in height and with permissions from the organisation responsible for the obstacle).
- Within 500m of the RP, unless operating under the Emergency Services exemption;
- Within the operational envelope of the aircraft.

The aircraft must not be flown within the separation distances in the following table (these mandatory separations are specified in UKPDRA01 and OA issued to Merseyside Fire and Rescue Service), unless operating under the Emergency Services exemption:

Assemblies of People	Within 50m horizontally
Any uninvolved person during take-off and landing	Within 30m
Any uninvolved person while in flight	Within 50m

The aircraft must not be flown in the airspace defined as the Flight Restriction Zone of a protected aerodrome unless permission has been obtained from the ATC or FIS.

3.2 Risk Management

Throughout all aspects of operations, hazards and risks must be identified, assessed and suitable control measures implemented to reduce the risk to a level deemed ALARP. Risk management will commence during operational planning and throughout the operation. All flight crew personnel must adhere to the control measures detailed within the risk assessment and the RP is responsible for monitoring the implementation of such. The production of a risk assessment for each UAS Operation is a mandatory requirement and the format of such can be found as an appendix to this document. Risks are assessed against the Risk Matrix detailed on the risk assessment document.

Unforeseen events that require dynamic risk assessment and mitigating action must be reported to the Accountable Manager. Reporting of such issues is vital to identifying possible failure mechanisms and pathways for future flight safety.

3.3 Communications

During the operation planning, the method of communicating with external agencies such as ATC and other Emergency Services must be considered. This will routinely be by mobile telephone however, consideration should be given to the location of landline communication methods where mobile communications cannot be achieved. Communication between the flight crew is also required to maintain effective lines of communication and risk mitigation.

For all operations, a nominated crew member must carry a suitably charged mobile phone in the event of needing to contact ATC or emergency services. Voice and Data signal should be checked during operational planning using suitable online resources such as the Ofcom or network provider website/ app.

In some instances, it may be required to deploy a fire ground pack set radio communication system to the flight crew to maintain communications on large or complex locations. The Flight Crew should designate a separate channel to those in use and be familiar with the operation of pack set radio equipment and voice procedures. A communications check must be conducted.

3.4 Pre-Notification

If the flight is within Controlled Airspace (A, C, D or E), the controlling ATCU must be identified during operational planning. If the flight is within a Flight Restriction Zone of a protected aerodrome, permission must be obtained from ATC or FIS in advance. In some circumstances, a 28 working day lead time is in effect and therefore, an application should be considered as early as practicable. It may also be necessary to submit an application to the aircraft manufacturer to issue a software licence for such operations.

A Non-Standard Flight is an operation that does not follow published routes or notified procedures. An Enhanced Non-Standard Flight application must be submitted for flights within Restricted Areas within Central London – Hyde Park, City of London and Isle of Dogs. Further information is available at ENR 1.1 - 4.1 on the NATS electronic Aeronautical Information Publication (eAIP). Enhanced/ Non-Standard Flight (E/NSF) applications must be submitted at least 28 working days prior to the operation via the NATS website www.nats.co.uk/nsf

Appropriate contact numbers must be noted on the Operational Planning documentation for quick reference. The Police should be notified if there is a reasonable chance of a member of the public being alarmed by the UA flight, such as the operation taking place in close proximity to areas of social sensitivity such as schools, medical and care facilities.

3.5 Operating Site Permissions

Merseyside Fire and Rescue Service will always ensure that the appropriate land owner permissions are obtained prior to the operation and documentary evidence must be held by the RP for the operation. The relevant trespass laws are always observed and Merseyside Fire and Rescue Service personnel must not knowingly commit trespass during operations.

3.6 Weather

Weather is a significant consideration when planning and carrying out any UAS operation. It is vital to ensure that it is within a safe margin of the aircraft's operational envelope, but also that the RP feels it is within their safe working limitations and experience levels. The Remote Pilot is responsible for assessing the forecast conditions 7 days prior to the operation, and verifying suitable conditions onsite. Consideration should be made for weather conditions both at surface level and at the maximum operating ceiling of that specific operation, as the two can differ significantly.

The operating site wind conditions must be assessed and monitored using an anemometer and any visual indications of wind speed. Both constant and gusting wind speed must be taken into consideration.

Due to its changeable nature, the weather must be monitored throughout the flight to ensure the aircraft remains within the operational envelope at all times. If the safety of the operation cannot be assured, the RP must abort the flight until conditions are suitable. The following factors are to be considered when conducting operational planning:

Temperature
Humidity
Wind Speed (Constant and Gusting)
Wind Direction
Precipitation
Presence of cumulonimbus clouds
Visibility

The following information sources and tools will assist in weather forecasting during operational planning:

3.6.1 Websites

The following information sources are used to gather weather forecasting information, although this list is not exhaustive, other suitable sources may also be used.

- www.windy.com
- www.metoffice.gov.uk
- TAFs and METARs
- FireMet (via the Met Office - User login required)

3.6.2 Mobile Applications

The following information sources are used to gather weather forecasting information, although this list is not exhaustive, other suitable sources may also be used.

- UAV forecast App
- Windy
- MetOffice
- Dark Skies

3.7 Methods to Determine the Intended Tasks and Feasibility

Merseyside Fire and Rescue Service will always ensure that any operations undertaken are in a safe and responsible manner. Comprehensive operational planning and the accurate recording of information will assist in providing a safe working environment for employees, contractors and the general public.

Initial identification of the operating site is likely to be provided on initial consultation with the organisation requesting deployment although this information may be subject to change depending on the requirement/ incident.

3.7.1 Operational Planning Form

The Operational planning form documents the proposed operating site, environmental considerations, initial hazard identification, meteorological forecasting and airspace management. This document must accompany the Remote Pilot when deployed on-site and kept as a record following completion of the operation. Each operation is assigned a unique reference number to ensure that corresponding documentation can be correlated. A variety of tools can assist in the operating site planning which are detailed below:

Bing Maps/ Magic Maps. As part of early flight planning, a map appreciation should take place which will indicate potential ground hazards, public rights of way and other relevant information. Both satellite imagery and Ordnance Survey mapping should be used to identify the features of terrain.

UK Grid Reference Finder. The UK Grid Reference finder service enables a 10 figure Grid Reference and Latitude/ Longitude to be converted by entering a UK postcode.

Latlong.net. This platform is used to convert latitude and Longitude from decimal to degrees, minutes and seconds; a format to which ATC are more accustomed.

Sky Demon Light. The Sky Demon Light application and website provide aeronautical charts of the FIR detailing active Notice to Airmen (NOTAM), airspace classification and other airspace users which are relevant to flight planning.

Drone Assist. The Drone Assist application by NATS provides a service similar to SkyDemon Light and should be used to complement the information obtained. It details the same information to assist in flight planning with the addition of ground hazard information.

NATS AIS. The Aeronautical Information Service (AIS) provided by the National Air Traffic Service (NATS) provides NOTAM, SNOWTAM, BIRDTAM and ASHTAM information of the operating site and surrounding area. This service is deemed the most reliable source of NOTAM and should be used as the primary means of obtaining such information. In addition, the contact information for civil licensed aerodromes can be obtained from the Integrated Aeronautical Information Package (IAIP) section of the platform.

DJI Fly Safe. For UAS Operations a Flight Restriction Zone, the Remote Pilot may also need to apply to DJI to have the area geographically 'unlocked' in order to operate the UA. An application must be made to DJI in advance of the operation providing documentary evidence of the permission to fly. This must be submitted well in advance of the operation and the RP is responsible for ensuring that the UAS firmware is updated to install the license.

