Massachusetts State Police

Uncrewed Aircraft Systems

Standard Operating Procedures

Introduction / Mission Statement

I. Uncrewed Aircraft Systems (UAS) provide enhanced operational capability, safety, and situational awareness for first responders, other staff or volunteers, affiliated partners, and the community. They can operate in many types of environments (natural or manmade), or during other critical incidents which might be hazardous to the safety of first responders or others. UAS provide a unique, viable, safe, versatile, supplemental tool for incident commanders and first responders. UAS also have a cost benefit compared to manned aircraft. UAS is not a replacement for manned aircraft but for some missions UAS can provide first responders with a tool that can access areas where manned aircraft cannot fly due to weather or other safety regulations. UAS provides a viable, safe, and supplemental asset to other manned aircraft assets.

II. The Uncrewed Aircraft Systems Standing Operating Procedures (UAS-SOP) has been compiled for the use and guidance of the Massachusetts State Police (MSP) UAS personnel in the execution of their duties.

III. The mandate of the Uncrewed Aircraft System (UAS) program is to provide: operations support for front-line resources while focused on the safety of the public and UAS flight crews; the protection of individuals' privacy, civil rights and civil liberties; compliance with all applicable federal, state, and local laws, regulations, and policies; and maintaining operational and training requirements.

IV. The standards, practices, procedures and specifications contained in this manual incorporate specific requirements of the Federal Aviation Administration (FAA). It is therefore the responsibility of all Uncrewed Aircraft System (UAS) Remote Pilots in Command (RPIC) to be familiar with evolving FAA regulations governing UAS technology and this UAS-SOP. In the event of a conflict between the FAA regulations and the UAS-SOP, the FAA regulations shall have precedence.

V. Any errors or omissions shall be promptly brought to the attention of the UAS Program Manager. The Massachusetts State Police is dedicated to highly professional flight operations. ***Safety will always be our priority and we will be persistent in continuously demonstrating high safety consciousness in our daily flight operations.*** We are committed to abiding by the highest safety standards and going beyond the legal compliance with implementing industry best standards.

1.0 Scope

I. Consistent with MSP policy TOP-07A, applicable laws and unit-specific SOPs, Department-authorized UAS may be utilized for missions including, but not limited to, the following:

• Search and rescue for lost, missing, or endangered persons;
• Photographic and video documentation missions;
• Motor vehicle crash investigations / crash scene mapping;
• Criminal investigations and crime scene mapping;
• Tactical response missions (e.g., hostage rescue/barricaded subject);
• Providing an Aircraft visual perspective to assist officers in providing direction for crowd control, traffic incident management, special circumstances, and temporary perimeter security;
• Fire Services / Bomb Squad support;
• Homeland Security-related missions; and
• Other special events/incidents as assigned by the Division Commander, Unit Commander and/or UAS Program Manager or designee, consistent with and as permitted by law.

II. A Department UAS shall not be intentionally used for viewing, recording or transmitting images and/or video in a criminal investigation at any location or property where a person has a reasonable expectation of privacy unless:

a. A warrant or court order has been approved for the search of the property;
b. Consent by the owner or person responsible for the property is obtained; or
c. Exigent circumstances exist, including but not limited to search and rescue missions, tactical missions, crash scenes, crime scenes, fire scenes, hazmat scenes and natural disasters.

2.0 Acronyms and Definitions

Acronyms

AGL: Above Ground Level
ATC: Air Traffic Control
CARS: Collision Analysis & Reconstruction Section of the MSP
CFR: Code of Federal Regulations
COA: Certificate of Authorization
CRM: Crew Resource Management
CS: Control Station
CSC: Combined Stick Command – start motors, stop motors, stop motors in flight
FAA: Federal Aviation Administration
FCR: Fatal Conditioned Response
GPS: Global Positioning System

LZ: Landing Zone
MSP: Massachusetts State Police
NAS: National Airspace System
NFCR: Non-Fatal Conditioned Response
NOTAM: Notice to Airmen
NTSB: National Transportation Safety Board
OPAREA: Operational Area
PII: Personally Identifiable Information
PMTC: Person manipulating the controls under supervision by RPIC
QEP: DJI Qualified Entity Program
RPIC: Remote Pilot in Command
RTH: Return to Home function on control station
SGI: Special Government Interest waiver or authorization for emergency operations
TRACON: Terminal Radar Approach Control Facility
UAS: Uncrewed Aircraft System
UAV: Uncrewed Aircraft Vehicle
VLOS: Visual Line of Sight
VO: Visual Observer

2.1 Definitions

Certificate of Authorization (COA). An authorization issued by the Air Traffic Organization of the Federal Aviation Administration to a public UAS program for a specific Uncrewed aircraft activity.