Ofcom Signal Checker. The Ofcom website will be used to ascertain the cellular voice and data coverage of the operating site in order to assess the ability to contact relevant agencies whilst deployed on-site.

Weather Forecast. Weather forecasting is an important aspect of flight planning although consideration should be given to the accuracy of the forecast too far in advance of the operation.

On completion of the operational planning form, the Accountable Manager must review the document together with the Risk Assessment and provide authorisation.

3.8 On-Site Procedures

On arrival at the operating site, the Remote Pilot will conduct an operating site assessment and complete the on-site assessment form taking into consideration the following factors:

- Weather
- NOTAM
- Obstacles
- Terrain
- Hazards and Risks
- Final ATC clearance

3.8.1 Cordon Procedure

The RP must maintain the separation distances detailed in Section 3.0 – Operating Limitations in order to ensure a safe operating site. It may not always be necessary to have a visible cordon in place if the likelihood of public encroachment into the operating site is minimal. Personnel do not have the ability to restrict site access depending on the nature of the operating site. It may be necessary however, to stage UA observers at locations within or around the operating site boundary to intercept uninvolved persons or vehicles which may otherwise compromise the separation distances.

Personnel may request persons to hold position whilst the UA is landed or diverted from the operating site under their own persuasion. No form of duress should be used to indicate that their public right of way is disallowed. In such circumstances, the flight crew should inform the RP of the potential operating site incursion as soon as possible so appropriate action can be taken.

The following may be used to mark the operating site cordon:

- Existing physical barrier (existing infrastructure – eg. Gates & Walls)
- Natural Barriers/ Furniture (Foliage)
- Marker Cones/ Signage
- Flight Crew staging point

Consultation with the Land Owner should enable an understanding of the traffic routine in the operating area to assist with cordon planning. The On-Site Survey will also identify the 'Pattern of Life' of the operating area to complement the information provided by the land owner.

3.8.2 Take-Off and Landing Site(s)

The RP is responsible for the establishment of a primary TOLS and additional LS where necessary. It may be necessary to mark the Primary Take Off and Landing Zone using cones or another suitable method of marking in order to designate the area as sterile for access for the RP alone. These should be placed in the four corners of the point of landing at a suitable distance so as not to represent a hazard to the UA should it operate an automatic landing using the RTH function. The following considerations should be made:

S	**Size**	Minimum of 5m x 5m
S	**Surface**	Consider use of landing mat and check for FOD
S	**Slope**	Flat and level
S	**Shape**	Square TOLS denoting sterile area
S	**Surrounds**	30m omnidirectional from uninvolved persons

3.9 Flight Crew Briefing

Prior to take-off, all flight crew and site visitors must receive a verbal safety brief issued by the RP. It is essential that the brief is as succinct as possible so that important information is retained and sufficient time should be allocated for clarification questions to be adequately answered.

The mnemonic SEEDS must be used for briefings to ensure the Remote Pilot provides the required information to all flight crew personnel. The briefing format is included in the Operational Planning documentation.

3.10 Night Operations

The following procedures must be implemented for any operation which is conducted either partly or in full during the period defined as Night.

3.10.1 Reduced Operating Distances

Placing a reduction in the operating distances of the aircraft at night may be suitable especially when considering the ability to maintain VLOS in relation to smaller aircraft.

3.10.2 Sources of Illumination

The provision of a source of illumination for each member of the flight crew is advisable in order to ensure that there is adequate lighting to conduct equipment checks and aid in communication. It should be considered however, that the use of light will degenerate the natural adaptation of the human eye to dark conditions. Red light has a proven lesser effect on the eye than that of white light.

3.10.3 Aircraft Conspicuity Lighting

The UA conspicuity lighting must be operational throughout the flight in order to facilitate VLOS. The system must be checked prior to the commencement of the operation to ensure that it is functioning effectively.

3.10.4 Daytime Site Assessment

The conduct of a site assessment is critical to complement the operational planning already conducted and aids in identifying additional hazards and risks not achieved through resource planning. A daytime site assessment enables the Remote Pilot to gain a ground appreciation of the operating site as it appears and plan any additional control measures required to safely manage the operation. In an ideal situation, the Remote Pilot would conduct the site assessment on the same day of the intended night operation and remain on site until light conditions warrant a night operation. This would therefore provide additional assurance that there are no significant changes to the operating site which may otherwise be masked by darkness.

3.10.5 Illuminated TOLS

An Illuminated Take-Off and Landing Site is mandatory as this is generally considered the most hazardous period of flight. The provision of an illuminated TOLS enables the Remote Pilot to execute a take-off and landing whilst maintaining an enhanced awareness of this element of the operating site. Sources of illumination can be torches, LED/ strobe lighting, chemical lights (glow sticks) or other suitable illumination markers.

3.11 Use of a UA Observer

The UA observer takes the responsibility to maintain direct, unaided VLOS with the aircraft, sufficient to avoid collisions so the RP can focus on the iOSD to frame shots or operate the UAS in First-Person View (FPV). The responsibility to ensure the safety of the flight remains with the RP at all times.

The UAS Operator must be satisfied that he or she is:

- Competent to perform the tasks which he or she may be called upon to perform;
- Competent, by direct unaided visual observation of the UA, to assist and advise the remote pilot with the safe conduct of the flight.

The Remote Pilot must ensure that:

- The UA Observer is fully briefed on the planned flight and what is expected of him/her, taking into account the prevailing conditions;
- The UA Observer understands that he/she must stay directly adjacent to the remote pilot and maintain direct unaided visual contact with the UA at all times, to visually and aurally monitor the airspace for other aircraft and the area that the UA will be operating in for any uninvolved persons;
- The UA Observer has been instructed on the actions to take in the event of another aircraft being spotted and a risk of collision is assessed;
- The UA Observer has been instructed on the actions to take in the event of any uninvolved person being sighted within, or close to, 50m whilst in flight, and 30m during take-off/ landing;
- The UA Observer understands that he/she must advise the remote pilot if the UA is proceeding beyond the point at which he/she is able to monitor its flight path sufficiently to identify a risk of collision.

3.12 Application of the Emergency Services Exemption

The Emergency Services exemption was introduced by the CAA as a means for the emergency services to operate UAS in a manner which would usually be restricted under the UKPDRA01. Such exemption only applies to short term reactive situations aimed at preventing the immediate risk to human life, or during a major incident, where the observance of the operating limitations and separation distances within UKPDRA01 would be likely to hinder this objective.

The exemption is not intended to be used for pre-planned or routine UAS operations, therefore should there be the requirement to utilise such exemption during these operations, an Operating Safety Case (OSC) is required for submission and approval to the CAA.

As outlined within the exemption document, authorisation is required from the On-Scene Commander to operate the UA at a distance beyond 1000 metres or from the Tactical Commander to operate at a distance beyond 2000 metres. However, for all Merseyside Fire and Rescue Service operations using such exemption, an officer holding the rank of a minimum of Station Manager will be considered as the Tactical Commander who has Command and Control (C2) over all Merseyside Fire and Rescue Service assets and is

therefore best placed to provide authorisation. The On-Scene Commander may still provide authorisation for use of such exemption, however this should only be to a maximum distance of 1000 metres beyond the Remote Pilot. The Tactical Commander has the authority to override the decision of the On-Scene Commander and withdraw the authorisation to use such exemption should they deem it necessary.