Emergency Certificate of Authorization (SGI). An authorization issued by the Air Traffic Organization of the Federal Aviation Administration to a public RPIC for a specific Uncrewed aircraft activity during an urgent or exigent event.

Civil Twilight. The time periods between approximately 30 minutes before sunrise until sunrise, and between sunset and approximately 30 minutes after sunset.

Controlled Airspace. A generic term that covers the different classifications of airspace (Class A, B, C, D and E airspace) and defined dimensions within which ATC services are provided.

Crew Resource Management (CRM). A process designed to aid in the prevention of aviation accidents and incidents by improving performance through an understanding of human factor concepts, which focuses on interpersonal communication, leadership and decision making by the flight crew.

FAA Part 107 Waiver / Authorization. The FAA will issue waivers/authorizations for operation outside of Part 107 regulations if an applicant demonstrates that he/she can fly safely under the waiver without endangering people or property on the ground or in the air.

First Person View (FPV). A method used to control a radio-controlled aircraft from the pilot's viewpoint via an onboard camera, fed wirelessly to video goggles or a video monitor.

MSP UAS: Massachusetts State Police Uncrewed Aircraft Section - this unit within the Incident Management Assistance Team (IMAT) is tasked with oversight of all UAS related matters within the MSP.

NAS: FAA term for National Airspace System within the United States

Night / Nighttime: The time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time.

Nonparticipant: Any person not associated with the UA flight mission, including the public, spectators and media.

Uncrewed Aircraft System / Vehicle (UAS/UAV/UA): An aircraft without a human pilot on board. Its flight is controlled either autonomously by computers in the vehicle or under the remote control of a pilot on the ground or in another vehicle.

3.0 Protection of Privacy, Civil Rights and Civil Liberties

The MSP UAS team understands concerns exist that UAS may be misused or abused, particularly by law enforcement agencies. MSP UAS operators, observers, and support staff shall ensure the protection of individuals' civil rights, civil liberties and privacy in any UAS deployment. To accomplish this goal:

I. MSP UAS shall make reasonable efforts to ensure that its privacy policies relative to UAS are periodically updated to keep pace with these developments. This will be accomplished by annually examining existing UAS policies and procedures relating to the collection, use, retention, and dissemination of information obtained by UAS, to ensure that privacy, civil rights, and civil liberties are protected. MSP UAS will update policies and procedures, or issue new policies and procedures, as necessary.

II. A Department UAS shall not be intentionally used for viewing, recording or transmitting images and/or video in a criminal investigation at any location or property where a person has a reasonable expectation of privacy unless:

a. A warrant or court order has been approved for the search of the property;
b. Consent by the owner or person responsible for the property is obtained; or
c. Exigent circumstances exist, including but not limited to search and rescue missions, tactical missions, crash scenes, crime scenes, fire scenes, hazmat scenes and natural disasters.

III. Prohibited Uses: Department UAS shall not be used for the following:
a. To target a person based solely on individual characteristics, such as, but not limited to race, ethnicity, national origin, religion, disability, gender or sexual orientation;
b. To harass, intimidate or discriminate against any individual or group; and/or
c. For the collection, use, retention, or dissemination of data in any manner that would violate the First Amendment or in any manner that would discriminate against persons based upon their ethnicity, race, gender, national origin, religion, sexual orientation, or gender identity, in violation of law.

IV. This SOP requires that all MSP personnel operating Department UAS shall be knowledgeable about individual privacy rights, civil rights, civil liberties and ensure UAS activities are performed in a manner consistent with the Constitution and applicable laws, Executive Orders, and other Presidential directives. This topic is addressed in the training section of this SOP.

V. Non-law enforcement agencies or other regulatory agencies shall not be requested to fly missions on behalf of law enforcement or any regulatory agency in order to circumvent any search warrant requirements.

VI. This SOP ensures that adequate procedures are in place to receive, investigate, and address, as appropriate, privacy, civil rights, and civil liberties complaints by filing a Citizen Response Report to MSP Division of Standards & Training:

https://www.mass.gov/files/2017-07/citizen-response-report.pdf

1) email to: **citizensresponsereports@pol.state.ma.us**
2) fax to: 508-820-2149
3) Mail or deliver in person to:
   Massachusetts State Police
   General Headquarters
   470 Worcester Road
   Framingham, MA 01702

3.1 UAS Data Collection, Use and Retention:

I. UAS-recorded data shall not be collected, disseminated or retained solely for the purpose of monitoring activities protected by the U.S. Constitution, such as the First Amendment's protections of religion, speech, press, assembly, and redress of grievances (e.g., protests, demonstrations).

II. Collection, use, dissemination, or retention of UAS-recorded data shall not be based solely on individual characteristics (e.g., race, ethnicity, national origin, sexual orientation, gender identity, religion, age, or gender), which is a violation of the law.

III. All UAS users shall adopt a posture of minimal data collection, limited to only that data, including images or video recordings, which are essential to complete the objective of the UAS mission.

IV. All personnel operating a Department UAS shall take every reasonable precaution to avoid inadvertently recording or transmitting images of individuals and properties unrelated to the mission. To the maximum extent possible, onboard cameras shall be directed toward the area of interest and away from uninvolved individuals or properties to minimize such inadvertent recording or transmission of images.

V. Unless required by an articulable operational purpose, the recording of data imagery shall not begin until the UAS has arrived at the location designated for the mission.

VI. UAS live feed only transmit capability will be the normal, preferred UAS use by the Pilot in Command or on-scene commander. Live streaming feeds use an encrypted data link. The UAS camera recording capability may be used during an operation if essential with a summary of photos and/or videos taken listed in a post-incident report.

VII. Pictures and video may be stored onboard the UAS. Any video transmission from the UAS to the remote control uses an encrypted data link. The video is viewable by the operator of the UAS utilizing a monitor at the ground control station.

VIII. MSP UAS will employ reasonable technological or administrative safeguards to ensure that images incidentally or inadvertently recorded are not misused, disseminated or viewed unnecessarily to protect individual rights.

IX. The UAS training program shall include topics on the protection of individuals' privacy, civil rights, and civil liberties, FOIA, and data dissemination, storage, retention, and security requirements.

X. The users of UAS recorded data are responsible for ensuring dissemination of data is authorized and is consistent with the recipients' legitimate need to know and authority to receive such data.

XI. Any collected data will not be indexed or otherwise arranged to be searchable by an individual's name, personal number or other identifiers.

XII. The MSP UAS program will not be paired with facial recognition technology to identify individuals in real-time.

XIII. Photo or Video data collected using UAS that contains PII (personal identifiable information), specific to mission related information, shall not be retained for more than 120 days unless retention of the information is determined to be necessary to an authorized mission of the retaining agency or is required to be retained for a longer period by any other applicable law or regulation.

XIV. UAS-collected information shall not be disseminated outside of the agency unless dissemination is required by law or fulfills an authorized purpose and complies with agency requirements.

3.2 Accountability. To provide for effective oversight, this SOP requires:

I. The UAS Program Manager shall review all MSP UAS flight logs on a quarterly basis to ensure compliance with all applicable policies, laws and to ensure the protection of individuals' civil rights, civil liberties and privacy in all UAS deployments.

II. The UAS Program Manager shall ensure that after every UAS deployment a report is completed summarizing a detailed flight log of the date / time/ location, reason for the mission, requesting unit or agency, type of UAS used, search warrant information and/or exigent circumstances surrounding mission, whether any data (photos or videos) were captured on the UAS, the specific person and agency to whom the data was given to and final disposition of any collected data (deleted - no evidentiary value, uploaded into a stored case report file in ACISS, etc).

III. The UAS Program Manager shall complete an annual report of all UAS activity and submit it to the Division Commander of DHS. This data is submitted to the Commonwealth of Massachusetts Executive Office of Public Safety and Security (EOPSS) and is available to the public.

3.3 Transparency. To promote transparency about MSP UAS activities:

I. The MSP UAS has been in operation since November 2016. The MSP held a demonstration day on 12/2/2016 with all interested media outlets to show the capabilities of UAS in public safety[1].

II. The MSP UAS submits an annual report of all UAS operations to the Massachusetts Executive Office of Public Safety and Security (EOPSS) that includes a general summary of the agency's UAS operations during the previous fiscal year, to include a brief description of types or categories of missions flown, and the number of times the agency provided assistance to other agencies, or to State, local, tribal, or territorial governments.

[1] https://www.youtube.com/watch?v=SMyBOHtnm7I Example video of news report

III. FOIA requests for UAS data, including but not limited to images, video, policy, pilot and maintenance logs or other program materials will be treated as a public records request. FOIA requests can be requested by:

1) email:https://www.mass.gov/forms/request-public-records-online-from-the-massachusetts-state-police
2) phone: Records Access Officer at (508) 820-2300.
3) mail: Massachusetts State Police attn: Primary RAO
470 Worcester Road
Framingham, MA 01702

4.0 Organization, Restrictions, Roles & Responsibilities:

4.1 Overview

UAS flight crews consist of certified FAA 107 Remote Pilots, Visual Observers, and other crew members who assist in the safe operation and maintenance of the UAS services. All operations will follow FAA part 107 guidelines, waivers and or a certificate of operations

4.2 Restrictions

As per Federal Aviation Administration Regulation (FAR) 91.17 - No person may serve as a RPIC, person manipulating the controls, VO or other crew member if he or she:
a. Consumed any alcoholic beverage within the preceding 8 hours;
b. Has a blood alcohol concentration of 0.04 percent or greater; and/or
d. Is using a drug, whether prescription, over-the-counter, recreational, or illegal that affects the person's ability to safely operate the aircraft and/or participate in the UAS operational mission.