When considering the use of such exemption, the Tactical Commander and On-Scene Commander should consider the following:

- Weather conditions. (Wind speed (constant and gusting), temperature, precipitation and visibility)
- Airspace and/or proximity to aerodromes.
- The potential for other manned aircraft to be operating in the same area.
- Proximity to areas that would be particularly vulnerable if the UA were to be lost (major/busy roads, railways, large gatherings of people etc).
- Endurance of the aircraft (ie. how long it is able to keep flying).
- The quality of the control link.
- Operations beyond a distance of 3000 metres from the RP should only be considered in extreme circumstances.

The authorisation to operate the UAS under the provision of the Emergency Services exemption should be recorded in the incident log and on any subsequent operational documentation held by the RP. This may be requested for production to the CAA on request.

Once authorisation has been obtained, the RP must, as a minimum, obtain the following information prior to operating the aircraft. In most cases of Merseyside Fire and Rescue Service, this information will be gathered by the Fire Control Room Staff and disseminated to the RP and other relevant members of the flight crew via mobile telephone or San J radio whilst they transit to the incident, however it is the responsibility of the RP to interpret this information accordingly.

The RP must consider:

- Weather conditions must be within the Operational Envelope of the Aircraft
- NOTAM must be checked using an approved platform such as NATS AIS
- Airspace restrictions
- Liaison with the Local ATC when operating in controlled airspace and the issuing of a NOTAM

Once authorisation for use of the Emergency Service Exemption has been obtained, the RP must abide by the limitations described below and must apply sound judgement to the necessity to operate at reduced and extended operating distances.

Assemblies of People	As close as deemed necessary
Any uninvolved person during take-off and landing	As close as deemed necessary
Any uninvolved person while in flight	As close as deemed necessary

The RP must consider public perception and alarm/ distress caused by the reduction in operating distances there should be used only for as long as deemed necessary for the specific operation.

The RP remains responsible for the safe operation of the aircraft throughout such operations and must apply sound judgement to the necessity to operate the aircraft at such distances. The same logic is applied to that of use of blue lights on a public highway, in that whilst authorisation may be issued, the responsibility for applying judgement on the given situation rests with the RP.

3.12 Aircraft Assembly and Functional Checks

The Remote Pilot is responsible for conducting aircraft assembly and functional checks to ensure that the UAS is prepared for the operation and deemed airworthy. The RP must use the checklists contained within the FRC to ensure that each component is in a serviceable condition and the system is correctly configured for the operation. If any element of the UAS is deemed unserviceable, the UAS must not be flown.

3.13 Flight Procedures

The Remote Pilot is responsible for conducting take off checks each time the aircraft takes off to ensure it is functioning correctly. The RP must use the checklists contained within the FRC. If any element of the inspection is deemed unsatisfactory, the operation must be aborted.

While the aircraft is in flight the RP must:

- Maintain VLOS with the aircraft;
- Monitor the status of the aircraft;
- Monitor the area around the flight to avoid collisions;
- Maintain situation awareness of the operating site

At the conclusion of the operation, the Remote Pilot is responsible for conducting landing checks to ensure that the procedure is methodical and controlled. The RP must use the checklists contained within the FRC.

3.14 Between Flight Checks

The RP must be familiar with and operate in accordance with the procedures found in the FRC. The functional checks must be conducted following a battery change to ensure that the system settings remain correct for the operation and that the new component is suitable to use.

3.15 Post Flight Checks

The RP must be familiar with and operate in accordance with the procedures found in the FRC.

3.16 Emergency Response Plan

The RP must ensure they are familiar with the EPs for the aircraft that they are operating. By following the procedures set out in Section 3 Operations, specifically pre-flight checks and flight procedures, the likelihood of having to initiate an emergency procedure should be minimal.

In an emergency, the safety of the UA must take second place to any person; this includes the people in a manned aircraft or any other vehicle. If necessary, the aircraft must be sacrificed to ensure the safety of any person. Consideration must be given to the potential outcomes of any emergency action. For example, checking below the aircraft is clear before initiating a motor stop in flight, and not landing near baled hay if the aircraft is on fire.

All flight crew members must be issued with a FRC. They must be briefed on the use of the FRC; an overview of what information is included and when it may be useful is essential.

The RP must be familiar with all EPs for all aircraft they operate. In an emergency there may not be time to check the FRC, however, if other crew members are present, they can read out the RP response actions as a memory aid.

Flight crew members must be shown how to activate RTH and contact ATC and Emergency Services in the event it is required, and the RP is incapacitated.

All crew must be aware of the potential issues and must be vigilant in spotting signs early so that operations can be ceased before it is necessary to perform an emergency procedure.

All emergencies must be assessed, and if classed as a reportable occurrence, a serious incident or an accident, it must be reported as detailed in Section 2.7.

Remote Pilot Incapacitation			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
RP feels unwell, losing consciousness or is unconscious	Warn flight crew Clear TOLS Activate RTH Monitor UA Shutdown UAS	Clear TOLS Activate RTH Monitor UA Shutdown UAS Administer first-aid	Request ambulance AAIB ECCAIRS Report
Mitigations			
1. Remote Pilot/ Flight Crew IMSAFE Declaration 2. RTH Familiarisation/ Demonstration			

Loss of Command & Control Link			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
Loss of video link Loss of UA Control Loss of CU lights/ power	Check antenna position Move closer to UA Restart CU Power CU from alternative power source Follow FLYAWAY procedure if the aircraft does not RTH	Monitor UA Clear TOLS	ATC AAIB ECCAIRS Report
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. UA Assembly 4. UA Functional checks			

Public Encroachment/ Uninvolved Person(s)			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
Uninvolved person(s) observed entering operating site	Increase separation distance Select TOLS Follow landing procedure	Inform RP Intercept encroaching person(s) Request they hold position until the UA has landed	Nil
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. Cordon erection 4. Flight Crew personnel 5. Situation awareness			

Aircraft Encroachment			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
(Un)Manned Aircraft observed entering operating site	Manoeuvre UA away from aircraft If head-on collision imminent, turn RIGHT Follow landing procedure	Inform RP Clear TOLS	ATC UK Airprox Board
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. Flight Crew personnel 4. Situation awareness			

Loss of Control			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
UA behaving erratically or visually unstable Uncommanded movement	Toggle flight mode Activate RTH If no control: Restart CU If no control: Motor stop If no control: Follow FLYWAY procedure	Clear operating site Monitor UA	ATC AAIB ECCAIRS Report
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. UA Assembly 4. UA Functional checks			

Loss of GNSS			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
UA lights iOSD warning UA drift	Inform flight crew Orientate UA Control UA Toggle flight mode Select TOLS Follow landing procedure	Clear operating site Monitor UA	Nil
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. UA Assembly 4. UA Functional checks			

UA Fire			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
Smoke/ flames visible from UA	Inform flight crew Identify suitable LS Descent Follow landing procedure Contain/ extinguish (if safe to do so)	Inform RP Clear operating site Monitor UA Prepare safety equipment Contain/ extinguish (if safe to do so)	Fire Service AAIB ECCAIRS Report
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. Flight Crew Briefing 4. Battery Maintenance 5. UA Assembly 6. UA Functional checks			