It is the responsibility of the RPIC, person manipulating the controls, VO, or other crew member to determine whether he/she is unable to participate in a UAS operation.

4.3 Unit Commander

The Unit Commander is the accountable executive for the Uncrewed Aircraft Systems Standard Operating Procedure (UAS-SOP) Manual, and responsible for notifying the DHS Commander or designee of any amendments to this manual.

4.4 UAS Program Manager

The UAS Program Manager shall:

- Report directly to the Unit Commander or his designee;
- Ensure a state of operational readiness for the UAS program;
- Assist with the selection of the UAS personnel;
- Establish operational procedures within the UAS program;
- Attend UAS operations as needed and provide support;
- Monitor / assess all aspects of the UAS program;
- Develop instruction and evaluation criteria for all UAS RPICs;
- Ensure that the UAS personnel are provided relevant and current UAS- related training information to maintain the UAS operation in compliance with Part 107 regulations and/or any FAA COA;
- Regularly review policies and procedures of the UAS program;
- Apply for, review & maintain FAA COA's, waivers, authorizations and reporting;
- Apply for & maintain DJI QEP list of unlocked MSP UAS;
- Remove MSP UAS from QEP prior to sale, disposal or transfer to another agency;
- Liaise with municipal, state and federal partners on UAS program development;
- Establish, maintain and annually review MSP UAS Standard Operating Procedures;
- Review all MSP UAS flight logs on a quarterly basis to ensure compliance with all applicable FAA laws and to ensure the protection of individuals' civil rights, civil liberties and privacy in any UAS deployment;
- Prepare budget submissions / program audits / grant management & reporting;
- Assess / monitor performance management of UAS RPICs.

4.5 UAS RPIC – Remote Pilot in Command (RPIC)

The RPIC is the member who has final authority and responsibility for the operation and safety of flight, has been designated as RPIC before or during the flight, and holds the appropriate category, class, and type rating, if appropriate, for the conduct of the flight.

- Holds FAA Part 107 Remote Pilot Certificate;
- Maintains a state of operational readiness and complete all mandatory UAS training standards, and maintain personal fitness to adhere to the FAA guidelines;
- Maintains maintenance logs of assigned UAS equipment;
- Ensures methods / tactics utilized conform to approved policy and SOP's;
- Pilots and pilot trainees shall maintain personal flight logs or a digital recording of all UAS flight time, regardless of purpose;
- Upon request, RPICs shall produce their logs for inspection to the UAS Program Manager or FAA representatives. RPIC logs shall be retained indefinitely by the individual or within a digital platform stored at a secure location.

4.6 UAS Visual Observer (VO)

The Visual Observer is the individual trained to maintain the line-of-sight and 360-degree hazard awareness around the UAS always and assist the RPIC in carrying out all duties required for the safe operation of the UAS.

The RPIC and Visual Observer will communicate via the following methods in order of preference:

a) Direct voice within close proximity
b) Via Department radio on frequency assigned at start of mission
c) If handheld radio communication is lost, then cell phone contact will be used as a backup communication.

- All MSP UAS RPICs operating under a Certificate of Authorization or Part 107 Waiver / Authorization shall utilize a Visual Observer when specified under the terms of the waiver/authorization/COA/SGI;
- MSP UAS RPICs shall brief the Visual Observer and provide the specifics of the operation to be undertaken;
- All Visual Observers will receive specific instructions from the RPIC prior to flight operations;
- In exigent circumstances the RPIC can provide UAS Familiarization training on scene to any qualified person present or can start a mission without a Visual Observer if not restricted by waiver or COA requirements;
- UAS Visual Observer Familiarization to including the following topics:
    i. See and Avoid / Sense and Avoid responsibilities i.e.: other aircraft, manned or Uncrewed, objects, hazards, or persons in the area of operation that may pose a risk to safe operations UAS systems in use and limitations;
    ii. Limitations of UAS including weather, wind etc.;
    iii. Approach and departure routes to be taken by the UAS to and from the operating area;
    iv. Explain need for compliance with VLOS, weather minimums and other conditions for operations consistent with the COA, SGI, waiver, authorization or applicable Part 107 Regulation;
    v. Class of Airspace the operation is taking place in and the restrictions therein;
    vi. Means of communications;
    vii. Review of the Emergency Contingency Plan including emergency telephone numbers in the event of unintentional flight into controlled airspace;
    viii. How to initiate the RTH function on the control station.

- Visual Observers are only responsible for the observation of one UAS at a time;
- In areas of extended operational areas, the use of multiple Visual Observers can be utilized if the appropriate waiver / authorization exists to maintain VLOS if communications can be maintained between RPIC and VO;
- Visual Observers shall immediately advise the UAS RPIC of any other aircraft in the vicinity of operations by clearly advising its location and proximity and direction of travel to assist the UAS RPIC in giving way to manned aircraft.

4.7 Selection criteria of Remote Pilots

To be eligible for this role, the member must successfully complete the UAS RPIC Training Program.

Qualifications:

MINIMUM REQUIREMENTS:

- Officers must possess or be willing to obtain and successfully pass FAA Part 107 Remote Pilot certificate;
- Officers must successfully travel to and complete the required manufacturer training program(s) as required;
- Officers must successfully complete the required UAS field training;
- Highly motivated and willing to accept case assignments on a recall basis;
- Willingness to be on call;
- Excellent communication and report writing skills;
- Excellent investigative and organizational skills;
- Willingness to attend training courses as deemed necessary;
- Experience with UAS operation preferred;
- Knowledge of technical/operational skills with audio/camera/video equipment as well as computers and image processing software preferred;
- Commitment for four (4) years to the Section with a willingness to withdraw from the Section at the request of the Section Commander;
- Ability to work cooperatively with MSP specialty units, local law enforcement agencies as well as other state and federal agencies;

5.0 Training: The MSP UAS Training Program consists of three stages.

5.1 Stage One training consists of ground school that will be used to help prepare all new program crew to take the FAA Part 107 exam. Training will include topics in meteorology, flight standards, aeronautical chart interpretation, communications and flight safety. Additional topics covered in Stage One:

- FAA knowledge and evaluation;
- Review & Understanding of:
  - SOP's for UAS deployments;
  - Protection of individuals' privacy, civil rights, and civil liberties.
  - Review the Presidential Memorandum: Promoting Economic Competitiveness While Safeguarding Privacy, Civil Rights, and Civil Liberties in Domestic Use of Uncrewed Aircraft Systems [2];
  - FOIA requests;
  - Data dissemination, storage, retention, and security requirements.

[2] https://obamawhitehouse.archives.gov/the-press-office/2015/02/15/presidential-memorandum-promoting-economic-competitiveness-while-safegua

5.2 Stage Two is flight school. During this training, each pilot and observer will be exposed to the basics of flight characteristics for the aircraft, maintenance procedures, safety and hands on flying the aircraft. The candidate's evaluation is progressive and culminates with knowledge based and practical scenarios near the end of the course. Each scenario must be completed successfully. The UAS instructor will test and certify that the Pilot-In-Training has met all the training requirements and report the same to the UAS Program manager prior to flying an actual mission. Additional topics covered in Stage Two:

- Review & Understanding of:
  - SOP's for UAS deployments;
  - Specific UAS platform checklists;
  - Specific UAS platform operator's manual & processing software;
  - UAS flight controls;
  - UAS pre/post flight planning;
  - Emergency procedures;
  - Communication procedures;

5.3 Stage Three is recurrent flight training. To maintain both the skills and qualification as a pilot each crew member must fly a minimum of three qualifying events in the preceding 90 days. A qualifying event can be either a live mission or training session. Each crew member must also maintain a current Remote Pilot Certificate issued by the FAA with a small UAS rating to retain pilot qualifications in the UAS program. At the end of the mission or training the RPIC will document the date, time, location, reason for flight, UAS used, RPIC MSP ID #, case number (if applicable) and approximate minutes flown by accessing & completing the online documentation link provided by the UAS program manager or designee.

5.4 Failure to Meet Monthly Proficiency

If a RPIC fails to meet the monthly required flight time, he/she will be deemed non-operational until his/her proficiency can be displayed to another qualified UAS RPIC and this proficiency has been reported to the UAS Program Manager or designee.

5.5 Training Records:

Training records shall be maintained by the UAS Program Manager and shall include:

- The candidate's name;
- Date of initial RPIC training and location;
- Successful completion date of initial training;
- Dates of recurrent training;
- Record of any failures to complete training or to obtain the required training standard;
- Any Pilot that does not maintain proficiency will not be operational until designated by the UAS Program Manager or designee

6.0 Aircraft Airworthiness and Maintenance

6.1 Airworthiness Certification

Each member is responsible for determining that the Uncrewed aircraft is airworthy by completing pre and post flight inspections. Any defective aircraft or parts will be clearly labeled as "out of service" (OOS) and sent back to the manufacturer for repair or replacement.