CU Fire			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
Smoke/ flames visible from CU CU become hot to touch	Inform flight crew Activate RTH Power off CU Place on ground away from TOLS and equipment Monitor UA Contain/ extinguish (if safe to do so)	Clear operating site Monitor UA Prepare safety equipment Contain/ extinguish (if safe to do so)	Fire Service AAIB ECCAIRS Report
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. Flight Crew Briefing 4. CU Maintenance 5. UA Assembly 6. UA Functional checks			

Flyaway			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
UA not responding to input and departing operating site	Inform flight crew Record - Speed - Direction - Height - Battery % Contact Police	Monitor UA Record - Speed - Direction - Height - Battery %	ATC Police (Via 999) AAIB ECCAIRS Report
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. Flight Crew Briefing 4. UA Maintenance 5. UA Assembly 6. UA Functional checks			

Loss of Lights (Night Operation)			
Sign/ Symptom	**RP Action**	**Flight Crew Action**	**Reporting**
Loss of Lights and VLOS	Inform flight crew Activate RTH Clear TOLS Monitor iOSD Following landing procedure	Clear TOLS Illuminate sky Monitor airspace	ECCAIRS Report
Mitigations			
1. Operational planning/ risk assessment 2. Site survey 3. Flight Crew Briefing 4. UA Maintenance 5. UA Assembly 6. UA Functional checks			

PART THREE - TECHNICAL SPECIFICATIONS

4.0 Aircraft Management

All aircraft operated by Merseyside Fire and Rescue Service must be done so in accordance with the technical specifications contained within this document. The Accountable Manager must ensure that any aircraft which is operated under the provisions of the OA are detailed within this document prior to the operation.

4.1 Operational Envelope

The aircraft must be flown within the operational envelope. The specifications for the aircraft are included on the FRC for ease of reference; these are provided by the manufacturer in the aircraft's user manual.

4.2 Payloads

The technical specifications for the aircraft's payload are found in the Aircraft Manual. Official Equipment Manufacturer approved payloads only are approved for use and must be done so in compliance with Data Protection policies.

4.3 Emergency Recovery Systems

All aircraft must be fitted with a system that can land the aircraft safely if there is a loss of communication between the aircraft and the CU. Details of this system are found in the aircraft user manual. For DJI systems this is referred to as the RTH system.

4.4 Change Management/ Modifications

No modification has been made to any of the aircraft other than keeping the firmware up to date. Minor modifications to the aircraft may be made in the future. All modifications must be risk assessed, tested, and included in this document before the aircraft is used. A change or upgrade of firmware is considered as a modification to the system and therefore requires a test flight before being used in an operation.

4.5 Single Points of Failure

The single points of failure have been identified for the aircraft system on the FRC; these items must be checked before the flight and during routine maintenance to ensure the risk of failure is mitigated.

4.6 Maintenance and Inspection

The aircraft, CU, payload and batteries must be serviced every 20 hours or every 3 months, whichever comes first, following the user manual. All aircraft maintenance must be recorded in the relevant maintenance log.

4.7 Spares

All replacement components and spares must be sourced from a reputable supplier and must also be Original Equipment Manufacturer parts.

4.8 Repair

Minor repairs can be carried out by Merseyside Fire and Rescue Service, however, any major repairs must be outsourced to an approved repair centre. The aircraft system must be subject to a test flight before it is used for an operation.

4.9 Known Failure Modes

A list of known failure modes is included in the FRC. The RP must be aware of the failure mechanisms of the aircraft flown and know how to avoid or correct the situation

4.10 Transportation

Aircraft, batteries and all associated ancillary equipment must be securely transported in a way that prevents damage to equipment that may affect the safety of a flight. Manufacturer supplied cases or third-party cases specifically designed for the aircraft must be used.

FLIGHT REFERENCE CARDS

DJI Matrice 300 RTK

UA Type	Multi-Rotor		**Motors**	4
MTOM	9000g		**Max Velocity**	23m/s
Max Ascent Rate	6m/s		**Max Descent Rate**	7m/s
Max Wind Speed	15m/s		**Ingress Protection**	IP45
Max Altitude (AMSL)	5000m		**Operating Temp**	-20°C to 50°C
Transmission dBm	18.5	12.5	**Hovering Accuracy**	+/-0.5m
Frequency Band GHz	2.4	5.8		+/-1.5m
Max Flight Time	55 Minutes		**Max Operating Radius**	8km

Known Failure Modes
Irrational behaviour of aircraft following firmware update
RTH does not work without GPS
Low cell voltage causing battery failure

Single Points of Failure
PMU Flight Controller Airframe

FLIGHT REFERENCE CARD

DJI Mavic 2 Enterprise Advanced

SUA Type	Multi-Rotor		**Motors**	4
MTOM	1100g		**Max Velocity**	20m/s
Max Ascent Rate	6m/s		**Max Descent Rate**	5m/s
Max Wind Speed	10m/s		**Ingress Protection**	0
Max Altitude (AMSL)	6000m		**Operating Temp**	-10□ (CU -20□) - 40□
Transmission dBm	18.5	12.5	**Hovering Accuracy**	+/-0.5m
Frequency Band GHz	2.4	5.8		+/-1.5m
Max Flight Time	31 minutes		**Max Operating Radius**	6km

Known Failure Modes
Irrational behaviour of aircraft following firmware update
RTH does not work without GPS
Low cell voltage causing battery failure

Single Points of Failure
Battery PMU ESC Motors Propellers Flight Controller Airframe

Assembly Checklist			✓
Aircraft	Body/ Shell	Condition	
	Bolts	Security	
	Motors	Condition	
	Propellers	Condition/ Security	
Command Unit	Body	Condition	
	Antenna	Position	
	Battery	Fully Charged	
	Flight Mode	Set	
iOSD	Body	Condition	
	Connection	Install	
	Battery	Fully Charged	
	Position	Glare Prevention	
Payload	Attachment	Security	
	Lens	Clean	
	Gimbal Guard	Removed	
	Media Cards	Formatted/ Installed	
Battery	Body	Condition	
	Charge	Fully Charged	
	Temperature	Optimum (>15□)	
	Install	Secure	

Functional Checklist	✓
Power on Command Unit	
Power on Aircraft	
Check Firmware Version	
Enable Multiple Flight Modes	
Set Return to Home Altitude	
Disable Beginner Mode	
Set Max Flight Distance	
Set Max Flight Altitude	
Set Failsafe [Return to Home/ Land/ Hover]	
Controller Stick Mode (Default Mode 2)	
Battery Temperature Optimum (>15□)	
Battery Cell Voltage within threshold (0.05v)	
Sensor State (Calibrate Compass/ IMU as required)	
GPS Signal	
CLEAR FOR TAKE-OFF	

Take-Off Checklist	✓
Check Surroundings and Separation Distances	
Start Motors	
Stop Motor	
Start Motors	
Check Right Stick Response	
Ascend to 10m	
Hold position and Observe for 10 Seconds	
Stick Checks	
COMMENCE OPERATION	

Landing Checklist	✓
Select TOLS	
Check FOD	
Check Surroundings and Separation Distances	
Aircraft Orientation	
Descend	
Position	
Land	
Stop Motors	
UA Off	
CU Off	
FLIGHT COMPLETE	

Post Flight Checklist	✓
Notify ATC	
Disassemble Aircraft	
Operating Site Closure	
Equipment Accounting	
Complete Remote Pilots Logbook	
Flight Crew Debrief	
OPERATION COMPLETE	

EMERGENCY PROCEDURES

RP Incapacitation	
Symptom(s)	RP feels unwell, losing consciousness or is unconscious
RP Action	Warn crew of your status Clear TOLS Activate RTH Monitor UA Shutdown UAS
Crew Action	Follow directions of RP Clear TOLS Activate RTH Monitor UA Shutdown UAS Administer First-Aid
Report	Request Ambulance AAIB ECCAIRS Report

Loss of Command & Control Link	
Symptom(s)	Loss of video link, loss of UA Control and/ or loss of CU lights/ power
RP Action	Check antenna position Move closer to UA Restart CU Power CU from alternative power source Follow FLYAWAY procedure if the aircraft does not RTH
Crew Action	Monitor UA Clear TOLS
Report	ATC AAIB ECCAIRS Report

Public Encroachment/ Uninvolved Person(s)	
Symptom(s)	Uninvolved person(s) observed entering operating site
RP Action	Increase separation distance Select TOLS Follow landing procedure
Crew Action	Inform RP Intercept encroaching person(s) Request they hold position until landed
Report	Nil

Loss of Control	
Symptom(s)	UA behaving erratically or visually unstable and/ or Uncommanded movement
RP Action	Toggle flight mode Activate RTH If no control: Restart CU If no control: Motor stop If no control: Follow FLYWAY procedure
Crew Action	Clear operating site Monitor UA
Report	ATC AAIB ECCAIRS Report

Aircraft Encroachment	
Symptom(s)	(Un)Manned Aircraft observed entering operating site
RP Action	Manoeuvre UA away from aircraft If head-on collision imminent, turn RIGHT Follow landing procedure
Crew Action	Inform RP Clear TOLS
Report	ATC UKAB

Loss of GNSS	
Symptom(s)	UA lights, iOSD warning and UA drift
RP Action	Inform flight crew Orientate UA Control UA Toggle flight mode Select TOLS Follow landing procedure
Crew Action	Clear operating site Monitor UA
Report	Nil

UA Fire	
Symptom(s)	Smoke/ flames visible from UA
RP Action	Inform flight crew Identify suitable LS Descent Follow landing procedure Contain/ extinguish (if safe to do so)
Crew Action	Inform RP Clear operating site Monitor UA Prepare safety equipment Contain/ extinguish (if safe to do so)
Report	Fire Service AAIB ECCAIRS Report

CU Fire	
Symptom(s)	Smoke/ flames visible from CU and CU become hot to touch
RP Action	Inform flight crew Activate RTH Power off CU Place on ground away from TOLS and equipment Monitor UA Contain/ extinguish (if safe to do so)
Crew Action	Clear operating site Monitor UA Prepare safety equipment Contain/ extinguish (if safe to do so)
Report	Fire Service AAIB ECCAIRS Report

Flyaway	
Symptom(s)	UA not responding to input and departing operating site
RP Action	Inform flight crew Record ■ Speed ■ Direction ■ Height ■ Battery % Contact Police
Crew Action	Monitor UA Record ■ Speed ■ Direction ■ Height ■ Battery %
Report	ATC Police (via 999) AAIB ECCAIRS Report

Loss of Lights (Night Operation)	
Symptom(s)	Loss of Lights/ Loss of VLOS
RP Action	Inform flight crew Activate RTH Clear TOLS Monitor iOSD Following landing procedure
Crew Action	Clear TOLS Illuminate sky Monitor airspace
Report	ECCAIRS Report

APPENDIX A - OPERATIONAL AUTHORISATION

Civil Aviation Authority

UNMANNED AIRCRAFT - OPERATIONAL AUTHORISATION

SPECIFIC CATEGORY – UKPDRA-01

1.	AUTHORITY RELEASING THE AUTHORISATION
1.1. **State**	**United Kingdom**
1.2. **Issuing Authority**	**United Kingdom Civil Aviation Authority**
1.3. **Authorising Signatory Point of Contact**	SSC Technical Services 0330 022 1908 uavenquiries@caa.co.uk
2.	**UAS OPERATOR INFORMATION**
2.1. **Operator Registration No.** **CAA Reference.**	[redacted]
2.2. **UAS Operator Name**	Merseyside Fire & Rescue Authority
2.3. **Operational Point of Contact** Name Telephone E-MAIL	[redacted]
2.4. **Authorisation Number**	1
2.5. **Operations manual**	1.0 22/09/2021
3.	**UAS INFORMATION**
3.1. **Manufacturer**	N/A
3.2. **Model**	Any rotary wing unmanned aircraft with a Maximum Take-Off Mass/flying weight of less than 25kg.
3.3.	

Serial Number or UAS operator Registration Mark (If Applicable)	The UAS operator's registration number listed at 2.1 must be displayed on every unmanned aircraft flown under this operational authorisation.
3.4. **Relevant/Other Comments**	a. The Unmanned Aircraft must be equipped with a mechanism that will cause it to land in the event of a disruption to, or a failure of, any of its control systems, including the C2 Link. b. The remote pilot must ensure that this mechanism is in working order before any flight is commenced. c. The UAS operator must ensure that the radio spectrum used for the C2 Link and for any payload communications complies with the relevant Ofcom requirements and that any licences required for its operation have been obtained.
4.	**LIMITATIONS AND CONDITIONS FOR THE UAS OPERATION**
4.1. **Type of operation**	a. VLOS only. b. But remote pilots may be assisted by a single unmanned aircraft observer, who must be positioned alongside the remote pilot. The unmanned aircraft observer must maintain direct unaided visual contact with the unmanned aircraft sufficient to monitor its flight path in relation to other aircraft, persons, vehicles, vessels and structures for the purpose of avoiding collisions, and advise the remote pilot accordingly.
4.2. **Operating times/periods**	Day or night. No timing limitations.
4.3. **Location(s) of operation**	Any location within the United Kingdom subject to the airspace restrictions detailed in 4.4
4.4 **Airspace**	Flights must not be conducted within the Flight Restriction Zone (FRZ) (See Note 1) of a protected aerodrome, or within any Restricted, Prohibited or Danger Area, unless the appropriate clearance or permission to enter has been obtained.
4.5. **Operating heights/altitudes/levels**	a. The unmanned aircraft must be maintained within 120 metres (400ft) from the closest point of the surface of the earth. b. Obstacles taller than 105m may be overflown by a maximum of 15m provided that: (i) The person in charge of the obstacle has requested this; and, (ii) The unmanned aircraft must not be flown more than 50m horizontally from the obstruction.
4.6. **Maximum operating range**	Maximum horizontal range of 500 metres from the remote pilot, unless a lesser control link radio range has been specified by the UAS manufacturer.
4.7. **Separation from uninvolved persons**	a. No flight within 50 metres of any uninvolved person, except that during take-off and landing this distance may be reduced to 30 metres. b. No flight within 50 metres horizontally of any assemblies of people.
4.8.	