6.2 Maintenance

- The UAS RPIC is required to be familiar with the UAS operations manual of the UAS Unit he/she is operating.
- Software changes to the aircraft and control station as well as hardware system changes are classified as a part of the normal maintenance procedures.
- Each aircraft that has a change in software or hardware configuration must be test flown to confirm the airworthiness of the UAS prior to being deployed on a mission.
- Charging of the UAS batteries will be done in accordance with the appropriate manufacturer guidelines.
- Physical inspections of the battery and battery health and shall be checked regularly using the appropriate manufacturer or aftermarket application (Aeryon Live, DJI, etc). Battery degradation shall be reported to the UAS program manager as soon as practicable.
- A fire extinguisher shall be present at all times during flight operations and battery charging stations.
- The UAS kit will be inspected to ensure that the appropriate spare equipment is available to maintain operational readiness in the event of minor damage to the system.
- Most UAS are relatively maintenance free. The UAS RPIC will not be tasked with performing maintenance on the components of the UAS. Should an item be damaged or defective it is to be returned to the manufacturer for repair or replacement shall be procured.

6.3 Payload Restrictions

Any payload attached to a UAS that was not designed by the aircraft manufacturer must be approved for use by the UAS Program Manager and must be shown not to adversely affect the flight characteristics or controllability of the aircraft.

No UAS may carry hazardous materials.
No UAS may carry weapons.

6.4 Storage

Department members are responsible for storage of their UAS in accordance with manufacturer recommendations.

Unattended storage in a vehicle during extreme temperatures is to be avoided.

6.5 End of life procedure

Prior to sale, trade-in, disposal or transfer to another agency:

- Remove / delete / format all means of data retention or SD cards on the UAS;
- Remove the serial number from the list of unlocked UAS in the DJI QEP.

7.0 Callout Procedures & Mission approval criteria

7.1 UAS Section requests:

Mission requests are initiated by contacting the appropriate Troop Duty Officer or GHQ at 508-820-2121. The request is then forwarded to the UAS Program Manager or designee for mission suitability, evaluation and assignment.

Requests are then forwarded to the on duty / on call UAS personnel. The UAS personnel will use the mission approval criteria and pre-flight mission checklist (included at the end of this manual) as a guide to determine what resources are needed for the mission.

7.2 Mission Approval Criteria:

The UAS Program Manager or designee will make the determination as to the approval of the mission request. Important approval decision factors include, but are not limited to:

- Is the mission request justified and necessary?
- Is the mission request within the capabilities of the equipment, program and personnel?
- Does the mission fall within federal, state, and local laws, regulations, and policies?
- Can the UAS be deployed safely based on current and forecast weather conditions?
- Can the UAS be deployed in the operational environment without unduly risking the personal privacy of individuals or groups of individuals?
- Are there sufficiently trained and qualified personnel available to safely operate the UAS?
- If the UAS deployment requires a search warrant, has one been requested and approved?
- Is there enough information available to make the decision or will a follow up call need to be made to the requestor?
- Determine proximity of critical infrastructure or restricted airspace.

Whether a mission is accepted or not, notifications are to be made to the UAS OIC, program manager or designee.

7.2 CARS Section callout requests:

CARS Section (Collision Analysis & Reconstruction) UAS operations are to follow callout guidelines set by the CARS Commanding Officer and Qualified Team Leaders.

Designated CARS team leaders & RPIC will liaise with the UAS Program Manager for purposes of COA, SGI, Waiver, Authorization reporting requirements, training and any other matters pertaining to UAS operations & technologies.

7.3 STOP Team callout requests:

STOP team UAS operations are to follow callout guidelines set by the STOP Team Commanding Officer and Qualified Team Leaders.

Designated STOP team leaders & RPIC will liaise with the UAS Program Manager for purposes of COA, SGI, Waiver, Authorizations reporting requirements, training and any other matters pertaining to UAS operations & technologies.

7.4 All sections / units operating Department UAS shall review & understand

The UAS RPIC shall have final authority in determining if the flight is feasible based on:

- The terms and conditions of the current regulations, airspace restrictions, FAA COA / SGI / Waivers / Authorizations, etc.;
- Weather conditions (icing, wind, visibility, etc.);
- Proficiency within current environmental conditions;
- Specific platform ability to safely & effectively complete required mission;
- Individual skill and ability;
- Legal search authority where applicable;
- Privacy of persons and/or property not directly involved in the operation.