Security of loads/equipment	The remote pilot must ensure that any load carried by, or equipment on, the unmanned aircraft is properly secured and that the aircraft is in a safe condition for the specific flight.
4.9. **Remote Pilot requirements**	a. Remote pilots must be employed by or contracted to the UAS operator. b. Remote pilots operating under this operational authorisation must be in possession of a GVC. c. Remote pilots operating under this operational authorisation must comply with the responsibilities set out in point UAS.SPEC.060 of Regulation (EU) 2019/947 as retained in UK law.
4.10. **UAS operator requirements**	a. The UAS operator must comply with the responsibilities set out in point UAS.SPEC.050 of Regulation (EU) 2019/947 as retained in UK law. b. The UAS operator must maintain records of each flight made under this authorisation, and must make such records available to the Civil Aviation Authority on request as set out in point UAS.SPEC.090 of Regulation (EU) 2019/947 as retained in UK law.
4.11. **Occurrence reporting requirements - (Regulation (EU) 376/2014)**	Any occurrences that take place while operating under this authorisation must be reported in accordance with the requirements set out in CAP 722 (section 2.9).
4.12. **Insurance**	Insurance cover meeting the requirements of regulation (EC) 785/2004 must be held.
5.	**VALIDITY**
5.1. **Duration of the Authorisation**	This operational authorisation is valid: **From:** 21/10/2021 **To:** 21/10/2022 Unless otherwise suspended or revoked.
5.2. **Regulation references**	This operational authorisation is issued under Article 5 of Regulation (EU) 2019/947 as retained in UK law.
6.	**AUTHORISATION SIGNATURE**
6.1. **Signature / Stamp**	
	The UAS operator detailed in section 2 is authorised to conduct UAS Operations with the UAS defined in Section 3, and according to the conditions and limitations in Section 4, provided that they comply with this authorisation, Annex IX to Regulation (EU) 2018/1139 and its implementing rules. **This operational authorisation must be carried by the remote pilot during the operation.**
6.2.	

Date	21/10/2021

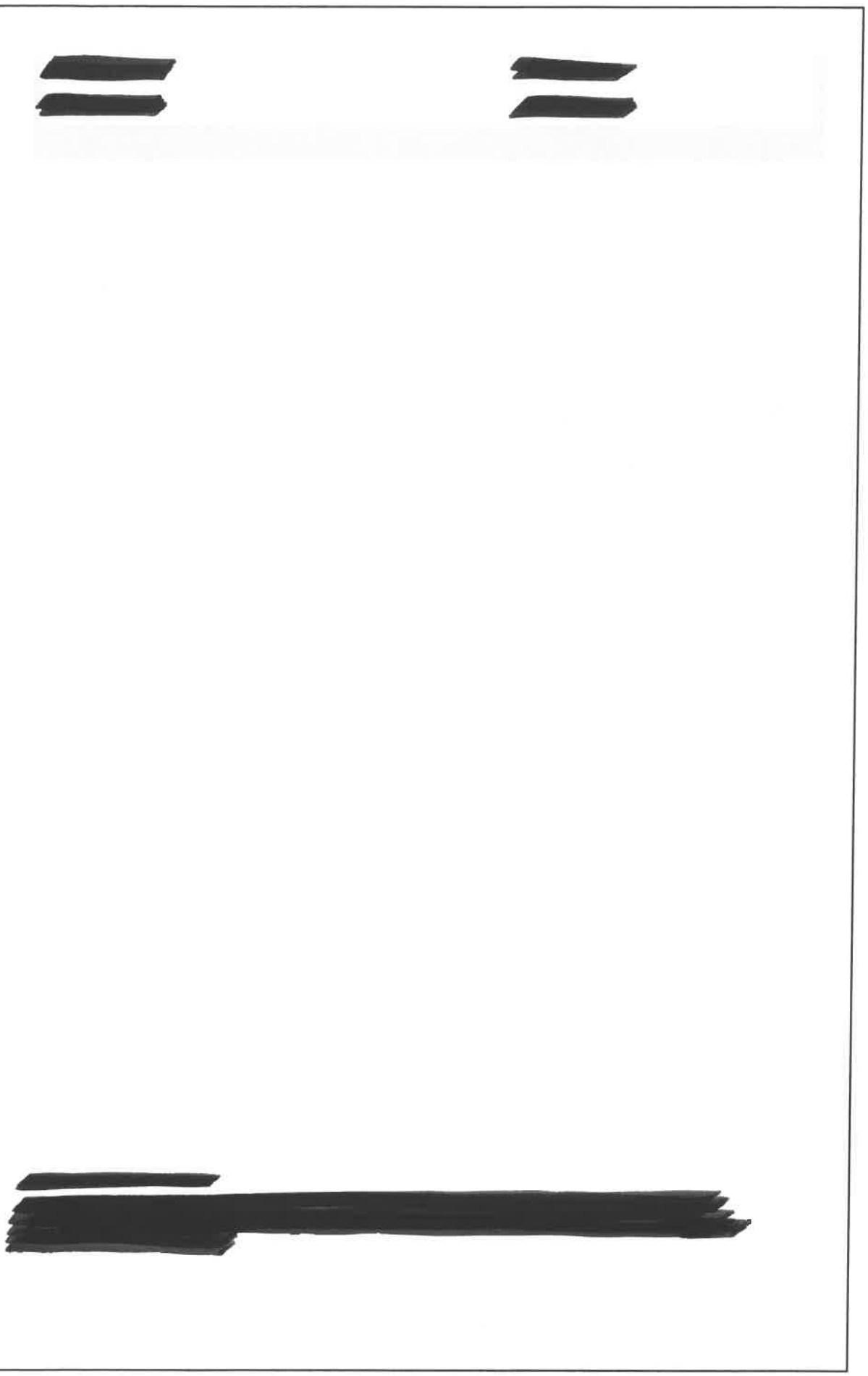
Note 1: The "Flight Restriction Zone" of a protected aerodrome can be determined by reference to the table contained within ANO 2016 Article 94A, Paragraph 7 and is described in CAP 722.

Note 2: UAS operators and remote pilots should be aware that the collection of images of identifiable individuals, even inadvertently, when using surveillance cameras mounted on an unmanned aircraft may be subject to the General Data Protection Regulation and 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 3: UAS 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. They must ensure that they observe the relevant trespass laws and do not unwittingly commit a trespass whilst conducting a flight.

APPENDIX B - INSURANCE SCHEDULE

(*REDACTED*)



APPENDIX C - PRIMARY RP QUALIFICATION

UNITED KINGDOM

Unmanned Aircraft Systems

Remote Pilot Certificate of Competence

UK Civil Aviation Authority

Flyer ID

[redacted]

First name: [redacted]

Last name: [redacted]

Expiry date: 22/07/2026

heliguy

RAE: 1447

SCAN ME

register-drones.caa.co.uk

GVC SPECIFIC CATEGORY | Multi-rotor

GVC - General VLOS Certificate

UK Civil Aviation Authority

The holder is competent to act as a remote pilot in the Specific Category in accordance with the limitations specified in the associated Operational Authorisation

This can be revoked, amended or suspended by the CAA at any time.

GENERAL VISUAL LINE OF SIGHT CERTIFICATE

APPENDIX D - REMOTE PILOT LOGBOOK

Remote Pilot Name:

Date	Aircraft	Battery		Flight Time (MM:SS)	Total Time (MM:SS)
		Reference	Percentage		
			Start %		
			End %		
			Start %		
			End %		
			Start %		
			End %		
			Start %		
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			Start %		
			End %		
			Start %		
			End %		
			Start %		
			End %		
			Start %		
			End %		
			Start %		
			End %		

I certify this document as a true and accurate record.

Signature	
Name	
Date	

APPENDIX E - OPERATIONAL PLANNING FORM

PART A - PRE-DEPLOYMENT

Operation Reference		**Date**	
Client Name		**Client Contact**	

www.bing.com/maps	www.gridreferencefinder.com	www.latlong.net		
Post Code			**Address**	
Grid Reference				
Latitude	DD	MM	SS	N/S
Longitude	DDD	MM	SS	E/W

Flight Crew			
Role	**Name**	**Contact Number**	**Radio**
Remote Pilot			
UA Observer			
Camera Operator			

Aircraft			
Make/ Model	**Payload**	**Serial Number**	**Airworthy**

https://checker.ofcom.org.uk/			
Mobile Phone Signal			
Network	**Voice**	**Data**	**Enhanced Data**

police.uk	nats-uk.ead-it.com	gov.uk/find-local-council	gov. uk
Permissions/ Pre-Notification/ Emergency Contact Information			
Organisation	**Name**	**Contact Number**	**Conditions/ Ref No**
Land Owner			
ATC			
Police			
Local Authority			
AAIB	AAIB	01252 512299	

www.skydemonlight.com	https://skyvector.com/	http://www.nats-uk.ead-it.com/	
Local Aerodromes/ Airspace Users			
Name	**Distance**	**Bearing**	**Contact Information**

www.skydemonlight.com	NATS Drone Assist	https://skyvector.com/
Airspace Chart		

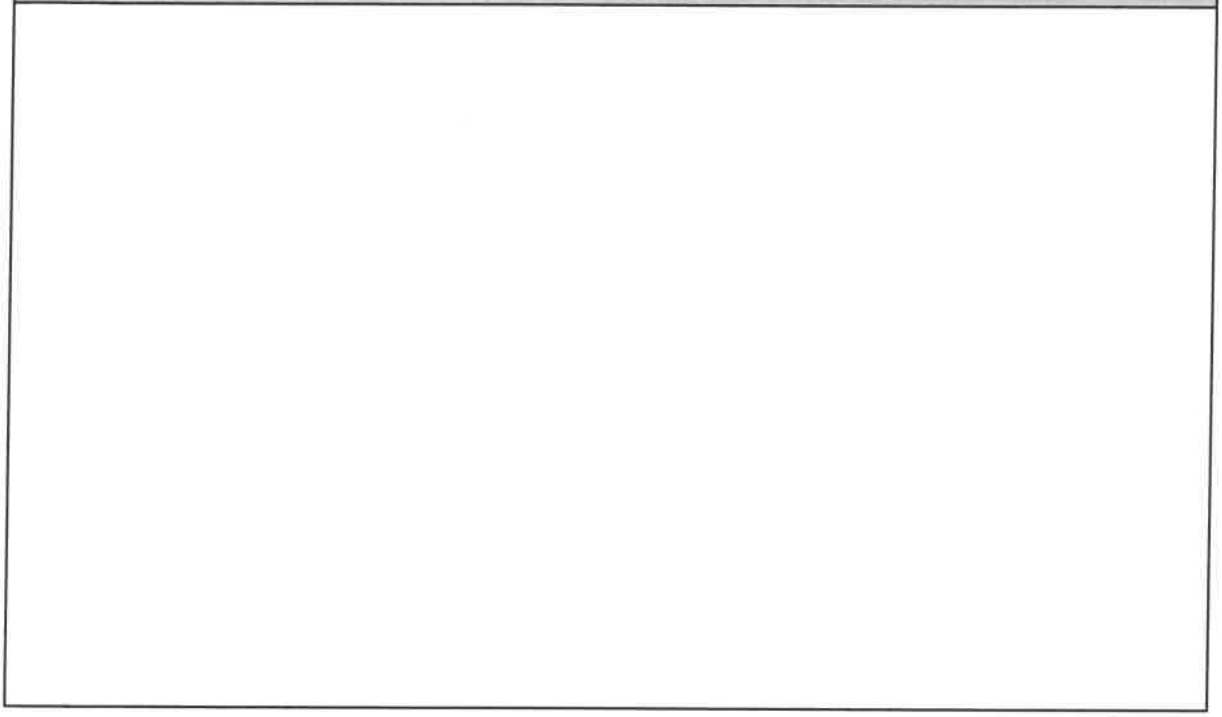
www.skydemonlight.com		NATS Drone Assist			http://www.nats-uk.ead-it.com/
Airspace Classification					
A	C	D	E	G	ATZ
Flight Restriction Zone					
No		Yes		**ATCU**	
Airspace Hazards					
Restricted Area	Prohibited Area	Danger Area	AIAA	HIRTA	MATZ
Other (Specify)					

www.dji.com/flysafe			
Software Restricted Zone			
No	Yes	User Unlock	Custom Unlock
Application Date		**Licence Issued**	

www.nats-uk.ead-it.com			
NOTAM			
Pre-Flight Information Bulletin Number			
Reference	**Date**	**Time**	**Information**

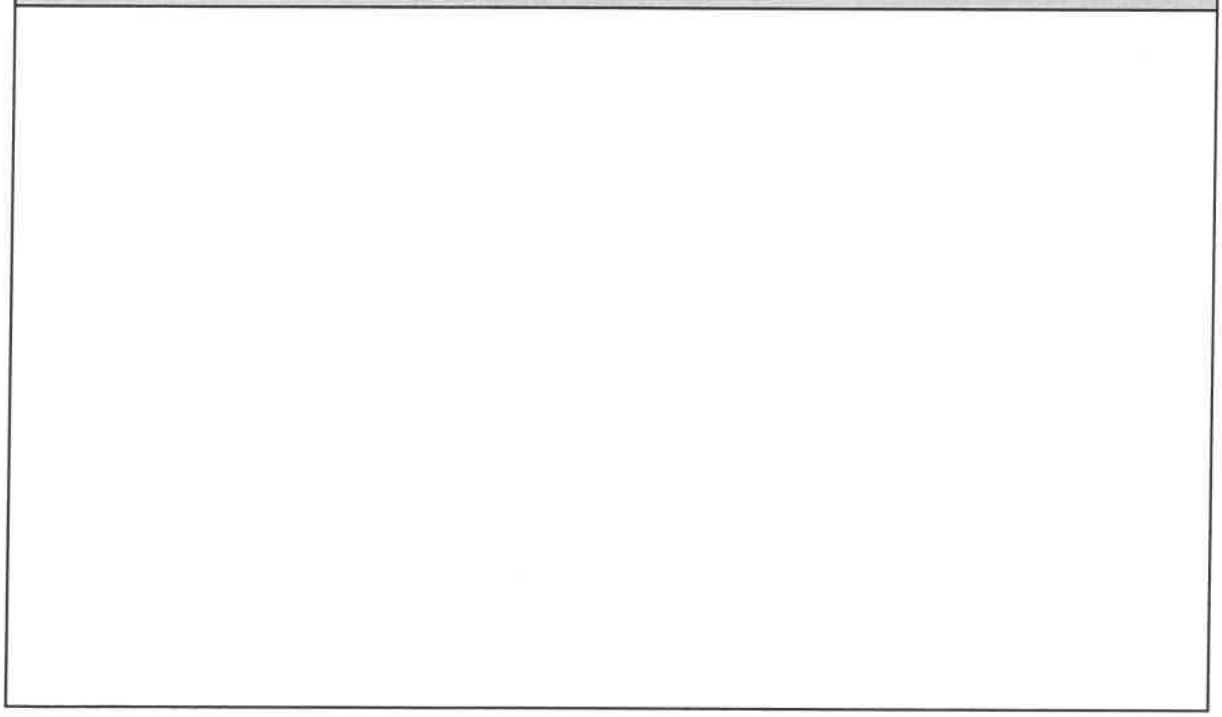
www.bing.com/maps www.magic.defra.gov.uk

Ordnance Survey Map



www.bing.com/maps www.google.com/maps www.magic.defra.gov.uk

Satellite Imagery



Operating Site Observations	
Terrain	
Ground Hazards	
Access Points	
Areas of social sensitivity	

www.metoffice.gov.uk		www.windy.com		
Meteorological Report				
Wind Speed (Constant)		**Within Op Envelope**	Yes	No
Wind Speed (Gusting)		**Within Op Envelope**	Yes	No
Wind Direction		**Within Op Envelope**	Yes	No
Precipitation		**Within Op Envelope**	Yes	No
Temperature		**Within Op Envelope**	Yes	No
Visibility		**Suitable to Operate**	Yes	No
Sunrise Time				
Sunset Time				

I certify that the proposed operation meets the requirements of UKPDRA01.