8.0 Flight Operations

Regardless of what model UAS is used the following guidelines are to be used:

8.1 Site Survey

- Boundaries of the operation – define and brief;
- Weather conditions – adequate for platform being used and record same;
- Airspace – check type, check for TFR's & NOTAMS, select altitudes and route of flight - note airspace and/or waiver/authorization restrictions/instructions;
- Apply for SGI when needed for operations outside Part 107 regulations, existing waivers / authorizations and/or COA restrictions;

- In controlled airspace, the RPIC will follow the conditions set by Part 107 regulations / COA / SGI / Waiver / Authorization prior to the start of UAS operations;
- Aircraft in Vicinity – note, brief, monitor appropriate frequency;
- Monitor MSP "State" Channel for MSP manned aviation awareness
- Hazards, Obstacles, RFI (Radio Frequency Interference sources) noted and briefed;
- Height of nearby obstacles – noted, briefed and factored into minimum safe altitude (MSA) / return to home (RTH) functions;
- A safe area of UAS operations is set by a Radius Limit, Flight Perimeter or No Fly Zone within the controller of the UAS;
- Security – prohibit public access to area of UAS flight;
- Review emergency procedures and have immediately available the appropriate phone numbers for the appropriate TRACON, nearest towered airport and appropriate CTAF frequencies tuned to handheld aviation radios (if equipped).

All flight operations will be performed within the conditions outlined by FAA Part 107 regulations and/or within the current COA / SGI / 107 Waivers / Authorizations.

Aircraft-specific checklists will be utilized before, during and after mission to insure uniform safe operations for all MSP UAS systems.

At the end of all flight operations the RPIC will document the date, time, location, reason for flight, UAS used, RPIC MSP ID #, case number (if applicable) and approximate minutes flown by accessing & completing the online documentation link provided by the UAS program manager.

9.0 Emergency Procedures

All RPICs are required to know the operating and emergency procedures specified in the UAS's operator manual and checklists provided during training.

9.1 Fatal Mechanical

All UAS systems utilized by the MSP are of the Vertical Take-Off/Landing (VTOL) type. In the event of a fatal malfunction while airborne (power plant failure, control surface/prop failure, compromised airframe), the UAS will fall directly down from the UAS's last position of control. The UAS's used by the MSP have no glide ratio in the event of a loss of power. Whatever lateral movement they may engage in during a rapid descent/crash will depend on their airspeed at the time of the fatal malfunction, or whatever residual action still functioning propellers may have on the UAS during the crash. MSP UAS pilots are trained to recognize this characteristic of rotary-wing based UAS's, and as such, are to avoid operating the UAS directly above persons not involved in the operation.

9.2 Non-Fatal Mechanical Malfunction

In the event of a non-fatal mechanical malfunction (chipped propeller blade, malfunctioning gyro sensor, unexpected power loss), the UAS may remain airborne, however it may exhibit uncontrolled attitude/altitude changes that threaten to compromise its safe operation. MSP UAS pilots are trained to recognize unusual flight behavior and, after an assessment of the UAS's performance, terminate the operation and initiate an emergency landing.

9.3 Control Station / Remote Control Loss-of-Link

Communication outages are detected by the system and are reported to the pilot. During the communication outage the UAS will hover in place. Outages exceeding a pre-set threshold will result in the UAS gaining altitude to the RPIC preset Minimum Safe Altitude (MSA) and a Return to Home (RTH) / Non-Fatal Conditional Response (NFCR) will be initiated

There are three settings for the UAS RTH / NFCR that may be pre-set by the RPIC prior to flight:

a. Hover in place;
b. Flying to the "Home" position (the take-off point) and landing ("home and land");
c. Returning to the home position and hovering in place ("home and hover" until battery level triggers a landing response). NFCR will initiate and the UAS will land.

9.4 Fly-Away Due to Loss of Control

The possibility of total loss of control of the UAS is mitigated to the maximum possible extent using a series of safety measures which respond appropriately to increasingly critical situations.

a. Loss of communication triggers a RTH / NFCR after 5 seconds, and the UAS will return to its home position and land or return to its home position and hover until the batteries require landing (depending on how the user has it configured).

b. If there is a GPS failure, a Fatal Condition Response (FCR) will be triggered and the UAS will land at its current position (Aeryon) or the RPIC can manually fly the UAS in 'Atti' mode and land (DJI).

c. In the event of a fly-away while in controlled airspace immediate notification will be made to the appropriate TRACON, nearby airport towers by phone and manned aircraft in the area via the appropriate frequency or CTAF and advise of the last known direction, speed, altitude and remaining battery indicated flight time remaining when the control loss occurred.

d. The RPIC and Visual Observer will continue to monitor the UAS in flight to and maintain efforts to regain control when possible.

e. The RPIC will advise the appropriate TRACON, nearby airport towers by phone and manned aircraft in the area via the appropriate frequency or CTAF upon recovering the data link or locating the UAS.

f. The RPIC can use the Automatic Emergency Landing System procedure, Motor Stop or CSC (combined stick command) resulting in a free-fall condition as a last resort.

9.5 Loss of Visual Sight of UAS

If the RPIC and Visual Observer lose visual sight of the UAS the RPIC will maneuver the UAS back towards home to re-establish VLOS of the UAS.

If not re-established quickly he/she will:

a. Cause the UAS to enter the RTH / NFCR that will cause it to rise to the MSA and return to the Home position (Take-off location).
b. The Command Station or Remote position can be referenced to assist in orienting the RPIC and Visual Observer to the position of the UAS within the Operation Area.

9.6 Potential Conflict with Other Aircraft

It is the responsibility of the RPIC and/or the VO to continuously scan the operational airspace. Should an aircraft appear that may pose a conflict, the RPIC will immediately lower the altitude of the aircraft and/or land until safe to resume flight.

9.7 RPIC Incapacitation

The UAS utilized by the MSP have pre-set battery margins. These pre-set battery limitations allow the RPIC to be able to pre-set minimum battery levels during the pre-flight procedure. Should the UAS remain at altitude due to pilot incapacitation, once the battery margins have been reached, an automatic “Go Home” procedure would trigger, sending the UAS back to its original takeoff location. If the UAS is not able to fly to its home position, it will enter a controlled descent from its current location.

10.0 Incident/Accident/Mishap Reporting

10.1 FAA Reporting Criteria

All accidents/mishaps involving UAS operations, where any of the following occur, shall be reported to the FAA:

a. Fatal injury, where the operations of a UAS results in a death occurring within 30 days of the accident/mishap;

b. Serious injury, where the operation of a UAS results in a hospitalization, the fracture of any bone (except for simple fractures of fingers, toes, or nose), severe hemorrhage or tissue damage, internal injuries, or second or third-degree burns;

c. Damage to property over $500, other than the Uncrewed aircraft.

All Part 107 incidents or accidents are required to be reported to the FAA within 10 days via the following website: https://faadronezone.faa.gov/#/gateway/accident-reporting

10.2 MSP Reporting criteria

In the event of a crash/incident involving fatalities, injuries, property damage, damage to the UAS or UAS fly-away, the RPIC shall:

a) Report the crash/incident immediately to the appropriate Unit Commander and UAS Program Manager or designee;
b) When applicable, the UAS Program Manager will notify the FAA in compliance with 14 CFR 107;
c) Complete and submit an incident report to the UAS Program Manager and appropriate Unit Commander.

The UAS Program Manager shall:

a) Review all documentation and reports;
b) Complete a summary report with conclusions and recommendations; and
c) Forward all documentation through channels to the Colonel/Superintendent.

11.0 Safety Management System

- Within the SMS, a hazard is any situation or procedure that could eventually lead to a loss of or degradation to UAS resources (i.e. damage or injury). Essentially, a hazard is a situation that has potential to cause an incident, if left unchecked. The earlier a hazard is recognized and reported, the earlier preventative measures can be implemented or in some cases re-education can take place.

- All members are encouraged to report any hazards so that UAS Services are provided with the highest level of safety. To ensure a timely and uninhibited flow of information to occur, this SOP will abide by the following policy:
  - Immunity – no disciplinary action, or reprisal, will be taken against any member who reports a hazard or incident that affects safety;
  - Confidentiality – the identity, or information revealing the identity, of any member who reports a hazard or incident, will not be disclosed unless agreed to by the member, or required by law;
  - This policy applies to all persons involved directly or indirectly with the sUAS operations but does not provide any protection when the actions are:
    - Unlawful acts or intent;
    - Regulatory infractions; or
    - Willful or gross negligence

12.0 References & Links:

MSP P&P - ADM-14, TOP-07A

MSP FAA UAS Resources www.faa.gov/uas

Presidential Memorandum on Privacy https://obamawhitehouse.archives.gov/the-press-office/2015/02/15/presidential-memorandum-promoting-economic-competitiveness-while-safegua

Best practices for Protecting Privacy
https://www.dhs.gov/sites/default/files/publications/UAS%20Best%20Practices.pdf

SkyVector Aeronautical Charts/Mapping: https://skyvector.com/

FAA UAS Facility Maps:
https://faa.maps.arcgis.com/apps/webappviewer/index.html?id=9c2e4406710048e19806ebf6a06754ad