Operation Approval			
Approved		Denied	
RP Signature		**AM Signature**	
RP Name		**AM Name**	
Date		**Date**	

PART B - ON-SITE ASSESSMENT

www.bing.com/maps	www.google.com/maps	www.magic.defra.gov.uk
Operating Site Sketch Plan		
	Key	**Symbol**
	Primary TOLS	
	Secondary TOLS	
	Cordon	
	Flight Crew	
	Access Point	

www.metoffice.gov.uk		www.windy.com		
Meteorological Conditions				
Wind Speed (Constant)		**Within Op Envelope**	Yes	No
Wind Speed (Gusting)		**Within Op Envelope**	Yes	No
Wind Direction		**Within Op Envelope**	Yes	No
Precipitation		**Within Op Envelope**	Yes	No
Temperature		**Within Op Envelope**	Yes	No
Visibility		**Suitable to Operate**	Yes	No

On-Site Checklist		
NOTAM	Conduct final NOTAM Check	
Meteorological Conditions	Anemometer	
Primary TOLS	Establish	
Secondary TOLS	Establish	
Cordon	Establish	
Risk Assessment	Complete	
Flight Crew Brief	All personnel	
Safety Equipment	Issue	
ATC Final Clearance	Obtain	

Notes

Flight Crew Briefing		
Briefing Prompt		**Briefing Notes**
Safety	Airside Safety Hazards	
	Crew Health (IMSAFE)	
	Risk Mitigations	
	FRC	
	TOLS/ LS	
Exercise	Purpose	
	Method	
	Role	
	Responsibilities	
	Timings	
Equipment	First Aid Equipment	
	Fire Equipment	
	Aircraft	
	RTH Activation Demo	
	Battery Safety	
Discipline	Locations	
	Start/end operation	
	Specific Duties	
	Exclusion Areas	
	Cordon Control	
Signals	Protocol	
	Signal Strength	
	Battery Check	
	Functionality Check	
	Secondary System	

APPENDIX F - RISK ASSESSMENT

Hazard	Risk	Risk Level (P x S = L)			Control Measures	Risk Level (P x S = L)		
		P	S	L		P	S	L

Severity of Consequences		
Definitions	**Meaning**	**Value**
Catastrophic	Results in an accident, death or equipment destroyed	5
Hazardous	Serious injury or major equipment damage	4
Major	Serious injury or incident	3
Minor	Results in a minor incident	2
Negligible	Nuisance of little consequence	1
Probability of consequences		
Definitions	**Meaning**	**Value**
Frequent	Likely to occur many times	5
Occasional	Likely to occur sometimes	4
Remote	Unlikely to occur but possible	3
Improbable	Very unlikely to occur	2
Extremely Improbable	Almost inconceivable that the event occurs	1

Probability	**Severity**				
	Catastrophic 5	Hazardous 4	Major 3	Minor 2	Negligible 1
Frequent 5	Unacceptable 25	Unacceptable 20	Unacceptable 15	Review 10	Review 5
Occasional 4	Unacceptable 20	Unacceptable 16	Review 12	Review 8	Acceptable 4
Remote 3	Unacceptable 15	Review 12	Review 9	Acceptable 6	Acceptable 3
Improbable 2	Review 10	Review 8	Acceptable 6	Acceptable 4	Acceptable 2
Extremely Improbable 1	Review 5	Acceptable 4	Acceptable 3	Acceptable 2	Acceptable 1

APPENDIX G - REGISTER OF APPROVED RP

Name	GVC Certificate Expiry Date	CAA FLYER-ID	Permitted UA
[redacted]	22/07/2026	[redacted]	0-25kg Multi-Rotor
[redacted]	22/07/2026	[redacted]	0-25kg Multi-Rotor
[redacted]	22/07/2026	[redacted]	0-25kg Multi-Rotor
[redacted]	22/07/2026	[redacted]	0-25kg Multi-Rotor
[redacted]	22/07/2026	[redacted]	0-25kg Multi-Rotor
[redacted]	22/07/2026	[redacted]	0-25kg Multi-Rotor
[redacted]	28/07/2027	[redacted]	0-25kg Multi-Rotor
[redacted]	27/07/2027	[redacted]	0-25kg Multi-Rotor
[redacted]	27/07/2027	[redacted]	0-25kg Multi-Rotor

I [redacted] certify that the above named individual(s) are qualified and permitted to operate UA under the Operational Authorisation issued by the Civil Aviation Authority (CAA) to Merseyside Fire and Rescue Service

Signature	*(redacted)*
Name	[redacted]
Date	12/07/2021

APPENDIX H - BATTERY LOG

Date	Battery								
	A			B			C		
	Start State	End State	Charge Cycle	Start State	End State	Charge Cycle	Start State	End State	Charge Cycle
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
	%	%		%	%		%	%	
DISCHARGE CYCLE IF NOT COMPLETED AT 3 MONTH INTERVAL									

APPENDIX I - AIRCRAFT MAINTENANCE RECORD

Manufacturer		**Model**	
Serial Number		**Purchase Date**	

Date of Service	20 hours								
	3 Months								
Firmware									
Frame/ Shell									
Bolts									
Motors									
Landing Gear									
IMU									
Compass									
Vision System									
Collision Sensors									
Infra-Red Sensors									
Conspicuity Lights									
Propellers									
CAA Operator ID tag									
Signature									

S	Serviceable	**U**	Unserviceable

APPENDIX J - CU MAINTENANCE RECORD

Manufacturer		**Model**	
Serial Number		**Purchase Date**	

Date of Service	20 hours							
	3 Months							
Firmware								
Body								
Bolts								
Sticks								
Switches								
Buttons								
Dials								
Connectors								
Battery								
Antenna								
Cables								
Signature								

S	Serviceable	**U**	Unserviceable

APPENDIX K - BATTERY MAINTENANCE RECORD

Manufacturer		**Serial Number**	
Local Reference		**Purchase Date**	

Date of Service	20 hours								
	3 Months								
Firmware									
Body									
Cycles									
Charge									
Cell Voltage									
Signature									

S	Serviceable	**U**	Unserviceable

APPENDIX L - SENSOR MAINTENANCE RECORD

Manufacturer		**Model**	
Serial Number		**Purchase Date**	

Date of Service	20 hours							
	3 Months							
Firmware								
Body								
Bolts								
Connection								
Lens								
Lens Function								
Ribbon Cable								
Gimbal								
Gimbal Clamp								
SD Card								
ND Filter								
Signature								

S	Serviceable	**U**	Unserviceable